agency probe into the 20

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Animal Science Refresher

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Section-I Previous Year Question Papers



UPPSC Veterinary Medical Officer Exam Paper-2022

1. **Metabolical active form of vitamin D is**
   (1) 1, 25-dihydroxycholecalciferol (2) Ergocalciferol
   (3) 25-hydroxycolicalciferol (4) Colicalciferol
2. **Dry matter intake of dairy animals should be**
   (1) 1% of body weight per day
   (2) 0.5 % of body weight per day
   (3) 4% of body weight per day
   (4) 10% of body weight per day
3. **Artificial insemination (AI) of cattle in India, was first time attempted at.....and in the year.....**
   (1) Dairy farm, Mysore, 1939 (2) IVRI, Izatnagar, 1932
   (3) NDRI, Karnal, 1945 (4) None of the above
4. **Hinny is a cross of**
   (1) Jennet x Stallion (2) Jack x Mare
   (3) Mithun x Cow (4) Jennet x Zebra
5. **Match the column**

List-I (In chicken)	**List-II (pH value)**
A. Saliva	1. 6.7 – 6.9
B. Mucus of crop	2. 4.7 – 4.9
C. Gizzard content	3. 2.0 – 3.6
D. Gastric juice	4. 4.0 – 4.4

Code:

	A	**B**	**C**	**D**
(1)	1	2	4	3
(2)	2	1	3	4
(3)	1	4	3	2
(4)	1	2	3	4

6. **Match the column**

List-I (Classification of zoonosis)	**List-II (Disease)**
A. Non-obligatory cyclozoonosis	1. Salmonellosis
B. Saproanthrapozonosis	2. Tuberculosis
C. Zooanthroponosis	3. Hydatidosis
D. Amphixenosis	4. Ancylostomiasis

Code:

	A	**B**	**C**	**D**
(1)	2	1	4	3
(2)	1	3	2	4
(3)	3	4	2	1
(4)	4	2	3	1

7. **The most hygienic and efficient method of milking buffalo is**
   (1) Stripping (2) Dry full hand
   (3) Wet full hand (4) Knuckling

8. **Match the column**

List-I(Disease)	List-II(Type of vaccine use)
A. Marek's disease	1. Live virus vaccine
B. Avian spirochaetosis	2. Herpes virus of Turkeys
C. Fowl pox	3. Mukteswar strain
D. New castle disease	4. Formalized vaccine

Code:

	A	B	C	D
(1)	3	2	4	1
(2)	2	4	1	3
(3)	4	3	2	1
(4)	3	4	2	1

9. **Which of the following is eliminated (80%) by biliary excretion ?**
(1) Cephapirin (2) Cefuroxime
(3) Cefoxitin (4) Cefoperazone

10. **The "Frontline Demonstration" (FLD) is a concept of field demonstration evolved by**
(1) NDDB (2) ICAR
(3) IARI (4) IVRI

11. **Which of the following are applied on the vulva to retain the prolapsed vagina**
(1) Lambert sutures (2) Halsted sutures
(3) Lock stitch sutures (4) Modified quill sutures

12. **Drug used in treatment of Schistosomiasis disease in animals is**
(1) Triclobendazole (2) Ivermectin
(3) Niclosamide (4) Praziquantel

13. **Hog cholera is a disease caused by**
(1) Filterable virus (2) Clostridium chauvoei
(3) Haemonchus controtus (4) None of the above

14. **Common extender used for frozen seamen is**
(1) Tris buffer diluent (2) Illini variable temperature diluent
(3) Sodium citrate dilutor (4) Coconut milk based dilutor

15. **In which animal seirrhous cord is seen as complication of castration**
(1) Dog (2) Sheep
(3) Goat (4) Horse

16. **A cow suffering with milk fever having body temperature**
(1) 98 ^{0}F (2) 102 ^{0}F
(3) 104 ^{0}F (4) 106 ^{0}F

17. **Oxytocin is the secretion of**
(1) Anterior pituitary (2) Posterior pituitary
(3) Intermediate lobe of pituitary (4) None of the above

18. **Match the column**

List-I	List-II
A. Father of Anatomy	1. Renatus Vegetius
B. Father of Veterinary Medicine	2. Edward Jenner
C. Father of Histology	3. Claudius Galen
D. Father of Immunology	4. Marie Francois Xavier Bichat

Code:

	A	B	C	D
(1)	1	3	2	4
(2)	3	1	4	2
(3)	4	2	1	3
(4)	2	4	3	1

19. Which of the following is at the top of Edgar Dale's cone of experience

(1) Exhibition (2) Field trips
(3) Visual symbols (4) Verbal symbols

20. Which species is the most efficient "Amplifier" host of Japanese encephalitis

(1) Monkey (2) Cattle
(3) Pig (4) Sheep

21. Depreciation of pucca cattle shed per year should be

(1) 1 percent (2) 2 percent
(3) 3 percent (4) 4 percent

22. Flieg index is commonly used method for evaluation of

(1) Haylage (2) Wastelage
(3) Silage (4) Brown hay

23. According to the Prevention of Food Adulteration (PFA) rules 1976, the standards for different classes of milk in UP, which is the following is correctly matched

Class of milk	Minimum % Fat	Minimum % SNF
(1) Pasteruized buffalo milk	7	9
(2) Raw cow milk	4	8.5
(3) Toned milk	3	9
(4) Standardized milk	4.5	8.5

24. Match the column

Breeds	Home Tract
(a) Muzzafarnagri	(1) West Bengal
(b) Chottnagpuri	(2) UP & MP
(c) Jalauni	(3) UP & Uttrakhand
(d) Garole	(4) Jharkhand

Code:

	A	B	C	D
(1)	1	2	4	3
(2)	2	1	3	4
(3)	4	3	1	2
(4)	3	4	2	1

25. Which of the following is not correctly matched

Column –A	Column –B
(1) Elephant foot	Camel
(2) Laminitis	Slipper Foot
(3) Corkscrew Claw	Inherited defect
(4) Beak Claw	Curable

26. In which animal, Aschheim Zondek test is used for diagnosis of pregnancy

(1) Cow (2) Mare
(3) Buffalo (4) Goat

27. **Match the column**

Antihelmintic	**Most Effective Against**
(A) Dicestol	(1) Tapeworm
(B) Carbon Tetra Chloride	(2) Ascarids
(C) Thiabendazole	(3) Liverfluke
(D) Piperazine salt	(4) Strongylus

Code:

	A	**B**	**C**	**D**
(1)	1	3	4	2
(2)	1	3	2	4
(3)	1	2	3	4
(4)	1	4	3	2

28. **Bestiality is punishable under which section of IPC**
(1) Section 93 (2) Section 377
(3) Section 415 (4) Section 429

29. **Poultry disease- Infectious coryza is caused by**
(1) Haemophilus gallinarum (2) Aspergillus flavous
(3) Mycoplasma gallisepticum (4) None of the above

30. **Mating of unrelated individuals within the same pure breed is called as**
(1) In breeding (2) Out breeding
(3) Out crossing (4) Cross breeding

31. **In dairy cattle the time taken for complete uterine involution is**
(1) 4- 10 days postpartum (2) 10-20 days postpartum
(3) 26-52 days postpartum (4) None of the above

32. **Following organs/tissue simple should be send to laboratory in suspected copper poisoning**
(1) Kidney (2) Brain
(3) Liver (4) Stomach content

33. **Placenta is considered retained in cattle if it is not expelled within**
(1) 7-8 hours after parturition (2) 1-4hours after parturition
(3) 24hours after parturition (4) 8-12hours after parturition

34. **How much layer ration is required to produce one kg eggs**
(1) 1kg (2) 2kg
(3) 3kg (4) 4kg

35. **Bacterial count (SPC per ml) of good quality raw milk should be**
(1) Not exceeding 2 lakhs (2) Between 2-10 lakhs
(3) Between 10-50 lakhs (4) Above 50 lakhs

36. **The commonest venue of infection is through**
(1) Respiratory tract (2) Urogenital tract
(3) Alimentary tract (4) Congenital tract

37. **"Mali" is a pig bread which has its habitat in**
(1) Gujarat (2) Tripura
(3) Bihar (4) Tamil nadu

38. **Buffalo is**
(1) Monoestrous (2) Dioestrous
(3) Polyestrous (4) None of the above

39. How many times of Vitamin-A is found in colostrum in comparison to milk

(1) 9 (2) 10

(3) 11 (4) 12

40. Match the column

Species	**Larval stage**
(A) Taenia hydatigena	1. Cysticercus ovis
(B) Taenia ovis	2. Coenurus cerebralis
(C) Taenia taeniaformis	3. Cysticercus tenuicolis
(D) Taenia multiceps	4. Cysticercus fasciolaris

Code:

	A	**B**	**C**	**D**
(1)	2	1	3	4
(2)	4	1	2	3
(3)	3	1	4	2
(4)	4	1	3	2

41. The drug of choice for treatment of bovine tropical theileriosis is

(1) Imidocarb (2) Berenil

(3) Buparvaquone (4) 4-hydroxyquinolines

42. In birds, egg yolk is formed in

(1) Uterus (2) Isthmus

(3) Ovary (4) Magnum

43. Length of cervix in cow and buffalo is

(1) 5-20cm (2) 1-5cm

(3) 5-10cm (4) 15-25cm

44. Swollen faces and sticky eyes is the symptom of

(1) Coccidiosis (2) Aspergillosis

(3) Marek's disease (4) Infectious coryza

45. Assertion (A): The infant calves require a high percentage of protein in their ration.
Reason (R): Microbial Protein synthesis is very low in infant calves

(1) Both (A) and (R) are true and (R) is correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not correct explanation of (A)

(3) (A) is true but (R) is false

(4) (A) is false but (R) is true

46. Starting anticonvulsant dose of Phenobarbital in dog is

(1) 2-4mg/kg body weight orally BID (2) 12-14mg/kg body weight orally BID

(3) 0.2-0.4mg/kg body weight orally BID (4) 20-30mg/kg body weight orally BID

47. Which of the following is not correctly matched

Poison	**Antidote**
(1) Arsenic	(A) White of eggs
(2) HCN	(B) Inhalation of amyl nitrate
(3) Organophosphates	(C) Atropine sulphate
(4) Urea	(D) 10% acetic acid

48. Ovulation in buffaloes occurs

(1) Before the end of estrus (2) 13-15 hours after end of estrus

(3) In mid estrus (4) 6 hours after insemination

49. Which method of selection is adopted widely by livestock breeders

(1) Tandom method (2) Independent culling method
(3) Selection index (4) None of these

50. In extension teaching method debate is

(1) Individual contact method (2) Group contact method
(3) Mass contact method (4) None of these

51. Which of the following approach does not help in control of antibiotic resistance

(1) Antimicrobial sensitivity test is necessary to select drug for therapy
(2) Drug combination may overcome the emergence of drug resistance
(3) Drugs should not be used for short period at therapeutic
(4) Isolation of sick animals as preventive measure for spread of resistant bacteria

52. One of the following is a clinically used as an anticoccidial agent

(1) Kanamycin (2) Tobramycin
(3) Salinomycin (4) Streptomycin

53. Chemical is used as preservative in developing solution used in X-ray film processing

(1) Potassium iodide (2) Sodium sulphite
(3) Potassium bromide (4) Hydrogen peroxide

54. From which day of age "Hay" can be given to new born calves

(1) 10^{th} day (2) 15^{th} day
(3) 20^{th} day (4) 1 month

55. Under Rashtriya Gokul Mission, farmer maintaining the best herd of indigenous breeds and practicing best management is awarded with

(1) Kamdhenu Award (2) Gopal Ratna Award
(3) Pashudhan Award (4) Kisan Samman Award

56. Disease which affects even single animal and show no tendency to spread within the herd is

(1) Exotic disease (2) Sporadic disease
(3) Enzootic disease (4) Epizootic disease

57. Most common maternal cause of dystopia in buffalo is

(1) Lateral deviation of head and neck (2) Breech presentation
(3) Torsion of uterus (4) Biological flexion of fetal fore limbs

58. Feed ingredient responsible for yolk coloration in layers diet is

(1) Groundnut cake (2) Linseed meal
(3) Yellow maize grain (4) Vitamin B complex

59. With reference to post mortem examination of Ranikhet disease, which of the following statement(s) is/are correct?

1. Carcasses with systemic involvement are unfit for food.
2. If lesions are localized, only affected parts are condemned, rest are passed for food.

Select the correct answer using the code given below

(1) Only 1 (2) Only 2
(3) Both 1 and 2 (4) Neither 1 nor 2

60. Recording commonly used teat instrument which one of the following is correctly matched

Coloumn –A	**Coloumn -B**
(1) Litchy	(A) Teat knife
(2) Larson's	(B) Teat spiral
(3) Hudsons 's	(C) Teat tube
(4) Hugs	(D) Teat tumor extractor

61. A suitable vaccine for FMD is

(1) B.C.G. vaccine (2) Spore vaccine
(3) Polyvalent tissue culture vaccine (4) None of the above

62. The quarantine period for most of animal diseases is

(1) 8 days (2) 15 days
(3) 20 days (4) 30 days

63. Due to homogenization, area of milk fat increases

(1) 2 times (2) 3 times
(3) 4 times (4) 5 times

64. A feed stuff classified as roughage if it contains

(1) More than 3% EE (2) Less than 16% crude protein
(3) Less than 3% lignin (4) More than 18% crude fiber

65. As per guidelines of DHAD, sperm concentration in stored straw/post thaw progressive mobile sperm in sex sorted semen shell not less than

(1) 2.1 million/1.3 million per straw (2) 2.2million/1.4million per straw
(3) 2.3 million/1.4 million per straw (4) 2.3million/1.3millionper straw

66. What should be the number of motile sperm per straw in cryopreservation

(1) 5-10 million (2) 25-30 million
(3) 10-15 million (4) 20-25 million

67. The first line of defence of livestock against thermal stress is by

(1) Increased respiratory activity (2) Activation of sweating
(3) Making changes in the circulation (4) Making behavioural adjustments

68. The first Embryo Transfer Technology project in the country was initiated by

(1) National Dairy Research Institute
(2) Indian Veterinary Research Institute
(3) National Bureau of Animal Genetic Resources
(4) National Dairy Development Board

69. COFAL test is used for diagnosis in which of the disease

(1) Ranikhet disease (2) Gumboro disease
(3) Avian Leukosis Complex (4) Egg drop syndrome

70. Consider the intramuscular fat (%) and arrange the following in ascending order:

A. Pork B. Beef C. Chevon D. Mutton

Select the correct answer using the code given below

(1) A,B,C and D (2) C,B,A and D
(3) B,C,A and D (4) D,B,C and A

71. Match the column

Species	**Animal**
a. *Babesia caballi*	(1) Pig
b. *Babesia gibsoni*	(2) Sheep
c. *Babesia trautmanni*	(3) Dog
d. *Babesia motasi*	(4) Horse

Code:

	A	**B**	**C**	**D**
(1)	1	3	2	4
(2)	2	3	4	1
(3)	2	3	1	4
(4)	4	3	1	2

72. **Central permanent pairs of incisors appears in cattle at the age of**
(1) 8 months (2) 12 months
(3) 18 months (4) 24 months

73. **Consider the following events and arrange them into chronological order, based on their implementation year**
A. The Transport of Animals Rules, 1978
B. Performing Animal Rules , March, 2001
C. The Prevention of cruelty to Animals Act, 1960
D. Animal Birth Control (dogs) Rules, 25 December, 2001
(1) B,C,A and D (2) A,C,B and D
(3) C,B,A and D (4) B,A,D and C

ve

74. **Persistent carpus luteum may lead to**
(1) Anoestrus (2) Abortion
(3) Haemophilia (4) None of the above

75. **As per ICAR National Bureau of Animal Genetic Resources, Karnal (Haryana) at present total number of registered breeds of Buffalo in the country is**
(1) 18 (2) 16
(3) 17 (4) 19

76. **Which technique is employed in the computer analysis to calculate least cost ration**
(1) Linear programming (2) Non-Linear programming
(3) Curvi-Linear programming (4) Integer-Linear programming

77. **Medusa head colony is a characteristic of**
(1) *Pasturella multocida* (2) *Bacillus anthracis*
(3) *Haemophilus swis* (4) *Clostridium tetani*

78. **The Brooder Pneumonia in chicks is caused by**
(1) A filterable virus (2) *Haemophilus gallinarum*
(3) *Aspergillus fumigatus* (4) None of the above

79. **"Vanaraja" is a dual purpose variety of chicken developed by**
(1) C.P.B.F. Bengaluru (2) Punjab Agricultural University, Ludhiana
(3) I.C.A.R.-P.D.R. Hydrabad (4) Kerala Agricultural University, Trissure

80. **A bulletin usually contains**
(1) 4-6 pages (2) 6-12 pages
(3) 12-20 pages (4) 20-30 pages

☆☆☆

Answer Key

1 1	2 3	3 1	4 1	5 4	6 3	7 2	8 2	9 4	10 2
11 4	12 4	13 1	14 1	15 4	16 1	17 2	18 2	19 4	20 3
21 2	22 3	23 4	24 4	25 4	26 2	27 1	28 2	29 1	30 3
31 3	32 3	33 3	34 2	35 2	36 3	37 2	38 3	39 1	40 3
41 3	42 3	43 3	44 4	45 1	46 1	47 1	48 2	49 3	50 2
51 3	52 3	53 2	54 2	55 2	56 2	57 3	58 3	59 3	60 1
61 3	62 4	63 4	64 4	65 1	66 2	67 3	68 4	69 3	70 3
71 4	72 4	73 3	74 1	75 4	76 1	77 2	78 3	79 3	80 3

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NTA- ICAR (PG) Exam Paper-2021

1. **What is correct with respect to all India Livestock Census?**
   A. last two all india livestock census show the population data for the year 2021 and 2019
   B. according to 20th all india livestock census , cattle populations was highest in w. bengal
   Choose the correct answer from the options given below.
   (a) 'A' is correct and 'B' is incorrect (b) 'B' is correct and 'A' is incorrect
   (c) Both 'A' and 'B' are correct (d) Both 'A' and 'B' are incorrect
2. **Which of following statements is correct with respect to domestic animals.**
   (a) all are herbivores (b) all are carnivores
   (c) all are omnivores (d) all are mammals
3. **During summers in which period the buffaloes mostly come in to heat -**
   (a) between dawn and dusk (b) between dusk and dawn
   (c) during forenoon (d) during aftemoon
4. **What is correct with respect to effective handling and restraining of animals**
   A. Most liked food is often used as 'mild pain' can be useful in controlling animals in open.
   B. Judicious use of 'mild pain' can be useful in controlling animals.
   choose the correct answer from the options given below:
   (a) 'A' is correct, 'b' is incorrect (b) 'B' is correct, 'a' is incorrect
   (c) Both 'A' and 'b' are correct (d) Both 'A' and 'b' are incorrect
5. **What is correct in order to reduce economic losses around farrowing**
   A. Sow is brought to farrowing pen (crate) a week before farrowing.
   B. Needle teeth of all piglets, including runt, are cut.
   Choose the correct answer from the options given below
   (a) 'a' is correct, 'b' is incorrect (b) 'b' is correct, 'a' is incorrect
   (c) both 'a' and 'b' are correct (d) both 'a' and 'b' are incorrect
6. **What term is given to an old broken ewe who is still retained in the flock due to her excellent breeding performance?**
   (a) free-martin (b) gimmre
   (c) gummre (d) crone
7. **What are the most prominent of kankrej breed of cattle?**
   (a) pendulous dewlap s sheath, red or white ponderous
   (b) lyre-honed white-grey coloured, prominent orbital arches
   (c) short homed s coffin shapad skull
   (d) medium sized compact body homs emerging close together
8. **In which animal natural matermal behaviour gets stimulated on approaching parturition,if nesting material like paddy straw is provided in the pen?**
   (a) doe (b) ewe
   (c) she-buffalo (d) sow
9. **What is correct permanent dental formula for the haryana bull?**
   (a) 2 (I0/4,C 0/0, pm 3/3,M0/0) = 20 (b) 2 (I3/3,C 0/0,pm 3/3, M 3/3) = 24
   (c) 2 (I0/4, C 0/0, pm 3/3, M3/3) = 32 (d) 2 (I3/4, C 0/0, pm M 3/3) = 36

10. **The number of calving boxes at a farm should be approximately-**
(a) 05% of breedable female stock (b) 10% of breedable female stock
(c) 15% of breedable female stock (d) 20% of breedable female stock

11. **Specialized, diversifled, mixed and integrated are the examples of-**
(a) System of farming (b) Intensity of farming
(c) Livestock markets (d) Livestock products

12. **Which cattle development program had provision of bulls initially for natural service?**
(a) National dairy plan-I (b) Intensive cattle development project
(c) key village scheme (d) Technology mission on dairy development

13. **What is the approximate share of feed cost in total cost in a dairy enterprise?**
(a) 20% (b) 40%
(c) 70% (d) 90%

14. **What constant is used for adult sheep or goat to convert them in to adult animal units at the farm of mixed animal species?**
(a) 0.25 AU (b) 0.50 AU
(c) 0.75 AU (d) 1.50 AU

15. **A balanced diet for siall-fed goats normally contains dry matter available through green fodder, dry fodder and concentrate in the ratil of-**
(a) 2 : 2 : 1 (b) 1 : 2 : 2
(c) 1 : 2 : 1 (d) 1 : 1 : 1

16. **Which of the followings is considered as material factor in the practice of hygiene?**
(a) water with force (b) manpower
(c) light (d) air with force

17. **How many times a year the activities like dipping and shearing are generally carried at the sheep farm?**
(a) once a year (b) twice a year
(c) thrice a year (d) not fixed

18. **Which one of the followings is considered as contaminant of shom wool?**
(a) medullation per cent (b) shorter staple length
(c) fewer crimp frequency (d) burr

19. **An example of 'heeding' is the "care of newborn and infants" which begins-**
(a) at birth (b) in the womb of dam
(c) at the time of first feeding (d) at weaning time

20. **Feeding of increasing amount of concentrate about 2 weeks before calving to enable to enable the cow produce maximum milk later, is called-**
(a) steaming up or challenge feeding (b) grooming
(c) squeezing (d) stripping

21. **Under farm conditions in which of the following activity pigs devote their maxinum time ?**
(a) feeding (b) resting
(c) socializing (d) breeding

22. **During mating after intromission, who takes longest time in ejaculation ?**
(a) ram (b) bull
(c) buck (d) boar

23. **Burdizzo, knife and elastrator are used for ?**
(a) castration and docking (b) castration and dehorning
(c) docking and dehorning (d) castration only

24. **When is national milk day celebrated in india ?**
(a) June 26 (b) July 26
(c) September 26 (d) November 26

25. **Which transort method is not suitable for shifting down calvers, recent calvers, neonates, lame and blind animals ?**
(a) on foot (b) by road
(c) by rail (d) by air

26. **The classes, like-fine medium and coarse are related to which animal product ?**
(a) milk (b) dung
(c) wool (d) urine

27. **Continuous ridge opening is a kind of -**
(a) device for forced lighting in to the shedv (b) device for forced ventilation
(c) inlet ventilator (d) outlet ventilator

28. **Which of the following statements is incorrect with respect to the housing of livestock**
(a) It is impossible to design an ideal set of buildings to suit all regions of india.
(b) Conventional barns and loose houses are the two main types of housing systems followed in indiaIt is impossible to design an ideal set of buildings to suit all regions of india.
(c) Long narrow buildings with roof on pillars are suitable for hot humid regions
(d) Outer surface of roof should be black in hot-dry desert and semi-desert regions

29. **In order to maintain the herd at optimum production level the ratio of in-milk to animals should be around -**
(a) 90 : 10 (b) 80 : 20
(c) 60 : 40 (d) 50 : 50

30. **Livestock farm of which of the following breeds will be more benefitted with the use of teaser bull ?**
(a) Gir (b) Rathi
(c) Vechur (d) Nili-Ravi

31. **Following are the facts regarding egg production of india (2018-19):**
A. Total egg production was approximately 84 billion.
B. Three states viz andhra pradesh, tamil nadu and telangana contributed more than 50% of the total egg production.
C. Per capita egg availability in andhra pradesh state was 372 eggs per annum
Choose the correct answer from the options given below:
(a) A and B only (b) B and C only
(c) A and C only (d) A, B and C only

32. **Following are the facts regarding meat production of india (2018-19):**
A. Total meat production is approximately 8.1 million metric tonnes.
B. Poultry are contributing more than 50% of total meat produced in india.
C. Annual growth rate of meat production in india is about 6% per annum .
Choose the corrct answer from the options given below:
(a) A and B only (b) B and C only
(c) A and C only (d) A, B and C only

33. **Which of the following characteritics are correct for the average of a series of numerical values ?**
A. It is the sum of the numerical values divided by number of observations.
B. It is lower than the maximum value in the series.
C. It is an indicator of the central tendency.

Choose the correct answer from the options given below:

(a) A and B only (b) B and C only

(c) A and C only (d) A, B and C only

34. Standard deviation is

A. Square root of the variance

B. Measured using the unit of the variable

C. Measured using squared unit of the variable

Choose the correct answer from the options given below:

(a) A and B only (b) B and C only

(c) A and C only (d) A, B and only

35. It a normally distributed population about 95% of observations lie in the interval of

(a) $\mu \pm \sigma$ (b) $\mu \pm 2\sigma$

(c) $\mu \pm 3\sigma$ (d) $\mu \pm 4\sigma$

36. It a couple desire to have four children the probability of all being son would be:

(a) 1/4 (b) 1/8

(c) 1/16 (d) 1/32

37. The standard deviation of 11 observations taken from a sample with a mean of 500 is 250 the coefficient of variation is:

(a) 10% (b) 20%

(c) 40% (d) 50%

38. Which of the following measure of dispersion is independent of the unit of measurement

(a) mean deviation (b) standard deviation

(c) variance (d) coefficient of variation

39. The efficacy of a vaccine can be tested dy using

(a) t Test (b) chi square Test

(c) Z Test (d) Analysis of variance

40. In chi-square test using r x c contingency table, degree of freedom will be

(a) (r-1)(c-1) (b) (r-1) + (c-1)

(c) (r-1) - (c-1) (d) r + c - 2

41. Average square deviation from arithmetic mean may be called as-

(a) Mean deviation (b) Standard deviation

(c) Variance (d) Coefficient of variance

42. The median of a series of numerical value is :

(a) A value for which half of the values are higher and half of the values are lower

(b) The value located exactly midway between minimum and maximum of the series

(c) The most commonly encounterd values among the series

(d) A measure of the eccentricity of the series

43. A regression line is a straight line which :

A. Is located as close as possible to all the points of a scatter chart

B. Is defined by an equation having 2 parameters the slope and the intercept

C. Provides an approximate relationship between the values of two parameters

Select the most appropriate answer from the options given below:

(a) A only (b) B only

(c) A and C only (d) All A, B and C

44. The statistical significance of classical genetic ratios is tested by using ?

(a) Chi square Test (b) t Test

(c) Z Test (d) F Test

45. **Match List I with List II**

List I	List II
A. Product Moment Correlation	I. W.S. Grosset
B. Student t distribution	II. Karl Pearson
C. F Test	III. Karl Pearson
D. The Genetic Theory of Natural Selection	IV. G.W. Snedecor

Choose the correct answer from the options given below:

(a) A-I, B-III, C-II, D-IV
(b) A-II, B-I, C-IV, D-III
(c) A-IV, B-I, C-III, D-II
(d) A-II, B-III, C-I, D-IV

46. **Consider the following statements:**

A. Differences of general combining ability are due to additive variance in the base population.

B. Differences of specific combining ability are due to additive variance in the base population.

C. Differences of general combining ability are due to non-additive in the base population.

D. Differences of specific combining ability are due to non-additive variance in the base population.

Choose the correct answer from the options given below:

(a) A and B only
(b) A and C only
(c) A and D only
(d) B and D only

47. **Selection is considered to be keystone of the arch of animal improvement. which of the following statements are correct about selection:**

A. Selection is differenial raproductive and survial rate.

B. It causes change in genotypic frequencies of a population as a result of change in the gene frequency.

C. It caunge in gene frequency as an result of induction of desirable genes in the population.

Choose the correct answer from the options below:

(a) A and B only
(b) A and C only
(c) B and C only
(d) A, B and C only

48. **Inbred lines are generally produced in poultry production development programmes because:**

A. Highly variable isogenic lines will be useful to produce superior two cross hybrids.

B. To have a genetically control stock over many years, inbred lines are preferable.

C. It provides uniform experimental material for nutririonist and physiologist

Choose the correct answer from the options given below.

(a) A and B only
(b) A and C only
(c) B and C only
(d) A, B and C only

49. **Read the following staements about the genetic code:**

A. Genetic code is read in triplets

B. Genetic code consists of a specific sequence of DNA bases

C. It determines the sequence of the corresponding amino acids in the protein

Choose the correct answer from the options given below:

(a) A and B only
(b) A, B and C
(c) B only
(d) C only

50. Holandric genes are situated on

(a) Autosomes (b) X Chromosomes
(c) Y Chromosomes (d) Sex Chromosomes

51. Which of the following is an example of sex-linked inheritance?

(a) Coat colour in Rabbit (b) Comd shape in poultry
(c) Milk Yield in cattle (d) Haemophilia in man

52. All the blood groups of ABO system may be represented in children when

(a) Both the parents belong to blood group A
(b) One parent belongs to blood group O and other to AB
(c) Both the parents belong to blood group ABA
(d) One parent belongs to blood group A and other to B

53. Results from a test cross involving genes linked in coupling show 20% crossing over If a similar test cross is made involving the same gene in repulsion one would expect the percentge of crossing over to:

(a) Be approximately the same (b) Be distinctly less
(c) Be distinctly more (d) Have no relationship

54. Failure of sex chromosome to separate after synapsis is referred as:

(a) Disjunction (b) Non disjunction
(c) Independent assortment (d) Segregation

55. A population consists of 5 breeding males and 995 breeding females. The effective population size of this population will be:

(a) 1000 (b) 19.9
(c) 9.9 (d) 78.4

56. The breeding value of an individual is judged by the mean value of its:

(a) Pedigree (b) Full-sids and half-sibs
(c) Progenies (d) Sire and Dam

57. The primary effect of selection for a character is:

(a) To increase variation (b) To increas h^2
(c) To change the population mean (d) None of these

58. The Hardy-Weinberg law applies to

A. A population of self fertilised plants
B. A random mating population of plants or animals
C. a population where random assortative mating occurs

Select the most appropriate answer from the options given below:

(a) A only (b) B only
(c) C only (d) A, B and C, all

59. Match List I with List II

List I	List II
A. Sahiwal	I. High fecundity
B. Saanen	II. Milch breed of cattle
C. Bhadawari	III. High fat % in milk
D. Bhadawari	IV. Milk queen of the goat world
	V. A registered breed of pig

Choose the correct answer from the options given below:

(a) A-I, B-III, C-II, D-IV (b) A-II, B-IV, C-III, D-I
(c) A-IV, B-V, C-I, D-II (d) A-II, B-III, C-I, D-V

60. Match List I with List II

List I	List II
A. Heterosis	I. Sewall Wright
B. Reciprocal Recurrent Selection	II. G.H. Shull
C. Father of Modern Animal Breeding	III. Combstock, Robinson and Harvey
D. Coefficient of Inbreeding	IV. J.L. Lush
	V. D.S. Falconer

Choose the correct answer from the options given below:

(a) A-I, B-III, C-II, D-IV (b) A-II, B-III, C-IV, D-I

(c) A-IV, B-V, C-III, D-II (d) A-II, B-III, C-I, D-IV

61. Match List I with List II.

List I Traditional Dairy product	List II Principle of manufacture
A. Khoa	I. Coagulation
B. Basundi	II. Heat desiccation
C. Paneer	III. Fermentation
D. Dahi	IV. Concentration

Choose the correct answer from the options given below:

(a) A-I, B-II, C-III, D-IV (b) A-II, B-IV, C-I, D-III

(c) A-III, B-I, C-IV, D-II (d) A-IV, B-II, C-I, D-III

62. Match LIst I with List II

List I Sausage classification	List II Example
A. Cooked smoked	I. Bratwurst
B. Fresh and smoked	II. Salami
C. Cooked-grilled	III. Frankfurter
D. Dry fermented	IV. Pepperoni

Choose the correct answer from the options given below.

(a) A-III, B-I, C-II, D-IV (b) A-I, B-III, C-II, D-IV

(c) A-II, B-I, C-IV, D-III (d) A-IV, B-II, C-III, D-I

63. All except one of "South peninsular Region" sheep breeds, is used for mutton

(a) Nellore (b) Mandya

(c) Nilgiri (d) Vembur

64. Arrange the following processing steps for greasy wool in correct sequence:

A. Oiling B. Carding

C. Combing D. Roving

Choose the correct answer from the options below

(a) A, B, C, D (b) B, D, A, C

(c) C, A, B, D (d) D, B, A, C

65. Felt manufacturing processes like "combination of heat, moisture and mechanical energy" fall under

(a) Sorting (b) Milling

(c) Hardening (d) Drying

66. Safety and quality assurance system which constitues "activities to be undertaken and hygienic conditions to be fulfilled and monitored at steps of the food chain in order to assure safety" is

(a) GMP (b) GHP

(c) QCR (d) MRL

67. **Among indigenous dairy products highest material cost in comparision to price is incurred in**
(a) Gulabjamun (b) Khoa
(c) Sandesh (d) paneer

68. **The shelf life of Rasogolla at room temperature packed in lacquered tins is about**
(a) 6 months (b) 6 weeks
(c) 6 days (d) 6 hours

69. **"Conical process vac" developed by ICAR-NDRI, Karnal is used for preparation of-**
(a) Khoa only (b) Ghee only
(c) Butter only (d) Khoa, Ghee and Butter

70. **Designer/ health meat products should contain lower level of all except**
(a) Calcium (b) Fat
(c) Calorie (d) Sodium

71. **ICAR-NBAGR, Karnal has registered following chicken breeds**
A. Mewari **B. Uttara**
C. Nicobari **D. Hansli**
The correct chronological order for their registration is
(a) A, B, C, D (b) C, A, D, B
(c) B, C, A, D (d) D, C, B, A

72. **Choose 'odd one' from the list to be used as 'Toxin binders' in poultry feed**
(a) 3.5-Dinitro-o-toluamide (DOT) (b) Hydrated calcium aluminosilicate (HSCAS)
(c) Activated charcoal (d) Mannan-oligo-saccharide (MOS)

73. **Dominant sex-linked charecteristics in chicken is**
(a) Pea comb (b) Naked Neck
(c) Frizzle Plumage (d) Late Feathering

74. **Optimum "concentration of fumigant" (Formalin & Potassium Permanganate) required for fumigation of hatching eggs during incubation is**
(a) 0 (b) 1X
(c) 2X (d) 3X

75. **"Restricted Feeding" in layers is usually recommended during**
(a) Brooding period (b) Growing period
(c) Laying period (d) After moulting

76. **Arrange the pigmentation of the following body parts in laying birds in correct sequence:**
A. Eye ring **B. Beak**
C. Ear lobe **D. Shank**
Choose the correct answer from the options below
(a) A, B, C, D (b) B, A, C, D
(c) A, C, B, D (d) D, A, B, C

77. **Match List I with List II**

List I Deficiency disease	**List II** Nutrient
A. Encephalomalacia	**I. Manganese**
B. Slipped Tendon	**II. Thiamine**
C. Curled Toe Paralysis	**III. Vitamin E**
D. Polyneuritis	**IV. Riboflavin**

Choose the correct answer from the options given below:
(a) A-III, B-I, C-IV, D-II **(b) A-II, B-III, C-I, D-IV**
(c) A-III, B-I, C-II, D-IV **(d) A-IV, B-II, C-III, D-I**

78. **'Ideal Temperature' for poulty housing is**
(a) 10°C (b) 15°C
(c) 20°C (d) 25°C

79. **The ratio of light from 'poorly lighted corner to brightly lighted comer' should not be more than**
(a) 1:1 (b) 1:2
(c) 1:3 (d) 1:4

80. **Eggs of which poultry species have lowest moisture content?**
(a) Duck (b) Chicken
(c) Quail (d) Turkey

81. **The proportion of which of the following volatile fatty acid is higher in the rumen of animals fed on fibrous diet?**
(a) Butyric acid (b) Acetic acid
(c) Propionic acid (d) Valeric acid

82. **Read the following statements carefully**
A. A proximate principle 'NFE' represents strucctural carbohydrate fraction of feeds.
B. NFE determination in proximate analysis leads to underestimation of crude fibre content
C. NFE detemination in proximate analysis leads to overestimation of starch and sugar content of feeds.
D. NFE and CF represent total carbohydrate content of feeds
Choose the correct answer from the options given below:
(a) A and D only (b) B, C and D only
(c) A only (d) B and C only

83. **Which among the following is primarily a cellulolytic bacteria tn the rumen ?**
(a) Oxalobacter formigenes (b) Fibrobacter succinogenes
(c) Succinomonas amylolytica (d) Methanobacterium ruminantium

84. **The process of adding hydrogen to the double bonds of the unsaturated fatty acids, thereby converting them to their saturated analogues is called as**
(a) Deamination (b) Hydrogenation
(c) Fermentation (d) Hydrolysis

85. **The energy which is available to the animal for useful purpose is**
(a) Digestible energy (b) Net energy
(c) Metabolizable energy (d) Gross energy

86. **A measure of the proportion of the absorbed nitrogen retained by the body is ?**
(a) Ideal protein value (b) Biological value
(c) Digestible crude protein value (d) Prortein efficiency ratio

87. **The physiologically active form of vitamin D in the body is?**
(a) 25-OH-D_3 (b) 1α.25 $(OH)_2D_3$
(c) 24, 25-$(OH)_2D_3$ (d) 25, 26-$(OH)_2D_3$

88. **Generally the calcium: phosphorus ratio in animal diets should be**
(a) 10 : 1 (b) 2 : 1
(c) 15 : 1 (d) 9 : 1

89. **Which selenoprotein is involved in the conversion of thyroid hormone T into**
(a) Thioredoxin reductase (b) Glutathione peroxidase
(c) Selenophosphate synthetase (d) Iodothyronine 5' -deiodinase

90. **Which water soluble vitamin among the followings has beneficial role in the management of ketosis in dairy cows?**
(a) Betaine (b) Pyridoxine
(c) Niacin (d) Pantothenic acid

91. Enzyme used as feed additive for degeading structural polysaccharides in poultry ration is?

(a) Phytase (b) Protease
(c) B-glucanase (d) Lipase

92. Match List I with List II

List I Animal feed	List II Classification
A. Productive type roughage	I. Wheat straw
B. Non maintenance type roughage	II. Maize grains
C. Mnergy rich concentrate feed	III. Legume fodder
D. Protein rich concentrate feed	IV. Soybean meal

(a) A - I, B - III, C - IV, D - II
(b) A - II, B - IV, C - I, D - III
(c) A - III, B - I, C - II, D - IV
(d) A - IV, B - II, C - III, D - I

93. The crude protein content on dry matter basis in animal feed 'Zea mays' grains is

(a) 45.0% (b) 16.0%
(c) 22.0% (d) 9.5%

94. Which compound leads to the formation of chocolate brown coloured dlood after ingestion at severe toxic level?

(a) Mimosine (b) Nitrate
(c) Oxalate (d) Tannin

95. The pH of very good quality silage should be in the range of

(a) 6.5 - 7.2 (b) 3.5 - 4.2
(c) 4.8 - 6.0 (d) 4.2 - 4.5

96. Hay is prepared by curing the herbage so that dry matter content of the product is

(a) 65-70% (b) 86-88%
(c) 8-10% (d) 30-35%

97. Parasympathetic stimuli to the intestine

(a) Lowers RMP and inhibits motility (b) Raises RMP and inhibits motolity
(c) Lowers RMP and increases motility (d) Raises RMP and increases motility

98. Which among the following is NOT a factor that stimulates acid secretion by fundic paietal cells?

(a) Histamine (b) Gastrin
(c) Acetylcholine (d) Prostaglandin

99. The mucus seen at estrus is the secretion of goblet cells of

(a) Cervix (b) Endometrium
(c) Myometrium (d) Vagina

100. Given below are two statements

Statement I: An increase in the concentration of estrogen in circulation causes an increase in the release of gonadotropins.

Statemen II: Progesterone decrease the sensitivity of the anterior pituitary to GnRH and decreases LH and FSH concentrations.

In light of the above statements, choose the most appropriate answer frow the options given below

(a) Boht statement I and Statement II are correct
(b) Boht Statement I and Statement II is incorrect
(c) Statement I is correct but Statement II is incorrect
(d) Statement I is incrrect but statement II is correct

101. **Ruminants have**
(a) Diffuse placenta (b) Discoidal placenta
(c) Cotyledonary placenta. (d) Zonary placenta

102. **The maturation process which involves series of nuclear and cytoplasmic changes and the development of a tail in spermatid is known as**
(a) Spermiation (b) Spermiogenesis
(c) Spermatidosis (d) Spermatogenesis

103. **One molecule of haemoglobin can transport how many molecules of oxygen?**
(a) One (b) Two
(c) Three (d) Four

104. **In vitro maturation time for bovine oocytes is**
(a) 18 h (b) 24 h
(c) 48 h (d) 72 h

105. **Among the components of coagulation pathway, which is the Factor II?**
(a) Fibrinogen (b) Prothrmbin
(c) Thromboplastin (d) Ca ion

106. **During atrial systole, the ventricles are in state of**
(a) Systole (b) Diastole
(c) Iso-volumic contraction (d) None above

107. **The neurotransmitter at motor end plate is**
(a) Adrinaline (b) Noradrenaline
(c) Acetylcholine (d) Serotonin

108. **Which one of the following leukocytes is often increased in numbers in the presence of either local inflammatory reactions of allergic origin or types of parasitisms?**
(a) Neutrophils (b) Eosinophils
(c) Monecytes (d) Lymphocytes

109. **Vomiting is rare in -**
(a) Horses (b) Dogs
(c) Pigs (d) Ruminants

110. **Which among the following is a major intracellular ion in tissues?**
(a) Sodium (b) Potassium
(c) Calcium (d) Chloride

111. **Subsistence agriculture is often practiced**
(a) for commercial crop production (b) for organic crop production
(c) for inorganic crop production (d) for large scale farming

112. **Microsociology involves study of**
(a) face-to-face interactions of people (b) widespread social processes
(c) social structure of socity (d) broader system of organezation

113. **A society in which the primary means of subsistence is domesticated livestock is called**
(a) Pastoralist society (b) Hunter-gatherer sociery
(c) A grarian society (d) Industrial society

114. **Which Standing Committee NOT the part of Gram Panchayat?**
(a) Finance and Planning Standing Committee
(b) A griculture and Animal Resources Development Standing Committee
(c) Education and public Health Standing Committee
(d) Water and soil Conservation Standing Committee

115. Which cooperative in India is NOT a member of ICA?

(a) Indian Farmers Fertiliser Co-operative (IFFCO)

(b) Parag Co-operative Dairy Federtion (PCDF)

(c) Krishak Bharati Co-perative Ltd. (KRIBHCO)

(d) National Agricultural Co-operative Marketing Federation (NAFED)

116. Choose the correct statement/s

A. Social change is universal process

B. Social change does not always depend on the willingness of society and its members

C. Speed of social change remains constant in different societies

D. Social change has qualitative aspect only

Choose the correct answer from the options given below:

(a) A and B only

(b) C and D only

(c) A and D only

(d) A, B and C only

117. Choose the correct statement/s

A. People in social organisation are purposefully associated in systematically arranged units

B. No formal set of rules and regulation is framed for social oraganization

C. Each member in social orgaisation has in-formal status and role

D. Major objective of forming social organiztion is to achieve is to achieve some common interests

Choose the correct answer from the options given below:

(a) A, B and D only

(b) A and D only

(c) A and C only

(d) B, C and D only

118. The total milk production in India according to GOI-Basic Animal Husbandry Statistics 2019 was

(a) 187.75 million tonnes

(b) 177.75 million tonnes

(c) 167.75 million tonnes

(d) 197.75 million tonnes

119. Choose the correct statement/s

A. The marketing concept is based on the "right" principle

B. Marketing does not create exchanges

C. Marketing finds out needs of potential buyers

D. There is no difference between marketing and sales

Choose the correct answer from the optins given below:

(a) B and D only

(b) A, B and C only

(c) A only

(d) A and C only

120. NRLM stands for

(a) National Rural Livelihood Mission

(b) National Rural Livestock Mission

(c) National Royal Livelihood Mandate

(d) National Rural Literature Mode

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
c	d	b	c	a	d	b	d	c	b
11	12	13	14	15	16	17	18	19	20
a	c	c	a	d	c	b	d	b	a
21	22	23	24	25	26	27	28	29	30
b	d	a	d	a	c	d	d	b	d
31	32	33	34	35	36	37	38	39	40
b	d	d	a	b	c	d	d	b	a
41	42	43	44	45	46	47	48	49	50
c	a	d	a	b	c	a	a	b	c
51	52	53	54	55	56	57	58	59	60
d	d	a	b	b	c	c	b	b	b
61	62	63	64	65	66	67	68	69	70
b	a	c	a	c	b	d	a	d	a
71	72	73	74	75	76	77	78	79	80
b	a	d	b	b	c	a	b	d	a
81	82	83	84	85	86	87	88	89	90
b	b	b	b	b	b	b	b	d	c
91	92	93	94	95	96	97	98	99	100
c	c	d	b	b	b	c	d	a	a
101	102	103	104	105	106	107	108	109	110
c	b	d	b	b	b	c	c	a	b
111	112	113	114	115	116	117	118	119	120
b	a	a	d	b	a	b	a	d	a

☆☆☆

NTA- ICAR (PG) Exam Paper-2020

1. **The latest feeding standard for various classes of animals was developed by ICAR in the year**
   (a) 1985 (b) 1998
   (c) 2013 (d) 2019
2. **Non-digestible food substances that selectively stimulate the growth of favourable species of bacteria in gut are called**
   A. Probiotics
   B. Prebiotics
   C. Synbiotics
   Select the most appropriate answer from the options given below
   (a) A only (b) B only
   (c) A and B only (d) A, B and C only
3. **pH of good quality silage is**
   (a) Less then 3.0 (b) 3.8 - 4.2
   (c) 5.0 - 7.0 (d) More than 7.0
4. **Molybdenum toxicity in ruminants is known as**
   (a) Milk fever (b) Grass staggers
   (c) Teartness (d) None of these
5. **Pica is the symptom of deficiency of**
   (a) Calcium (b) Iron
   (c) Copper (d) Phosphorous
6. **H_2O_2 (Hydrogen peroxide) is used as preservative in milk in the concentration of**
   (a) 300-800 ppm (b) 1000-1200 ppm
   (c) More than 1200 ppm (d) Less than ppm
7. **As per Bacteriological Standards (IS - 3507 - 1966), what is the count (per ml) of yeast and mold in good quality butter?**
   (a) < 20 (b) 21 - 50
   (c) 51 - 100 (d) > 100
8. **Milk powder should contain**
   (a) 0% Moisture (b) 5% Moisture
   (c) 10% Moisture (d) 15% Moisture
9. **Linseed Meal Containing limatidine interferes in the utilization of which of the following vitamins?**
   (a) Thiamin (b) Pyridoxine
   (c) Biotin (d) Folacin
10. **A Cattle feed was supplied at two levels, i.e 40 and 100 Mj/d. if the additional supply of 60 Mj resulted in an increase in heat production by 24 Mj/d, what will be the increment as a proportion of additional energy provided?**
    (a) 0.2 (b) 0.4
    (c) 0.6 (d) 0.8
11. **Which one of the following is a lactate producing bacteria?**
    (a) Bacteroides ruminicala (b) Megasphaera elsdenii
    (c) Succinomonas ruminantium (d) Strptococcus bovis

12. **'Thumps' is caused by deficiency of which one of the following?**
(a) Iron (b) Copper
(c) Cobalt (d) Manganese

13. **Which one of the following is called "invert sugar"?**
(a) Maltose (b) Sucrose
(c) Glucose (d) Fructose

14. **Which one of the following is not a Zinc containing enzyme?**
(a) Catalase (b) SOD
(c) Alcohol dehydrogenase (d) Carbonic anhydrase

15. **In a digestion trial, a goat consumed 800 g of DM and voided 800 g of faeces having 30% DM. what was the digestibility of DM in that goat?**
(a) 50% (b) 60%
(c) 70% (d) 80%

16. **Which of the following amino acids is helpful in partially meeting niacin requirement?**
(a) Phenylalanine (b) Tryptophan.
(c) Tyrosine (d) Threonine

17. **'Fatty liver and kidney' syndrome is caused by a deficiency of which one of the following vitamins?**
(a) Cyanocobalamin (b) Biotin
(c) Folacin (d) Pyridoxine

18. **Which one of the following is an S-containing vitamin?**
(a) Thiamin (b) Niacin
(c) Pyridoxine (d) Folacin

19. **Which one of the following vitamins is associated with transfer of single carbon unit?**
(a) Thiamin (b) Niacin
(c) Pyridoxine (d) Folacin

20. **Which one of the following species CANNOT synthesize Vitamin C?**
(a) Cat (b) Chicken
(c) Dog (d) Monkey

21. **Which one of the following cereal grains contains a considerable amount of pentosans?**
(a) Barley (b) Maize
(c) Sorghum (d) Wheat

22. **Which one of the following is a highly insoluble protein?**
(a) Albumin (b) Casein
(c) Lactoglobulin (d) Keratin

23. **Which one of the following protein sources contains gossypol?**
(a) Cottonseed cake (b) Groundnut cake
(c) Mustard cake (d) Soybean cake

24. **Which one of the following is a natural indicator to Measure digestibility in animals?**
(a) Carmine red (b) Chromic oxide
(c) Ferric oxide (d) Lignin

25. **High yielding dairy cows should have a dry period of?**
(a) Two weeks (b) Four weeks
(c) Six weeks (d) Eight weeks

26. **DCP requirement for maintenance of goat is**
(a) 3 g/ kg $BW^{0.75}$ (b) 6 g / kg $BW^{0.75}$
(c) 9 g / kg $BW^{0.75}$ (d) 12g / kg $BW^{0.75}$

27 **Milk of which one of the following breeds maximum amount of fat?**

(a) Ayrshire (b) Guernsey

(c) Holstein (d) Jersey

28. **Which one of the following is omnivorous?**

(a) Tiger (b) Vulture

(c) King Cobra (d) Dog

29. **Which one of the following cereal grains contains a considerable amount of tannins?**

(a) Oat (b) Maize

(c) Barley (d) Sorghum

30. **BMR in poultry is**

(a) 66 kcal/kg $BW^{0.75}$/d (b) 86 kcal/kg $BW^{0.75}$/d

(c) 106 kcal/kg $BW^{0.75}$/d (d) 126 kcal/kg $BW^{0.75}$/d

31. **When glucose is completely oxidized to CO_2 and water, $C_6H_{12}O_6 + 6O_2 \rightarrow 6\ CO_2 + 6H_2o$, what will be the RQ?**

(a) 0.7 (b) 0.8

(c) 0.9 (d) 1.0

32. **A cow consuming 10 kg of DM having 12% CP voided 20 kg of feaces having 3% CP (as is basis), what is the CP digestibility?**

(a) 30% (b) 40%

(c) 50% (d) 60%

33. **The condition for continuing production in the short-run condition is, if at least?**

(a) Selling price < AVC (b) Selling price > AVC

(c) Selling price < AFC (d) Selling price > AFC

34. **An increase in the investment at national level directly increases the ?**

(a) National Income (b) Gross National product

(c) personal Income (d) Disposable Income

35. **Which of the following has zero cross elasticity of demand?**

(a) Paddy and Wheat (b) Butter and Mango

(c) Ink and Pen (d) Bread and Butter

36. **In the case of two substitutable commodities (X and Y), when the price of X increases, the demand for Y.**

(a) Decreases (b) Does not vary

(c) Increases (d) Becomes zero

37. **The opportunity cost of sunshine is**

(a) –1 (b) –1 to + 1

(c) Zero (d) 1

38. **Dairy cattle reach puberty when the bodyweight is what percentage of the bodyweight of the adult?**

(a) 60-70% (b) 50-60%

(c) 30-40% (d) 20-30%

39. **Placental hormone include**

(a) PMSG **(b) HCG**

(c) Placental lactogen (PL) **(d) TSH**

Choose the correct answer from the options given below:

(a) A only (b) A and B only

(c) A, B and C only (d) A, B, C and D only

40. **Cervical mucus of cows shows fern pattern of crystallization during**
(a) **Metestrus** (b) **Diestrus**
(c) **Estrus** (d) **Pre estrus**
Choose the correct answer from the options given below.
(a) a only (b) a and b only
(c) c only (d) all a, b, c and d

41. **Match List I with List II.**

List I	List II
A. Mullerian ducts	I. Male
B. Wolffian ducts	II. Differentiation and steroidogenic capacity
C. Follicular fluid	III. Ovulation
D. LH surge	IV. Female

Choose the correct answer from the options given below:
(a) A-I, B-III, C-IV, D-II (b) A-IV, B-I, C-II, D-III
(c) A-I, B-II, C-IV, D-III (d) A-III, B-IV, C-I, D-II

42. **Given below are two statements:**
Statement I. For effective functioning, the mammalian testes must be maintained at a temperature higher than that of the body.
Statement II: Anatomical features of the testes and scrotum permit the regulation of testicular temperature.
In the light of the above statements, choose the ***most appropriate*** answer from the options given below.
(a) Both statement I and Statement II are true
(b) Both statement I and statement II are false
(c) Statement I is correct but statement II is false
(d) Statement I is incorrect but statement II is true

43. **In comparison to temperate breeds of cattle, sweat glands in buffaloes are about.**
(a) One fourth (b) One fifth
(c) One sixth (d) One seventh

44. **Which animal has the highest metabolic rate/gram of body?**
(a) Elephant (b) Buffalo
(c) Shrew (d) Sheep

45. **The two gases with the highest relative contribution to the Green House Gases (GHG) are.**
(a) CO_2 and N_2O (b) CO_2 and CH_4
(c) N_2O and CH_4 (d) CO_2 and CO

46. **In which stage of lactogenesis, there is cytologic and enzymatic differentiation of the epithelial cells?**
A. Stage 3 of lactogenesis **B. Stage 1 of lactogenesis**
C. Stage 2 of lactogenesis **D. At the end of lactogenesis**
Choose the correct answer from the options given below:
(a) A and B only (b) B only
(c) A, B and C only (d) All A, B, C and D

47. **The RNA : DNA ratio increases from pregnancy to lactogenesis. It increase, respectively from 1 : 1 to.**
(a) 1 : 2 (b) 2 : 1
(c) 2 : 2 (d) 1 : 3

48. **First scientific artificial insemination in cattle and sheep was performed by.**
(a) Lazzaro Spallanzani (b) Sampath Kumaran
(c) C. R. Ivanoff (d) P. Bhattacharya

49. Which of the following is a fluorescent stain?

A. Indian Ink **B. Rose Bengal**

C. Chromomycein A3 **D. Eosin**

Choose the correct answer from the options given below:

(a) A only (b) A and B only

(c) C only (d) All A, B, C and D

50. Given below are two statements:

Statement I. Spermatozoa of foul is hook-shaped

Statement II. Appendix testis is present in equine

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are correct

(b) Both statement I and statement II are incorrect

(c) Statement I is correct but statement II is incorrect

(d) Statement I is incorrect but statement II is correct

51. Prescrotal sigmoid flexure is found in.

A. Stallion **B. Bull**

C. Boar **D. Buck**

Choose the correct answer from the options given below:

(a) A only (b) B only

(c) C only (d) All A, B, C and D

52. Which interleukin inhibits the immune response

A. IL - 4 **B. IL - 13**

C. IL - 10 **D. IL - 7**

Choose the correct answer from the options given below.

(a) A only (b) B only

(c) C only (d) All A, B, C and D

53. β-lymphocytes develop immunocompetence in the

A. Bone marrow **B. Spleen**

C. Thymus **D. Lymph nodes**

Choose the correct answer from the options given below.

(a) A only (b) A and B only

(c) B and C only (d) A, C and D only

54. Which of the following processes may be considered as an example of biotechnological process?

(a) Treatment of straw with sodium hydroxide

(b) Grinding of straw

(c) Fungal treatment of straw

(d) Ammonia treatment of straw

55. Match List I with List II

List I	List II
A. Tonometer	I. Relative humidity
B. Hygrometer	II. consistency of testis
C. Biological clock	III. Abnormal behaviour
D. Mismothering	IV. Suprachiasmatic nuclei

Choose the correct answer from the options given below.

(a) A-II, B-I, C-IV, D-III (b) A-III, B-II, C-I, D-IV

(c) A-I, B-II, C-III, D-IV (d) A-IV, B-III, C-II, D-I

56. **Match List I with List II**

List I	List II
A. Panoramic vision	I. Leptin
B. Aging	II. Etiology
C. Animal behaviour	III. Gerontology
D. Adipose tissue	IV. 330°

Choose the correct answer from the options given below.

(a) A-IV, B-III, C-II, D-I
(b) A-II, B-IV, C-III, D-I
(c) A-III, B-II, C-IV, D-I
(d) A-III, B-IV, C-I, D-II

57. **Working efficiency of bullocks can be enhanced by selecting.**

(a) Soil and Animal
(b) Animal and implement
(c) Soil and environment
(d) Implement and environment

58. **The structure and function of muscle and non-muscle cells are similar with regard to**

A. Mitochondria **B. Ribosomes**
C. Endoplasmic reticulum **D. Golgi complex**

Choose the correct answer from the options given below:

(a) A only
(b) A, B and D only
(c) A, B and C only
(d) A, B and C only

59. **Given below are two statements:**

Statement I. A reduction in the secretion of growth hormone (GH) is require for the survival of homeotherms during heat stress.

Statement II. Acclimation to thermal stress is identified as a homeostatic process under endocrine control.

In light of the above statements, choose ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are correct.
(b) Both statement I and statement II are incorrect.
(c) Statement I is correct but statement II is incorrect.
(d) Statement I is incorrect but statement II is correct.

60. **Which of the following are skeletal muscle named on the basis their location?**

A. Quadriceps **B. Subscapularis**
C. Adductor **D. Supraspainatus**
E. Rectus abdominis

Choose the correct answer from the options given below.

(a) A and B only
(b) A, B and C only
(c) A, B and D only
(d) A, B, D and E only

61. **The mammalian neurohypophysis is the eource of which of the following principle hormones (s)?**

A. Oxytocin **B. Arginine vasopressin**
C. Lysine vasopressin **D. Corticosteroid**

Choose the correct answer from the options given below.

(a) A only
(b) A and B only
(c) A, B and C only
(d) A, B, C and D only

62. **Salivary mixed glands include(s).**

A. Submaxillary **B. Sublingual**
C. Labial **D. Buccal**
E. Pharyngeal

Choose the correct answer from the options given below:

(a) A and B only
(b) A, B and C only
(c) A, B, C and D only
(d) All A, B, C, D and E

63. **Gastrontestinal microorganisms are capable of.**

A. Reduction **B. Dehydration**

C. Ring fusion **D. Aromatization**

Choose the correct answer from the options given below:

(a) A only (b) A and B only

(c) A, B and C only (d) A, B, C and D only

64. **The vital capacity includes.**

A. Expiratory reserve volume **B. Inspiratory reserve volume**

C. Tidal volume **D. Residual volume**

Choose the correct answer from the options given below.

(a) A only (b) A and B only

(c) A, B and C only (d) A, B, C and D

65. **Given below are two statements:**

Statement I. The mean pressure in the pulmonary artery is approximately one-third that of the systemic.

Statement II. The mean pressure in the pulmonary artery is one-sixth that of the systemic.

In the light of the above statements, choose ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are correct.

(b) Both statement I and statement II are incorrect.

(c) Statement I is correct but statement II is incorrect

(d) Statement I is incorrect but statement II is correct.

66. **Intrinsic mechanism of blood coagulation refers to the sequence of enzymatic reactions which is due to.**

A. Damage to a vessel **B. Exposure to air**

C. Foreign surface **D. Sufficiently traumatic blood vessel.**

Choose the correct answer from the options given below.

(a) A only (b) A and B only

(c) A, B and C only (d) All A, b, C and D

67. **Homeostasis is maintained by following physiological processes.**

A. Diffusion **B. Concentration gradient**

C. Pressure gradient **D. Nervous system**

E. Endocrine system

Choose the correct answer from the options given below:

(a) A and B only (b) B and C only

(c) A, B, C and D only (d) All A, B, C, D and E

68. **The overall increase in the air temperature in the 20th century has been about.**

(a) 1.0 - 1.5 °C (b) 0.2 - 0.8 °C

(c) 0.9 - 1.2 °C (d) 1.5 - 2.0 °C

69. **Under normal feeding conditions, methane forms what percent of the total gas produced in the rumen of cattle?**

(a) 10 - 15% (b) 15 - 20%

(c) 30 - 40% (d) 20 - 30%

70. **Which of the following animals is an induced ovulator?**

(a) Buffalo (b) Cattle

(c) Rabbit (d) Goat

71. **The fertile life of sperm of cattle is between.**

(a) 15 - 20 hours (b) 20 - 25 hours

(c) 30 - 48 hours (d) 40 - 48 hours

72. **Hemophilia A is caused by the deficiency of coagulating factor**
(a) XI (b) X
(c) XII (d) VIII

73. **Climate is defined as the study of average meteorological variables of any region of at least.**
(a) 35 years (b) 40 years
(c) 30 years (d) 50 years

74. **if b_{xy} = + 0.80, the value of b_{yx} can be**
(a) + 1.25 (b) −1.25
(c) + 1.26 (d) −1.24

75. **Non-parametric tests are**
A. Wilcoxon signed-rank test **B. Kruskal - Wallis test**
C. Sperman's rank correlation **D. One way ANOVA**
E. Paired t-test
Choose the correct answer from the options given below.
(a) A, B and C only (b) B, C and D only
(c) D and E only (d) All A, B, C, D and E

76. **X ~ N (100, 15) is read as**
(a) X is normal random variable with median 100 and standard deviation 15
(b) X is normal random variable with mean 100 and standard deviation 15
(c) X is normal random variable with mode 100 and variance 15
(d) X is normal random variable with mean 100 and variance 15

77. **Regression coefficient ranges from**
(a) −1 to + 1 (b) 0 to 1
(c) −1 to + 2 (d) $-\infty$ to $+\infty$

78. **Number of regression equations with 2 variables will be**
(a) 8 (b) 4
(c) 2 (d) 6

79. **Given below are two statements.**
Statement I. The total pig population in India in 2019 was 9.06 million
Statement II. Total pig pupulation in 2019 has shown a decrease of 12.03% over the previous census.
In the light of the above statements, choose the ***most appropriate*** answer from the options given below.
(a) Both statement I and statement II are true.
(b) Both statement I and statement II are false.
(c) Statement I is correct but statement II is false.
(d) Statement I is incorrect but statement II is true.

80. **Given below are two statements.**
Statement I. Breed is maintained through grading of animals.
Statement II. Heterosis is stabilized in the 3rd generation of mating.
In the light of the above statements choose the ***most appropriate*** answer from the options.
(a) Both statement I and statement II are true.
(b) Both statement I and statement II are false.
(c) Statement I is correct but statement II is false.
(d) Statement I is incorrect but statement II is true.

81. Ongole cattle are characterized by-

A. Small size **B. Large size**

C. Long body **D. Short body**

E. Board forehead

Choose the correct answer from the options given below.

(a) A and C only (b) A and D only

(c) B and C only (d) B, C and E only

82. Vent of a non-layer hen is-

A. Small **B. Dry**

C. Round **D. Large**

E. Moist

Choose the correct answer from the options given below.

(a) D only (b) B, C and D only

(c) C, D and E only (d) A, B and C only

83. Doom is breed of

A. Goat **B. Pig**

C. Camel **D. Sheep**

E. Cattle

Choose the correct answer from the options given below.

(a) A and B only (b) B only

(c) B and C only (d) B, C and D only

84. 'Turkey', a poultry species is a native of

(a) North America (b) South America

(c) Turkmenistan (d) Turkey

85. Heat-trapping capacity of Green House Gases is known as.

(a) Global warming potential (b) Heating power

(c) Heating capacity (d) Heating index

86. Instrument shelter used to protect the temperature measuring device from rain, wind or snow is called.

(a) Stevenson screen (b) Wather screen

(c) LCD screen (d) Radiation protecting instrument

87. Which one of the following is NOT a farm income and profit efficiency measure?

(a) Net cas income (b) Capital per man

(c) Net farm income (d) Family labour earnings

88. Which one of the following is the tallest breed of goat?

(a) Jamunapari (b) Beetal

(c) Black Bengal (d) Barbari

89. Primitive man used which one of the following families as food?

(a) Bovidae (b) Suidae

(c) Equidae (d) Camelidae

90. Metestrus period is characterized by

(a) Increase in levels of both estrogen and LH

(b) Increase in level of estrogen and fall in level of LH

(c) Fall in levels of both estrogen and LH

(d) Fall in level of estrogen and increase in level of LH

91. Cows infected with pathogens have SCC of

(a) 2 L or more (b) 1 L or more

(c) 4 L or more (d) 5 L or more

92. **Grower diet of pigs should contain about.**
(a) 9 - 10% CP (b) 11 - 12% CP
(c) 15 - 16% CP (d) 21 - 22% CP

93. **Permanent incisors in cattle start coming up at the age of**
(a) 3 years (b) 2 years
(c) 6 months (d) 12 months

94. **Electric dehorner maintains the temperature at about**
(a) 137 °C (b) 237 °C
(c) 537 °C (d) 37 °C

95. **Given below are two statements:**
Statement I. FAO defines a mixed farming system as one wherein more than 20% of the total value of production comes from non-livestock farming activities
Statement II. Headquarter of the Word Organization for Animal Health is located in France.
In the light of the above statements, choose the ***most appropriate*** answer from the options given below.
(a) Both statement I and statement II are true.
(b) Both statement I and statement II are false.
(c) Statement I is correct but statement II is false.
(d) Statement I is incorrect but statement II is true.

96. **Given below are two statements.**
Statement I. Cattle have a visual field in excess of 300 degrees.
Statement II. Animal handlers should never work on the edge of light zone.
In the light of the above statements, choose the ***most appropriate*** answer from the options given below.
(a) Both statement I and statement II are true.
(b) Both statement I and statement II are false.
(c) Statement I is correct but statement II is false.
(d) Statement I is incorrect but statement II is true.

97. **Given below are two statements.**
Statement I. Common foot bath products are Formalin and Copper sulphate.
Statement II. Lime is not used for foot bath purposes.
In the light of the above statements, choose the ***most appropriate*** answer from the options given below.
(a) Both statement I and statement II are true.
(b) Both statement I and statement II are false.
(c) Statement I is correct but statement II is false.
(d) Statement I is incorrect but statement II is true.

98. **Match List I with List II**

List I	**List II**
A. Veal	**I. Wild animals meat**
B. Venison	**II. Pig meat**
C. Bacon	**III. Calf meat**
D. Bushmeat	**IV. Deer meat**

Choose the correct answer from the options given below.
(a) A-III, B-IV, C-II, D-I (b) A-I, B-II, C-III, D-IV
(c) A-IV, B-III, C-II, D-I (d) A-II, B-III, C-IV, D-I

99. **Match List I and List II**

List I	List II
A. Outbreeding	I. Unrelated animals
B. Inbreeding	II. Animals from different established breeds
C. Outcrossing	III. Related animals
D. Crossbreeding	IV. Unrelated animals within same pure breed

Choose the correct answer from the options given below.

(a) A-I, B-III, C-IV, D-II
(b) A-I, B-II, C-III, D-IV
(c) A-IV, B-III, C-II, D-I
(d) A-II, B-III, C-I, D-IV

100. **Match List I with List II**

List I	List II
A. Amylase	I. Protein
B. Lipase	II. Starch
C. Rennin	III. Milk protein
D. Pepsin	IV. Fats

Choose the correct answer from the options given below.

(a) A-IV, B-III, C-II, D-I
(b) A-I, B-II, C-III, D-V
(c) A-II, B-IV, C-III, D-I
(d) A-III, B-IV, C-I, D-II

101. **Match List I with List II**

List I	List II
A. Cattle	I. 30 kg Birth Weight
B. Buffalo	II. 25 kg Birth Weight
C. Sheep	III. 55 kg Birth Weight
D. Horses	IV. 2.5 kg Birth Weight

Choose the correct answer from the options given below.

(a) A-II, B-I, C-IV, D-III
(b) A-I, B-II, C-IV, D-III
(c) A-I, B-II, C-III, D-IV
(d) A-I, B-III, C-II, D-IV

102. **Match List I with List II**

List I	List II
A. Atavism	I. Previous sire characteristic on progeny
B. Nicking	II. Stamping characteristics on progeny
C. Prepotency	III. Best or worst progeny
D. Telegony	IV. Re appearance of ancestral traits

Choose the correct answer from the options given below.

(a) A-II, B-III, C-I, D-IV
(b) A-III, B-IV, C-II, D-I
(c) A-IV, B-III, C-II, D-I
(d) A-I, B-II, C-III, D-IV

103. **Given below are two statements.**

Statement I. If 3 genes are relatively close together along one chromosome, the expected frequency of double cross over gametes is very high.

Statement II. Three gene pairs must be investigated to study double exchanges of genetic materials.

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are true.
(b) Both statement I and statement II are false.
(c) Statement I is correct but statement II is false.
(d) Statement I is incorrect but statement II is true.

104. **Given below are two statements.**

Statement I. Individuals afflicted with phenylketonuria can metabolize phenylalanine.

Statement II. Individuals afflicted with galactosemia can metabolize galactose.

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are true.

(b) Both statement I and statement II are false.

(c) Statement I is correct but statement II is false.

(d) Statement I is incorrect but statement II is true.

105. **Given below are two statements.**

Statement I. Mendel performed his first set of hybridization in 1858.

Statement II. Gregor Johann Mendel was born in 1822 to a peasant family.

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are true.

(b) Both statement I and statement II are false.

(c) Statement I is correct but statement II is false.

(d) Statement I is incorrect but statement II is true.

106. **Given below are two statements.**

Statement I. Genetic code consists of a linear series of nucleotide triplets.

Statement II. Each triplet code is complementary to the information stored in DNA.

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are true.

(b) Both statement I and statement II are false.

(c) Statement I is correct but statement II is false.

(d) Statement I is incorrect but statement II is true.

107. **Given below are two statements.**

Statement I. Alternative splicing generates uniform mRNA from identical pre-mRNA molecules.

Statement II. Changes in splicing patterns may have many different effects on translated proteings.

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are true.

(b) Both statement I and statement II are false.

(c) Statement I is correct but statement II is false.

(d) Statement I is incorrect but statement II is true.

108. **Given below are two statements.**

Statement I. Crossbreeding of cattle in India started with the development of Jersind

Statement II. Frieswal is the cross of Holstein-Friesians and Sahiwal.

In the light of the above statements, choose the ***most appropriate*** answer from the options given below.

(a) Both statement I and statement II are true.

(b) Both statement I and statement II are false.

(c) Statement I is correct but statement II is false.

(d) Statement I is incorrect but statement II is true.

109. Arrange the following stages in correct sequence.

A. Leptonema **B. Zygonema**
C. Diakinesis **D. Pachynema**
E. Diplonema

Choose the correct answer from the options given below.

(a) A, B, D, E, C (b) A, B, C, D, E
(c) B, A, C, E, D (d) E, C, D, A, B

110. Arrange the following animals in increasing order of haploid number of chromosomes.

A. Cat 38 **B. Cattle** 60
C. Chicken 78 **D. Dog** 78
E. Horse 64

Choose the correct answer from the options given below.

(a) C < A < B < E < D (b) D < E < C < A < B
(c) E < D < C < B < A (d) A < B < E < C < D

111. REML takes into account the degree of freedom involved in estimating.

(a) Fixed effect (b) Random effect
(c) Regression effect (d) Covariable effect

112. Index is ..... of an individual's breeding value.

A. Best Linear prediction **B. Best linear unbiased prediction**
C. Best prediction **D. Best linear biased prediction**

Choose the correct answer from the options given below.

(a) A and B only (b) A only
(c) C and D only (d) D only

113. If the selection coefficient is 0.7, fitness will be

(a) 0.3 (b) 0.4
(c) 0.7 (d) 0.6

114. What would be the sum of determination coefficients if all causes are accounted for?

(a) 1 (b) 0
(c) – 0.50 (d) 0.50

115. If there is complete dominance, the additive variance is maximal when the frequency of recessive allele is.

(a) 0.25 (b) 0.50
(c) 0.75 (d) 1.00

116. The most reliable procedure of heritability estimation is

(a) Full sib correlation (b) Half sib correlation
(c) Regression of offspring on dam (d) Intra-sire regression of offspring on dam

117. Heritability of fat percentage as compared to fat yield is.

(a) Less (b) More
(c) Equal (d) Very less

118. Ayrshire breed of cattle was developed in.

(a) Scotland (b) USA
(c) UK (d) Switzerland

119. Characteristics repeated in space are chiefly.

(a) Structural (b) Production
(c) Growth (d) Reproduction

120. Dominance deviations are interactions-

(a) Within alleles (b) Between loci
(c) Within locus (d) Values

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
c	b	b	c	d	a	a	b	b	b
11	12	13	14	15	16	17	18	19	20
d	a	b	a	c	b	b	a	d	d
21	22	23	24	25	26	27	28	29	30
d	d	a	d	c	a	d	d	d	b
31	32	33	34	35	36	37	38	39	40
d	c	b	b	b	c	c	a	c	c
41	42	43	44	45	46	47	48	49	50
b	d	c	c	b	b	b	c	c	d
51	52	53	54	55	56	57	58	59	60
c	c	a	c	a	a	d	d	b	d
61	62	63	64	65	66	67	68	69	70
c	b	d	c	d	a	d	b	c	c
71	72	73	74	75	76	77	78	79	80
c	d	c	a	a	b	d	c	a	b
81	82	83	84	85	86	87	88	89	90
d	d	b	a	a	a	b	a	a	c
91	92	93	94	95	96	97	98	99	100
a	c	b	c	d	c	a	a	a	c
101	102	103	104	105	106	107	108	109	110
a	c	d	b	d	a	d	d	a	D
111	112	113	114	115	116	117	118	119	120
a	b	a	a	c	b	b	a	a	c

☆☆☆

NTA-ICAR (JRF) Exam Paper-2020

General Knowledge

1. **Agricultural Scientist M.S. Swaminathan received an honorary medallion from India for his contribution towards the development of agricultural practices from which country?**
   (a) Canada (b) Australia
   (c) New Zealand (d) Mexico
2. **Which of the following is the main characteristic of mixed farming?**
   (a) Cultivation of both cash crops and food crops
   (b) Cultivation of two or more crops in the same field.
   (c) Cultivation of crops and rearing of animals together
   (d) Cultivation of fruits and vegetables
3. **The National Milk Day which marks the birth anniversary of father of White Revolution Dr. Verghese Kurien is celebrated on**
   (a) November 23 (b) November 24
   (c) November 25 (d) November 26
4. **When you travel in certain parts of India, you will notice red soils. What is the main reason for this colour?**
   (a) Abundance of magnesium (b) Accumulated humus
   (c) Presence of ferric oxides (d) Abundance of phosphates
5. **ICAR, New Delhi has identified three BT cotton varieties for cultivation in Punjab, Haryana and Rajasthan; which were developed by Punjab Agricultural University (PAU), Ludhiana recently. Which one of the following is NOT among those three?**
   (a) PAU BT -1 (b) BT-1861
   (c) F 1861 (d) RS-2013
6. **World Bank assisted project SMART was launched in**
   (a) Rajasthan (b) Gujarat
   (c) Maharashtra (d) Chhattisgarh
7. **National Research Centre for grapes is located at**
   (a) Nashik (b) Pune
   (c) Muzaffarpur (d) Lucknow
8. **Golden rice variety has been developed to combat the deficiency of**
   (a) Iron (b) Vitamin C
   (c) Calcium (d) Vitamin A
9. **Most abundant Carbohydrate in the world is**
   (a) Pectin (b) Rubisco
   (c) Hemicellulose (d) Cellulose
10. **Which one of the following is known as queen of spices?**
    (a) Clove (b) Pepper
    (c) Nutmeg (d) Cardamom
11. **For increasing milk production, which state launched Rs.215 crore project 'Milk Mission' in July, 2018?**
    (a) Meghalaya (b) Assam
    (c) Tripura (d) Nagaland

12. **Gilt-edge market refers to**
(a) Bullion market (b) Market of Govt. securities
(c) Market of guns (d) Market of pure metals

13. **In which city NABARD launched South East Asia's first centre for 'climate change' ?**
(a) Jaipur (b) Patna
(c) Lucknow (d) Chennai

14. **Which of the following sets of elements were primarily responsible for the origin of life on the earth?**
(a) Carbon, Hydrogen, Nitrogen (b) Hydrogen, Oxygen, Sodium
(c) Oxygen, Calcium, Phosphorous (d) Carbon, Hydrogen, Potassium

15. **There is a parliamentary system of Government in India because the**
(a) Lok Sabha is elected directly by the people
(b) Parliament can amend the Constitution
(c) Rajya Sabha cannot be dissolved
(d) Council of the ministers are responsible to the Lok Sabha.

16. **A person of mixed European and Indian blood in Latin America is called a**
(a) Mulato (b) Mestizo
(c) Meiji (d) Mau Mau

17. **The nitrogen present in atmosphere is**
(a) of no use to plants (b) injurious to plants
(c) directly utilized by the plants (d) utilized through micro organism

18. **Which one of the following is known as the 'Coffee Port' of the world?**
(a) Sao Paulo (b) Santos
(c) Rio de Janeiro (d) Buenos Aires

19. **Which of the following statement is NOT true?**
(a) Khaira is a disease found in paddy. (b) False smut is a disease found in barley.
(c) Rust disease is found in wheat. (d) Early blight is a disease found in potato.

20. **In the context of International Trade 'Early Harvest Package' refers to**
(a) A precursor to a free trade agreement between two trading partners.
(b) A clause related to the agreement on agriculture under the WTO.
(c) A subsidy mechanism given to the developing countries for trade in agriculture.
(d) A transportation agreement signed between countries for the movement of goods

Subject questions

1. **Genes contribute much more variance when they are not at:**
(a) Intermediate frequencies (b) High frequencies
(c) Low frequencies (d) Rare frequencies

2. **Generally, who is harder to milk by hand milking?**
(a) Sahiwal cow (b) Jaffarabadi buffalo
(c) Frieswal cow (d) Jamunapari goat

3. **Without feeding/watering, the newly hatched chick can survive for**
(a) 4 hours (b) 14 hours
(c) 24 hours (d) 44 hours

4. **Most appropriate Gas mixer for modified atmospheric packaging of cooked meat and sausages is**
(a) 70-80% N_2 + 20-30% CO_2 (b) 70-80% O_2 + 20-30% N_2
(c) 70-80% CO_2 + 20-30% O_2 (d) 40-50% O_2 + 40-50% CO_2

5. **Major component of egg shell is**
   (a) Calcium phosphate (b) Calcium carbonate
   (c) Calcium chloride (d) Dicalcium phosphate
6. **Which of the followings is due to antiperistaltic movements?**
   (a) Impede digesta flow (b) Enhance digesta flow
   (c) Have no effect on digesta flow (d) Balance-regulate digesta flow
7. **Which one of the following vitamins is not present in the egg?**
   (a) A (b) C
   (c) D (d) E
8. **As per basic animal husbandry statistics (2018) the proportion of meat produced by poultry out of total meat produced in India is nearby:**
   (a) 25% (b) 33%
   (c) 40% (d) 50%
9. **During relative refractory period, the muscle fibre shows**
   (a) Response to normal stimulation (b) Response to a stronger stimulus
   (c) No response to a stronger stimulus (d) Refractoriness to tetanisation
10. **Which out of the followings represents true physiological growth?**
   (a) Erythropoiesis (b) Tumorous growth
   (c) Obesity weight gain (d) Muscular dystrophy
11. **Surface sliming on meat stored at chilling temperature under aerobic conditions is generally caused by**
   (a) Psedomonas sps (b) Clostridium sps
   (c) Penicillium sps (d) Lactobacillus
12. **At the livestock farm what should be done round the clock?**
   (a) Feeding (b) Security
   (c) Milking (d) Vaccination
13. **The only essential fatty acid in poultry is**
   (a) Glutamic acid (b) Arachidonic acid
   (c) Linolenic acid (d) Linoleic acid
14. **Whose last born and weak young one of same litter is known as runt?**
   (a) Mare (b) Ewe
   (c) Rabbit (d) Sow
15. **Type of placenta in pregnant bitch is**
   (a) Epithelio-chorial (b) Syndesmo-chorial
   (c) Endotheliochorial (d) Hemo- chorial
16. **As per FSSAI notification, maximum permissible moisture content in 'Ghee' is**
   (a) Less than 0.5% (b) Less than 1.0%
   (c) Less than 0.1% (d) Less than 1.5%
17. **Enzootic ataxia (sway-back) is a disease of lambs and calves due to deficiency of -**
   (a) Magnesium (b) Manganese
   (c) Copper (d) Molybdenum
18. **Sarcomere Length' in the muscle fibre is the distance between**
   (a) 'M' lines (b) 'Z' lines
   (c) 'H Zones (d) 'A Bands
19. **Animal of choice in north-eastern India is:**
   (a) Cow (b) Pig
   (c) Camel (d) Horse

20. **In poultry house one nest hole is sufficient for:**
(a) 4 layers (b) 8 layers
(c) 12 layers (d) 16 layers

21. **The effectiveness of gene exchange under migration depends on:**
(a) Gene frequency of the migrant population
(b) Gene frequency of the native population
(c) Difference between the gene frequencies of the migrant and native population
(d) Addition of the gene frequencies of the migrant and native populations

22. **The mating method in which the inbreeding coefficient is the lowest in poultry**
(a) Pair mating (b) Pen mating
(c) Flock mating (d) Shift mating

23. **In composting of poultry carcass, the temperature inside the composting bin should rise above**
(a) 40°C (b) 45°C
(c) 54°C (d) 70°C

24. **Which of the following breeding systems does not utilize the non-additive genetic variance?**
(a) Cross breeding (b) Inbreeding and hybridization
(c) Reciprocal recurrent selection (d) Progeny testing

25. **A neuronal circuit involved in strengthening of pre-existing memory is**
(a) Convergent (b) Divergent
(c) Antagonistic (d) Reverberating

26. **False nostrils are present in**
(a) Stallion (b) Sow
(c) Nanny (d) Bitch

27. **pH of meat decreases during 'conversion of muscle to meat mainly due to breakdown of**
(a) Lactose to lactic acid (b) Glycogen to Acetic acid
(c) Glycogen to lactic acid (d) Myofibrillar proteins to lactic acid

28. **DFD' condition is common in**
(a) Bovines subjected to long term stress (b) Pigs subjected to long term stress
(c) Pigs subjected to short term stress (d) Bovines subjected to short term stress

29. **Average litter size at weaning was 10 for parental population of pigs. What was the percentage heterosis?**
(a) 8 (b) 9
(c) 10 (d) 11

30. **Which one of the following is the term used for DNA formed from RNA?**
(a) A-DNA (b) B-DNA
(c) C-DNA (d) Z-DNA

31. **Which of the following hormones is involved in growth of female reproductive tract?**
(a) Follicle stimulating hormone (b) Luteinizing hormone
(c) Testosterone (d) Estrogens

32. **Birth weight of new born is largest in**
(a) Elephant (b) Sheep
(c) Cattle (d) Dog

33. **End product of nitrogen metabolism in bird is**
(a) Urea (b) Ammonia
(c) Amino acids (d) Uric acid

34. **After FMD vaccination in bulls, their:**
(a) Semen quality will be deteriorated (b) Libido will improve
(c) Semen quality will be improved (d) Semen quality will remain unaffected

35. **Which one of the following process does not involve direct enzyme action?**
(a) Peptic digestion (b) Emulsification of lipids
(c) Lipolytic digestion (d) Curdling of milk

36. **In calves, colostrum provides immunity for:**
(a) 6 weeks 42 days.
(b) 12 weeks
(c) 18 weeks (d) 24 weeks

37. **Which one of the following grains is deficient in tryptophan?**
(a) Maize (b) Oats
(c) Bajra (d) Barley

38. **Which of the following is 'NOT related to active or smart packaging?**
(a) Oxygen scavengers or absorbers (b) Antimicrobial substances
(c) Biodegradability (d) Quality and temperature sensors

39. **The potassium permanganate required to fumigate a hatcher compartment of 400 cu ft with 1X concentration is**
(a) 160g (b) 120g
(c) 100g (d) 80g

40. **Which one of the following morphological adaption is useful against cold stress?**
(a) Well-developed dewlap (b) Long extremities
(c) Compact barrel type body (d) Shiny hair coat

41. **All reactions in TCA cycle are reversible except the formation of**
(a) Succinyl CoA (b) Succinate
(c) a- ketoglutarate (d) Fumarate

42. **Leguminous fodder for longer duration is**
(a) Berseem (b) Lucerne
(c) Oats (d) Bajra

43. **Which of the following term was not coined by Johanseen?**
(a) Gene (b) Genotype
(c) Phenotype (d) Prototype

44. **High blood and urine ketone levels indicate**
(a) Bloat (b) Ketosis
(c) Milk fever (d) Viral infection

45. **Which mode of reflection is generally used to improve the population?**
(a) Stabilizing selection (b) Directional selection
(c) Disruptive selection (d) Tendem selection

46. **During strenuous exercise, changes occurring in the body are:**
(a) Rise in respiratory minute volume and fall in cardiac minute volume
(b) Fall in respiratory minute volume and rise in cardiac minute volume
(c) Fall in both respiratory and cardiac minute volumes
(d) Rise in both respiratory and cardiac minute volumes

47. **Which one of the following breeding strategies you will recommended forevolving a new breed of sheep for superior carpet wool in India**
(a) Progeny testing with MOET (b) Inbreeding and hybridization
(c) Cross breeding (d) Open nucleus breeding system

48. **True wool fiber does not have**
(a) Cortex (b) Cuticle
(c) Medulla (d) Cortex and cuticle

49. **As per FSSAI notification, minimum fat and SNF percentage in cow milk shall be:**
(a) 4.5% Fat and 8.5% SNF (b) 3.5% Fat and 8.5% SNF
(c) 3.2% Fat and 8.3% SNF (d) 3.0% Fat and 8.0% SNF

50. **Recurrent selection is used to improve**
(a) General combining ability (b) Specific combining ability
(c) Both general and specific combining ability (d) Reciprocal effect

51. **Expulsion of placenta is accomplished in which stage of parturition?**
(a) First (b) Second
(c) Third (d) Fifth

52. **Who are most agile and unpredictable in their behavior?**
(a) Equines (b) Caprines
(c) Ovines (d) Bovines

53. **Loin Eye Area' us measured to determine**
(a) Growth of muscular tissue (b) Age of animal
(c) Fat deposition in the carcass (d) Tenderness of meat

54. **The egg price in India is determined by**
(a) NECC (b) APEDA
(c) CLFMA (d) BCC

55. **The part of ear involved in sensing rotatory movement is**
(a) Vestibule (b) Saccule
(c) Cochlea (d) Organ of corti

56. **Which one of the following is used in recombinant technology?**
(a) Plasmid (b) Plastid
(c) Ribosome (d) Mutation

57. **Which test of significance is used in case of qualitative data**
(a) t (b) Z
(c) F (d) x2 (Chi square)

58. **Which of the following is the costliest genetic strategies?**
(a) Inbreeding and hybridization (b) Nucleus Breeding Scheme
(c) Multiple Ovulation Embryo Transfer (d) Cloning

59. **How many pairs of nipples does the laboratory mouse have?**
(a) 4 (b) 5
(c) 6 (d) 7

60. **De-oiled (solvent extracted) brans contain**
(a) 0.0 percent lipids (b) 0-0.5 percent lipids
(c) 0.5-1.0 percent lipids (d) More than 1.0 percent lipids

61. **Skeletal maturity during grading of lamb is generally judged from**
(a) Spool Joint (b) Hock Joint
(c) Hip Joint (d) Break Joint

62. **Coagulation time of blood is increased due to deficiency of**
(a) Vitamin A (b) Calcium
(c) Vitamin K (d) Iron

63. **Which one of the following statement is false about the additive variance?**
(a) It is main cause of resemblance between relatives
(b) It is main determinant of the observable genetic properties of population
(c) It is the main determinant of response to selection
(d) It cannot be exactly estimated from observations made on the population

64. **The device which checks flow of foul gases towards inlet is**
(a) DPC (b) Dado
(c) Trap (d) Drain

65. **Osborne's index methed of selection for egg number is a**
(a) Individual selection (b) Within family selection
(c) Combined selection (d) Progeny testing

66. **Dry cow therapy helps in prevention of**
(a) Metritis (b) Abortion
(c) Retained placenta (d) Masttis

67. **Metal ion involved in mediating action of insulin is:**
(a) Zinc (b) Calcium
(c) Magnesium (d) Iron

68. **R-wave of electrocardiogram represents depolarization of:**
(a) Atria (b) Ventricles
(c) Both atria and ventricles (d) Atrio ventricular valve

69. **Most potent stimulus for release of antidiuretic hormone is**
(a) Plasma hyperosmolality (b) Plasma hypoosmolality
(c) Over hydration of plasma (d) Tissue hypoxia

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72. **The fire diameter and fibre crimps of fine Merino wool generally vary between**
(a) 15-20 micron and 2-4 crimps per inch (b) 35-40 micron and 20-30 crimps per inch
(c) 25-30 micron and 2-4 crimps per inch (d) 15-20 micron and 20-30 crimps per inch

73. **With reference to co-operative milk marketing system, the term marketable surplus' at village level indicates 'the amount of milk hat**
(a) Could be procured (b) Was produced
(c) Was consumed at home (d) Was converted into products

74. **Animal Husbandry is most developed in:**
(a) Snowy regions (b) Coastal regions
(c) Temperate regions (d) Semi-arid regions

75. **The weigh of abumen (egg white) fan egg weighing 60 gram s around**
(a) 36g (b) 30g
(c) 25g (d) 20g

76. **Bicarbonate buffer system is most effective buffer system or blood because of its**
(a) Highest concentration in blood
(b) Rapid removal from kidneys
(c) Concentration rapidly adjusted through lungs
(d) High solubility in plasma

77. **Which out of the following is a characteristic of cardiac muscle cell:**
(a) Automaticity (b) Individually innervated
(c) Anaerobic metabolism (d) Absence of syncytium

78. **Presence of oxalates in the diet interferes with the metabolism of**
(a) Chlorine (b) Fluorine
(c) Calcium (d) Manganese

79. **Uttara is a breed of Indian**
(a) Goat (b) Cattle
(c) Pig (d) Poultry

80. **Thalassemia is caused due to**
(a) Absence of globin chain (b) Defective amino acid in globin chain
(c) Absence of haem (d) Excessive haem catabolism

81. **The main difference between starter feed, grower feed and layer feed for feeding of chicks, pullets and laying hens is**
(a) Energy level (b) Protein level
(c) Mineral content (d) Vitamin content

82. **Which of the following selection index approach is suitable for improving some traits while holding the response to other traits?**
(a) Smith Hazel Index (b) Restricted selection Index
(c) Weight free index (d) Family index

83. **Who have similar chromosome number?**
(a) Cattle and goat (b) Sheep and goat
(c) Cattle and pig (d) Donkey and mare

84 **Reflex control of mammalian respiration is comes out through**
(a) Haldane effect (b) Herring Breuer reflex
(c) Bohr's effect (d) Brain-bridge reflex

85. **How many kinds of F2 genotypes wil be heterozygous (assuming independent assortment) if mating is done among F1 heterozygotes for 4 gene pairs?**
(a) 19 (b) 56
(c) 65 (d) 81

86. **Andi is a cloned**
(a) Sheep (b) Pig
(c) Monkey (d) Cat

87. **The highest concentration of plasma progesterone is found in laying her**
(a) 30 minutes before ovulation (b) 1-2 hours before ovulation
(c) 4-6 hours before ovulation (d) 3-5 hours after ovulation

88. **Which of the following egg protein is wrongly matched with its properties**
(a) Ovalbumin viscosity builder (b) Avidn -binds protein
(c) Ovomacro globuin-strongly antigenic (d) Lysozyme-destroys bacteria

89. **In acidosis, Ph of the rumen liquor is**
(a) More than 8 (b) 7-8
(c) 6-7 (d) Less than 6

90. **The proportion of ammonia nitrogen in a good quality silage is**
(a) Less than 10 percent of total nitrogen
(b) 10-15 percent of total nitrogen
(c) 16-30 percent of total nitrogen
(d) More than 30 percent of total nitrogen

91. **Wildlife institute of India (WII) is located at:**
(a) Amritsar (b) Agra
(c) Delhi (d) Dehradun

92. **Which one of the following function is not performed by rumen bacteria?**
(a) Saturation of unsaturated fatty acids (b) Microbial protein synthesis
(c) Glucose synthesis (d) Vitamin B complex synthesis

93. **The maximum tolerance level of carbon dioxide in hatcher**
(a) 0.25% (b) 0.40%
(c) 0.50% (d) 0.75%

94. **The correct sequence of events during dressing of poultry birds (after bleeding) is**
(a) Singing- Scalding- Evisceration (b) Scalding-Evisceration- Singeing
(c) Evisceration Scalding Singeing (d) Scalding-Singeing-Evisceration

95. **Inbreeding in a population of 10 males and females will be equal to that of a population with:**
(a) 5 males 500 females (b) 5 males 5 females
(c) 500 males 500 females (d) 20 males 20 females

96. **Genetic covariance of dizygotic twins is equal to:**
(a) Genetic covariance of full-sibs (b) Genetic covariance of half-sibs
(c) Genetic covariance of parent-offspring (d) Genetic covariance of identical twins

97. **The lateral chambers of clavicular air sac connect with the bone**
(a) Femur (b) Humerus
(c) Sternum (d) Scapula

98. **The term TMR in feeding generally refers to**
(a) Total maintenance ration (b) Total mixed ration
(c) Total mandatory ration (d) Tabulated maintenance ration

99. **Slaughter houses which are supplying meat for domestic use only are licensed and monitored by**
(a) NRC on meat (b) APEDA
(c) FSSAI (d) MoFPI

100. **Which one of the following is special feature of skeletal muscles?**
(a) Presence of intercalated disc (b) Presence of tight intercellular junction
(c) Individually innervated (d) Presence of functional syncytium

101. **Which one of the following inputs has to be arranged by the farmers themselves in broiler production under integration?**
(a) Chicks (b) Feed
(c) Litter material (d) Medicine and vaccines

102. **Single combed White Leghorn is a**
(a) Breed (b) Variety
(c) Line (d) Strain

103. **Which one of the following is inherited by complementary gene action?**
(a) Comb pattern (b) Egg number
(c) Shank Colour (d) Rate of feathering

104. **The correct sequence for preparation of emulsion based meat products is**
(a) Deboning-Mincing-Cooking-Stuffing-Chopping (Bowl)
(b) Deboning-Stuffing-Cooking-Mincing-Chopping (Bowl)
(c) Mincing-Deboning-Cooking-Stuffing-Chopping (Bowl)
(d) Deboning-Mincing-Chopping (Bowl)-Stuffing-Cooking

105. **Which out of the followings is most suitable for expressing compensatory growth?**
(a) Kidneys (b) Brain
(c) Bone marrow (d) Skin epidermis

106. **Who is the largest terrestrial domestic animal?**
(a) Rhinoceros (b) Elephant
(c) Bison (d) Gharial

107. **Surface Ropiness' of mik during storage is generally caused by**
(a) Pseudomonas Fragi (b) Alkaligenes Viscolactis
(c) Streptococcus Lactis (d) Serratia Marcescens

108. **White plumage in Plymouth Rock chicken is an example of**
(a) Epistasis (b) Complementary of gene action
(c) Modifying gene action (d) Cryptomere

109. **12D heat treatment concept is recommended for canning industry, for**
(a) Cl.bobulinum spores in high acids foods (b) B. Subtilis spores in low acid foods
(c) CI. Botulinum spores in low- acid foods (d) B. Subtilis spores in high acid foods

110. **Which of the followings could be used as better fodder round the year for cows and buffaloes?**
(a) Babool (b) Morninga (sahjan)
(c) Berseem (d) Mango

111. **Psittacine Beak and Feather Disease is caused by**
(a) Circovirus (b) Birnavirus
(c) Coronavirus (d) Paramyxovinus

112. **Sandiness 'in ice-cream is mainly contributed by**
(a) Salt soluble protein content (b) Lactose content
(c) Saturated fat content (d) Mineral content

113. **In line processing of poultry, the chilling of carcass is done in a refrigerated blast room with the air temperature of**
(a) 10°F (b) 20°F
(c) 25°F (d) 30°F

114. **The acidic nature of a good quality silage is due to**
(a) Lactic acid (b) Acetic acid
(c) Butyric acid (d) Propionic acid

115. **India ranks first in total population of its:**
(a) Pigs (b) Buffaloes
(c) Horse (d) Camels

116. **The recommended dry matter in a crop to be ensiled is**
(a) Less than the 30 percent (b) 30-35 percent
(c) 36-40 percent (d) More than the 40 percent

117. **Which of the amino acid is precursor of lignin?**
(a) Alanine (b) Phenyl alanine
(c) Tyrosine (d) Glycine

118. **Nitrogen free extract (NEF) of feeds is determined by**
(a) Dissolution in water (b) Solvent extraction
(c) Calculations (d) Burning

119. **pH value of mechanically deboned meat is generally higher than hand deboned meat, mainly due to incorporation of**
(a) Bone chips (b) Bone marrow
(c) Meat trimmings (d) Fat particles

120. Which one of the following hormones has longest half life?

(a) Thyroxine (b) Cortisol

(c) Oxytocin (d) Tri-iodo-thyronine

121. The deficiency of zinc in swine causes

(a) Xerophthalmia (b) Ketosis

(c) Parakeratosis (d) Osteomalacia

122. The metal associated with haemoglobin is

(a) Sodium (b) Potassium

(c) Calciium (d) Iron

123. Proximate analysis is usually carried out for assessment of quality of

(a) Feed (b) Blood

(c) Urine (d) Water

124. Which of the following functions is not stimulated by gastro-intestinal hormones?

(a) Gut motility (b) Gut secretions

(c) Blood flow to gut (d) Thermoregulation

125. The microorganisms when added to food, multiply and pass through a succession of phases. The correct sequence of important phases in the "Growth Curve" is

(a) Lag Phase- Stationary Phase-Exponential Phase-Death Phase

(b) Lag Phase-Exponential Phase- Stationary Phase-Death Phase

(c) Stationary Phase-Exponential Phase-Death Phase-Lag Phase

(d) Lag Phase- Death Phase- Exponential Phase-Stationary

126. In case of multiple alleles at a locus, if there are 4 alleles, how many genotypes are possible?

(a) 6 (b) 10

(c) 15 (d) 4

127. Which of the following is a complete protein (i.e. with no limiting amino acids)?

(a) Wheat protein (b) Maize protein

(c) Egg protein (d) Rice protein

128. Path coefficient analysis is based on

(a) Correlation between cause and effect

(b) Regression of cause on effect

(c) Square root of correlation between cause and effect

(d) Square root if regression of cause on effect

129. The conditioning of feed is done in pelletizer before extrution at a

(a) 60°C (b) 90°C

(c) 75°C (d) 110°C

130. Important sheep breeds which are generally classified as Apparel Wool Sheep Breeds' are

(a) Hissardale, Nilgiri, Kashmiri merino (b) Marwari, Malpura, Sonad

(c) Muzaffanagari, Magra, Gaddi (d) Jaisalmeri, Coimbatore, Deccani

131. The sequence for the priorities for deposition of fat in the body of meat animal is

(a) Intramuscular-Subcutaneous Intramuscular

(b) Subcutaneous-Intramuscula-Intermuscular

(c) Intermuscular-Subcutaneous-Intramuscular

(d) Intramuscular-Intermuscular-Subcutaneous

132. The enclosed piece of land, adjacent to shed, for the comfort of animals is called as:

(a) Shed pasture (b) Pasture

(c) Paddock (d) Range

133. **Usually conception rate is higher it served during:**
(a) Foal heat in mares
(b) Involuntary phase in cows
(c) Soon after parturition in buffaloes
(d) Pseudo pregnancy in bitch

134. **Which of the following statement is not correct for quantitative trait expression?**
(a) Genes have small effect each
(b) Genes have large effect each
(c) Expression of genotype is modified by non-genetic causes
(d) Many genes are involved

135. **The difference between neutral detergent fibre (NDF) and acid detergent fibre (ADF) is mainly due to**
(a) Cellulose
(b) Hemicellulose
(c) Starch
(d) Pectin's

136. **Biochemical Oxygen Demand (BOD) is the amount of oxygen required by the microorganisms to assimilate available nutrient in**
(a) 5 days at 20°C
(b) 3 days at 15°C
(c) 4 days at 10°C
(d) 2 days at 25°C

137. **Presently India is producing about 66 eggs/person/year against ICMR recommendation of**
(a) 106 eggs/person/year
(b) 146 eggs/person/year
(c) 180 eggs/person year
(d) 196 eggs/person/year

138. **Which out of the followings is observed when heat load on the animal is enhanced?**
(a) Wallowing
(b) Hibernation
(c) Unddling
(d) Piloerection

139. **The substance extracted from vitelline membrane of the eggs for pharmaceutical use is**
(a) Sialic acid
(b) Lysozyme
(c) Lutein
(d) Lecithin

140. **Which out of the following cells is a component of blood brain barrier**
(a) Microglia
(b) Oligodendroglia
(c) Astrocyte
(d) Schwann cell

141. **Movement of solvent due to osmosis occurs from solute concentration direction as**
(a) Higher to lower
(b) Lower to higher
(c) Equalized concentration
(d) Irrespective of concentration

142. **Cryovac packaging system is related to**
(a) Modfied Atmospheric packaging
(b) Vaccum packaging
(c) Shrink packaging
(d) Biodegradable packaging

143. **Which out of the following hormonal condition favours normal parturition in cow?**
(a) Low progesterone, low oxytocin, low estrogen
(b) High progesterone, low oxytocin, high estrogen
(c) Low progesterone, low oxytocin, high estrogen
(d) High progesterone, high oxytocin, low estrogen

144. **During pneumothorax the transpleural pressure tends to be**
(a) Negative
(b) Positive
(c) Zero
(d) Fluctuating

145. **Out of 2000 eggs set 1900 were fertile. Out of which, 1800 chicks hatched out. The fertile hatchability is**
(a) 98.00%
(b) 94.74%
(c) 90.50%
(d) 90.00%

146. Neurotropic Velogenic New Castle Disease (NVND) is otherwise called as

(a) Doyle's form
(b) Beaudette's form
(c) Hitchners form
(d) Beach's form

147. Digestibility coefficients of various nutrients in feeds are estimated more precisely by

(a) Digestibility trial
(b) Nylon bag
(c) Gas production
(d) Rumen stimulation

148. Most promising initial symptom of vitamin A deficiency in cows and horses is

(a) Copius lacrymation
(b) Copius salivation
(c) Frequent urination
(d) Frequent defecation

149. Which disease cannot be prevented by vaccination?

(a) H.S.
(b) B.Q
(c) F.M.D
(d) Milk fever

150. Per capita meat and milk availability in India is approximately

(a) 4.5 kg/year and 337gm/day, respectively
(b) 6.0 kg/year and 300gmdey, respectively
(c) 6.5 kg/year and 437gm/day, respectively
(d) 3.5 kg/year and 250gm/day, respectively

151. Covariance due to resemblance between half-sibs is:

(a) 1/2VA
(b) 1/2VA+ 1/4VD
(c) 1/4 VA
(d) 1/4VA+ 1/8 VD

152. Which of the following defines the characteristics of a population?

(a) Gene frequencies
(b) Genotype frequencies
(c) Phenotype frequencies
(d) Gene and genotype frequencies both

153. If a virus particle contains double stranded DNA with 200 base pairs, how many nucleotides would be present?

(a) 100
(b) 200
(c) 300
(d) 400

154. Which out of the followings is not a part of Graafian Follicle?

(a) Leydig's cell
(b) Chorona radiata
(c) Cumulus cells
(d) Zona pellucida

155. Electrical stimulation of carcasses has been found to be LEAST effective in bringing improvement in

(a) Tenderness of meat
(b) pH of meat
(c) colour and texture of meat
(d) Microbial load of meat

156. Who is the risk bearer in the farm business

(a) Farm Employees
(b) Farm Entrepreneur
(c) Farm Manager
(d) Farm Accountant

157. Which one of the following is not a accessory reproductive organ of male chicken?

(a) Paracloacal vascular bodies
(b) Dorsal proctodeal gland
(c) Lymphatic folds
(d) Cowper's gland

158. **Finger printing was first used in**
(a) England (b) USA
(c) India (d) Germany

159. **Methane is produced in the rumen by**
(a) Bacteria (b) All fungi
(c) Protozoa (d) Methanogenic bacteria

160. **Electro encephalographic rhythm associated with deep sleep is**
(a) Alpha (b) Beta
(c) Delta (d) Theta

161. **Coccidiosis and subsequent treatment with sulpha drugs will result in the deficiency of Vitamin**
(a) A (b) D
(c) E (d) K

162. **Which of the following is the most important factor in inhibiting the digestibility of paddy straw?**
(a) Cellulose (b) Hemicellulose
(c) Silica (d) Oxalates

163. **The most limiting amino acid in the growing horse's ration**
(a) Leucine (b) Arginine
(c) Threonine (d) Lysine

164. **The methionine requirement during chick stage in commercial layers as per BIS (2007) is**
(a) 0.35% (b) 0.40%
(c) 0.45% (d) 0.50%

165. **Curled toe paralysis in chicks is due to deficiency of**
(a) Vitamin D3 (b) Riboflavin
(c) Thiamin (d) Pantothenic acid

166. **Which of the following statements is NOT TRUE from meat quality point of view?**
(a) Rest should be given to animal before slaughter
(b) Animal should not be fed, only ad lib water should be given before slaughter
(c) As far as possible, meat/carcass should be chilled before making cuts
(d) For best sensory quality, meat should be cooked during full rigor stage

167. **Range of correlation coefficient is:**
(a) -1 to $+1$ (b) 0 to 1
(c) 0 to ∞ (d) $-\infty$ to $+\infty$

168. **The most efficient method of transgenesis in poultry is**
(a) Sperm mediated gene transfer (b) Microinjection
(c) Nuclear transfer (d) Primordial germ cell transfer

169. **The method of sensory testing consisting of three coded samples, wherein two are identical and one is different, is known as**
(a) Duo test (b) Duo-trio test
(c) Triangle test (d) Paired test

170. Most common vice of stallion is

(a) Bring (b) Kicking

(c) Wind sucking (d) Rearing

171. Which of the following is not the normal function of the kidney?

(a) Thermoregulation (b) Water Homeostasis

(c) Electrolyte Homeostasis (d) Acid base balance

172. Who can consume more dry matter per kilogram of her body weight?

(a) Mare (b) Sow

(c) Ewe (d) Nanny

173. The minimum viable flock size of a commercial layer farm at the present scenario is

(a) 10,000 birds (b) 50,000 birds

(c) 1 lakh birds (d) 10 lakh birds

174. Collagen content of a tissue is generally estimated in terms of the following Amino Acid:

(a) Proline (b) Hydroxyproline

(c) Lysine (d) Methionine

175. Deficiency of iodine causes enlargement of

(a) Thyroid gland (b) Pineal gland

(c) Prostate gland (d) Adrenal gland

176. The thickest layer of egg shell is

(a) Palisade layer (b) Mammillary layer

(c) Surface crystal layer (d) Cuticle

177. Pick the correct formula for association between phenotypic, genetic and environmental correlation:

(a) $r_P + h_x h_y r_A + e_x e_y r_E$ (b) $r_P - h_x h_y r_A - e_x e_y r_E$

(c) $r_P + h_x h_y r_A - e_x e_y r_E$ (d) $r_P - h_x h_y r_A + e_x e_y r_E$

178. Who is generally shed to work on tar roads?

(a) Bull (b) Bullock

(c) Stallion (d) Camel

179. Most common acid used for preparation of paneer is

(a) Citric acid (b) Lactic acid

(c) Propionic acid (d) Hydrochloric acid

180. Ricin is a deleterious factor in

(a) De-oiled rice bran (b) Cotton seed cake

(c) Castor seed meal (d) Wheat bran

☆☆☆

Answer Key

1 a	2 c	3 d	4 c	5 b	6 c	7 b	8 d	9 d	10 d
11 a	12 b	13 c	14 a	15 d	16 b	17 d	18 b	19 b	20 a
1 a	2 b	3 c	4 a	5 b	6 a	7 b	8 d	9 b	10 a
11 a	12 b	13 d	14 d	15 c	16 a	17 c	18 b	19 b	20 a
21 c	22 a	23 c	24 d	25 d	26 a	27 c	28 a	29 c	30 c
31 d	32 a	33 d	34 a	35 b	36 a	37 a	38 c	39 d	40 c
41 a	42 b	43 d	44 b	45 b	46 b	47 c	48 c	49 c	50 a
51 c	52 b	53 a	54 a	55 a	56 a	57 d	58 d	59 b	60 b
61 d	62 c	63 d	64 c	65 c	66 d	67 a	68 b	69 a	70 a
71 c	72 d	73 a	74 d	75 a	76 c	77 a	78 c	79 d	80 a
81 b	82 b	83 a	84 b	85 b	86 c	87 c	88 a	89 d	90 b
91 d	92 c	93 d	94 d	95 a	96 a	97 b	98 b	99 c	100 c
101 c	102 b	103 a	104 d	105 c	106 b	107 b	108 d	109 c	110 b
111 a	112 b	113 b	114 a	115 b	116 b	117 b	118 c	119 b	120 d
121 c	122 d	123 a	124 d	125 b	126 b	127 c	128 a	129 b	130 a
131 c	132 c	133 a	134 b	135 b	136 a	137 c	138 a	139 a	140 c
141 b	142 b	143 c	144 c	145 b	146 d	147 a	148 a	149 d	150 a
151 c	152 d	153 d	154 a	155 d	156 b	157 d	158 a	159 d	160 a
161 d	162 c	163 d	164 b	165 b	166 d	167 a	168 d	169 c	170 a
171 a	172 d	173 b	174 b	175 a	176 a	177 d	178 b	179 a	180 c

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TNPSC VAS Exam Paper-2020

1. **Which of the following facts are true regarding operation flood programme launched in India?**
   1. NDDB formulated OF-I Programme in 1985,
   2. Of project is based on milk producers co-operative societies throught out India.
   3. Supply of milk to urban consumers at stable price.

   (a) 1 alone correct (b) 1 and 2 are correct
   (c) 3 alone correct (d) 2 and 3 are correct

2. **Which of the following statement is not true?**
   1. Operation flood to sought to replicate the AMUL Model of dairy development all over India.
   2. AMUL Model is based on Anand pattern co-operative structure.
   3. Anand pattern dairy co-operatives formulate and implement their own policiesand regulations for dairy development in their area
   4. The role of Government is limited to assist the co-operative financially isimplementing their own Programme.

   (a) 1 and 3 (b) 2 and 4
   (c) 4 only (d) All the above

3. **As per the 19th livestock census, the total livestock population in Tamil Nadu is**
   (a) 117.13 lakh (b) 227.23 lakh
   (c) 337.13 lakh (d) 367.23 lakh

4. **In India, the percapita availability of milk during 2017-18.**
   (a) 320 gms/day (b) 374 gms/day
   (c) 380 gms/day (d) 385 gms/day

5. **Twinning rate is..... in Goat Farming**
   (a) 20 % (b) 30%
   (c) 40% (d) 50%

6. **Which one of the following indigenous cattle breed is known as "Wadhiar"?**
   (a) Ongole (b) Kankrej
   (c) Krishna Valley (d) Kangeyam

7. **.....possesses two white collars, one round the jaw and the other round thebrisket.**
   (a) Murrah (b) Surti
   (c) Mehaana (d) Bhadawari

8. **Match the following:**

Poultry Species	**Zoological Name**
(a) Duck	(1) Pero Cristatus
(b) Turkey	(2) Anas Platyrhynchos
(c) Goose	(3) Anser anser
(d) Pea fowl	(4) Meleagris galloparo

(a)	(b)	(c)	(d)		(a)	(b)	(c)	(d)
(a)	2	4	1	3	(b)	2	4	3	1
(c)	4	2	3	1	(d)	2	3	4	1

9. **In dairy cow, milking operations should be completed within**
   (a) 2-3 minutes (b) 10-15 minutes
   (c) 15-20 minutes (d) 5-7 minutes

10. **Ear notching is commonly practiced for identification method in**
    (a) Horse (b) Camel
    (c) Poultry (d) Swine

11. **The pigment responsible for the brown eggshell in chicken**
(a) Crustacyanin (b) Tetrapyrroles
(c) Oocyan (d) Ooporphyrin

12. **The ideal age for dehorning the calf is**
(a) Before 7 days old (b) Before 10 days old
(c) Before 15 days old (d) Before 12 days old

13. **Which of the following device(s) that could be used to prevent abnormal behaviours of cattle?**
1. Muzzle
2. Gag
3. Drencher
(a) 1 alone is correct (b) 2 alone is correct
(c) 1 and 2 are correct (d) 1 and 3 are correct

14. **The parturient paresis in dairy cattle is caused by the deficiency or nutrient.**
(a) Sodium (b) Magnesium
(c) Sulphur (d) Calcium

15. **Feeding of bypass protein is advisable to**
(a) Dairy cow yielding more than 15 kg, milk/day
(b) Dairy cow yielding less than 15 kg. milk/day
(c) Pregnant cows
(d) Dry cows

16. **Feed dry matter in take of adult elephant ranges from**
(a) 2-3% of body weight (b) 1-1.5% of body weight
(c) 4 - 5% of body weight (d) 3-4% of body weight

17. **Which one of the following unconventional feed which can be very well ensiled for ruminary feeding?**
(a) Mango seed kernel (b) Sugarcane tops
(c) Tapiocathippi (d) Tamarind seed powder

18. **The pH value of good silage is**
(a) 3.7 - 4.2 (b) 4.5 - 4.8
(c) 2.0 - 2.5 (d) 5.5 — 6.0

19. **Grass tetany in cattle is due to the deficiency of**
(a) Magnesium (b) Manganese
(c) Calcium (d) Copper

20. **Which one of the following has high phosphorus content?**
(a) Wheat bran (b) Ground nut oil cake
(c) Maize (d) Soyabean meal

21. **The crude protein equivalent of urea is**
(a) 150% (b) 300 %
(c) 281 % (d) 181 %

22. **Which one of the following is essential amino acid for cats?**
(a) Taurine (b) Tryptophan
(c) Tyrosine (d) Methionine

23. **Glucogenic volatile fatty acid is**
(a) Propionic acid (b) Acetic acid
(c) Iso valeric acid (d) Butyric acid

24. **Which of the following is precursor for prostaglandin and thromboxane?**
(a) Eicosapentaenoic acid (b) Hydoxy eicosatrienoic acid
(c) Docosahexaenoic acid (d) Dihomo-y-linoleic acid

25. **.....is the direct measure of proportion of crude protein that can be used by anima for synthesis of body tissue.**
(a) Biological value (b) Gross protein value
(c) Net protein retention (d) Nitrogen balance

26. **Who postulated the theory of chromosomal basis of linkage?**
(a) Gregor Mendel (b) Morgan
(c) Muller (d) Griffith

27. **The exchange of chromosome segments or portion between non homologuschromosomes is known as**
(a) Translocation (b) Translation
(c) Transfection (d) Recombination

28. **The mechanism that equalizes the level of expression of genes on the X-chromosome between the two sexes even though males and females have different number ofX chromosomes is**
(a) Inactivation of chromosome (b) Hyperactivation of X chromosome
(c) Dosage compensation (d) Epigenetic inheritance

29. **Situation in which each member of a population has an equal opportunity of mating with any individual of the opposite sex**
(a) Preferential mating (b) Panmixia
(c) Non-random mating (d) Compulsory mating

30. **Which of the following method of heat loss can occur when an animal is kept standing in a room with temperature above 40°C, with very low humidity?**
(a) Convection and radiation (b) Convection and evaporation
(c) Evaporation and radiation (d) Radiation alone

31. **The organ that receives the maximum amount of cardiac output is**
(a) Pancreas (b) Liver via Splanchnic circulation
(c) Spleen (d) Heart

32. **The average life span of erythrocytes of chicken is.....days.**
(a) 8 to 15 (b) 28 to 35
(c) 48 to 55 (d) 68 to 75

33. **An abnormal type of hemoglobin HbS is observed in**
(a) Aplastic anemia (b) Megaloblastic anemia
(c) Sickle cell anemia (d) Microcytic anemia

34. **A condition of breathing in which the rate or the depth or both are increased is termed as**
(a) Polypnea (b) Apnea
(c) Hyperpnea (d) Eupnea

35. **The primary stimulant for glycogenolysis in the muscle is**
(a) Insulin (b) Glucagon
(c) Epinephrine (d) Acetylcholine

36. **The pelvic organs can be palpated through this passage**
(a) Rectum (b) Colon
(c) Anus (d) Vagina

37. **Stomach capacity will be rumen 80 percent, reticulum 05 percent, omasum07 percent and abomasum 08 percent at the age of**
(a) 6 months (b) 8 months
(c) 24 months (d) 18 months

38. **Oval prominences of the mucous membrane lining the uterus are called as**
(a) Cotyledons (b) Placentomes
(c) Caruncles (d) Hippomanes

39. **Ventral diverticulum of eustachian tube in equines is**
(a) Guttural pouch (b) Pharyngeal diverticulum
(c) Isthmus faucium (d) Auditus laryngis

40. **Nails swallowed by cattle, commonly lodged in this compartment and perforates diaphragm.**
(a) Rumen (b) Reticulum
(c) Omasum (d) Abomasum

41. **Alimentary canal consist of all except**
(a) Esophagus (b) Liver
(b) Stomach (d) Intestine

42. **Among the babesia species, which one is more pathogenic and causing huge mortality in animals at field level is**
(a) *Babesia bovis* (b) *Babesia bigemina*
(c) *Babesia divergens* (d) *Babesia microti*

43. **The microscope which is routinely used in microbiology labs to examine both stained and unstained specimens.**
(a) Park field microscope (b) Bright field microscope
(c) Phase contrast microscope (d) DIC microscope

44. **Which one of the following is considered as non-obligatory cydozoonosis?**
(a) Taeniosis (b) Hyatidosis
(c) Trichinellosis (d) Cutaneous larva migrans

45. **A decision support system for the control of disease that require national control or eradication procedures**
(a) EpiMAN (b) EpiInfo
(c) Epizoo (d) Win Episcope

46. **Animals that shed infectious agent when they are recovering from a disease, and the agent may then persist for prolonged periods**
(a) Incubatory carriers (b) Latent carriers
(c) Convalescent carriers (d) Persistant carriers

47. **The constant presence with usual frequency of occurrence of disease in a population**
(a) Sporadic (b) Endemic
(c) Epidemic (d) Pandemic

48. **Blue Comb disease in Turkeys is caused by**
(a) Adeno Virus (b) Corona Virus
(c) Picorna Virus (d) Herpes Virus

49. **Which virus causes blue tongue in Sheep?**
(a) Orbi Virua (b) Circo Virus
(c) Calci Virus (d) Corona Virus

50. **Mareks disease in Chicken is caused by**
(a) Herpes Virus (b) Pox Virus
(c) Paramyxo Virus (d) IB Virus

51. **Duck viral hepatitis is caused by**
(a) Herpes Virus (b) Corona Virus
(c) Adeno Virus (d) Picorna Virus

52. **Number of Serotypes present in FMD Virus**
(a) 10 (b) 7
(c) 8 (d) 6

53. **Brucellosis is caused by**
(a) Brucella abortus (b) Mycobacterium bovis
(c) Bacillus anthracis (d) Leptospira interrogans

54. **Leptospira spirochetes are more prevalent in**
(a) Marshy and Alluvial Soil
(b) Rock Soil
(c) Red Soil
(d) Black Sand Soil

55. **Diagnosis of coccidiosis in Chicken is best accomplished by**
(a) Clinical signs
(b) Post mortem examination
(c) Oocyst count
(d) Demonstration of Oocyst in droppings

56. **Eosinophilic enteritis in humans is caused by the dog parasite Ancylostomacaninum. Which of the following statements are correct?**
(a) It is caused by adult A. Caninum
(b) It is caused by infective larva (L) of A.Caninum
(c) It can be diagnosed by examination of faeces of human patient
(d) It causes an increase in the levels of circulating eosinophils
(a). (b) and (d)
(b). (b), (c) and (d)
(c). (a), (c) and (d)
(d). (a) and (d)

57. **Severe infestation of this flea can lead to corneal ulceration and blindness**
(a) Echidnaphaga gallinacea
(b) Ctenocephalides cania
(c) Xenopsylla cheopsis
(d) Pulex irritans

58. **In the following parasitic diseases, hypoglycemia is observed in**
(a) Theileriasis
(b) Babesiosis
(c) Trypanosomiasis
(d) Leishmaniasia

59. **Brandyzoites characteristic of chronic Toxoplasma infections are seen in**
(a) Blood
(b) Brain
(c) Faeces
(d) Lymph

60. **Immune evasion in trypanosoma infections is due to**
(a) Antigenic memory
(b) Immuno suppression
(c) Repeated change in antigenic character
(d) Inhibition of phagolysome formation

61. **The most pathogenic cestode of poultry is**
(a) Raillietina echinobothridia
(b) Davainea proglottina
(c) Choanotaenia infundibulum
(d) Cotugnia digonopora

62. **Temporary relationship between two organisms, where in one organism transports another is known as**
(a) Symbiosis
(b) Mutualism
(c) Phoresy
(d) Commensalism

63. **Death of an animal is assessed by**
(1) Stoppage of respiration
(2) Loss of corneal reflex
(3) Cooling of the body
(4) Pedalling movements of legs
(a) (1) is true, and (2), (3) and (4) are false
(b) (2) is true, and (1), (3) and (4) are false
(c) (1), (2) and (3) are true, and (4) is false
(d) (1) is true, and (1), (2) and (3) are false

64. **Ruptured immature neutrophils in circulation are called as**
(a) Basket cells
(b) Smudge cells
(c) Target cells
(d) Crenated cells

65. **In which of the following disease, the upper respiratory tract is usually the primarynidus of infection in rabbits?**
(a) Coronavira! enteritis
(b) Pasteurellosis
(c) Listeriosis
(d) Dermatophytosis

66. **Histological features of interstitial pneumonia are given below. Which of the following feature is/are unrelated to the condition?**
(1) Thickening of inter lobular septa due to fibrous tissue proliferation
(2) Epitheliolisation or fotalisation is prominent
(3) Giant cell and hyaline membrane formation is seen
(4) Hyperplastic alveolar epithelium gives it a glandular appearance
(a) (2) and (3) are unrelated (b) (3) alone is unrelated
(c) (4) alone is unrelated (d) (1), (3) and (4) are unrelated

67. **Cooling of the body**
(a) Rigor Mortis (b) Algor Mortis
(c) Hypothermia (d) Livor Mortis

68. **Langhan's giant cells are seen in**
(a) Burkitt Lymphoma (b) Pseudo rabies
(c) Hodgkin's disease (d) Tuberculosis

69. **Diffuse spreading suppurative inflammation of connective tissue is known as**
(a) Phlegmon (b) Abscess
(c) Pustule (d) Sinus

70. **The drug effective in anaerobic bacterial infection is**
(a) Azithromycin (b) Ciprofloxacin
(c) Metronidazole (d) Gentamicin

71. **Cetotaxime which is highly effective in Staphylococci infection is classified as**
(a) First generation Cephalosporin (b) Second generation Cephalosporin
(c) Third generation Cephalosporin (d) Fourth generation Cephalosporin

72. **An agent used against anaerobic as well as protoza is**
(a) Mebendazole (b) Metronidazole
(c) Methicillin (d) Marbofloxacin

73. **The Methicilin Resistant Staphylococci (MRS) is resistant to B lactam antibiotica through**
(a) Pencillin Binding Protein Mutation (PBP1(a)
(b) PBP1b
(c) PBP2
(d) PBP3

74. **Antibacterial agent used for topical application is**
(a) Amikacin (b) Cafepime
(c) Tazobactum (d) Polymyxin-B

75. **Drugs concentrate more in milk if they are**
(a) weakly acidic (b) weakly basic
(c) strongly acidie (d) strongly basic

76. **Pick up the correct sequence with regard to the "Descending order of First Pass Effect of a drug with reference to route of administration of drugs"**
(a) Intra venous, sublingual, intra muscular, rectal, oral
(b) Oral, rectal, intra muscular, sublingual, intra venous
(c) Intra venous, sublingual, rectal, intra muscular, oral
(d) Oral, intra muscular, rectal, intra venous, sublingual

77. **The following are purgatives EXCEPT**
(a) Docusate sodium (b) Castor oil
(c) Bisacodyl (d) Loperamide

78. **Assertion (a): Loop diuretics are used along with potassium sparing diuretics. Reason (R):Loop diuretics cause hypokalemia.**
(a) (a) is true and (R) is the correct reason for (a)
(b) (a) is true but (R) is not the correct reason for (a)
(c) (a) is false but (R) is true
(d) (a) and (R) are falso

79. **Collection of blood between the ear cartilage and skin of the dog is**
(a) Otitis externa (b) Otitis media
(c) Otitis interna (d) Aural haematoma

80. **The sperm concentration of adult bull ranges from**
(a) 1.8 x 10 sperm/ml (b) 10 x 109 sperm/ml
(c) 9.0 % 10% sporm/ml (d) 6.0 x 107 sperm/ml

81. **Which of the following facts are correct regarding signs of fetal acidosis in reauccidation of calf?**
(1) Low heart rate (2) Prolonged Jugular refilling time
(3) Corneal opacity (4) Poor muscle tone
(a) (1) is true, (2), (3), (4) false (b) All are true statements
(c) (1), (2). (4) true, (3) false (d) (1), (2), (3), (1) statements are false

82. **Administering GnRH 11-13 days after breeding, to improve conception rate in cows induces**
(a) Accessory corpus luteum formation (b) Clearing the uterine environment
(c) Proliferation of endometrial glands (d) Inducing persistence of dominant follicle

83. **The intersexual characteristics of a male pseudohermaphrodites**
(a) Phenotypically resemble males but have ovaries
(b) Phenotypically resemble females but have testes
(c) Have both testes and ovaries
(d) Does not have both testes and ovaries

84. **Goose stepping gait in pigs is due to deficiency of**
(a) Niacin (b) Folic acid
(c) Pantothenic acid (d) Pyridoxing

85. **The state of dehydration is assessed by inspecting**
(a) eye and skin (b) tail and skin
(c) mucous membrane (d) heart area and skin

86. **Which of the following deficiency occurs most commonly in animals grazing during drought seasons and houses and fed on hay only?**
(a) Phosphorous deficiency (b) Biotin deficiency
(c) Chloride deficiency (d) Pottassium deficiency

87. **Which one of the following puppy having low immunity against Parvo viral enteritis leading to high risk?**
(a) Pug (b) Chippi parai
(c) Dobermann (d) Rajapalayam

88. **Commonly used dairy sanitizer is**
(a) Calcium hypochlorite (b) Quaternary ammonium compound
(c) Iodine compound (d) Choramine

89. **After pasturization milk should be stored below..... to retard the growth ofsurviving organism**
(a) 10°C (b) 0°C
(c) 5°C (d) 15°C

90. **The pH of normal cow milk usually varies from**
(a) 5.4 to 5.6 (b) 7.4 to 7.6
(c) 6.7 to 6.8 (d) 6.4 to 6.6

91. **The stabilizer used in ice-cream preparation is**
(a) Gelatin (b) Starch
(c) Egg yolk (d) GMS

92. **In general the lighting intensity at all inspection points of slaughter house/meat inspection room should not be less than**
(a) 110 lux (b) 540 lux
(c) 220 lux (d) 320 lux

93. **Overall result of stress to the line stock before slaughter results in**
(a) increase in blood urea
(b) increase in the level of blood glucose and ketones
(c) decrease in blood urea
(d) increase in blood cholesterol

94. **The ultimate pH of meat is**
(a) 4.5 (b) 5.5
(c) 6.5 (d) 6.0

95. **Gelatin is prepared from**
(a) Intestines (b) Skin and hide trimmings
(c) Bore meal (d) Horns and hooves

96. **During animal waste processing high risk material must be heated to a coretemperature of**
(a) 133 °C (b) 90 °C
(c) 210 °C (d) 100°C

97. **Average BOD values of effluents from poultry meat processing plant ranges between**
(a) 1000 - 1200 (b) 600 - 1300
(c) 5000 (d) 20000

98. **The dip lift method of stunning is related to**
(a) Electrical stunning (b) Gaseous stunning
(c) Mechanical stunning (d) None of the above

99. **During stunning, the arterial blood pressure of animals raises to**
(a) 120-145 mm Hg (b) 260 mm Hg
(c) 450 mm Hg (d) 90 mm Hg

100. **Maiming of an animal is made by all excepts**
(a) Fracture of bone (b) Cutting of tendons of leg
(c) Injury to adder (d) Over loading

101. **Any establishment involving on experimentation on animals should be registered with**
(a) AWBI (b) SPCA
(c) VCPCSEA (d) PETA

102. **The prevention of cruelty to Draught and Park Animals Rules,**
(a) 1955 (b) 1965
(c) 1975 (d) 1986

103. **Demand change with the change in following except**
(a) Taste of preference (b) Income
(c) Price (d) Tax

104. **Insurance Premium isof animal cost.**
(a) 5% (b) 10%
(c) 15% (d) 20%

105. **Fixed Capital to work out economics of dairy enterprise comprises of**
(a) Building Cost (b) Dairy Cattle Cost
(c) Equipment Cost (d) All the above

106. **The native breed of cattle in southern districts of Tamil Nadu**
(a) Kangeyam (b) Umbalacheri
(c) Alambadi (d) Pulikulam

107. **Which is the rural development programme according to technology dissemination system?**
(a) Artificial Insemination Programme (b) Hill Area Development Programme
(c) Khadi and Village Industries (d) Krishi Vigyan Kendra

108. **National Dairy Research Institute located in**
(a) Mumbai (b) Karnal
(c) Bangalore (d) Chennai

109. **Choose the correct statement regarding livestock development programme of India.**
1. Key Village Scheme was launched in 1952 for the improvement of cattle and buffaloes
2. Central Gaushala Development Board was setup in 1989
3. Central Frozen Semen Production and Training Institute at Hesseryatta in1963.
(a) 1 alone correct (b) 2 alone correct
(c) 1 and 3 are correct (d) 3 alone correct

110. **The estimated egg production during 2017-18 has increased toTamil Nadu**
(a) 1,64,161 lakh numbers (b) 1,77,160 lakh numbers
(c) 1,74,161 lakh numbers (d) 1,87,160 lakh numbers

111. **Which breed is famous for Jallikattu in Southern parts of Tamil Nadu?**
(a) Pulikulam (b) Kangayam
(c) Bargur (d) Umblachery

112. **Umblachery breed is considered to be developed by crossing animals of Thanjavur.**
(a) Alambadi (b) Kangayam
(c) Pulikulam (d) Bargur

113. **Which of the following breed(s) of sheep are polled in nature?**
1. Mandya 2. Vembur
3. Mecheri
(a) 1 alone is correct (b) 1 and 2 are correct
(c) 3 alone is correct (d) 2 alone is correct

114. **Which of the following statements are correct related to "Pashima"?**
1. It is a finer speciality fiber. 2. Produced from goats.
3. Himalaya like high attitude area. 4. High quality shawls and fabric.
(a) 1 and 2 (b) 2 and 3
(c) 1, 3 and 4 (d) 1, 2, 3 and 4

115. **The order of disappearance of pigments (bleaching) from poultry body is**
(a) Vent - Eye ring - Ear lobes - Beak - Shank
(b) Vent - Beak - Eye ring - Ear lobes - Shank
(c) Shank - Beak - Ear lobes - Ear ring - Vent
(d) Vent - Shank - Beak -Ear lobes-Ear ring

116. **Floor space requirement recommended under covered area for a farrowing sowis.....m^2**
(a) 7.0-9.0 (b) 10.0 -11.0
(c) 12.0-13.0 (d) 1.8 - 2.7

117. **Floor space requirement of adult buffaloe in covered area is**
(a) 3.5 m^2 (b) 4.0 m^2
(c) 12.0 m^2 (d) 1.0 m^2

118. **What will be the floor space requirement like covered area per animal (m^2) and open area per animal (m^2) for cows.**
(a) 4.5 and 8.0 (b) 6.0 and 9.0
(c) 3.5 and 7.0 (d) 5.5 and 9.0

119. **.....are surgically unsexed male chickens.**
(a) Toms (b) Capons
(c) Fryers (d) Roasters

120. **Which one of the following method is widely used for disposal of farm animal wastes?**
(a) Rendering (b) Burial
(c) Composting (d) Incineration

121. **High intake of maize in the diet of pigs and poultry leads to..... deficiency.**
(a) Thiamin (b) Nicotinamide
(c) Riboflavin (d) Pyridoxine

122. **Perosis in chicks is caused by the deficiency of**
(a) Calcium (b) Phosphorus
(c) Manganese (d) Magnesium

123. **.....feeding starts 2 weeks before the expected date of carving**
(a) steaming up (b) complete
(c) challenge (d) mixed

124. **The inclusion level of molasses in the animal ration is**
(a) 5-10% (b) 1 - 2%
(c) 40- 50% (d) 20 -30%

125. **Rape seed contain which of the following fatty acid**
(a) Erucic acid (b) Oleic acid
(c) Linolenic acid (d) Stearic acid

126. **Match List I (Feed Ingredients) with List II (Anti-nutritional factor) and select the correct answer :**

List I	List II
(a) Soyabean	1. Ricin
(b) Caster bean	2. Saponin
(c) Salseed meal	3. Protease inhibitor
(d) Lucerne	4. Tannin

	(a)	(b)	(c)	(d)
(a)	2	3	1	4
(b)	1	4	3	2
(c)	4	2	1	3
(d)	3	1	4	2

127. **Part of feed dry matter which consists mostly of sugars and starches is referred as**
(a) Ether Extract (b) Crude fibre
(c) Nitrogen free extract (d) Crude protein

128. **As per breeding policy of Tamil Nadu use of Holstein-Friesian (HF) bull semen is recommended for grading up of non-descript cattle in the areas like**
(a) Coimbatore, Udumalpet, Pollachi and Dharmapuri
(b) Nilgiris, Kodaikanal and Kanyakumari district
(c) Thanjavur, Tiruvarur and Nagai Districts
(d) Madurai, Tirunelveli and Virudhunagar Districts

129. **The procedure of treating some genetic disorders by delivering a normal copy of the defective gone to the individual is called**
(a) Nuclear Transfer (b) Gene Transfer
(c) Gene Therapy (d) Gene knock-out

130. In Poultry Breeding studies, it is found that egg weight and egg production traits are

(a) Positively correlated
(b) Negatively correlated
(c) Not at all correlated
(d) Environmentally correlated

131. REML stands for

(a) Random Error Maximum Likelihood Method
(b) Restricted Maximum Likelihood Method
(c) Relative Environment Maximum Likelihood Method
(d) Restricted Minimum Likelihood Method

132. The age at sexual maturity in Tiger is between

(a) One and Two years
(b) Two and Three years
(c) Three and Four years
(d) Four and Five years

133. Which indigenous breed of cattle produces more milk yield per lactation?

(a) Gir
(b) Red Sindhi
(c) Sahiwal
(d) Tharparkar

134. In rumen, methane is produced by the action of

(a) Bacteriodes succinogens
(b) Ruminococcus albus
(c) Methanobacterium ruminantium
(d) Butyrivibrio fibrisolvons

135. Which one of the following is termed as Internal baro receptors!

(a) JG cells
(b) Macula densa
(c) Vasa recta
(d) Lacis cells

136. Match the following Digestive Enzymes with its Physiological Function:

Enzymes	**Function.**
(a) Pepsin	1. Activate the trypsinogen
(b) Enterokinase	2. Splits fate to free fatty acids
(c) Pancreatic lipase	3. Conversion of proteins into polypeptides
(d) Rennin	4. Milk coagulating enzyme

	(a)	**(b)**	**(c)**	**(d)**
(a)	2	1	4	3
(b)	1	3	2	4
(c)	4	1	2	3
(d)	3	1	2	4

137. The immunoglobulins are absorbed intact in newborn animals due to all of the following except.

(a) Presence of antitrypsin factor in colostrum
(b) Absorption occurs by pidocytic mechanism
(c) Gastric acid is not secreted
(d) Absorption occurs via special ruminal papillae

138. Calcium channel blocker

(a) Captopril
(b) Verapamil
(c) Losartan
(d) Labetalol

139. The oxidative phase of HMP shunt generates which of the following reducing equivalent?

(a) NADH
(b) NADPH
(c) FADH
(d) NAD

140. The pulmonary veins opens into

(a) Left ventricle
(b) Right ventricle
(c) Left atrium
(d) Right atrium

141. The number of thoracic vertebrae in OX

(a) 9
(b) 12
(c) 13
(d) 18

142. **In domestic fowl, the clavicles of two sides unites to form a plate called**
(a) Hypocleidium (b) Keel
(c) Pectoral girdle (d) Pelvic girdle

143. **Point of Hock joint is formed by**
(a) Tibial tarsal (b) Fibular tarsal
(c) Pused central and fourth tarsal (d) Fused second and third tarsal

144. **The action of the Deltoideus muscle is**
(a) To flex the shoulder joint and adduct the arm
(b) To abduct the arm and rotate it outwards
(c) To extend the shoulder joint
(d) To flex the shoulder joint and abduct the arm

145. **The drug of choice and dose rate for treating *H. canis* infection in dog is**
(a) Trimethoprion – 15 mg/kg bwt for 6 days
(b) Pyrimethamine- 0.25 mg/kg but for 2 days
(c) Clindamycin -10 mg/kg bw for 4 days
(d) Imidoearb dipropionate- 5 mg/kg bwt for 4 days

146. **Which one is the correct and safe protected litre value for rabies?**
(a) <0.25 (b) <0.36
(c) <0.45 (d) 0.5

147. **An example for primary lymphoid organ**
(a) Tonsils (b) Spleen
(c) Lymph node (d) Thymus

148. **Ability of an infectious agent to cause disease, in a particular host, interms of severity**
(a) Virulence (b) Pathogenicity
(c) Infectivity (d) Invasiveness

149. **Which immunoglobulin mediates Type I hypersensitivity reaction**
(a) IgE (b) IgM
(c) IgD (d) IgA

150. **Germ tube test is carried out for the identification of**
(a) Candida albicans (b) Clostridium tetani
(c) E.Coli (d) Staphylococcus aureus

151. **In the absence of bright sunlight and certain atmospheric pollutants, the Foot and Mouth Disease Virus (FMDV) can be carried by air stream for atleastmile distance to infect incontact health susceptible animals.**
(a) 20 mile distance (b) 30 mile distance
(c) 40 mile distance (d) 10 mile distance

152. **Which of the following is the order in which the lesions of pox virus infections developed?**
(a) Papular-Pustular-Roseolar - Senb formation - Vesicles
(b) Romeolar Papular - Vesicular-Pustular - Scab formation
(c) Vesicles - Pustules - Papules - Rashes - Scabs
(d) Scabs - Vesicles — Pastules - Papular – Rashes

153. **Johne's disease infection is acquired by calves at an early stage through:**
(a) Ingestion of organism (b) Inhalation
(c) By seeing the discased animal (d) Skin contact

154. **'Pink Eye' in bovine is caused by**
(a) Moraxella bovis (b) Pseudomonas aeroginosa
(c) Aptho Virus (d) Lyssa Virus

155. Organism that live on dead or decaying organic matter is called

(a) Symbiosis
(b) Saprophytism
(c) Parasitism
(d) Commensalism

156. The most commonly used media to grow fungi

(a) Nutrient agar
(b) Sabouraud dextrose agar
(c) Mullen hinton agar
(d) Macconkey agar

157. Micro organism that grow in moderate temperatures are called

(a) Mesophiles
(b) Thermophiles
(c) Psychrophiles
(d) Hyperthermophiles

158. Lithium antimony thiomaleate is a drug of choice for

(a) Acute fasciolosis
(b) Nasal Schistosomosis
(c) Amphistomosis
(d) Toxocarosis in cattle

159. During necropsy, hepatic coccidiosis is easily diagnosed by the examination of

(a) Faeces for oocysts
(b) Liver for asexual stages
(b) Bile for oocysts
(d) Liver for macrogamonts

160. Slime balls expelled by snails contain what larval stage of Dicroopelium dendriticum?

(a) Redia
(b) Sporocysts
(c) Metacercaria
(d) Cercaria

161. Which of the following parasite is transmitted by swallowing/ingeation of intermediate host/vector?

(a) Babesia gibsoni
(b) Hepatozoon canis
(c) Dipylidium caninum
(d) Both (b) and (c)

162. Which of the following statement is incorrect?

(a) Schistosoma nasale egg is Boomerang shaped
(b) Strongyloides spp eggs are thin shelled with segmented yolk
(c) Taenia spp eggs are cart-wheel appearance
(d) Trichuria spp eggs are brown and barrel-shaped

163. Most suitable type of soil for development of Ancylostoma Caninum larvae is

(a) Sandy moist soil
(b) Gravel
(c) Clay
(d) Loamy

164. The distinctive morphological features of Psoroptes mites are

(a) Funnel-shaped sucker, three-jointed pedicel, pointed mouth parts, rounded abdominal tubercles
(b) Cup-shaped sucker, short jointed pedicel, rounded mouth parts, truncate abdominal tubercles
(c) Cup-shaped sucker, three-jointed pedicel, pointed mouth parts, rounded abdominal tubercles
(d) Funnel-shaped sucker, short jointed pedicel, rounded mouth parts, truncate abdominal tubercles

165. Assertion (a) : Death of an animal due to black quarter and malignant oedema is caused by toxemia
Reason (R) : In black quarter and malignant edema there is ingestion of food contaminated with toxins
Which of the following statement is true?

(a) Both (a) and (R) are true and (R) is the correct explanation of (a)
(b) Both (a) and (R) are true but (R) is not a correct explanation of (a)
(c) is true but (R) is false
(d) (a) is false but (R) is true

166. Match the following:

(a) Swine erysipelas	1. Diamond skin disease
(b) Listeriosis	2. Abscess in sub-maxillary lymph node
(c) Strangles	3. Wooden tongue
(d) Actinobacillosis	4. Circling disease

	(a)	(b)	(c)	(d)
(a)	1	2	3	4
(b)	1	3	2	4
(c)	2	4	3	1
(d)	1	4	2	3

167. Marbling of the lung is a characteristic feature is seen in

(a) Anaplasmosis (b) Contagious bovine Pleuropneumonia
(c) Leptospirosis (d) Vibriosis

168. In which disease the rectum shows "Zebra marking" or "Tiger striping" appearance?

(a) Rinderpest (b) Foot and mouth disease
(c) Bovine viral Diarrhoea (d) Malignant catarrhal fever

169. One of the following organic compounds is not an alkaloid

(a) Atropine (b) Quinine
(c) Digoxin (d) Arecoline

170. Which one of the following aflatoxin is the most toxic in nature?

(a) Gl (b) M
(c) Al (d) B2

171. Neurotoxic snake venom is produced by

(a) Cobra (b) Krait
(c) Vipers (d) Rattle snakes
(a) (a) and (b) (b) (b) and (c)
(c) (c) and (d) (d) (a) and (c)

172. Methylene blue is the treatment of choice for

(a) Lead poisoning (b) Nitrite poisoning
(c) Arsenic poisoning (d) Cadmium poisoning

173. 'Blind Stagger' is associated with the following toxicity condition

(a) Chronic Arsenic Toxicity (b) Sub-acute selenium Toxicity
(c) Acute lead Toxicity (d) Molybdenum Toxicity

174. Consider the following pair.

DrugClinical use

(1) PhenytoinAnticonvulsant
(2) OrdansetronAntienetic
(3) Liquid ParaffinLaxative
(4) KetamineDissociative anaesthetic

Which of the above pair is/are correctly matched?

(a) (1) only (b) (1) and (2) only
(c) (1) and (3) only (d) (1), (2), (3) and (4)

175. 'In stage III surgical anaesthesia, which plane ends with cessation of eyeball movement?

(a) Plane 1 (b) Plane 2
(c) Plane 3 (d) Plane 4

176. **Which one of the drug is used in local anaesthetic procedure in veterinary practices?**
(a) Ketamine (b) Propofol
(c) Thiopentan (d) 2% lignocaine

177. **Fenbendazole is a more potent anthelomintie than thiabendazole because**
(a) Fenbendazole are slowly absorbend in G, tract because of low soluability in water
(b) Thiabendazole are dissolved well and dissociates quickly in G tract
(c) Difference in Pharmcokinetic behaviour
(d) GI tracts acts as lipid barrier

178. **Wounde produced by friction is called**
(a) Abrasion (b) Contusion
(c) Bruise (d) Laceration

179. **Ranula is a**
(a) Exudation cyst (b) Retention cyst
(c) Dentigerous cyst (d) Dermoid cyst

180. **The phase of excretary urography during which contrast medium opacifies the renal collecting system**
(a) Cholecystogram (b) Myelogram
(c) Pyclogram (d) Gastrogram

181. **The nerve block given for motorparalysis of eyelid is**
(a) Mental nerve block (b) Retrobulbar nerve block
(c) Auriculopalpebral nerve block (d) Infratrachlear nerve block

182. **An abscess involving the sebacious gland is**
(a) Carbuncle (b) Impetigo
(c) Acne (d) Furunculosis

183. **A closed wound which is produced by blunt ohjects results in damage to subcutaneous tissues without break in continuity of the skin surface is**
(a) Bruise (b) Contusion
(c) Haematoma (d) Seroma

184. **At.....after death the fetal corneas are cloudy and grey**
(a) 24 hours (b) 12 hours
(c) 36 hours (d) 48 hours

185. **Fructose in a source of energy for spermatozoa in the semen of domestic animals Except**
(a) Bull (b) Dog
(c) Ram (d) Boar

186. **Which of the following hormones have primarily Luteinizing Hormone (LH) like activity?**
(a) Pregnant mare serum gonadotrophin (b) Human menopausal gonadotrophin
(c) Human chorionic gonadotrophin (d) Follicle stimulating hormone

187. **Butterfly cast is used in the treatment of**
(a) Hip displasia (b) Shoulder dislocation
(c) Hip dislocation (d) Elbow dislocation

188. **Uncommon sequelae of traumatic perforation of the reticular wall in cattle is**
(a) Acute local peritonitis (b) Rupture of loft gastroepiploic artery
(c) Perforation of pericardium (d) Recuvery

189. **Hypokalemia in cattle leads to**
(a) Myotonia (b) Tetany
(c) Opacity of the cornea (d) Epistaxis

190. The Polenske (P) value of ghee is normally not more than

(a) 2 (b) 4
(c) 3 (d) 5

191. Match List I correctly with List II and select your answers using the codes given below:

List I	List II
(a) Fisher & Hooker Theory	1. Heat stability of Milk
(b) Stocke's law	2. Condensed Milk
(c) Sommer and Harts Theory	3. Cream
(d) Forced crystallization	4. Butter

	(a)	(b)	(c)	(d)
(a)	3	4	1	2
(b)	4	3	2	1
(c)	4	3	1	2
(d)	1	3	4	2

192. Lactose content in cow milk is about

(a) 1-2% (b) 4-5%
(c) 10-15% (d) 16%

193. Salting in cheese is done at a level of.....%

(a) 1-2 (b) 3-4
(c) 5-6 (d) 7-8

194. Which is the richest source of milk fat of the following dairy products?

(a) Curd (b) Tee-cream
(c) Ghee (d) Khoa

195. Frankfuter is a typical example of

(a) uncooked sausage (b) cooked unsmoked sausage
(c) cooked smoked sausage (d) uncooked smoked sausage

196. Which one of the following is not a traditional meat product?

(a) Kabab (b) Sausages
(c) Tikka (d) Kofta

197. Strength of cartridge in captive bolt pistal is measured in grains. One grain equals to

(a) 500 mg (b) 0.2 grams
(c) 0.065 grams (d) 1.5 gramS

198. The judgement for "Fevered carcasses" is

(a) partial rejection (b) total rejection
(c) suspect (d) conditionally approve

199. Haemal lymphnodes are found in

(a) Sheep (b) Pig
(c) Horse (d) All the above

200. Place where animals are given rest before slaughter is called as

(a) Abattoir (b) Slaughterhouse
(c) Market (d) Lairage

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
d	c	b	b	c	b	b	b	d	d
11	12	13	14	15	16	17	18	19	20
d	b	a	d	a	b	b	a	a	a
21	22	23	24	25	26	27	28	29	30
c	a	a	a	a	b	a	c	b	c
31	32	33	34	35	36	37	38	39	40
b	b	c	c	c	a	d	c	a	b
41	42	43	44	45	46	47	48	49	50
c	a	b	b	a	c	b	b	a	a
51	52	53	54	55	56	57	58	59	60
d	b	a	a	b	d	a	c	b	c
61	62	63	64	65	66	67	68	69	70
b	c	c	a	b	c	b	d	a	d
71	72	73	74	75	76	77	78	79	80
c	b	c	d	b	b	d	a	d	a
81	82	83	84	85	86	87	88	89	90
c	a	b	c	a	a	c	a	c	d
91	92	93	94	95	96	97	98	99	100
a	b	b	b	b	a	a	b	b	d
101	102	103	104	105	106	107	108	109	110
c	b	d	a	d	d	d	b	c	c
111	112	113	114	115	116	117	118	119	120
a	b	c	d	a	a	b	c	b	c
121	122	123	124	125	126	127	128	129	130
b	c	c	a	a	d	c	b	c	b
131	132	133	134	135	136	137	138	139	140
b	c	c	c	a	d	d	b	b	c
141	142	143	144	145	146	147	148	149	150
c	a	b	d	d	d	d	a	a	a
151	152	153	154	155	156	157	158	159	160
c	b	a	a	b	b	a	b	c	d
161	162	163	164	165	166	167	168	169	170
d	b	a	a	c	d	b	a	c	c
171	172	173	174	175	176	177	178	179	180
a	b	b	d	a	d	a	a	b	c
181	182	183	184	185	186	187	188	189	190
c	c	b	b	b	c	c	b	a	a
191	192	193	194	195	196	197	198	199	200
c	b	a	c	c	b	c	b	a	d

☆☆☆

NTA-ICAR (PG) Exam Paper-2019

1. **Which of the following is not a principle of working of cooperative system?**
   (a) Equal division of project (b) Democratic control
   (c) Voluntary association (d) Independent distribution of profit
2. **Milk is deficient in**
   (a) Zinc (b) Iron
   (c) Calcium (d) Magnesium
3. **The level of heterosis in F2 generation with respect to F1generation decreases by**
   (a) 10% (b) 25%
   (c) 50% (d) 75%
4. **As the number of observations increases, t-distributionapproaches**
   (a) Z-distribution (b) F-distribution
   (c) Y-distribution (d) Binomial distribution
5. **Individuals are closely related if they have a common ancestor upto**
   (a) 7-8 generations (b) 9-10 generations
   (c) 5-6 generations (d) 11-12 generations
6. **Heritability estimate of percent fat as compared to fat yield is**
   (a) less (b) equal
   (c) more (d) very less
7. **Acrosome part of mature spermatozoa derived from**
   (a) centriole (b) golgi bodies
   (c) mitochondria (d) nucleolus
8. **The limiting factor for the digestibility of paddy straw is**
   (a) oxalates (b) silica
   (c) cellulose (d) hemicellulose
9. **The example of primary group is**
   (a) neighbourhood (b) local shopkeeper
   (c) leader (d) Insurance agent
10. **A group of people organized for a definite purpose**
    (a) association (b) community
    (c) Institution (d) organization
11. **Which of the following sets is NOT properly matched?**
    (a) Toxin binder: Hydrated calcium aluminosilicates
    (b) Anticoccidials : lonophores
    (c) Enzyme : Phytases
    (d) Antioxidant Mannan-Oligo-Saccharides (MOS)
12. **The following breed of buffalo is known to have highest fatpercentage in the milk**
    (a) Bhadawari (b) Murrah
    (c) Nili-Ravi (d) Jaffarabadi
13. **An adoption is a**
    (a) Mental process (b) Social process
    (c) Individual process (d) Psychological process
14. **Gossypol is found in which food ingredient**
    (a) mustard cake (b) cotton sood cake
    (c) maize (d) barley

15. **Tomato pomace is a good source of which of the followingantioxidants?**
(a) Propyl gallate (b) Lycopene
(c) Anthocyanin (d) Ethoxyquin

16. **Goiter occurs due to the deficiency of**
(a) Iron (b) Cobalt
(c) Iodine (d) Copper

17. **Tabulated data can be represented graphically with**
(a) Frequency distribution (b) Normal distribution
(c) Histogram (d) Binomial distribution

18. **Bone darkening is a condition that occurs by freezing of**
(a) Broiler fryrer (b) Spent her
(c) Geese (d) Emu

19. **Spiral shaped artificial vagina (AV) is required for**
(a) Stallion (b) Boar
(c) Ram (d) Buck

20. **Multiple measurements may lead to gain inaccuracy of breedingvalue when the repeatability of a trait is**
(a) low (b) medium
(c) High (d) very high

21. **Which of the following can be a suitable area of study in the scopeof Rural Sociology**
(a) Education (b) Community
(c) Trade (d) Individual

22. **Fish meal used for poultry feed should be protected from**
(a) Aflatoxin (b) Gizerosin
(c) Ochratoxin (d) Aflatoxin-B1

23. **Stress hormones are secreted by**
(a) pituitary (b) adrenal
(c) pancreas (d) thyroid

24. **The plan of work arranged chronologically is**
(a) calendar of work (b) calendar of activities
(c) plan of work (d) project

25. **Giblet in poultry includes**
(a) heart, liver, oesophagus, gizzard (b) heart, gallbladder, liver
(c) heart, kidney, liver (d) heart, liver gizzard

26. **As per British method, efficiency of pasteurization of egg liquid ischecked by**
(a) Alpha amylase activity (b) Catalase enzyme activity
(c) Phytase enzyme activity (d) Alkaline phosphatase enzyme activity

27. **The mean of a Poisson distribution is**
(a) greater than variance (b) less than variance
(c) equal to variance (d) twice the variance

28. **Effective cooling system practiced in milk chilling centers is**
(a) Plate chillers (b) Immersion coils
(c) Bulk milk coolers (d) Freezers

29. **Which of the following egg protein is an excellent foaming agent.**
(a) Ovomucin (b) Ovoglobulins
(c) Ovalbumin (d) Ovomucoid

30. **Which of the following organisms is responsible for sulphur stinker in canned poultry products?**
(a) *Bacillus stearothermophilus* (b) *Bacilus coagulans*
(c) *Clostridium nigricans* (d) *Clostridium thermosaccharolyticum*

31. **The adulteration of milk with water is best judged by the determination of**
(a) freezing point (b) total solid content
(c) lactose content (d) protein content

32. **The maximum permissible limit (ppm) of sodium nitrite in curedmeat products is**
(a) 100 (b) 200
(c) 300 (d) 400

33. **Inbreeding coefficient (Fx) of full sib mating is**
(a) 0.25 (b) 0.50
(c) 1.00 (d) 0.125

34. **The neutral detergent fibre (NDF) and acid detergent fibre (ADF) are differentiated by**
(a) starch (b) pectin
(c) cellulose (d) Hemicellulose

the 35. **The ideal gradient of floor of animal house towards the drains is**
(a) 1 in 10 (b) 1 in 20
(c) 1 in 30 (d) 1 in 40

36. **Sweet clover disease syndrome in cattle occurs due to**
ogy (a) Dicumarol (b) Monensin
(c) Choline (d) Molybdenum

37. **The most effective method of selection**
(a) tandem (b) selection index
(c) ICLM (d) family selection

38. **The volume of air introduced 'in' and expelled 'out' from the lungs with each respiratory cycle is called as**
(a) residual volume (b) functional residual capacity
(c) total lung capacity (d) tidal volume

39. **Max absorption of water occurs in**
(a) proximal convoluted tubule (b) loop of Henle
(c) distal convoluted tubule (d) collecting ducts

40. **Milk pails should be made up of**
(a) iron (b) glass
(c) aluminium (d) stainless steel

41. **Maximum level of incorporation (%) of fish meal in poultry ration**
(a) 5 (b) 10
(c) 15 (d) 20

41. **In contracting cardiac and skeletal muscles, the calcium ionsprincipally bind to**
(a) Troponin C (b) Tropomyosin
(c) Actin (d) Calmodulin

42. **More than 10% fiber content in feed is not recommended for**
(a) layer (b) equine
(c) bovines (d) Ovine

43. **Non-digestible feed substances that selectively stimulate growthof favourable bacteria in gut is called**
(a) prebiotic (b) probiotic
(c) digesting enzyme (d) bypass fat

45. **The expected behaviour of one member of society in relation toothers is**
(a) social norms (b) social role
(c) social change (d) social control

46. **The cleaning method in which equipment are partiallydisassembled and cleaned specialized cleaning tanks iscalled**
(a) cleaning-in-place (b) self-contained cleaning system
(c) central cleaning system (d) cleaning out of place

47. **The act of mating in horses is known as**
(a) Covering (b) Coupling
(c) Serving (d) Tupping

48. **Probability of getting a head in a single toss of a coin is**
(a) 0.50 (b) 0.25
(c) 1.00 (d) 0.05

49. **'Project Tiger' was launched**
(a) 1962 (b) 1963
(c) 1952 (d) 1973

50. **Venison is meat of**
(a) cattle (b) monkey
(c) horse (d) deer

51. **Which volatile fatty acid is glucogenic in nature?**
(a) Acetic acid (b) Propionic acid
(c) Butyric acid (d) Formic acid

52. **Plucking is a method of removal of**
(a) wool (b) guard hair
(c) Trimming of pelts (d) Fur

53. **The milk taken for condensing should have**
(a) Positive Clot-on-Boiling Test (b) Negative Alcohol Test
(c) Negative Clot-on-Boiling Test (d) Negative Clot-on-Boiling and Alcohol Test

54. **Ranking of raw data in numerical order is called**
(a) frequency distribution (b) series
(c) scores (d) classification

55. **With respect to plasma, the glomerular filtrate is**
(a) hypotonic (b) isotonic
(c) hypertonic (d) Variable

56. **Principle organ of prehension in cattle is**
(a) incisor teeth (b) lips
(c) tongue (d) muzzle

57. **Coarse hair like fibers on the lower hind legs and around the dockof some sheep**
(a) apparel wool (b) cotton wool
(c) britch wool (d) buck wool

58. **Cold shortening of muscles occurs during chilling of followingmuscles**
(a) pre-rigor (b) rigor
(c) post-rigor (d) after thawing

59. **Socialization is the process which**
(a) continues throughout life (b) ceases at maturity
(c) Influence society (d) does not affect society

60. **Learning process continues**
(a) up to school (b) up to college
(c) up to job (d) life long

61. **Peripheral baroreceptors for the regulation of blood pressure arepresent in**
(a) right atrium (b) carotid sinus
(c) hypothalamus (d) vena cava

62. **The social norms**
(a) lead society to disintegration (b) make society rigid
(c) give cohesion to the society (d) instigate society to fight

63. **In the beginning, community development projects were startedfor a period of**
(a) 1 year (b) 3 years
(c) 5 years (d) 10 years

64. **Satiety center is situated in**
(a) lateral hypothalamus (b) ventro-medial hypothalamus
(c) supra-optic nucleus (d) pre-optic nucleus

65. **Pashmina is obtained from**
(a) Angora goat (b) Angora rabbit
(c) Kashmiri goat (d) Yak

66. **Configuration of snail is maternally influenced and not a case of maternal inheritance because**
(a) phenotype is inconsistent with genotype and controlled by cytoplasmic factor
(b) phenotype is inconsistent with genotype with no control of nucleus
(c) phenotype is inconsistent with genotype but in all classes, control resides in the nucleus
(d) phenotype in consistent with genotype with no control of cytoplasmic factor

67. **The following mineral is known as master mineral due to its involvement in various metabolic processes**
(a) Calcium (b) Phosphorus
(c) Magnesium (d) Sulphur

68. **Which of the following is best method of identification of local leader?**
(a) Cultural method (b) Socio-metric method
(c) Psychological method (d) Personal contact method

69. **Water requirement of the bird is usually twice their feed intake, however in summer it is**
(a) same as in winter (b) four times of feed intake
(c) four times than winter (d) six times of food intake

70. **The most commonly used method of stunning in poultry is**
(a) electrical stunning (b) captive bolt pistol stunning
(c) concussion stunning (d) free bold pistol stunning

71. **AMUL pattern of dairy cooperative has**
(a) two-tier system (b) three-tier system
(c) four-tier system (d) five-tier system

72. **National Research Center (Meat) is situated at**
(a) Chennai (b) Ludhiana
(c) Hyderabad (d) Bangalore

73. **Panchayati Raj was introduced on the basis of recommendations of**
(a) Balwant Rai Mehta Committee (b) Royal Commission on agriculture
(c) Operation flood (d) White revolution

74. **The floor space required per layer in deep litter system is**
(a) 2.0 sq.ft (b) 3.0 sq. ft.
(c) 3.0 sq. ft. (d) 5.0 sq.ft

75. **A social custom that prohibits or restricts particular practice is called**
(a) Taboos (b) Restrictions
(c) Folk ways (d) Narrow thinking

76. **During transportation by rail, the animal should be rested after every**
(a) 08 hr (b) 28 hr
(c) 48 hr (d) 68 hr

77. **Farming in which, crop production is combined with livestock production is known a**
(a) mixed farming (b) specialized farming
(c) extensive farming (d) diversified farming

78. **How many certification agencies are accredited by APEDA for inspection an certification of organic agricultural products?**
(a) 12 (b) 22
(c) 42 (d) 62

79. **In case of multiple alleles at a locus, if there are 4 alleles, then how many genotype are possible**
(a) 6 (b) 10
(c) 15 (d) 4

80. **The requirement of fresh air supply per hour is higher for which species?**
(a) Horses (b) Cows
(c) Pigs (d) Sheep and Goats

81. **The scurvy occurs due to the deficiency of**
(a) Vitamin C (b) Vitamin D
(c) Vitamin E (d) Vitamin K

82. **FSSA standards of marketable standardized milk in India are**
(a) 3.0% milk fat and 8% SNF (b) 3.5% milk fat and 8.5% SNF
(c) 4.0% milk fat and 8.5% SNF (d) 4.5% milk fat and 8.5% SNF

83. **Johannsen did not coin the term**
(a) Gene (b) Genotype
(c) Phenotype (d) Prototype

84. **The participation of people in an extension program is**
(a) involuntary (b) voluntary
(c) compulsory (d) partial

85. **Which of the following is an individual contact method?**
(a) News paper (b) Conference
(c) Television (d) Telephone cells

86. **The coefficient of correlation (a) between X and Y will have positive sign when**
(a) x is increasing, y is decreasing (b) both x and y are increasing
(c) x is decreasing, is increasing (d) both x and y are static

87. **The stable pink colour of cured and cooked meat products is due to**
(a) Myoglobin (b) Nitroso hemochromogen
(c) Met myoglobin (d) Nitroso myoglobin

88. **Which of the following is NOT true about social change?**
(a) It is universal phenomenon (b) It is law of nature
(c) It is a community change (d) It is a uniform change

89. **The fat and oil quality in feed is evaluated for oxidative rancidity by the test**
(a) Peroxide value (b) Free fatty acid
(c) Cresol red test (d) Ammonium molybdate test

90. **Genetic improvement path with the highest gain is**
(a) sire to breed cow (b) dam to breed bull
(c) sire to breed bull (d) dam to breed cow

91. **When one locus is showing dominant-recessive relationship and second locus shows co-dominance, then expected phenotypic ratio is**
(a) 9:33:1 (b) 3:6:3:1:2:1
(c) 3:6:1:2 (d) 1:2:1:2:4:2

92. **Freemartins are**
(a) normal male calves (b) normal female calves
(c) sterile female calves (d) sterile male calves

93. **The specific organ, where bile salt micelle are found is**
(a) portal vein (b) lumen of ileum
(c) mucosal cells of gut (d) gut-lymphatics

94. **Which of the following is/are group teaching method?**
(a) Demonstration (b) Poster
(c) Office calls (d) Both Poster and Office calls

95. **Secretin is a**
(a) strong stimulant for pancreatic enzymes (b) strong stimulant for pancreatic bicarbonates
(c) weak stimulant for pancreatic enzymes (d) weak stimulant for pancreatic bicarbonates

96. **The egg shell constitutes of egg**
(a) 5% (b) 11%
(c) 21% (d) 31%

97. **Criss-cross inheritance is the characteristic of**
(a) sex influenced inheritance (b) sex limited inheritance
(c) sex linked inheritance (d) autosomal inheritance

98. **The 'Hereford' breed of pig belongs to**
(a) Australia (b) USA
(c) China (d) Mexico

99. **Frizzled feathers in poultry occurs due to the deficiency of**
(a) NaCl (b) Copper
(c) Magnesium (d) Zinc

100. **The overall intensity of light should be work rooms of a slaughter house**
(a) 50 lux (b) 110 lux
(c) 220 lux (d) 540 lux

101. **The cells of mature Graafian Follicle developing into future Corpus Luteum are**
(a) Theca cells (b) Theca and Granulosa cells
(c) Corona cells (d) Oocytes

102. **Average gestation period in swine is**
(a) 114 days (b) 134 days
(c) 154 days (d) 174 days

103. **Duo-trio test is**
(a) descriptive test (b) difference test
(c) ranking test (d) threshold test

104. Which of the following about poultry breeds is NOT properly matched?

(a) American Class: Rhode Island Reds (b) Asiatic Class: Brahma

(c) English Class: New Hampshire (d) Mediterranean Class: Minorca

105. Stage 3 of normal parturition process in cattle is associated with

(a) expulsion of fetus from genital tract (b) dilatation of cervix

(c) expulsion of fetal membranes (d) suckling of calf

106. Process of drawing conclusions on inferences after analysis of collected data is known

(a) tabulation (b) interpretation

(c) classification (d) evaluation

107. Which one of the following is a measure of central tendency

(a) Mean deviation (b) Range

(c) Standard deviation (d) Median

108. Which of the following are units of social structure?

(a) Institutions and groups (b) Institutions and associations

(c) Groups and associations (d) Institutions, groups and associations

109. Zanskari is a breed of

(a) pigs (b) dogs

(c) horses (d) goats

110. Enzootic ataxia in lambs occurs due to the deficiency of

(a) Copper (b) Iron

(c) Magnesium (d) Manganese

111. Measure of dispersion is

(a) Mean (b) Mode

(c) Range (d) Median

112. The physical methods to detect adulteration or contamination of feed are

(a) winnowing (b) sieving

(c) smell (d) All of the above

113. Market type in which there is a single seller and a single buyer is called as

(a) monopsony (b) monopoly

(c) bilateral monopoly (d) oligopoly

114. Renin secreting cells of kidneys are derived from

(a) distal tubular epithelium (b) glomerular endothelium

(c) smooth muscle cells of efferent arteriole (d) henle's loop epithelium

115. The characteristic colour of a paneer whey is due to

(a) carotene (b) riboflavin

(c) annatto (d) xanthophyll

116. Range of relationship coefficient is

(a) -1 to +1 (b) $-\infty$ to $+\infty$

(c) 0 to 0.5 (d) 0 to 1

117. Time required to destroy 90% of the organisms from food commodity is known as

(a) thermal death time (b) F-value

(c) D-value (d) Z-value

118. Extension education deals with

(a) only men (b) only women

(c) men, women and youth (d) only youth

119. Lab to Land programme was started in

(a) 1970 (b) 1975

(c) 1979 (d) 1985

120. **Binomial distribution tends to Poisson distribution when**
(a) n is large and p is small
(b) nis small and p is large
(c) n is small and p is small
(d) n is large and p is large

121. **The basic element at core of extension education is**
(a) man himself
(b) man and environment
(c) man made things
(d) external environment

122. **As per 19 Livestock Census (201(b), which Indian State has highest per capita availability of milk?**
(a) Andhra Pradesh
(b) Punjab
(c) Haryana
(d) Goa

123. **If one of the regression coefficients is greater than unity, then other must be**
(a) greater than the first one
(b) equal to unity
(c) less than unity
(d) equal to zero

124. **Monosodium glutamate (MSG) is used in meat products as**
(a) emulsifier
(b) flavor enhancer
(c) binder
(d) filler

125. **How many comb types have been recorded in chicken?**
(a) Six
(b) Seven
(c) Eight
(d) Nine

126. **During mating among heterozygous for 4 gene pairs, how many kinds of genotypes will be available?**
(a) 91
(b) 81
(c) 61
(d) 41

127. **The covered area required per adult cattle is**
(a) 12 m^2
(b) 3.5 m^2
(c) 1.5 m^2
(d) 0.5m^2

128. **The most critical amino acids in poultry diet are**
(a) Lysine and methionine
(b) Cystine and cysteine
(c) Glycine and cystine
(d) Phenylalanine and lysine

129. **A cross between Tibetan Yak and ordinary domestic cattle produces**
(a) fertile male or fertile female
(b) fertile male or sterile female
(c) sterile male or fertile female
(d) sterile male or sterile female

130. **The highest fat percentage is found in**
(a) fore milk
(b) stripping
(c) middle milk
(d) skimmed milk

131. **Which of the following set is NOT properly matched?**
(a) Calcium: Rickets
(b) Colic: Horses
(c) Ghungroo: Haryana
(d) Copper: Enzootic ataxia

132. **Which one of the following is most effective method of selection when a trait has high heritability and trait is expressed early in life**
(a) Family selection
(b) Combined selection
(c) Individual selection
(d) Within family selection

133. **PSE (pale, soft exudative) meat has_____ kind of water holding capacity. Choose one of the following**
(a) low
(b) high
(c) medium
(d) variable

134. During smoking, which of the following compound formed may act as carcinogenic?

(a) Met myoglobin (b) Benzopyrenes
(c) Phenol (d) Aldehydes

135. Swiss cheese is manufactured by using one of the following cultures

(a) *Propinobacterium shermanii* (b) *Streptococcus lactis*
(c) *Penicillum roqueforti* (d) *Lactobacillus plantarum*

136. The tight junction between adjacent myocardial cells is known as

(a) cross bridges (b) syncytium
(c) intercalated discs (d) nexus

137. The extension program is a statement of

(a) problem and situation (b) situation and objectives
(c) solution and problem (d) All of the above

138. The progeny of full sibs are

(a) a new breed (b) new strain
(c) lowly inbred (d) highly inbred

139. The Planning Commission was set up in

(a) 1947 (b) 1950
(c) 1962 (d) 1952

140. Which of the following poultry breed has dark black muscles?

(a) Aseel (b) Kadaknath
(c) Vanaraja (d) Rhode Island Red

141. Myoepithelial cells play role in

(a) lactogenesis (b) galactopoiesis
(c) milk ejection (d) milk synthesis

142. Which of the following is an element of behavior?

(a) Education (b) Belief
(c) Attitude (d) Dis-belief

143. Size of milk fat globules is reduced by the process of

(a) pasteurization (b) sterilization
(c) standardization (d) homogenization

144. Erythropoietin is mainly produced from

(a) kidney (b) stomach
(c) bone marrow (d) liver

145. The coefficient of correlation

(a) cannot be positive (b) cannot be negative
(c) is always positive (d) can be both positive as well as negative

146. A bilateral cryptorchid bull may show

(a) good semen quality and poor libido
(b) poor semen quality and good libido
(c) good semen quality and good libido
(d) poor semen quality and poor libido

147. Which of the following was launched to solve the problem of degraded cattle?

(a) Gaushala (b) Gosadan
(c) Cattle markets (d) Cattle shelters

148. The intramuscular fat is known as

(a) marbling (b) seam fat
(c) caulfat (d) leaf fat

149. **A good extension program should be**
(a) rigid (b) flexible
(c) tough (d) strict

150. **The failure of lungs to eliminate surplus carbon dioxide may result into**
(a) respiratory alkalosis (b) respiratory acidosis
(c) metabolic alkalosis (d) metabolic acidosis

151. **Overrun in butter is due to**
(a) moisture and curd (b) protein and air
(c) lactose and fat (d) fat and air

152. **The calorific value (kcal) of one gram fat is**
(a) 4.2 (b) 5-6
(c) 9.4 (d) 36-0

153. **Inbreeding increases degree of**
(a) heterozygosity (b) homozygosity
(c) hybrid vigour (d) non-relatives

154. **The dental formula of adult pigs is**
(a) 3133/3133 (b) 0033/4033
(c) 3113/3121 (d) 3143/3143

155. **Father of extension in India is**
(a) Adivi Reddy (b) OP. Dhama
(c) B. R. Mehta (d) K. N. Singh

156. **The heritability estimate of body condition score in cattle is**
(a) low (b) medium
(c) high (d) very high

157. **The test to differentiate cow and buffalo milk is**
(a) Baudouin test (b) Alizarin test
(c) Hansa test (d) COB test

158. **Central Avian Research Institute (CARI) was established at**
(a) Bareilly (b) Hyderabad
(c) Tuticorin (d) Nammakal

159. **The mean breeding value of a population at Hardy Weinberg equilibrium must be**
(a) zero (b) 0-25
(c) 0-50 (d) (a)0

160. **Chromosome number (2n) of camel is**
(a) 72 (b) 62
(c) 74 (d) 86

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
d	b	c	a	c	c	b	b	a	a
11	12	13	14	15	16	17	18	19	20
d	a	a	b	b	c	c	a	b	a
21	22	23	24	25	26	27	28	29	30
b	b	b	a	d	b	c	a	b	c
31	32	33	34	35	36	37	38	39	40
a	a	a	d	d	a	b	d	a	d
41	42	43	44	45	46	47	48	49	50
a	a	a	a	b	d	a	a	d	d
51	52	53	54	55	56	57	58	59	60
b	b	d	a	b	c	c	a	a	d
61	62	63	64	65	66	67	68	69	70
b	c	b	b	c	c	b	b	b	a
71	72	73	74	75	76	77	78	79	80
b	c	a	a	a	b	a	b	b	a
81	82	83	84	85	86	87	88	89	90
a	d	d	b	d	b	b	d	a	c
91	92	93	94	95	96	97	98	99	100
b	c	b	a	b	b	c	b	d	c
101	102	103	104	105	106	107	108	109	110
b	a	b	c	c	b	d	d	c	a
111	112	113	114	115	116	117	118	119	120
c	d	c	c	b	d	c	c	c	a
121	122	123	124	125	126	127	128	129	130
a	b	c	b	a	b	b	a	c	b
131	132	133	134	135	136	137	138	139	140
c	c	a	b	a	c	d	d	d	b
141	142	143	144	145	146	147	148	149	150
c	c	d	a	d	b	b	a	b	b
151	152	153	154	155	156	157	158	159	160
a	c	b	d	d	b	c	a	a	c

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RPSC-Veterinary Officer Exam Paper-2019

1. **Treatment of acute inflammation is ?**
   (1) Ice pack application (2) Blister application
   (3) Warm application (4) All of these
2. **Exostosis or new bone growth on second phalanx of a horse is known as-**
   (1) Sesamoiditis (2) Ring bone
   (3) Side bone (4) Pyramidal disease
3. **Utrecht method is used for correction of displacement of ?**
   (1) Heart (2) Reticulum
   (3) Abomasum (4) Testicle
4. **Medial patellar ligament is absent in which animal ?**
   (1) Bullock (2) Horse
   (3) Camel (4) Buffalo
5. **Opacity of eye lens in dog is called ?**
   (1) Cataract (2) Glaucoma
   (3) Ptosis (4) None of these
6. **Retention of cyst under the tongue in a buffalo is called ?**
   (1) Palatitis (2) Gnathitis
   (3) Gingivitis (4) Ranula
7. **Overlapping matterss sutures are applied on ?**
   (1) Hernial ring (2) Hernial sac
   (3) Hernial contents (4) All of these
8. **Which one of the following groups of hormones can be used for therapy of ovarian cysts in dairy cows?**
   (1) Estrogen and FSH (2) GnRH, PG and hCG
   (3) Oxytocin and prolactin (4) Testosterone and Corticoids
9. **Which one of the following is used for personnel monitoring of radiation ?**
   (1) Pocket dosimeter (2) Geiger-Muller Counter
   (3) Air Ionisation Chmaber (4) Thermoluminescence dosimeter
10. **Abnormal large amount of granulation tissue is known as ?**
    (1) Callus (2) Adenoma
    (3) Proud flesh (4) Sarcoma
11. **Zepp's operation is related with ?**
    (1) Ear (2) Tongue
    (3) Nose (4) Eye
12. **A cow is in estrus on 10th of July. Her next anticipated date of estrus would be on ?**
    (1) 21st July (2) 31st July
    (3) 7th August (4) 15th August
13. **Choose the correct sequence of hormones used in an OV-SYNCH protocol for estrus synchronization in cows ?**
    (1) eCG day 0 – PG day 7 – hCG day 9 (2) GnRH day 0 – PG day 7 – GnRH day 9
    (3) PG day 0 – GnRH day 7 – PG day 9 (4) Estradiol day 0 – GnRH day 7 – PG day 9

14. **Superovulation treatments in cattle are usually started on day 8-10 of estrus because?**
(1) Corpus luteum is fully formed at this time.
(2) Follicles have entered atresia.
(3) The second follicular wave emerges at this time and follicles responsive to exogenous gonadotropins are present.
(4) Cows are docile at this time.

15. **An important protozoal cause of infertility in dairy cows that result in post service pyometra, increased services per conception and abortoion during first trimester of gestation is ?**
(1) Brucellosis
(2) Leptospirosis
(3) Tuberculosis
(4) Trichomoniasis

16. **Which of the following drug/ Hormone is incorrect in therapy of uterine infections in cows ?**
(1) Intrauterine administration of antibiotics
(2) Intrauterine administration of hCG
(3) Intrauterine administration of prostaglandins
(4) Intrauterine administration of ceftiofar

17. **In a 10 year old bitch presented with sign of gastritis, polydypsia, fever and abdominal distension that developed 2 months after mating the most likely clinical diagnosis would be ?**
(1) Gastric ulcer
(2) Diabetes mellitus
(3) Pyometra
(4) Gastro-enteritis

18. **The most common maternal cause of dystocia in buffalo is ?**
(1) Pelvic fracture
(2) Uterine interia
(3) Uterine torsion
(4) Cervical dilation failure

19. **Paraphimosis means ?**
(1) Prevention of normal protrusion of the penis
(2) Lack of penile erection
(3) A disease caused by paraphistomes
(4) Inability of the penis to be retracted back to the prepuce after protrusion

20. **A sperm defect in bulls in which the main tail piece is strongly coiled over the mid piece giving an impression of short tail and resultant extremely poor sperm motility. This is known as ?**
(1) Knobbed sperm
(2) Diadem defect
(3) Dag defect
(4) Cork-screw defect

21. **Which of the following statements is incorrect with reference to hydroallantois in cattle?**
(1) It occurs in 85 to 90 % of cases of dropsy
(2) Can be rephrased to make it unambiguous as "The abdominal enlargement develops slowly over many months"
(3) The foetus and placentomes can not be palpated
(4) The prognosis is extremely poor

22. **A Buhner suture is applied for ?**
(1) Ovariectomy in a bitch
(2) Vaginal prolapsed in a cow
(3) Perineal lacerations in a mare
(4) Vulval hematoma in a sow

23. **Which of the following pair is incorrectly matched with reference to dystocia ?**
(1) Belgian blue cattle – 80 % dystocia
(2) Bitches – Uterine inertia commonest cause
(3) Goats – Fetal maldisposition commonest cause
(4) Sheep – Transverse presentation common

24. **A conjoined twin monster foetus which is joined at the sternal region is termed ?**
(1) Pygopagus (2) Ischiopagus
(3) Craniopagus (4) Xiphopagus

25. **The species in which vaginal insemination is performed and a minimum of 100-200 million normal motile sperms are deposited in the uterus is ?**
(1) Mare (2) Cow
(3) Bitch (4) Buffalo

26. **The livestock keeper's community in Rajasthan and Gujrat takes large herds of cattle and buffaloes and flocks of sheep and goats in search of better pasture in other locations and states. This type of livestock production system is known as ?**
(1) Pastoralism (2) Mixed Farming
(3) Landless Livestock Farming (4) Intensive Livestock Farming

27. **The external quality of egg is judged from its ?**
(1) Albumen thickness (2) Yolk colour
(3) Shell thickness (4) Presence of blood & meat spot

28. **A practical way to supplements iron and copper to the new born piglets to prevent piglet anaemia is ?**
(1) Giving injection of copper to new born piglets
(2) Giving injection of Vitamin E to new born piglet
(3) Painting the udder of sow with thick solution of copper and iron sulphate
(4) Allowing the new born piglets to access soil

29. **Feeding colostrum within first two hours of the birth of new born is essential because?**
(1) It is iron rich
(2) It is Vitamin B complex rich
(3) It is rich in copper
(4) It contains gamma globulins which can get absorbed as such in the blood stream only during the first few hours after birth

30. **The concept of organic livestock production has gained momentum recently in the country because of concerns for ?**
(1) Synthetic (urea) milk
(2) Insecticide and pesticide residue in the milk
(3) Incidence of Bovine Spongiform Encephalopathy
(4) Genetically Modified food

31. **Buffalo milk is preferred over cow milk for manufacture of Paneer because ?**
(1) *Paneer* prepared from Buffalo milk is white in colour, sweetish, spongy, nutty flavoured
(2) *Paneer* prepared from Buffalo milk is very compact and fragile and its piece lose their identity during cooking
(3) *Paneer* prepared from Buffalo milk is often substituted for meat in many vegetarian dishes of Indian cuisine
(4) *Paneer* prepared from Buffalo milk is more quantitatively as compared to cow milk

32. **Meat curing refers to ?**
(1) Production of thermally stable pink pigment (2) Chilling
(3) Freezing (4) Smoking

33. **With reference to the Designer Meat Products consider following statements**
(1) They are low in sodium, fat and calories
(2) They are high in sodium and high in calories
(3) They are low in calcium
(4) They are low in fibers and natural antioxidants

34. **The Food Safety Management System (FSMS), main system of export inspection and certification being followed in the Indian food sector is based on international standards including ?**
(1) HACCP
(2) APIDA
(3) Auditing
(4) Inspecting the books only of the manufacturer

35. **Diallele crossing is usually practiced in ?**
(1) Cattle
(2) Sheep
(3) Camel
(4) Poultry

36. **The carbonisation of wool refers to ?**
(1) Grading of wool
(2) Removal of vegetable matter from wool
(3) Drying and baking of wool
(4) Shearing

37. **Goal oriented social groups are ?**
(1) Primary groups
(2) In groups
(3) Secondary groups
(4) Involuntary groups

38. **Maximum heterosis is observed in ?**
(1) Base population
(2) F_1 generation
(3) F_2 generation
(4) F_3 generation

39. **Sudden heritable change in genetic material is known as ?**
(1) Duplication
(2) Deletion
(3) Translocation
(4) Mutation

40. **Which of the following is used to predict future performance of individual ?**
(1) Genetic correlation
(2) Heritability
(3) Repeatability
(4) Phenotypic correlation

41. **First step in extension education process is ?**
(1) Evaluation
(2) Analysis of situation
(3) Objectives
(4) Teaching plan of work

42. **Modified dihybrid ration in duplicate dominant epistasis is ?**
(1) 9:6:1
(2) 9:7
(3) 12:3:1
(4) 15:1

43. **Which one of the following is Digestible-Nutrient system types feeding standard ?**
(1) Hay standard
(2) Armsby feeding standard
(3) Scandinavian "Feed unit" standard
(4) Morrison standard

44. **Specific combining ability is due to ?**
(1) Additive gene effects
(2) Non-additive gene effects
(3) Environmental effects
(4) Genotype-environment interaction effects

45. **Exchange of genetic material between non-homologous chromosome is known as ?**
(1) Crossing over
(2) Duplication
(3) Translocation
(4) Inversion

46. **The response to selection increases when ?**
(1) Proportion of individuals selected decreases
(2) Proportion of individuals selected increases
(3) Heritability of trait is low
(4) Phenotypic standard deviation is less

47. **How much more nutrients than the maintenance needs should be provided to breeding rams during breeding season ?**
(1) 30 %
(2) 40 %
(3) 50 %
(4) 60 %

48. **In Van Soest method of Forage analysis the hemicellulose is determined as ?**
(1) NDF-ADF
(2) ADF-Lignin
(3) ADF-Cellulose
(4) None of these

49. **Colostrum is fed to calves at the rate of ?**
(1) 20 % of BW
(2) 15 % of BW
(3) 10 % of BW
(4) 5 % of BW

50. **Dry matter intake in Indian breeds of goats varies between ?**
(1) 10 – 25 g/$w^{0.75}$ kg
(2) 20 – 40 g/$w^{0.75}$ kg
(3) 35 – 80 g/$w^{0.75}$ kg
(4) 100 – 140 g/$w^{0.75}$ kg

51. **The pH range of good quality silage is ?**
(1) 3.5 – 4.2 – Good
(2) 3.2 – 3.5
(3) 4.2 – 4.5
(4) 4.5 – 4.8

52. **Non-digestible food substances that selectively stimulate the growth of favourable species of bacteria in gut are called ?**
(1) Prebiotics
(2) Probiotics
(3) Symbiotic
(4) Enzymes

53. **Maximum level of inclusion of maize in poultry ration is ?**
(1) 50 %
(2) 60 %
(3) 70 %
(4) 80 %

54. **Which one of the amino acid is of greater practical importance in the diet of swine ?**
(1) Leucine
(2) Lysine
(3) Cystine
(4) Methionine

55. **How much kg of water per kilogram of feed intake is required by horses ?**
(1) 1.0 – 1.5 kg
(2) 2.0 – 4.0 kg
(3) 4.5 – 6.0 kg
(4) 6.5 – 8.0 kg

56. **Minamata disease is caused by pollution of water by ?**
(1) Mercury
(2) Lead
(3) Tin
(4) Methyl isocyanate

57. **A moderate dispersion of minute droplets in atmosphere is known as ?**
(1) Droplet
(2) Dust
(3) Mist
(4) Smoke

58. **The ingestion of viable pathogenic bacteria along with food leads to their lodgement and the establishment in consumers organ is termed as ?**
(1) Food infection
(2) Food intoxication
(3) Toxi-infection
(4) Food infestation

59. **Milk and Milk Products Order (MMPO) was promulgated by Govt. of India ?**
(1) 1973
(2) 1975
(3) 1992
(4) 1995

60. **The term "Kosher" is related to ?**
(1) Muslim method of slaughter
(2) Sikh method of slaughter
(3) Mexican method of slaughter
(4) Jewish method of slaughter

61. **Anti-hypertensive drugs "Losartan" and "Enalapril" act as ?**
(1) Angiotensin receptor antagonist and Renin secretor respectively
(2) Angiotensin converting Enzyme inhibitor and Angiotensin receptor antagonist respectively
(3) Angiotensin receptor antagonist and angiotensin converting enzyme inhibitor respectively
(4) Angiotensin receptor agonist and angiotensin converting enzyme stimulator respectively

62. **One of the agents, recommended in treating the organophosphorus poisoning, but not in the carbamate poisoning cases is ?**
(1) Pralidoxime (2) Atropine sulphate
(3) Acetylcholine (4) Physostigmine

63. **Salbutamol and Terbutaline are widely used as ?**
(1) Bronchodilator as they are Beta-1 receptor agonists
(2) Bronchoconstrictor as they are Beta-2 receptor agonists
(3) Oxytocic as they are Alpha-1 receptor agonists
(4) Bronchodilator as they are Beta-2 receptor agonists

64. **The elimination of drug as "fixed quantity" and of "fixed fraction" per unit time is associated with ?**
(1) Constant-rate kinetics and Linear kinetics respectively
(2) First-order kinetics and zero-order kinetics respectively
(3) zero-order kinetics and First-order kinetics respectively
(4) Both (1) and (3)

65. **Which non-steroidal Anti-inflammatory drug (NSAID) has property of irreversible blockade of both the iso-enzymes COX-1 and COX-2 ?**
(1) Meloxicam (2) Celecoxib
(3) Aspirin (4) Diclofenac

66. **Identify the false statement from the following statements ?**
(1) Gram negative bacteria have periplasmic space
(2) Teichoic acid is absent in Gram negative bacteria
(3) Peptidoglycan is absent in Gram negative bacteria
(4) Lipid A is actual toxic component of Lipopolysaccharide

67. **Which of the following is not a dermatophyte ?**
(1) *Trichosporon* spp. (2) *Epidermophyton* spp.
(3) *Microsporum* spp. (4) *Trichophyton* spp.

68. **Which amongst the following *Haemophilus* spp. requires only factor V but not factor X?**
(1) *Haemophlus aphrophilus* (2) *Haemophlus influenzae*
(3) *Haemophlus parainfluenzae* (4) *Haemophlus ducriyi*

69. **Identify the mismatch pair ?**
(1) Cattle plague – Rinderpest virus
(2) Fowl plague – Newcastle Disease virus
(3) Goat plague – Peste des petites Ruminants virus
(4) Duch plague – Anatid Herpesvirus 1

70. **Which pair of histotoxic Clostridium and its associated disease is incorrect ?**
(1) *Cl. haemolyticum* – Bacillary haemoglobinuria
(2) *Cl. novyi*-A – Big head of rams
(3) *Cl. septicum* - Braxy
(4) *Cl. tetani* - Tetanus

71. **Shuttle programme is associated with treatment and control of ?**
(1) Sarcocystosis (2) Hexamitosis
(3) Histomoniasis (4) Coccidiosis

72. **Three stripes on the thorax is characteristic feature is ?**
(1) House fly (2) Stable fly
(3) Flesh fly (4) Horse fly

73. **Cucumber seed shaped gravid proglottids are passed out in faeces of dogs infected with ?**
(1) *Echinococcus granulosus* (2) *Diphylidium caninum*
(3) *Taenia hydatigena* (4) *Diphyllobothrium latum*

74. **Anal pruritus in horses is seen in infection with ?**
(1) *Oxyuris equi* (2) *Parascaris equorum*
(3) *Strongylus edantatus* (4) *Habronema muscae*

75. **Pipērazine is a drug of choice against ?**
(1) Lung fluke (2) Hook worm
(3) Strongyle (4) Ascariosis

76. **Inflammation of crop ?**
(1) Gingivitis (2) Ingluvitis
(3) Typhlitis (4) Cheilitis

77. **In intestine especially in the cecum and colon characteristic "Button ulcers" are Pathognomic lesions of ?**
(1) African Swine fever (2) Hog Cholera
(3) Swine pox (4) Contagious ecthyma

78. **First line of defence are ?**
(1) Lymphocytes (2) Basophils
(3) Neutrophils (4) Eosinophils

79. **A tumor arising out of an embryonic defect and consist of tissue developing from all germinal layers is known as ?**
(1) Fibroma (2) Hepatoma
(3) Teratoma (4) Angioma

80. **Most potent aflatoxin is ?**
(1) G_1 Aflatoxin (2) G_2 Aflatoxin
(3) B_1 Aflatoxin (4) B_2 Aflatoxin

81. **Bovine ephemeral fever is transmitted ?**
(1) by insect vector (2) through inhalation
(3) through ingestion (4) through direct contact

82. **Which of the prescribed test for international trade for diagnosis of Brucellosis ?**
(1) Rose Bengal test (2) Milk Ring test
(3) Complement fixation test (4) None of these

83. **Listening to the sounds produced by organ movement by using stethoscope, is clinically examination method commonly known as ?**
(1) Percussion (2) Auscultation
(3) Ballotment (4) Palpation

84. **Botulism results from ingestion of preformed exotoxins of**
(1) *Clostridium botulinum* (2) *Clostridium tetani*
(3) *Clostridium haemolyticum* (4) *Clostridium novyi*

85. **In which year, Veterinary council of India was established by the Indian Veterinary council Act?**
(1) 2014 (2) 2000
(3) 1948 (4) 1984

86. **Clinical symptoms of fever and swollen superficial lymph nodes in crossbred cow-calves are indicative of which disease ?**
(1) Trypanosomiasis (2) Babesiosis
(3) Listeriosis (4) Bovine Tropical Theileriosis

87. **For clinical management of which disease, lubricants, faecal softeners and promotility agents are given ?**
(1) Diarrhoea in cattle (2) Dysentry in Pigs
(3) Dehydration in dogs (4) Colic in horses

88. **Curled toe paralysis in chickens results due to deficiency of ?**
(1) Vitamin B_1 (2) Vitamin B_6
(3) Vitamin B_2 (4) Vitamin B_{12}

89. **Lactic acidosis is caused by ?**
(1) Accidental ingestion of large quantities of wheat grain
(2) Excessive intake of green fodder
(3) Excessive intake of dry fodder
(4) Excessive intake of urea

90. **In which form of Surra, affected animals suffer from fever, circling movements, incoordination, head pressing against hard objects, blindness, convulsions and death ?**
(1) Subclinical form (2) Chronic form
(3) Acute form (4) Per-acute form

91. **Chronic equine infectious anaemia is usually associated which ?**
(1) Recurrent episodes of fever, weight loss, ventral edema and petechial hemorrhages
(2) Continuous fever, Lethargy and inappetance with mild thrombocytopenia
(3) Generalized edema, constipation and colic
(4) Colic, diarrhea and anscesses

92. **Low-milk-fat syndrome in cattle occurs due to ?**
(1) Ruminal acidosis (2) Ruminal alkalosis
(3) Vagal indigestion (4) Simple indigestion

93. **In poultry, enlargements of wattles, lameness and torticollis occurs in ?**
(1) Pasteurellosis (2) New Castle disease
(3) Infectious laryxgotracheitis (4) Infectious bursal disease

94. **Brucellin skin test is used for diagnosis of**
(1) Tuberculosis (2) Para tuberculosis
(3) Brucellosis (4) Leptospirosis

95. **Which is antagonist of Xylazine ?**
(1) Atropine (2) Yohimbine
(3) Lavallorphane (4) Acepromazine

96. **Inflammation of stifle joint is called ?**
(1) Spavin (2) Coxitis
(3) Gonitis (4) Pedal ostitis

97. **Bunnell suture technique is used for ?**
(1) Muscle repair (2) Tendon repair
(3) Ligament repair (4) Skin repair

98. **Osteophagia, infantophagia and Coprophagia are types of which condition ?**
(1) Allotriophagia (2) Anorexia
(3) Inappetance (4) Aphagia

99. **A technique in which two or more agents are combined to achieve anaesthesia is called?**
(1) Light anaesthesia (2) Basal anaesthesia
(3) Balanced anaesthesia (4) Epidural anaesthesia

100. **An artificially induced sleep that result from moderate depression of CNS is known as?**
(1) Hypnosis (2) Narcosis
(3) Tranquilization (4) Sedation

☆☆☆

Answer Key

1. Ice pack application
2. Ring bone
3. Abomasum
4. Camel
5. Cataract
6. Ranula
7. Hernial ring
8. GnRH, PG and hCG
9. Pocket dosimeter
10. Proud flesh
11. Ear
12. 31st July
13. GnRH day 0 – PG day 7 – GnRH day 9
14. The second follicular wave emerges at this time and follicles responsive to exogenous gonadotropins are present.
15. Trichomoniasis
16. Intrauterine administration of hCG
17. Pyometra
18. Uterine torsion
19. Inability of the penis to be retracted back to the prepuce after protrusion
20. Dag defect
21. Can be rephrased to make it unambiguous as "The abdominal enlargement develops slowly over many months"
22. Vaginal prolapsed in a cow
23. Sheep – Transverse presentation common
24. Xiphopagus
25. Mare
26. Pastoralism
27. Shell thickness
28. Painting the udder of sow with thick solution of copper and iron sulphate
29. It contains gamma globulins which can get absorbed as such in the blood stream only during the first few hours after birth
30. Insecticide and pesticide residue in the milk
31. *Paneer* prepared from Buffalo milk is white in colour, sweetish, spongy, nutty flavoured
32. Production of thermally stable pink pigment
33. They are low in sodium, fat and calories
34. HACCP
35. Poultry
36. Removal of vegetable matter from wool
37. Secondary groups
38. F_1 generation
39. Mutation
40. Repeatability
41. Analysis of situation
42. 15:1
43. Morrison standard
44. Non-additive gene effects
45. Translocation
46. Proportion of individuals selected decreases
47. 50 %
48. NDF-ADF
49. 10 % of BW
50. 35 – 80 g/$w^{0.75}$ kg
51. 4.2 – 4.5
52. Prebiotics
53. 60 %
54. Lysine
55. 2.0 – 4.0 kg
56. Mercury

57. Mist
58. Food infection
59. 1992
60. Jewish method of slaughter
61. Angiotensin receptor antagonist and angiotensin converting enzyme inhibitor respectively
62. Pralidoxime
63. Bronchodilator as they are Beta-2 receptor agonists
64. Both (1) and (3)
65. Aspirin
66. Peptidoglycan is absent in Gram negative bacteria
67. *Trichosporon* spp.
68. *Haemophlus parainfluenzae*
69. Fowl plague – Newcastle Disease virus
70. *Cl. tetani* - Tetanus
71. Coccidiosis
72. Flesh fly
73. *Diphylidium caninum*
74. *Oxyuris equi*
75. Ascariosis
76. Ingluvitis
77. Hog Cholera
78. Neutrophils
79. Teratoma
80. B_1 Aflatoxin
81. by insect vector
82. Complement fixation test
83. Auscultation
84. *Clostridium botulinum*
85. 1984
86. Bovine Tropical Theileriosis
87. Colic in horses
88. Vitamin B_2
89. Accidental ingestion of large quantities of wheat grain
90. Acute form
91. Recurrent episodes of fever, weight loss, ventral edema and petechial hemorrhages
92. Ruminal acidosis
93. Pasteurellosis
94. Brucellosis
95. Yohimbine
96. Gonitis
97. Tendon repair
98. Allotriophagia
99. Balanced anaesthesia
100. Tranquilization

☆☆☆

PPSC Veterinary Officer Exam Paper-2019

1. **Triclabendazole is effective against**
   (a) Mature flukes (b) Immature flukes
   (c) Both a & b (d) Not effective
2. **Nipper-The HMV logo dog belongs to:**
   (a) Mixed Terrier breed (b) Spitz breed
   (c) Bichon breed (d) None of above
3. **The record of the ancestors of a particular animal is recorded in its**
   (a) Performance record (b) Phenotype
   (c) Pedigree (d) Genetic map
4. **Level of urea feeding as a source of NPN to an adult cow should not be more than:**
   (a) 175g per day (b) 100g per day
   (c) 125g per day (d) 200g per day
5. **Two-way rotational crossing (crisscrossing) would stabilize at:**
   (a) 50% inheritance from each breed
   (b) 25% inheritance from each breed
   (c) 75% inheritance from last sire breed and 25% from other breed
   (d) 65% inheritance from last sire breed and 35% from other breed
6. **Name of the mobile app launched by NDDB which helps to calculate to different feeds that need added in appropriate proportions for balanced diet**
   (a) Chara-Vigyan (b) Santulan
   (c) Pashu Poshan (d) Pashu Palan Poshan
7. **Irreversible degeneration of seminiferous tubules in bulls is caused by**
   (a) Deficiency of Vitamin A (b) Deficiency of Vitamin C
   (c) Deficiency of Zinc mineral (d) Excess of Vitamin A
8. **Maternal heterosis is:**
   (a) Superiority of purebred dam (b) Superiority of F1 females
   (c) Superiority of progeny of crossbred female (d) None of above
9. **The concentration of motile and morphologically normal spermatozoa per mL in the semen sample is known as:**
   (a) Motile sperm concentration (b) Sperm motility index
   (c) Functional sperm concentration (d) Total cell concentration
10. **Prolongedrecumbency results in ischemic muscle necrosis and marked increases in the**
    (a) Serum creatine phosphokinase (b) Serum hyaluronidase
    (c) Serum lipase (d) Serum catalase
11. **Amount of heterosis in F2 generation was 20 kg for six months weight in crossbred pigs.**
    What would be the amount of heterosis in F3 generation:
    (a) 10 kg (b) 5 kg
    (c) 20 kg (d) 40 kg
12. **Which suture pattern is considered in rumen suturing?**
    (a) Cushing (b) Vertical mattress
    (c) Simple continuous (d) Cross mattress
13. **FSSAI is autonomous body under the ministry of:**
    (a) Agriculture and farmer's welfare (b) Health and family welfare
    (c) Drinking water and sanitation (d) Consumer affairs, food and public distribution

14. **Suture size used for closure of skin in cow is**
(a) No.2 (b) No.3-0
(c) No.1-0 (d) No.2-0

15. **Pien niu is a cross of:**
(a) Mithun and cow (b) Cow and yak
(c) Camel and Llama (d) Wolf and dog

16. **Incubation period of paratuberculosis is :**
(a) 1-3 months (b) 5-8 months
(c) More than 18 months (d) Few days

17. **In fistula method of semen collection, fistula is made in:**
(a) Testis (b) Seminiferous tubules
(c) Epididymis body (d) Vas deferens

18. **Vaccination against brucellosis in sheep and goat is done using:**
(a) Strain 19 live attenuated (b) Rev 1 live attenuated
(c) Strain 45/20 killed (d) Strain 19 killed

19. **Booroola gene is related to:**
(a) Ovulation rate (b) Growth rate
(c) Milk production (d) None of above

20. **Radiological sign of Non-union of fracture is**
(a) External bridging callous
(b) Fracture line not visible, medullary cavity reestablished
(c) Fracture line not visible and obliterated with callous
(d) Rounding of fracture ends with large radiolucent line

21. **Which enzyme is used in Polymerase Chain Reaction (PCR)?**
(a) Reverse Transcriptase (b) RNA Polymerase
(c) Taq Polymerase (d) Integrase

22. **Osteomalacia is caused by:**
(a) Poor mineralisation of bones (b) Demineralization of bones
(c) Defective mineralization of bones (d) None of the above

23. **Smallest part of a ruminant's stomach is**
(a) Rumen (b) Reticulum
(c) Omasum (d) Abomasum

24. **Ovulation rate can be increased by vaccinating ewes against:**
(a) Inhibin & Androstenedione (b) GnRH
(c) Both a & b (d) None of the above

25. **The Index organism taken for pasteurization of milk is**
(a) *Coxiella burnetii* (b) *Mycobacterium paratuberculosis*
(c) *E. coli* (d) None

26. **Urea supplementation is not recommended if minimum crude protein content of ruminant diet is above:**
(a) 18% (b) 25%
(c) 7% (d) 13%

27. **How much floor space required per adult cow in milking byre?**
(a) 50-55 sq. feet (b) 80-85 sq. feet
(c) 65-70 sq. feet (d) 40-45 sq. feet

28. **Bitter almond like smell is observed from the breath of the animal due to the poisoning of:**
(a) Nitrite (b) Cyanide
(c) Carbon monoxide (d) None of the above

29. **Engagement of forehead of fetus against maternal pelvis during handling of dystocia is known as**
(a) Vertex (b) Nape
(c) Breech presentation (d) Dog sitting posture

30. **The enlargement of superficial lymph node is seen in:**
(a) *Trypanosoma* infection (b) *Babesia* infection
(c) *Theileria* infection (d) All of the above

31. **Which one of the following is not a laboratory method of estrus detection in cattle?**
(a) Progesterone estimation (b) Fern pattern test
(c) Vaginal pH (d) Pedometer

32. **Adulterant in milk responsible for kidney failure and even death in infants is:**
(a) Urea (b) Formalin
(c) Ammonium sulfate (d) Melamine

33. **Non- pathological ovarian cyst is**
(a) Cystic corpus luteum (b) Follicular cyst
(c) Luteal cyst (d) None of the above

34. **Stilbamidine test is used to diagnose**
(a) Theileriosis (b) Anaplasmosis
(c) Trypanosomiasis (d) Whip worm infection

35. **Preferred method of treatment for avulsion fracture is**
(a) Interfragmentary wiring (b) Hemicirclage wiring
(c) Tension band wiring (d) Circlage wiring

36. **The maggots of primary myiasis feed on:**
(a) Living tissue (b) Dead tissue
(c) Partially dead tissue (d) All of the above

37. **Predominant immunoglobulin in follicular fluid is:**
(a) Ig M (b) Ig G
(c) Ig A (d) Ig E

38. **Guillain-Barré syndrome results as a complication due to infection with**
(a) C. jejuni (b) B. mallei
(c) L. monocytogenes (d) E. rhusiopathiae

39. **Dose ofketamine recommended for anaesthesia in dogs is**
(a) 8 to 15 mg/kg B.W (b) 0.5mg/kg B.W.
(c) 0.05 to 0.11 mg/kg B.W. (d) 1 mg/kg B.W.

40. **Daily production of saliva in cows is around:**
(a) 100-200 litres (b) 25-30 litres
(c) 5-10 litres (d) 40-50 litre

41. **The preferred basis of selection when there is substantial amount of common environmental variance:**
(a) Individual (b) Family
(c) Sibs (d) Within family

42. **Barberio's test is usually done to detect**
(a) Blood stain (b) Faecal stain
(c) Sperm stain (d) Bile stain

43. **The enzyme used for debridement of a wound:**
(a) Bacterial collagenase (b) Bacterial Protease
(c) Bacterial lipases (d) Reverse transcriptase

44. **Sheep population is highest in:**
(a) Rajasthan
(b) Uttar Pradesh
(c) Andhra Pradesh
(d) Madhya Pradesh

45. **How many generations are required for converting non-descript animals to 99% purebreds:**
(a) 2
(b) 4
(c) 6
(d) 8

46. **Disease inducing ability of an organism is called as**
(a) Virulence
(b) Pathogenicity
(c) Infectivity
(d) None

47. **Preferred incision for castration in dog is**
(a) Midline postscrotal
(b) Midline prescrotal
(c) Scrotal ablation
(d) Ischial incision

48. **Which is not an elective surgery?**
(a) Oesophagotomy in dog
(b) Ovariohysterectomy in dog
(c) Docking in 10 day old dog
(d) Mastectomy in bitch

49. **Antibody isotype that provides defense against helminthes is**
(a) IgE
(b) IgM
(c) IgA
(d) IgG

50. **Cows consuming more grasses and legumesfodders than grains will produce milk having:**
(a) More omega-3 fatty acids and less omega-6 fatty acids
(b) Less omega-3 fatty acids and more omega-6 fatty acids
(c) Omega-3 fatty acids and omega-6 fatty acids in equal amounts
(d) None of above

51. **Most popular body building protein supplements are made from:**
(a) Chicken meat
(b) Egg
(c) Soyabean
(d) whey

52. **Succulent, fermented preserved green fodder is called**
(a) Hay
(b) Forage
(c) Silage
(d) None of them

53. **How much berseem hay having 30% NDF would be consumed by a cow weighing 400 kg:**
(a) 10 kg
(b) 12 kg
(c) 14 kg
(d) 16 kg

54. **Opiod used for capturing wild animals is:**
(a) Buprenorphine
(b) Fantanyl
(c) Etorphine
(d) Butorphanol

55. **Which of the following is not feature of hypovolemic shock?**
(a) Mental dullness
(b) Bradycardia
(c) Tachycardia
(d) Peripheral vasoconstriction

56. **Viability of bovine spermatozoa in the female genital tract is for:**
(a) 10-12 h
(b) 60-72 h
(c) 30-56 h
(d) 12-24 h

57. **Which breed have characteristic Swai chal (gait):**
(a) Kankrej cattle
(b) Nili-Ravi buffalo
(c) Bikaneri camel
(d) Spiti horse.

58. **Production type roughages contain DCP of**
(a) <3% (b) 3-5%
(c) >5% (d) None of the above

59. **Ideal dry period in crossbred cattle is**
(a) 30 days (b) 45 days
(c) 60 days (d) 75 days

60. **Cow dung containsNitrogen, Phosphorous and potassium in ratio of:**
(a) 5:3:2 (b) 1:2:3
(c) 2:3:5 (d) 3:2:1

61. **The first mechanism to prevent polyspermy is**
(a) Vitelline block (b) Zona reaction
(c) Vitelline membrane (d) None of the above

62. **Loci and alleles combining additively would show:**
(a) Good amount of heterosis but no inbreeding depression
(b) No heterosis but great amount of inbreeding depression
(c) Niether heterosis nor inbreeding depression
(d) Good amount of heterosis and inbreeding depression

63. **The smallest cat breed in the world is:**
(a) Abyssinian (b) Bobtail
(c) Singapura (d) Siamese

64. **Which of the following is the most common feature of diaphragmatic hernia in buffalo**
(a) Impaction of rumen (b) Chronic recurrent Tympany
(c) Leukocytosis and shift to left (d) Brisket oedema

65. **Which method is the best to control haemorrhage:**
(a) Thumb pressure (b) Tourniquet application
(c) Ligation (d) All above

66. **Which of the disease in cattle manifests oral lesions with diarrhea?**
(a) FMD (b) Vesicular stomatitis
(c) Bluetongue (d) Bovine malignant catarrh

67. **In ruminants, the placenta is of ..... Type:**
(a) Epitheliochorial (b) Endotheliochorial
(c) Hemochorial (d) Allantochorial

68. **The reporter system used in Complement Fixation Test is:**
(a) Antigen-Antibody complex (b) Enzyme-substrate complex
(c) Sheep RBCs-anti Sheep RBCs complex (d) Avidin-Biotin complex

69. **Preferred surgical approach forovariohysterectomy in dog is**
(a) Cranial ventral midline approach (b) Caudal ventral midline approach
(c) Caudal paramedian (d) Paracostal approach

70. **The breed of pigs, black in colour with a white belt which encircles the shoulders including both front legs and feet is**
(a) Chester white (b) Berkshire
(c) Hampshire (d) Duroc

71. **Neoplasia of the spleen of dog is best treated by:**
(a) No treatment (b) Chemotherapy
(c) Irradiation (d) Splenectomy

72. **Calcium content in calcium boro-gluconate used to treat milk fever is :**
(a) 8.0 % (b) 8.3 %
(c) 8.6 % (d) None of the above

73. **Nibbling reflex in seen in sheep suffering from:**
(a) Scrapie (b) PPR
(c) FMD (d) Pox

74. **Breed of chicken having black flesh:**
(a) Aseel (b) Nicobari
(c) Harringhata black (d) Kadaknath

75. **Transplacental transmission is exhibited by**
(a) Trypanosoma evansi (b) Ancylostoma caninum
(c) Fasciola gigantica (d) Tacnia solium

76. **The effect of cobalt in the rumen is to participate in the production**
(a) Vitamin B12 (b) Vitamin B1
(c) Vitamin B 6 (d) Vitamin C

77. **Following is an oral antifungal agent**
(a) Desenex (b) Undecyclenic acid
(c) Griseofulvin (d) Sopronol

78. **Casings prepared from the pig stomach are known as**
(a) Middles (b) Bung
(c) Cap (d) Maws

79. **Site of posterior epidural anaesthesia in mares is**
(a) Lumb-sacral (b) First intercoccygeal
(c) Sacro-coccygeal (d) None of the choices

80. **How much green oats having 75% moisture content is required daily for a buffalo weighing 500 kg to be fed @ 3% (of body weight) DM intake.**
(a) 50 kg (b) 25 kg
(c) 60 kg (d) 40 kg

81. **The testosterone released from tunica interna is converted to estradiol, a female sex hormone under the influence of:**
(a) FSH (b) LH
(c) Prolactin (d) Oxytocin

82. **What usually limits the microbial protein production in dairy cows fed alfalfa based diets**
(a) the amount of degradable protein (b) the amount of ammonia in the rumen
(c) the amount of fermentable energy (d) the amount of dietary NDF

83. **The most deficient amino acid in cereals is**
(a) Arginine (b) Lysine
(c) Tyrosine (d) Glycine

84. **Best combination of drugs for induction of parturition in bovines is**
(a) Estrogen and Dexamethasone (b) Prostaglandins and Dexamethasone
(c) Estrogen and Prostaglandins (d) All of the above

85. **Which of the following is most effective drug for disseminatedhistoplasmosis in dogs and cats**
(a) Gresiofulvin (b) Itraconazole
(c) Rafoxanide (d) Tylosin

86. **Which is the main source of energy in bull semen?**
(a) Fructose (b) Lactose
(c) Glucose (d) Sorbitol

87. **According to B.I.S. standard good quality butter should not contain moisture more than**
(a) 16.0% (b) 10.0%
(c) 12.0% (d) 8.0%

88. **Tuberculin skin testing is based on**
(a) Type I hypersensitivity reaction (b) Type II hypersensitivity reaction
(c) Type III hypersensitivity reaction (d) Type IV hypersensitivity reaction

89. **Range of fibre diameter of fine wool from sheep is:**
(a) 5-8 micron (b) 18-20 micron
(c) 28-30 micron (d) 30-35 micron

90. **Hardhenu-synthetic breed of dairy cattle is composed of:**
(a) 62.5% Holstein + 27.5% Sahiwal + 10% Hariana
(b) 50% Holstein + 50% Hariana
(c) 62.5% Holstein + 27.5% Tharparkar + 10% Hariana
(d) 75% Holstein + 25% Hariana

91. **Breed of camel adapted to coastal ecosystem is:**
(a) Kutchhi (b) Kharai
(c) Malwi (d) None of above

92. **Boiled rice grain type of segments are seen in the infection of:**
(a) Taenia (b) Hymenolepis
(c) Moniezia (d) None of the above

93. **Telescoping of the anterior portion of intestine into posterior part is called as:**
(a) Torsion (b) Volvulus
(c) Intussuception (d) Enteritis

94. **Coggin's test is used to diagnose:**
(a) Equine infectious anemia (b) Echinococcosis
(c) Tuberculosis (d) Trypanosomosis

95. **Which of the following is the heavy metal discharged from leather industry and is associated with tanning process:**
(a) Lead (b) Arsenic
(c) Mercury (d) Chromium

96. **The type of wound healing in which granulation tissue forms, filling the defect, is known as:**
(a) First intention (b) Second intention
(c) Third intention (d) Fourth intention

97. **Chromic catgut is made up of:**
(a) Cat gut (b) Sheep gut
(c) Kangaroo gut (d) Dog gut

98. **What main problem is caused when a calf has scours and not enough fluids areobserved**
(a) Dehydration (b) Chelation
(c) Rumination (d) High fever

99. **Rotation of third phalanx is a radiological sign of**
(a) Quittor (b) Side bone
(c) Chronic laminitis (d) Navicular disease

100. **AI gun should be entered into the vagina at an angle of:**
(a) 45 degree (b) 30 degree
(c) 60 degree (d) 20 degree

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
c	a	c	c	d	c	a	c	c	a
11	12	13	14	15	16	17	18	19	20
c	a	b	a	b	c	d	b	a	d
21	22	23	24	25	26	27	28	29	30
c	b	b	a	a	d	b	b	b	c
31	32	33	34	35	36	37	38	39	40
d	d	a	c	c	a	b	a	a	a
41	42	43	44	45	46	47	48	49	50
d	c	b	c	c	a	b	a	a	a
51	52	53	54	55	56	57	58	59	60
d	c	d	c	b	c	a	c	c	d
61	62	63	64	65	66	67	68	69	70
b	c	c	b	c	d	a	c	b	c
71	72	73	74	75	76	77	78	79	80
d	b	a	d	b	a	c	d	b	c
81	82	83	84	85	86	87	88	89	90
a	c	b	b	b	a	a	d	b	a
91	92	93	94	95	96	97	98	99	100
b	c	c	a	d	b	b	a	c	b

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ICAR JRF Exam Paper-2018

1. **Shape of Y chromosome in Gir cattle is:**
   (a) Metacentric (b) Telocentric
   (c) Acrocentric (d) Sub Metacentric
2. **Rhode Island Red of poultry belongs to:**
   (a) American class (b) English class
   (c) Mediterranenan class (d) Asiatic class
3. **Accuracy of selection based on single record on an individual is:**
   (a) 1/2h (b) 1/4h
   (c) 1/8h (d) h
4. **If 9 out of 100 individuals in a population suffer from a homozygous recessive disorder, frequency of the disease causing allele is:**
   (a) 0.7 (b) 0.9
   (c) 0.09 (d) 0.3
5. **Alkali disease is caused by due to toxicity of:**
   (a) Molybednum (b) Selenium
   (c) Sulphur (d) Potassium
6. **Amino acid precursor of lignin is:**
   (a) Phenylalanine (b) Tyrosine
   (c) Alanine (d) Glycine
7. **Mineral needed for acetate incorporation in cholesterol biosynthesis is:**
   (a) Calcium (b) Copper
   (c) Manganese (d) Magnesium
8. **The most deficient amino acid in cereal is:**
   (a) Arginine (b) Lysine
   (c) Tyrosine (d) Glycine
9. **If nitrogen content of feedstuff is 4%, its crude protein content will be.....%.**
   (a) 25 (b) 15
   (c) 45 (d) 20
10. **'Vacreation' is most commonly used in pasteurization of:**
    (a) Milk (b) Cream
    (c) Flavoured milk (d) Condensed milk
11. **According to BIS standard, good quality butter should not contain moisture more than:**
    (a) 16.0% (b) 10.0%
    (c) 12.0% (d) 8.0%
12. ***Cysticercus cellulosae* is found in the:**
    (a) Intestine of human being (b) Intestine of pig
    (c) Muscles of pigs (d) Muscles of cattle
13. **General combining ability indicates the importance of:**
    (a) Non additive gene action (b) GE interaction
    (c) Environmental variation (d) Additive gene action
14. **Wool quality can be genetically be improved by selecting animals for:**
    (a) Reduced modulation % (b) Increased modulation %
    (c) Increased fiber diameter (d) Short staple length

15. **Casings prepared from the stomach are known as:**
(a) Middles (b) Bung
(c) Cap (d) Maws

16. **The most abundant protein in animal body is:**
(a) Myosin (b) Actin
(c) Collagen (d) Titin

17. **Committee which fixes the price of egg in India is:**
(a) NEPC (b) NECC
(c) NERC (d) NEEC

18. **Grey matter is composed of:**
(a) Nerve cell (b) Nerve fibers
(c) Nerve tissue (d) Myelin sheath

19. **Main excretory organ is:**
(a) Kidney (b) Skin
(c) Liver (d) GIT

20. **Time of placentation in Sow is:**
(a) 10-12 days (b) 18-20 days
(c) 30-35 days (d) 4-5 days

21. **Gestation period of Yak is:**
(a) 9 months (b) 12 months
(c) 17 months (d) 6 months

22. **During moulting, feathers are shed in order of:**
(a) Head-Neck-Breast-Body-Wing-Tail (b) Head-Breast -Body- Tail Wing -Neck
(c) Breast-Body-Wing-Tail -Head-Neck (d) Tail-Head- Body -Wing -Breast- Neck

23. **Queen of milch breed of goat is:**
(a) Saanen (b) Alpine
(c) Nubian (d) Anglo-Nubian

24. **The mutation in sickle cell anaemia is due to:**
(a) Deletion (b) Duplication
(c) Insertion (d) Point Mutation

25. **Part of placenta which is immediate covering of the foetus is:**
(a) Yolk sac (b) Amnion
(c) Allantois (d) Chorion

26. **Fats aid in the absorption of:**
(a) Vitamin B_1 (b) Vitamin E
(c) Vitamin C (d) Vitamin B_{12}

27. **New Zealand White is a breed of Rabbit originated in:**
(a) New Zealand (b) USA
(c) UK (d) USSR

28. **Only breed of south India producing fine wool is:**
(a) Bellari (b) Deccani
(c) Nilgiri (d) Nellore

29. **Curled toe paralysis in birds is caused due to deficiency of:**
(a) Thiamin (b) Pyridoxine
(c) Biotin (d) Riboflavin

30. **Which of the following contributes least in total volatile fatty acids production in rumen:**
(a) Acetic acid (b) Propionic acid
(c) Valleric acid (d) Butyric acid

31. **Proportion of nitrogen absorbed which is retained by the animals is called as:**
(a) Protein effieciency ratio (b) Biological value
(c) Net protein retention (d) Gross protein value

32. **The crossbreeding of crossbred is:**
(a) Inter se mating (b) Back crossing
(c) Test crossing (d) Criss crossing

33. **pH of ruminant saliva:**
(a) 5.4 (b) 8.1
(c) 11.2 (d) 3.5

34. **What causes the release of histamine in an allergic reaction:**
(a) Binding of IgM to basophils (b) Binding of IgE to mast cells
(c) Release of histamine by Helper T cells (d) Free radical stimulation rate of endothelial cells

35. **How many grams of methane are formed for every 100 g of carbohydrates digested:**
(a) 4.5 g (b) 10 g
(c) 20 g (d) 40 g

36. **The true digestibility different from apparent digestibility and always is:**
(a) Higher (b) Lower
(c) Three-fourth (d) Half

37. **The wet: dry ratio in organized dairy herd should be:**
(a) 1:1 (b) 2:1
(c) 3:1 (d) 4:1

38. **The main problem with mass communication is:**
(a) Costly (b) No local dialect
(c) Same information (d) Cumbersome

39. **Acid detergent soluble fractions of feed includes:**
(a) Soluble carbohydrates (b) Cellulose
(c) Hemi-cellulose (d) Lignin

40. **One gram of fat produces how many grams of metabolic water:**
(a) 0.56 (b) 0.40
(c) 1.07 (d) 0.8

41. **The energy available to animal body for useful purpose is:**
(a) Metabolisable energy (b) Net energy
(c) Heat increment (d) Digestible energy

42. **In poultry ration, Mannan oligosaccharides are used as:**
(a) Antioxidants (b) Synbiotic
(c) Prebiotic (d) Probiotic

43. **Principal site of lipid digestion in non-ruminants is:**
(a) Stomach (b) Small intestine
(c) Large intestine (d) Oesophagus

44. **The effective antidote for urea toxicity in cattle:**
(a) Acetic acid (b) Hydrochloric acid
(c) Liquid ammonia (d) Glycerol

45. **Site of fertilization in poultry is:**
(a) Uterus (b) Ovary
(c) Infundibulum (d) Ampullary- isthamus junction

46. **The e-chaupal concept in extension delivery is promoted by:**
(a) ITC (b) MSSRF
(c) KINFRA (d) CAPART

47. **Central Institute for Research on Buffaloes is located at:**
(a) Anand (b) Bareilly
(c) Hissar (d) Karnal

48. **Which one of the following sets of ions is necessary in the chemical events for muscle contraction:**
(a) Na^+ and K^+ (b) Ca^{2+} and Mg^{2+}
(c) Na^+ and Ca^{2+} (d) Na^+ and Mg^{2+}

49. **Unfertilized ovum remains for months in the oviduct of:**
(a) Sow (b) Mare
(c) Ewe and Doe (d) Bitch

50. **Longest phase of estrous cycle:**
(a) Estrus (b) Proestrus
(c) Diestrus (d) Metestrus

51. **During blood coagulation, thromboplastin is released by:**
(a) RBC (b) WBC
(c) Blood plasma (d) Clumped platelets

52. **Which of the following is a potent vasoconstrictor released by platelets adhering to a wounded blood vessel?**
(a) Seretonin (b) Prothrombin
(c) Thrombin (d) Thromboplastin

53. **Which of the following tissue is the most rapidly available source of energy within a muscle cell?**
(a) Adenylate kinase (b) Creatine kinase
(c) Glycogen (d) Phosphocreatine

54. **Act of passage of food from the mouth to the stomach through pharynx and oesophagus:**
(a) Mastication (b) Deglutition
(c) Regurgitation (d) Rumination

55. **pH of TRIS extender is:**
(a) Slightly acidic (b) Slightly alkaline
(c) Neutral (d) Alkaline

56. **The slope (in degrees) of the roof in animal shed should not exceed:**
(a) 90 (b) 65
(c) 45 (d) 25

57. **Faulty milking method in dairy animals:**
(a) Stripping (b) Full hand
(c) Knuckling (d) Machine

58. **"Alfalfa" fodder is commonly known as:**
(a) Berseem (b) Lucerne
(c) Cowpea (d) Maize

59. **If the number of trials is large and probability of occurrence of an event is very small, the distribution is:**
(a) Binomial distribution (b) Poisson's distribution
(c) Normal distribution (d) Asymmetric distribution

60. **Karan Fries is a synthetic cattle breed produced by crossing HF bull with the female of:**
(a) Tharparkar (b) Red Sindhi
(c) Sahiwal (d) Gir

61. **The most important genetic cause of heterosis is:**
(a) Codominance
(b) Overdominance
(c) Directional dominance
(d) Epistasis

62. **Central fluid filled cavity of the blastula is known as:**
(a) Blastocoel
(b) Blastocyst
(c) Morula
(d) Zygote

63. **Fertilizin is produced from:**
(a) Acrosome
(b) Polar bodies
(c) Middle piece of sperm
(d) Mature eggs

64. **Cock feathering trait in chicken is a:**
(a) Sex-linked trait
(b) Sex-influenced trait
(c) Sex-limited trait
(d) Sex-controlled trait

65. **If a coin is tossed twice, the result of second throw would not affect the result of first throw, this type of events is:**
(a) Mutually exclusive event
(b) Independent event
(c) Equally likely
(d) Exhaustive event

66. **The regression equation of x on y is the equation of best fitting straight line in the form:**
(a) $y=a+bx$
(b) $x=a+by$
(c) $y=bx+c$
(d) $x=b+ay$

67. **The percentage of items covered by mean±2n in normal distribution is:**
(a) 68
(b) 75
(c) 95
(d) 99

68. **Which of the following is non-parametric test?**
(a) Z-test
(b) t-test
(c) F-test
(d) Chi-square test

69. **A single sheet of printed matter made to give accurate information on a specific topic is:**
(a) Pamphlet
(b) Poster
(c) Leaflet
(d) Circular letter

70. **The method of purchasing done to ensure uninterrupted supply of raw material to the production process:**
(a) Purchasing for a future period
(b) Contract purchasing
(c) Scheduled buying
(d) Current market purchasing

71. **Which one is an example of variable input in dairy farm:**
(a) Farm family's labour
(b) Casual hired labour
(c) Farm manager's labour
(d) Permanently hired labour

72. **Actual price that is existed at a particular point of time:**
(a) Normal price
(b) Market price
(c) Issue price
(d) Equilibrium price

73. **What type of farming enterprise is Low-input, low output farming system?**
(a) Subsistence
(b) Commercial
(c) Intensive
(d) Extensive

74. **A summary statement of all the assets and liabilities of a business at a given point of time is:**
(a) Profit and loss statement
(b) Balance sheet
(c) Cash flow statement
(d) None of the above

75. **Traders are the main participants in this market:**
(a) Local market
(b) Primary market
(c) Secondary market
(d) Village market

76. **The conversion of paddy into rice is:**
(a) Place utility
(b) Time utility
(c) Form utility
(d) Possession utility

77. **The pure bred inheritance after five generations of grading up is (in percentage):**
(a) 93.75
(b) 96.87
(c) 98.43
(d) 99.21

78. **The release of energy is a slow in certain feeds/nutrients and such feeds/nutrients are considered as 'non-heating' for horse feeding. They are:**
(a) Carbohydrates
(b) Fat
(c) Protein
(d) Feed additives

79. **The internal width of a shed (from wall to wall) is termed:**
(a) Span
(b) Pinth
(c) Eaves
(d) Pitch

80. **The phenomenon in which one gene of one pair masks the expression of the genes of another pair:**
(a) Interaction
(b) Over dominance
(c) Dominance
(d) Epistasis

81. **The following is not commonly seen in an animal cell:**
(a) Lysosome
(b) Centrisome
(c) Golgi bodies
(d) Plastids

82. **The value of an individual judged by mean value of its offspring is:**
(a) Breeding value
(b) Phenotypic value
(c) Non-additive genetic value
(d) Dominance value

83. **Calving interval is a sum of:**
(a) Service period and gestation period
(b) Service period and dry period
(c) Service period and lactation length
(d) Gestation period and dry period

84. **Crossing of Red Sindhi cow with Red Sindhi bull is an example for:**
(a) Top crossing
(b) Out crossing
(c) Cross breeding
(d) Upgrading

85. **Unmasking of recessive genes occur:**
(a) Out breeding
(b) Inbreeding
(c) Cross breeding
(d) Out crossing

86. **The eructation contractions in reticulo-rumen are initiated at:**
(a) Reticulum
(b) Dorsal rumen sac
(c) Ventral rumen sac
(d) Cardia

87. **Which of the following end product is absorbed in the body through blood:**
(a) SCFA
(b) LCFA
(c) Cholesterol
(d) Glycerides

88. **The functional equivalent of teeth in birds is:**
(a) Beak
(b) Ventriculus
(c) Proventriculus
(d) Crop

89. **Which of the following is called "Hunger hormone"?**
(a) CCK
(b) Glucagon
(c) Leptin
(d) Ghrelin

90. **Rabbits can be fed the following feed in liberal quantity:**
(a) Cabbage vegetable (b) Cottonseed meal
(c) Subabul green forage (d) Cowpea hay

91. **Slat system of housing is preferred for housing:**
(a) Broilers (b) Broilers breeders
(c) Layers (d) Layers breeders

92. **Common litter borne diseases encountered in deep litter housing system is:**
(a) Salmonellosis (b) E.coli infection
(c) Coccidiosis (d) Mycoplasmosis

93. **The colour of mutton is:**
(a) Bright red to dark red (b) Light pink to dark pink
(c) Dark red (d) Light red to brick red

94. **Bacterial group that causes spoilage of milk at refrigerator temperature is called as:**
(a) Halophilic (b) Thermophilic
(c) Coliform (d) Psychrophilic

95. ***Apis cerana indica* is:**
(a) Indian bee (b) Rock bee
(c) Indian butter fly (d) Italian butter fly

96. **One of the following is fit into festive occasions and serves recreational purpose:**
(a) Exhibition (b) Meetings
(c) Campaign (d) Lecture

97. **Milk secretion occurs in:**
(a) Gland cistern (b) Alveoli
(c) Teat cistern (d) Milk gland

98. **When an adult dry animal is neither losing nor gaining in body weight and its body condition is constant, then the nutrient requirements are called as:**
(a) Work requirements (b) Maintenance requirements
(c) Pregnancy requirements (d) Growth requirements

99. **The appearance resulting from a given gene combination is referred to as the:**
(a) Phenotype (b) Genotype
(c) Stereotype (d) Phototype

100. **The crop left over after harvesting of any cereal/millet/legume is called:**
(a) Hull (b) Straw
(c) Bran (d) Husk

101. **Better use of productive resources is seen in:**
(a) Diversified farming (b) Peasant farming
(c) Specialized farming (d) Aqua farming

102. **Water soluble antineuretic factor is:**
(a) Thiamine (b) Riboflavin
(c) Pyridoxine (d) Biotin

103. **Major anion of the extra cellular fluid of the body involved in osmotic pressure regulation is:**
(a) Chloride (b) Sodium
(c) Potassium (d) Selenium

104. **The faeces is the primary path for phosphorus excretion in:**
(a) Omnivore (b) Carnivore
(c) Monogastric (d) Herbivore

105. **Substitution of purine by a pyrimidine is called:**
(a) Translation
(b) Transversion
(c) Transmission
(d) Translocation

106. **The quantity of saliva (litres) produced by adult cattle in a day is about:**
(a) 2-3
(b) 130-180
(c) 50-60
(d) 100

107. **Oedema is caused by:**
(a) Increased capillary pressure
(b) Increased rate of return of lymph
(c) Increased permeability of the capillary walls
(d) Decreased rate of return of lymph

108. **Fatty liver kidney syndrome is caused in poultry due to deficiency of:**
(a) Biotin
(b) Vitamin B_{12}
(c) Choline
(d) Vitamin B_6

109. **The repetitive growing of the same sole crop on the same piece of land is:**
(a) Polyculture
(b) Monoculture
(c) Monohybrid
(d) Polyhybrid

110. **Colostrum has antibodies in the protein fraction of:**
(a) Casein
(b) Cystine
(c) Lactalbumin
(d) Lactglobulin

111. **Estimation of repeatability is not possible for:**
(a) Litter size in successive kindlings of Rabbits
(b) Fleece yield in successive shearing
(c) Age at first calving
(d) Milk yield in different lactations

112. **The following factor will not affect the chemical composition of forage crop is:**
(a) Manuring and fertilization
(b) Method of harvesting of the forage crop
(c) Stage of the maturity of the plant
(d) Soil composition

113. **Organisms or substances which contribute to intestinal microbial balance are:**
(a) Probiotics
(b) Antibiotics
(c) Prebiotics
(d) Hormones

114. **Chromosome compliment of nullisomics is:**
(a) 2n-2
(b) 2n+1
(c) 2n+2
(d) 2n

115. **If a female haemophilic married a normal male, what percentage of their male offspring would be expected to have haemophilic? (%)**
(a) 25
(b) 33
(c) 100
(d) 50

116. **Grinding of grains increases the digestibility, because of:**
(a) Slower rate of passage in digestive tract
(b) Decreased surface area for enzymatic action
(c) Faster rate of passage from digestive tract
(d) Increased surface area for enzymatic action

117. **For determining the digestibility of a feed by conducting digestion trial in ruminants, the optimum length of 'collection period' followed is:**
(a) 7 days
(b) 14 days
(c) 21 days
(d) 30 days

118. **The digestibility of the following nutrient is not determined:**
(a) EE
(b) CP
(c) CP
(d) Ash

119. **Change of gene frequency in migration is given by:**
(a) $q_m(m+q_o)$ (b) $q_o(m+q_m)$
(c) $m(q_m-q_o)$ (d) $m(q_m+q_o)$

120. **The 'external indicator' used to determine the digestibility of a feed in non-ruminants is:**
(a) Titanium dioxide (b) Carmine red
(c) Magnesium ferrite (d) Chromic oxide

121. **In a linkage experiment, if the observed number of double cross over is 5 and expected are 7, coefficient of coincidence is:**
(a) 0.8 (b) 0.92
(c) 1.5 (d) 0.71

122. **Selenium is a component of the enzyme:**
(a) Gluthathione peroxidase (b) Xanthine oxidase
(c) Cytochrome oxidase (d) Aldehyde oxidase

123. **If Hardy -Weinberg equilibrium can be assumed, the frequency of heterozygotes among all individuals is given by:**
(a) $2q(1-q)$ (b) $2q(1+q)$
(c) $2q(1-q)^2$ (d) $2q(1+q)^2$

124. **Which of the following is the correct sequence of code transfer during polypeptide formation?**
(a) DNA, mRNA, tRNA, amino acids (b) DNA, tRNA, rRNA, mRNA
(c) mRNA, tRNA, DNA, amino acids (d) rRNA, DNA, mRNA, tRNA

125. **In a locus there are three alleles A1, A2 and A3 with the frequencies of 0.6, 0.3 and 0.1, respectively. If the parents mates at random, the frequency of A1A1 genotype in the progeny generation will be:**
(a) 0.36 (b) 0.06
(c) 0.09 (d) 0.12

126. **Castrated male pig is known as:**
(a) Neuter (b) Barrow
(c) Capon (d) Wedder

127. **As the age of animal/human advances the following nutrient decreases:**
(a) Carbohydrates (b) Protein
(c) Fat (d) Vitamins

128. **Inbreeding in a population:**
(a) Reduce variance (b) Increases heritability
(c) Increases the fitness (d) Reduces the genetic abnormalities

129. **The gene which kills an individual before birth is called as:**
(a) Semi lethal (b) Sub vital
(c) Lethal (d) Sub lethal

130. **One of the following is a non-ionizing radiation:**
(a) X-rays (b) UV rays
(c) Gamma rays (d) Cosmic rays

131. The most variable constituent in milk is:
(a) Protein
(b) Fat
(c) Ash
(d) None of the above

132. **Pig skin is called:**
(a) Hide
(b) Rind
(c) Kip
(d) Slunk

133. **Anti-nutritional factor present in groundnut cake is a:**
(a) Aflatoxin
(b) Glycogen
(c) Glucosinolate
(d) None of the above

134. **Which of the following is a true for Red muscle fibers:**
(a) Lacks mitochondria
(b) Rich in mitochondria
(c) Rich in haemoglobin
(d) None of the above

135. **Which of the following stabilizer is from animal source:**
(a) Gelatin
(b) CMC
(c) Sodium alginate
(d) Guar gum

136. **Salmonellosis is an example of the following food poisoning:**
(a) Infectious type
(b) Non-infectious
(c) Chemical
(d) Metabolic

137. **Which heat is more effective:**
(a) Moist
(b) Dry
(c) Mixture
(d) 60:40 combination

138. **Red rot of egg is due to:**
(a) *Proteus and Pseudomonas*
(b) *Pseudomonas fluoroscens*
(c) *Serratia*
(d) *Sporotrichum, Penicillium, Cladosporium*

139. **Cornish breed of chicken has:**
(a) Single comb
(b) Pea comb
(c) Walnut comb
(d) Rose comb

140. **Continuous variation is shown by:**
(a) Less genes with large effect
(b) More genes with small effect
(c) Less genes with less effects
(d) More genes with large effect

141. **Melatonin controls:**
(a) Cyclic breeding behaviour
(b) Feeding behaviour
(c) Investigative behaviour
(d) Teasing behavior

142. **Gimmer is female sheep between:**
(a) 2 to 3 years of age
(b) 1st and 2nd shearing
(c) 4 to 6 years of age
(d) 6 to 8 years of age

143. **Mature sheep have:**
(a) 30 teeth
(b) 32 teeth
(c) 34 teeth
(d) 36 teeth

144. **Native tract of Dangi breed is:**
(a) Maharashtra
(b) Uttar Pradesh
(c) Gujarat
(d) Rajasthan

145. **Increase in number of daughter per bull:**
(a) Decreases accuracy of sire evaluation
(b) Increases accuracy of sire evaluation
(c) Does not affect accuracy of sire evaluation
(d) Improves intensity of selection

146. **Progeny testing is valuable for:**
(a) High heritable traits
(b) Medium heritable traits
(c) Low heritable traits
(d) Non heritable traits

147. **Heritability of fertility traits:**
(a) Low
(b) Medium
(c) High
(d) Very high

148. **Diestrus phase of estrus is predominated by influence of:**
(a) Estrogen
(b) Progesterone
(c) Testosterone
(d) FSH

149. **Concept of A2 milk is associated with:**
(a) Alpha S1 casein
(b) Alpha S2 casein
(c) Beta casein
(d) Kappa casein

150. **A primary spermatocyte is transformed into:**
(a) Two spermatids
(b) Four spermatids
(c) Eight spermatids
(d) Sixteen spermatids

151. **Match the following:**

i	Vitamin-A	A	Ergocalciferol
ii	Vitamin-D2	B	Retinol
iii	Vitamin-D3	C	Cholecalciferol
iv	Vitamin-E	D	Phylloquinone
v	Vitamin-K	E	Tocopherol

152. **Match the following:**

i	Total digestible nutrients	A	Deficiency of Thiamine
ii	Castor bean	B	Deficiency of iron
iii	Immature jowar green fodder	C	Measure of energy
iv	Piglet anaemia	D	HCN toxicity
v	Polyneuritis	E	Haemagluttin

153. **Match the following:**

i	Iodine	A	Major anion of ECF
ii	Cobalt	B	Major cation of ECF
iii	Chlorine	C	Highest concentration is found in muscle
iv	Sodium	D	Hairless piglets
v	Potassium	E	Coast disease

154. **Match the following:**

i	NDRI	A	Maqdoom
ii	IVRI	B	Rani
iii	CIRG	C	Karnal
iv	NRC on pig	D	Hissar
v	NRC on horse	E	Bareilly

155. Match the following:

i	Murrah	A	Prominent forehead
ii	Jaffarabadi	B	Strong horns
iii	Surti	C	Jet black
iv	Gir	D	Sickel shaped horns
v	Kankrej	E	Leafy ears

156. Match the following:

i	Neem seed cake	A	Ricin
ii	Mahua seed cake	B	Glucosinolates
iii	Linseed cake	C	Nimbidin
iv	Mustard seed cake	D	Mowrin
v	Castor bean meal	E	Linmarin

157. Match the following:

i	Jersind	A	Nondescript cow X BS bull
ii	Karan Swiss	B	Rambouillet, Merino X Chokla, Nali
iii	Karan Fries	C	Sahiwal X BS
iv	Sunandini	D	RS X Jersey
v	Avivashtra	E	Tharpakar X HF

158. Match the following:

i	Night blindness	A	Se
ii	Piglet anaemia	B	Zn
iii	Alkali disease	C	Mg
iv	Parakeratosis	D	Fe
v	Grass tetany	E	Vitamin A

159. Match the following:

i	Degradation of Glucose	A	Glycogenesis
ii	Synthesis of Glucose	B	Glycogenolysis
iii	Synthesis of Glycogen	C	Glucose
iv	Degradation of Glycogen	D	Glycolysis
v	Key molecule in CHO metabolism	E	Glucogenesis

160. Match the following:

i	Antharx	A	Crystal violet vaccine
ii	Black quarter	B	Cotton Strain 19
iii	HS	C	Oil adjuvant vaccine
iv	Brucellosis	D	Formol killed vaccine
v	Hog cholera	E	Spore vaccine

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
c	a	d	d	b	a	c	b	a	c
11	12	13	14	15	16	17	18	19	20
a	a	d	a	d	c	b	a	a	a
21	22	23	24	25	26	27	28	29	30
a	a	a	d	b	b	c	c	d	d
31	32	33	34	35	36	37	38	39	40
b	a	b	b	a	a	d	b	c	c
41	42	43	44	45	46	47	48	49	50
a	c	b	a	c	a	c	b	d	c
51	52	53	54	55	56	57	58	59	60
a	a	d	d	a	c	c	b	b	a
61	62	63	64	65	66	67	68	69	70
c	a	d	c	b	d	c	d	c	c
71	72	73	74	75	76	77	78	79	80
b	b	d	b	b	c	b	a	c	d
81	82	83	84	85	86	87	88	89	90
d	a	a	b	b	a	a	d	d	d
91	92	93	94	95	96	97	98	99	100
c	c	a	d	a	a	b	b	b	b
101	102	103	104	105	106	107	108	109	110
a	a	a	d	b	b	c	c	b	d
111	112	113	114	115	116	117	118	119	120
c	b	a	a	d	d	a	d	c	d
121	122	123	124	125	126	127	128	129	130
a	a	a	a	a	b	b	a	c	b
131	132	133	134	135	136	137	138	139	140
b	b	a	a	a	a	a	c	b	d
141	142	143	144	145	146	147	148	149	150
a	b	b	a	b	c	a	b	c	b

Match the column					
	i	ii	iii	iv	v
151	B	A	C	E	D
152	C	E	D	B	A
153	D	E	A	B	C
154	C	E	A	B	D
155	C	A	D	E	B
156	C	D	E	B	A
157	D	C	E	A	B
158	E	D	A	B	C
159	D	E	A	B	C
160	E	D	C	B	A

ICAR-JRF (Online)
Memory Based Exam Paper-2018

1. **Full form of IVLP**
   (a) Institution Village Linkage Programme
   (b) Indian Village Linked Programme
   (c) Institutional Village Linked Programme
   (d) Indian Village Linkage Programme

2. **Relationship % in double first cousin**
   (a) 25
   (b) 62.5
   (c) 87.5
   (d) 100

3. **The canine or bridle teeth erupt in the inter dental space at the age of**
   (a) 1-2 years
   (b) 3-4 years
   (c) 4-5 years
   (d) Not erupt at all

4. **The process of recognizing and targeting invading particles for phagocytosis is termed as**
   (a) Opsonization
   (b) Invasion
   (c) Lethality
   (d) Neutralization

5. **The outward migration of individuals from a population to brings about the reduction in the size of the gene pool is termed as**
   (a) Imigration
   (b) Emigration
   (c) Selection
   (d) Genetic drift

6. **The growth rate of poultry in 2016-17 according to Department of Animal Husbandry Dairying & Fisheries**
   (a) 5.5%
   (b) 6.13%
   (c) 6.5%
   (d) 7.0%

7. **The best crop for hay making is**
   (a) Lucerne
   (b) Berseem
   (c) Oat
   (d) Maize

8. **Yellow lethal mice is example of**
   (a) Inter-allelic gene interaction
   (b) Intra -allelic gene interaction
   (c) Polymorphism
   (d) Lethal gene

9. **MHC are present on surface of which cell types**
   (a) Nucleated cell
   (b) Non-nucleated cells
   (c) RBCs
   (d) Enucleated cells

10. **Fungal spoilage condition occurs in livestock products, when it is kept in moisture-temperature combinations of**
    (a) high moisture, high temperature
    (b) low moisture, high temperature
    (c) high moisture, low temperature
    (d) low moisture, low temperature

11. **CARI GOLD is produced by crossing**
    (a) WLH Female X RIR Male
    (b) Cornish Male X Busra Female
    (c) Busra Male X Cornish Female
    (d) WLH Male X RIR Female

12. **The first phase of cell cycle is termed as**
    (a) Interphase
    (b) Mitotic phase
    (c) Meiotic phase
    (d) None of above

13. **Water in food which is not bound to food moleeules can support the growth of bacteria, yeasts and molds (fungi) is termed as**
    (a) Specific activity
    (b) Water activity
    (c) Specific gravity
    (d) Relative density

14. **The milk veins emerge at the front of udder and reenters the body at**
(a) Milk well (b) Milk mirror
(c) Milk foramena (d) Milk outlet

15. **The steps in extension teaching method (AIDCAS) given was given by the scientist:**
(a) Leagens (b) Wilson and Gallup
(c) Landis (d) Horton

16. **Product differentiation is characteristic feature of which market**
(a) Monopolistic competition (b) Oligopoly market
(c) Duopoly market (d) Monopoly market

17. **At the point where Marginal Product =Average Product, then Average Product its**
(a) Minimum (b) Maximum
(c) Cannot be calculated (d) None of the above

18. **If the value of respiratory quotient exceeds unity, then**
(a) Fat metabolism is nil (b) Fat is 100% metabolized
(c) Carbohydrates metabolism is nil (d) Protein metabolism is nil

19. **Tannin impairs nutrient availability by**
(a) reducing the solubility or interfering with the utilization of mineral elements
(b) depressing digestion or metabolic utilization of protein
(c) inactivating or increasing the requirements of certain vitamins and certain mineral
(d) None of the above

20. **The term sanitation is derived from latin word 'sanitas' which means**
(a) wellbeing (b) health
(c) cleaning (d) hygiene

21. **Which of the following is not a component of effective teaching learning situation**
(a) Teacher (b) Learner
(c) Subject matter (d) Environment

22. **Messages can be distinguished in three dimensions of the communication area**
(a) Semantic (referential, informative) (b) Subjective (individual)
(c) Cultural (social) (d) All of the above

23. **Location of thermoregulatory set point is**
(a) Pituitary (b) Thyroid
(c) Thymus (d) Hypothalamus

24. **The structural support in cell membrane is due to presence of**
(a) Techoic acid (b) Phospholipids
(c) N-acetyl glucosamine (d) N-acetyl muraminic acid

25. **During hay preparation due to sunrays,**
(a) oxidation occurs leading to reduction in the carotene concentration
(b) enhances the vitamin D content
(c) Both a and b
(d) None of the above

26. **Which of the following system is used for preserving raw milk where refrigeration is not available**
(a) Lactoperoxidase/Thiocyanate/Hydrogen peroxide system
(b) Oxidoreductase/Thiocyanate/Hydrogen peroxide system
(c) Peroxidase/Thiocyanate/Hydrogen peroxide system
(d) All of the above

27. The thoracic lymph contains
(a) Mediastinal lymph node (b) Parotid lymph node
(c) Renal lymph node (d) Mesentric lymph node

28. **The breeding method in which gene frequency is remains constant**
(a) Random breeding (b) Selective breeding
(c) Family selection (d) Progeny Testing

29. **The inborn error of metabolism given by**
(a) GJ Mendel (b) Waltercanon
(c) Hugo de vries (d) Archibald Garrod

30. **First to adapt an innovation are termed as**
(a) Innovators (b) Early adaptors
(c) Late majority (d) Laggards

31. **The person associated with Sevagram project**
(a) Spencer Hatch (b) Mahatma Gandhi
(c) Rabindranath Tagore (d) FL Brayne

32. **Economics is science of wealth given by scientist**
(a) Adam Smith (b) Alfred Marshall
(c) Lionel Robbins (d) Paul Samuelson

33. **The livestock contribution in agricultural Gross Domestic Product is**
(a) 16.0% (b) 20.0%
(c) 25.6% (d) 30%

34. **NABARD established in year**
(a) 1965 (b) 1982
(c) 2001 (d) 2015

35. **The hormone responsible for upholding the milk**
(a) Prolactin (b) Adrenaline
(c) Oxytocin (d) Vasopressin

36. **The thawing of meat is influenced by**
(a) Temperature of medium involved (b) Exposure time
(c) Both a and b (d) None of the above

37. **Mutation theory given by**
(a) Singer and Nicolsan (b) Hugo de vries
(c) Mendel (d) Griffth

38. **District Rural Development Agencies (DRDA) established in the year**
(a) 1960 (b) 1976
(c) 1978 (d) 1980

39. **Crude fiber in feed contains**
(a) Cellulose (b) Hemicellulose
(c) Lignin (d) All of above

40. **Ancestor of todays zebu cattle is**
(a) *Bos taurus* (b) *Bos indicus*
(c) *Bos tauroindicus* (d) *Bos taurus primigenius*

41. **The half moon shaped horn breed is**
(a) Gir (b) Sahiwal
(c) Kankrej (d) Deoni

42. **Which of the following content less in buffalo milk than cow milk**
(a) Water (b) Total solids
(c) Fat (d) Lactose

43. **AICRP on buffalo was started in 1970-71 for which breed**
(a) Murrah (b) Jaffarabadi
(c) Surti (d) Both a and c

44. **The property of wool most affecting its commercial value**
(a) Medullation percentage (b) Staple length
(c) Fiber length (d) Diameter

45. **Thaw rigor results in**
(a) Increased toughness of meat (b) Increased drip loss
(c) Loss of nutritive value (d) All of above

46. **Small Farmer Development Agency was established in the year**
(a) 1951 (b) 1971
(c) 1985 (d) 2001

47. **The mixture of milk and meat are prohibited in which religion**
(a) Hindu (b) Sikh
(c) Jewish (d) Muslim

48. **Lung contains which phagocytes**
(a) Mast cell (b) Dust cell
(c) Glial cell (d) Satellite cell

49. **WTO agreement for quality control of agricultural product was established in the year**
(a) 1990 (b) 1994
(c) 1995 (d) 1998

50. **The heredity information is stored in**
(a) Genes (b) Mitochondria
(c) Plastids (d) Chloroplasts

51. **Glycerol is oxidized to provide _____ moles of ATP per mole of glycerol.**
(a) 10 (b) 17
(c) 22 (d) 25

52. **Mohair is produced by _____ goat breed.**
(a) Chanthangi (b) Angora
(c) Surti (d) Black Bengal

53. **The protein content in cow and buffalo milk ranges from _____ %.**
(a) 3.5-4.0 (b) 4.5-5.0
(c) 5.5-6.0 (d) 6.5-7.0

54. **The largest compartment of new born calf stomach**
(a) Rumen (b) Reticulum
(c) Omasum (d) Abomasum

55. **The crude fibre % in cattle feed type I**
(a) 18 (b) 20
(c) 22 (d) 25

56. **The attempt for first cooperative movement was started in**
(a) Rochdale (b) Allahabad
(c) Meerut (d) Frankfurt

57. **The measures of central tendency that divides data in two halves is termed as**
(a) Mean (b) Median
(c) Mode (d) All of above

58. **The fat content in normal size chicken egg is**
(a) 2g (b) 6g
(c) 10g (d) 15g

59. **Substances which acts as both emulsifier and stabilizer in ice cream preparation**
(a) Guar gum (b) Sodium alginate
(c) Carboxy methyl cellulose (d) Carragenan

60. **Chromosome is best studied in which stage of mitosis**
(a) Prophase (b) Metaphase
(c) Anaphase (d) Telophase

61. **The process of egg laying in poultry is termed as**
(a) Ovulation (b) Oviposition
(c) Both a and b (d) None of the above

62. **Marketable surplus**
(a) is the actual quantity marketed in the market by the producer.
(b) is the quantity which can be delivered by the producer to the market after his on-farm consumption.
(c) represents the excess quantity affordable to the market and it creates the market for certain commodity.
(d) Both b and c

63. **The amino acids not involved in transamination**
(a) Alanine (b) Aspartate
(c) Glutamate (d) All of the above

64. **Good quality silage have pH in the range of**
(a) 3.5-4.2 (b) 4.2-4.5
(c) 4.5-4.8 (d) >4.8

65. **Prebiotic and probiotic combination is called as**
(a) Synbiotic (b) Symbiotic
(c) Metabiotic (d) All of above

66. **Work allotment to labour depends upon**
(a) inclination of each labourer (b) capacity of each labourer
(c) Both a and b (d) None of the above

67. **The phenomenon of crossing over is absent is**
(a) Drosophila male (b) Drosophila female
(c) Both a and b (d) None of the above

68. **The cross breed Karan swiss developed in year**
(a) 1963 (b) 1980
(c) 1995 (d) 2001

69. **The peak yield in cattle attains after _____ parturition.**
(a) 4-6 weeks (b) 6-8 weeks
(c) 8-10 weeks (d) 10-12 weeks

70. **Sunandini was developed in which state**
(a) Karnataka (b) Kerala
(c) Telangana (d) Andhra Pradesh

71. **MANAGE (National Institute of Agricultural Extension Management) is located at**
(a) Hyderabad (b) Lucknow
(c) Chennai (d) New Delhi

72. **The continuous variable is**
(a) Cattle population (b) Milk yield
(c) Number of horns (d) Number of teeth

73. **Sudden intake of protein in large amount leads to**
(a) Impaction (b) Ruminal acidosis
(c) Bloat (d) Ruminal alkalosis

74. **The urea supplementation is not required in dairy animal feeding if**
(a) Crude protein >13% (b) Crude protein <13%
(c) Crude protein >18% (d) Crude protein <18%

75. **Gramalakshmi evolved in which state**
(a) Tamil nadu (b) Kerala
(c) Andhra Pradesh (d) Madhya Pradesh

76. **The chief volatile fatty acid produced in rumen is**
(a) Acetate (b) Propionate
(c) Butyrate (d) Valarate

77. **Pilot survey represents**
(a) A preliminary survey (b) Public or Confidential survey
(c) Postal or Personal survey (d) Official, Semi-official or Private Survey

78. **Rashtriya Krishi Vikas Yojana was launched in the year**
(a) 2005 (b) 2007
(c) 2009 (d) 2011

79. **Colostrum will be fed after birth in hours**
(a) 1 (b) 6
(c) 12 (d) 24

80. **The respiratory center is located at**
(a) Medulla oblongata (b) Hypothalamus
(c) Pons (d) Mediastenum

81. **The chief component of brine is**
(a) NaCl (b) NaOH
(c) Na_2CO_3 (d) Na_3HPO_4

82. **Sweet curdling in milk occurs due to bacteria**
(a) *Pseudomonas aerugenosa* (b) *Alkaligenes viscolactis*
(c) *Serratia marcescens* (d) *Staphlococcus aureus*

83. **The level of urea feeding is**
(a) upto 3% of concentrate mixture in ruminants
(b) upto 1% of the total dry matter in the ration
(c) Both a and b
(d) None of the above

84. **In Nucleus Breeding System, the nucleus tier consists of ----------_____ of total breed population.**
(a) 10 – 15% (b) 30-40%
(c) 40-60% (d) None of the above

85. **The green color of whey due to presence of**
(a) Riboflavin (b) Carotenoids
(c) Thiamine (d) Thymine

86. **The Government of India declared _____ as the Year of Women's Empowerment.**
(a) 1985 (b) 1990
(c) 2001 (d) 2011

87. **Sociometry given by scientist**
(a) Jacob L. Moreno and Helen Hall Jennings (b) Gandhi and Thomas
(c) Lehninger (d) Sharma and Prasad

88. **Ice cream mix instability occurs due to**
(a) High lactose content (b) Low lactose content
(c) Stabilizers (d) Emulsifiers

89. **The respiratory enzyme where iron is complexed covalently to protein**
(a) Cytochrome a (b) Cytochrome b
(c) Cytochrome c (d) Cytochrome d

90. **Oat hay poisoning occurs due to presence of toxic principle**
(a) Nitrate (b) Gossypol
(c) Curcin (d) Mowrin

91. **Operation flood programme was started in the year**
(a) 1970 (b) 1980
(c) 1985 (d) 1990

92. **The milk production for the year 2016-17 is**
(a) 146.3 million tonnes (b) 165.4 million tonnes
(c) 176.3 million tonnes (d) 187.7 million tonnes

93. **The contractile proteins playing a major role in conversion of muscle to meat are**
(a) Actin (b) Myosin
(c) Both a and b (d) None of the above

94. **Intensive Cattle Development Project (ICDP) was launched during**
(a) First five year plan (b) Second five year plan
(c) Third five year plan (d) Fourth five year plan

95. **The number of chromosome in swine is**
(a) 38 (b) 58
(c) 60 (d) 78

96. **The process of dirt removal from wool is termed as**
(a) Shearing (b) Scouring
(c) Clipping (d) Ringing

97. **The cardiac output is defined as**
(a) Amount of blood pumped by heart per minute
(b) Stroke volume × Heart rate
(c) Mean Arterial Pressure/Total peripheral resistance
(d) All of the above

98. **The use of experimental units into homogenous blocks is followed in**
(a) Completely Randomised Design (CRD) (b) Randomised Block Design (RBD)
(c) Latin Square Design (LSD) (d) All of above

99. **The rate of feeding colostrum to calf is**
(a) $1/10^{th}$ of body weight (b) $1/20^{th}$ of body weight
(c) $1/30^{th}$ of body weight (d) $1/50^{th}$ of body weight

100. The goat milk

(a) having higher digestibility of protein and fat
(b) having smaller fat globules and more short and medium chain fatty acids
(c) certain therapeutic values in medicine and human nutrition
(d) All of the above

101. The sequence of stages in innovation decision process are

(a) Decision, Knowledge, Persuasion, Implementation and Confirmation.
(b) Knowledge, Decision, Persuasion, Confirmation and Implementation.
(c) Persuasion, Decision, Knowledge, Implementation and Confirmation.
(d) Knowledge, Persuasion, Decision, Implementation and Confirmation.

102. The chief constituent of semen of boar are

(a) inositol
(b) ergothioneine
(c) Both a and b
(d) None of the above

103. Brunner's gland secretes hormone

(a) Mucin
(b) Cholecystokinin
(c) Secretin
(d) All of the above

104. The gene frequency in mixed population will depend on

(a) the original gene frequency of the population
(b) the difference in gene frequency between the immigrants and native
(c) the proportion of immigrants
(d) All of the above

105. The active enzyme present in calf stomach is

(a) Rennin
(b) Renin
(c) Pepsin
(c) Secretin

106. Gyandoot project was launched in tribal-dominated rural area of which state

(a) Uttar Pradesh
(b) Chhattisgarh
(c) Madhya Pradesh
(d) Bihar

107. The floor space requirement per bull in terms of covered and open area (m^2) are

(a) 1 and 2, respectively
(b) 3.5 and 7, respectively
(c) 4 and 8, respectively
(d) 12 and 120, respectively

108. Monensin is a

(a) polyether ionophore antibiotics
(b) marketed under trade name Rumensin
(c) is produced by *Streptomyces cinnamonensis*
(d) All of the above

109. In this stage of adoption, the individual is interested in the innovation and actively seeks information /detail about the innovation. Name the stage?

(a) Knowledge
(b) Persuasion
(c) Decision
(d) Implementation

110. Hay like off odour in egg occurs due to which bacteria

(a) *Achromobacter sp.*
(b) *Proteus sp.*
(c) *Pseudomonas sp.*
(d) *Enterobacter sp.*

111. When total cost is equal total revenue, it is called as

(a) Break even point
(b) Shut down point
(c) Both a and b
(d) None of the above

112. The last step of extension teaching is

(a) Attention (b) Interest

(c) Conviction (d) Satisfaction

113. Central Institute for Research on Cattle is located at

(a) Meerut (b) Izatnagar

(c) Avikanagar (d) Mathura

114. Cardiac muscle is different due to presence of

(a) Intercalated disc (b) Voluntary activity

(c) Nuclei are placed at periphery (d) Less mitochondria

115. The most prolific breed of sheep is

(a) Garole (b) Kendrapada

(c) Nellore (d) Marwari

116. The important cause of genetic correlations are

(a) Pleiotropy (b) Linkage

(c) Both and b (d) None of the above

117. The method demonstration principle

(a) is a relatively short term demonstrations

(b) given before a group to show how to carry out an entirely new practice

(c) is not concerned with proving the worth of the practice

(d) All of the above

118. _____is the continual use of sires of one pure breed starting with non- descript females.

(a) Cross-breeding (b) Top crossing

(c) Grading up (d) Line breeding

119. Molasses is good source of

(a) Energy (b) Protein

(c) Fat (d) Vitamin and minerals

120. Black tongue condition occurs in dog due to deficiency of

(a) Pantothenic acid (b) Niacin

(c) Biotin (d) Thiamine

121. Burying of urine and faeces is a characteristic of which species

(a) Ovidae (b) Felidae

(c) Suidae (d) All of above

122. The ratio of dominant epistasis

(a) 9:3:4 (b) 12:3:1

(c) 13:3 (d) 9:7

123. _____is a society of key stakeholders involved in agricultural activities for sustainable agricultural development in the district.

(a) ATMA (b) ICAR

(c) NABARD (d) RBI

124. Frankfurter is a

(a) Cooked sausage (b) Smoked sausage

(c) Comminuted meat product (d) All of above

125. **Annual culling level for dairy farm**
(a) 25% (b) 30%
(c) 35% (d) 40%

126. **Unsaturation of fatty acid is reflected by**
(a) Presence of double bonds (b) Presence of single bond
(c) cis-trans isomerism (d) Both a and c

127. **Blind staggers occurs due to**
(a) Acute poisoning of selenium (b) Chronic poisoning of selenium
(c) Both a and b are correct (d) None of the above

128. **The cone of experience is given by scientist**
(a) Edgar Dale (b) Robert Cone
(c) Malthus (d) Stahlin

129. **Cooperative society is an example of**
(a) Primary group (b) Secondary group
(c) Tertiary group (d) Functional group

130. **Which of the following is social stratification factor**
(a) Sex (b) Age
(c) Caste (d) Creed

131. **Cellulose is polymer of**
(a) β (1 $\rightarrow$ 4) linked D-glucose units (b) α (1 $\rightarrow$ 4) linked D-glucose units
(c) β (1 $\rightarrow$ 6) linked D-glucose units (d) α (1 $\rightarrow$ 6) linked D-glucose units

132. **Example of heterocyclic amino acid is**
(a) Tryptophan (b) Histidine
(c) Proline (d) All of the above

133. **A scientist coined the term green revolution is**
(a) MS Swaminathan (b) NE Borlaug
(c) William Gadd (c) None of the above

134. **The last step of extension educational process**
(a) Deciding objectives and solution (b) Reconsideration
(c) Evaluation (d) Teaching plan of work

135. **DNA polymerase works in the direction**
(a) 3'–5' direction along the old strand (b) 5'–3' direction along the old strand
(c) 3'–5' direction along the new strand (d) 5'–3' direction along the new strand

136. **The phenomenon of cold shortening occurs when pre-rigor meat is kept at temperature below**
(a) 5°C (b) 15°C
(c) 25°C (d) 35°C

137. **The height of roof for cattle shed is constructed**
(a) 6-8 feet above the floor level. (b) 12-14 feet above the floor level.
(c) 18-20 feet above the floor level. (d) 20-25 feet above the floor level.

138. **The increase in renal vascular resistance leads to**
(a) Reduction in renal blood flow (b) Reduction in Glomerular Filtration Rate
(c) Both a and b (d) None of the above

139. CD4 (cluster of differentiation 4) is a glycoprotein found on the surface of immune cells such as

(a) T helper cells and macrophages
(b) Monocytes and dendritic cells
(c) Both a and b
(d) None of the above

140. Choline has important role in

(a) Fat metabolism
(b) Carbohydrate metabolism
(c) Protein metabolism
(d) Vitamin and mineral transport

141. ICAR recognized NBAGR as nodal agency for breed registration in year

(a) 2001
(b) 2005
(c) 2007
(d) 2009

142. Grow more food campaign was launched in year

(a) 1936
(b) 1943
(c) 1948
(d) 1955

143. The objective of pasteurization is/are

(a) To render the milk safe for human consumption by destruction of cent percent pathogenic microorganism.
(b) To improve the keeping quality of milk by destruction of almost all spoilage organisms.
(c) Both a and b
(d) None of the above

144. Mule is cross of

(a) Stallion X Mare
(b) Jackal Ass X Mare
(c) Stallion X She Ass
(d) Jackal Ass X She Ass

145. Mating of two unrelated inbred lines of same breed is called as

(a) Outcrossing
(b) Crossbreeding
(c) Species hybridization
(c) Grading up

146. Example of sex linked condition is/are

(a) Haemophilia
(b) Colour blindness
(c) Retinitis pigmentosa
(d) All of the above

147. Test used to determine the significance of the difference between two sample means is

(a) t-test
(b) Z test
(c) Chi square test
(d) F-test

148. Response to selection/Selection differential is termed as

(a) Realized h^2
(b) h^2 in narrow sense
(c) h^2 in broad sense
(d) All of above

149. The net result of semi conservative replication is that it

(a) produces two copies of the original DNA molecule, each of which contains one of original strand, and one newly-synthesized strand
(b) produces three copies of the original DNA molecule, each of which contains two of original strand, and one newly-synthesized strand
(c) Both a and b are correct
(d) None of the above

150. The flushing is related to

(a) Feeding of extra concentrate in last 6-8 weeks of pregnancy
(b) Feeding of extra concentrate 2-3 weeks prior to breeding
(c) Both a and b are correct
(d) None of the above

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
a	a	c	a	b	b	c	b	a	a
11	12	13	14	15	16	17	18	19	20
d	a	b	a	b	a	b	a	b	b
21	22	23	24	25	26	27	28	29	30
d	d	d	b	c	a	a	d	d	a
31	32	33	34	35	36	37	38	39	40
b	a	c	b	b	c	b	b	d	d
41	42	43	44	45	46	47	48	49	50
c	a	d	a	d	b	c	b	c	a
51	52	53	54	55	56	57	58	59	60
c	b	a	d	c	a	b	b	c	b
61	62	63	64	65	66	67	68	69	70
b	d	c	b	a	c	a	b	b	b
71	72	73	74	75	76	77	78	79	80
a	b	c	a	b	a	a	b	a	a
81	82	83	84	85	86	87	88	89	90
a	b	c	a	a	c	a	a	c	a
91	92	93	94	95	96	97	98	99	100
a	b	c	b	a	b	d	b	a	d
101	102	103	104	105	106	107	108	109	110
d	c	d	d	a	c	d	d	b	d
111	112	113	114	115	116	117	118	119	120
a	d	a	a	a	c	d	c	a	b
121	122	123	124	125	126	127	128	129	130
b	b	a	d	a	d	a	a	b	c
131	132	133	134	135	136	137	138	139	140
a	d	c	b	a	b	b	c	c	a
141	142	143	144	145	146	147	148	149	150
c	c	c	b	a	d	a	a	a	b

☆☆☆

ICAR-JRF
Memory Based Exam Paper-2017

1. **The National Livestock Mission was launched in the year**
   (a) 2010 (b) 2014
   (c) 2016 (d) 2017
2. **The Rashtriya Gokul Mission was launched in _____ five year plan.**
   (a) 9 (b) 10
   (c) 11 (d) 12
3. **The National Dairy Plan was launched in the year**
   (a) 2011-12 (b) 2013-14
   (c) 2015-16 (d) 2016-17
4. **Legumes are exceptionally rich in which minerals**
   (a) Calcium (b) Selenium
   (c) Sodium (d) Potassium
5. **H-zone is present in which myofibrillar filament**
   (a) Myosin (b) Actin
   (c) Troponin (d) Tropomyosin
6. **The ultimate source of energy for muscle contraction**
   (a) ATP (b) ADP
   (c) Creatine phosphate (d) All of the above
7. **_____ are defined as two or more people in reciprocal interaction with one another**
   (a) Neighbourhood (b) Groups
   (c) Communities (d) Organizations
8. **The quality of an entrepreneur is/are**
   (a) Authoritarian (b) Risk bearing ability
   (c) Persistence (d) All of the above
9. ***Salmonella* sp. in dairy products can be confirmed by**
   (a) Polymerase Chain Reaction (b) Rapid microbiology
   (c) Biochemical tests (d) All of the above
10. **The newly developed pig breed by NBAGR**
    (a) Belahi (b) Niang megha
    (c) Ghunghroo (d) Both b and c
11. **Legume hay contains**
    (a) 16.5% Protein, 9% Calcium (b) 16.5% Protein, 0.9% Calcium
    (c) 22 % Protein, 9% Calcium (d) 22% Protein, 0.9% Calcium
12. **In 1996, Dolly sheep was the first animal to be produced by**
    (a) Intra Cytoplasmic Sperm Injection (ICSI) (b) Artificial Insemination (AI)
    (c) Ovo-synch method (d) Somatic Cell Nuclear Transfer (SCNT)
13. **The day-old chicks that have not been sorted by sex is called as _____**
    (a) Sexed chicks (b) Straight-run chicks
    (c) Preening (d) Zoning
14. **Ideal dry period in crossbred cattle is**
    (a) 30 days (b) 45 days
    (c) 60 days (d) 75 days
15. **The effect of cobalt in the rumen is to participate in the production**
    (a) Vitamin B12 (b) Vitamin B1
    (c) Vitamin B 6 (d) Vitamin C

16. **Megaloblastic anaemia in swine is seen due to deficiency of**
(a) Cyanocobalamin (b) Biotin
(c) Folacin (d) Choline

17. **The organ meat that is rich in vitamin A, D, E and K and iron is**
(a) Heart (b) Kidney
(c) Brain (d) Liver

18. **Which one of the following is the smallestbreeds of rabbit?**
(a) White giant (b) New Zealand White
(c) Angora (d) Netherland Dwarf

19. **The removal of wool from around a sheep's eyes to prevent wool-blindness is _____**
(a) Ringing (b) Crutching
(c) Wigging (d) Dagging

20. **Which of the following cattle breed having black colour teats?**
(a) Deoni (b) Gir
(c) Bechur (d) Sahiwal

21. **Which of the following registered breed from Tamil Nadu is being used for *Jallikattu* festival?**
(a) Mewati (b) Bargur
(c) Gaolao (d) Pullikulam

22. **Good indicator for negative energy balance in the dairy cattle**
(a) NEFA (b) BHBA
(c) Acetate (d) Both a & b

23. **For feeding trial, minimum number of animals per group should be?**
(a) 2 (b) 3
(c) 4 (d) 5

24. **If the value of correlation coefficient is +1, the correlation is**
(a) perfect and positive (b) perfect and negative
(c) no correlation (d) cannot be interpreted

25. **Which of the following is used as energy source for livestock feeding?**
(a) Salseed (b) Linseed
(c) Mustard cake (d) Sunflower cake

26. **The diet containing high fiber and less calories will be fed to**
(a) Lactating queen and bitch (b) Obese dog and cat
(c) Growing dog and cat (d) Adult dog and cat

27. **Tomato powder contains antioxidant component known as**
(a) Lycopene (b) Ethoxyquin
(c) Pyrogallate (d) All of the above

28. **Respiratory quotient >1 indicates the metabolism of**
(a) Fat (b) Protein
(c) Carbohydrates (d) Fasting/hibernating animals

29. **As plant matures, which of the following content increases**
(a) Minerals (b) Vitamins
(c) Crude fiber (d) Crude protein

30. **Most of the embryo mortality during incubations occurs during**
(a) 1-2 days (b) 5-6 days
(c) 14-15 days (d) 18-20 days

31. **Which combination of technology yields more progeny per year?**
(a) Multiple Ovulation and Embryo Transfer (MOET)
(b) Intra Cytoplasmic Sperm Injection (ICSI)
(c) Artificial Insemination (AI)
(d) Somatic Cell Nuclear Transfer (SCNT)

32. **According to 19th Livestock Census, the cattle population was**
(a) 160 million
(b) 170 million
(c) 180 million
(d) 190 million

33. **The covariance of half sibs is represented by**
(a) ¼ VA
(b) ½ VA
(c) $1/2V_A+1/4V_D+V_{EC}$
(d) All of the above

34. **Mehsana is cross of which two buffalo breeds?**
(a) Jaffrabadi X Murrah
(b) Murrah X Banni
(c) Chhattisgarhi X Murrah
(d) Surti X Murrah

35. **N:S ratio for optimal utilization of urea is**
(a) 5:1
(b) 10:1
(c) 15:1
(d) 20:

36. **Lead feeding is also known as**
(a) Steaming up
(b) Flushing
(c) Challenge feeding
(d) All of above

37. **The golden number for concentrates and roughages used by Kellener for calculation of starch equivalent**
(a) 0.50 and 0.50
(b) 0.75 and 0.45
(c) 0.95 and 0.58
(d) 1.0 and 0.75

38. **Avikalin is a cross of**
(a) 50% Malpura X 50% Rambouillet
(b) 25% Malpura X 75% Rambouillet
(c) 12.5% Malpura X 87.5% Rambouillet
(d) 6.25% Malpura X 93.75% Rambouillet

39. **Karan Swiss is a cross of**
(a) Brown Swiss X Sahiwal
(b) Brown Swiss X Red Sindhi
(c) Both a and b
(d) None of the above

40. **Channa should not contain less than**
(a) 70% moisture
(b) 80% moisture
(c) 90% moisture
(d) It is dried product

41. **Overrun in icecream is mostly due to presence of**
(a) Air
(b) Moisture
(c) Curd
(d) Salt

42. **Standardized milk contains ____ fat and ____ SNF according to FSSAI.**
(a) 3.0% milk fat and 8% SNF
(b) 3.5% milk fat and 8.5% SNF
(c) 4.0% milk fat and 8.5% SNF
(d) 4.5% milk fat and 8.5% SNF

43. **For blood transfusion, the anticoagulant of choice is**
(a) Sodium fluoride
(b) Sodium citrate
(c) EDTA
(d) Calcium carbonate

44. **For total body water estimation, the chemical substance used is**
(a) Deuterium dioxide
(b) Tritium dioxide
(c) Antipyrine
(d) Hydrogen dioxide

45. **The negatively correlated traits are**
(a) Milk yield and fat percentage
(b) Size of eggs and weight of eggs
(c) Birth weight and weight at weaning in cattle
(d) Normal body temperature and body size

46. **Wool and mutton are example of**
(a) Price demand
(b) Income demand
(c) Joint demand
(d) Composite demand

47. **Galvayne's groove is located on**
(a) The lateral surface of the upper third incisor of horse
(b) The lateral surface of the upper third incisor of swine
(c) The lateral surface of the upper third incisor of cattle
(d) The lateral surface of the upper third incisor of goat

48. **The range of correlation coefficient is**
(a) 0 to 1
(b) -1 to +1
(c) $-\infty$ to $+\infty$
(d) Range cannot be determined

49. **The range of heritability is**
(a) 0 to 1
(b) -1 to +1
(c) $-\infty$ to $+\infty$
(d) Range cannot be determined

50. **The unitless measure of variance is**
(a) Range
(b) Coefficient of Variance
(c) Mean deviation
(d) Standard deviation

51. **A1 and A2 beta casein peptides contains**
(a) Histidine and proline at 67th position respectively
(b) Proline and histidine at 67th position respectively
(c) Histidine and proline at 57th position respectively
(d) Proline and histidine at 57th position respectively

52. **The place where 'uneconomic' cattle could be housed cheaply and allowed to die naturally**
(a) Gosadan – Only cattle
(b) Gaushalas
(c) Panjarapole → pm,
(d) All of above

53. **The dry matter intake (DMI) percentage for goat feeding is**
(a) 1%
(b) 3%
(c) 4%
(d) 5-6%

54. **The efficiency of utilization of metabolisable energy (ME) for lactation is**
(a) 0.50
(b) 0.62
(c) 3.31
(d) 5.1

55. **Wing rot disease of poultry is caused by bacteria**
(a) *Clostridium sp.*
(b) *Pasteurella sp.*
(c) *Mycoplasma sp.*
(d) *Salmonella sp.*

56. **Sweet curdling in milk is caused by**
(a) *Bacillus cereus*
(b) *Salmonella sp.*
(c) *Coxiella burnetti*
(d) *Mycobacterium sp.*

57. **Most appropriate measure to determine the adulteration of milk with water is**
(a) Lactometer reading
(b) Alcohol test
(c) Alcohol Alizarin test
(d) Resazurin test

58. **The first dose of IBD in poultry vaccination schedule is**
(a) 0 days
(b) 5th day
(c) 10th day
(d) 14-15th day

59. **For fertile egg storage, the percentage humidity required is**
(a) 50
(b) 60
(c) 75
(d) 80

60. **1% increase in oxygen concentration causes _____ % rise in hatchability.**
(a) 0.5
(b) 2.5
(c) 3.5
(d) 5

61. The first Krishi Vigyan Kendra (KVK) was established at Puducherry in the year
(a) 1965 (b) 1974
(c) 1999 (d) 2015

62. One I.U. of vitamin-A contains _____ mcg of beta carotene.
(a) 0.3 (b) 0.6
(c) 1.9 (d) 1.2

63. Body composition on fat free and moisture free basis
(a) 80% protein and 20% ash (b) 20% protein and 80% ash
(c) Both of above (d) None of above

64. Who discovered rumen fungi?
(a) CG Orpin and T Bauchop (b) Singer and Nicolsan
(c) Messelson and Stahl (d) None of the above

65. The Project Tiger was launched in the year
(a) 1965 (b) 1973
(c) 1999 (d) 2015

66. The Giemsa stain is used for
(a) G banding (b) Q banding
(c) C banding (d) R banding

67. Which of the combination is correct?
(a) 1kg TDN=3.616 M cal ME (b) 1kg TDN=4.414 M cal ME
(c) Both a and b are correct (d) Both a and b are false

68. Processed cheese is produced by
(a) blending shredded natural cheeses of different types and degrees of maturity with emulsifying agents
(b) heating the blend under a partial vacuum with constant agitation until a homogeneous mass is obtained
(c) Both a and b
(d) None of the above

69. Huffed defect in cheese causes
(a) Excessive gassy fermentation
(b) Excessive thickness
(c) Excessive acidity
(d) Excessive humidity

70. The financial position of a business can be determined with the help of
(a) Ledger (b) Balance sheet
(c) Debit account (d) Credit account

71. Which of the following is not a notifiable disease?
(a) Anthrax (b) Black Quarter
(c) Rabies (d) Haemorrhagic septicaemia

72. The protein content of chicken egg is
(a) 10% (b) 12%
(c) 15% (d) 20%

73. The water activity of fresh meat is
(a) 0.86 (b) 0.91
(c) 0.99 (d) 1.0

74. The scoring of mammary gland in dairy cattle includes
(a) 15 marks (b) 25 marks
(c) 35 marks (d) 45 marks

75. **Oat hay poisoning occurs due to presence of**
(a) Gossypol (b) Nitrate
(c) Mowrin (d) Tannin

76. **During migration, the rate of change (Äq) in gene frequency in a population is (q_m: gene frequency among immigrants, q_o: among natives)**
(a) Äq = m(qm-qo) (b) Äq = m(qo-qm)
(c) Äq = -m(qm-qo) (d) Äq = -m(qo-qm)

77. **In lipid metabolism, the methyl donors is**
(a) Ascorbic acid (b) Methylcobalamine
(c) Amyl alcohol (d) Choline

78. **Which of the following equation is correct regarding to crude protein estimation in milk?**
(a) CP % = Nitrogen content X 6.25 (b) CP % = Nitrogen content X 6.38
(c) CP % = Nitrogen content X 6.48 (d) CP % = Nitrogen content X 6.55

79. **The chief acid produced during silage preparation is**
(a) Lactic acid (b) Malic acid
(c) Butyric acid (d) All of the above

80. **The method of detannification with addition of tannin complexing agents like**
(a) Polyethylene glycol (PEG) (b) Polyvinylpyrrolidone (PVP)
(c) Both a and b (d) None of the above

81. **Galvayne's groove appears in horse at an age of**
(a) 7 years (b) 10 years
(c) 14 years (d) 17 years

82. **Which of the following breed belong to Odisha**
(a) Ganjam (b) Kendrapada
(c) Garole (d) Both a and b

83. **The newly registered chicken breed Kaunayen belong to**
(a) Odisha (b) Chhattisgarh
(c) Manipur (d) Bihar

84. **Which of the following combination is correct?**
(a) 1 mg retinol = 3333 IU Vitamin A
(b) 1 mg cholecalciferol = 40000 IU Vitamin D_3
(c) 1 mg DL á tocopherol acetate = 1 IU Vitamin E
(d) All of the above

85. **The non-digestible carbohydrate includes**
(a) Resistant starch (b) Non starch polysaccharide (NSP)
(c) Non digestible oligosaccharides (d) All of the above

86. **Which combination of livestock species and gestation period is not correctly matched?**
(a) Cattle-283 days (b) Sow-114 days
(c) Buffalo-310 days (d) Mare-290 days

87. **Loss of nutrients due to rain and loss of carotene due to sunrays occurs during silage making, technically termed as**
(a) Bleaching and leaching, respectively (b) Leaching and bleaching, respectively
(c) Leaching and oxidation, respectively (d) Leaching and depigmentation, respectively

88. **Non movables ToT programmes of ICAR**
(a) LLP (b) ORP
(c) AICPND (d) KVK

120. Mohair is
(a) Wool from Angora Goat
(b) Wool from Surti Goat
(c) Pelt from Rabbit
(d) Pelt of Yak

121. The true stomach of ruminants is
(a) Rumen
(b) Reticulum
(c) Omasum
(d) Abomasum

122. The area at the rear of a cow that extends upward just above and in back of the udder where the hair turns upward in contrast to the normal downward direction of hair is
(a) Milk mirror
(b) Milk synthesis region
(c) Escutcheon
(d) None of the above

123. The water activity of most foods is above
(a) 0.60
(b) 0.86
(c) 0.99
(d) 1

124. Radappertization is equivalent to
(a) Radiation sterilization
(b) Commercial sterility
(c) Both a and b
(d) None of the above

125. Decimal reduction time is
(a) D-value
(b) F-value
(c) Z-value
(d) All of the above

126. Probelia system is used for identification of _____ organisms in foods.
(a) *E. coli*
(b) *L. monocytogenes*
(c) *Salmonella spp.*
(d) *Cryptosporidim spp.*

127. The mold _____ is associated with the formation of buttons on the surface of sweetened condensed milk is
(a) *Aspergillus repens*
(b) *Leconostoc*
(c) *Torula lactis spp.*
(d) *Torula globosa*

128. The mold spoilage of eggs is known as
(a) Rots
(b) Pin spots
(c) Fungal spoilage
(d) All of the above

129. FSSAI is autonomous body under the ministry of:
(a) Agriculture and farmer's welfare
(b) Health and family welfare
(c) Drinking water and sanitation
(d) Consumer affairs, food and public distribution

130. Booroola gene is related to:
(a) Ovulation rate
(b) Growth rate
(c) Milk production
(d) None of above

131. Guillain-Barré syndrome results as a complication due to infection with
(a) *C. jejuni*
(b) *B. mallei*
(c) *L. monocytogenes*
(d) *E. rhusiopathiae*

132. Development of Women and Children in Rural Areas (DWCRA) was launched in the year
(a) 1979
(b) 1982
(c) 1985
(d) 1982

133. Which of the following is an individual extension-teaching method?
(a) Method and result demonstration
(b) Print media
(c) Farm & home visits
(d) Campaign

134. Which of the following is known as backbone of the statistics?
(a) Variance
(b) Range
(c) Standard deviation
(d) All of the above

135. The ogives for more than type and less than types intersect at
(a) Mode
(b) Median
(c) Arithmetic mean
(d) Geometric mean

136. **Which of the following is not a positional average?**
(a) Mode (b) Median
(c) Arithmetic mean (d) Quartile

137. **Which of the following is the most powerful and best measure of dispersion?**
(a) Variance (b) Range
(c) Standard deviation (d) All of the above

138. **Who coined the term regression?**
(a) Francis Galton (b) PC Mahalanobis
(c) August Compte (d) None of the above

139. **The mean and variance are same in which type of distribution?**
(a) Normal distribution (b) Binomial distribution
(c) Poisson's distribution (d) All of the above

140. **Reciprocal recurrent selection (RRS) is more suitable for poultry and swine selection programme to improve**
(a) GCA (b) SCA
(c) Both (d) None

141. **Highest milk producing state in India is** _____
(a) Punjab (b) Tamil Nadu
(c) Andhra Pradesh (d) Uttar Pradesh

142. **Soil health card scheme**
(a) Feb 2015 (b) Mar 2015
(c) April 2015 (d) May 2015

143. **The abbreviation of NITI Aayog is**
(a) National Institute for Transforming India
(b) National Information for Transforming Industries
(c) National Institute for Transferring India
(d) National Industries for Transforming India

144. **Dairy Processing & Infrastructure Development Fund (DIDF) was started in the eyar**
(a) 2013 (b) 2012
(c) 2019 (d) 2017

145. **Fixed cost is otherwise called as**
(a) Sunk cost (b) Variable costs
(c) Explicit cost (d) Opportunity cost

146. **Fatty Liver and Kidney Syndrome in poultry caused by** _____
(a) Riboflavin (b) Thiamin
(c) Choline (d) Biotin

147. **Succulent, fermented preserved green fodder is called**
(a) Hay (b) Forage
(c) Silage (d) None of them

148. **Prone sticking is common method of bleeding in**
(a) Cattle (b) Buffalo
(c) Sheep (d) Pig

149. **Leftover feed which an animal refuses to eat is known as**
(a) Residual feed (b) Refused feed
(c) Orts (d) All of the above

150. **Chloride shift is also known as**
(a) Alkaline tide (b) Hamburger phenomenon
(c) Bohr's effect (d) Haldane effect

☆☆☆

Answer Key

1	2	3	4	5	6	7	8	9	10
c	d	a	a	a	c	b	d	d	d
11	12	13	14	15	16	17	18	19	20
b	d	b	c	a	c	d	d	c	a
21	22	23	24	25	26	27	28	29	30
d	a	c	a	a	b	a	d	c	d
31	32	33	34	35	36	37	38	39	40
a	d	a	d	b	c	c	a	c	a
41	42	43	44	45	46	47	48	49	50
a	d	b	a	a	c	a	b	a	b
51	52	53	54	55	56	57	58	59	60
a	a	d	b	a	a	a	d	c	d
61	62	63	64	65	66	67	68	69	70
b	b	a	a	b	c	a	c	a	b
71	72	73	74	75	76	77	78	79	80
c	b	c	c	b	a	d	b	a	c
81	82	83	84	85	86	87	88	89	90
b	d	c	d	d	d	b	d	c	a
91	92	93	94	95	96	97	98	99	100
c	a	b	c	b	d	a	a	c	c
101	102	103	104	105	106	107	108	109	110
d	a	a	c	d	c	b	d	a	c
111	112	113	114	115	116	117	118	119	120
c	b	b	b	b	b	b	d	d	a
121	122	123	124	125	126	127	128	129	130
d	c	c	c	a	c	a	b	b	a
131	132	133	134	135	136	137	138	139	140
a	b	c	a	b	c	c	a	c	c
141	142	143	144	145	146	147	148	149	150
a	a	a	d	a	d	c	d	c	b



ICAR-JRF
Memory Based Exam Paper-2016

1. **Native tract of Rampur Bushair breed of sheep**
   (a) Himachal Pradesh (b) Uttar Pradesh
   (c) Jammu & Kashmir (d) Rajasthan
2. **Aseel is famous for-**
   (a) Fighting quality (b) Meat quality
   (c) Egg production (d) Fighting and meat quality
3. **Neck of womb is called as-**
   (a) Cervix (b) Uterus
   (c) Salpinx (d) Oviduct
4. **Which of the hormone causes Oviposition (egg laying) in birds-**
   (a) Oxytocin (b) Vasotocin
   (c) Prolactin (d) Estrogen
5. **First family used by primitive man as food was-**
   (a) Bovidae (b) Suidae
   (c) Camelidae (d) Equidae
6. **Most stressful environment to livestock is-**
   (a) High relative humidity and high environment temperature
   (b) Low relative humidity and low environment temperature
   (c) High relative humidity and low environment temperature
   (d) Low relative humidity and high environment temperature
7. **Selection differential depends on several factors except**
   (a) Phenotypic standard deviation (b) Heritability
   (c) Sex of the individual (d) Proportion of animal selected
8. **Ruminants can synthesize vitamin B_{12} if**
   (a) Cobalt is provided in the ration (b) Selenium is provided in the ration
   (c) Calcium is provided in the ration (d) Phosphorus is provided in the ration
9. **Which of the following VFA has been given with milk replacer for development of ruminalepithelium-**
   (a) Caproate (b) Butyrate
   (c) Acetate (d) Propionate
10. **Disbudding of calves is done at the age of-**
    (a) 3-4 days (b) 1 days
    (c) 3-10 days (d) 3-4 months
11. **Creep feeding of swine should be started at the age of-**
    (a) 7-10 days (b) 2-3 days
    (c) 21-24 days (d) 30 days
12. **The DCP content in calf starter in percentage**
    (a) 18-20 % (b) 14-16%
    (c) 12-14% (d) 24-26%
13. **Mostly amino-acids found in the living organisms are in-**
    (a) D- form (b) L- form
    (c) D & L form (d) None
14. **Feed-stuff which contains less than 18% crude fiber&more than 60% TDN are classified as-**
    (a) Concentrate (b) Roughage
    (c) Feed supplement (d) Feed additive

15. **Which of the following is a vice due to mineral deficiency**
(a) Kicking (b) Biting
(c) Pica (d) Rolling of eye

16. **Rice bran is a rich source of**
(a) Calcium (b) Phosphorus
(c) Vit.B_{12} (d) Vit.E

17. **Which of the following animal comes under genus "Sus"**
(a) Pig (b) Guinea pig
(c) Cat (d) Dog

18. **Cryptorchidism is a——————————defect.**
(a) Hereditary (b) Non-hereditary
(c) Congenital (d) None

19. **Which of the feed is an unconventional source of feed except**
(a) Mango kernel (b) Sugarcane Tops
(c) Safflower meal (d) Soybean

20. **Which of the following is not correctly matched-**
(a) Soybean: Trypsin inhibitor (b) Tapioca: HCN
(c) Raw fish: Thiaminase (d) Ricin: GNC

21. **Which of the following statement is not correct about silage making-**
(a) Moisture content of the silage should be 60-70%
(b) Crop should have high sugar content
(c) Crop should be harvested between flowering and milk stage
(d) Only leguminous fodder is used for silage making

22. **The chief extracellular cation used for the maintenance of osmolarity**
(a) Ca^{+} (b) K^{+}
(c) Mg^{2+} (d) Na^{+}

23. **Heritability and fitness ranges from**
(a) -1 to +1 (b) 0 to 1
(c) +1 to ∞ (d) $-\infty$ to $+\infty$

24. **Generation interval for poultry is-**
(a) 0.65 year (b) 21 days
(c) 1-2 years (d) 42 days

25. **Which of the following is not a monosaccharide-**
(a) Glucose (b) Fructose
(c) Galactose (d) Maltose

26. **In ruminants, ME is obtained by multiplying DE with**
(a) 0.92 (b) 0.82
(c) 0.72 (d) 0.62

27. **End product of nitrogen metabolism in ruminants-**
(a) Ammonia (b) Urea
(c) Uric acid (d) BUN

28. **TDN % in oat is**
(a) 10 % (b) 45 %
(c) 55 % (d) 70 %

29. **Molasses can be added in ruminant ration up to**
(a) 10-15 % (b) 20-25 %
(c) 33 % (d) 5 %

30. **Amount of metabolic water(g) obtained from 100g of fat**
(a) 40g (b) 60g
(c) 110g (d) 200g

31. **Urea can be added in the ration upto———— % of total DM-**
(a) 1% (b) 3%
(c) 5% (d) 8%

32. **Streptococcus bovis belongs to group of rumen bacteria-**
(a) Cellulolytic (b) Amylolytic
(c) Both a & b (d) Acid utilizing

33. **RDI stands for**
(a) Recommended Daily Intake (b) Recommended Dietary Index
(c) Residual Dietary intake (d) Residual Daily Index

34. **If heritability of a particular trait is 0.2, then it indicates**
(a) Trait is 20 % heritable (b) Breeding value of individual is 80 %
(c) Additive genetic variance is 20% (d) Phenotypic variance is 80%

35. **All are written form of extension teaching method except-**
(a) Bulletins (b) Leaflet
(c) News articles (d) Exhibitions

36. **Tharparker is used for development of which of the following crossbreed of cattle at NDRI, Karnal-**
(a) Karan-swiss (b) Karan-fries
(c) Sunandhini (d) Frieswal

37. **Ex-situ conservation indicates the conservation of-**
(a) Strain (b) Semen
(c) Ova (d) Germplasm

38. **Crossbreeding causes change in gene frequency due to**
(a) Mutation (b) Migration
(c) Selection (d) Random drift

39. **Difference between Genotypic value (G) and Breeding value ((A) is -**
(a) Dominance deviation (b) Expected progeny difference
(c) Interaction deviation (d) Non-additive gene action

40. **Most of the milch breed of cattle belongs to which region of India-**
(a) Southern region (b) NE region
(c) Dry north-western region (d) Coastal region

41. **Which of the following nutrient mainly regulates body temperature of animal-**
(a) Lipid (b) Protein
(c) Carbohydrate (d) Water

42. **Chromosomes number of domestic pig are-**
(a) 60 (b) 78
(c) 38 (d) 54

43. **Chromosomes can be best karyotyped in which stage of mitosis**
(a) Prophase (b) Metaphase
(c) Anaphase (d) Telophase

44. **Selection differential does not depend on which of the following**
(a) Sex of the individual (b) Heritability
(c) Proportion of the animal (d) Phenotypic standard deviation

73. **Most of the dairy breeds of Indian buffalo are distributed to which part of India-**
(a) North-West
(b) North-East
(c) Southern part
(d) Cental India

74. **India is the top exporter of which animal meat-**
(a) Buffalo
(b) Cattle
(c) Goat
(d) Pig

75. **Most preferable ration of horse is-**
(a) Maize
(b) Oat
(c) Wheat
(d) Gram

76. **If coefficient of selection is 0.25, then fitness is-**
(a) 0.25
(b) 0.50
(c) 0.75
(d) 1.0

77. **Site for the exchange of nutrients and gases between blood and the interstitial tissue is-**
(a) Capillaries
(b) Veins
(c) Arteries
(d) Heart

78. **The decision to apply a technology and its continuous use is called-**
(a) Innovation
(b) Adoption
(c) Transfer
(d) Investigation

79. **What is supplement income-**
(a) Extra income in addition to regular salary
(b) Extra money that has to deposit in bank
(c) Extra money that is used for saving
(d) None of the above

80. **In which season sheep shows maximum fertility-**
(a) Autumn
(b) Summer
(c) Winter
(d) Monsoon

81. **Age of full mouth in cattle-**
(a) 4 years
(b) 5 years
(c) 7 years
(d) 9 years

82. **Repeatability is-**
(a) Upper limit of heritability
(b) Lower limit of heritability
(c) Always less than heritability
(d) None of the above

83. **The size of fat globule (micron) in homogenized milk is-**
(a) 2μ
(b) 3μ
(c) 4μ
(d) 5μ

84. **Non-additive gene action includes-**
(a) Dominance
(b) Over-dominance
(c) Epistasis
(d) All the above

85. **Cheddar cheese is made up of-**
(a) Cheese + Common salt
(b) Cheese + Common salt + Sodium citrate
(c) Cheese + Common salt + Sodium citrate + Citric acid
(d) Cheese + Common salt +Sodium citrate + Citric acid + permitted natural colour

86. **Which of the following statement(s) is/are true about nutritive value of cheese-**
(a) Excellent source of milk proteins
(b) Excellent source of fat-soluble vitamins such as A, D, E and K
(c) Rich source of calcium and phosphorus & good source of energy
(d) All the above

87. **Which of the following is not a principle of extension education-**
(a) Principle of interest and need (b) Principle of learning by doing
(c) Principle of satisfaction (d) Principle of recreation

88. **Most important influencing factor in the process of social change-**
(a) Family (b) Religion
(c) Government (d) Education

89. **Which of the following is not a characteristic of social change-**
(a) It is a universal phenomenon (b) It is a law of nature
(c) Speed of social change is uniform (d) Social change is a community change

90. **A shelter used to shield meteorological instruments against precipitation and direct heat radiation from outside sources is-**
(a) Stevenson screen (b) Standard weather station
(c) Instrument shelter (d) Both a & c

91. **Instrument used to detect smoke density in smoking chamber**
(a) Anemometer – wind velocity (b) Electric eye
(c) Torrymeter – freshness of meat (d) Penetrometer – firmness of meat

92. **Major foetal development in cattle takes place in a ——— trimester.**
(a) First (b) Second
(c) Third (d) All the above

93. **Secondary-Primary follicle ratio (S:P ratio) in wool fibers of fine merino should be-**
(a) 5:1 (b) 10:1
(c) 15:1 (d) 20:1

94. **Blockage of pregnancy in female rodents after the introduction of a strange male is occurred due to inhibition of which of the following hormone-**
(a) Estrogen (b) Progesterone
(c) Prolactin (d) Oxytocin

95. **Moisture content of soft cheese is-**
(a) 20% (b) 30%
(c) 40% (d) 50%

96. **A good layer bird has -**
(a) Large body size and dull eye (b) Large body size and bright eye
(c) Small body size and dull eye (d) Small body size and bright eye

97. **Dry matter requirement per day for a dairy goat should be-**
(a) 1-2% of total body weight (b) 3-4% of total body weight
(c) 5-7% of total body weight (d) 8-10% of total body weight

98. ***Ad -lib* feeding means-**
(a) Restricted feeding (b) Feeding as per body weight of animal
(c) Free choice of animal (d) Appetite feeding

99. **Recommended floor space requirement of layer in cage is-**
(a) 0.75 Square feet (b) 2 Square feet
(c) 1.5 Square feet (d) 3 Square feet

100. **Number of essential amino acid in ruminant are-**
(a) 8 (b) 9
(c) 10 (d) 0

101. **Caecotrophy is generally seen in-**
(a) Cattle (b) Bitch
(c) Rabbit (d) Cat

102. Maximum permissible level of NH_3 in poultry house is-

(a) 5 ppm (b) 25 ppm
(c) 55 ppm (d) 65 ppm

103. The best site of the hot branding of buffalo is-

(a) Neck (b) Hind-quarter
(c) Ear (d) Flank

104. Metabolic energy(ME) is calculated as-

(a) GE – Faecal energy
(b) GE – (Faecal energy + Urinary energy)
(c) DE – (Urinary energy + CH_4 energy)
(d) DE – (Urinary energy + Faecal energy)

105. The Water intake of adult cattle for every kg of dry matter intake is

(a) 2-3 liter (b) 3-5 liter
(c) 6-7 liter (d) More than 7 liter

106. Service time for a dairy cattle should be-

(a) 60 days post-parturient (b) 70 days post-parturient
(c) 85 days post-parturient (d) 120 days post-parturient

107. Maternal recognition of pregnancy (MRP) in pig is mainly due to secretion of-

(a) Estrogen (b) Progesterone
(c) Interferon tau (d) PGF2*a*

108. Lignocellulose bond of fiber diet is broken by-

(a) Ruminal bacteria (b) Ruminal fungi
(c) Ruminal protozoa (d) None

109. Mostly ruminal bacteria are-

(a) Gram – ve & Obligate anaerobes (b) Gram– ve & Obligate aerobes
(c) Gram + ve & facultative anaerobes (d) Gram+ve & Obligate anaerobes

110. Advantage of tail-to-tail system of housing as compare to face-to-face system are all except-

(a) Feed distribution is easy (b) Milking supervision is easy
(c) Danger of disease spread is less (d) Easy clearance operation

111. The most cranial and smallest compartment of ruminant stomach is-

(a) Rumen (b) Reticulum
(c) Omasum (d) Abomasum

112. Breed of goat suitable for stall feeding is-

(a) Beetle (b) Barbari
(c) Jamunapari (d) Sirohi

113. Removal of undesirable stock from herd is known as-

(a) Isolation (b) Quarantine
(c) Segregation (d) Culling

114. Which of the following structure is act as birth canal-

(a) Vagina (b) Cervix
(c) Uterus (d) Fallopian tube

115. Water-electrolyte homeostasis is achieved through action of which hormone-

(a) Aldosterone (b) Cortisone
(c) Oxytocin (d) Growth hormone

116. Cortical reaction is the process initiated for-

(a) Sperm capacitation (b) Blocking polyspermy
(c) Implantation (d) Gastrulation

117. **Vitamin responsible for the synthesis of proteins required for blood coagulation.**
(a) Vitamin A (b) Vitamin K
(c) Vitamin C (d) Vitamin D

118. **Ketosis in dairy cattle is due to-**
(a) Protein deficiency (b) Mineral deficiency
(c) Energy deficiency (d) Fatty acid deficiency

119. **Temperature of liquid nitrogen (LN_2) employed for storage of semen straw-**
(a) -190^0C (b) 196^0F
(c) -96^0C (d) -196^0C

120. **All of the following are anticoagulant except-**
(a) Heparin (b) Sodium citrate
(c) EDTA (d) Sodium dodecyl sulfate

121. **Which of the following is not a structural component of crude fiber-**
(a) Cellulose (b) Hemicellulose
(c) Lignin (d) Chitin

122. **Null hypothesis is a hypothesis which the researcher tries to-**
(a) Prove (b) Reject
(c) Prove &accept (d) Reject & disprove

123. **Theory of continuity of germplasm was given by-**
(a) Charles Darwin (b) Lamarck
(c) Robert Bakewell (d) August Weismann

124. **The nitrogenous base pair present in RNA but absent in DNA is-**
(a) Adenine (b) Thymine
(c) Cytosine (d) Uracil

125. **The animal species which has the longest gestation period among the following-**
(a) Mare (b) Camel
(c) Cattle (d) Buffalo

126. **Food (Dairy product) borne intoxication is usually caused by-**
(a) *Streptococcus thermophilus* (b) *E.coli*
(c) *Lactococcus lactis* (d) *Staphylococcus aureus*

127. **Natural casings are made from the histologically defined which layer of animal intestine-**
(a) Mucosa (b) Serosa
(c) Sub-mucosa (d) Muscular layer

128. **Backyard poultry & dairy enterprises are-**
(a) Complementary enterprises (b) Supplementary enterprises
(c) Competitive enterprises (d) Independent enterprises

129. **Entrepreneur is not concerned with -**
(a) Scale of production (b) Choice of commodities
(c) Location of production unit (d) Choice of industry

130. **Chegu and Changthangi breeds are known for-**
(a) High prolificacy (b) Milking ability
(c) Pashmina production (d) Better heat tolerance

131. **The license to slaughter houses in India is issued by-**
(a) Local Veterinary Officer (b) Veterinary Council of India
(c) Animal Husbandry Department (d) Food Safety and Standards Authority of India

132. **Mono-Sodium Glutamate (MSG) is specifically used in food industry as-**
(a) Preservative (b) Binder
(c) Flavour enhancer (d) Antifoaming agent

133. **Herd average is the total milk production of herd in a day divided by-**
(a) Total animals in herd (b) Total lactating animals in herd
(c) Total breedable females in herd (d) Total pregnant animals in herd

134. **National Bureau of Animal Genetic Resources (NBAGR) is located at-**
(a) Anand (b) New Delhi
(c) Karnal (d) Hisar

135. **All are non-infectious diseases of cattle except-**
(a) Milk fever (b) Ketosis
(c) Metabolic acidosis (d) Wooden tongue

136. **Till date, highest impact of animal husbandry extension programs is realized in-**
(a) Community Development (b) Key Village Scheme
(c) Cooperative dairy movement (d) Premium bull scheme

137. **Core concept of integrated farming system is-**
(a) Sustainable utilization of resources (b) Using hormones and growth promoters
(c) Producing hybrid animals and crops (d) Employ highly technical manpower

138. **All are essential components of successful farming operation except-**
(a) Planning and organization (b) Farm manager must be MBA
(c) Coordination and control (d) Production must be cost effective

139. **Ideal extension programs should be developed by focusing on-**
(a) Five-year plans (b) Recommendation of Niti Aayog
(c) Budgetary provision (d) Felt needs of the people

140. **Disease responsible for huge economic loss to dairy industry every year is-**
(a) Metritis (b) Milk fever
(c) Mastitis (d) Teat block

141. **Which of the following sentence is not true about variance-**
(a) Measure the variability (b) Square of standard deviation
(c) Always positive (d) Unit less

142. **Traits which are of degree rather than kinds referred as-**
(a) Qualitative traits (b) Quantitative traits
(c) Mendelian traits (d) Monogenic traits

143. **Which of the following statement is not true about normal distributions-**
(a) All normal distributions are asymmetric (b) It has bell-shaped density curves
(c) Mean= Mode=Median (d) It has two tails

144. **Which of the following is not fall under conventional five indicators of social change-**
(a) Shift in Behavior (b) Shift in Engagement
(c) Shift in Policy (d) Increase in GDP

145. **Which of the following statement about rural and urban societies is not true-**
(a) There is no division of labour in rural society
(b) In rural society, there is little scope of occupational mobility
(c) Urban community lives in man-made environment
(d) In rural society, woman enjoy comparatively higher social status than urban community

146. **Which of the following statement is not true about livestock sector of India-**
(a) India is first in world's milk production
(b) Growing at steady pace (4-5% annual)
(c) Constrained by fodder shortage
(d) Achieved per capita egg consumption above the recommended level

147. **Law of diminishing marginal returns(assume that all factors of production remain constant) states that in a production processas one input variable is increased, there will be a point at which -**
(a) The marginal per unit output will start to decrease
(b) The marginal per unit output will start to increase
(c) The marginal per unit output will remain same
(d) None of the above

148. **Flushing of sheep includes feeding of ————grams grains daily to each individual-**
(a) 100 g (b) 150 g
(c) 250 g (d) 500 g

149. **Karakul breed of sheep is a-**
(a) Fine wool breed (b) Fur breed
(c) Mutton breed (d) Milk breed

150. **Short-day breeders are-**
(a) Cattle and buffalo (b) Cattle and goat
(c) Sheep and goat (d) Cattle and sheep

Match the following (151 to 160 questions)

151.

Table-I		Table-II
1. Salami	(a)	Partially dehydrated whole milk product
2. Ricotta	(b)	Fresh emulsion type sausages
3. Khoa	(c)	Italian whey cheese
4. Paneer	(d)	Coagulated milk product by lactic acid fermentation
5. Yoghurt	(e)	Rennet coagulated soft cheese

152.

Table-I		Table-II
1. Jhansi	(a)	Central Institute for Research onBuffaloes
2. Hisar	(b)	National Research Centre on Yak
3. Dirang	(c)	Indian Grassland and Fodder Research Institute
4. Makhdoom	(d)	Directorate of Poultry Research
5. Hyderabad	(e)	Central Institute for Research on Goat

153.

Table-I		Table-II
1. Milk fever	(a)	Bacterial disease
2. Crazy chick disease	(b)	Protozoan disease
3. PPR	(c)	Deficiency disease
4. Coccidiosis	(d)	Viral disease
5. Black quarter	(e)	Metabolic disease

154.

Animal		Meat
1. Calf	(a)	Mutton
2. Deer	(b)	Veal
3. Wild animals	(c)	Venison
4. Pig	(d)	Bushmeat
5. Sheep	(e)	Bacon

155. **Table-I** **Table-II**

1.	Liquid N_2	(a)	Estrus and Proestrus
2.	Follicular phase	(b)	Metestrus and Diestrus
3.	Luteal phase	(c)	Pig
4.	Landrace	(d)	Goat
5.	Beetal	(e)	Cryogen

156. **Enzyme** **Substrate**

1.	Amylase	(a)	Nucleoprotein
2.	Lipase	(b)	Starch
3.	Rennin	(c)	Protein
4.	Pepsin	(d)	Milk Protein
5.	Nucleosidase	(e)	Fat

157. **Animal** **Gestation Period**

1.	Ass	(a)	31 days
2.	Camel	(b)	310 days
3.	Rabbit	(c)	21 days
4.	Buffalo	(d)	365 days
5.	Rat	(e)	390 days

158. **Table-I** **Table-II**

1.	Outbreeding	(a)	Pure breed obtained
2.	Inbreeding	(b)	Simplest form of outbreeding
3.	Outcrossing	(c)	New breed obtained
4.	Cross breeding	(d)	Mating between unrelated animals
5.	Upgrading	(e)	Mating between related animals

159. **Table-I** **Table-II**

1.	AGMARK	(a)	Casting a cow
2.	FAO	(b)	Certification mark on agricultural products
3.	Perishability	(c)	Faridabad
4.	Reuff's method	(d)	Key concept of services marketing
5.	DMI	(e)	Agency of the United Nations

160. **Table-I** **Table-II**

1.	Television	(a)	Nanny
2.	Adult sheep	(b)	Milk let down
3.	Adult goat	(c)	Audio-Visual Aid
4.	Oxytocin	(d)	Audio Aid
5.	Transistor	(e)	Gimmer

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Answer Key

1. Himachal Pradesh
2. Fighting and meat quality
3. Cervix (Uterus is also known as womb so neck of womb is cervix)
4. Vasotocin (Note: Arginine vasotocin (AVT) stimulate uterine contractions during oviposition. Like oxytocin in mammals, AVT is released from the posterior pituitary, and its plasma levels rise significantly shortly before and peak during oviposition)
5. Bovidae
6. High relative humidity and high environment temperature
7. Heritability
8. Cobalt is provided in the ration
9. Butyrate
10. 3-10 days
11. 7-10 days (Pre-starter ration or creep ration or milk replacer usually offered to piglets at the age of 7-10 days & it should be continued until weaning.Creep ration should have 20% protein.)
12. 18-20 %(Note: Calf starter contains 18.5-19.5% DCP, 23-26% CP & 75% TDN
13. L- form
14. Concentrate
15. Pica
16. Phosphorus
17. Pig
18. Hereditary (Note: Incidence of cryptorchidism is higher in swine & horses than in other farm animals. It is hereditary defect transmitted by the male; it is dominant in the horse and recessive in other species.)
19. Soybean
20. Ricin: GNC
21. Only leguminous fodder is used for silage making
22. Na^+
23. 0 to 1
24. 0.65year
25. Maltose (maltose is a disaccharide)
26. 0.82
27. Urea
28. 70 % (Oat is a concentrate feed so TDN > 60%)
29. 10-15 % (In ruminant ration, molasses is incorporate up to 10-15% of the ration while in poultry level is restricted to 2-5%)
30. 110g
31. 1%
32. Amylolytic or starch degraders
33. Recommended Daily Intake
34. Additive genetic variance is 20%
35. Exhibitions
36. Karan-fries (HF× Tharparkar)
37. Germplasm
38. Selection
39. Dominance deviation [Note: G=A+D; where G indicates Genotypic value, A is Breeding value or Additive genic value and D represents Dominance deviation]
40. Dry north-western region

41. Water
42. 38
43. Metaphase (Chromosomes are clearly visible at metaphase stage)
44. Heritability
45. Red Blood Cells (Because nucleus is absent in RBC)
46. Feedback
47. Pratham
48. Horse
49. Horse
50. F.W.Taylor
51. DADF(Department of Animal Husbandry Dairying & Fisheries) under Ministry of Agriculture & Farmers Welfare is the nodal agency for carrying out Livestock census in India
52. Poultry
53. 25
54. Sarcomere (Sarcomere is the basic structural &functional unit of skeletal muscle fiber)
55. Sire (Note: Best Linear Unbiased Prediction(BLUP) is the best method of sire evaluation/ indexing sire)
56. 1800-180-1551
57. 1967
58. Garole
59. Food poisoning
60. Clumped platelets [Note: Thromboplastin (TPL) or Thrombokinase is an enzyme secreted by blood platelets at the time of blood clotting through catalyzing the conversion of prothrombin to thrombin.]
61. 20 years (Note: Learning ability, starting about the age of six, rapidly grows till the age of 20, then it begins to level off until around 50. The rate of learning declines about one per cent a year after the age of 35)
62. 1.5 % & 9 %
63. 5
64. All the above (The breakeven point is obtained at intersection of Total revenue and Total cost line)
65. Break-even analysis is not a measure of risk
66. Actual sales – Sales at Breakeven point
67. Stainless steel &aluminium alloy
68. Last Saturday of April
69. 5 June
70. 200-250 Sq.ft.
71. 5:1
72. Leather
73. North-West
74. Buffalo
75. Oat
76. 0.75 (Note: Fitness (F) = 1" S or 1" L; where S is coefficient of selection & L is load)
77. Capillaries
78. Adoption [Note: At this stage, the individual decides to continue the full use of the innovation. The main function of this stage is consideration of the trial results and decides to continue the innovation.]
79. Extra income in addition to regular salary (Supplemental income include commissions, overtime earnings, awards, bonuses, retirement matching programs, or payment for unused vacation days.)

80. Autumn season [Note: In India, there are three main mating seasons in case of sheep namely Summer (march to April), Autumn (June-July) &Post-monsoon (September-October). Generally, in plain area fertility is highest in autumn season while in hilly area fertility is highest in summer season.]
81. 5 years [Note: Full mouth condition – the age at which all permanent teeth appear. Full mouth condition for various animals are as follows- (a) Sheep: 4years (b) Horse: 4.5years (c) Goat, Cattle & Buffalo: 5 years (d) Camel:7 years.]
82. Upper limit of heritability
83. 2μ
84. All the above
85. Cheese + Common salt +Sodium citrate + Citric acid + permitted natural colour
86. All the above
87. Principle of recreation
88. Government
89. Speed of social change is uniform
90. Both a &c [Note: Stevenson screen is a part of "standard weather station". It is also known as "Instrument shelter".It is used toshield meteorological instruments against precipitation and direct heat radiation from outside sources, while still allowing air to circulate freely around them.]
91. Electric eye [Note: (1) Anemometer – instrument for measuring the wind velocity.(2) Torrymeter – instrument for estimating freshness of meat (3) Shear force apparatus or Penetrometer is used to measure firmness of meat.]
92. Third
93. 20:1
94. Prolactin (Note: It is known as Bruce effect)
95. 40% [Note: moisture content of very hard cheese (less than 25%); hard cheese (25-36%); semi hard cheese (36-40%) and soft cheese(40%)]
96. Small body size and bright eye (Note: Good layer has small, active&compact body, wedgeshapedbody, long keel bone, heart girth wide)
97. 5-7% of total body weight
98. Free choice of animal (*Ad-libitum* feeding-where food is available at all times with the quantity and frequency of consumption being the free choice of the animal.)
99. 0.75 Square feet
100. 0
101. Rabbit
102. 25 ppm
103. Hind-quarter
104. DE" (Urinary energy + CH_4 energy)
105. 3-5 litre
106. 85 days post-parturient
107. Estrogen (Note: MRP in ruminants is mainly due to secretion of a protein by conceptus known as "Interferon-tau" while MRP in mare is due to "Intra-uterine migration" of conceptus)
108. Ruminal fungi
109. Gram"ve & Obligate anaerobes
110. Feed distribution is easy
111. Reticulum (Note: Regurgitation starts from reticulum & it is also known as "honeycomb")
112. Barbari (Note: Barbari is a dwarf breed highly suitable for stall feeding & generally found in cities so it is also known as "City breed")
113. Culling
114. Vagina (Note: Vagina acts as birth canal & copulatory organ)
115. Aldosterone
116. Blocking polyspermy
117. Vitamin K

118. Energy deficiency
119. $-196^{0}C$
120. Sodium dodecyl sulfate
121. Chitin
122. Reject & disprove [Note: Null hypothesis (H_0) is a hypothesis, which the researcher tries to disprove, reject or nullify while alternative hypothesis (H_1) is a hypothesis, which the researcher tries to prove.]
123. August Weismann
124. Uracil
125. Camel
126. Staphylococcus aureus
127. Sub-mucosa
128. Supplementary enterprises
129. Choice of industry
130. Pashmina production
131. Food Safety and Standards Authority of India (FSSAI)
132. Flavour enhancer (Note: Monosodium glutamate (MSG, also known as sodium glutamate) is the sodium salt of glutamic acid, one of the most abundant naturally occurring non-essential amino acids. Monosodium glutamate is found naturally in tomatoes, cheese and other foods. MSG is used in the food industry as a flavor enhancer with an umami taste.)
133. Total animals in herd
134. Karnal, Haryana
135. Wooden tongue
136. Key Village Scheme
137. Sustainable utilization of resources
138. Farm manager must be MBA
139. Felt needs of the people
140. Mastitis
141. Always positive
142. Quantitative traits
143. All normal distributions are asymmetric(Note: All normal distributions are symmetric and have bell-shaped density curves with a single peak.)
144. Increase in GDP (Note: The Five Indictors of Social Change are-Shift in Definition; Shift in Behavior; Shift in Engagement; Shift in Policy and Maintaining Past Gains)
145. In rural society, woman enjoy comparatively higher social status than urban community
146. Achieved per capita egg consumption above the recommended level
147. The marginal per unit output will start to decrease
148. 250 g
149. Fur breed [Note: Karakul is the bestpelt (good quality fur) producing breed in the world]
150. Sheep and goat
151. 1-b, 2-c, 3-a, 4-e, 5-d
152. 1-c, 2-a, 3-b, 4-e, 5-d
153. 1-e, 2-c, 3-d, 4-b, 5-a
154. 1-b, 2-c, 3-d, 4-e, 5-a
155. 1-e, 2-a, 3-b, 4-c, 5-d
156. 1-b, 2-e, 3-d, 4-c, 5-a
157. 1-d, 2-e, 3-a, 4-b, 5-c
158. 1-d, 2-c, 3-b, 4-c, 5-a
159. 1-b, 2-e, 3-d, 4-a, 5-c
160. 1-c, 2-e, 3-a, 4-b, 5-d

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PPSC Veterinary Officer Exam Paper-2016

1. Selection on the basis of individuality is most important when h^2 of the trait is:
   (a) Low (b) Medium
   (c) High (d) None of the above
2. **Dental formula (ICPM) for permanent teeth in the male horse is:**
   (a) 3133/3133 (b) 3033/4122
   (c) 0030/3333 (d) 3033/4033
3. **Dental formula (ICPM) for permanent teeth in ox is:**
   (a) 0033/4033 (b) 3033/4122
   (c) 0030/3333 (d) 3033/4033
4. **Which of the following vitamin having hormone-like properties-**
   (a) Vitamin A (b) Vitamin E
   (c) Vitamin D (d) Vitamin C
5. **The SPC in pasteurized milk per ml should not exceed:**
   (a) 3,000 (b) 50,000
   (c) 30,000 (d) 1,00,000
6. **Which one of the following is not included in Livestock-?**
   (a) Dog (b) Kangaroo
   (c) Buffalo (d) Turkey
7. **Grossly the placentation in bitches is:**
   (a) Diffuse (b) Zonary
   (c) Discoid (d) None of the above
8. **The frequencies of two alleles in parents are 'p' and 'q'; then the proportion of heterozygotes in progeny will be:**
   (a) 2pq (b) p^2
   (c) q^2 (d) p+q
9. **Selection differential depends on all except:**
   (a) Selection differential (b) Proportion selected
   (c) Heritability (d) Phenotypic standard deviation
10. **Which of the following is not true about heterosis-?**
    (a) Term coined by G H Shull (b) Depends on difference of gene frequency
    (c) Might be caused by overdominance (d) Independent of degree of dominance
11. **Energy requirement (Kcal/Kg fee(d) in broiler finisher ration as per BIS-2007 is:**
    (a) 2800 (b) 2900
    (c) 3100 (d) 3200
12. **Which of the following is not an essential amino acid for poultry-?**
    (a) Arginine (b) Glycine
    (c) Valine (d) Glutamate
13. **Hinny is the cross between:**
    (a) Male horse (stallion) × Female Ass (Jennet)
    (b) Female horse (mare) × Male Ass (Jack)
    (c) Male horse (stallion) × Female Zebra
    (d) Female horse (mare) × Male Zebra
14. **Most of the draught breeds of cattle were developed in ———— region of India**
    (a) Dry northern region (b) Southern region
    (c) North-eastern region (d) Coastal region

15. **The milking equipment should preferably be made up of:**
(a) Galvanized iron (b) Copper
(c) Iron (d) None of the above

16. **The shelf life of pasteurized milk kept at less than 8°C is:**
(a) 1-2 days (b) 3-5 days
(c) 6-8 days (d) 10-15 days

17. **World Rabies Day takes place each year on:**
(a) September 28 (b) September 8
(c) September 18 (d) April 28

18. **Efficacy of pasteurization is judged by:**
(a) Dye reduction test (b) Alkaline phosphatase test
(c) Amylase test (d) Malachite test

19. **Proteins in milk are present in one of the following form:**
(a) Emulsion (b) Soluble
(c) Colloidal (d) Suspension

20. **If an animal consumes 5Kg Dry matter and excretes 6 Kg of faeces with 50% moisture, the digestibility coefficient will be:**
(a) 40% (b) 50%
(c) 60% (d) None

21. **Brucella abortus needs to be incubated in an atmosphere containing which of the following for its isolation:**
(a) 5-10% of CO_2 (b) Erythritol
(c) 5-10% Nitrous oxide (d) None

22. **Which of the following is known as secretory antibody-**
(a) IgM (b) IgA
(c) IgD (d) IgE

23. **In cyanide poisoning, the colour of venous blood becomes:**
(a) Bright cherry red (b) Brown
(c) Chocolate (d) Both b & c

24. **Swimmers itch is caused by:**
(a) Ancylostoma (b) Ascarids
(c) Taenia (d) Schistosomes

25. **Drug of choice for the treatment of amphistomosis is:**
(a) Triclabendazole (b) Oxyclozanide
(c) Praziquantel (d) All the above

26. **Diabetes incipidus is characterized by:**
(a) Polyuria (b) Polydipsia
(c) Both of the above (d) None

27. **Boiled rice grain type of segment are observed during infestation with:**
(a) Taenia (b) Hymenolepis
(c) Moniezia (d) None

28. **Which of the following is an abnormal constituent of urine-**
(a) Glucos (b) Urea
(c) Creatinine (d) Bile pigments

29. **Turkey egg appearance of the kidney, button ulcer in the large intestine in pigs are a pathognomonic lesion of:**
(a) Swine fever (b) Swine erysipelas
(c) Salmonellosis (d) Auzesky's disease

30. **Microscopic agglutination test (MAT) has been widely used as the reference test for antibody detection for which of the following diseases:**
(a) Listeriosis (b) Rabies
(c) Leptospirosis (d) Influenza

31. **Cholesterol gives rises to all except:**
(a) Bile acids (b) Sex hormones
(c) Steroid hormones (d) Bile pigments

32. **All of the following tests are uses for the detection of mastitis except:**
(a) Hotis Miller test (b) Coombs test
(c) White side test (d) Bromothymol blue test

33. **Dourine disease is caused by:**
(a) Trypanosoma evansi (b) Trypanosoma equi
(c) Trypanosoma equiperdum (d) Trypanosoma brucei

34. **Prevention of Cruelty to Animal Act and Glander & Farcy Act were enacted in:**
(a) 1960 & 1899 (b) 1940 & 1898
(c) 1965 & 857 (d) 1997 & 1947

35. **The following test is most sensitive for detection of ketone bodies in urine**
(a) Benedict's test (b) Benzidine test
(c) Roberts test (d) Rothera's test

36. **In Sow, maternal recognition of pregnancy is mainly due to the action of:**
(a) Interferon tau (b) Oxytocin
(c) Estrogen (d) Prostaglandins

37. **Taq polymerase, an enzyme used in PCR requires:**
(a) Mg^{++} (b) Temperature of 72°C
(c) pH 8.4 (d) All of above

38. **The animal disease that has been eradicated from India:**
(a) Braxy (b) Ephemeral fever
(c) Rinderpest (d) PPR

39. **A polyphenol present in cotton seeds which interferes with utilization of metal ions is:**
(a) Propofol (b) Gossypol
(c) Mimosine (d) Thioglucoside

40. **Which of the following components from smoke contribute to the smoky flavor of meat-**
(a) Phenol (b) Alcohol
(c) Formaldehyde (d) Caproic acid

41. **Which of the following is a long-acting tetracycline-**
(a) Oxytetracycline (b) Doxycycline
(c) Methacycline (d) Both a & c

42. **In order to collect a blood sample for estimation of glucose, the following is added as preservative in order to ensure that the level of glucose does not go down with the passage of time:**
(a) EDTA (b) Sodium citrate
(c) Sodium fluoride (d) Heparin

43. **Which is the right time to perform a post-mortem of the animal suspected to be affected with anthrax-**
(a) Immediately after the death of animal (b) Within 6 hours of the death of animal
(c) Within 24 hours of the death of animal (d) None of the above

44. **Lack of blood supply is known as:**
(a) Emboli (b) Thrombus
(c) Both a & b (d) Ischemia

45. **Which of the following in not an example of a non-random sampling technique-**
(a) Purposive sampling (b) Convenience sampling
(c) Quota sampling (d) Cluster sampling

46. **Peg cells are found in-**
(a) Oviduct (b) Vagina
(c) Uterus (d) Ovary

47. **White diarrhoea, pesting of feathers of vent region, shrill crying while voiding droppings in young chicks are features of-**
(a) Fowl typhoid (b) Pullorum disease
(c) Fowl cholera (d) Fowl paratyphoid

48. **Reciprocal apparatus operates in:**
(a) Hind Limbs (b) Fore-limbs
(c) All Limbs (d) None

49. **The brown dog tick of dog is:**
(a) Boophilus (b) Rhipicephalus
(c) Hyalomma (d) Dermacentor

50. **The principal constituent of the purulent exudate:**
(a) Macrophage (b) Lymphocyte
(c) Neutrophils (d) Eosinophils

51. **The branch of dentistry concerned with irregularities of teeth and malocclusion:**
(a) Orthodontics (b) Periodontics
(c) Endodontics (d) Exodontics

52. **Veiny leather is a defect caused by:**
(a) Imperfect bleeding (b) Hypoderma lineatum
(c) Demodex follicularum (d) Actinomyces spp

53. **In physiological quantities thyroid hormones are:**
(a) Anabolic (b) Catabolic
(c) Both a & b (d) None

54. **The presence of albumin in urine indicates:**
(a) Injury to glomeruli (b) Tubular injury
(c) Both (d) None

55. **Introduction of *Pseudomonas aeruginosa* through intra-mammary antibiotic preparations is:**
(a) Iatrogenic infection (b) Cold mastitis
(c) Inoculation (d) None

56. **The most common method employed for semen collection in dog is:**
(a) AV method (b) Digital manipulation
(c) Electroejaculation (d) None

57. **Zoonotic pathogens originate from:**
(a) Animals (b) Food and animals
(c) Both (d) None

58. **An international bulletin of animal diseases is published by:**
(a) OIE (b) World Veterinary Association
(d) WHO (d) PETA

59. **Pre-cervical uterine torsion is diagnosed by:**
(a) Per-vaginal
(b) Per-rectal
(c) Abdominal ballotment
(d) Through radiography

60. **Rodents play important role in transmission of:**
(a) FMD
(b) Plague
(c) Scrub typhus
(d) None

61. **The most appropriate, easy and economic method of pregnancy diagnosis in bovines is**
(a) Ultrasonography
(b) Rectal examination
(c) Abdominal ballotment
(d) Progesterone assay

62. **The most critical temperature which may cause maximum loss of sperms during freezing is between:**
(a) 37°C to 4°C
(b) 4°C to –1°C
(c) 5°C to –15°C
(d) –15°C to –30°C

63. **Exogenous oxytocin has luteolytic action in:**
(a) Bitch
(b) Cow & Ewe
(c) Cattle & Sow
(d) Cow & Doe

64. **In a herd in which brucellosis is endemic; an infected cow:**
(a) Abort only once after exposure
(b) Subsequent gestation appear normal
(c) Lactations normal
(d) All of above

65. **The dermatophyte that does not give fluoresce under wood's light include:**
(a) Microsporum equi
(b) Microsporum distortum
(c) Microsporum canis
(d) Microsporum audounii

66. **An outbreak of disease from drinking water well is an example of:**
(a) Propagative epidemic
(b) Repeated exposure
(c) Seasonal trend
(d) All of above

67. **Major side effect of vincristine treatment are-**
(a) Myelosuppression
(b) Gastrointestinal disturbances
(c) Both
(d) None

68. **Hemolytic anemia may be sequalae of-**
(a) Babesiosis
(b) Leptospirosis
(c) Phosphorus deficiency
(d) All of the above

69. **In obligatory cyclo-zoonoses life cycle of agent is completed in-**
(a) Man
(b) Mosquitoes
(c) Ticks
(d) None

70. **Blastokinin, a protein which influences blastocyst formation is secreted by uterus of-**
(a) Cattle
(b) Sheep
(c) Goat
(d) Rabbit

71. **Macroepidemiology is concerned with the ——— of disease and the social, economic and political factors that influence them.**
(a) International pattern
(b) National pattern
(c) Forecasting
(d) Disaster management

72. **Major viral surface antigen important in avian influenza immunity is:**
(a) Haemagglutinin
(b) Neuraminidase
(c) Fusion spikes
(d) None

73. **The peripheral nerve disorder is associated with-**
(a) Trivalent arsenic (b) Pentavalent arsenic
(c) Organic arsenicals (d) Arsine

74. **Castration in the male dog is done by which of the following surgical approach:**
(a) Pre-scrotal incision (b) Scrotal incision
(c) Post-scrotal incision (d) None

75. **Calcium channel blocker is-**
(a) Nifedipine (b) Diltiazem
(c) Verapamil (d) All of these

76. **Following recovery from FMD, some animals may show sequels like-**
(a) Panting (b) Over-growth of hair
(c) Anemia (d) All of the above

77. **Antibody isotype that provides defense against helminths is:**
(a) IgA (b) IgM
(c) IgG (d) IgE

78. **The drug of choice for the treatment of pyometra in bovines:**
(a) Estrogen (b) Testosterone
(c) PGF_2a (d) PGE

79. **In pigs, the lesion of chronic anthrax are restricted to-**
(a) Cervical lymph nodes (b) Tonsils
(c) Surrounding tissues (d) All of above

80. **Carbaryl is an example of-**
(a) OC insecticide (b) OP insecticide
(c) Carbamate (d) Pyrethroid

81. **Agglutination is a serological reaction in which-**
(a) Antigen is in soluble form (b) Antigen is in particulate form
(c) Antibody is in soluble form (d) Antibody is in particulate form

82. **Standard treatment of acetonemia in dairy animals is-**
(a) 50% dextrose, glucose precursor and corticosteroids
(b) Insulin and corticosteroid
(c) Chloral hydrate, cyanocobalamine and cobalt
(d) Single infusion of 50% dextrose

83. **Bromhexine is-**
(a) Mucolytic (b) Antitusssive
(c) Analeptic (d) None

84. **Chronic hypertrophy of the horn producing tissues of the foot of horses is called-**
(a) Laminitis (b) Corn
(c) Subsolar abscess (d) Canker

85. **A food borne outbreak is an examples of-**
(a) Point source epidemic (b) Periodic fluctuation
(c) Propagative epidemic (d) None of the above

86. **In developing follicles of hen, the chromosomal material of the ovum is present in the-**
(a) Vitelline membrane (b) Chalaza
(c) Blastodisc (d) None

87. **Powders are often administered as-**
(a) Drenches (b) Pills
(c) Electuary (d) Pessary

88. **Body coat comprising of large irregular patches of black and white with well defined line of demarcation between two colours is called-**
(a) Pie bald (b) Skew bald
(c) Whole coloured (d) Roan

89. **The protein accounts for about average ————% of total protein in the skeletal muscle-**
(a) 13 (b) 15
(c) 19 (d) 23

90. **The mineral supplement in artificial diet of fishes should be-**
(a) Nil (b) 1-2%
(c) 4-5% (d) Varies according to geographical distributions

91. **Which of the following is not a measure of reproductive efficiency-**
(a) Fertility index (b) Wilcox method of BE
(c) Osborne index (d) AI per conception

92. **A circumscribed cavity with pus, situated in epidermis is called-**
(a) Abscess (b) Carbuncle
(c) Acne (d) Pustule

93. **Selected theme for 2016 World Veterinary Day was-**
(a) Continuing education with a one health focus (b) One health one mission
(c) Food security for all (d) None

94. **Dimensions of feed manger (w×d×h) for calf is-**
(a) $40\times15\times20\ cm^3$ (b) $40\times20\times15\ cm^3$
(c) $15\times40\times20\ cm^3$ (d) $40\times15\times25\ cm^3$

95. **The superiority of selected parents over the average performance of the population is called as-**
(a) Selection intensity (b) Selection plateau
(c) Selection differential (d) Response to selection

96. **The progeny testing is usually done for the selection of-**
(a) Sire (b) Dam
(c) Sibs (d) Progeny

97. **Bomb calorimeter is used to estimate-**
(a) GE (b) NE
(c) ME (d) DE

98. **Which of the following is a wet processing method of grains-**
(a) Popping (b) Roasting
(c) Steam rolling (d) Dry rolling

99. **Skin of unborn calf is called as-**
(a) Kip (b) Murrain
(c) Slunk (d) Kid

100. **Rendered bone meal is a good source of-**
(a) Minerals (b) Proteins
(c) Fats (d) Vitamins

☆☆☆

Answer Key

1. High
2. 3133/3133
3. 0033/4033
4. Vitamin D
5. 30,000
6. Turkey [Note: Livestock comprises of all farm animals having economic importance (milk/meat/wool/draught purpose) Ex. Cattle, Buffalo, Sheep, Goat, Camel, Pig, Horse, Mule, Donkey, Pony etc.]Poultry, dog, cat and rabbit are not fallen under category of livestock
7. Zonary
8. 2pq
9. Heritability
10. Independent of degree of dominance
11. 3200
12. Glutamate
13. Male horse (stallion) × Female Ass (Jennet)
14. Southern region
15. None of the above (Note: Stainless steel and Aluminiumalloy mainly used for the manufacturing of the dairy utensils.)
16. 6-8 days
17. September 28
18. Alkaline phosphatase test
19. Colloidal
20. 40% [% Digestibility coefficient on DM basis = (DM intake – DM excrete(d)/DM intake × 100] % DC = (5–3)/5×100 = 40; out of 6 Kg faeces 50% is dry matter so DM excreted is 3 Kg
21. 5-10% of CO_2
22. IgA
23. Bright cherry red
24. Schistosomes
25. Oxyclozanide
26. Both of the above
27. Moniezia
28. Glucose
29. Swine fever
30. Leptospirosis
31. Bile pigments
32. Coombs test (Note: Coombs test is used to diagnose brucellosis)
33. Trypanosoma equiperdum
34. 1960 & 1899
35. Rothera's test
36. Estrogen
37. All of above
38. Rinderpest
39. Gossypol
40. Phenol
41. Doxycycline
42. Sodium fluoride
43. None of the above (Note: Post-mortem must not be done in case of anthrax because Bacillus anthracis is aerobic organism & oxygen helps in the formation and dissemination of spores)
44. Ischemia
45. Cluster sampling
46. Oviduct
47. Pullorum disease
48. Hind Limbs
49. Rhipicephalus
50. Neutrophils

51. Orthodontics
52. Imperfect bleeding
53. Anabolic
54. Both
55. Iatrogenic infection
56. Digital manipulation
57. Animals
58. OIE
59. Per-rectal
60. Plague
61. Rectal examination
62. 5^0C to -15^0C
63. Cow & Doe
64. All of above
65. Microsporum equi
66. Propagative epidemic
67. Both
68. All of the above
69. Man
70. Rabbit
71. National pattern
72. Haemagglutinin
73. Trivalent arsenic
74. Pre-scrotal incision
75. All of these
76. All of the above
77. IgE
78. PGF_2a
79. All of above
80. Carbamate
81. Antigen is in particulate form
82. 50% dextrose, glucose precursor and corticosteroids
83. Mucolytic
84. Canker
85. Point source epidemic
86. Blastodisc
87. Electuary
88. Pie bald
89. 19
90. 1-2%
91. Osborne index (Note: Osborne index is a selection index for improving egg production in poultry)
92. Pustule
93. Continuing education with a one health focus
94. $40 \times 15 \times 20$ cm^3
95. Selection differential
96. Sire
97. GE
98. Steam rolling
99. Slunk
100. Minerals

☆☆☆

MPPSC Veterinary Assistant Surgeon Exam Paper-2016

1. **Succulent feeds usually contain moisture ranging from**
   (a) 55 to 65% (b) 30 to 40%
   (c) 45 to 60% (d) 60 to 90%
2. **Most suitable fodder crop for leguminous hay-making is**
   (a) Berseem (b) Lucerne
   (c) Cow pea (d) All of these
3. **The Protein digestibility of wheat straw is approximate-**
   (a) 0.5% (b) 0.0%
   (c) 1% (d) 2%
4. **The quality of straw can be improved by**
   (a) Alkali Treatment (b) Urea Treatment
   (c) Silage making with succulent fodder (d) All of these
5. **The water intake by adult cattle for every kg of dry matter intake is**
   (a) 2-3 litre (b) 3-5 litre
   (c) 6-7 litre (d) More than 7 litre
6. **More than 50% of energy value of the diet is provided by the**
   (a) Carbohydrates (b) Fat
   (c) Protein (d) None
7. **Which one of the following domestic animal has the lowest capacity of crude fiber digestibility**
   (a) Ruminants (b) Horse
   (c) Pig (d) Dog
8. **The method of the protecting protein from ruminal degradation is-**
   (a) Heat Treatment (b) Use of amino acid analogs
   (c) Encapsulation of amino acids (d) All of these
9. **Protein supplement contains-**
   (a) Less than 18% crude protein and more than 20% crude fiber
   (b) More than 20% Crude protein and less than 18% crude fiber
   (c) Less than 20% crude protein and less than 18% crude fiber
   (d) More than 20% Crude protein and More than 18% crude fiber
10. **Roughage contains how much crude fiber-**
    (a) Less than 15% (b) Less than 18%
    (c) More than 20% (d) More than 18%
11. **Encephalomalacia in chick is caused by-**
    (a) Vita. E deficiency (b) Avian encephalomyelitis virus
    (c) Vita. B1 Deficiency (d) All the above
12. **Roan coat colour in short-horned cattle is an example of which type of gene action-**
    (a) Dominance (b) Co-dominance
    (c) Recessive (d) None
13. **The father of animal breeding is-**
    (a) Bateson (b) Charles Darwin
    (c) Mendel (d) Robert Bakewell
14. **When a gene controls two or more traits this property of gene is known as-**
    (a) Pleiotropy (b) Heterotropy
    (c) Monotropy (d) None of these

15. **Rampur Bushair is a breed of-**
(a) Pig (b) Goat
(c) Cattle (d) Sheep

16. **The crossing of the two inbred lines of different breeds is called as-**
(a) Cross Breeding (b) In-cross breeding
(c) Inbreeding (d) Line Breeding

17. **Barbari breed is originated from**
(a) India (b) South Africa
(c) East Africa (d) North Korea

18. **The inbred lines are developed mainly for crossing them to take advantage of-**
(a) Hybrid Vigour (b) Heterosis
(c) Both a & b (d) None of these

19. **The Heritability of number of legs in dairy cattle is-**
(a) Zero (b) 0.5
(c) 0.75 (d) 1.0

20. **The contribution of offspring to the next generation in selection experiments is known as-**
(a) Fitness (b) Adaptive Value
(c) Selective Value (d) All of these

21. **The Observed value of a trait measured on an individual is called as**
(a) Genotypic Value (b) Phenotypic Value
(c) Karyotypic Value (d) None of these

22. **Niang Megha is a breed of-**
(a) Indigenous goat (b) Exotic Pig
(c) Indigenous Pig (d) Indigenous Sheep

23. **Response to selection is affected by-**
(a) Heritability of the Trait (b) Phenotypic standard deviation
(c) Intensity of selection (d) All the above

24. **Most dwarf breed of cattle is-**
(a) Vechur (b) Malvi
(c) Siri (d) Hallikar

25. **Ideal calving interval in cattle is**
(a) 10 Months (b) 12 Months
(c) 16 Months (d) 2 Years

26. **The desirable slope of floor in tail to tail system is-**
(a) 1:30 (b) 1:40
(c) 1:50 (d) 1:60

27. **Sty is the house of-**
(a) Young calves (b) Goat
(c) Sheep (d) Pig

28. **For maximum growth rate in rabbit minimum crude fiber in ration should be**
(a) 10% (b) 8%
(c) 6% (d) 4%

29. **Manger length for a cow should be**
(a) 20-24 inch (b) 24-30 inch
(c) 15-20 inch (d) More than 30 inch

30. **Budgeting, a tool of dairy farm management includes**
(a) Comparative budgeting (b) Annual budgeting
(c) Partial budgeting (d) All the above

31. **The example of baggage type of camel is**
(a) Desert Camel (b) Riverine Camel
(c) Riding camel (d) All of these

32. **Best rabbit breed for production of fur is-**
(a) British Angora (b) Russian Angora
(c) German Angora (d) All of these

33. **In an organized dairy farm, the calves are separated from dams and maintained in individual pens or stalls normally up to the age of -**
(a) 4 Weeks (b) 5 Weeks
(c) 6 Weeks (d) 8 Weeks

34. **Bropkas herdsman manages which species of animal-**
(a) Mule (b) Yak
(c) Ass (d) None of these

35. **Debeaking is best done at the age of**
(a) 1st-day (b) 7th-day
(c) 10th-day (d) 14th day

36. **The average egg production of an improved strain of White Leghorn is approximate-**
(a) 300 eggs per year (b) 100 eggs per year
(c) 50 eggs per year (d) 200 eggs per year

37. **Longer incubation period is generally observed in case of**
(a) Large size eggs
(b) Older eggs at setting time
(c) Eggs from Hens with longer duration in production
(d) All of these

38. **Unhealed naval or mushy chicks may be caused by the following reasons**
(a) Unsanitary hatchery conditions (b) Unsanitary incubator conditions
(c) Omphalitis (d) All of these

39. **From the health management point of view, the flow of on-farm traffic must be directed**
(a) From Oldest to youngest birds (b) From Youngest to oldest birds
(c) With no set pattern (d) None of these

40. **Which of the light management programme is not recommended for growing pullets-**
(a) Decreasing light (b) Constant light
(c) Increasing light (d) None of these

41. **What type of feasibility report is necessary before starting or planning a poultry project—**
(a) Technical (b) Social/ Environmental
(c) Economical (d) All of these

42. **To record the temperature in a brooder house the thermometer is placed above the litter at a height of—**
(a) 5 cm (b) 10 cm
(c) 15 cm (d) 20 cm

43. **Which of the following breed of poultry is well known for egg production-**
(a) Cornish (b) Aseel
(c) Kadaknath (d) White Leghorn

44. **Which of the following is not an egg quality trait-**
(a) Shape of the egg (b) Shell thickness
(c) Yolk Index (d) Broodiness

45. **On which type of floor breeding stock of poultry should be reared for better Fertility-**
(a) Wired floor (b) Slat floor
(c) Deep litter (d) None of these

46. **Pindi, a type of khoa, is used to prepare which specific sweet-**
(a) Kalakand (b) Gulabjamun
(c) Rosagulla (d) Burfi

47. **Lal dahi, a preparation popular in the eastern region of India is which type of dahi-**
(a) Salted dahi (c) Plain stored dahi
(b) Sweetened dahi (d) None of these

48. **Normally single toned milk should contain how much fat percentage-**
(a) 3% (b) 4.5%
(c) 1.5% (d) 5%

49. **Clotted milk is the synonym in which Indian milk product-**
(a) Mawa (b) Kulfi
(c) Rabri (d) Basundi

50. **Stale or sour flavor usually develops at what temperature of storage of khoa-**
(a) 24-30°C (b) 5-10°C
(c) 31-35°C (d) Refrigerated temperature

51. **The defect caused by undissolved coarse salt in butter is known as**
(a) Streaky (b) Sticky
(c) Grainy (d) Gritty

52. **For preventing oxidized or metallic flavor, the butter oil must be stored in which type of container-**
(a) Aluminum/Stainless steel vessels (b) Copper alloy vessels
(c) Copper vessels (d) Iron Vessels

53. **Which one of the following is not the cause of churning difficulties-**
(a) Excessive hardness of fat (b) Excessive thin Cream
(c) Large Sized fat globules (d) Excessive low churning temperature

54. **Homogenization of ice cream milk is essential because it**
(a) Lengthens ageing period (b) Prevent Fat Separation during Ageing
(c) Reduces whipping ability (d) All of these

55. **How many kg of salt will be required to be added in 200 kg fat for making butter containing 2% salt assuming 80% fat in the butter-**
(a) 4.0 (b) 2.0
(c) 2.5 (d) 5.0

56. **For handling horses, the handler should approach the horse at an angle of**
(a) 30° (b) 45°
(c) 15° (d) Zero degree

57. **Which international agency is not directly involved in veterinary public health activities-**
(a) OIE (b) FAO
(c) WHO (d) None of these

58. **Majority of the slaughter facilities that exist in India are**
(a) Unhygienic (b) Hygienic
(c) Suitable (d) Up to date

59. **Intestinal mucus membrane from a healthy animal is used to manufacture which pharmacological preparation-**
(a) Relaxin (b) Heparin
(c) Growth Hormone (d) Nor adrenaline

60. **Slaughter bleeding time for sheep and pig is**
(a) More in Pigs than Sheep
(b) More in Sheep than Pigs
(c) Equal in both
(d) None of these

61. **Which one is non-projected display type visual aid-**
(a) Flash Cards
(b) Exhibits
(c) Flip Charts
(d) Flannel Graph

62. **The Philosophy of extension is**
(a) How to think
(b) What to think
(c) Directed to work
(d) All of these

63. **In extension education learners are**
(a) Having common goal
(b) Homogenous
(c) Heterogeneous
(d) None of these

64. **Gyandoot project was launched in tribal-dominated rural area of Madhya Pradesh in the year-**
(a) 1979
(b) 1989
(c) 1999
(d) 2000

65. **TRYSEM was introduced in the year -**
(a) 1963
(b) 1979
(c) 1989
(d) 2001

66. **The concept of extension education is-**
(a) An applied science
(b) A behavioral science
(c) Defined as educational process
(d) All of these

67. **Different techniques are used to access the situation (situational analysis) in program planning process farmers participation is maximum in-**
(a) PRA
(b) RRA
(c) Survey
(d) Schedule

68. **NES was launched in the year-**
(a) 2000
(b) 1979
(c) 1952
(d) 1953

69. **Extension education, a participatory process, involves**
(a) Five independent steps
(b) Six Independent steps
(c) Five inter-related steps
(d) Six inter-related steps

70. **In fowl, the pygostyle is made up of vertebrae**
(a) Thoracic
(b) Cervical
(c) Coccygeal
(d) Sacral

71. **The splanchnic skeleton of the Ox is-**
(a) Os-rostrum
(b) Os-penis
(c) Os-cordis
(d) Os-phrenic

72. **The menisci are present in which joint-**
(a) Hip
(b) Stifle
(c) Hock
(d) Shoulder

73. **The muscles attached to the bone surface-**
(a) Cardiac muscles
(b) Skeletal muscles
(b) Smooth muscles
(d) All of these

74. **The white pulp and red pulp are found in the micro-section of**
(a) Kidney
(b) Pancreas
(c) Spleen
(d) Liver

75. **The number of chromosomes is reduced to half during**
(a) Mitosis (b) Meiosis
(c) Interphase (d) None of these

76. **Fertilized ovum is divided into number of cells by mitotic division by the process of -**
(a) Blastulation (b) Cleavage
(c) Gastrulation (d) None of these

77. **Oxytocin has specific effects on-**
(a) Smooth muscles of uterus (b) Myoepithelial cells of mammary gland
(c) Facilitates parturition (d) All the above

78. **Maintenance of milk secretion is known as-**
(a) Galactopoiesis (b) Lactogenesis
(c) Mammogenesis (d) Galactogenesis

79. **Pepsinogen and HCl is secreted in ruminant by-**
(a) Omasum (b) Abomasum
(c) Reticulum (d) Ruman

80. **The basic unit of gas exchange in birds is-**
(a) Primary bronchi (b) Secondary bronchi
(c) Parabronchi (d) Air sacs

81. **The major cation of intracellular fluid is-**
(a) Na^+ (b) K^+
(c) Mg^{++} (d) Mn^{++}

82. **Hypovolemic shock may be due to-**
(a) Haemorrhage (b) Trauma
(c) Both a & b (d) None

83. **Ambient hypoxia occurs due to-**
(a) Low pO_2 in atmosphere (b) Shortage of functional hemoglobin
(c) High pO_2 in atmosphere (d) None of these

84. **Buparvaquone is a drug of choice for the treatment of**
(a) Tick infestation (b) Tape worm infection
(c) Theileria infection (d) Babesiosis

85. **Sui or Ratti poisoning is the common name for**
(a) *Dhatura poisoning* (b) *Heavy metal poisoning*
(c) *Strychnine poisoning* (d) *Abrus precatorius poisoning*

86. **Hepatotoxicity and photo-sensitization in grazing livestock is caused due to ingestion of**
(a) *Lantana camara* (b) *Naricum oleandir*
(c) *Digitalis purpurea* (d) *Beta vulgaris*

87. **One of the followings is an anti-coccidial drug used in poultry-**
(a) Amprolium (b) Acriflavine
(c) Both a & b (d) None

88. **Restriction enzymes capable of making internal cuts in a DNA molecule is called**
(a) Restriction exonuclease (b) Restriction endonuclease
(c) Both a & b (d) S1 nuclease

89. **Incorporation of recombinant plasmids into a cell from external environment is called-**
(a) Transduction (b) Transformation
(c) Conjugation (d) Both a &

90. **PCR was invented by**
(a) Watson and Crick (b) Paul Berg
(c) Kary Mullis (d) Kohler and Milstein

91. **On the basis of maternal-fetal barrier, type of placenta in bitch-**
(a) Syndesmochorial (b) Haemochorial
(c) Epitheliochorial (d) Endotheliochorial

92. **Post- service pyometra in cow is usually caused by-**
(a) Campylobacter fetus (b) Brucella abortus
(c) E.coli (d) Trichomonas fetus

93. **Aschheim – Zondek (A-Z) test is the method of Pregnancy diagnosis in-**
(a) Bitch (b) Cattle
(c) Mare (d) Sow

94. **The second stage of parturition in a cow lasts for-**
(a) 0.5 - 1 hr (b) 6 - 8 hrs
(c) 24 hrs (d) 4 hrs

95. **Synchronization of estrus in cattle can be achieved by administering**
(a) Single injection of FSH (b) Combination of FSH and GnRH
(c) Single injection of GnRH (d) Two doses of PGF2*a* at 11 days interval

96. **When sperm concentration is less in the semen sample the condition is known as**
(a) Hypospermia (b) Asthenozoospermia
(c) Oligozoospermia (d) Teratozoospermia

97. **Testosterone hormone is produced from-**
(a) spermatogonia (b) Sertoli cells
(c) Leydig cells (d) Medusa cells

98. **Fructose is predominantly present in the semen of-**
(a) Dog (b) Stallion
(c) Cow bull (d) Buffalo bull

99. **Lack of sexual interest in female immediately the following copulation is known as**
(a) Intromission (b) Dismounting
(c) Impotentia coeundi (d) Refractoriness

100. **Which of the following formula is used to calculate total solid (TS) & Solid Not Fat (SNF) content of milk-**
(a) Babcock's formula (b) Fleischmann's formula
(c) Richmond's formula (d) All the above

101. **Mercuric nitrate solution is used for the detection of adulteration of milk**
(a) Gelatin (b) Starch
(c) Vegetable oil (d) None

102. **Which of the following types of meats contains firm and fine muscle fibers-**
(a) Horse meat (b) Fish meat
(c) Poultry meat (d) None

103. **The Animal welfare board was established in the year-**
(a) 1952 (b) 1962
(c) 1982 (d) 1992

104. **Which of the following is added as preservative to milk samples that are to be later used for laboratory examination-**
(a) Toluene (b) Formalin
(c) Potassium dichromate (d) Thymol

105. **Which of the following is not a major mastitis pathogen**
(a) Staphylococcus aureus (b) E.coli
(c) Streptococcus agalactia (d) Staphylococcus Hyicus

106. **Which of the following triggers the multiplication of Brucella abortus organisms-**
(a) Erythymol (b) Erythritol
(c) Erytol (d) Ethambutol

107. **Which of the following is used for staining smears for the diagnosis of tuberculosis**
(a) Giemsa stain (b) Z-N stain
(c) EMB stain (d) Seller's stain

108. **The usual frequency of occurrence of a disease is known as-**
(a) Endemic (b) Sporadic
(c) Epidemic (d) Pandemic

109. **Which of the following is used for post bite anti-rabies vaccination schedule-**
(a) 0, 3rd , 7th , 14th & 30th day (b) 0, 3rd , 7th , 14th & 28th day
(c) 0, 3rd ,7th , 14th , 30th & 90th day (d) 0, 3rd ,7th , 14th , 28th & 90th day

110. **Using a diseased animal for work is punishable under-**
(a) Prevention of Cruelty to Animals Act 1960 (b) Prevention of Cruelty to Animals Act 1965
(c) Prevention of Cruelty to Animals Act 1970 (d) Prevention of Cruelty to Animals Act 1975

111. **The phenomenon of rigor mortis commences from which of following body parts**
(a) Head and neck (b) Extremities of forelimbs
(c) Shoulder and abdomen (d) Extremities of hindlimbs

112. **The term, "Skin leukosis" is used for which of the following diseases**
(a) Fowl pox (b) Marek's disease
(c) Lymphoid leukosis (d) None

113. **Disorder of eye in which additional cilia emerges from the openings of Meibomian glands of eye is known as**
(a) Ectopic cilia (b) Distichiasis
(c) Trichiasis (d) None of These

114. **Surgical procedure indicated for mass lesions and caecal impaction or inversion called**
(a) Typhlectomy (b) Colotomy
(c) Caecocystensis (d) None of these

115. **Extra-pelvic urethral structures in dogs are best managed by-**
(a) Urethrostomy (b) Resection & anastomosis
(c) Extrapelvic cysto-urethral anastomosis (d) None of these

116. **To visualize details of different structures, a good radiograph is expected to have**
(a) Long scale contrast (b) High radiographic density
(c) Short scale contrast (d) Low radiographic density

117. **Telescoping of a part of intestine distally into an adjacent portion is called as**
(a) Volvulus (b) Intussusception
(c) Torsion (d) None of these

118. **Auriculo-palpebral nerve block results into-**
(a) Loss of sensation of eyelids (b) Blockade of sensory & motor nerve
(c) Motor Paralysis of eyelids (d) None of these

119. **Conformation in which the entire forelimb from the body to ground is too far forward when viewed from the side is called as-**
(a) Compedin front (b) Open knees
(c) Standing under in front (d) Comped behind

120. **If a horse refuses to move unless forces, the lameness is graded as**
(a) Grade - 1 (b) Grade - 2
(c) Grade - 3 (d) Grade - 4

121. **Bunnell suture technique is used for-**
(a) Muscle repair (b) Tendon repair
(c) Ligament repair (d) Skin repair

122. The chief indication for electrotherapy are-

(a) Paralysis and muscular atrophy (b) Paralysis and muscular tremors
(c) Paralysis and torticollis (d) None of these

123. Fluoroscopy was invented by

(a) Thomas A. Edison in 1896 (b) J.J. Thompsan in 1897
(c) W.C. lord Roentgen in 1895 (d) J.J. Thompsan in 1913

124. The basis of diagnostic ultrasound is-

(a) Absorption of ultrasound energy (b) Scattering of ultrasound waves
(c) Reflection of ultrasound waves (d) All the above

125. Among the following, which one is the most dangerous type of a hernia

(a) Gastrorcele (b) Entro- epiplocele
(c) Strangulated hernia (d) Non-reducible hernia

126. In which types of animals atropine makes the salivary secretions viscid-

(a) Canines (b) Bovines
(c) Equines (d) Felines

127. Grid is used to prevent the following from reaching the X-ray film during exposure

(a) Primary radiation
(b) Scattered radiation
(c) Both Primary radiation & scattered radiation are true
(d) Both Primary radiation & scattered radiation are false

128. Which of the following is not used as a preservative during post-mortem examination of vetero-legal cases-

(a) Common salt (b) Alcohol
(c) Formalin d (d) None of these

129. For internal examination during post-mortem examination of equine, the carcass should be placed

(a) Right side down (b) In sternal recumbency
(c) Left side down (d) In dorsal recumbency

130. Under the law, manufacture and sale of which of the following is considered to be a crime

(a) Adulterated drugs (b) Misbranded drugs
(c) Spurious drugs (d) All of these

131. Which of the following specimens should be submitted for chemical analysis from a suspected case of nitrate poisoning

(a) Whole blood (b) Kidney
(c) Liver (d) Urine

132. Mackenzie toothbrush technique is used for the diagnosis of which of the following conditions-

(a) Canine atopy (b) Canine dermatophytosis
(c) Canine pyoderma (d) Flea allergic dermatitis

133. Which of the following is a commensal organism that inhabits canine skin and ear canals and produces disease under favorable conditions-

(a) Malassezia pachydermatis (b) Sarcoptes scabiei var. canis
(c) Staphylococcus intermedius (d) Otodectes Cyanotis

134. Enrofloxacin is not used to treat bacterial infections in young animals as it is

(a) Ototoxic (b) Nephrotoxic
(c) Neurotoxic (d) Chondrotoxic

135. Which of the following is the smallest virus of animal origin

(a) Pox virus (b) FMD virus
(c) Blue tongue virus (d) Corona virus

136. **The amount of IgG that a neonatal calf receives through colostrum should be equal to**
(a) 50 gm /45 kg body wt. of calf (b) 100 gm /45 kg body wt. of calf
(c) 75 gm /45 kg body wt. of calf (d) 150 gm /45 kg body wt. of calf

137. **For the treatment of Babesiosis in cattle, the dose of Diminazine is-**
(a) 8 mg/kg body wt. (b) 12 mg/kg body wt.
(c) 10 mg/kg body wt. (d) 15 mg/kg body wt.

138. **For the treatment of trypanosomiasis (surr(a) in pig, camel and buffalo, the curative dose of antrycide (Quinupramine sulfate) is-**
(a) 4 mg/kg body wt. (b) 10 mg/kg body wt.
(c) 8 mg/kg body wt. (d) 15 mg/kg body wt.

139. **Hydatidosis is caused due to intermediate stage of which of the following parasites**
(a) Taenia solium (b) Moniezia sp
(c) Echinococcus granulosus (d) Tenia multiceps

140. **Permissible upper limit of arsenic in drinking water of livestock in mg/liter is-**
(a) 0.8 (b) 0.6
(c) 0.4 (d) 0.2

141. **For how much time water should be boiled to destroy microorganisms and to make the dissolved impurities harmless-**
(a) 15 to 20 minutes (b) 5 minutes
(c) 7 minutes (d) 10 minutes

142. **Which chemical is used for removing suspended impurities in water-**
(a) Potassium Permanganate (b) Chlorine
(c) Bleaching powder (d) Alum

143. **Mannitol is contraindicated in dogs suffering from congestive heart failure because it**
(a) Increases blood volume and precipitates pulmonary edema
(b) Causes hypovolemia with excess excretion of Na^+, K^+, and Cl^- ions
(c) Both Increases blood volume and precipitates pulmonary edema & Causes hypovolemia with excess excretion of Na^+, K^+ and Cl^- ions
(d) None of the above

144. **Tamoxifen is an antiestrogen used mainly in the treatment of**
(a) Mammary gland carcinoma in bitches (b) Horn cancer in bullocks
(c) Reduced libido in males (d) None of these

145. **The dose rate at which urea is lethal for starved cattle is**
(a) 1 - 1.5 g / kg b.wt (b) 0.22 - 0.30 g / kg b.wt
(c) 0.33 - 0.44 g / kg b.wt (d) None of the above

146. **The effect of radiation on biological material is measured in**
(a) Curie (b) Rem
(c) Rad (d) Decibel

147. **Fertilized ovum immediately starts dividing into series of mitosis by a process called-**
(a) Blastulation (b) Cleavage
(c) Gastrulation (d) Neurulation

148. **Goitrogens are usually found in which of the following feed ingredient-**
(a) Groundnut Cake (b) Soybean Cake
(c) Mustard Cake (d) Cotton seed cake

149. **Testicular hypoplasia a condition in buffalo bull is-**
(a) Acquired (b) Congenital
(c) Hereditary (d) Environmental

☆☆☆

Answer Key

1. 60 to 90%
2. Lucerne
3. 0.0% (Note: DCP% of wheat straw is zero &DCP% of Paddy straw is 0.2%)
4. All of these
5. 3-5 litre
6. Carbohydrates
7. Dog
8. All of these
9. More than 20% Crude protein and less than 18% crude fiber
10. More than 18%
11. Vita.E deficiency
12. Co-dominance
13. Robert Bakewell
14. Pleiotropy
15. Sheep
16. In- cross breeding
17. East Africa
18. Both a & b
19. Zero
20. All of these
21. Phenotypic Value
22. Indigenous Pig
23. All the above
24. Vechur
25. 12 Months
26. 1:40
27. Pig
28. 10%
29. 20-24 inch
30. All the above
31. Riverine Camel
32. German Angora (Note: Rabbit breeds are Soviet chinchilla, New Zealand white, Greygiant, Whitegiant, Angor(a)Angora breeds have four strains namely German, British, Russian &British-Russian. Among these, German strain is best fur producer.
33. 8 Weeks
34. Yak
35. 1st day
36. 300 eggs per year
37. All of these
38. All of these
39. From Youngest to oldest birds
40. Increasing light
41. All of these
42. 5 cm
43. White Leghorn
44. Broodiness

45. Deep litter
46. Burfi
47. Sweetened dahi
48. 3%
49. Rabri
50. 5-10°C
51. Gritty
52. Aluminum/Stainless steel vessels
53. Large Sized fat globules
54. Prevent Fat Separation during Ageing
55. 5.0
56. 45°
57. None of these
58. Unhygienic
59. Heparin
60. More in Pigs than Sheep
61. Exhibits
62. How to think
63. Heterogeneous
64. 2000
65. 1979
66. All of these
67. PRA
68. 1953
69. Five inter-related steps
70. Coccygeal
71. Os-cordis
72. Stifle
73. Skeletal muscles
74. Spleen
75. Meiosis
76. Cleavage
77. All the above
78. Galactopoiesis
79. Abomasum
80. Parabronchi
81. K^+ (Potassium ion)
82. Both a & b
83. Low PO_2 in atmosphere
84. Theileria infection
85. Abrus precatorius poisoning
86. Lantana camara
87. Amprolium (Note:- Acriflavine is a topical antisepti(c)
88. Restriction endonuclease
89. Transformation Note: (1) Transduction-transfer of genetic material from one bacterium to another by a bacteriophage. (2) Conjugation- transfer of genetic material between two bacterial cells in direct contact

90. Kary Mullis(Note: Watson and Crick- DNA double helical model; Kohler and Milstein- Monoclonal antibodies)
91. Endotheliochorial
92. Trichomonas fetus
93. Mare
94. 0.5 - 1 hr
95. Two doses of $PGF_{2\alpha}$ at 11 days interval
96. Oligozoospermia
97. Leydig cells
98. Cow bull
99. Refractoriness (It is the period after orgasm/sexual climax is also known as Refractory period)
100. All the above
101. Gelatin
102. Poultry meat
103. 1962
104. Potassium dichromate
105. Staphylococcus Hyicus
106. Erythritol
107. Z-N stain
108. Endemic
109. 0, 3rd,7th,14th,28th& 90th day
110. Prevention of Cruelty to Animals Act 1960
111. Head and neck
112. Marek's disease
113. Distichiasis
114. Typhlectomy
115. Urethrostomy
116. Long scale contrast
117. Intussusception
118. Motor Paralysis of eyelids
119. Comped in front
120. Grade - 4
121. Tendon repair
122. Paralysis and muscular atrophy
123. Thomas A. Edison in 1896
124. Reflection of ultrasound waves
125. Strangulated hernia
126. Bovines
127. Scattered radiation
128. Formalin
129. Right side down
130. All of these
131. Whole blood
132. Dermatophytosis
133. Malassezia pachydermatis
134. Chondrotoxic
135. FMD virus
136. 100 gm /45 kg body wt. of calf
137. 12 mg/kg body wt.
138. 4 mg/kg body wt.
139. Echinococcus granulosus
140. 0.2
141. 15 to 20 minutes
142. Alum
143. Both Increases blood volume and precipitates pulmonary edema & Causes hypovolemia with excess excretion of Na^+, K^+ and Cl^- ions
144. Mammary gland carcinoma in bitches
145. 1 - 1.5 g / kg b.wt
146. Rad
147. Cleavage
148. Mustard Cake
149. Congenital (Note: Testicular hypoplasia is a congenital defect in which the potential for development of the spermatogenic epithelium is lacking, occurs in all farm animals particularly in bulls of several breeds.)

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ICAR-JRF
Memory Based Exam Paper-2015

1. **Which of the following number system is commonly used in modern day computers**
   (a) Hexadecimal (b) Octal system
   (c) Decimal (d) Binary
2. **The observed value of a trait measured on an individual is known as**
   (a) Genotypic value (b) Phenotypic value
   (c) Breeding value (d) None
3. **If correlation coefficient of full-sib is 0.2, then heritability of a trait**
   (a) 0.2 (b) 0.4
   (c) 0.6 (d) 0.8
4. **Mating between two different inbred lines derived from the same breed is known as**
   (a) Outcrossing (b) Cross breeding
   (c) In-crossing (d) In cross breeding
5. **When repeatability of a trait is low, how many measurements is made to increase the genetic gain of the trait**
   (a) One (b) Two
   (c) Three (d) Four
6. **The significance of two variances is tested by which test**
   (a) t-test (b) F-test
   (c) Chi-square test (d) Z-test
7. **Which of the following statement is/are true about intangible variations-**
   (a) These are non-genetic variation (b) Variations whose cause is unknown
   (c) Cannot be eliminated by experimental design (d) All the above
8. **In which generation, thegenetic proportion of pure breed attain 87.5% during upgrading-**
   (a) 5^{th} (b) 3^{rd}
   (c) 6^{th} (d) 8^{th}
9. **Family selection is followed, when the heritability of the trait is**
   (a) Low (b) High
   (c) Medium (d) None
10. **For the construction of selection index, which parameter is not necessary-**
    (a) Phenotypic variance (b) Repeatability
    (c) Genotypic variance (d) Economic value
11. **Synthesis of polypeptide sequence in the order of**
    (a) DNA,mRNA,tRNA,amino acid (b) tRNA,mRNA,DNA,amino acid
    (c) mRNA,DNA,tRNA,amino acid (d) None
12. **In Recurrent Reciprocal selection which of the following is not involved**
    (a) General combining ability (b) Inbred line
    (c) Specific combining ability (d) Heterozygosity
13. **If AA=15 and aa=5, then which of the following is true about complete dominance-**
    (a) Aa = 15 (b) Aa = 10
    (c) Aa = 20 (d) Aa = 25
14. **While calculating selection intensity, selection differential is standardized to**
    (a) Genotypic standard deviation (b) Environmental standard deviation
    (c) Phenotypic standard deviation (d) None

15. **ONBS is effective when**
(a) PT available in the field (b) MOET available in the field
(c) AI is available in field (d) ETT is available in field

16. **Extrachromosomal DNA mostly present in bacteria is-**
(a) Centrosome (b) Plasmid
(c) Lysozyme (d) Ribosome

17. **Inbreeding increases-**
(a) Homozygosity (b) Heterozygosity
(c) Both (d) None

18. **The mating of animals from different established breeds**
(a) Cross breeding (b) Out crossing
(c) Species hybridization (d) Top crossing

19. **When a female calf is twin with male calf condition is known as**
(a) Buller (b) Free-martin
(c) Nymphomanic (d) None

20. **Ex-situ conservation means**
(a) Live animal (b) Semen
(c) Live tissue (d) Semen, livetissue and embryo

21. **Inter-allelic interaction is**
(a) Dominance (b) Epistasis
(c) Incomplete dominance (d) Co-dominance

22. **F_2 Phenotype ratio of Duplicate gene action is-**
(a) 9:3:4 (b) 15:1
(c) 12:3:1 (d) 9:6:1

23. **The percentage of individuals with a given genotype that expresses the expected phenotype is known as-**
(a) Penetrance (b) Dominant
(c) Expressivity (d) Epistasis

24. **'A' blood group individual has**
(a) Antigen A (b) Antigen B
(c) Antigen A & B (d) None

25. **2N-2 chromosomal condition is indicative of**
(a) Monosomy (b) Nullisomy
(c) Trisomy (d) Tetrasomy

26. **Polyploidy is induced by chemical**
(a) Nitrous oxide (b) Colchicine
(c) Chloroform (d) All the above

27. **Two genes of two different traits which are located on the same chromosome are known as-**
(a) Linked genes (b) Allele
(c) Mutated gene (d) Multiple alleles

28. **In case of sex-linkedinheritance, female will get characters from**
(a) Father only (b) Mother only
(c) Either Father or Mother (d) None

29. **Gene frequency is not changed in case of**
(a) Cross breeding (b) Out crossing
(c) Inbreeding (d) Top crossing

30. **Sudden heritable change in the genetic constitution of an animal is known as-**
(a) Mutation (b) Migration
(c) Selection (d) None

31. **Environmental correlation arising from-**
(a) Different environment shared by two characters
(b) Common environment shared by two characters
(c) Does not depend on environment
(d) None of the above

32. **Selection is most effective when gene frequency is**
(a) High (b) Intermediate
(c) Low (d) None

33. **Sex-linked inheritance follow a pattern of**
(a) Criss cross inheritance (b) Non criss-crossinheritance
(c) Both (d) None

34. **Parameter used to make culling decision-**
(a) Heritability (b) Repeatability
(c) Correlation (d) Regression

35. **Regression of breeding value on phenotypic value**
(a) Breeding value (b) Repeatability
(c) Heritability (d) None

36. **Which method of heritability estimate is best, when the population is free from environmental deviation**
(a) Paternal half-sib correlation (b) Maternal half-sib correlation
(b) Full-sib (d) Regression of offspring on sire

37. **Genetic correlation is caused by**
(a) Pleiotropy (b) Linkage
(c) Heterozygosity (d) All the above

38. **Panmixia means**
(a) Inbreeding (b) Outbreeding
(c) Random mating (d) Cross breeding

39. **The ratio of response to selection to the selection differential is**
(a) Breeding value (b) Repeatability
(c) Realized Heritability (d) None

40. **The crossing of a number of inbred lines in all possible combination is known as**
(a) Four-waycrossing (b) Out crossing
(c) Diallel cross (d) Four-way rotational crossing

41. **Coefficient of relationship during half-sib mating is**
(a) 25% (b) 50%
(c) 75% (d) 100%

42. **Best crop for silage making is**
(a) Berseem (b) Jowar
(c) Maize (d) Cowpea

43. **pH of very-good silage should be**
(a) 4.0 (b) 5.5
(c) 4.5 (d) 6.0

44. **Goose stepping gait in pigs is due to deficiency of**
(a) Thiamine (b) Riboflavin
(c) Pantothenic acid (d) Niacin

45. **Crazy chick disease is due to deficiency of**
(a) Vita.A (b) Vita.D
(c) Vita.E (d) Vita.K

46. **Metabolic water produced from Carbohydrate is**
(a) 40% (b) 60%
(c) 80% (d) 100%

47. **Metabolic faecal nitrogen depends on**
(a) Crude protein (b) Metabolizable energy
(c) Dry matter intake (d) None

48. **Energy requirement for Cattle in India is calculated as**
(a) CP (b) ME
(c) TDN (d) DE

49. **Feed stuff containing more than 18% crude fiber is classified as**
(a) Concentrates (b) Roughages
(c) Oil cakes (d) Cereals

50. **Antinutritional factor Gossypol is present in**
(a) GNC (b) Cotton seed meal
(c) Soybean meal (d) Til cake

51. **Digestible crude protein content high in**
(a) GNC (b) Cotton seed meal
(c) Coconut oil cake (d) mustard oil cake

52. **In poultry, energy requirement is calculated as**
(a) NE (b) ME
(c) TDN (d) DE

53. **When fat content of ruminant ration is increased beyond 10% then it would lead to-**
(a) Increase fiberdigestion (b) Increase protein digestion
(c) Decrease fiber digestion (d) Decrease protein digestion

54. **Crude protein content high in**
(a) Jowar (b) Sugarcane tops
(c) Berseem (d) Maize

55. **DCP content of wheat straw is**
(a) Nil (b) 1%
(c) 2% (d) 3%

56. **Best leguminous hay is-**
(a) Lucerne hay (b) Guinea grass hay
(c) Berseem hay (d) Oats hay

57. **Which of the following ingredient has high aflatoxin**
(a) GNC (b) Sesamemeal
(c) Coconut oil cake (d) Maize

58. **Live culture of beneficial strains bacteria is**
(a) Prebiotic (b) Probiotic
(c) Synbiotic (d) Antibiotic

59. **Cow dung is used for production of**
(a) Yeast (b) Fish
(c) Yeast and fish (d) Neither yeast nor fish

60. **Crude protein content of feed is estimated by**
(a) Soxhlet method (b) Kjeldahlmethod
(c) By difference (d) None

61. **Selenium is an integral part of which of the following enzyme**
(a) Glutathione peroxidase (b) Enolase
(c) Ascorbic acid oxidase (d) Phosphatase

62. **Essential mineral for wool growth**
(a) Magnesium (b) Manganese
(c) Zinc (d) Sulphur

63. **Milk fat in ruminant is synthesized from-**
(a) Glucose (b) Acetate
(c) Propionate (d) Butyrate

64. **1 Kg of TDN is equivalent to(Kcal) of metabolic energy**
(a) 4.5 Kcal (b) 3.6 Kcal
(c) 5.2 Kcal (d) 4.0 Kcal

65. **Stiff lamb disease is caused by the deficiency of-**
(a) Vita.A (b) Vita.D
(c) Vita.E (d) Vita.K

66. **Quality of protein is not considered in**
(a) Cattle (b) Pig
(c) Poultry (d) Horse

67. **Best milch breed of India**
(a) Sahiwal (b) Red Sindhi
(c) Tharparkar (d) Haryana

68. **Lifespan of cattle**
(a) 15-20 yrs (b) 25-30 yrs
(c) 30-35 yrs (d) 35-40 yrs

69. **Nagori is a**
(a) Milch breed (b) Dual purpose breed
(c) Draught breed (d) None

70. **A cow always in heat is known as**
(a) Buller (b) Free martin
(c) Anestrous (d) None

71. **Roman nose and Leaf like ear is a characteristic of a**
(a) Jamunapari (b) Barbari
(c) Beetal (d) Mehsana

72. **Which of the following is spontaneous ovulatory**
(a) Camel (b) Cat
(c) Rabbit (d) Cow

73. **Copper colour body coat is a characteristic of which buffalo breed**
(a) Nili-Ravi (b) Bhadawari
(c) Kundi (d) Murrah

74. **Covered area as compared to open area in the loose housing system is-**
(a) One-half (b) One-third
(c) One fourth (d) One fifth

75. **In buffalo normal milk fat%**
(a) 4% (b) 7%
(c) 10% (d) 13%

76. **Colostrum feeding based on body weight**
(a) $1/10^{th}$ (b) $1/15^{th}$
(c) $1/20^{th}$ (d) $1/25^{th}$

77. **Length of oestrus cycle of cattle is-**
(a) 21 hours (b) 21 days
(c) 17 days (d) 17 hours

78. **Which of the following buffalo breed has highest Fat %**
(a) Nili-Ravi (b) Bhadawari
(c) Kundi (d) Murrah

79. **Origin of Mehsana**
(a) Haryana (b) U.P
(c) Gujarat (d) Punjab

80. **Vechur is a**
(a) Small breed (b) Intermediate breed
(c) Large breed (d) None

81. **Black Bengal is famous for**
(a) Meat (b) Skin
(c) Twinning (d) Meat, Skin and twinning

82. **Major cause of calf mortality is-**
(a) FMD (b) Calf scour
(c) Pneumonia (d) None

83. **Chemical caustic potash is used for**
(a) Castration (b) Weaning
(c) Breeding (d) Dehorning

84. **Number of permanent teeth in sheep**
(a) 32 (b) 34
(c) 36 (d) 38

85. **Gestation period of pig**
(a) 110 days (b) 114 days
(c) 120 days (d) 125 days

86. **The place where dogs are kept-**
(a) Shed (b) Herd
(c) Kennel (d) Pack

87. **In case of ewe, feeding of extra grains 2-3 weeks prior to the breeding season is known as**
(a) Steaming up (b) Challange feeding
(c) Flushing (d) None

88. **Pashmina producing goat**
(a) Chegu (b) Changthangi
(c) Kutchi (d) Both a & b

89. **Which of the following disinfectant is used for the treatment of navel cord in calf-**
(a) $KmnO_4$ (b) Tincture iodine
(c) Formaline (d) Phenyl

90. **Why early weaning is difficult in case of buffalo calf-**
(a) Due to low maternal instinct (b) Due to medium maternal instinct
(c) Due to high maternal instinct (d) Due to agnostic behavior

91. **Milk queen of goat world**
(a) Anglo-Nubian (b) Alpine
(c) Angora (d) Saanen

92. **Cannibalism is generally seen in**
(a) Horse (b) Cattle
(c) Pig (d) Poultry

93. **Testes temperature is————(less or more) as compared to body temperature is**
(a) 1-2°C less (b) 1-2°F more
(c) 1-2°C more (d) 4-5°C less

94. **Which of the following is a venereal disease-**
(a) Vibriosis (b) Fowl pox
(c) Gumboro disease (d) FMD

95. **Sanitary and Phytosanitary Measures ("SPS-Agreement") of WTO is meant for-**
(a) Animal health (b) Plant health
(c) Food safety (d) All the above

96. **For blood clotting which mineral is essential**
(a) Ca (b) Mg
(c) Mn (d) Cu

97. **Master endocrine gland is-**
(a) Adrenal gland (b) Pituitary gland
(c) Parathyroid (d) None

98. **ADH deficiency leads to**
(a) Diabetes mellitus (b) Diabetes insipidus
(c) Goitre (d) None

99. **Spermatozoa is produced from**
(a) Seminiferous tubule (b) Sertoli cells
(c) Leydig cells (d) None

100. **Respiratory volume and intensity is measured by**
(a) Spirometer (b) Pulse oximeter
(c) Sphygmomanometer (d) Anemometer

101. **Development of mammary gland alveolar system is under influence of**
(a) Prolactin (b) Estrogen
(c) Progesterone (d) Prostaglandin

102. **Secretion of ADH hormone is inhibited by-**
(a) Nicotine (b) Morphine
(c) Stress (d) Alcohol

103. **Which of the following gland secretion is alkaline; helps to neutralize the acidity of the vaginal tract & protecting the sperm cells-**
(a) Prostate (b) Vas-deference
(c) Epididymis (d) Seminal vesicle

104. **Which of the following is the function of estrogen hormone**
(a) Secondary sexual character (b) Sex hormone
(c) Mammary gland duct system development (d) All the above

105. **Which of the following has fibrin**
(a) Serum (b) Plasma
(c) Platelet (d) Clot

106. **For sperm cell energy is produced by mitochondria is located at**
(a) Tail (b) Midpiece
(c) Head (d) Neck

107. **Pasteurization efficiency of milk is tested by-**
(a) Phosphatase test (b) Picric acid test
(c) Hansa test (d) COB test

108. **Which of the following is the volumetric method for determination of milk and cream fat percentage-?**
(a) Wast fall balance (b) Gerber's method
(c) soxhlet method (d) Babcock's method

109. **HTST pasteurization**
(a) Kills 99.99% of bacteria (b) Kills 69.99% of bacteria
(c) Kills 50% of bacteria (d) Kills 0% of bacteria

110. **Casein contribute how much percentage of milk protein**
(a) 60 % (b) 70 %
(c) 80 % (d) 90 %

111. **Fat globule size of homogenized milk**
(a) 5 micron (b) 2 micron
(c) 3 micron (d) 6 micron

112. Double toned milk containing fat percentage-

(a) 3 %
(b) 1.5 %
(c) 4.5 %
(d) 6 %

113. Refractive index of milk

(a) 1.31
(b) 1.32
(c) 1.33
(d) 1.34

114. Khoa prepared from cow milk has fat % of

(a) 25 %
(b) 15 %
(c) 30 %
(d) 50%

115. Hydroxy proline cotent of animal body indicates

(a) Collagen
(b) Elastin
(c) Keratin
(d) Myofibrillar protein

116. Which of the following vitamin is absent in meat

(a) Vita.A
(b) Vita.B complex
(c) Vita.C
(d) Vita.D

117. Bright red colour of meat is due to

(a) Nitrosomyoglobin
(b) Oxymyoglobin
(c) Metmyoglobin
(d) None

118. Which of the following meat has highest crude protein content?

(a) Carabeef
(b) Beef
(c) Pork
(d) Rabbit

119. Pork has high amount of which vitamin

(a) Niacin
(b) Riboflavin
(c) Thiamine
(d) Biotin

120. Communication is a

(a) Process
(b) Method
(c) Technique
(d) None

121. Function of the extension worker is to create a

(a) Teaching environment
(b) Learning situation
(c) Planning situation
(d) None

122. Fourth generation audio-visual aid

(a) Computer
(b) Poster
(c) Chalk
(d) None of the above

123. Farmer's farming two enterprises, which are competitive to each other is called as

(a) Joint farming
(b) Complementary farming
(c) Competitive farming
(d) None

124. Which method of farming system has more risk

(a) Specializedfarming
(b) Dry farming
(c) Mixed farming
(d) Diversified farming

125. Growing of A sustainable land management system in which forestry trees are grown along with arable crops is known as-

(a) Silvipasture
(b) Mixed farming
(c) Agroforestry
(d) Dry farming

126. The last step of extension teaching is-

(a) Attention
(b) Conviction
(c) Desire
(d) Satisfaction

127. Egg shell formation in poutry

(a) 25 hours
(b) 2 hours
(c) 20 min
(d) 10 hours

128. **CP% of layer ration**
(a) 10-12 %
(b) 16-18 %
(c) 20-22 %
(d) 22-24%

129. **Light intensity require for the inspection & packing point in abattoir**
(a) 550 Lux
(b) 110 Lux
(c) 220 Lux
(d) 440 Lux

130. **In animals fertilization occurs in**
(a) Ampulla
(b) Infundibulum
(c) Isthmus
(d) Uterus

131. **In Poultry, Marek's disease vaccination should be done at the age of**
(a) 1day old
(b) 3rd day
(c) 4thday
(d) 5th day

132. **IBD or Gumboro decreases immunity by destroying**
(a) B-cells
(b) T-cells
(c) Both
(d) None

133. **Ground meat product which is generally used as filling for burger roll or sandwich**
(a) Luncheon meat
(b) Meat patties
(c) Meat loaves
(d) Meat balls

134. **Best milk producer breed of buffalo in India-**
(a) Jaffarabadi
(b) Murrah
(c) Bhadawari
(d) Mehsana

135. **Poultry breed with purple colored comb, wattles & tongue is**
(a) Aseel
(b) Kadaknath
(c) Busra
(d) RIR

136. **Cholesterol content of 58g standard egg of poultry is-**
(a) 250 mg
(b) 100 mg
(c) 500 mg
(d) 750 mg

137. **Albumin is secreted by which part of oviduct-**
(a) Infundibulum
(b) Magnum
(c) uterus
(d) Isthmus

138. **Contribution of inorganic & organic matter in eggshell should be respectively-**
(a) 96% & 4%
(b) 90% & 10%
(c) 80% & 20%
(d) None

139. **Feed requirement for a layer per day is-**
(a) 110g
(b) 100g
(c) 120g
(d) 140g

140. **Haugh unit & yolk index of egg are respective measures of-**
(a) Albumin quality &Yolk quality
(b) Yolk quality & Albumin quality
(c) Shell thickness &Yolk quality
(d) Depth of air sac &Yolk quality

141. **Egg white injury factor is-**
(a) Avidin
(b) Biotin
(c) Vitamin C
(d) None

142. **To avoid selective feeding, best method of poultry feeding for commercial production is-**
(a) Whole grain feeding
(b) Pellet feeding
(c) All mash feeding
(d) Crumble feeding

143. **Method of pregnancy diagnosis in small ruminants (sheep & goat) is-**
(a) Rectal palpation
(b) Cuboni test
(c) Abdominal palpation
(d) Cocking of tail

144. Syndesmochorial placenta is generally present in-

(a) Cattle (b) Sow
(c) Mare (d) Bitch

145. Which of the following breed of buffalo is not fall under category of Murrah group-

(a) Nili-Ravi (b) Mehsana
(c) Godavari (d) Kundi

146. Biggest & most majestic breed of Indian goat is-

(a) Barbari (b) Black Bengal
(c) Jamunapari (d) Beetle

147. Temperature-time protocol for dehorning by Electrical dehorner should be

(a) 1000°C/10 min (b) 1000°F/10 sec
(c) 1000°F/10 min (d) 100°C/10sec

148. Average number of days between latest two successive calving dates for all cows in the herd is known as-

(a) Calving interval (b) Generation interval
(c) Calving index (d) Herd average

149. For controlling ectoparasite in sheep, which of the following method is used—

(a) Deworming (b) Weaning
(c) Dipping (d) Culling

150. Method used for controlling ectoparasites in winter season-

(a) Spraying (b) Hand bath
(c) Swim bath (d) Dusting

Match the following (151 to 160 questions)

151.

Animal	**Chromosome no**
1. Horse	(a) 54
2. Rabbit	(b) 60
3. Sheep	(c) 38
4. Goat	(d) 64
5. Cat	(e) 44

152.

Table-I	**Table-II**
1. Communication	(a) Cognition
2. Interpersonal communication	(b) Conation
3. Effective communication	(c) Process
4. Element of behavior "to know"	(d) Message
5. Behaviour after affection	(e) Receiver

153.

Table-I	**Table-II**
1. Systemic forces	(a) Permanent change in environment
2. Dispersive force	(b) Random mating
3. Panmixia	(c) Mutation
4. Dizygotic twins	(d) Random genetic drift
5. Repeatability	(e) Fraternal

154.

Disease	**Deficiency**
1. Megaloblastic anemia	(a) Phosphorus
2. Star-gazer condition	(b) Zinc
3. Swollen hock syndrome	(c) Thiamine
4. Fatty liver kidney syndrome	(d) Vitamin B_{12}
5. Pica	(e) Biotin

155. **Table-I**

1. Glucose
2. Starch
3. Tryptophan
4. Fat
5. Linoleic acid

Table-II

(a) Essential amino acid
(b) 2.25% more energy than carbohydrate
(c) Monosaccharide
(d) Essential fatty acid
(e) Polysaccharide

156. **Table-I**

1. Ham
2. Curd
3. Sausage
4. Paneer
5. Ghee

Table-II

(a) Rennet
(b) Clarified butter
(c) Lactobacillus
(d) Casings
(e) Cured meat

157. **Breed**

1. Toda
2. Nellore
3. Garole
4. Nili-Ravi
5. Chokla

Native tract

(a) Andhra Pradesh
(b) West Bengal
(c) Punjab
(d) Rajasthan
(e) Tamil Nadu

158. **Table-I**

1. Contagious disease
2. Congenital disease
3. Venereal disease
4. Deficiency disease
5. Metabolic disease

Table-II

(a) Milk fever
(b) FMD
(c) Rickets
(d) Trichomoniasis
(e) White heifer disease

159. **Table-I**

1. Angora
2. Changthangi
3. Jamunapari
4. Sahiwal
5. Saanen

Table-II

(a) Milk Queen
(b) Lola
(c) Mohair
(d) Pashmina
(e) Roman nose

160. **Table-I**

1. Hay
2. Silage
3. Trypsin inhibitor
4. Saponin
5. Gossypol

Table-II

(a) Cotton seed cake
(b) Soybean
(c) Lucerne
(d) Sun-dried forage
(e) Maize

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Answer Key

1. Binary
2. Phenotypic value
3. 0.4 (Note: For Full-sibs, $h^2 = 2t$, so heritability of trait is 0.4)
4. In-crossing (Note: Crossing of the two different inbred lines derived from different breeds is known as In-cross breeding)
5. Four
6. F-test
7. All the above
8. 3rd
9. Low (Note: 1. Progeny testing & Family selection are effective when heritability of the trait is low.2. Individual selection & Pedigree selection are effective when heritability of the trait is high.
10. Repeatability [Requirements to construct selection index are: (1) Economic value (2) Genetic and phenotypic variances of all traits (3) Phenotypic and Genotypic covariances among all traits]
11. DNA,mRNA,tRNA,amino acid
12. Inbred line (Note: Recurrent Reciprocal selection/RRS
13. Aa=15
14. Phenotypic standard deviation (Note: $S = i\acute{o}_p$;where i is the intensity of selection, $\acute{o}_p$ is the phenotypic standard deviation & S is selection differential)
15. MOET available in the field
16. Plasmid
17. Homozygosity
18. Cross breeding
19. Free-martin
20. Semen, live tissue and embryo
21. Epistasis
22. 15:1
23. Penetrance
24. Antigen A
25. Nullisomy
26. All the above (Colchicine is the best chemical for this purpose)
27. Linked genes
28. Either Father or Mother
29. Inbreeding
30. Mutation
31. Common environment shared by two characters
32. Intermediate (Note: Selection is most effective at intermediate gene frequencies& becomes least effective at high or low gene frequencies)
33. Both
34. Repeatability
35. Heritability

36. Paternal half-sib correlation (Note: Half sib correlation is best method for heritability estimation while Full sib correlation is least reliable method for heritability estimation)
37. All the above
38. Random mating
39. Realized Heritability (Note: Response to selection(R) = h^2 S; where h^2 is realized heritability, S is the selection differential)
40. Diallel cross
41. 25%
42. Maize
43. 4.0 (pH of very good silage is ranges from 3.7 to 4.2)
44. Pantothenic acid (It is also known asvitamin B_5)
45. Vita.E
46. 60%
47. Dry matter intake
48. TDN
49. Roughages
50. Cotton seed meal
51. GNC
52. ME
53. Decrease fiber digestion
54. Berseem
55. Nil
56. Lucerne hay
57. GNC
58. Probiotic
59. Yeast and fish
60. Kjeldahl method
61. Glutathione peroxidase
62. Sulphur
63. Acetate
64. 3.6 Kcal
65. Vita.E
66. Cattle (Quality of protein is not considered in ruminants)
67. Sahiwal
68. 15-20 yrs
69. Draught breed
70. Buller
71. Jamunapari
72. Cow (Note: Camel, Cat & Rabbit are reflexive ovulator or induced ovulator while others are spontaneous ovulator)
73. Bhadawari
74. One-half
75. 7%
76. 1/10th
77. 21 days
78. Bhadawari
79. Gujarat
80. Small breed(It is the Smallest cattle breed in the World & it's home tract is Kottayam,Kerala)
81. Meat,Skin and twinning
82. Pneumonia
83. Dehorning (Caustic potash/KOH)
84. 32
85. 114 days
86. Kennel
87. Flushing
88. Both a&b
89. Tincture iodine (Navel cord is detached to ½ inch from the body by sterilised scissors & 30% solution of tincture iodine is used as disinfectant)
90. Due to high maternal instinct
91. Saanen
92. Poultry
93. 4-5^{0}C less

94. Vibriosis (Disease transmitted by sexual intercourse is known as venereal disease)
95. All the above ("SPS-Agreement" concern with the application of food safety and animal and plant health regulations)
96. Ca
97. Pituitary gland
98. Diabetes insipidus
99. Seminiferous tubule
100. Spirometer
101. Progesterone
102. Alcohol
103. Prostate
104. All the above
105. Clot (Blood clot is a gel-like mass formed by platelets and fibrin in the blood to stop bleeding)
106. Mid piece
107. Phosphatase test
108. Gerber's method (Gerber's buyrometer & Babcock method are volumetric method of fat estimation while Soxhlet method is gravimetric method)
109. Kills 99.99% of bacteria
110. 80 %
111. 2 micron
112. 1.5 %
113. 1.34
114. 25 % (Khoa prepared from cow milk has 25% fat &while prepared from buffalo milk has 37% fat)
115. Collagen
116. Vita.C
117. Oxymyoglobin
118. Carabeef
119. Thiamine
120. Process
121. Learning situation
122. Computer
123. Competitive farming
124. Specializedfarming
125. Agroforestry
126. Satifaction
127. 25 hours
128. 16-18 %
129. 550 Lux
130. Ampulla
131. 1day old
132. B-cells
133. Meat patties
134. Murrah
135. Kadaknath
136. 250 mg
137. Magnum
138. 96% & 4%
139. 110g
140. Albumin quality &Yolk quality
141. Avidin
142. All mash feeding
143. Abdominal palpation
144. Cattle
145. Mehsana
146. Jamunapari
147. 1000^0F/10 sec
148. Calving index
149. Dipping
150. Dusting
151. 1-d, 2-e, 3-a, 4-b, 5-c
152. 1-c, 2-d, 3-e, 4-a, 5-b
153. 1-c, 2-d, 3-b, 4-e, 5-a
154. 1-d, 2-c, 3-b, 4-e, 5-a
155. 1-c, 2-e, 3-a, 4-b, 5-d
156. 1-e, 2-c, 3-d, 4-a, 5-b
157. 1-e, 2-a, 3-b, 4-c, 5-d
158. 1-b, 2-e, 3-d, 4-c, 5-a
159. 1-c, 2-d, 3-e, 4-b, 5-a
160. 1-d, 2-e, 3-b, 4-c, 5-a

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ICAR-JRF
Memory Based Exam Paper-2014

1. **The milk production (in million tones) of India in 2011-12**
   (a) 128 (b) 132
   (c) 140 (d) 150
2. **Buffalo breed of Southeast countries and China belongs to————————type.**
   (a) Mediterranean (b) Riverine
   (c) Swamp (d) All of above
3. **National Cattle Breeding Policy in India include-**
   (a) Grading up (b) Cross-breeding
   (c) Selective breeding (d) All the above
4. **The lactation phase of cattle and buffaloes with peak dry matter intake**
   (a) Early phase (b) Mid phase
   (c) Last phase (d) All of above
5. **The principal milk sugar present in milk is**
   (a) Sucrose (b) Lactose
   (c) Galactose (d) Maltose
6. **The optimum service time (in days) in cattle is**
   (a) 60 days post-parturient (b) 70 days post-parturient
   (c) 85 days post-parturient (d) 90 days post-parturient
7. **Which of the following phase of lactation has negative energy balance-**
   (a) Early phase (b) Mid phase
   (c) Last phase (d) None of above
8. **In hot dry climatic conditions, the long axis of dairy barn should be in————direction.**
   (a) East-west (b) North-south
   (c) North-east (d) South-west
9. **The covered area (in m^2) for a cow in loose housing is-**
   (a) 3.5 (b) 2.5
   (c) 7.0 (d) 5.0
10. **The per capita availability of milk (g/day) in India in 2011-12**
    (a) 180 (b) 290
    (c) 250 (d) 300
11. **The first post-partum secretion containing serum and antibodies, which provide passive immunity to newborn calves is known as-**
    (a) Meconium (b) Colostrum
    (c) Calf milk (d) Calf serum
12. **The most variable constituent of milk is**
    (a) Fat (b) Carbohydrates
    (c) Protein (d) Vitamins
13. **The maximum heat tolerance exotic breed of cattle is**
    (a) HF (b) Brown Swiss
    (c) Jersey (d) Guernsey
14. **The pH of fresh cow milk is**
    (a) 6.4-6.6 (b) 6.7-6.8
    (c) 6.8-7.0 (d) None of above

15. **80% protein portion of the milk is contributed by-**
(a) Casein protein (b) Whey proteins
(c) Serum proteins (d) Serine

16. **The heat coagulation of milk occurs due to**
(a) Destabilization of milk proteins (b) Renaturation of whey proteins
(c) Scaffolding of milk proteins (d) All of above

17. **The colostrum should feed to newborn calf within ————hours of birth for maximum absorption through intestine.**
(a) 1 hours (b) 6 hours
(c) 12 hours (d) 24 hours

18. **The body weight range of calves (in kg)**
(a) 25-30 (b) 28-35
(c) 33-39 (d) 38-45

19. **The size of fat globule in buffalo milk (in μ)**
(a) 5-10 (b) 15-20
(c) 25-30 (d) 35-40

20. **The even toed animals comes under**
(a) Perrisodactyla (b) Artiodactyla
(c) Tylopoda (d) None of above

21. **The mechanism of milking machine is-**
(a) Application of vacuum continuously
(b) Application of atmospheric pressure continuously
(c) Introduction of air and positive pressure continuously
(d) Application of vacuum and atmospheric pressure alternatively

22. **The secretion of sebaceous gland, which is alkaline in nature-**
(a) Suint (b) Lanolin
(c) Grease (d) Wool wax

23. **For conversion of tyrosine to melanin, enzymes requires which of the following metal ions**
(a) Cu (b) Mn
(c) Mg (d) Co

24. **The deficiency of iron causes which type of anemia**
(a) Normocytic normochromic anemia (b) Normocytic hypochromic anemia
(c) Microcytic hypochromic anemia (d) Macrocytic hypochromic anemia

25. **The Nitrogen: Sulphur ratio in ruminant ration should be-**
(a) 10:1 (b) 1:10
(c) 9:1 (d) 1:9

26. **The action of Potassium permanganate on lignin in proximate analysis work by**
(a) Oxidation (b) Reduction
(c) Ignition (d) Hydrolysis

27. **Sulphur hexafluoride (SF_6) tracer technique is used to measure**
(a) Metabolic energy of ruminants (b) Enteric methane emissions from ruminants
(c) Respiratory quotient (d) Heat of nutrient metabolism

28. **The estimation of fat conent of milk is by**
(a) Zeiss apparatus (b) Gerber method
(c) Hansa test (d) All of above

29. **Best crop for the preparation of silage is**
(a) Maize (b) Oat
(c) Barley (d) Lucerne

30. **The speed of computer processor is measure in terms of**
(a) Mbps (b) HTML
(c) htpp (d) All of above

31. **Most of the economic traits of animal follow**
(a) Binomial distribution (b) Normal distribution
(c) Poissons distribution (d) All of above

32. **The society is**
(a) Boundary (b) Organization
(c) Restriction (d) Culture

33. **The final pathway for oxidation of carbohydrate, protein and fat is-**
(a) Glycolysis (b) Krebs cycle
(c) HMP Shunt (d) None of the above

34. **IGFRI is located at**
(a) Agra (b) Varanasi
(c) Jhansi (d) Ludhiana

35. **1 Kg of organic material produces how much amount of microbial protein on ruminal digestion (in grams)-**
(a) 200 g (b) 250 g
(c) 300 g (d) 400 g

36. **The best method of milking practices in Indian scenario is**
(a) Full hand milking (b) Knuckling
(c) Stripping (d) Machine milking

37. **The Hinny is a cross of**
(a) Stallion × Jennet (b) Jack × Mare
(c) Mithun × Sire (d) All of above

38. **Organic livestock meat production does not include**
(a) Castration (b) Dehorning
(c) A.I. (d) Embryo transfer

39. **The conversion of spermatids into sperms is known as**
(a) Spermatogenesis (b) Spermiogenesis
(c) Spermiation (d) All of above

40. **In ruminants, how much percentage of dietary protein are degraded to ammonia in the rumen**
(a) 30 (b) 40
(c) 60 (d) 70

41. **The presence of needle teeth is a characteristic feature of which species**
(a) Porcine (b) Bovine
(c) Caprine (d) Ovine

42. **The piglet anemia occurs due to the deficiency of**
(a) Fe (b) Mg
(c) Mn (d) Co

43. **Freeze branding (a method of permanent identification of animals) causes-**
(a) Destruction of melanocytes & hair follicles
(b) Destruction of melanocytes
(c) Destruction of hair follicles
(d) Destruction of melanocytes without destroying the hair follicle

44. **The number of calving pens required at livestock farm is equals to**
(a) 10% of total stock (b) 10% of total breedable female stock
(c) 20% of total breedable female stock (d) 30% of total breedable female stock

45. **If the same trait repeated in the life of the same animal, then it is called as**
(a) Heritability (b) Repeatability
(c) Territoriality (d) All of above

46. **The mohair is obtained from-**
(a) Angora (b) Pashmina
(c) Judas (d) Chegu

47. **The hard dense mass structure in place of incisors in upper jaw of ruminant is-**
(a) Dental tartar (b) Dental caries
(c) Dental pad (d) Dental star

48. **The lowest edge of roof is kept at the structure known as**
(a) Pillar (b) Eaves
(c) Beam (d) None of above

49. **The gestation period of Sheep and Goat is around**
(a) 130 days (b) 150 days
(c) 175 days (d) 200 days

50. **The loose and brittle hair present in wool is known as-**
(a) Kemp (b) Ruffles
(c) Lanolin (d) Crackles

51. **The accessory building present in livestock farm is-**
(a) Quarantine shed (b) Isolation box
(c) Milking parlour (d) Calving box

52. **The collection of blood through intravenous route is possible in cattle through**
(a) Jugular vein (b) Cephalic vein
(c) Carotid arteries (d) None of above

53. **The amino acid, which firstly undergoes nitrogen assimilation-**
(a) Glutamate (b) Aspartate
(c) Lysine (d) Glycine

54. **In ruminant ration, By-Pass protein is the protein that**
(a) Does not undergoes ruminal degradation (b) Undergoes ruminal degradation
(c) Does not undergoes omasal degradation (d) None of the above

55. **The variance ratio is tested by**
(a) t-test (b) Z-test
(c) F-test (d) None of above

56. **If the number of observations is 16 and variance is 9, the what is a standard error?**
(a) 3/4 (b) 4/3
(c) 5/9 (d) 9/5

57. **The regression coefficient ranges from**
(a) -1 to +1 (b) $-\infty$ to $+\infty$
(c) 0 to 1 (d) None of above

58. **The simplest measures of dispersion is**
(a) Range (b) Standard deviation
(c) Standard error (d) Variance

59. **If the sense strand has the following sequence 5′CCCGGG′3, then its palindrome in the antisense strand is**
(a) 5′GGGCCC′3 (b) 5′CCCGGG′3
(c) 3′CCCGGG′5 (d) 3′GGGCCC′5

60. **In F2 generation of the dihybrid cross, the proportion of genotype having both alleles in heterozygous condition-**
(a) 4/16 (b) 2/16
(c) 1/16 (d) 9/16

61. **The anticodon is present in which type of RNA**
(a) m-RNA (b) t-RNA
(c) r-RNA (d) c-RNA

62. **The largest plan in dairy sector is**
(a) National Dairy Plan (b) Mass Infertility Campaign
(c) Ration Balancing Programme (d) All of these

63. **The dry matter requirement (in Kg) for maintenance of the Zebu cattle is-**
(a) 1Kg (b) 2 Kg
(c) 4Kg (d) 6Kg

64. **The total number of chromosomes in chicken-**
(a) 38 (b) 78
(c) 50 (d) 74

65. **The Ram (male sheep) sperm showing following chromosome pattern-**
(a) 27Y (b) 27X
(c) Either 27Y or 27X (d) 52+XY

66. **U.V. light affects the chromosomal structure of cell by**
(a) Thymine dimerization (b) Thymine scaffolding
(c) Thymine hydrolysis (d) Thymine stratification

67. **The percentage of individuals with a given genotype that expresses the expected phenotype is known as-**
(a) Epistasis (b) Expressivity
(c) Penetrance (d) Recessive

68. **A single sheet of paper containing preliminary information on certain aspect is-**
(a) Leaflet (b) Flash card
(c) Flash chart (d) Pamphlet

69. **Which of the following is a sense codon?**
(a) UAC (b) UAA
(c) UGA (d) UAG

70. **The decision to apply innovative technologies is known as-**
(a) Innovation (b) Adoption
(c) Trial (d) Awareness

71. **The silent heat is a characteristics feature of which of the following species**
(a) Sheep (b) Goat
(c) Buffalo (d) Pig

72. **In case of goat, the milk is stored mainly in-**
(a) Alveolus (b) Lobules
(c) Cisterns (d) None

73. **The aplastic anemia occurs due to dysfunctioning of**
(a) Spleen (b) Bone marrow
(c) Liver (d) Sternum

74. **The transferrin protein present in blood contains-**
(a) Fe (b) Co
(c) Mn (d) Ca

75. **Centers for the regulation of respiration are located in-**
(a) Medulla oblongata (b) Pons
(c) Cerebellum (d) Both a & b

76. **The dipping process in case of sheep is use to eradicate-**
(a) Ectoparasites (b) Endoparasites
(c) Both a&b (d) None of above

77. **Heterosis occurs due to**
(a) Additive gene action (b) Non-additive gene action
(c) Both a &b (d) None

78. **According to BIS, the moisture percentage in concentrates**
(a) 11 (b) 15
(c) 20 (d) 22

79. **The pigment nitroso-haemochromogen in meat will provide which of the following color**
(a) Brown (b) Pink
(c) Yellow (d) None of above

80. **In operation flood program, which of the following breed had played a major role?**
(a) Murrah (b) Red Sindhi
(c) Tharparkar (d) Surti

81. **IRMA is located at-**
(a) Anand (b) Izatnagar
(c) Guhawati (d) Ahmedabad

82. **In-situ or In-Sacco method of digestibility determination uses————————bags**
(a) Nylon (b) Dacron
(c) Teflon (d) Both a & b

83. **The example of community is**
(a) College (b) Town
(c) Village (d) None of above

84. **The mating between unrelated animals of the same breed is-**
(a) Inbreeding (b) Outcrossing
(c) Line-breeding (d) Cross breeding

85. **The tool for animal breeder is/are-**
(a) Selection (b) Mating System
(c) Both a & b (d) None of above

86. **The cooling of animal body after death**
(a) Rigor mortis (b) Algor mortis
(c) Both a & b (d) None of above

87. **Buffalo breed with sword shape horn is-**
(a) Jaffarabadi (b) Nagpuri
(c) Surti (d) Murrah

88. **Dry matter requirement of buffalo per day-**
(a) 2-2.5 Kg/100 Kg body wt. (b) 3.0-3.5 Kg/100 Kg body wt.
(b) 2.5-3.0 Kg/100 Kg body wt. (d) 3.5- 4.0 Kg/100 Kg body wt.

89. **The proximate principle that can be calculate indirectly-**
(a) Nitrogen free extract (b) Crude fat
(c) Crude protein (d) None

90. **The commercial chicks are developed by**
(a) Two-way crossing (b) Four-way crossing
(b) Three-way crossing (d) None of above

91. **The ratio of VFAs (Acetate: Propionate: Butyrat(e) production in the rumen-**
(a) 50:20:30 (b) 65:20:10
(c) 40:30:30 (d) None of above

92. **The international organization based on multilateral rules and regulations for the trade-**
(a) GATT (b) TRIPS
(c) CFTRI (d) FAO

93. **Which of the following animal is pseudo-ruminant-?**
(a) Camel (b) Vicuna
(c) Alpaca (d) All the above

94. **The most used animal by-products**
(a) Bone (b) Blood
(c) Wool (d) Hide

95. **The bioavailability of iron is maximum in the form of-**
(a) Ferric chloride (b) Ferric gluconate
(c) Ferrous fumarate (d) Ferrous sulfate

96. **The lignin is chemically**
(a) Polyphenols (b) Polysaccharides
(c) Phospholipids (d) None

97. **The amino acids are mostly in which nature**
(a) Alpha (b) Beta
(c) Gamma (d) None of above

98. **Energy requirement for cattle and buffaloes are express in terms of-**
(a) TDN (b) SE
(c) DE (d) ME

99. **If lipid content in the ruminant diet is increases above 10% then- *"**
(a) Activity of rumen microbes are reduced (b) The fermentation of fiber is retarded
(c) Feed intake fall (d) None

100. **The flushing is a routine practice done-**
(a) Before breeding season (b) After breeding season
(c) Both a & b (d) None

101. **The best method for sire evaluation is-**
(a) Dam daughter index (b) BLUP
(c) Equi-parent index (d) None

102. **The number of barr-bodies in case of Klinefelter syndrome-**
(a) 0 (b) 1
(c) 2 (d) 3

103. **The inbreeding depression causes**
(a) Expression of recessive gene (b) Expression of dominant gene
(c) Expression of both dominant and recessive gene (d) None of above

104. **To avoid selective feeding, the best method of poultry feeding for commercial production is-**
(a) Whole grain (b) All mash feeding
(c) Pellet feeding (d) Crumble feeding

105. **The freshness of meat with the change in dielectric properties can be detected by-**
(a) pH meter (b) Cathode ray tube
(c) Magnetron (d) None of above

106. **Faithful performance of all the elements of the communication process is known as-**
(a) Fidelity (b) Empathy
(c) Apathy (d) Feedback

107. **The largest amount of gas production in rumen is**
(a) CO_2 (b) CH_4
(c) VFA (d) None of above

108. The deficiency of which intermediate has effect on the kinetics of the TCA cycle
(a) Oxaloacetate (b) TCA
(c) Succinate (d) Glutamate

109. The Toned milk has the followingcomposition-

(a) 3% Fat, 8.5%SNF (b) 1 .5 % Fat, 9.0%SNF
(c) 3% Fat, 9.0%SNF (d) 1.5% Fat, 8.5%SNF

110. The teaser used for heat detection is-

(a) Vasectomized male (b) Intact male
(c) Castrated male (d) Tagged male

111. The wallowing is a feature of-

(a) Swine (b) Buffalo
(c) Both a & b (d) None

112. Heparin is obtained from-

(a) Lung (b) Liver
(c) Heart (d) All of above

113. Application of dry heat (700-800^{0}F) for 15-30 seconds that causing sudden expansion of grain which rupture the endosperm-

(a) Extrusion (b) Popping
(c) Seaming (d) All of above

114. The active form of Vitamin-D_3-

(a) 1, 25-dihydroxy cholecalciferol (b) Hydroxy cholecalciferol
(c) 1, 25-dihydroxy ergocalciferol (d) Hydroxy ergocalciferol

115. Inbreeding increases-

(a) Homozygosity (b) Heterozygosity
(c) Hemizygosity (d) None

116. Type of chromosome having equal arms-

(a) Acrocentric (b) Telocentric
(c) Submetacentric (d) Metacentric

117. The complete milking is possible with the help of

(a) Full hand milking (b) Machine milking
(c) Stripping (d) Knuckling

118. The Karan Swiss has combination of

(a) Brown Swiss × Sahiwal (b) Brown Swiss × Local breed
(c) Sahiwal × Frieswal (d) HF × Tharparkar

119. The freezing point of meat is

(a) –1 to –1.5°C (c) 1 to –1.5°C
(b) 1 to –0.5°C (d) –0.5 to –1.5°C

120. The drastic change in gene frequency of population can be done by-

(a) Selection (b) Migration
(c) Mutation (d) None of above

121. Haugh unit is used to determine the

(a) Internal quality of egg (b) External quality of egg
(c) Both a and b (d) None of the above

122. In case of Open Nucleus Breeding Scheme (ONBS), gene flows occurs from

(a) Nucleus herd to Multiplier (b) Multiplier to Nucleus herd
(c) Both a and b (d) None of above

123. The calf starter fed to the calf at the age of-

(a) 2 weeks (b) 4 weeks
(c) 3 weeks (d) 5 weeks

124. The ICDP was launched in which five-year plans

(a) 1st (b) 2nd
(c) 3rd (d) 4th

125. **The N.E. $_{Lactation}$ equals to-**
(a) 0.62 M.E. (b) 0.52 M.E.
(c) 0.72 M.E. (d) 1.12 M.E.

126. **The time of ovulation in cattle-**
(a) 12-14 hours after the end of estrus (b) 12-14 hours before the end of estrus
(c) 12-14 hours after the end of metestrus (d) 12-14 hours before the end of metestrus

127. **The cold sterilization is also known as**
(a) Radicidization (b) Pasteurisation
(c) Tyndallization (d) All of above

128. **The optimum dry period in dairy cows**
(a) 60 days (b) 90 days
(c) 120 days (d) 150 days

129. **The efficient converter of poor waste into product**
(a) Buffalo (b) Cattle
(c) Swine (d) Both a and c

130. **The individual ownership and collective operatorship is called as**
(a) Cooperation (b) Coordination
(c) Understanding (d) Enhancement

131. **The calorie: Protein ratio for broiler finisher ration is**
(a) 145:1 (b) 155:1
(c) 125:1 (d) 110:1

132. **The lower utilization of leaves protein in rumen is due to presence of**
(a) Condensed Tannins (b) Phytates
(c) Lignins (d) Cellulose

133. **The laying birds eat per day**
(a) 50 g (b) 75 g
(c) 110 g (d) 150 g

134. **Hay is-**
(a) Naturally dried legumes (b) Artificially dried concentrates
(c) Sun-dried forage (d) Sun-dried concentrate

135. **The red meat in comparison to poultry meat contains higher amount of**
(a) Energy (b) Cholesterol
(c) Unsaturated fatty acids (d) Both b&c

136. **The draught purpose breed is**
(a) Kangayam (b) Red Sindhi
(c) Tharparkar (d) Kankrej

137. **The temperature of sterilization of milk is**
(a) 108-111°C/25-30 minutes (b) 108-111°C/25-30 seconds
(c) 63-72°C/25-30 minutes (d) 63-72°C/25-30 seconds

138. **The in-vivo enzyme is**
(a) Cellulase (b) Synthase
(c) Both a and b (d) None of above

139. **The dressing percentage of goat is**
(a) 35-50 % (b) 65 %
(c) 70 % (d) All of above

140. **The antemortem examination after unloading should be done within**
(a) 12 hrs (b) 24 hrs
(c) 36 hrs (d) 48 hrs

141. The intensity of selection is done by male because
(a) Larger number of female is required for herd replacement
(b) Smaller number of female is required for herd replacement
(c) Both a and b
(d) None of above

142. The biological value of microbial protein is
(a) 80 (b) 88
(c) 98 (d) >100

143. Sheep are more susceptible to deficiency&toxicity of-
(a) Co and Cu (b) Mg and Mn
(c) Both a and b (d) None of above

144. According to ICAR, AFC (Age at first calving) for Murrah buffaloes is
(a) 30 months (b) 44 months
(c) 51 months (d) 60 months

145. The adulteration in meat is detected by-
(a) ELISA (b) AGID
(c) PCR (d) All the above

146. The colostrum should be fed to the calf at the rate of————% of body weight
(a) 10% (b) 15%
(c) 20% (d) 25%

147. The degradability of urea in the rumen is upto-
(a) 60% (b) 75%
(c) 90% (d) 100%

148. The farming system to increase production
(a) Integrated farming (b) Mixed farming
(c) Terrace farming (d) None of above

149. The pH of good silage is
(a) 3.5 to 4.2 (b) 4.2 to 4.5
(c) 4.8 to 5.6 (d) None of above

150. The temperature of liquid nitrogen is
(a) –196°C (b) –196°F
(c) –250°C (d) None of above

Match the following:

151.

TABLE-A	TABLE-B
(1) Karan Swiss	(a) Brown Swiss × Local breed
(2) Karan Fries	(b) Jersey × Red Sindhi
(3) Sunandini	(c) HF × Sahiwal
(4) Frieswal	(d) HF × Tharparkar
(5) Jersindh	(e) Brown Swiss × Sahiwal

152.

TABLE-A	TABLE-B
(1) Genetic correlation	(a) Galton
(2) Charles Darwin	(b) Sex chromatin
(3) Murray Barr	(c) Pleiotropy
(4) Eugenics	(d) Kornberg
(5) DNA polymerase	(e) Origin of species

153.

TABLE-A	TABLE-B
(1) Protein rich	(a) Sunn hemp
(2) Carbohydrate-rich	(b) Maize
(3) Silage	(c) Probiotics
(4) Dry legume	(d) Oilseeds
(5) Feed supplement	(e) Cereal grains

154. **TABLE-A**

(1) Horse
(2) Cattle
(3) Buffalo
(4) Sheep
(5) Goat

TABLE-B

(a) *Capra hircus*
(b) *Ovis aries*
(c) *Equus caballus*
(d) *Bos indicus*
(e) *Bubalus bubalis*

155. **TABLE-A**

(1) Diacetyl
(2) Channa
(3) Butter
(4) Cheese
(5) Annatoo

TABLE-B

(a) Cheddaring
(b) Flavoring agent
(c) Colouring agent
(d) Rasgolla
(e) Ghee

156. **TABLE-A**

(1) Zinc
(2) Vitamin B_1
(3) Ricin
(4) Vitamin E
(5) Vitamin B_2

TABLE-B

(a) Castor
(b) Curled toe paralysis
(c) Parakeratosis
(d) CCN
(e) Exudative diathesis in chicken

157. **TABLE-A**

(1) DPR
(2) IGFRI
(3) NRC on Yak
(4) NRC on Mithun
(5) NRC on Camel

TABLE-B

(a) Bikaner
(b) Dirang
(c) Jharnapani
(d) Jhansi
(e) Hyderabad

158. **TABLE-A**

(1) Milk protein
(2) Milk sugar
(3) Density of milk
(4) Platform test
(5) Milk ring test

TABLE-B

(a) Lactometer
(b) Casein
(c) Lactose
(d) Brucellosis
(e) COB

159. **TABLE-A**

(1) B. indicus
(2) B. taurus
(3) Candid gene
(4) Candling
(5) Fe dextran

TABLE-B

(a) Quality of egg
(b) TLR-4
(c) Piglet anemia
(d) Disease resistant
(e) Early puberty

160. **TABLE-A**

(1) Panchayati raj
(2) KVS
(3) Cooperative principles
(4) ITDP

TABLE-B

(a) Cattle breeding farm
(b) Rochadale
(c) Improvement of gene conservation
(d) B.R. Mehta

☆ ☆ ☆

Answer Key

1. 128
2. Swamp
3. All the above
4. Mid phase[Note: Cows will achieve peak milk production (6-8 weeks after parturition), feed intake is lagging and cows are usually losing weight & susceptible to negative energy balance. At the end of early lactation, peak dry matter intake (12-16 weeks after parturition) willbe achieve so that animal can compensate.]
5. Lactose
6. 85 days post-parturient
7. Early phase
8. East-west
9. 3.5
10. 290
11. Colostrum[Note: Three major types of immunoglobulins: IgG(80-90%), IgM(5-10% and IgA(5-10%) are typically found in the colostrum of dairy cattle]
12. Fat
13. Brown Swiss
14. 6.4-6.6
15. Casein protein
16. Destabilization of milk proteins
17. 1 hours(Note: The ability of the intestine to absorb antibodies decreases with the time after birth. It is highest within one hour of birth &then decreases continously. It decreases by 30–50 % within 6 hours of birth & stops completely 24 hours after birth. At 24 hours of age, digestive enzymes break down and digest all of the antibodies)
18. 25-30
19. 15-20
20. Artiodactyla
21. Application of vacuum and atmospheric pressure alternatively
22. suint [Note: Wool wax and suint are secretions from the sebaceous and sweat (suint) glands within the skin, which mingle, forming "yolk" in the follicle shafts, and coat the developing fibre. Linolin also called as wool wax or wool grease.Suint is highly alkaline in nature & also known as "sweat salts"]
23. Tyrosinase is a copper-containing enzyme present in animal tissues that catalyzes the production of melanin from tyrosine by oxidation.
24. Microcytic hypochromic anemia
25. 10:1
26. Oxidation
27. Enteric methane emissions from ruminants
28. Gerber method
29. Maize
30. Mbps (megabits per second)
31. Normal distribution
32. Organization
33. Krebs cycle/Citric acid cycle/Tricarboxylic acid (TCA) cycle
34. Jhansi [IGFRI-Indian Grassland and Fodder Research Institute, Jhansi (UP)]
35. 200 g [Note: 30 g microbial nitrogen (or about200 g microbial protein) synthesized per Kg of organic matter digested in rumen]
36. Full hand milking/Fisting
37. Stallion × Jennet

38. Embryo transfer
39. Spermiogenesis
40. 60 (Note: 40% of the true dietary protein escapes rumen digestion(by pass protein) while rest 60% of true dietary protein & 100% of dietary NPN are degraded entirely to ammonia in the rumen)
41. Porcine
42. Fe
43. Destruction of melanocytes without destroying the hair follicle [Note: Freeze branding/ Super-cold branding: It is the technique for permanent identification of cattle. It destroys the melanocytes (pigment-producing cells) in the skin of the animal without destroying the hair follicle.Therefore, when the hair regrows at the branding area, it is white in colour.Dry ice and alcohol are the most commonly used coolant for freeze branding iron. We can also use Liquid Nitrogen]
44. 10% of total breedable female stock
45. Repeatability
46. Angora
47. Dental pad
48. Eaves
49. 150 days
50. Kemp
51. Quarantine shed
52. Jugular vein
53. Glutamate
54. Does not undergoes ruminal degradation
55. F-test
56. 3/4 [Note: Std. error = Std. deviation/+N; Variance = (std.deviation)^2;Where N is the number of observations]
57. $-\infty$ to $+\infty$
58. Range
59. 3′GGGCCC′5 [Note: The literal meaning of palindrome is "ulta sidha ek saman" like-madam. A palindromic sequence is a nucleic acid sequence on double-stranded DNA or RNA wherein nucleotide sequence of one strand (5' to 3') is same as the nucleotide sequence of its complementary strand (3' to 5')]
60. 4/16 (RrYy)
61. t-RNA [Note: A codon is a three-base sequence (three nitrogen bases in a row) on mRNA while the anticodon region of a transfer RNA is a sequence of three bases that are complementary to a codon in the messenger RNA.]
62. National Dairy Plan
63. 1Kg
64. 78
65. Either 27Y or 27X (Note: Sperm and ovum are haploid cells so sperm has N number of chromosomes)
66. Thymine dimerization
67. Penetrance
68. Leaflet
69. UAC [Note: Nonsense codon/Stop codon/Termination codon-genetic code, which does not contribute to any amino acid, these are UAA, UGA & UAG.]
70. Adoption
71. Buffalo
72. Cisterns[Note: Proportion of Milk Stored in Cistern / Alveolus:-Goat-75:25, sheep:-50:50 , cattle:-30:70 , buffalo & camel :-5:95 , Sow:- 0:100
73. Bone marrow

74. Fe [Note: Ferritin & hemosiderin are storage form of iron while transferrin is the iron transpo protein in serum.Ceruloplasmin is the major copper-carrying protein in the blood.]
75. Both a & b
76. Ectoparasites
77. Non-additive gene action
78. 11
79. Pink
80. Murrah
81. Anand [Note: Institute of Rural Management (IRMA) is an autonomous institution located in Anand, Gujarat.]
82. Both a&b (In-situ/In-sacco/semi-in vivo technique: digestibility of feeds in the rumen can be determined by keeping the feed sample in the bag which is put in rumen by making fistula.The bag is made of nylon, dacron or silk cloth)
83. Village
84. Outcrossing
85. Both a&b
86. Algor mortis
87. Nagpuri (Note: Nagpuri &Pandharpuri both possess sword shape horn; both are from Maharashtra)
88. 2.5-3.0 Kg/100 Kg body wt.
89. Nitrogen free extract
90. Four-way crossing
91. 65:20:10
92. GATT
93. All the above
94. Hide
95. Ferrous sulfate
96. Polyphenols
97. Alpha
98. TDN
99. The fermentation of fiber is retarded
100. Before breeding season
101. BLUP
102. 1 [Note: Number of Barr body = No. of X-chromosome "1; In case of Klinefelter's syndrome (44+XXY), there are two X- chromosomes.]
103. Expression of recessive gene
104. All mash feeding
105. pH meter
106. Fidelity
107. CO_2
108. Oxaloacetate
109. 3% Fat, 8.5%SNF
110. Vasectomized male
111. Both a & b
112. Lung
113. Popping
114. 1, 25-dihydroxy cholecalciferol
115. Homozygosity
116. Metacentric
117. Stripping
118. Brown Swiss × Sahiwal

119. –0.5 to –1.5°C
120. Selection
121. Internal quality of egg (Note: Haugh unit is indicative of albumin quality of egg)
122. Both a and b [Note: (1) In case of CNBS, the gene flow is unidirectional from top to down herd i.e. Nucleus herd → Multiplier → Commercial/Village herd (2) In case of ONBS, the gene flow is bidirectional i.e. Nucleus herd → Multiplier → Village herd or its vice-versa]
123. 2 weeks
124. 3rd (ICDP initiated in 1965;3rd five year plan was from 1961 to 1966)
125. 0.62 M.E.
126. 12-14 hours after the end of estrus
127. Radicidization
128. 60 days
129. Both a and c
130. Cooperation
131. 145:1
132. Condensed Tannins [Note: In ruminants, protein requirement of animals cannot meet out by microbial protein. Therefore, it is essential to reduce the ruminal degradation of proteins. Tannins are phenolic compounds and divided into two groups: Condensed tannin (CT) and hydrolysable tannins. Condensed Tannins (CT) are organic protectants of protein in the ruminant ration. The high affinity of tannins for proteins is due to the presence of great number of phenolic groups. These provide many points at which bonding may occur with the carbonyl groups of peptides. CT form complexes with proteins that are stable over the pH range of 3.5–7.0, but dissociate in the abomasum (pH below 3.5)]
133. 110 g
134. Sun-dried forage
135. Both b&c
136. Kangayam
137. 108-111°C/25-30 minutes
138. Cellulase
139. 35-50 %
140. 24 hrs
141. Larger number of female is required for herd replacement
142. 80
143. Co and Cu
144. 44 months
145. All the above
146. 10%
147. 100%
148. Integrated farming
149. 4.2 to 4.5
150. –196°C
151. 1-e, 2-d, 3-a, 4-c, 5-b
152. 1-c, 2-e, 3-b, 4-a, 5-d
153. 1-d, 2-e, 3-b, 4-a, 5-c
154. 1-c, 2-d, 3-e, 4-b, 5-a
155. 1-b, 2-d, 3-e, 4-a, 5-c (Note: Cheddaring is a unique process in making Cheddar cheese)
156. 1-c, 2-d, 3-a, 4-e, 5-b
157. 1-e, 2-d, 3-b, 4-c, 5-a
158. 1-b, 2-c, 3-a, 4-e, 5-d
159. 1-d, 2-e, 3-b, 4-a, 5-c
160. 1-d, 2-c, 3-b, 4-e, 5-a

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RPSC Veterinary Officer Exam Paper-2013

1. **Which one of the following is not a milch breed of Cattle-**
   (a) Mewati (b) Red Sindhi
   (c) Tharparker (d) Sahiwal
2. **A teaser bull is maintained to**
   (a) Keep the herd moving (b) Protect weak animals
   (c) Inseminate cow (d) Detect heat
3. **Milk fat is easily separated from milk-**
   (a) Because it is lighter than other constituents (b) Because it is not uniformly mixed in milk
   (c) Because it has more specific gravity (d) Because it has less specific tension
4. **Dry matter percent of sheep milk is-**
   (a) 12.4 (b) 8.5
   (c) 19.3 (d) 10
5. **The toal time taken by a hen from ovulation until oviposition is-**
   (a) 16 17 hours (b) 19 20 hours
   (c) 23 25 hours (d) 28 30 hours
6. **For proper growth of the calf whole milk feeding is desired up to the age of-**
   (a) 30 days (b) 60 days
   (c) 90 days (d) 180 days
7. **Which of the following pair is not properly match**
   (a) Chick Brooder (b) Layer Deep Litte
   (c) Egg Incubator (d) Broiler Cage
8. **The State when animal becomes sexually mature**
   (a) Calving (b) Dry period
   (c) Service Period (d) Puberty
9. **Which basis of selection cannot be used for selection of sire for milk production?**
   (a) Performance of collateral relatives (b) Performance of ancestor
   (c) Performance of Progeny (d) Performance of individual
10. **What is genetic covariance between half-sibs**
    (a) $\frac{1}{4} V_A$ (b) $\frac{1}{2} V_A$
    (c) $\frac{3}{4} V_A$ (d) $\frac{1}{2} V_A + \frac{1}{4} V_D + V_{EC}$
11. **The regression of breeding value on phenotypic value is**
    (a) Repeatability (b) Phenotypic Correlation
    (c) Heritability (d) Genetic Correlation
12. **The buffalo breeds in India can be best improved by:**
    (a) Cross Breeding (b) Inbreeding
    (c) Selective Breeding (d) Random Breeding
13. **The ratio of selection differential to the phenotypic standard deviation of a trait is known as:**
    (a) Intensity of selection (b) Response to selection
    (c) Accuracy of selection (d) Limit of selection
14. **Which of following genetic parameter can be used to predict future performance of the same individual?**
    (a) Heritability estimate (broad sense) (b) Repeatability estimate
    (c) Heritability estimate (narrow sense) (d) Non-additive genetic variance
15. **Permanent genetic correlation between the traits is due to:**
    (a) Linkage (b) Pleiotropy
    (c) Heterozygosity (d) Homozygosity

16. **Which system of mating is used for the improvement of non descript animals**
(a) Grading up
(b) Criss- crossing
(c) Cross Breeding
(d) Selfing

17. **The CP and TDN contents in calf starter must be:**
(a) 12 15 % CP, 52% TDN
(b) 18 21% CP, 60 % TDN
(c) 15 18 % CP, 75%TDN
(d) 23 26 % CP, 75% TDN

18. **The volatile fatty acid mainly responsible for milk fat synthesis:**
(a) Butyric acid
(b) Propionic acid
(c) Acetic acid
(d) None of these

19. **In Very good silage the pH and Ammoniacal Nitrogen concentration of total nitrogen ranges between:**
(a) Above 4.8 pH Ammoniacal nitrogen above 20% of total nitrogen
(b) 4.5 4.8 pH and Ammoniacal nitrogen between 15 20% of total nitrogen
(c) 4.2 4.5 pH and Ammoniacal nitrogen between 10 15% of total nitrogen
(d) 3.5 4.2 pH and Ammoniacal nitrogen less than 10% of total nitrogen

20. **Lucerne and Berseem are:**
(a) Cereal fodder
(b) Leguminons fodder
(c) Zaid fodder
(d) None

21. **Glandular stomach of poultry is**
(a) Crop
(b) Proventriculus
(c) Gizzard
(d) Caeca

22. **In ruminant animals net gain of ATP from metabolism of one mole of the propionic acid obtained from carbohydrate breakdown is:**
(a) 17
(b) 34
(c) 16
(d) 0

23. **Straw and Stovers are:**
(a) Deficient in minerals
(b) Low in digestibility
(c) Poor in crude protein
(d) All of the above

24. **In the Process of Gluconeogenesis:**
(a) Glucose is formed from carbohydrate substrate
(b) Glucose is formed from other than carbohydrate substrate
(c) Glucose is formed from minerals
(d) Glucose is formed from minerals and vitamins

25. **During the post mortem infection of lungs, the following lymph node attached to it is examined:**
(a) Portal lymph node
(b) Mediastinal lymph node
(c) Mesenteric lymph node
(d) Retropharyngeal lymph node

26. **The spores of anthrax organisms are formed in presence of:**
(a) Oxygen
(b) Carbon monoxide
(c) Carbon dioxide
(d) Hydrogen peroxide

27. **The humidity of air is estimated by:**
(a) Simple thermometer
(b) Laboratory thermometer
(c) Kata thermometer
(d) Hygrometer

28. **The presence of detergent in milk is detected by adding:**
(a) Ether
(b) Acetic acid solution
(c) Hydrochloric acid
(d) Bromocresol purple solution

29. **The toxicity of copper in animals is enhanced by the low dietary level of:**
(a) Manganese
(b) Iron
(c) Magnesium
(d) Molybdenum

30. **The antidotefor nitrate toxicity in cattle is:**
(a) Methylene blue (b) Calcium disodium EDTA
(c) Sodium thiosulphate (d) Desferrioxamine

31. **The Antibiotic with a high degree of photosensitivity is:**
(a) Tetracycline (b) Gentamycin
(c) Ampicillin (d) Ceftizoxime

32. **An ideal antimicrobial agent should have:**
(a) Good oral bioavailability (b) Long shelf life
(c) Long elimination half-life (d) All of them

33. **Which one of the following staining methods is used for fungus demonstration:**
(a) Methylene blue stain (b) Gram's stain
(c) Periodic acid Schiff (d) Ziehl Neelsen stain

34. **Which one of the following pairs of etiological agent and disease condition is not correctly matched:**
(a) Clostridium chauvoei Black Leg
(b) Clostridium septicum Braxy
(c) Clostridium hemolyticum Bacillary hemoglobinuria
(d) Clostridium perfringens type C Enterotoxaemia

35. **On re immunisation with the same antigen, the levels of which of the following would rise steeply in the serum:**
(a) IgM (b) IgG
(c) IgA (d) Complement

36. **Which one of the following cell is an antigen presenting cell-?**
(a) Plasma cell (b) Natural killer cell
(c) T Lymphocyte (d) Dendritic cell

37. **Surra in animal is caused by-**
(a) Trypanosoma evansi (b) Trypanosoma equinum
(c) Trypanosoma brucei (d) Trypanosoma equiperdum

38. **An anemic, emaciated pup with the dry coat, passing watery mucus mixed with blood in the feces, shows infection of:**
(a) Toxascaris leonina (b) Toxocara canis
(c) Ancylostoma caninum (d) All of them

39. **Extensive nodule formation in both small and large intestines of the calf is caused by-**
(a) Chabertia ovina (b) Oesophagostomum radiatum
(c) Haemonchus contortus (d) Strongyloides papillosus

40. **Mange in Mammals is caused by-**
(a) Bacteria (b) Virus
(c) Mite (d) Tick

41. **The increase in the size of cells leading to increasing in size of the organ is known as-**
(a) Atrophy (b) Hyperplasia
(c) Hypertrophy (d) Metaplasia

42. **Which one of the following diseases is characterized by hemolytic anemia:**
(a) Babesiosis (b) Theileriosis
(c) Trypanosomiasis (d) Anaplasmosis

43. **Which type of nephritis is common in male dog-**
(a) Embolic nephritis (b) Pyelonephritis
(c) Interstitial nephritis (d) Glomerulonephritis

44. **Inflammation of gallbladder is called:**
(a) Cholangitis (b) Cholelithiasis
(c) Cholecystitis (d) Colitis

45. **The incidence of milk fever:**
(a) Increases with parity (b) May increase or decreases with parity
(c) Decreases with parity (d) Not related to parity

46. **Thiamine deficiency in goats may lead to:**
(a) Pica (b) Iodine deficiency
(c) Fatty liver syndrome (d) Polioencephalomalacia

47. **Persistent vomition is commonly seen in cases of:**
(a) Acidosis (b) Alkalosis
(c) Uremia (d) Shock

48. **In severe grain engorgement, the ruminal pH becomes:**
(a) 4 (b) 6
(c) 7.5 (d) 9

49. **Following infection of cattle, Dictyocaulus viviparous larvae reach the lungs via:**
(a) Intestine, portal vein, liver, heart, lung
(b) Intestine, abdominal cavity, liver, heart, lungs
(c) Intestine, lymphatics, mesenteric lymph node thoracic duct, heart, lungs
(d) Intestine, abdominal cavity, thoracic duct, heart, lungs

50. **Following are the diagnostic clinical signs in bovine theileriosis:**
(a) Haemoglobinuria (b) Fever and enlarged lymph node
(c) Diarrhoea (d) Chronic emaciation

51. **Spasm of masseter muscle leading to restriction of jaw muscle movements is seen in one of the following diseases:**
(a) Enterotoxaemia (b) Tetanus
(c) Botulism (d) Rabies

52. **A host in which causal agent is mechanically transferred without further development is referred as:**
(a) Link host (b) Amplifier host
(c) Primary host (d) Paratenic host

53. **The person selling the adulterated milk can be booked under the following IPC Section:**
(a) IPC 272 (b) IPC 273
(c) IPC 274 (d) IPC 275

54. **Common offenses against animals in India are:**
(a) Mischief (b) Cruelty against animals
(c) Bestiality (d) All of them

55. **Animal Welfare Organizations are:**
(a) Red Cross (b) Blue Cross
(c) Green Cross (d) All of them

56. **An expert witness can be given by:**
(a) Veterinary Compounder (b) Veterinary Pharmacist
(c) Veterinary Doctor (d) Livestock Owner

57. **The following instrument is used during rumenotomy operation:**
(a) Ferrier set (b) Postmortem set
(c) Weingarth set (d) Orthopedic set

58. **Surgical anaesthesia produced by combining two or more drugs or anaesthetic techniques are called:**
(a) Combination Anaesthesia (b) General Anaesthesia
(c) Basal Anaesthesia (d) Balanced Anaesthesia

59. **Which of the following drug is most potent sedative:**
(a) Acepromazine (b) Xylazine
(c) Detomidine (d) Diazepam

60. **In majority of cases the mandibular fracture of horizontal ramus in camels occur across the:**
(a) Incisors (b) Tushes
(c) Molars (d) Canines

61. **Which of the following statement is correct regarding teat fistula repair in a cow:**
(a) Epidural anaesthesia, debridement, lambert's sutures and teat cannulation
(b) Pudendal nerve block, debridement, overlapping mattress sutures and teat cannulation
(c) Ring block debridement, vertical mattress sutures, and teat cannulation
(d) None of these

62. **Which of the following group of surgical instruments are used in a specific operative procedure:**
(a) Weingarth set, osteotome, keratome, bistoury
(b) Bone cutter, bone rongeur, periosteal elevator, pin cutter
(c) Hoof Knife, hoof rasp, cortical screw, pin chuck
(d) Trephiner, K nail, Allis tissue forceps, Intestinal clamp

63. **Blepharospasm is:**
(a) Opacity of the lens (b) Inflammation of the eyelids
(c) Catarrhal conjunctivitis (d) Partial or Complete closure of eyelids

64. **One of the following steps signifies complete aseptic preparation of a proposed area for surgery:**
(a) Clipping, shaving, scrubbing with a surgical soap and paint the area with 2.5% povidone iodine
(b) Clipping, shaving and paint the area with surgical spirit
(c) Shaving and scrubbing the area with surgical soap
(d) None of these

65. **Peroneal tenotomy in the horse is indicated to correct:**
(a) Shivering (b) Upward fixation of Patella
(c) Stringhalt (d) Spavin

66. **The surgical technique of Utrecht method is performed for:**
(a) Omasal Impaction (b) Intestinal Anastomosis
(c) Diaphragmatic hernia (d) Abomasal displacement

67. **Phencyclidine is a:**
(a) Anticholinergic pre-anaesthetic agent (b) Alfa 2 adrenoceptor agonist
(c) Dissociative anaesthesia (d) Muscle relaxant

68. **Hypothermia has been used for:**
(a) Surgery of the heart and great vessels, brain, and spinal cord
(b) Surgery of heart and gastrointestinal tract
(c) Surgery of heart, liver and kidney
(d) None of these

69. **The secondary uterine inertia is frequently followed by:**
(a) Retained placenta (b) Uterine infections
(c) Septic metritis (d) All the above

70. **The maternal recognition of pregnancy in Sow is associated with:**
(a) Luteal progesterone (b) Embryonic estrogens
(c) Placental lactogens (d) All the above

71. **Paraphimosis refers to:**
(a) Inability to withdraw the penis into prepuce (b) Inability to protrude the penis out of prepuce
(c) Deviation of penis (d) Diphallus condition

72. **The most common form of ectopic pregnancy is:**
(a) Abdominal (b) Ovarian
(c) Fallopian tube (d) None of these

73. **Which of the following symptoms is shown by male affected with segmental aplasia of Wolffian duct system**
(a) Absence of testes (b) Absence of Fallopian tube
(c) Absence of epididymis and vas deferens (d) None of these

74. **The virgin heifer mucus agglutination test is used for the diagnosis of which disease**
(a) Brucellosis (b) Trichomoniasis in heifer
(c) Campylobacter vibriosis in bull (d) Catarrhal vagino cervicitis

75. **The Conception failure with normal genital discharge in a cow is due to:**
(a) Ovario bursal adhesion (b) Anovulation
(c) Tubal occlusion (d) All the above

76. **Semen straws are stored in liquid nitrogen at:**
(a) $-79^{0}C$ (b) $-100^{0}C$
(c) $-196^{0}C$ (d) $-270^{0}C$

77. **The calf affected with Klinefelter syndrome possesses which of the gene pairs**
(a) XXY (b) XXX
(c) XYY (d) None of above

78. **Assertion(A): In cattle, the weight of male calves is higher than female calves. Reason (R): Male conceptus prolongs the gestational length. Choose the correct answer from following options:**
(a) Both A and R are correct and R is correct explanation of A
(b) Both A and R are correct but R is not correct explanation of A
(c) A is true but R is false
(d) R is true but A is false

79. **When do testes descend into a scrotal cavity in swine:**
(a) First Quarter of fetal life (b) Second Quarter of fetal life
(c) Last Quarter of fetal life (d) After birth

80. **Which one of the following pairs is correctly matched**
(a) Anestrus ——— Delayed ovulation (b) Oxytocin Milk let down
(c) Spermatocele Oviduct (d) Fallopian tubes Nidation

Rajasthan GK Questions

81. **The dialect, which is not related to the Easter Rajasthan:**
(a) Harauti (b) Mewati
(c) Dhundhadi (d) Ahirwati

82. **Which one of the following pairs is not correctly matched?**
(a) Daulat Vijai Khuman Raso (b) Suryamal Mishran Vansh Bharkar
(c) Mandan Raj Vallab (d) Chand Bardai Prithviraja Vijaya

83. **Who was the author of "Kanhed De Prabandh"?**
(a) Girdhardas Asia (b) Karnidan
(c) Padmanabh (d) Surajprakash

84. **Who is known as Camel's God**
(a) Mallinathji (b) Pabuji
(c) Ramdeoji (d) Harbhuji

85. **The main center of Dadu Sect is:**
(a) Narayana (b) Sambharathal
(c) Kolu (d) Kishangarh

86. **The fair which is held twice in a year during Navratras is:**
(a) Bharthari (b) Pushkar
(c) Jeenmata (d) Diggi

87. **Which of the following statements is incorrect about 'Kartal':**
(a) It is an autophonic (b) It is a pair instrument
(c) It is made of wooden (d) It is played with a wooden stick

88. **One of the following painters is not related to Kishangarh School of Painting:**
(a) Nagridas (b) Nihal Chand
(c) Amroo (d) Bagata

89. **Hide of which animal is used for 'Usta' art:**
(a) Camel (b) Horse
(c) Deer (d) Dog

90. **Salam Singh's Haveli at Jaisalmer is of how many stories**
(a) 5 (b) 6
(c) 8 (d) 9

91. **In Bhils, head of the clan is called:**
(a) Tadavi (b) Gameti
(c) Kotwal (d) Patel

92. **Number of Sanskar in Hindu Society is:**
(a) 10 (b) 13
(c) 16 (d) 19

93. **Name of the architect of Ranakpur temple was:**
(a) Mandan (b) Dipak
(c) Garibdas (d) Chokha

94. **The 'Ajarakh' print is related to:**
(a) Barmer (b) Bikaner
(c) Bagru (d) Sikar

95. **The Famous poetry 'Senani' was written by:**
(a) Sumnesh Joshi (b) Ramnath Kavia
(c) Ganeshilal Vyas (d) Meghraj Mukul

96. **The anecdote of saving cows is not the associated with the life lore of one o following folk deities:**
(a) Gogaji (b) Tejaji
(c) Pabuji (d) Ramdev Ji

97. **Which of the following pair is not correctly matched**
(a) Theva art Pratapgarh (b) Badla -Jodhpur
(c) Usta art Bikaner (d) Namda-Barmer

98. **The musical instrument played by mouth is:**
(a) Iktara (b) Algoja
(c) Nobat (d) Tasha

99. **In Rajasthan, the Panghat Pooja (Worship of well) is performed on the occasion of:**
(a) Birth of a son (b) Marriage of a son
(c) Marriage of a daughter (d) Gangaur festival

100. **One of the following established 'Lok Kala Mandal' at Udaipur, he was:**
(a) Bhanu Bharti (b) Devilal Samar
(c) Vasudeo Bhatt (d) Abhay Bajpai

☆☆☆

Answer Key

1. Mewati
2. Detect heat
3. Because it is lighter than other constituents
4. 19.3
5. 23-25 hours
6. 90 days
7. Broiler-Cage (Note: Layer can be reared in deep litter as well as cage system but broiler can be reared only in deep litter system)
8. Puberty
9. Performance of individual (because male cannot produce milk)
10. ¼ V_A
11. Heritability
12. Selective Breeding
13. Intensity of selection
14. Repeatability Estimate
15. Pleiotropy
16. Grading up
17. 23-26 % CP, 75% TDN
18. Acetic acid
19. 3.5-4.2 pH and Ammoniacal nitrogen less than 10% of total nitrogen
20. Leguminous fodder
21. Proventriculus
22. 17
23. All of the above
24. Glucose is formed from other than carbohydrate substrate
25. Mediastinal lymph node
26. Oxygen (Note: Bacillus anthracis is aerobic bacteria, it need oxygen for sporulation)
27. Hygrometer
28. Bromocresol purple solution
29. Molybdenum (Copper & molybdenum are antagonistic of each other)
30. Methylene blue (1% Methylene blue)
31. Tetracycline
32. All of them
33. Periodic acid-Schiff
34. Clostridium perfringens type C-Enterotoxaemia
35. IgG
36. Dendritic cell (Note: Antigen-presenting cells includes dendritic cells, macrophages & B-lymphocytes)
37. Trypanosoma evansi
38. Ancylostoma caninum
39. Oesophagostomum radiatum
40. Mite
41. Hypertrophy
42. Babesiosis
43. Interstitial nephritis

44. Cholecystitis
45. Increases with parity
46. Polioencephalomalacia
47. Uremia
48. 4 (Note: In ruminants, excessive feeding of carbohydrate such as cereal grains leads to metabolic acidosis & excessive feeding of protein such as pulses, urea, leguminous fodder etc. leads to metabolic alkalosis)
49. Intestine, lymphatics, mesenteric lymph node thoracic duct, heart, lungs
50. Fever and enlarged lymph node
51. Tetanus(Locked jaw condition)
52. Paratenic host
53. IPC-273
54. All of them
55. Blue Cross
56. Veterinary Doctor
57. Weingarth set
58. Balanced Anaesthesia
59. Detomidine
60. Tushes
61. Ring block debridement, vertical mattress sutures, and teat cannulation
62. Bone cutter, bone rongeur, periosteal elevator, pin cutter
63. Partial or Complete closure of eyelids
64. Clipping, shaving, scrubbing with a surgical soap and paint the area with 2.5% povidone iodine
65. Stringhalt
66. Abomasal displacement
67. Dissociative anaesthesia
68. Surgery of the heart and great vessels, brain, and spinal cord
69. All the above
70. Embryonic estrogens
71. Inability to withdraw the penis into prepuce
72. Fallopian tube
73. Absence of epididymis and vas deferens
74. Campylobacter vibriosis in bull
75. All the above
76. $-196^{0}C$
77. XXY
78. Both A and R are correct and R is correct explanation of A
79. Last Quarter of fetal life
80. Oxytocin-Milk let down
81. Harauti
82. Chand Bardai-Prithviraja Vijaya
83. Padmanabh
84. Pabuji
85. Narayana
86. Jeenmata
87. It is played with a wooden stick
88. Bagata
89. Camel
90. 9
91. Tadavi, Gameti
92. 16
93. Dipak
94. Barmer
95. Meghraj Mukul
96. Ramdev Ji
97. Namda-Barmer
98. Algoja
99. Birth of a son
100. Devilal Samar

☆☆☆

RPSC Veterinary Officer Exam Paper- 2011

1. **A sheep breed, which is a cross of Bikaneri ewe and Merino ram with long fine wool, is-**
   (a) Gaddi (b) Hissardale
   (c) Malpura (d) Corriedale
2. **Chromosome number (2N) of *Bubalus bubalis* is-**
   (a) 60 (b) 50
   (c) 48 (d) 46
3. **Modification of normal gene expression in which a particular gene at one locus masks the expression of at least one other gene at different chromosomal location is termed–**
   (a) Crossing over (b) Epistasis
   (c) Mutation (d) None
4. **Act of mating in sheep is termed as-**
   (a) Crossing (b) Tupping
   (c) Copulation (d) Breeding
5. **First faecal material voided by a newborn calf is known as-**
   (a) Meconium (b) Faeces
   (c) Excreta (d) Pellets
6. **Two genes of two different traits located on the same chromosome are called-**
   (a) Alleles (b) Linked
   (c) Segregated (d) Intermediate
7. **Starch equivalent based energy system was given by-**
   (a) Morrison (b) Armsby
   (c) Kellner (d) Dubois
8. **Crazy chick disease is caused due to the deficiency of-**
   (a) Vitamin E (b) Vitamin B_1
   (c) Vitamin B_{12} (d) Vitamin B_2
9. **Anti-nutritional factor present in groundnut cake is a-**
   (a) Aflatoxin (b) Glycogen
   (c) Glucosinolate (d) None
10. **Heat treatment can destroy which antinutritional factor found in soybean cake-**
    (a) Glucosinolate (b) Aflatoxin
    (c) Trypsin inhibitor (d) Ricin
11. **Postparturient hemoglobinuria or Redwater disease is basically caused due to an acute deficiency of which mineral in the blood**
    (a) Copper (b) Magnesium
    (c) Phosphorus (d) Calcium
12. **Blind stagger is a condition in cattle and sheep due to subacute poisoning with-**
    (a) Manganese (b) Selenium
    (c) Lead (d) None
13. **Purple coloured comb, wattles and tongue are characteristics of which breed of poultry-**
    (a) Aseel (b) Chittagong
    (c) Kadaknath (d) None
14. **Parents of one generation pass on the sex-linked characters to the opposite sex in the next generation. This process is known as-**
    (a) Conjugation (b) Crossing over
    (c) Cross over unit (d) Criss-cross inheritance

15. **Reappearance of an ancestral trait, after several generations is known as-**
(a) Atavism (b) Autogamy
(c) Asynapsis (d) Amphidiploid

16. **Sulphur containing vitamins are-**
(a) Riboflavin and biotin (b) Biotin and choline
(c) Riboflavin and choline (d) Biotin and thiamine

17. **Fraction of all alleles that occur at a given locus in a specified population is defined as**
(a) Variation (b) Heritability
(c) Gene frequency (d) Regression

18. **Full sibs and half-sib mating in poultry and parent - offspring or uncle - cousin mating in swine is most commonly used in-**
(a) Outcrossing (b) Inbreeding
(c) Pure breeding (d) Strain crossing

19. **High-fat content up to 14% is found in the milk of which breed of buffalo**
(a) Murrah (b) Mehsana
(c) Bhadawari (d) Surti

20. **The bacterial population per ml of rumen liquor in a cow is**
(a) 10^9 (b) 10^7
(c) 10^6 (d) 10^4

21. **Probiotic is classified under-**
(a) Feed supplement (b) Feed additive
(c) Feed ingredient (d) All of the above

22. **Babul seed contain an antinutritional factor-**
(a) Tannin (b) Ricin
(c) Aflatoxin (d) Oxalic acid

23. **Best crop suitable for silage making-**
(a) Jowar (b) Bajra
(c) Oat (d) Maize

24. **Which breed of sheep with a roman nose and producing fine wool is found in Rajasthan**
(a) Magra (b) Chokla
(c) Marwari (d) Sonadi

25. **The rutting period in camel is from-**
(a) November to March (b) April to August
(c) September to January (d) None

26. **Which drug/salt should be used to acidify the urine**
(a) Sodium chloride (b) Ammonium chloride
(c) Potassium chloride (d) None

27. **Griseofulvin can be used in the treatment of ringworm.It is also an effective treatment for-**
(a) Chromomycosis (b) Phycomycosis
(c) Sporotrichosis (d) Blastomycosis

28. **Of the following the best first antimicrobial agents to treat septicemia in a newborn foal would be-**
(a) Penicillin and Gentamicin sulphate (b) Trimethoprim and sulfadiazine
(c) Sodium ampicillin and streptomycin (d) Chloramphenicol

29. **Loading dose of a drug primarily depends on-**
(a) Volume of distribution (b) Clearance
(c) Rate of administration (d) Half-life

30. **Inter-close interval depends on-**
(a) Half life of drug
(b) Dose of drug
(c) Age of patient
(d) Bioavailability of drug

31. **Which of the following drug is bacteriostatic-**
(a) Sulphadimidine
(b) Penicillin-G
(c) Griseofulvin
(d) Cephalexin

32. **Which of the following drugs increases gastro-intestinal motility**
(a) Glycopyrrolate
(b) Atropine
(c) Neostigmine
(d) None

33. **Drug of choice for treatment of acute organophosphate poisoning is-**
(a) Atropine
(b) Neostigmine
(c) Carbachol
(d) None

34. **Environmental mastitis pathogens include-**
(a) E.coli
(b) Klebsiella
(c) Streptococcus dysgalactiae
(d) All of the above

35. **Leptospirosis can be diagnosed serologically by-**
(a) Microscopic agglutination test
(b) DNA probes
(c) ELISA
(d) All of the above

36. **Mad cow disease is caused by-**
(a) Bacteria
(b) Protozoa
(c) Virus
(d) Prion

37. **The most common myocardial parasite in the cow is-**
(a) Trichinella spiralis
(b) Cysticercus cellulosae
(c) Sarcocystis spp.
(d) Cysticercus bovis

38. **Egg of Demodex canis are-**
(a) Round
(b) Spindle-shaped
(c) Oval
(d) None

39. **The intermediate host of Paraphistomum cervi is-**
(a) Indoplanorbis exustus
(b) Lymnaea luteola
(c) Gyraulus convexusculus
(d) None

40. **Schistosoma indicum is present in the-**
(a) Aorta
(b) Renal artery
(c) Jugular veins
(d) Mesenteric veins

41. **Nasal granuloma is caused by-**
(a) Schistosoma spindale
(b) Schistosoma haematobium
(c) Schistosoma nasalis
(d) None of the above

42. **The Ascaridia galli causes-**
(a) Diarrhoea
(b) Anaemia
(c) Emaciation
(d) All of the above

43. **In equine, endarteritis is caused by the larvae of-**
(a) Strongylus vulgaris
(b) Strongylus edentatus
(c) Strongylus equines
(d) All of the above

44. **Hydropic degenerations is-**
(a) Disturbance in protein metabolism
(b) It involves epithelial cells
(c) Cell takes on clear fluid
(d) All of the above

45. **Which one is a benign neoplasm**
(a) Fibroma
(b) Fibrosarcoma
(c) Adinocarcinoma
(d) Lymphosarcoma

46. **In horse, a light red foam coming from both nostrils and harsh sound over the trachea and bronchi indicates-**
(a) Pulmonary haemorrhage (b) Pharyngeal haemorrhage
(c) Nasal haemorrhage (d) Pulmonary congestion

47. **Over the right flank fluid splashing sound may indicate-**
(a) Intestinal obstruction (b) Paralytic ileus
(c) Abomasal volvulus (d) All the above

48. **Hypothermia occurs in**
(a) Shock (b) Milk fever
(c) Acute ruminal engorgement (d) All the above

49. **To examine the integrity of central nervous system, the clinician should look for abnormalities of-**
(a) Mental state (b) Posture and gait
(c) Involuntary muscles (d) All the above

50. **Blue tongue virus is transmitted through-**
(a) Ingestion (b) Inhalation
(c) Culicoids vectors (d) All of the above

51. **The most common form of actinomycosis of soft tissues is-**
(a) Involvement of abomasum (b) Involvement of tongue
(c) Involvement of esophageal groove (d) None

52. **Rabies causes-**
(a) Non-suppurative encephalomyelitis (b) Suppurative encephalitis
(c) Non-suppurative encephalitis (d) All the above

53. **Colibacillosis is most common in animals of age group-**
(a) 1-3 days (b) 1-3 weeks
(c) 1-3 months (d) All of the above

54. **An investigation involving the collection of information and in which a causal hypothesis is usually not tested is called-**
(a) Survey (b) Surveillance
(c) Synergism (d) None

55. **Spread of disease over large geographical area is called-**
(a) Epidemic (b) Endemic
(c) Pandemic (d) None

56. **Mischief is punishable under section-**
(a) 428 and 429 IPC (b) 326 IPC
(c) 304 A IPC (d) None

57. **The prevention and control of infectious and contagious diseases in animals act came into existence in the year-**
(a) 2009 (b) 2010
(c) 2008 (d) None

58. **To avoid collapse of lungs upon closure of a thoracotomy, the surgeon's primary concern should be-**
(a) Suturing the intercostal muscles adequately
(b) Suturing the lateral thoracic musculature adequately
(c) Making sure that the lung is moist before closure
(d) Creating negative pressure in the pleural cavity

59. **Displacement of the intestine outside the abdominal cavity with displaced portion being covered with parietal peritoneum is called-**
(a) Herniation (b) Eventration
(c) Intussusception (d) Volvulus

60. **In reducing an elbow luxation in the dog, the joint should be positioned by-**
(a) Extension (b) Flexion
(c) Abduction (d) Normal standing position

61. **The breed of dog that is most susceptible to perianal fistulas is the-**
(a) Collie (b) German shepherd
(c) Boxer (d) Bull dog

62. **The hormone directly responsible for the preparing the uterine mucosa for implantation is-**
(a) Luteinizing hormone (b) Estradiol
(c) Prolactin (d) Progesterone

63. **The period of gestation where you get abortion with trichomonas foetus infection is the –**
(a) Last trimester (b) Middle trimester
(c) First-trimester (d) Last week

64. **In rectal palpation for detecting early pregnancy in a cow, one of the dependable signs of pregnancy is detection of-**
(a) Fetal membrane slip and amniotic vesicle (b) One enlarged uterine horn
(c) Prominent CL of one ovary (d) Fremitus of the middle uterine artery

65. **Endotheliochorial placentation occurs in the-**
(a) Horse (b) Dog
(c) Cow (d) Sheep

66. **Nali race is related to-**
(a) Sheep (b) Camel
(c) Buffalo (d) Cow

67. **A reasonably good feed conversion ratio value of broiler of 0-6 weeks of age is-**
(a) 1.2 (b) 1.4
(c) 1.6 (d) 1.8

68. **The thermo-neutral zone for poultry ranges from-**
(a) 13°C to 24°C (b) 0°C to 13°C
(c) 24°C to 38°C (d) None

69. **The correct method of milking dairy animals is-**
(a) Fisting (b) Knuckling
(c) Stripping (d) None

70. **For producing 1 ml of milk, the quantity of blood which passes through the secretory tissue of mammary gland-**
(a) 400-500 ml (b) 1000 ml
(c) 200-300 ml (d) None

71. **Floor space required per chick during the first week in an artificial brooder is-**
(a) 100-120 sq. cm. (b) 150-180 sq. cm.
(c) 200-250 sq. cm. (d) None

72. **In the deep litter system of housing the material used for litter such as rise husk and poultry manure are allowed to accumulate up to a depth of-**
(a) 8-12 inches (b) 0-6 inches
(c) 12-18 inches (d) 20-24 inches

73. **Colostrum is fed to newborn calf at what percentage of its body weight**
(a) 5% (b) 10%
(c) 15% (d) 20%

74. **Bull nose ring is first inserted at the age of-**
(a) 8-12 months (b) 18 months
(c) 24 months (d) 30 months

75. **During the first week of artificial brooding, the temperature of the brooder should be-**
(a) 95°F (b) 100°F
(c) 105°F (d) None

76. **According to norms of Prevention of Food Adulteration Act (PFA) 1976, cow milk should contain not less than-**
(a) 8.5% SNF and 3.5% milk fat (b) 6.5% SNF and 2.5% milk fat
(c) 7.5% SNF and 3.0% milk fat (d) 9.5% SNF and 2.0% milk fat

77. **Horvet apparatus is generally used to determine which physical property of milk**
(a) Boiling point (b) Electrical conductivity
(c) Freezing point (d) Density

78. **In the HTST type of pasteurization of milk, the temperature and time is-**
(a) 63°C /30 minutes (b) 72°C /15 minutes
(c) 72°C /15 seconds (d) 74°C /7 seconds

79. **Very good silage should have pH ranging from-**
(a) 4.2 to 4.5 (b) 4.5 to 4.8
(c) 3.7 to 4.2 (d) 4.8 to 5.0

80. **A deficiency condition Enzootic ataxia has been associated with pastures as low as 2-4 mg/Kg DM of which mineral element-**
(a) Sulphur (b) Magnesium
(c) Copper (d) Zinc

81. **Percentage of gross energy of food lost as methane in ruminants is-**
(a) 5-6% (b) 7-9 %
(c) 10-12% (d) 3-4%

Rajasthan G.K. Questions

82. **Godwari dialect is spoken at-**
(a) Sirohi (b) Ajmer
(c) Alwar (d) Jodhpur

83. **"Pratap charitra" is composed by-**
(a) Karnidan (b) Kesari Singh
(c) Isardas (d) Kishor Singh

84. **The folk deity who saves the camels from diseases-**
(a) Goga Ji (b) Teja Ji
(c) Ramdev Ji (d) Pabu Ji

85. **The main seat of saint Dariyava Ji is at-**
(a) Shahpura (b) Nagaur
(c) Ren (d) Merata

86. **Kajali Teej festival comes on-**
(a) Shravan Shukla Tritiya (b) Kartik Shukla Tritiya
(c) Shravan Krishna Tritiya (d) Bhadrapada Krishna Tritiya

87. **The Galata Tirth belongs to-**
(a) Maharshi Gautam (b) Maharshi Galav
(c) Kapil Muni (d) Goga Ji

88. **Swang is a-**
(a) Folk drama (b) Folk song
(c) Musical instrument (d) Folk deity

89. **Dadhimati Mata fair held at-**
(a) Pushkar (b) Goth Manglod
(c) Merta (d) Deshnok

90. **The main function of Dhadi caste is-**
(a) Handicrafts (b) Priests of temple
(c) Telling folk stories (d) Singing folk songs

91. **Mashak is a-**
(a) Water storage vessel (b) Agricultural instrument
(c) Musical instrument (d) Surgical instrument

92. **The famous dance of Jasanathi sect is-**
(a) Fire dance (b) Gair dance
(c) Terah talidance (d) Ghoomer dance

93. **The Sahariya tribal region mainly is-**
(a) Alwar (b) Banswara
(c) Sirohi (d) Baran

94. **Rakhari is an ornament of woman used for-**
(a) Head (b) Neck
(c) Hands (d) Nose

95. **An artist of Kishangarh style of painting is-**
(a) Goverdhan (b) Anoop Singh
(c) Bhoor Singh (d) Nihalchand

96. **The Usta art initiated at-**
(a) Kota (b) Bundi
(c) Ajmer (d) Bikaner

97. **The place famous for Terracotta is-**
(a) Falna (b) Deoli
(c) Molela (d) Chittor

98. **The famous temple of Vimal Shah is at-**
(a) Ranakpur (b) Mount Abu
(c) Sirohi (d) Pali

99. **The Siwana fort is in the district of-**
(a) Pali (b) Udaipur
(c) Sirohi (d) Barmer

100. **The famous Patuva haveli is situated at-**
(a) Fatehpur (b) Ramgarh
(c) Jaisalmer (d) Nagaur

☆☆☆

Answer Key

1. Hissardale
2. 50
3. Epistasis
4. Tupping
5. Meconium
6. Linked
7. Kellner
8. Vitamin E
9. Aflatoxin
10. Trypsin inhibitor
11. Phosphorus
12. Selenium
13. Kadaknath
14. Criss-cross inheritance
15. Atavism
16. Biotin and thiamine
17. Gene frequency
18. Inbreeding
19. Bhadawari
20. 10^9
21. Feed additive
22. Tannin
23. Maize
24. Chokla
25. November to March
26. Ammonium chloride
27. Sporotrichosis
28. Trimethoprim and sulfadiazine
29. Half life
30. Half life of drug
31. Sulphadimidine
32. Neostigmine
33. Atropine
34. All of the above
35. All of the above
36. Prion
37. Sarcocystis spp.
38. Spindle shaped
39. Indoplanorbis exustus
40. Mesenteric veins
41. Schistosoma nasalis
42. All of the above
43. Strongylus vulgaris
44. All of the above
45. Fibroma
46. Pulmonary haemorrhage
47. All the above
48. All the above
49. All the above
50. Culicoids vectors
51. Involvement of esophageal groove
52. Non-suppurative encephalomyelitis
53. 1-3 days
54. Survey
55. Pandemic
56. 428 and 429 IPC
57. 2009
58. Creating negative pressure in the pleural cavity
59. Herniation
60. Extension
61. German shephard
62. Progesterone
63. First trimester
64. Prominent CL of one ovary
65. Dog
66. Sheep
67. 1.8 68. 13^0C to 24^0C
69. Fisting
70. 400-500 ml
71. 100-120 sq. cm.
72. 8-12 inches
73. 10%
74. 8-12 months
75. 95^0F
76. 8.5% SNF and 3.5% milk fat
77. Freezing point
78. 72^0C /15 seconds
79. 3.7 to 4.2
80. Copper
81. 7-9 %
82. Sirohi
83. Kesari Singh
84. Pabu Ji
85. Ren
86. Bhadrapada Krishna Tritiya
87. Maharshi Galav
88. Folk drama
89. Goth Manglod
90. Singing folk songs
91. Water storage vessel and Musical instrument both are correct
92. Fire dance
93. Baran
94. Head
95. Nihalchand
96. Bikaner
97. Molela
98. Mount Abu
99. Barmer
100. Jaisalmer

☆☆☆



Section-II: Fundamental Information



General Awareness in the Field of Animal Science

Table 1: Research Institutes of Veterinary and Animal Sciences in India

1.	IVRI	Indian Veterinary Research Institute, Izatnagar, Bareilly (UP)
2.	NDRI	National Dairy Research Institute, Karnal (Haryana)
3.	CIRG	Central Institute for Research on Goat, Makhdoom, Mathura (UP)
4.	CIRC	Central Institute for Research on Cattle, Meerut (UP)
5.	CIRB	Central Institute for Research on Buffaloes, Hisar (Haryana)
6.	CSWRI	Central Sheep & Wool Research Institute, Avikanagar, Malpura, Tonk (Rajasthan)
7.	CARI	Central Avian Research Institute, Izatnagar, Bareilly (UP)
8.	NRCC	National Research Centre on Camel, Bikaner (Rajasthan)
9.	NRCE	National Research Centre on Equines, Hisar (Haryana)
10.	NRCM	National Research Centre on Meat, Hyderabad (Telangana)
11.	NRCMI	National Research Centre on Mithun, Jharnapani, Medziphema (Nagaland)
12.	NRCP	National Research Centre on Pig, Rani, Guwahati (Assam)
13.	NRCY	National Research Centre on Yak, West Kameng, Dirang (Arunachal Pradesh)
14.	NBAGR	National Bureau of Animal Genetic Resources, Karnal (Haryana)
15.	DPR	Directorate of Poultry Research, Hyderabad (Telangana)

Note:-

- ✓ MANAGE- National Institute of Agricultural Extension Management, Hyderabad (Telangana)
- ✓ NIRDPR- National Institute of Rural Development and Panchayati Raj, Hyderabad (Telangana)
- ✓ NAARM- National Academy of Agricultural Research & Management, Hyderabad
- ✓ IRMA- Institute of Rural Management, Anand (Gujarat)
- ✓ IGFRI- Indian Grassland and Fodder Research Institute, Jhansi (UP)
- ✓ IASRI- Indian Agricultural Statistical Research Institute, New Delhi
- ✓ CAZRI- Central Arid Zone Research Institute, Jodhpur (Rajasthan)
- ✓ NIANP-National Institute of Animal Nutrition and Physiology, Bengaluru (Karnataka)
- ✓ CCSNIAH - Chaudhary Charan Singh National Institute of Animal Health, Baghpat (Uttar Pradesh)
- ✓ NIAW- National Institute of Animal Welfare, Ballabgarh, Faridabad (Haryana)
- ✓ DMI- Directorate of Marketing & Inspection, Faridabad (Haryana)
- ✓ NIAM- National Institute of Agricultural Marketing, Jaipur (Rajasthan)
- ✓ Project Directorate on Foot & Mouth Disease, Mukteshwar (Uttarakhand)
- ✓ Project Directorate on Animal Disease Monitoring and Surveillance, Hebbal, Bengaluru (Karnataka)
- ✓ NIHSAD-National Institute of High Security Animal Diseases, Bhopal (Madhya Pradesh)
- ✓ NIVEDI-National Institute of Veterinary Epidemiology and Disease Informatics, Yelahankam Bengaluru (Karnataka)

Important Days:-

- ✓ January 12: National Youth Day (Birthday of Swami Vivekananda)
- ✓ February 4: World Cancer day
- ✓ March 24: World TB Day
- ✓ April 7: World Health Day
- ✓ April 22: World Earth Day
- ✓ April 25: World Malaria Day

- Last Saturday of April: World Veterinary Day
- June 1: World Milk Day
- June 5: World Environment Day
- June 7: World Food Safety Day
- June 22: World Camel Day
- July 1: Doctor's Day
- July 6: World Zoonoses Day
- July 11: World Population Day
- July 16: ICAR Foundation Day
- August 26: International Dog Day
- September 16: World Ozone Day
- September 28: World Rabies Day (death anniversary of Louis Pasteur who developed the first efficacious rabies vaccine)
- October 4: World Animal Welfare Day/World Animal Day
- October 6: World Wildlife Day 3 March.
- October First Week: Wild Life Week
- 2nd Friday of October: World Egg Day
- October 16: World Food Day
- November 12: National Bird Day (Birthday of Dr. Salim Ali)
- November 26: National Milk Day (Birthday of Dr Verghese Kurien, Milk Man of India)
- December 1: World AIDS Day
- December 3: Agricultural Education Day (Birthday of Dr. Rajendra Prasad)
  - MAFSU DAY

Colour revolutions in India:-

- Blue revolution: Fish Production
- Green revolution: Food grains (Wheat, Rice)
- Red revolution: Meat/Tomato production
- Silver revolution: Egg/Poultry Production
- White revolution: Milk/Dairy production
- Brown Revolution: Leather, Cocoa
- Golden Revolution: Horticulture & Honey Production
- Rainbow revolution: It is an integral development programme of agriculture, horticulture, forestry, sugarcane, fishery, poultry and animal husbandry

Note:-

- Father of Blue revolution: Dr. Hiralal Chaudhuri, Dr. Arun Krishnan
- Father of Green revolution in the world: Norman Ernest Borlaug
- Father of Green revolution in India: M.S. Swaminathan
- Father of White revolution: Dr.Verghese Kurien
- Father of Condensed milk industry: Gail Borden
- Mother of Silver revolution: Indira Gandhi
- Father of Golden revolution: Nirpakh Tutej
- Father of Red revolution: Vishal Tewari
- ther of Brown revolution: Hiralal Chaudri

Note:-

- ✓ Father of Nutrition: Antoine Lavoisier
- ✓ Father of Genetics: Gregor Johann Mendel
- ✓ Father of Animal Breeding and Genetics: J L Lush
- ✓ Father of Extension Education: J.P. Leagans

First in India:-

- ✓ Shalihotra: first veterinarian of India or father of Veterinary Science in India
- ✓ First Veterinary College in the world: Lyon, France (1762)
- ✓ Bombay Veterinary College: first veterinary college in India (1886)
- ✓ First Agriculture University in India: GBPUAT, Pantnagar (1960)
- ✓ First Veterinary University in India: TANUVAS, Tamil Nadu
- ✓ First Embryo transfer (E.T.) cattle calf in India was produced in 1986 at Andhra Pradesh Agriculture University (APAU), Tirupati
- ✓ India's first ovum pick up- IVF cattle calf "HOLI" (Sahiwal breed) developed by NDRI, Karnal
- ✓ World's first IVF (In Vitro fertilization) buffalo calf 'PRATHAM' developed by NDRI, Karnal
- ✓ World's first cloned buffalo calf 'SAMRUPA' developed by NDRI Karnal, Haryana
- ✓ World's first cloned pashmina goat "NOORI" developed by SKUAST-Kashmir
- ✓ World's first Mithun Calf "BHARAT" through embryo transfer technology developed by NRC on Mithun, Nagaland.

Note:-

- ✓ Nodal agency for carrying out livestock census in India is DAHD (Department of Animal Husbandry & Dairying) under Ministry of Fisheries, Animal Husbandry and Dairying.
- ✓ Livestock census is carrying out in every five-year interval
- ✓ The 20th Livestock census was conducted in 2019.
- ✓ Nodal agency for registration of new breeds of livestock and poultry in India is NBAGR
- ✓ A total number of indigenous breeds on 16/08/2021 in the country are 202, which include 50 for cattle, 19 for buffalo, 34 for goat, 44 for sheep, 7 for horses & ponies, 9 for camel, 10 for pig, 3 for donkey, 1 for yak, 19 for chicken, 2 for duck, 1 for geese and 3 of dog.
- ✓ NBAGR also approved registration of one line of chicken 'PD2 (Vanaraja Female)' developed by ICAR-DPR, Hyderabad.

Indian Council of Agricultural Research (ICAR):

- ✓ An autonomous organization under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India
- ✓ Established **on 16 July 1929** in pursuance of the report of the Royal Commission on Agriculture
- ✓ Headquarters: New Delhi
- ✓ President of the ICAR: Union Minister of Agriculture & Farmer welfare
- ✓ Current President of ICAR: Shri Narendra Singh Tomar
- ✓ Principal Executive Officer of the ICAR and Secretary of DARE: Director General of ICAR
- ✓ Current DG of ICAR: Dr. Himanshu Pathak
- ✓ Deputy Director General (Animal Science): Dr. Bhupendra Nath Tripathi
- ✓ There are total 4 Deemed Universities, 64 Institutions, 15 National Research Centres, 6 National Bureaux and 13 Directorates/ Project Directorates under ICAR.

NITI Aayog- National Institution for Transforming India

- ✓ Established by the Narendra Modi government to replace the Planning Commission
- ✓ Established on 1 January 2015
- ✓ Chairperson: Shri Narendra Modi (Hon'ble Prime Minister of India)
- ✓ Vice chairperson: Shri Suman Bery
- ✓ CEO: Shri Parameswaran Iyer

Table 2: International organizations

S.No.	Name of organization	Establishment year	Headquarter	Function/Comment
1	World trade organization (WTO)	1995	Geneva, Switzerland	To supervise and liberalize international trade
2	International Organization for Standardization (ISO)	1947	Geneva, Switzerland	International standards setting body
3	World Health Organization (WHO)	1948	Geneva, Switzerland	An agency of the United Nations concerned with international public health
4	Food and Agriculture Organization (FAO)	1945	Rome, Italy	An agency of the United Nations that leads international efforts to defeat hunger
5	*Office International des Epizooties* (OIE)	25 Jan-1924	Paris, France	Coordinating, supporting and promoting animal disease control
6	Codex Alimentarius	1963	Rome, Italy	The Codex Alimentarius or "Food Code" was established by FAO and WHO in 1963

Note: OIE new name: The World Organisation for Animal Health (OIE)

Rules & regulations on product standards:-

- ✓ Agriculture Produce (Grading & Marketing) Act, 1937
- ✓ Prevention of Food Adulteration Act, 1954
- ✓ Meat Food Products Order (MFPO), 1973
- ✓ Bureau of Indian Standard (BIS), 1986
- ✓ Milk and Milk Product Order (MMPO), 1992
- ✓ Food Safety and Standards Act (FSSA), 2006

Note:-

- ✓ Indian Standards Institution (ISI-1946) is replaced by Bureau of Indian Standards (BIS-1986) which is further replaced by National Standards Body of India (NSBI-2015)
- ✓ PFA-1954 is replaced by FSSA-2006

Special note:-

1. **Food Safety and Standards Authority of India (FSSAI):-**
   - ✓ The FSSAI established under the Food Safety and Standards Act, 2006 that regulate the food safety in India
   - ✓ Headquarters: New Delhi
   - ✓ All meat shops and slaughterhouses must have FSSAI license
   - ✓ Local slaughterhouses are licensed by municipal corporation of that area
2. **Agricultural and Processed Food Products Export Development Authority (APEDA):**
   - ✓ The APEDA established under the Agricultural and Processed Food Products Export Development Authority Act passed by the Parliament in December 1985
   - ✓ Headquarters: New Delhi

- ✓ Function: It provides the single window clearance system related to the export of perishable agricultural produce like- meat & meat Products, poultry & poultry products, dairy products, fruits, vegetables and others.

3. **Animal Welfare Board of India (AWBI)**
   - ✓ Established in 1962 under the Prevention of Cruelty to Animals Act, 1960
   - ✓ Smt. Rukmini Devi Arundale was the founder of the board
   - ✓ Headquarters: Shifted from previous Chennai (Tamil Nadu) to present Ballabhgarh, Faridabad (Haryana)
   - ✓ It consists of 28 members; serve for a period of 3 years.
   - ✓ It is under the Ministry of Fisheries, Animal Husbandry and Dairying (Department of Animal Husbandry and Dairying).
4. **Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA):** Established under the Prevention of Cruelty to Animals Act 1960. It is under the Ministry of Fisheries, Animal Husbandry and Dairying (Department of Animal Husbandry and Dairying).
5. **People for the Ethical Treatment of Animals (PETA)** is the largest animal rights organization in the world.
6. **Marine Products Export Development Authority (MPEDA)** was established in 1972. Headquarter of MPEDA at Kochi (Kerala)
7. **National Egg Coordination Committee (NECC)** was established in 1982. It is an association of poultry farmer & traders.

Salient Features of 20th Livestock Census-2019

(Source: Department of Animal Husbandry & Dairying, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India)

- ✓ The livestock sector alone contributes nearly 28.26% in Agricultural GVA. The overall contribution of livestock sector in national GVA is nearly 5.21% during 2019-20.
- ✓ The major thrust given to 20th Livestock Census is the collection of data through tablets computers.The enumeration was done both in rural and urban areas.
- ✓ The 20thLivestock Census was carried out in about 6.6 lakhs villages and 89000 urban wards across the country covering more than 27 Crores of households and non-households.
- ✓ Various species of animals (Cattle, Buffalo, Mithun, Yak, Sheep, Goat, Pig, Horse, Pony, Mule, Donkey, Camel, Dog, Rabbit and Elephant)/poultry birds (Fowl, Duck, Emu, Turkeys, Quail and other poultry birds) possessed by the households, household enterprises/non-household enterprises and institutions have been counted at their site.
- ✓ The total livestock population of the country is 536.76 million. The total livestock population has increased by about 4.6 % over the previous census. It consists of 35.93% Cattle, 27.79% Goat, 20.50% Buffaloes, 13.86% Sheep and 1.69% Pigs.
- ✓ Livestock population (in 2019 as compared to 2012) has increased substantially in West Bengal (23.32%), Telangana (22.21%), Andhra Pradesh (15.79%), Madhya Pradesh (11.81%), Bihar (10.67%), Karnataka (4.70%), Maharshtra (1.61%), and decreased in Gujarat (-0.95%), Uttar Pradesh (-1.35%) and Rajasthan (-1.66%).
- ✓ The total poultry population in the country is 851.81 million in 2019. The total poultry population in the country has increased by 16.8% over the previous census.
- ✓ The total Backyard Poultry in the country is 317.07 million in 2019, increased by 45.8% over previous census.
- ✓ The total Commercial Poultry in the country is 534.74 million in 2019, increased by 4.5% over previous census.

Table 3: Livestock and poultry population of major species during 2012 and 2019

ALL INDIA LIVESTOCK & POULTRY CENSUS (in million)

Category	2012	2019	% Change (2012 to 2019)
Cattle	190.9	193.46	1.34
Buffalo	**108.7**	**109.85**	**1.06**
Yak	0.08	0.06	-24.90
Mithun	**0.30**	**0.39**	**29.52**
Bovines	299.98	303.76	1.26
Sheep	65.07	74.26	14.13
Goat	135.17	148.88	10.14
Horses & Ponies	**0.63**	**0.34**	**-45.22**
Mules	**0.20**	**0.08**	**-57.09**
Donkeys	0.32	0.12	-61.23
Camels	0.4	0.25	-37.05
Pigs	10.29	9.06	-12.03
Total livestock	**512.06**	**536.76**	4.82
Total poultry	**729.2**	**851.81**	16.81

Table 4: Livestock and poultry population State ranking (20th livestock census-2019)

S.No.	Livestock & Poultry	1st Rank	2nd Rank	3rd Rank
1	Buffalo	U.P.	Rajasthan	Gujarat
2	Cattle	West Bengal	U.P.	M.P.
3	Sheep	Telangana	Andhra Pradesh	Karnataka
4	Goat	Rajasthan	West Bengal	U.P.
5	Pig	Assam	Jharkhand	Meghalaya
6	Camel	Rajasthan	Gujarat	Haryana
7	Mithun	Arunachal Pradesh	Nagaland	Manipur
8	Yak	Jammu & Kashmir	Arunachal Pradesh	Sikkim
9	Horse & Ponies	U.P.	Jammu & Kashmir	Rajasthan
10	Mule	Uttarakhnad	Himanchal Pradesh	Jammu & Kashmir
11	Donkey	Rajasthan	Maharashtra	U.P.
12	Total livestock	U.P.	Rajasthan	M.P.
13	Poultry	Tamil Nadu	Andhra Pradesh	Telangana

Table 5: Position of countries in world population

Livestock population	First rank in world population	Position of India in world
Buffalo	India	1st
Cattle	Brazil	2nd
Goat	China	2nd
Sheep	China	3rd
Camel	Somalia	9th
Poultry	USA	5th
Pig	China	-

Table 6: Production statistics of different livestock products for 2019-20 (BAHS, 2020)

Livestock products	Production	Per capita availability (ICMR recommendations)	Species wise contribution	Top three producing state	Per capita availability ranking
Milk	198.4 million tonnes (2021-22: 209.95 million tonnes)	406 g/day (280 g/day)	Buffalo-48.34%, Cattle-48.71%, Goat-2.95%	UP>Rajasthan >MP	Punjab> Haryana> Rajasthan
Egg	114.38 billion numbers (2021-22: 122.04 billion number)	86 eggs per year (182 eggs/year)	Improved fowl-88.03%, Desi fowl-10.89%, Improved duck-0.21%, Desi duck-0.86%	Andhra Pradesh> Tamil Nadu> Telangana	Andhra Pradesh> Telangana> Andaman & Nicobar Island
Meat	8.60 million tonnes (2021-22: 8.79 million tonnes)	6.45 kg per year (11 kg/year)	Poultry-50.50%, Buffalo-18.43%, Goat-13.72%, Sheep-8.94%, Pig-4.82%, Cattle-3.59%	UP> Maharashtra> West Bengal	Telangana> Haryana> Andhra Pradesh
Wool	36.76 million kg (2021-22: 36.93 million kg)	—	Ewes-70.61%, Ram-17.10, Lamb-12.30%	Rajasthan> Jammu & Kashmir> Telangana	—

Table 7: Ranking of India in world in different sectors

Ranking of India	Sectors
1st	Total livestock population; Milk production; Buffalo population, Total Bovine population
2nd	Cattle population: Goat population
3rd	Sheep population; Egg production
5th	Poultry population; Meat production
6th	Poultry meat production
9th	Camel population; Wool production

- **Number of Artificial Inseminations performed (All India)**

AI is the most successful applied reproductive technology in dairy husbandary. It is a powerful tool mostly employed for livestock improvement. The number of AI-performed in the country has been increased to 76.39 millions in 2019-20.

- **Ministry of Fisheries, Animal Husbandry and Dairying**

It is a newly formed ministry in May 2019 by Modi government from the department of same name under Ministry of Agriculture and Farmers Welfare.

It consists of two departments:

1. Department of Animal Husbandry and Dairying
2. Department of Fisheries

Table 8: Ministers of Ministry of Fisheries, Animal Husbandry and Dairying

Name	Designation
Shri Parshottam Rupala	Hon'ble Minister of Fisheries, Animal Husbandry and Dairying
Dr. Sanjeev Kumar Balyan	Hon'ble Minister of State of Fisheries, Animal Husbandry and Dairying
Dr. L. Murugan	Hon'ble Minister of State of Fisheries, Animal Husbandry and Dairying

- National Dairy Plan Phase I (NDP I) is a Central Sector Scheme being implemented by the National Dairy Development Board (NDDB) through End Implementing Agencies (EIA) for a period of 2011-12 to 2018-19.
- Rashtriya Gokul Mission (RGM) has been launched in December 2014 with an outlay of Rs 2025 crore for development and conservation of indigenous breeds through selective breeding in the breeding tract and genetic upgradation of nondescript bovine population. The scheme comprises of two components namely National Programme for Bovine Breeding (NPBB) and National Mission on Bovine Productivity (NMBP).
- The Government of India in 2019 has constituted "Rashtriya Kamadhenu Ayog" under Ministry of Agriculture and Farmers Welfare, Department of Animal Husbandry and Dairying for the Conservation, Protection and Development of cows and their progenies to support the rural , socio- economic and sustainable development. Dr Vallabhbhai Kathiria has been appointed as Chairman of the Ayog.
- National Livestock Mission is an initiative of the Ministry of Agriculture and Farmers' Welfare. The mission, which commenced from 2014-15, has the objective of sustainable development
- Under National Kamdhenu Breeding Centers, two centers in India established; one in South (Andhra Pradesh) and one in North (Madhya Pradesh).

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Objective Questions

1. **Match the column:-**

Table- A	Table –B
(1) NDRI	(a) Meerut
(2) CSWRI	(b) Hisar
(3) NRCC	(c) Avikanagar
(4) NRCE	(d) Dirang
(5) CIRC	(e) Karnal
(6) NRCY	(f) Bikaner

2. **Match the column:-**

Table-A	Table-B
(1) IRMA	(a) Jhansi
(2) IVRI	(b) Jodhpur
(3) CAZRI	(c) Izatnagar
(4) IGFRI	(d) Makhdoom
(5) CIRG	(e) Anand

3. **Match the column:-**

Table-A	Table-B
(1) World Veterinary Day	(a) June 5
(2) World Environment Day	(b) July 6
(3) World Rabies Day	(c) July 11
(4) World Zoonoses Day	(d) Last Saturday of April
(5) World Population Day	(e) September 28

4. **First veterinarian of India who referred as Father of Veterinary Science in India-**
   (a) Nakul (b) Dhanvantri
   (c) Shalihotra (d) Charak
5. **Nodal agency for carrying out livestock census in India-**
   (a) IVRI (b) ICAR
   (c) DAHD (d) IASRI
6. **Nodal agency for registration of new breeds of livestock and poultry in India-**
   (a) IVRI (b) NBAGR
   (c) DAHD (d) IASRI
7. **Headquarter of Animal Welfare Board of India is located in-**
   (a) New Delhi (b) Chennai
   (c) Haryana (d) Kolkata
8. **National Institute of Animal Welfare (NIAW) is located in-**
   (a) New Delhi (b) Chennai
   (c) Hyderabad (d) Faridabad
9. **Animal Welfare Board of India established under-**
   (a) Prevention of Cruelty to Animals Act, 1960
   (b) Prevention of Cruelty to Animals Act, 1965
   (c) Prevention of Cruelty to Animals Act, 1982
   (d) Prevention of Cruelty to Animals Act, 2006

10. **Headquarters of The World Organisation for Animal Health (OIE) is located at-**
(a) Geneva (b) Paris
(c) Rome (d) New York

11. **All meat shops and slaughterhouses must have ——————license**
(a) FSSAI (b) APEDA
(c) MFPO (d) PFA

12. **The livestock sector alone contributes ————% in total Agricultural GVA of India-**
(a) 10% (b) 5%
(c) 25% (d) 28%

13. **The overall contribution of Livestock Sector in total GVA is near————% at current prices during 2019-20.**
(a) 4.11 (b) 8.3
(c) 5.2 (d) 7.3

14. **APEDA has its headquarter at-**
(a) Kolkata (b) Bengaluru
(c) New Delhi (d) Chennai

15. **FSSAI has its headquarter at-**
(a) Kolkata (b) Bengaluru
(c) New Delhi (d) Chennai

16. **According to 20th Livestock census of India, which state has highest Cattle population-**
(a) Uttar Pradesh (b) Rajasthan
(c) West Bengal (d) Madhya Pradesh

17. **According to 20th Livestock census of India, which state has highest Goat population-**
(a) Uttar Pradesh (b) Rajasthan
(c) Bihar (d) Madhya Pradesh

18. **According to 20th Livestock census of India, which state has highest Mithun population-**
(a) Arunachal Pradesh (b) Manipur
(c) Nagaland (d) Jammu & Kashmir

19. **According to 20th Livestock census of India, which state has highest Yak population-**
(a) Arunachal Pradesh (b) Manipur
(c) Nagaland (d) Jammu & Kashmir

20. **Which of the following is not classified as Livestock-**
(a) Dog (b) Poultry
(c) Rabbit (d) All the above

21. **Which of the following organization was established under Prevention of Cruelty to Animals Act, 1960-**
(a) FSSAI & APEDA (b) AWBI & CPCSEA
(c) FSSAI & AWBI (d) APEDA & CPCSEA

22. **First Veterinary College in the world was established at————————in 1762**
(a) Mumbai, India (b) Lyon, France
(c) Paris, France (d) Rome, Italy

23. ***Office International des Epizooties* (OIE) was established in**
(a) 1902 (b) 1924
(c) 1889 (d) 1995

24. **Prevention of Food Adulteration Act-1954 is now replaced by-**
(a) Food Safety and Standard Act (FSSA),2006
(b) Bureau of Indian Standard (BIS),1986
(c) Milk and Milk Product Order (MMPO),1992
(d) Meat Food Product Order (MFPO),1973

25. **Operation flood is related to-**
(a) Milk (b) Meat
(c) Egg (d) Water

26. **World's first cloned buffalo calf developed by NDRI Karnal, Haryana-**
(a) SAMRUPA (b) PRATHAM
(c) GARIMA (d) MAHIMA

27. **World's first IVF (In Vitro fertilization) buffalo calf developed by NDRI Karnal**
(a) SAMRUPA (b) PRATHAM
(c) GARIMA (d) MAHIMA

28. **According to 2019-20, highest per capita milk availability is present in-**
(a) Punjab (b) Haryana
(c) Rajasthan (d) Gujrat

29. **World Rabies Day is celebrated on the death anniversary of**
(a) Louis Pasteur (b) Robert Koch
(c) Darwin (d) Robert Hooke

30. **Father of White revolution**
(a) M.S. Swaminathan (b) Dr.Verghese Kurien
(c) Sardar Patel (d) Lal Bahadur Shastri

31. **Silver revolution is related to-**
(a) Egg/Poultry Production (b) Meat production
(c) Milk production (d) None of the above

32. **Project Directorate on Poultry (PDP) Hyderabad is now known as-**
(a) Directorate of Poultry Research, Hyderabad
(b) Poultry Research Institute, Hyderabad
(c) National Institute of Poultry Research, Hyderabad
(d) None of the above

33. **Project Directorate on Cattle (PDC) Meerut is now known as-**
(a) National Research Centre on Cattle, Meerut (UP)
(b) Central Institute for Research on Cattle, Meerut (UP)
(c) National Institute of Cattle Research, Meerut (UP)
(d) None of the above

34. **Current Director General of ICAR is-**
(a) Dr.S.Ayyappan (b) Dr.K.M.L.Pathak
(c) Dr. Himanshu Pathak (d) Dr. N.S.Rathore

35. **ICAR foundation day is celebrated on-**
(a) July 16 (b) July 6
(c) September 28 (d) October 10

36. **President of the ICAR is-**
(a) Union Minister of Agriculture & Farmer (b) Secretary, DARE
(c) Director General of ICAR (d) Finance Minister of India

37.
38.
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47.

37. **Total number of indigenous breeds of pig registered in NBAGR are-**
(a) 7 (b) 8
(c) 9 (d) 10

38. **Total number of indigenous breeds of cattle registered in NBAGR are-**
(a) 30 (b) 39
(c) 50 (d) 55

39. **As compared to 19th livestock census, in 20th livestock census population of all following species decreases except**
(a) Mithun (b) Pig
(c) Horse (d) Camel

40. **Total number of indigenous breeds of livestock and poultry now in India which are registered in NBAGR-**
(a) 102 (b) 202
(c) 302 (d) 402

41. **Chairperson of Niti Aayog is-**
(a) Prime Minister of India (b) Home Minister of India
(c) Finance Minister of India (d) President of India

42. **Niti Aayog was established on-**
(a) 1 January 2015 (b) 1 January 2016
(c) 25 December 2014 (d) 25 December 2015

43. **Ranking of India in world population of buffalo-**
(a) First (b) Second
(c) Third (d) Fourth

44. **Ranking of India in world population of cattle-**
(a) First (b) Second
(c) Third (d) Fourth

45. **Which state is known as poultry capital of India.**
(a) Maharashtra (b) Tamil Nadu
(c) Haryana (d) Andhra Pradesh

46. **Which of the following is/are voluntary standard(s) for food industry?**
(a) BIS (b) FSSAI
(c) AGMARK (d) Both a & b

47. **Amber box mentioned in WTO agreement deals with-**
(a) Subsidies on agriculture (b) Domestic support system
(c) Production limit measures (d) Geographical indicators of agriculture produces

☆☆☆

Answer Key

1. 1-e, 2-c, 3-f, 4-b, 5-a, 6-d
2. 1-e, 2-c, 3-b, 4-a, 5-d
3. 1-d, 2-a, 3-e, 4-b, 5-c
4. Shalihotra
5. DAHD
6. NBAGR
7. Haryana
8. Faridabad
9. Prevention of Cruelty to Animals Act, 1960
10. Paris
11. FSSAI
12. 28%
13. 5.2
14. New Delhi
15. New Delhi
16. West Bengal
17. Rajasthan
18. Arunachal Pradesh
19. Jammu & Kashmir
20. All the above (Note: Livestock comprises of all farm animals having economic importance (milk/meat/wool/draught purpose) Ex. Cattle, Buffalo, Sheep, Goat, Camel, Pig, Horse, Mule, Donkey, Pony etcPoultry, dog, cat and rabbit are not fallen under category of livestock
21. AWBI & CPCSEA
22. Lyon, France
23. 1924
24. Food Safety and Standard Act (FSSA),2006
25. Milk
26. SAMRUPA
27. PRATHAM
28. Punjab
29. Louis Pasteur
30. Dr.Verghese Kurien
31. Egg/Poultry Production
32. Directorate of Poultry Research, Hyderabad
33. Central Institute for Research on Cattle, Meerut (UP)
34. Dr. Himanshu Pathak
35. July 16
36. Union Minister of Agriculture & Farmer
37. 10
38. 50
39. Mithun (Note: Cattle, Buffalo, Sheep, Goat and Mithun population increases in this census as compared to the previous census)
40. 202
41. Prime Minister of India
42. 1 January 2015
43. First
44. Second
45. Tamil Nadu
46. AGMARK
47. Subsidies on agriculture

☆☆☆



Section-III
Subject
Analysis



Table 1: Chromosomes number of various animals/organisms/plants

S.No.	Animal/Organism/Plant	Chromosome number (Diploid or 2N)
1.	Drosophila	08
2.	Roundworm (*Caenorhabditis elegans*), House fly (*Musca domestica*)	12
3.	Pea (*Pisum sativum*)	14
4.	Yeast (*Saccharomyces cerevisiae*)	32
5.	Cat, Pig	38
6.	Rabbit	44
7.	Swamp buffalo	48
8.	River buffalo/Water buffalo	50
9.	Sheep	54
10.	Mithun	58
11.	Goat, Cattle (zebu/exotic), Yak	60
12.	Donkey	62
13.	Mule, Hinny	63
14.	Horse	64
15.	Camel	74
16.	Dog, Chicken	78
17.	Mice	40
18.	Rat	42
19.	Hamster	44
20.	Guinea pig/ Sea pig	64

- **Types of chromosomes according to the position of centromere**:-
  1. **Telocentric (i-shape):** terminal centromere
  2. **Acrocentric (J-shape) :** sub-terminal centromere or centromere is located close to the end giving a very short arm and exceptionally long arm
  3. **Submetacentric (L-shape) :** centromere is located near to the center
  4. **Metacentric (V-shape):** centromere in the center & chromosome with equal arms

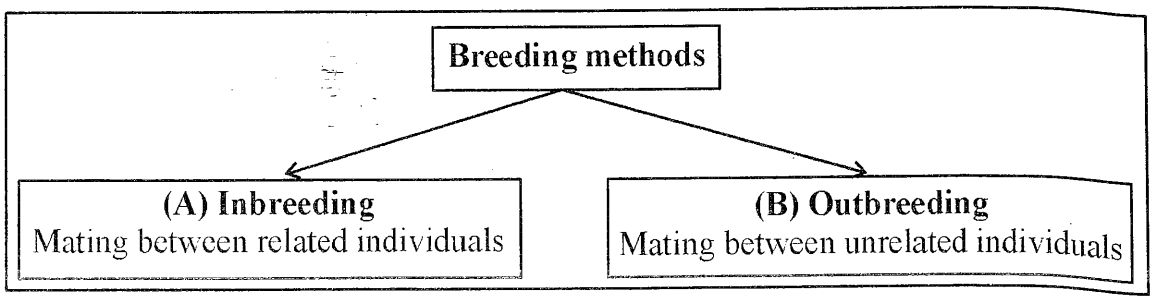


Table 2: Two types of inbreeding

S.N.	Index	Close breeding	Line breeding
1.	Define	More intensive form of inbreeding	Less intensive form of inbreeding
2.	Examples	**1. Parent-offspring mating:-** a. Sire to daughter mating b. Son to dam mating **2. Full sib mating**	**1. Half-sib mating** **2. Cousin mating** **3. Grand parent-grand son/granddaughter mating**

Note:-

1. Full sib/full brother & sister: whose both parent are common
2. Half-sib/half brother & sister: whose one parent is common
3. Double first cousin: whose four grandparents are common
4. Single first cousin: Whose two grand-parents are common
5. Half-firstcousin: whose one grand-parent is common

Table 3: The coefficient of relationship & Inbreeding coefficient

- Inbreeding coefficient of an individual is the probability that two alleles at a locus are identical by decent (carried by a common ancestor and exact copies of single allele).
- Coefficient of relationship between two individuals is the probability that they both carry a particular allele due to common ancestry.

S.N.	Mating	Coefficient of relationship (Rxy)	Inbreeding coefficient (Fx) (value of Fx = 1/2 Rxy)
1.	**Close breeding:** a) Sire to daughter mating b) Son to dam mating c) Full sib mating	**0.50 or 50%**	**0.25 or 25%**
2.	a) Half-sib mating b) Grand parent-grandson/ granddaughter mating c) Double first cousin mating d) Uncle- niece mating	**0.25 or 25%**	**0.125 or 12.5%**
3.	Single first cousin mating	0.125 or 12.5%	0.0625 or 6.25%
4.	Half first cousin mating	0.0625 or 6.25%	0.03125 or 3.125%

Table 4: Types of Outbreeding

S.N.	Types of outbreeding	Define	Special point
1.	Out-crossing	Mating between unrelated animals of the same breed; progeny produced: "outcross"	a) **Simplest form** of outbreeding. b) Used for production of parent/seed stock.
2.	Grading-up	Mating of the pure-bred sire of the descriptive breed with a native non-descript female, generation after	a) Use to obtain **Pure breed.** b) Greatest improvement in first cross.

		generation & **pure breed is obtained just after 7-8 generation.**	
3.	Top crossing	Mating of pure-bred male with unrelated female. Mating of female to the last male in top side of pedigree.	It is just like grading up (but only for one generation)
4.	Cross breeding	Mating between animals of **different breeds within same species;** Progeny produced: "**cross-bred"**	a) **Use to obtain New breed.** b) Used for breed complemenatrity, Gene introgression and fusion of genetic variability. c) Crossbreeds of sheep are: Hissardale, Avikalin, Avivastra, Avishaan etc. d) Crossbreeds of cattle are: Karan-swiss, Jersindh, and Frieswal etc.
5.	Species hybridization	Mating between animals of **different species**	**Farthest or most extensive form** of outbreeding

- **Examples of species hybridization:-**
  1. **Cattalo:** American buffalo bull × Exotic cattle
  2. **Pien-niu:** Cattle ×Yak
  3. **Zebroid:** Zebra × Horse
  4. **Mule:** Mare × Jack
  5. **Hinny:** Stallion × Jennet
  6. **Cama:** Camel × llama
  7. **Tigon:** Male tiger × Female lion
  8. **Liger:** Male lion × Female tiger
  9. **Zonkey**: Zebra × Donkey
  10. **Jasta (male)/ Jastamin (female):** Mithun × Cow
  11. **Jechha (male)/ Jessam (female):** Mithun × Siri cow

Note:-

- **Inbreeding** is also known as **genetic assortative mating** while **out-breeding** is also known as **genetic disassortative mating**.
- **Inbreeding increases homozygosity while out-breeding increases heterozygosity.**
- **Geep** is a **chimera** produced by **combining the embryos of a goat & a sheep.**
- A sheep-goat chimera should not be confused with a sheep-goat hybrid. Chimera has four parents but a hybrid has only two parents.
- In chimera, two or more than two different cell lines derived from two or more than two zygotes. In mosaic, two or more than two different cell lines derived from same zygote.
- Chimera and Mosaic develops due to mitotic non-disjunction.
- Selective breeding- **It is the out-crossing within a herd** with the help of selected sires. In India, the **best method for improvement of buffalo breeds is selective breeding**.

- **Inbred line** - developed from two generations of full-sib mating. A line is called inbred line, if it has **minimum inbreeding coefficient of 0.375 or 37.5%**
- **In crossing** - Crossing of two different inbred lines derived from the **same breed**.
- **In cross breeding** - Crossing of the two different inbred lines derived from **different breeds.**
- **Inbreeding depression:** Reduction in phenotypic value of traits due to inbreeding (-2pqdF).
- **Heterosis:** Improed perdormance of progeny over parental population due to outbreeding (Mean of F_1 progeny – Mean of parents)

Grading up: By grading up pure breed is obtain just after 7-8 generation

Table 5: Purity developed by grading up

Generation	% replaced (or) % purity	% non-descript
0	0 %	100%
1st	50 %	50%
2nd	75%	25%
3rd	87.5%	12.5%
4th	93.75%	6.25%
5th	96.8%	3.125%
6th	98.4%	1.56%
7th	**99.2%**	0.780%
8th	**99.6%**	0.39%

- **Advantages of cross-breeding:-**
  1. **Breed complementation:** to combine good qualities of two or more breeds in one crossbred.
  2. **To take advantage of hybrid vigour**
  3. **Gene introgression – Introduction of specific allele into established breed through repeated back crossing**
  4. Use for improving those traits that cannot be improved by selection within a breed due to less genetic variation.

Table 6: Inheritance of characters

S.N.	Index	Sex-limited traits	Sex-influenced traits	Sex-linked traits
1	Gene of these traits are present on	Autosome	Autosome	**Sex chromosomes (X-linked or Y- linked)**
2	Examples	**Semen production; Egg production** in poultry; **Milk production; Secondary sexual characters;** Responsible for	**Baldness in human; Polled & horned Dorset sheep; Coat color in Ayershire cattle**	Barred plumage in poultry; broodiness; feather growth in poultry (rapid /slow feathering); cryptorchidism in horse; Autosexing (method of sexing) of chick; Skin color of chicken; Eye color, body color and

		Sexual dimorphism; Cock fighting; Hen feathering		wing size in drosophila **X-linked**:-Hemophilia, Colourblindness **Y-linked**:- Hypertrichosis (excess hair on ear pinna), TDF (Testis-determining factor)
3	Inheritance of traits is through	Both male & female	Both male & female	Inheritance of X-linked is through both male & female but **Inheritance of Y-linked is through male only**
4	Inheritance pattern	Mendelian	Mendelian	Distinctive

Note: -

- **A phenotype caused by sex linked recessive gene: -**
  - Found in male
  - Fails to appear in daughter
  - Seldom appear in father & son (if mother was carrier)
- **A phenotype caused by sex linked dominant gene: -**
  - Found in female
  - Found in all daughters (if father showed it)
  - Fail to transmission in son (if mother did not exhibit phenotype)
- **X-linkage:-** Genes on non-homologus region of X-chromosome
- **Y-linkage:-** Genes on non-homologus region of Y-chromosome
- **Sex linkage: -** Genes located on X chromosome (in XY system) or on Z chromosome (in ZW system)
- Testis-determining factor (TDF) is also known as Sex determining region on Y chromosome (SRY)
- Phenotypic expression of sex-influenced traits showed by heterozygotes

Table 7: Inheritance of sex-linked characters

Criss-cross inheritance	Noncriss-cross inheritance
Parent of one generation passes the sex-linked character to the opposite sex in the next generation	Parent of one generation passes the sex-linked character to the same sex in the next generation
Types of criss-cross inheritance a. Diagenic:- Father → Daughter → Grandson b. Diandric:-Mother → Son → Granddaughter	Types of Noncriss-cross inheritance a. Holandric:-Father → Son→ Grandson b. Hologenic:-Mother →Daughter →Granddaughter

- **Hardy-Weinberg law/ Square law/ Random mating principle:** Proposed by G.H. Hardy (English mathematician) W. Weinberg (German physician) in 1908, independently.
- Law of genetic constancy states that: In a **large, random-mating population**, in **absence of mutation, migration & selection**, the **gene & genotypic frequencies remain constant** from generation to generation.

Note: Panmixia means random mating.

Table 8: Relationship between gene & genotypic frequencies in HW Equilibrium

Index	Genes of parents		Genotypes of offspring		
	A	a	AA	Aa	aa
Their frequencies	p	q	P	H	Q
Important formula	p+q=1		P+Q+H=1		

Note:

1. Gene frequency in term of genotypic frequencies are: **p=P+1/2H; q=Q+1/2H**
2. **$P= p^2$; H= 2pq; $Q= q^2$**

H.W.Equation: $(p^2) + (2pq) + (q^2) = 1$

Note:

1. Frequencies of all alleles at one locus must be equal to 1
2. Frequency of heterozygotes (2pq) cannot be greater than 50% and this is maximum when the gene frequencies are equal or p=q=0.5
3. Genotypic frequency of offspring will depend only upon gene frequencies of parents

- **Forces affecting H.W. Equilibrium:-**

1. **Systematic forces (Directional change)**: acting both in large as well as small population & can be predicted in amount as well as in direction
   Examples:-**Mutation, Migration & Selection**.
2. **Dispersive forces (Random change)**: Acting only in a small population, can be predicted only in an amount, not in direction
   Examples: **-Random genetic drift (Sewell Wright effect)**

- **Central tendency, measures of dispersion & relative measures of dispersion**

1. **Central tendencies:** it tells about the central position of any series
   Examples: **Mean** (arithmetic mean, geometric mean, harmonic mean & weighted mean), **Mode & Median**
2. **Measures of dispersion**: degree to which data tends to spread around an average
   Examples: **Range, Variance, Standard deviation, Mean deviation & Standard error (SE)**
3. **Relative measures of dispersion:**
   Examples: **Coefficient of variance (CV)** y No unit

Note:-

- **Range:** The difference between the smallest and largest values in a set of data
- **Mean deviation:** mean absolute deviation from an average. Its value is least affected by extreme values of a series.
- **Standard deviation (S.D.):** -It is the ideal measure of dispersion. Its value is always greater than mean deviation (M.D.)
  Note: Std. deviation = 5/4(M.D.)
- **Variance:** It is equal to square of standard deviation
- **Standard error (SE)** = $S.D/\sqrt{N}$ Where N is no. of observation
- **Coefficient of variance (CV)** = S.D/A.M × 100 where AM is arithmetic mean
- **Array series:** Arrangement of data in ascending or descending order of their magnitude.
- Cartogram/ Mapgraph: diagrams are made to represent geographical situations.

- **Historigram** (line graph) is time series graph.
- **Histogram** is frequency distribution graph. It gives value of **Mode.**
- **Ogive** is a cumulative frequency curve. It gives value of **Median.**

- **Mendel's Laws:-**
  1. **First law/law of segregation of gametes/law of purity of gametes**: -It is universally accepted Mendel's law.
  2. **Second law/law of independent assortment**: Its exception is linkage.

Table 9: Genotypic and phenotypic ratios of Mendelian crosses

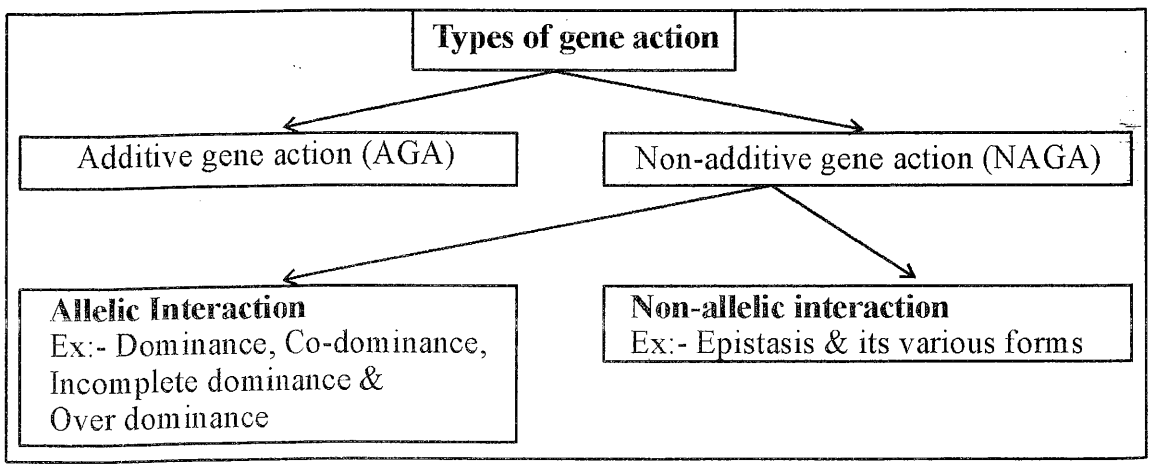
S.N.	Types of cross	Number of traits taken during crossing	F_2 phenotypic ratio	F_2 genotypic ratio
1	Monohybrid cross (TT × tt)	One	3:1	1:2:1
2	Dihybrid cross (YYRR × yyrr)	Two	**9:3:3:1**	1:2:1:2:4:2:1:2:1
3	Trihybrid cross (YYRRTT×yyrrtt)	Three	**27:9:9:9:3:3:3:1**	

Note: Dihybrid cross = 2 × monohybrid cross

- F2 phenotypic ratio in dihybrid cross = (3:1) × (3:1) = 9:3:3:1
- F2 genotype ratio of dihybrid cross = (1:2:1) × (1:2:1) = 1:2:1:2:4:2:1:2:1
- Number of gamete, phenotype, genotype if parents are heterozygous
  - No. of gametes = 2^n
  - No. of phenotype = 2^n
  - No. of genotype = 3^n
  - No. of zygote = 4^n
  - Proportion of homozygous recessive in progeny = $(¼)^n$

Note:-

- Back cross is two types: Test cross & Out cross
- Back cross = F_1 hybrid x Any of the parent (Tt × TT or tt)
- Test cross = F_1 hybrid x Homozygous recessive parent (Tt × tt)
- Out cross = F_1 hybrid x Homozygous dominant parent (Tt × TT)
- Test cross distinguish between homozygous dominant and heterozygote. It is used to identify carriers of recessive allele.



Note:

- AGA is individual effect of each gene. Examples of AGA:
  - Selection (Basis of selection, Methods of multi-trait selection, Response to selection etc.)
  - Breeding value
  - General combining ability
  - Heritability (Resemblance between relatives)
- NAGA is combination effect of genes. Examples of NAGA:
  - Mating system (Inbreeding, Outbreeding, Inbreeding depression, Heterosis etc.)
  - Specific combining ability
  - Recurrent selection
  - Reciprocal recurrent selection
- Allelic interaction is also known as intragenic interaction or intra-allelic interaction.
- Non-allelic interaction is also known as intergenic interaction or inter-allelic interaction.

- **Types of allelic interactions:-**
  1. **Dominance**: -When dominance is complete, then phenotype of heterozygote & dominant homozygote is same.
  2. **Incomplete dominance/Partial-dominance**: - the phenotypic value of heterozygote is intermediate between dominant & recessive homozygous.
  3. **Co-dominance:** Phenotype of heterozygote progeny is mixture of dominant & recessive homozygous parents.
  4. **Over-dominance:** -When the phenotypic value of heterozygous is superior to either of homozygous.

- **Sample question 1:** If AA=10 & aa = 0, then which of the following is the example of
  1. Over-dominance (a) Aa=5 (b) Aa=7 (c) Aa=10 **(d) Aa=15**
  2. Complete dominance (a) Aa=5 (b) Aa=7 **(c) Aa=10** (d) Aa=15
  3. Incomplete dominance (a) Aa=5 **(b) Aa=7** (c) Aa=10 (d) Aa=15
  4. Additive gene action **(a) Aa=5** (b) Aa=7 (c) Aa=10 (d) Aa=15

Note:-Answer is indicating by bold letter.

Table 10: Phenotypic ratios of various gene interactions

Types of Allelic interaction & their F_2 Phenotype ratio	Types of Non-allelic interaction & their F_2 Phenotype ratio
1. Incomplete dominance (1:2:1) Ex: -feather colour in Andalusian fowl	1. Collaborative gene action (9:3:3:1) Ex:- Comb type in chicken
2. Co-dominance **(1:2:1)** Ex: -AB blood group in human; the carrier of sickle cell anemia (Hb^SHb^A); **Roan coat colour in short-horned cattle**	2. Dominant epistasis (12:3:1) Ex: - Fruit color in squsb
3. Over-dominance (1:2:1)	3. Recessive epistasis/Supplementry gene action (9:3:4) Ex: - Hair/ coat color in dog (Labrador); Hair/ coat color in mouse

	4. Duplicate-Recessive gene action/ Complementary gene action (9:7) Ex: - Flower color in pea & *Lathyrus odoratus*
	5. Duplicate Dominant epistasis/ Duplicate gene action (15:1) Ex: - Shank condition in chicken
	6. Dominant-recessive interaction/ Inhibitory gene action (13:3) Ex: - Plumage color in chicken
	7. Duplicate dominant gene with cumulative effect (9:6:1) Ex: - Coat color in pig (Duroc jersey pig)

Note:-

(1) Pleiotropic gene: a gene with multiple phenotypic effects or a single gene that controls more than one trait

Examples:-

- Sickle cell anemia gene in human
- Halothane gene in pigs
- Double muscling gene in cattle
- Merle coat color in dog

(2) Polygenes: when one character is control by more than one gene.

(3) Multiple allelism-more than two alternative form of a gene located on the same locus of the homologous chromosome are known as multiple alleles.

- Multiple alleles are produced by mutation
- Multiple alleles are found in the population, not in the single individual
- **Examples:** ABO blood group in human (3 alleles); Coat colour in Rabbit (4 alleles); Eye colour in Drosophila (15 alleles)

Table 11: ABO blood group in human

S.N.	Blood group (Phenotype)	Genotypes	Antigen on RBC	Antibodies in plasma
1	A	I^AI^A or I^AI^O	A	Anti-B
2	B	I^BI^B or I^BI^O	B	Anti-A
3	AB	I^AI^B	A,B	Neither
4	O	I^OI^O	Neither	Anti-A & Anti-B

Note:

(1) **Possible no. of genotypes in multiple allelism = N (N+1)/2;** where N is the no. of alleles

(2) **Universal donor** blood group: $\mathbf{O^{-VE}}$

(3) Universal recipient blood group: $\mathbf{AB^{+VE}}$

(4) Blood group decided by the type of antigen present on surface of RBC

Sample question 2: AABbCc genotype organism produce how many types of gametes /phenotypes, genotypes & zygotes?

Solutions:-

(1) Types of gametes or phenotypes = $2^n \rightarrow 2^2 \rightarrow 4$ (where n = no. of heterozygote)

(2) Types of genotypes = $3^n \rightarrow 3^2 \rightarrow 9$

(3) Types of zygotes = $4^n \rightarrow 4^2 \rightarrow 16$

- **Heterosis/Hybrid-vigour:**
  - Superiority of crossbred offspring over the average performance of their parents
  - It is depended upon extent of heterozygosity & also depend upon Non-additive gene action (Dominance, Over-dominance & Epistasis)
  - At each generation, heterozygosity reduced by 50% and heterosis also, so we can say that maximum hybrid vigouris obtained in F_1 generation.
  - Heterosis in F_2 is diminished due to inter-se mating.
  - Heterosis in F_2 generation would be half of Heterosis of F_1 generation. Heterosis in F_3 remain constant as F_2 and subsequent generations.
  - Traits with low h^2 show high degree of heterosis and inbreeding depression or vice-versa.
- **Uses:-**
  - It is used to produce commercial stocks of high individual merits
  - It is commonly used in broiler, layer, swine and sheep production because of their high fertility.

Table 12: The difference between heritability & repeatability

S.N.	Index	Heritability (h^2)	Repeatability (r)
1.	**Formula**	**(1)** $H^2_B = V_G/V_P$ **(2)** $h^2_N = V_A/V_P$ Where:- H^2_B (heritability in broad sense); h^2_N (heritability in narrow sense); V_G (Genotypic/genetic variance); V_P (Phenotypic variance); V_A (Additive genetic variance or breeding value)	$r = V_G + E_P/V_P$ Where:- E_P (permanent component of environment)
2.	**Define**	**(a)** h^2_N is the regression of breeding value on phenotypic value. **(b)** H^2_B is the ratio of genotypic variance to phenotypic variance	(a) It is the regression of future performance on present performance. (b) Repeatability is the upper limit of heritability.
3.	**Method of estimation**	Resemblance between relatives	Intra-class correlation
4.	**Used for estimation of**	EBV	MPPA

Note:-

1. Range of heritability & repeatability for a trait is 0 to 1
2. Heritability can be use to predict breeding value of an animal from its phenotypic value.
3. Most probable producing ability (MPPA)/Expected real producing ability (ERPA) is estimated by repeatability.
4. MPPA: It is the prediction of producing ability of an animal.
5. Repeatability is used in making culling decisions.
6. Broad sense heritability is called as Degree of genetic determination.
7. Repeatability is the proportion of observed phenotypic variation that is caused by permanent differences among individuals in a population.

- **Heritability of different traits:-**
  (a) Reproductive traits: Low
  (b) Productive traits: Medium
  (c) Growth traits: High

Table 13: Covariance of relatives

S.N.	Relatives	Covariance	Regression (b) or correlation (t)
1.	Offspring & one parent	$1/2V_A$	$h^2 = 2b$
2.	Offspring & mid parent	$1/2V_A$	$h^2 = b$
3.	Half sibs	$1/4V_A$	$h^2 = 4t$
4.	Full sibs	$1/2V_A+1/4V_D+V_{EC}$	$h^2 = 2t$

Sample question 3: If correlation coefficient of half sibs is 0.2, then heritability of a trait is?
Solution: For half sibs, $h^2 = 4t$, so heritability of trait is 0.8
Sample question 4: If repeatability of a trait is 0.30, then which of the following value is not possible for its heritability.
(a) 0.20 (b) 0.15 (c) 0.25 (d) 0.45
Hint: The value of repeatability is generally greater than heritability so, answer is 0.45

- **Selection**:
  - Choose the parents for next generation. Criteria- **"keep the best & cull the poorest".**
  - Selection is the non-random process of differential reproduction and survival of different genotypes in a population.
- **Selection acts through:**
  - Differences in fertility among individuals in parent generation
  - Differences in viability among the progeny
  - Choice of mated individuals
- **Methods of selection/Multi-trait selection**:
  Given by Hazel and Lush in 1942
  (1) Tandem selection: It involves selection of only one trait at a time.
  - It is **least efficient method of selection**
  - Genetic progress depends on genetic correlation of traits.
  - Sea saw effect observed for negatively correlated traits.
  - In tandem selection, genetic improvement per generation in each trait of n trait would be only **1/n times** which would be made if single trait was the sole object of improvement over the entire period of selection.

  (2) Independent culling method: It involves selection of two or more traits at a time.
  - A minimum culling standard is fixing for every trait; an animal fails to meet the minimum standard for any one trait will cull irrespective of their merit in other traits.
  - Ex: -Assume that minimum std. for milk-yield is 10 liters per day & for fat is 5%; A cow giving 15 liters milk per day with 4% fat then it should be culled.
  - Culling level-tedious

  (3) Total score-card/Selection index method: It is practiced for several traits simultaneously.
  - It is **the best method of selection.**
  - Selection index: It is the single numerical expression, which predicts the breeding value of an individual.

- A scorecard is prepared by giving proper weight to each trait & animal with higher score card should be selected.
- Culling level- Flexible

♦ **Efficiency of above three method of selection:**

- Selection index is better than tandem selection because no. of traits (n) increases, efficiency of selection index increases
- Selection index is better than independent culling level because n increases, efficiency of selection index increases but when intensity of selection increases, efficiency of selection index decreases
- Independent culling level is better than tandem selection because intensity of selection increases, efficiency of independent culling level increases

♦ **<u>The basis of selection/Aids to selection/Criteria of selection</u>: -**

(1) Individual selection/Mass selection: Based on performance of individual
(2) Pedigree selection: Based on performance of ancestors
(3) Progeny testing: Based on performance of their progeny
(4) Family selection: Based on performance of their collateral relatives

Note:-

- Individual selection/Performance testing/phenotypic selection
- Individual selection & Pedigree selection are effective when heritability of the trait is high.
- **Sire: more than half of the herd**
- **Progeny testing** is used for the **selection of sire.**
- Progeny testing & Family selection are effective when heritability of the trait is low.
- The most accurate basis of selection for high h^2 traits is the individual selection.
- Most effective & best/ ideal basis of selection is progeny testing.
- Progeny testing is a "two-way selection system"
- Individual selection is the simplest, more rapid & most commonly used basis for selection.
- In individual selection, animals are selected on the basis of their own phenotype
- Ideal condition for family selection- low h^2, large family size and absence of "C" effect.
- Sib selection is best basis of selection for carcass traits.
- Shortest generation interval and preliminary selection are merits of pedigree selection.
- Progeny testing is a two stage selection.
- **Genotype environment correlation:** - When the better genotypes are given better environment, it introduces a correlation between genotypic value and environmental deviation and due to this phenotypic variance is increased. It is part of genetic variance.
- **Genotype environment interaction:** - Differential response of different genotypes in different environments is called genotype environment interaction. It is part of environmental variance.
- **C-effects:** - Environmental influences which differ from one family to another but which affect members of the same family.
- **Sire index:** Result of progeny testing in the form of index which gives the genetic worth of sire. It helps in ranking of bull according to production ability of sire. Different sire index given by different scientist as:
  - ✓ Simple daughter average index – Edward
  - ✓ Equiparent/ Intermediate index/ Yapp's index/ Mount hope index – Hansson
  - ✓ Corrected daughter average index – Krishan
  - ✓ Contemporary comparison/ Stable mate comparison – Searle
  - ✓ Contemporary daughter average index – Sunderasan

- ✓ Dairy search index – Sunderasan
- ✓ Herd-mate method- Handerson
- ✓ Maximum likelihood – Hartley & Rao
- ✓ DFREML (Derivative free restriction maximum likelihood) – Paterson & Thompson
- ✓ BLUP (Best linear unbiased prediction) – Handerson

♦ **Nucleus Breeding Schemes:-**

It contains two types of population:

(1) **Nucleus herd (N):** consists of elite females of high genetic merits (size = 10-15% top ranking females of total herd)

(2) **Test herd/Multiplier (M):** herd from the majority of the population.

Note: Generally, genetic gain achieved in Nucleus herd, it passes to Multiplier and then to Village herd/commercial herd (V)

- Improvement lag: Time taken in transfer of genetic progress from one herd (nucleus herd) to another herd.

♦ **Types of NBS based on direction of gene flow**

(1) Closed Nucleus Breeding Scheme (CNBS)

(2) Open Nucleus Breeding Scheme (ONBS)

Table 14: Differences between CNBS and ONBS

Closed Nucleus Breeding Scheme	Open Nucleus Breeding Scheme
1. Unidirectional gene flow (top to down (N → M → V)	1. Bidirectional gene flow (top to bottom & bottom to top) (N → M → V) or (V → M → N)
2. The nuclear population is entirely closed. It does not receive any gene from outside	2. Nucleus herd is open. Therefore, superior animals can enter from village herd to nucleus herd.
3. Inbreeding is more as compare to ONBS.	3. It reduce the rate of inbreeding & increases genetic progress
4. CNBS is mainly used in pigs & poultry.	4. ONBS is mainly used in cattle, buffalo & sheep.
5. Improvement lag present	5. No improvement lag

♦ **Special note:**

1. ONBS is better than CNBS
2. Basis of sire selection in NBS: Sibling test
3. For faster genetic improvement ONBS is used along with MOET (Multiple Ovulation and Embryo Transfer)
4. Sibling test is less accurate than progeny testing but due to shorter generation interval and genetic gain per year is higher in the case of sibling test that is why sibling test is preferred in NBS.

♦ **Methods of conservation of animal genetic resources:-**

(1) *In-situ* conservation: maintenance of live animals in their adaptive environment

- It is the best method for conserving a breed.

Ex: Institutional herds, Farmers herds, NGOs like- gaushalas, dairy cooperatives etc.

(2) *Ex-situ* conservation

(a) *In- vivo* **method**: conservation of live animals away from its main breeding tracts
Ex- organized herd of the **research station, Zoo, breeding park** etc.

(b) *In- vitro* **method**: conservation of living cells for long period of time
Ex- cryopreservation of **sperms, oocytes, embryos, stem cells, somatic cells** etc. & **storage of DNA**

- **New approaches of conservation**

(1) Cloning embryonic stem cell/ Inner cell mass culture
(2) Somatic cell cloning technique
- Roslin technique
- Honolulu technique

Table 15: Risk category for various species evolved by ICAR-NBAGR

S. No.	Risk status	Species	Total population	Breeding female population	Breeding male population
1.	Not at risk	C,B,S,G,H,Camel,Y,M	>20,000	>10,000	>40
		Pig and poultry	>10,000	>5,000	>40
2.	Vulnerable	C,B,S,G,H,Camel,Y,M	10,001-20,000	5001-10,000	21-40
		Pig and poultry	5,001-10,000	2501-5,000	21-40
3.	Endangered	C,B,S,G,H,Camel,Y,M	1001-10,000	501-5,000	6-20
		Pig and poultry	501-5,000	250-2500	6-20
4.	Critical	C,B,S,G,H,Camel,Y,M	Upto 1000	Upto 500	Up to 5
		Pig and poultry	Upto 500	Upto 250	Up to 5
5.	Extinct	C,B,S,G,H,Camel,Y,M	NiL	No female and no oocyte	No male and no sperm
		Pig and poultry			

(C: Cattle, B: Buffalo, S: Sheep, G: Goat, H: Horse, Y: Yalk, M: Mithun)

- **Types of correlation:**

(1) Phenotypic correlation (2) Genetic correlation (3) Environmental correlation
- Phenotypic correlation between two traits is not the sum and average of genetic and environmental correlation.

- **Causes of genetic correlation:**

(a) Pleiotropy: Permanent cause of genetic correlation
(b) Linkage: Temporary or transient cause of genetic correlation
(c) Heterozygosity

- **Correlation coefficient(r):-**

(1) If r = +1 (perfect positive correlation)
(2) If r = –1 (perfect negative correlation)
(3) If r = 0 (no correlation)

- **Examples of correlation**

1. **Positively correlated traits:-**
- Size of eggs and weight of eggs
- Milk yield and fat yield of dairy animal
- Heavier sheep produce more wool
- Heavier hen produce large sized eggs
- Birth weight and weight at weaning in cattle

2. **Negatively correlated traits:-**
   - Milk yield and fat%
   - Number of eggs produced and size of eggs
3. **No correlation:-**
   - Milk yield & horn length
   - Normal body temperature & body size

Table 16: Differences between correlation & regression

S.N.	Correlation	Regression
1.	It is the measure of association between two variables.	It is the measure of change in one trait per unit change in another trait.
2.	Correlation coefficient (r) is a pure number (having no unit)	Regression coefficient (b) carries unit
3.	Correlation coefficient is a relative measure	Regression coefficient is an absolute measure
4.	Range of r = (–)1 to (+)1	Range of b= (–) ∞ to (+) ∞
5.	The correlation coefficient measures the degree of relationship between two variables. Ex: -milk yield & fat% are (–) ve correlated	Regression coefficient measures the amount of change in a dependent variable per unit change in an independent variable. Ex: - By increasing age, systolic blood pressure also increases
6.	There is no cause & effect relationship between two variables	Cause & effect relationship between two variables is present
7.	$r_{xy} = r_{yx}$ (correlation coefficient is symmetric)	$b_{xy} \neq b_{yx}$ (regression coefficient is not symmetric)

Note:-

(1) **Fitness/ Adaptive Value/ Selective Value:** Proportionate contribution of offspring to the next generation
   - Fitness (W) = 1– S or 1– L; where S is coefficient of selection & L is load

(2) **Strength of selection/ Coefficient of selection (s):** Proportionate reduction in gametic contribution of particular genotype.
   - Genotype which is lethal then W = 0 and s = 1
   - Genotype which is fertile then W = 1 and s = 0

(3) **Phenotypic value (P)**: Observed value of a trait measured on an individual
   - Components of phenotypic value P = G+E; where P is Phenotypic value, G is Genotypic value and E is an environmental deviation in genotypic value.

(4) **Genotypic value (G)**: Average of the phenotypic values of all individuals who have the same genotype. Combined effect of all the genes as well as gene combinations carried by individual for a trait.

- **Models of genotypic value are as follows**
  - Additive dominance model (when there is no epistasis): **G=A+D**; where A is additive genetic effect or breeding value and D denotes Dominance deviation
  - Interaction model (when epistasis is present): **G=A+D+I**; where I denote interaction deviation or epistatic deviation

(5) **Population mean:** Mean of all phenotypic values of all the individuals belonging to different genotype. M = a(p-q)+2pqd
Where, p & q = gene frequencies
a = genotypic value d = dominance

(6) **The average effect of a gene**: It is the mean deviation from the population mean of individuals, which received that allele from one parent, the allele received from the other parent having come at random from the population.
Average effect of gene substitution $\alpha = a + d(q-p)$

(7) **Transmitting ability of parent**: mean deviation of progeny from its population mean

(8) **Breeding value (BV):-**
- BV is the sum of average effects of genes carried by an individual.
- BV is the value of individual judged by the mean value (performance) of its progeny.
- BV = 2 × Transmitting Ability
- BV is the twice of mean deviation of progeny from its population mean.
- BV is the sum of average effect of alleles affecting a trait.

(9) **Selection differential (S)/ Reach/ Attempted gain: -**
- It is the phenotypic superiority of selected individuals (parent) over population average before selection.

(10) **Response to selection(R) = h^2 S**
- It is the change in mean performace from parental to progeny generation brought by selection.
- It is the genetic superiority of progeny over parental population.
- Where h^2 is realized heritability, S is the selection differential.
- $S = i\sigma_p$ (Where i is the intensity of selection & σ_p is the phenotypic standard deviation)
- **Hence, $R = h^2 S = i h^2 \sigma_P = i \sigma_A r_{AP} = i \sigma_P b_{AP}$**

♦ **Special note:**
- **Factors affecting Response to selection are:**
  1. Intensity of selection (i)
  2. Additive genetic variance (σ_A)
  3. Accuracy of selection (r_{AP})
  4. Population size
  5. Generation interval
- **Factors affecting the intensity of selection (i) or selection differential (S) are:**
  1. Proportion of population selected
  2. Phenotypic standard deviation (σ_P)
  3. Sex of animal under selection
  4. Number of traits under selection
  5. Accurate measurement of the trait

(11) **Genetic slippage:** Reduction in the breeding value when population performs in environment other than that in which it was selected.

(12) **Correlated response to selection:** Change in performance from parent to progeny generation for the trait which is not being directly selected. It occurs due to pleiotropic effect.

(13) **Crossing over**: Exchange of segment between non-sister chromatids of homologous chromosomes in pachytene stage of Meiosis-I.

(14) **Interference:** Crossing over and chiasmata formation in one region of chromosome interfere with another crossing over and chiasmata formation near it.

(15) **Linkage:** Presence of two or more than two genes on same chromosome affecting two or more than two traits called linkage.
- It is the exception of Mendel's law of independent assortment
- It is detected by test crossing
- Complete linkage (i.e. no crossing over) is found in male drosophila and female silk worm.

- **Factor affecting linkage:**
  1. Distance between linked genes: Distance↑ = Linkage↓
  2. Age of animal: Age↑ = Linkage↑
  3. Temperature: Temperature↑ = Linkage↓
  4. X-ray: Linkage↓

  (16) Linkage group: All the genes present on a given pair of chromosome constituted a linkage group.
  Linkage group = Haploid no. of chromosome for a species.
  (17) Translocation: Exchange of chromosomal segments between non-homologous chromosomes
  (18) Penetrance: Percentage of individuals with a given genotype that expresses the particular phenotype. Ex: - Polydactyly condition in domestic fowl.
  (19) Expressivity: Degree or extent to which a given genotype is express phenotypically. Ex: Piebald condition in Beagle dog; Mule footed condition in pig.
  (20) Phenocopy: Environmentally induced condition. Ex: - Rumplessness in chicken.
  (21) Variation: (a) Genetic variation (b) Environmental variation
- **Components of variance**
  $V_P = V_G + V_E$
  $V_G = V_A + V_D + V_I$
  $V_P = (V_A + V_D + V_I) + V_E$
  Where: V_P: Phenotypic variance, V_G: Genotypic variance, V_A: Additive variance, V_D: Dominance variance, V_I: Interaction variance, V_E : Environmental variance
- **Causes of Genetic variation**
  1. Segregation (biggest cause of genetic variation)
  2. Crossing over (2nd biggest cause of genetic variation)
  3. Mutation, Migration, Selection, Random genetic drift

Statistical tests: There are four statistical tests namely Z –test, T-test, chi-square test & F- test.

Table 17: Difference between Z-test & t- test

Z-test / large sample test	T-test / Small sample test
Apply to compare sample mean & population mean When:- (1) Sample size is large (n> 30) (2) Population standard deviation or population variance is known	Apply to compare sample mean & population mean When:- (1) Sample size is small (n< 30) (2) Population standard deviation or population variance is not known

Note: **T-test** are two type (1) paired T-test (2) unpaired T-test

- **Chi-square test:-**
  - It is a **"non-parametric test"** (no population parameters are required)
  - It is applied in the case of **enumeration statistics only.**
- **Applications of chi-square test:-**
  (1) Test for the goodness of fit
  $\chi^2 = \sum (O - E)^2 / E$
  Where O is observed frequencies; E is expected frequencies; $\sum$ is summation
  (2) Test for independent attribute
  Note: Calculated value of chi-square test is always positive.

F- Test & Analysis of variance (ANOVA)

- **Application:-**
  Use to compare two variances.
  Use to compare more than two sample mean.

Note: ANOVA is used for testing significant difference between more than two sample means.

Mutation

- Sudden heritable change in genetic material
- Term mutation: Hugo de Vries
- Hugo de Vries proposed mutation theory of evolution in *Oenothera lamarckiana* (Evening primrose)

- **Types of mutation**:-
  (A) Chromosomal mutation: (1) Heteroploidy (2) Chromosomal aberration
  (B) Gene mutation: (1) Substitution (2) Frame shift mutation
- **Heteroploidy is two types:**
  (1) Euploidy: Change in number of sets of chromosomes
  (2) Aneuploidy: Change in number of chromosomes in a set
- **Examples of Euploidy:-**
  (1) 2N–N (Monoploidy/loss of one set of chromosomes)
  (2) 2N+N (Triploidy/Addition of one set of chromosomes)
  (3) 2N+2N (Tetraploidy/Addition of two sets of chromosomes)
- **Examples of Aneuploidy:-**
  (1) 2N–1 (Monosomy)
  (2) 2N–1–1 (Double monosomy)
  (3) 2N–2 (Nullisomy)
  (4) 2N+1 (Trisomy)
  (5) 2N+1+1 (Double Trisomy)
  (6) 2N+2 (Tetrasomy)
- **Two types of Substitution:**
  (1) Transition: replacement of purine by purine or replacement of pyrimidine-by-pyrimidine
  (2) Transversion: replacement of purine by pyrimidine or replacement of pyrimidine by purine

Table 18: Abnormalities of sex chromosomes in human

S.N.	Chromosomal abnormality	Condition
1.	Klinefelter's syndrome	47 (44+XXY)
2.	Turner syndrome	45 (44+XO)
3.	Super male/ Jacob's syndrome	47 (44+XYY)
4.	Super female	47 (44+XXX)

Table 19: Autosomal abnormalities in human

S.N.	Autosomal abnormality	Condition
1	Patau syndrome	Trisomy of 13th chromosome
2	Edward syndrome	Trisomy of 18th chromosome
3	Down syndrome	Trisomy of 21st chromosome
4	Cat cry syndrome	Terminal deletion of short arm of 5th chromosome

Note: Number of Barr body = No. of X-chromosome –1

- **Scientist and its contribution:-**
  - Gregor Johann Mendel: Father of Genetics
  - Bateson: term Genetics
  - Johannsen: Term Gene, Genotype, Phenotype
  - Lamarck: Theory of inheritance of acquired characters, Use and disuse of organ
  - August Weismann: Theory of continuity of germplasm
  - Charles Darwin: Theory of natural selection, Theory of Pangenesis
  - Hugo de Vries: Mutation theory of evolution
  - Jacob & Monod: Operon concept (gene regulation in prokaryotes)
  - Beadle & Tatum: One gene one enzyme hypothesis
  - Schleiden & Schwann: Cell theory
  - G.H. Shull: Term heterosis/hybrid vigour
  - Karl Landsteiner: Blood group and Rh factor
  - Morgan: Sex-linked inheritance, Term linkage, Chromosomal theory of linkage
  - C.B.Bridge: Genic balance theory of sex determination
  - HarGobind Khorana, Nirenberg & Holley: Genetic code
  - Barbara McClintock: Transposons /Transposable elements or "jumping genes"
  - Knoll & Ruska: Electron microscope
  - Sutton & Boveri: Chromosomal theory of heredity
  - Strasburger: Discovery of chromosome
  - Waldeyer: Term chromosome
  - Robert Hooke: Discovery of cell
  - Robert Brown: Discovery of cell nucleus
  - Watson and Crick: Double helical model of DNA
  - Robert bakewell: Father/ founder of animal breeding
  - J. L. Lush: Father of modern animal breeding
  - E. McClung: Chromosome theory of sex determination

- ***Some Important Points:***
  1. First outbred strain of Rat (*Rattus norvegicus*) - **Wistar Albino**
  2. Most common outbred strain of Guinea pig (*Cavia procelus*) – **Dunkin Hartley**
  3. First transgenic animal – **Mice (1981)**
  4. Wheel running activity and Escapism is commonly observed in - **Hamster**
  5. Most docile lab animal which have no tail – Guinea pig
  6. Most popular lab animal model – Mice
  7. Mutations - any heritable change and source of all genetic variation
  8. In **1944, Oswald Avery, Colin MacLeod, and Maclyn McCarty**, showed that DNA was the carrier of genetic information in bacteria
  9. Viruses that attack bacteria are called **Bacteriophages, or phages**
  10. DNA is a long, ladder-like **macromolecule** that twists to form a **double helix**. Each strand of the helix is a linear polymer of **nucleotides**
  11. Maurice Wilkins, Watson and Crick were awarded a Nobel Prize in 1962 for work on DNA structure
  12. The five model organisms whose genomes were also sequenced by the Human Genome Project are *Escherichia coli* **(a bacterium),** *Saccharomyces cerevisiae* **(a yeast),** *Caenorhabditis elegans* **(a roundworm),** *Drosophila melanogaster* **(the fruit fly), and** *Mus musculus* **(the mouse)**

13. **Genomics** - study of structure, function, and evolution of genes and genomes
14. *M. musculus* used as model organism for the study of Lesch–Nyhan disease, cystic fibrosis, fragile-X syndrome of human being
15. Genetic continuity between generations of cells is maintained through the process of mitosis
16. Genetic continuity between generations of sexually reproducing organisms is maintained through the process of meiosis
17. An organism's DNA, with its arrays of genes, is organized into structures called **chromosomes**, which serve as **vehicles for transmitting genetic information**
18. Ribosomes serve as sites where genetic information contained in messenger RNA (mRNA) is translated into proteins
19. Concentration of three RNAs as: rRNA> tRNA> mRNA
20. The shorter and longer arm of a chromosome is called the p and q arm, respectively
21. Genetic information contained in a haploid set of chromosomes constitutes the **genome**
22. The genetic material is partitioned into daughter cells during nuclear division, or karyokinesis
23. Karyokinesis is followed by cytoplasmic division, or cytokinesis
24. Cancer cells apparently avoid entering G_0 or pass through it very quickly. Other cells enter G_0 and never reenter the cell cycle
25. Each bivalent contains four member chromatids. The four membered structure, also referred to as a tetrad, contains two pairs of sister chromatids
26. Chiasma (pl. chiasmata), is thought to represent a point where nonsister chromatids have undergone genetic exchange through the process referred as crossing over
27. Inheritance is governed by information stored in discrete factors called genes. Genes are transmitted from generation to generation on vehicles called chromosomes
28. In 1866, Gregor Johann Mendel published the results of a series of experiments that would lay the foundation for the formal discipline of genetics
29. Units of inheritance - ***genes***
30. Alternative forms of a single gene-**alleles**
31. Crosses made in both these ways are called - reciprocal crosses
32. Degree of freedom for phenotypic ratio of monohybrid cross and dihybrid cross is **1 and 3**, respectively
33. The allele that occurs most frequently in a population, is called **wild-type allele**
34. Mutations that enhance the function of the wild-type product known as **-Gain-of-function mutations**
35. Mutation which causes the diminution or the loss of the specific wild-type function known as **-loss-of-function mutation**
36. Tay–Sachs disease is a **homozygous recessive disorder** in which **no functional copy of hexosaminidase A** (involved in lipid metabolism) enzyme is present, so individuals are severely affected with a fatal lipid-storage disorder and neonates die during their first one to three years of life
37. Multiple alleles can be studied only in populations
38. In epistasis, the effect of one gene or gene pair masks or modifies the effect of another gene or gene pair
39. One of the **first cases of X-linkage** was documented in **1910 by Thomas H. Morgan** during his studies of the **white eye mutation in Drosophila**. The normal wild-type red eye color is dominant to white eye color

40. Extra nuclear traits determined by mitochondrial DNA are most often transmitted through the maternal gamete while traits determined by chloroplast DNA may be transmitted uniparentally or biparentally
41. **Lynn Margulis** postulates **endosymbiotic theory** which states that mitochondria and chloroplasts arose independently about 2 billion years ago from free-living protobacteria (primitive bacteria).
42. The size of cpDNA is much larger than that of mtDNA
43. Size of mtDNA of
    a. ***Homo sapiens*** **(human)-16,569bp**
    b. *Mus musculus* (mouse)- 16.2 kbp
    c. *Drosophila melanogaster* (fruit fly)- 18.4 kbp
    d. *Saccharomyces cerevisiae* (yeast)- 75 kbp
    e. *Pisum sativum* (pea) -110 kbp
    f. *Arabidopsis thaliana* (mustard plant)- 367 kbp
44. Human mtDNA encodes **2 rRNAs, 22 tRNAs, and 13 polypeptides** essential to the oxidative respiratory functions of the organelle.
45. Mutations in Mitochondrial DNA Cause Human Disorders-
    a. **Myoclonic epilepsy and ragged red fiber disease (MERRF)** - Individuals express ataxia (lack of muscular coordination), deafness, dementia, and epileptic seizures
    b. **Leber's hereditary optic neuropathy (LHON)** - Characterized by sudden bilateral blindness
    c. **Kearns–Sayre syndrome (KSS) - Characterized by** lose their vision, experience hearing loss
46. Molecular weight of DNA molecules was determined to be in the range of **10^6 to 10^9 daltons**
47. Telomerase, first discovered by **E. Blackburn and Carol Grieder** in subsequent studies of **Tetrahymena in 1984** and they were awarded **Nobel Prize in 2009**, has helped us understand the solution to the problem of telomere shortening
48. Descending order of M_w of various Histone proteins are **H1> H3> H2A > H2B >H4**
49. H1, H2A and H2B proteins are **Lysine-rich** while **H3 and H4 proteins** are **Arginine-rich**
50. In all vertebrates, including humans, the sequence **of Telomeric DNA** is consisting of short Tandem repeats of **5-TTAGGGG-3**
51. **Variable number tandem repeats (VNTRs)** are DNA sequences may be 15 to 100 bp long and are found within and between genes. Many such clusters are dispersed throughout the genome, and they are often referred to as **minisatellites** and use as basis for **DNA fingerprinting**.
52. BLUP is the best method for evaluating the breeding value of bulls and rank the sires according to their genetic merit. BLUP can estimates the breeding value of individual having no records
53. For threshold traits sib selection is recommended
54. Family selection does not increase generation interval
55. **Probable Breeding Value** of an individual is the estimated genetic superiority of the individual over the average of the group from which it was selected
56. Selection index constructed by multiple regression analysis as **(I) = $b_1p_1+b_2p_2+.....+b_np_n$**
57. Average age of parents at the time of birth of their offspring is termed as generation interval
58. Interval between the matings made in successive generation is generation interval
59. Overdominace gene action is caused by heterozygote superiority

60. Heritability in narrow sense at equilibrium should be zero
61. Selection reduces and eliminates the recessive genes until they are rare in population
62. Limits to selection reached due to exhaustion of additive genetic variance
63. All the experiments took roughly 20-30 generation to reach the selection limits
64. Genetic superiority is more important as compare to environmental superiority as a component of selection differential
65. Whole amount of S.D. is not transmitted to the progeny but its portion equal to h^2 is transmitted
66. Simplest method of sire evaluation - Simple daughter index
67. A sire's production transmitting ability can be estimated by mathematical means and expressed as a single figure known as- Sire index
68. Combining ability (nicking ability) stands for all possible mating
69. General combining ability is because of main effect
70. Specific combining ability is because of interaction effect
71. Reciprocal recurrent selection (RRS) was proposed by Comstock, Robinson & Harvey in 1949
72. Recurrent selection (RS) was proposed by Hull in 1942
73. In RRS crosses are made between two segregating population
74. In RRS male and female are selected nicking ability on the basis of their cross bred progeny performance
75. RRS and RS have great scope for producing commercial hybrid
76. Due to Deletion and Duplication (Structural abnormalities) loss or gain in genome occurs.
77. Due to Inversion and Translocation (Structural abnormalities) rearrangement of gene sequence occurs.
78. Reduction in genotypic variability occurs due to cross over suppression in pericentric inversion (Structural abnormalities).
79. 1/29 Robertsonian translocation is the fusion of acrocentric chromosome no. 1 and no. 29. due to this total no. of chromosome decreased. This condition is not found in zebu cattle.
80. Testing of H-W law by = Chi-square test.
81. Table : % Heterosis

S. N.	Type of cross	Individual heterosis	Maternal heterosis	Paternal heterosis
1.	Two breed cross	100%	-	-
2.	Back cross	50%	100%	
3.	3-breed cross	100%	100%	-
4.	4-breed cross	100%	100%	100%
5.	Rotational cross			
	(i) 2 sire breed	66.7% (2/3)	66.7% (2/3)	-
	(ii) 3 sire breed	85.7% (6/7)	85.7% (6/7)	-

- **Reference Books:-**

1. Introduction to Quantitive Genetics by D.S.Falconer, 4th edition
2. Textbook of Animal Breeding by S.S.Tomar
3. Textbook of Population Genetics by S.S.Tomar
4. A Textbook of Animal Husbandry by G.C.Banerjee, 8th edition
5. Concepts of genetics by William S. Klug ... [et al.].—9th ed.

☆☆☆

Objective Questions

1. **Reappearance of an ancestral trait, after several generations, is known as———.**
2. **Parents of one-generation pass the sex-linked character to the opposite sex in the next generation is known as————.**
3. **When one gene mask the expression of another non-allelic gene is known as——.**
4. **Sudden heritable change in genetic material is known as ————.**
5. **Two genes of two different traits are located on the same chromosome are said to be———.**
6. **————is the fraction of all the alleles that occur at given locus in a specified population.**
7. **In————selection, only one trait is selected at a time.**
8. **Match the column: -**

TABLE-I	TABLE-II
(1) Inbreeding	(a) New breed is evolved
(2) Outbreeding	(b) Pure-bred is obtained
(3) Panmixia	(c) Mating of related individuals
(4) Grading up	(d) Random mating
(5) Cross breeding	(e) Mating of unrelated individuals

9. **Match the column: -**

TABLE-I	TABLE-II
(1) Close breeding	(a) Less intensive form of inbreeding
(2) Line breeding	(b) Simplest form of out breeding
(3) Species hybridization	(c) More intensive form of inbreeding
(4) Out-crossing	(d) Breed complementation
(5) Cross breeding	(e) Farthest form of out breeding

10. **Inbreeding coefficient of progenies produced by selfing, parent – offspring mating, full sibs mating & half sibs mating during first generation are respectively-**
    (a) 0.5, 0.25, 0.25, 0.125 (b) 0.5, 0.50, 0.50, 0.125
    (c) 0.5, 0.50, 0.25, 0.125 (d) 0.5, 0.25, 0.50, 0.125
11. **Heritability of production is-**
    (a) Low (b) Medium
    (c) High (d) None
12. **Most commonly used measure of dispersion is-**
    (a) Standard deviation (b) Range
    (c) Variance (d) Mean deviation
13. **Which measure of dispersion is free from unit-**
    (a) Range (b) Variance
    (c) Standard deviation (d) Coefficient of variance
14. **Which of the following test is used to compare two variance-**
    (a) F-test (b) Z-test
    (c) T-test (d) Chi-square test
15. **Which of the following sentence is correct about Chi-Square test-**
    (a) It is a non-parametric test (b) It is applied in case of enumeration statistics only
    (c) Both a & b (d) None

16. **Which is not a systematic force-**
(a) Random Genetic drift (b) Migration
(c) Mutation (d) Selection

17. **If gene frequency of A = 0.7 & a = 0.3, find out genotypic frequency of heterozygote-**
(a) 0.42 (b) 0.21
(c) 0.49 (d) 0.09

18. **Heterosis in F_2 generation becomes-**
(a) Half of F_1 generation (b) Not fix
(c) Double of F_1 generation (d) None

19. **DNA – synthesis occurs in which phase of cell division-**
(a) S - phase (b) G_1 – phase
(c) G_2 – phase (d) None

20. **Crossing over takes place in-**
(a) Pachytene stage of prophase-I (b) Diplotene stage of prophase-I
(c) Metaphase of meiosis I (d) Metaphase of meiosis II

21. **Change in gene frequency due to migration will depend upon-**
(a) Gene frequency of migrants (b) Proportion of migrants
(c) Gene frequency of base population (d) All the above

22. **Polygenic inheritance is governed by-**
(a) Epistasis (b) Over – dominance
(c) Dominance (d) Additive gene action

23. **Which force changes the gene frequency fastest-**
(a) Migration (b) Genetic drift
(c) Mutation (d) Selection

24. **Which force changes the gene frequency slowest-**
(a) Mutation (b) Migration
(c) Selection (d) Random drift

25. **Which of the following female is heterogametic-**
(a) Buffalo (b) Pig
(c) Poultry (d) Human

26. **Match the column: -**

ANIMALS	CHROMOSOMES
(1) Poultry female	(a) 76 + ZZ
(2) Human Male	(b) 76 + ZW
(3) Poultry Male	(c) 44 + XX
(4) Human Female	(d) 44 + XY

27. **Barred plumage in poultry, broodiness in poultry, rapid feathering & slow feathering in poultry, cryptorchidism in horses and white eye in drosophila are examples of-**
(a) Sex-linked inheritance (b) Sex-influenced inheritance
(c) Sex-limited inheritance (d) None

28. **Semen production, milk production & egg production are the examples of-**
(a) Sex – linked characters (b) Sex – limited characters
(c) Sex – influenced characters (d) None

29. **Colour of plumage & feather growth both are sex-linked characters, the method sexing on the basis of sex-linked characters in poultry is known as:**
(a) Vent method (b) Autosexing
(c) Proctoscope method (d) None

30. **Milk yield & draught capacity of cattle has a relation-**
(a) Negatively correlated (b) No correlation
(c) Positively correlated (d) None of the above

31. **The ratio of selection differential to the phenotypic standard deviation of a trait is known as-**
(a) Intensity of selection (b) Response to selection
(c) Accuracy of selection (d) Limit of selection

32. **The product of realized heritability & selection differential is known as-**
(a) Response to selection (b) Limit of selection
(c) Intensity of selection (d) Accuracy of selection

33. **Match the column: -**

TABLE-I	TABLE-II
(1) Sex- linked traits	(a) Milk production
(2) Sex influenced traits	(b) Broodiness in poultry
(3) Sex -limited traits	(c) Horn condition in sheep
(4) Multiple allelism	(d) Double muscling gene in cattle
(5) Pleiotropy	(e) ABO blood group in human

34. **Genes of sex-linked traits are present on-**
(a) Sex-chromosomes (b) Autosomes
(c) Both (d) None

35. **Genes of sex-influenced traits are present on-**
(a) Sex-chromosomes (b) Autosomes
(c) Both (d) None

36. **Genes of sex-limited traits are present on:**
(a) Sex-chromosomes (b) Autosomes
(c) Both (d) None

37. **Genes of testis-determining factor (TDF) & hypertrichosis are present on Y-chromosome & inheritance of these characters are only through male so these characters are known as:**
(a) Hologenic character (b) Diandric character
(c) Holandric character (d) Diagenic character

38. **The increasing order of efficiency of methods of selection is-**
(a) Tandem selection < Independent culling < Selection index
(b) Tandem selection < Selection index < Independent culling
(c) Independent culling < Selection index < Tandem selection
(d) Independent culling < Tandem selection< Selection index

39. **Match the column: -**

TABLE-I	TABLE-II
(1) Selection Index	(a) Most accurate aid to selection
(2) Progeny testing	(b) Best aid to selection for carcass traits in sheep
(3) Individual selection	(c) Most efficient aid to selection
(4) Sib selection	(d) Most efficient method of selection

40. **Match the column: -**

TABLE-I	TABLE-II
(1) Osborne index	(a) Best method of selection
(2) Sire Index	(b) For selection of pullet & cockerels
(3) Abplanalp Index	(c) For improving egg production in poultry
(4) BLUP	(d) Index of genetic worth of sire
(5) Selction Index	(e) Most powerful method of indexing sire

41. **Which is true about individual selection-**
(a) Animals are selected on the basis of their own phenotype
(b) It is most accurate basis of selection
(c) This gives direct estimate of breeding value
(d) All the above

42. **Individual selection & pedigree selection are more effective when heritability of trait is-**
(a) High (b) Low
(c) Medium (d) None

43. **Progeny testing & family selection are more effective when heritability of a trait is-**
(a) High (b) Low
(c) Medium (d) None

44. **The basis of selection cannot be used for selection of sire (male) for milk production-**
(a) Performance of collateral relative (b) Performance of Individual
(c) Performance of Ancestors (d) Performance of progeny

45. **Aid to the selection that can't be used for sex-limited traits, traits with low heritability & carcass traits/slaughter traits is:**
(a) Progeny testing (b) Individual selection
(c) Pedigree selection (d) Family selection

46. **Simplest, more rapid & most commonly used basis of selection is:**
(a) Individual selection (b) Family selection
(c) Pedigree selection (d) Progeny testing

47. **The sib selection is a type of-**
(a) Pedigree selection (b) Family selection
(c) Progeny testing (d) Individual selection

48. **The exotic breed of pig widely used for the upgrading of desi pig is-**
(a) Berkshire (b) Landrace
(c) LWY (d) MWY

49. **Most effective aid to selection for improving sex-limited trait is-**
(a) Progeny testing (b) Sib selection
(c) Family selection (d) Individual selection

50. **Best basis of selection for estimation of carcass quality-**
(a) Sib Selection (b) Individual selection
(c) Pedigree selection (d) Progeny testing

51. **Which of the following is true about repeatability of a trait-**
(a) It is used to predict future performance from past records
(b) It is used to predict MPPA
(c) It is the upper limit of heritability in broad sense
(d) It is used in making culling decisions
(e) All the above

52. **The ratio of response to selection to the selection differential is termed as-**
(a) Regression (b) Realized heritability
(c) Heritability in broad sense (d) Heritability in narrow sense

53. **The unit of selection in family selection is-**
(a) Entire family (b) Pedigree information
(c) Individual performance (d) Sib performance

54. **Genetic gain per year is depend upon-**
(a) Lactation period (b) Calving interval
(c) Generation interval (d) Calving index

55. **"Resemblance between relatives" is the basis of estimation of-**
(a) Heritability (b) Repeatability
(c) Genetic Correlation (d) Both a & c

56. **Repeatability is generally estimated by-**
(a) Half-sib correlation (b) Intra-class correlation
(c) Regression (d) BLUP

57. **Match the column: -**

TABLE-I	TABLE-II
(1) Pleiotropy	(a) Increase heterozygosity
(2) Linkage	(b) Increase homozygosity
(3) Inbreeding	(c) Random mating
(4) Out breeding	(d) Transient cause of genetic correlation
(5) Panmixia	(e) Permanent cause of genetic correlation

58. **Match the column: -**

TABLE-I	TABLE-II
(1) In crossing	(a) Mating between unrelated animals of the same breed
(2) In cross-breeding	(b) Mating of purebred (inbred) males with unrelated females
(3) Out-crossing	(c) Crossing of two different inbred lines of the same breed
(4) Top-crossing	(d) Crossing of two different inbred lines of different breeds
(5) Species hybridization	(e) Mating between animals of different species

59. **Heterosis & specific combining ability (SCA) both are caused by-**
(a) Non -additive gene action (Dominance + Over-dominance + Epistasis)
(b) Additive gene action
(c) Both a & b
(d) None of the above

60. **Traits governed by non-additive gene action are reproductive traits (e.g.: fertility, viability, fitness trait, hatchability, calving, litter size) & they have low heritability So if heritability of trait is low, heterosis will be-**
(a) Low (b) High
(c) Medium (d) Absent

61. **Polygenic inheritance, general combining ability & resemblance between relative is due to-**
(a) Additive Gene action (b) Non - Additive Gene action
(c) Both (d) None

62. **Reciprocal recurrent selection (RRS) is more suitable for poultry selection & RRS is used to improve-**
(a) GCA (b) SCA
(c) Both (d) None

63. **Which of the following statement(s) is/are true about hybrid vigour-**
(a) It is governed by non-additive gene action
(b) Heterosis is maximum in F_1 generation & it reduces to 50% in F_2 generation due to *inter-se* mating
(c) It is commonly practiced in poultry, swine & sheep production for whom fertility is high
(d) All the above

64. **Heritability in the narrow sense is:**
(a) Always less than or equal to broad sense heritability
(b) Always greater than broad sense heritability
(c) Always less than broad sense heritability
(d) None of the above

65. **Severe form of inbreeding in animals is-**
(a) Self Fertilization (b) Parent -offspring mating
(c) Full-sib mating (d) Half-sib mating

66. **Minimum number of breeds involved in rotational crossing is-**
(a) Three (b) Four
(c) Two (d) None

67. **If the heritability of a trait is 0.3, repeatability for same trait can be-**
(a) 0.25 (b) 0.05
(c) 0.15 (d) 0.45

68. **If repeatability of trait is 0.35, then which of following value can't be the heritability of the trait-**
(a) 0.40 (b) 0.30
(c) 0.05 (d) 0.15

69. **The value of inbreeding coefficient is always _____ of coefficient of relationship-**
(a) 2 times (b) Half
(c) Square root (d) 4 times

70. **What are the assumptions of Hardy-Weinberg equilibrium-**
(a) Small population, random mating, absence of mutation, migration & selection
(b) Large size population, random mating, absence of mutation, migration & selection
(c) Large size population, random mating, presence of mutation, migration & selection
(d) None the above

71. **In a multiple allelic system with 3 alleles (A_1, A_2 & A_3); If A_1= 0.25, A_2= 0.35 then frequency of A_3 will be-**
(a) 0.25 (b) 0.35
(c) 0.40 (d) 0.10

72. **Coefficient of relationship of progenies produced by parent – offspring mating, full sibmating & half sib mating are respectively-**
(a) 0.25, (b) 0.50, 0.50, 0.25
(c) 0.50 , 0.25, 0.125 (d) 0.125, 0.50, 0.25

73. **2N–2 condition of chromosomes reflects-**
(a) Nullisomy (b) Monoploidy
(c) Monosomy (d) Tetraploidy

74. **2N–N condition of chromosomes reflects-**
(a) Nullisomy (b) Monoploidy
(c) Monosomy (d) Tetraploidy

75. **Progeny testing-**
(a) Increase generation interval (b) Reduce genetic gain per year
(c) Estimates breeding value (d) All the above

76. Genetic correlation between traits is due to-

(a) Pleiotropy (b) Linkage
(c) Heterozygosity (d) All the above

77. Permanent genetic correlation between traits is due to-

(a) Pleiotropy (b) Linkage
(c) Heterozygosity (d) All the above

78. Match the column: -

TABLE-I	TABLE-II
(1) Euploidy	(a) 2N+N
(2) Aneuploidy	(b) 2N-N
(3) Monosomy	(c) 2N-2
(4) Nullisomy	(d) 2N-1
(5) Monoploidy	(e) Change in no. of chromosome in a set
(6) Triploidy	(f) Change in no. of sets of chromosome

79. Match the column: -

TABLE-I	TABLE-II
(1) Non-sense mutation	(a) Any insertion (or) deletion that is not evenly divisible by 3
(2) Silent mutation	(b) Any insertion (or) deletion that is evenly divisible by 3
(3) Mis-sense mutation	(c) Which code for different amino acids or Substitution of one amino acid by another
(4) In-frame mutation	(d) Which code for same amino acid so there is no visible change in phenotype
(5) Frame shift mutation	(e) Which code for stop codon & terminates Protein synthesis

80. Contribution of offspring to the next generation is known as-

(a) Fitness (b) Adaptive value
(c) Selective value (d) All the above

81. If coefficient of selection is 0.1, then find out fitness-

(a) 0.1 (b) 0.9
(c) 0.2 (d) 0.01

82. Which of the following pair is/are correctly matched-

(a) Test cross = F1 hybrid x Homozygous recessive parent
(b) Back cross = F1 hybrid x Any of the Homozygous parent
(c) Out cross = F1 hybrid x Homozygous Dominant parent
(d) All the above

83. Number of barr-body in turner syndrome-

(a) 0 (b) 1
(c) 2 (d) 3

84. Which of the following pair is correctly matched-

(a) XY – Heterozygous condition (b) XX – Homozygous condition
(c) XO – Hemizygous condition (d) All the above

85. Which of the following pair is not correctly matched-

(a) Turner syndrome : 44 + X 0 (b) Klinefelter syndrome : 44 + XXY
(c) Down syndrome: Trisomy 21 (d) Cat cry syndrome: Trisomy 5

86. Which of the following is correct about genetic code-
(a) It includes 61 codons for Amino acids & 3 stop codons
(b) Triplet nature for codon, some amino acids are coded by multiple codons
(c) Almost universal; exactly same in most genetic systems
(d) All the above

87. Which of the following is true about *inter- se* mating-
(a) It is a type of 2 – way cross/ 2 – breed cross
(b) It is the mating of crossbred progeny among themselves ($F_1 \times F_1$)
(c) It maintain the same level of inheritance
(d) All the above

88. System of mating in which 3 breeds are crossed in a rotational manner-
(a) Criss – cross
(b) 3-way rotational cross
(c) Triple crossing
(d) 3-way cross

89. System of mating in which 2 breeds are crossed alternatively-
(a) 2-way rotational cross / Criss-cross
(b) 2-way cross
(c) Back cross
(d) None

90. In which phase of cell cycle, DNA Replication is takes place-
(a) Interphase
(b) Prophase
(c) Metaphase
(d) Anaphase

91. The genetic correlation between milk yield & fat yield is generally-
(a) Negative & high
(b) Negetive & low
(c) Positive & high
(d) Positive & low

92. In DNA, replacement of one purine by another purine is known as-
(a) Transition
(b) Transversion
(c) Translation
(d) Transformation

93. Match the column: -

TABLE-I	TABLE-II
(1) Transition	(a) Direct uptake & incorporation of exogenous Genetic material in bacterial cell
(2) Transversion	(b) Transfer of DNA from one bacterium to another by bacteriophage
(3) Transduction	(c) Genetic exchange between two living bacteria by direct contact
(4) Conjugation	(d) Replacement of a purine by pyrimidine base
(5) Transformation	(e) Replacement of one purine by another purine

94. Milk yield & Fat yield in dairy animals, egg size & egg weight in poultry are ____ traits-
(a) Positively correlated
(b) Negatively correlated
(c) No correlation
(d) None

95. Milk yield & fat % in dairy animals, number of eggs & size of eggs produced by hen has _____ relation-
(a) Positive correlation
(b) Negative correlation
(c) No correlation
(d) None

96. Which is true about Mithun / Gayal-
(a) Mithun (*Bos frontalis*) is also known as "mountain cattle" or "ceremonial ox" of north – eastern hill region
(b) Mithun is a humpless animal
(c) It has 58 (2N) chromosomes & originated from Gaur
(d) National Research Centre on Mithun is located at Jharnapani (Nagaland)
(e) All the above

97. Number system commonly used in modern day computers & digital computers-

(a) Decimal number system (b) Binary number system

(c) Octal number system (d) Hexadecimal system

98. Which of the following pair is/are correctly matched-

(a) 1 Byte = 8 bits (b) 1 GB =1024 MB

(c) Input devices: Keyboard, Mouse, Scanner (d) Output devices: Monitor, Printer, Graphic Plotter

(e) All the above

99. Association between two variables is known as-

(a) Correlation (b) Regression

(c) Heritability (d) Repeatability

100. Associaton between dependent & independent variables is known as-

(a) Correlation (b) Regression

(c) Heritability (d) Repeatability

101. Criss-cross pattern of inheritance is seen in-

(a) Sex – linked traits (b) Sex – limited traits

(c) Sex – influenced traits (d) None of the above

102. If recombination or crossing-over frequency is zero, then it is-

(a) Complete linkage (b) Incomplete linkage

(c) Partial linkage (d) No linkage

103. Which of the following is/are example(s) of complete linkage-

(a) Male drosophila

(b) Female silk moth & female poultry

(c) Sex chromosomes of all heterogametic species

(d) All the above

104. Genetic covariance between Parent – offspring, half sibs, full sibs are respectively-

(a) $\frac{1}{2} V_A$, $\frac{1}{4} V_A$, $\frac{1}{2} V_A + \frac{1}{4} V_D + V_{EC}$

(b) $\frac{1}{2} V_A$, $\frac{1}{4} V_A$, $\frac{1}{2} V_A + \frac{1}{2} V_D + V_{EC}$

(c) $\frac{1}{2} V_A$, $\frac{1}{2} V_A$, $\frac{1}{2} V_A + \frac{1}{4} V_D + V_{EC}$

(d) $\frac{1}{2} V_A$, $\frac{1}{4} V_A$, $\frac{1}{2} V_A + \frac{1}{4} V_D + V_{EC}$

105. Which of the following is/are true about heritability-

(a) It is the regression of breeding value on phenotypic value in narrow sense

(b) It is the ratio of genotypic variance to phenotypic variance in broad sense

(c) It is fraction of parent superiority which is transmitted to the offspring

(d) All the above

106. Which of the following pair is/are correctly matched-

(a) One gene-one enzyme theory: Beadle & Tatum

(b) Term heterosis:G.H.Shull

(c) Operon-concept: Jacob & Monad

(d) All are correct

107. The degree of relationship between individuals in a population depends upon-

(a) Size of population (b) Type of mating system

(c) Both a & b (d) Gene & genotype frequencies

108. Breeding value of an animal can be described as-

(a) It is the sum of average effect of the genes carried by an individual

(b) It is twice of transmitting ability

(c) It is the value of individual judged by mean value of its progeny

(d) All are correct

109. **Mean deviation of progeny from its population mean is known as-**
(a) Transmitting ability (b) Breeding value
(c) Adaptive value (d) None of the above

110. **Phenotype is a good indicator of genotype when the heritability of a trait is-**
(a) High (b) Low
(c) Medium (d) Zero

111. **High heritability indicates high correlation between-**
(a) Genotype & Environment (b) Phenotype & Genotype
(c) Phenotype & Environment (d) None of the above

112. **Most of the economic traits such as milk production, egg production, fat %, growth rate etc. are -**
(a) Controlled by many genes (polygenes) & are greatly affected by environment
(b) They exhibit continuous variation
(c) Both correct
(d) None of the above

113. **Most recent & best method of sire evaluation is-**
(a) BLUP (b) Contemporary index
(c) Equi-parent index (d) None

114. **Value of individual judged by mean value of its offspring is-**
(a) Phenotypic value (b) Adaptive value
(c) Breeding value (d) Fitness

115. **Which of the following is/are disadvantage(s) of inbreeding-**
(a) Frequency of undesirable recessive genes is increased
(b) It results in inbreeding depression
(c) Inbred animals are more prone to environmental changes
(d) All the above

116. **Which of the following is /are application(s) of inbreeding -**
(a) Help to eliminate the undesirable genes
(b) It is used to develop inbred lines as a seed stock
(c) Helps to know the type of gene action affecting a trait. Trait governed by additive gene action do not show inbreeding depression
(d) It increases the prepotency of animal
(e) All are correct

117. **Ability of an individual to stamp its characters on its progeny is known as-**
(a) Prepotency (b) Penetrance
(c) Expressivity (d) Panmixia

118. **Random genetic drift is also known as-**
(a) Panmixia (b) Sewall Wright effect
(c) Both a & b (d) Inbreeding

119. **Best method of heritability estimation which is relatively free from biases is-**
(a) Half sibs correlation method (b) Full sibs correlation method
(c) Intra – sire regression (d) Dam – daughter regression

120. **Least reliable method of heritability estimation is-**
(a) Half-sib correlation method (b) Full sib correlation
(c) Intra – class regression method (d) BLUP

121. **Progeny testing is used to select-**
(a) Parent (b) Progeny
(c) Full sib (d) None

122. The ultimate source of all genetic variation-

(a) Segregation
(b) Crossing over
(c) Mutation, Migration, Selection, Genetic drift
(d) All the above

123. Biggest cause of genetic variation-

(a) Segregation (b) Crossing over
(c) Selection (d) None

124. Effect of Migration in a population can be predicted-

(a) Only in amount (b) Only in direction
(c) Amount & direction both (d) None of the above

125. Systematic processes/forces operate in-

(a) Small population (b) Large population
(c) Both (d) None

126. Which is not true about Random genetic drift-

(a) It is a systemic force to change gene frequency
(b) It is also known as Sewall Wright effect
(c) It is only predicted in amount, not in direction
(d) All the above

127. Which of the following pair is/are correctly matched-

(a) Exon : Coding sequence (b) Intron :Non-coding sequence
(c) High h^2 of a trait:Low heterosis (d) All the above

128. Which trait show greatest inbreeding depression-

(a) Carcass quality (b) Reproductive trait, fitness trait
(c) Trait related to viability (d) Both b & c

129. Random fluctuation in gene frequency in small population is known as-

(a) Genetic drift (b) Genetic load
(c) genetic death (d) None

130. If recombination frequency is between 0 to 0.5 then it is-

(a) Complete linkage (b) Incomplete linkage
(c) No linkage (d) All the above

131. The process that increases the frequency of desirable gene without introducing new gene is known as-

(a) Inbreeding (b) Outbreeding
(c) Selection (d) None

132. In ONBS (open nuclear breeding scheme), sire is selected on the basis of-

(a) Progeny testing (b) Sibling test
(c) Individual Selection (d) Pedigree selection

133. In ONBS, faster genetic progress can be achieved by using-

(a) MOET & Sibling test (b) MOET & Progeny test
(c) MOET & Individual selection (d) MOET & Pedigree selection

134. ONBS is better than CNBS, because in ONBS-

(a) Bidirectional gene flow takes place
(b) Nucleus herd is open for introduction of superior animals
(c) Reduced rate of inbreeding & greater response to selection is observed
(d) All correct

135. Which of the following statement(s) is/are true about Nucleus breeding schemes-

(a) CNBS is mainly used in pig & poultry but ONBS is used in cattle, buffalo & sheep
(b) Increase genetic progress & reduced rate of inbreeding is observed in ONBS
(c) Both a & b
(d) None

136. Range of heritability, repeatability & fitness of a trait is-

(a) -1 to +1
(b) 0 to +1
(c) More than 1
(d) None

137. Best way to increase heritability-

(a) Providing uniform environment
(b) Increasing inbreeding
(c) Increasing homozygosity
(d) All the above

138. Heritability can be increased by-

(a) Providing uniform environment (or) by reducing environmental variation
(b) Increasing number of records per animal
(c) By adjustment of record & accurate measurement of data
(d) All are correct

139. If a trait is largely controlled by environment, then h^2 estimate will be-

(a) Low
(b) High
(c) Medium
(d) None

140. In case of inbreeding, heritability tends to-

(a) Decline
(b) Increase
(c) Both
(d) None

141. Breeding policy adopted for increasing milk production of non-descript cattle is-

(a) Inbreeding
(b) Crossbreeding
(c) Grading up
(d) Line breeding

142. Buffalo breeds in India can be best improved by-

(a) Selective breeding
(b) Crossbreeding
(c) Grading up
(d) Inbreeding

143. Inbred lines are mainly used in poultry breeding to exploit-

(a) Heritability
(b) Inbreeding depression
(c) Heterosis
(d) All of the above

144. Inbreeding is used for commercial production of inbred lines in-

(a) Cattle, buffalo
(b) Pig & poultry
(c) Pig & buffalo
(d) Poultry & cattle

145. Arrangement of data in different rows & columns is known as-

(a) Classification of data
(b) Tabulation of data
(c) Collection of data
(d) Representation of data

146. Process of arranging the data in different groups or classes according to resemblance & similarities is known as-

(a) Classification of data
(b) Tabulation of data
(c) Collection of data
(d) Representation of data

147. Which of the following is not a diagrammatic representation of data-

(a) Pictogram
(b) Cartogram
(c) 1-D, 2-D & 3-D diagram
(d) Histogram

148. Graph of time series is known as-

(a) Histogram
(b) Line graph
(c) Historigram
(d) Both b & c

149. Which of the following is not a graph of frequency distribution-

(a) Histogram
(b) Frequency polygon & frequency curve
(c) Ogives
(d) Historigram

150. Match the column: -

TABLE-I	TABLE-II
(1) Cartogram	(a) Graph of time series
(2) Pictogram	(b) Graphical representation of frequency distribution of a continuous variable
(3) Historigram	(c) Joining the points of frequency polygon by free hand smoothed curve
(4) Histogram	(d) Pictorial representation of data
(5) Frequency curve	(e) Diagrammatical representation of data with geographical location

151. Cumulative frequency curve is also known as-

(a) Ogive
(b) Histogram
(c) Line graph
(d) None

152. Which of the following pair is/are correctly matched-

(a) Inclusive series e.g.- a-b, c-d, e-f
(b) Exclusive series e.g.- a-b, b-c, c-d
(c) Both a & b
(d) None

153. In an exclusive series of frequency distribution-

(a) Upper limit of class interval is excluded
(b) Lower limit of class interval is excluded
(c) Both
(d) None

154. In an inclusive series-

(a) Upper limit of class interval is included in same class
(b) Lower limit of class interval is included in same class
(c) Both upper & lower limits are inclusive
(d) None of the above

155. In many-fold tabulation, we have data on the basis of-

(a) 2 factors
(b) 3 factors
(c) More than 2 factors
(d) More than 3 factors

156. Daily milk yield recorded at a farm is an example of-

(a) Primary data
(b) Secondary data
(c) Both
(d) None

157. Total expenditure, total income or total monthly milk yield at a dairy farm are examples of-

(a) Primary data
(b) Secondary data
(c) Both
(d) None

158. State wise milk production of India is example of-

(a) Chronological classification
(b) Geographical classification
(c) Quantitative classification
(d) Qualitative classification

159. Classification of population according to sex & literacy are examples of-

(a) Chronological classification
(b) Geographical classification
(c) Quantitative classification
(d) Qualitative classification

160. Less than & more than cumulative frequency curves always intersect at-

(a) Median
(b) Mode
(c) Mean
(d) None

161. Z-test (or) Large sample test is used to compare the sample mean & population mean only when-

(a) Sample size is large (Sample size > 30)
(b) Population standard deviation or population variance is known
(c) Both conditions must be fulfilled
(d) None

162. T – test or small sample test is used to compare a sample mean & population mean only when _____.

(a) Sample size is small
(b) Population std. deviation (or) population variance is not known
(c) Both conditions must be fulfilled
(d) None of the above

163. Which test is used to compare two variance-

(a) Z – test
(b) T – test
(c) F - test
(d) Chi-square test

164. Which is true about Chi – square test-

(a) It is non-parametric test (No population parameters are required)
(b) It is used to assess two types of comparison (i) test of goodness of fit (ii) test for independent attributes
(c) Calculated value of Chi-square test is always positive
(d) All the above

165. Which test is used to compare more than two sample means-

(a) Z – test
(b) T – test
(c) F - test
(d) Chi-square test

166. Diallele crosses are generally made in-

(a) Cattle
(b) Swine
(c) Poultry
(d) Both b & c

167. Selection intensity is higher when-

(a) Fewer animals are selected
(b) Large no. of animals are selected
(c) Both
(d) None

168. The no. of Autosomes & sex chromosomes normally present in donkey egg cell is-

(a) 31 + Y
(b) 31 + X
(c) 62 + XY
(d) 60 + XY

169. Crossing of two or more inbred lines in all possible combinations is known as-

(a) Diallele cross
(b) Out – crossing
(c) Criss - cross
(d) Top – crossing

170. Maintenance of hybrid vigour in a cattle herd is done by-

(a) Grading up
(b) Inbreeding
(c) Top crossing
(d) Rotational crossing

171. Buffalo breed that is capable of surviving in high altitude & also requires conservation

(a) Bhadawari
(b) Toda
(c) Mehsana
(d) Nili-Ravi

172. Buffalo breeds which fall under category of endangered level (risk) are-

(a) Toda
(b) Bhadawari
(c) Nili Ravi
(d) All the above

173. The Global data bank for Animal genetics resources is functioning at-

(a) FAO, Rome (Italy)
(b) OIE – France (Paris)
(c) NBAGR, Karnal
(d) None

174. **Breeding plans for goat improvement involves-**
(a) Selective breeding (b) Grading up
(c) Cross breeding (d) All the above

175. **"Boer" breed of goat which is native to South Africa is a-**
(a) Meat type breed (b) Milk type
(c) Dual purpose (d) None

176. **Exotic cattle breed used for upgrading & crossbreeding of non- descript cattle in plain area of India-**
(a) H.F. (b) Jersey
(c) B.S. (d) a & b

177. **Exotic cattle breed used for upgrading & cross breeding of non-descript cattle in hilly & coastal area of India-**
(a) Jersey (b) H.F.
(c) B.S. (d) a & b

178. **Buffalo breed used for upgrading of non-descript local buffalo-**
(a) Murrah (b) Surti
(c) Both a & b (d) None

179. **Breeding policy adopted for buffalo improvement in India -**
(a) Grading up (b) Selective breeding
(c) Both a & b (d) Crossbreeding

180. **Which of the following is a part of National Cattle Breeding Policy in India-**
(a) Grading up (b) Crossbreeding
(c) Selective breeding (d) All the above

181. **Grading up & cross breeding programs are expected to increase milk production in cattle-**
(a) More than 5% Annually (b) 2% Annually
(c) 1% Annually (d) None

182. **Selective breeding within zebu cattle is expected to yield 1% genetic gain per year in organized herds whereas genetic improvement in farmer herds is-**
(a) Around 10% (b) 5%
(c) 2% (d) 1%

183. **Kankrej cattle breed is used for the upgrading of local cattle of**
(a) Gujarat (b) Rajasthan
(c) Both a & b (d) Punjab

184. **Selective breeding is fallen under-**
(a) Progeny testing programme (b) Crossbreeding
(c) Both (d) None

185. **Cross breeding of non-descript cattle with exotic breeds stabilize _____ % exotic inheritance in area of plenty of feed, fodder & adequate milk marketing system-**
(a) 50 – 62.5% (b) 50 – 75%
(c) 50 – 100% (d) 50%

186. **If V_A = 20, V_G=30 & V_P = 100, then heritability in narrow sense will be-**
(a) 0.20 (b) 0.30
(c) 0.50 (d) None

187. **Transient genetic correlation between two traits is due to-**
(a) Linkage (b) Pleiotropy
(c) Both (d) None

188. **Chief determiner of resemblance between relatives-**
(a) Non-additive gene action (b) Additive gene action
(c) Linkage (d) Pleiotropy

189. **Heritability is low in-**
(a) Lactation yield (b) Body weight
(c) Litter size (d) All the above

190. **Inbreeding leads to-**
(a) Increase fitness (b) Reduce fitness
(c) Both (d) None

191. **Heritability is the property of-**
(a) Population (b) Trait
(c) Environment (d) All the above

192. **Match the column: -**

TABLE-I	TABLE-II
(1) R. S.	(a) Upper limit of heritability
(2) R. R. S.	(b) G + E
(3) Phenotype	(c) Small population
(4) Random drift	(d) Hull
(5) Repeatability	(e) Comstock

193. **Blood grouping is done on the basis of-**
(a) Antigen on RBC (b) Antibody on RBC
(c) Antigen & Antibody on RBC (d) Antigen on WBC

194. **Non-additive gene action includes-**
(a) Dominance (b) Over-dominance
(c) Incomplete dominance (d) Epistasis
(e) All the above

195. **Which of the following statement is true about multiple allelism -**
(a) More than two alternative form of a gene located on the same locus of the homologous chromosomeis known as multiple alleles.
(b) Multiple alleles are produced by mutation.
(c) Multiple alleles are found in the population, not in the single individual.
(d) All are true

196. **If AA=10 & aa=0, then which of the following is the example of Over-dominance-**
(a) Aa=5 (b) Aa=7
(c) Aa=10 (d) Aa=15

197. **If AA=10 & aa=0, then which of the following is the example of complete dominance-**
(a) Aa=5 (b) Aa=7
(c) Aa=10 (d) Aa=15

198. **If AA=10 & aa=0, then which of the following is the example of Incomplete dominance-**
(a) Aa=5 (b) Aa=7
(c) Aa=10 (d) Aa=15

199. **If AA=10 & aa=0,then which of the following is the example of Additive gene action-**
(a) Aa=5 (b) Aa=7
(c) Aa=10 (d) Aa=15

200. **Which of the following statement is not true about Yak-**
(a) Yak (*Bos grunniens*) is locally known as banchour for wild & chour-gau for domestic variety.
(b) Chromosome number of Yak is 58
(c) Domestic yak makes grunting sounds, in contrast to wild yak, so he is also known as "grunting ox"
(d) Yak herdsmen are known as Bropkas
(e) NRCY is situated at Dirang (Arunachal Pradesh)

201. Yak dwells in the high hills of Himalayas even at altitudes of 6,000 meters above me sea level., what is the normal range for yak-

(a) 2000-3000 m (b) 2500-3500 m
(c) 3000-4500 m (d) 4500-5500 m

202. Which of the following is an Indian pig breed-

(a) Ghoongroo (b) Niang Megha
(c) Doom (d) All the above

203. *Ex- situ* conservation means-

(a) Organized herd outside breeding tract eg. Research station, Zoo etc.
(b) Cryopreservation of sperms, oocytes, embryos, somatic cells, stem cells etc.
(c) Storage of DNA & live tissue
(d) All the above

204. *In-situ* conservation means-

(a) Gaushala & Dairy cooperatives (b) Farmers herds
(c) Institutional herds (d) All the above

205. The percentage of individuals with a given genotype that expresses the expecte phenotype is known as-

(a) Epistasis (b) Expressivity
(c) Penetrance (d) Recessive

206. The degree or extent to which a given genotype is expressed phenotypically is know as-

(a) Epistasis (b) Expressivity
(c) Penetrance (d) Recessive

207. More than half of the herd is-

(a) Dam (b) Sire
(c) Son (d) Daughter

208. If correlation coefficient of full sib is 0.2 then find out the heritability of a trait-

(a) 0.2 (b) 0.4
(c) 0.8 (d) 0.16

209. Progeny testing is used for the selection of-

(a) Dam (b) Sire
(c) Son (d) Daughter

210. The first animal to be domesticated by man was———whereas the———— was the last animal domesticated.

(a) Dog, Horse (b) Goat, Yak
(c) Cat, Horse (d) Dog, Elephant

211. Which of the following is not a measure of central tendency—

(a) Arithmetic mean (b)Median
(c) Range (d) Mode

212. Which of the following is a measure of dispersion-

(a) Range (b) Standard deviation
(c) Variance (d) All the above

213. Which of the following is a relative measure of dispersion-

(a) Mean deviation (b) Coefficient of variance
(c) Standard deviation (d) Both a & b

214. Which measure of dispersion is least affected by extreme values-

(a) Range (b) Standard deviation
(c) Variance (d) Mean deviation

215. Which measure of dispersion is most affected by extreme values-

(a) Range (b) Standard deviation
(c) Variance (d) Mean deviation

216. If value of mean deviation is 16, then the value of standard deviation is-
(a) 4 (b) 8
(c) 20 (d) 64

217. If Arithmetic mean is 20 & Standard deviation is 10 then find out coefficient of variance-
(a) 2 (b) 50
(c) 25 (d) 20

218. Range includes-
(a) 50% of the items (b) 100% of the items
(c) 25% of the items (d) 0% of the items

219. Most frequently occurring value in a data set is known as-
(a) Mean (b) Mode
(c) Median (d) Standard deviation

220. Which measure of central tendency is not rigidly defined—
(a) Mean (b) Mode
(c) Median (d) Standard deviation

221. Most stable measure of central tendency is-
(a) Mean (b) Mode
(c) Median (d) Standard deviation

222. Main difference between water buffalo & swamp buffalo is in-
(a) Coat colour (b) Horn colour
(c) Chromosome number (d) Hump

223. Chromosome numbers in water buffalo (*Bubalusbubalis*) is-
(a) 60 (b) 50
(c) 48 (d) 54

224. Inheritance of X-linked character is through-
(a) Male parent only (b) Female parent only
(c) Both (d) None

225. Inheritance of Y-linked character is through-
(a) Male parent only (b) Female parent only
(c) Both (d) None

226. Genotypic frequency of offspring will depend upon-
(a) Gene frequencies of parents
(b) Genotypic frequencies of parents
(c) Both Gene and Genotypic frequencies of parents
(d) None of the above

227. In H.W.equilibrium, genotypic frequency of heterozygote will be highest when gene frequency of one gene is-
(a) 0.60 (b) 0.40
(c) 0.50 (d) 0.9

228. If genotypic frequency of dominant homozygote is P= 0.05 and genotypic frequency recessive homozygote is Q=0.65 then find out the gene frequencies p & q-
(a) p=0.20 & q= 0.80 (b) p=0.40 & q= 0.60
(c) p=0.80 & q= 0.20 (d) p=0.30 & q= 0.50

229. Type of cross breeding which exploites 100% maternal, paternal as well as individual heterosis-
(a) Four breed crosses (b) Double two breed crosses
(c) Rotational crossing (d) Both a & b

230. Outcrossing within a herd by use of selected sires
(a) Top crossing (b) Selective breeding
(c) *inter se* mating (d) Grading up

231. First crossbred cattle developed in India
(a) Taylor (b) Sunandini
(c) Karan Swiss (d) Karan fries

Answer Key

1. Atavism
2. Criss-cross inheritance
3. Epistasis.
4. Mutation
5. Linked
6. Gene frequency
7. Tandem
8. 1-c,2-e,3-d,4-b,5-a
9. 1-c, 2-a, 3-e, 4-b, 5-d
10. 0.5, 0.25, 0.25, 0.125
11. Medium
12. Standard deviation
13. Coefficient of variance
14. F-test
15. Both a &b
16. Random Genetic drift
17. 0.42 (Hint: -Genotypic frequency of heterozygote is 2pq)
18. Half of F_1 generation
19. S – phase
20. Pachytene stage of Prophase-I
21. All the above
22. Additive gene action
23. Selection
24. Mutation
25. Poultry
26. 1-b,2-d,3-a,4-c
27. Sex-linked inheritance
28. Sex-limited characters
29. Autosexing
30. Negatively correlated
31. Intensity of selection
32. Response to selection
33. 1-b, 2-c, 3-a, 4-e, 5-d
34. Sex-chromosomes
35. Autosomes
36. Autosomes
37. Holandric character
38. Tandem selection < Independent culling < Selection index
39. 1-d, 2-c, 3-a, 4-b
40. 1-c, 2-d, 3-b, 4-e, 5-a
41. All the above
42. High
43. Low
44. Performance of Individual
45. Individual selection
46. Individual selection
47. Family selection
48. LWY
49. Progeny testing
50. Sib Selection
51. All the above
52. Realized heritability
53. Family Mean
54. Generation Interval
55. Heritability
56. Intra-class correlation
57. 1-e, 2-d, 3-b, 4-a , 5-c
58. 1-c, 2-d, 3-a, 4-b, 5-e
59. Non -additive gene action (Dominance + Over dominance + Epistasis)
60. High
61. Additive Gene action
62. Both
63. All the above
64. Always less than or equal to broad sense heritability
65. Parent – offspring mating
66. Two
67. 0.45 (Hint: -Repeatability is the upper limit of heritability)
68. 0.40
69. Half
70. Large size population, random mating, absence of mutation, migration &selection
71. 0.40 (Hint-Sum total of gene frequencies of all the alleles of a gene is equals to (1)
72. 0.50, 0.50, 0.25
73. Nullisomy
74. Monoploidy
75. All the above
76. All the above
77. Pleiotropy

78. 1-f, 2-e, 3-d, 4-c, 5-b, 6-a
79. 1-e,2-d,3-c,4-b,5-a
80. All the above
81. 0.9 (Hint: Fitness = 1 – S)
82. All the above
83. 0
84. All the above
85. Cat cry syndrome: Trisomy 5
86. All the above
87. All the above
88. 3-way rotational cross
89. 2 – way rotational cross / Criss – cross
90. Interphase
91. Positive & high (Note: Correlation between milk yield & fat% is negative while correlation between milk yield & fat yield is positiv(e)
92. Transition
93. 1-e, 2-d, 3-b, 4-c, 5-a
94. Positively correlated
95. Negative correlation
96. All the above
97. Binary number system
98. All the above
99. Correlation
100. Regression
101. Sex – linked traits
102. Complete linkage
103. All the above
104. $\frac{1}{2} V_A$, $\frac{1}{4} V_A$, $\frac{1}{2} V_A + \frac{1}{4}_D + V_{EC}$
105. All the above
106. All are correct
107. Both a & b
108. All are correct
109. Transmitting ability
110. High
111. Phenotype & Genotype
112. Both correct
113. BLUP
114. Breeding value
115. All the above
116. All are correct
117. Prepotency
118. Sewall Wright effect (Random genetic drift is also known as allelic drift)
119. Half sibs correlation method
120. Full sib correlation
121. Parent
122. All the above
123. Segregation
124. Amount & direction both
125. Both
126. It is a systemic force to change gene frequency
127. All the above
128. Both b & c
129. Genetic drift
130. Incomplete linkage
131. Inbreeding
132. Sibling test
133. MOET & sibling test
134. All correct
135. Both a & b
136. 0 to +1
137. Providing uniform environment
138. All are correct
139. Low
140. Decline
141. Cross breeding
142. Selective breeding
143. Heterosis
144. Pig & poultry
145. Tabulation of data
146. Classification of data
147. Histogram
148. Both b & c
149. Historigram
150. 1-e, 2-d, 3-a, 4-b, 5-c
151. Ogive
152. Both a &b
153. Upper limit of class interval is excluded
154. Both upper & lower limits are inclusive
155. More than 3 factors
156. Primary data
157. Secondary data
158. Geographical classification
159. Qualitative classification
160. Medium

161. Both conditions must be fulfilled
162. Both conditions must be fulfilled
163. F – test
164. All the above
165. F – test
166. Both b & c
167. Fewer animals are selected
168. 31 + X
169. Diallel cross
170. Rotational crossing
171. Toda
172. All the above
173. FAO, Rome (Italy)
174. All the above
175. Meat type breed
176. H.F. (Holstein Friesian)
177. Jersey
178. Both a & b
179. Both a & b
180. All the above
181. More than 5% Annually
182. Around 10%
183. Gujarat only
184. Progeny testing programme
185. 50 – 75%
186. 0.20 (Hint:- Heritability in Narrow range = V_A / V_P)
187. Linkage
188. Additive gene action
189. Litter size
190. Reduce fitness
191. All the above
192. 1-d, 2-e, 3-b, 4-c, 5-a
193. Antigen on RBC
194. All the above
195. All are true
196. Aa=15
197. Aa=10
198. Aa=7
199. Aa= 5
200. Chromosome number of Yak is 58
201. 3000-4500 m
202. All the above
203. All the above
204. All the above
205. Penetrance
206. Expressivity
207. Sire
208. 0.4 (Hint: For full sibs, $h^2 = 2t$, So heritability of trait is 0.(4)
209. Sire
210. Dog, Horse
211. Range
212. All the above
213. Coefficient of variance
214. Mean deviation
215. Range
216. 20 (Hint: Std. deviation = 5/4(M.D.)
217. 50 (Hint: S.D/A.M × 100)
218. 100% of the items(Range is the difference between lowest & highest value in the series)
219. Mode
220. Mode
221. Mean
222. Chromosome number
223. 50 (Chromosomes number in water buffalo is 50 whereas in swamp buffalo 48)
224. Both
225. Male parent only
226. Gene frequencies of parents
227. 0.50 [Note: Genotypic frequency of heterozygotes (2pq) cannot be greater than 50% and this maximum occurs when the gene frequencies are p=q=0.5]
228. p=0.20 & q= 0.80 [Note: Firstly apply P+Q+H=1; then apply p= P+1/2H and finally apply p+q=1]
229. Both a &b
230. Selective breeding
231. Taylor

Extra common questions

Note: Answer is indicated in BOLD letter.

1. **Naked DNA stands for?**
   (a) Cell free DNA (b) **Protein Free DNA**
   (c) Nucleus fee DNA (d) Nucleic acid free DNA
2. **Genemaster goat breed is a composite of?**
   (a) Boer and Kiko (b) Jamnapuri and Boer
   (c) Beetal and Boer (d) Jamnapuri and Kiko
3. **Genome size of mice is consist of**
   (a) 2.8×10^9 bp **(b) 2.8×10^8 bp**
   (c) 3.1×10^9 bp (d) 2.8×10^7 bp
4. **Best mutton breed of Karnataka is**
   (a) Nellore (b) Mandya
   (c) Bannur (d) **b and c**
5. **1 CM is equal to**
   (a) 10^6 (b) 10^5
   (c) 10^8 (d) 10^4
6. **Hen feathering is an example of**
   (a) **sex limited trait** (b) sex influenced trait
   (c) sex linked trait (d) none
7. **Inheritance of RAPD is type of**
   (a) co-dominant (b) **dominant**
   (c) recessive (d) overdominant
8. **Inheritance of marker is a type of**
   (a) **co-dominant** (b) dominant
   (c) recessive (d) overdominant
9. **Population size of a breed is considered for endangered category**
   (a) 1000 (b) **5000**
   (c) 100 (d) less than 100
10. **Y chromosome of *Bos indicus* is**
    (a) **Acrocentric** (b) sub meta centric
    (c) meta centric (d) acentric
11. **G banding has a different staining procedure but similar in result with**
    (a) **Q Banding** (b) C. Banding
    (c) R Banding (d) NOR Banding
12. **Frequency of heterozygotes among normal individuals is**
    (a) **2q/1+q** (b) 2q (1-q)
    (c) 2q/1-q (d) $2q(1-q^2)$
13. **Change of gene frequency due to sampling variance in one generation is**
    (a) **Pq/2N** (b) pq/ N
    (c) 2pq/N (d) p^2q^2/N
14. **Population mean in case of no directional dominance is**
    (a) **a(1-2q)** (b) a(1+2q)
    (c) $a(1-2q^2)$ (d) a(1-2p)
15. **Coefficient of variance components in the covariance of full sib is**
    (a) $\frac{1}{2} V_A + \frac{1}{4} V_D$ (b) $\frac{1}{2} V_A + 3/4\ V_D$
    (c) $\frac{1}{2} V_A + 1/8 V_D$ (d) $1/4\ V_A + \frac{1}{4} V_D$
16. **Within lines genetic variance is**
    (a) $(1\text{-}F)\ V_G$ (b) $(1\text{-}F)\ V_A$
    (c) $2F\ V_G$ (d) $(1+F)\ V_G$

17. **Length of RAPD is**
(a) 25 bp
(b) **10bp**
(c) 15bp
(d) 6bp

18. **Heritability of milk is**
(a) medium
(b) High
(c) Low
(d) very high

19. **Concept of selection index was given by**
(a) Fisher
(b) Wright
(c) Hull
(d) Lush

20. **Selection index was first used in animal breeding by**
(a) Fisher
(b) Wright
(c) **Hazal**
(d) Lush

21. **Rate of gel electrophoresis is primerly depends on**
(a) Length of molecule
(b) Charge of molecule
(c) Shape of molecule
(d) All of these

22. **Natural and artificial selection is type of**
(a) Mutually exclusive
(b) Independent
(c) Interdependent
(d) Exhaustive event

23. **Indel is stands for**
(a) Insertion and deletion
(b) Translocation
(c) Inversion
(d) Frame shift mutation

24. **Duration of estrous in mice is**
(a) **1-2 days**
(b) 4-5 days
(c) 6-7 days
(d) 3-4 days

25. **Duration of estrous cycle in mice is**
(a) 1-2 days
(b) **4-5 days**
(c) 6-7 days
(d) 3-4 days \

26. **Which of the following is the example of seasonal breeder?**
(a) Hamster
(b) mink
(c) mice
(d) **all**

27. **Which of the following is the example of short day seasonal breeder?**
(a) sheep and goat
(b) foxes
(c) red deer and mice
(d) **all**

28. **Which of the following is the example of long day seasonal breeder?**
(a) Horses
(b) Ring tailed lemurs
(c) Hamster and mink
(d) **all**

29. **Amount of semen is required in A.I. in poultry**
(a) **0.1 ml**
(b) 0.01-0.02 ml
(c) 1 ml
(d) 0.5-0.8 ml

30. **Number of codons for amino acid is**
(a) 64
(b) **61**
(c) 60
(d) 63

31. **Phule triveni is a not composite breed of**
(a) Gir
(b) HF
(c) Jersuy
(d) Tharparker

32. **Which of the following is not a stop codon?**
(a) TAA
(b) TAG
(c) TGA
(d) ATG

33. **Booroola fecundity gene present on which of the following chromosome of sheep**
(a) 6
(b) 7
(c) 9
(d) 3

34. **Most widely used marker for biodiversity evolution**
(a) **Microsatellite** (b) RFLP
(c) RAPD (d) AFLP

35. **Which of the following is/ are true about to microsatellite**
(a) Tandem repeated motif of 1-6 nucleotides
(b) Most powerful genetic marker for biodiversity evolution
(c) Also known as Simple sequence repeats (SSR)
(d) **All**

36. **Fraction of Individual, Maternal and paternal heterosis in rotational crossing with three sire breed respectively is**
(a) 6/ 7, 6/ 7, 0 (b) 2 /3, 2/ 3, 0
(c) 85.7%, 87.7%, 0% (d) **a and c**

37. **Which type of matting is/ are able to full exploitation of maternal, paternal and individual heterosis**
(a) Four breed crosses (b) Double two breed crosses
(c) Rotational crossing with 3 sire breed (d) **a and b**

38. **How many number of breedable females and males are required respectively to estimate breed difference**
(a) **200, 10** (b) 200, 15
(c) 250, 15 (d) 250, 10

39. **Which class of MHC genes codes components of complement system and heat shock protein?**
(a) Class I MHC (b) Class II MHC
(c) **Class III MHC** (d) all

40. **Monoclonal antibody produces by fusion of**
(a) **Spleen and myeloma cell** (b) T and myeloma cell
(c) B and Spleen cell (d) B, T, and myeloma cell

41. **Malecot's coefficient is used to predict**
(a) Inbreeding coefficient (b) **Coancestory coefficient**
(c) coefficient of determination (d) None

42. **Tm refers to**
(a) 2 (G+C) + 2(A+T) °C (b) **4(G+C) + 2(A+T) °C**
(c) 4(G+C) + 2(A+T) °F (d) 2(G+C) + 2(A+T) °F

43. **Breeding value of an individual is equal to?**
(a) ½ BV of sire (b) ½ BV of dam
(c) **sum of ½ of BV of sire and dam** (d) None of the above

44. **In a population mating at random in which the frequency of gene A is 0.3, the proportion of heterozygote would be**
(a) 0.49 (b) **0.42**
(c) 0.09 (d) 0.35

45. **Low h^2, little variance due to common environment and large families are the conditions, which favor**
(a) Individual selection (b) **Family selection**
(c) Within family selection (d) Combined selection

46. **If individuals of a particular genotype are not permitted to reproduce, then selection coefficient for that genotype is**
(a) **One** (b) zero
(c) 0.5 (d) None of the above

47. **Heritability estimate from the data monozygotic**
(a) h^2 in narrow sense (b) **h^2 in broad sense**
(c) h^2 by half sib method (d) h^2 by full sib method

48. **When a gene controls more than one character than this phenomenon is known as**
(a) Polymorphism (b) **Pleiotropy**
(c) Linkage (d) Luxuriance

49. **Progeny testing of bulls began in 1902 in**
(a) USA (b) India
(c) **Denmark** (d) U.K.

50. **0.20 coefficient of selection indicates that for every 100 zygotes produced by favored genotype only**
(a) **80 are produced by genotype selected against**
(b) 20 are produced by genotype selected against
(c) 40 are produced by genotype selected against
(d) 60 are produced by genotype selected against

51. **Number of generations required for changing frequency of recessive allele from 0.50 to 0.25 under selection against a recessive gene with complete elimination of unwanted homozygote**
(a) 4 (b) **2**
(c) 6 (d) 3

52. **Frequency dependent selection causes**
(a) **polymorphism** (b) Linkage
(c) Inbreeding (d) Random drift

53. **Intensity of selection is limited by**
(a) population size (b) inbreeding
(c) population size and inbreeding (d) **neither population size nor inbreeding**

54. **Frequency of carriers in a normal population under HWE with 0.50 recessive allele frequencies?**
(a) **0.67** (b) 0.57
(c) 0.47 (d) 0.37

55. **A population is under HWE. If the gene frequency of A1 allele in parents is 0.30, the frequency of A2A2 genotype in progeny will be**
(a) 0.30 (b) 0.09
(c) 0.42 (d) **0.49**

56. **Marker assisted selection requires**
(a) Linkage between marker and QTL
(b) **Linkage disequilibrium between marker and QTL**
(c) No linkage between markers and QTL
(d) Linkage equilibrium between marker and QTL

57. **Gametic phase disequilibrium of unlinked loci in each generation becomes**
(a) equal (b) double
(c) **half** (d) NOTA

58. **Effect of recurrent mutation in ..... arresting the differentiation of subpopulation by random drift**
(a) **Low** (b) Medium
(c) High (d) Very high

59. **Change of gene frequency in a population on immigration depends on**
(a) coefficient of selection
(b) **immigration rate & difference of gene frequency and between immigrants and natives**
(c) average inbreeding coefficient of population
(d) heritability in base population

60. **Most important obstacle in new breed development**
(a) Breeding plan (b) Time
(c) Expanse (d) **Narrow base of genetic variability**

61. **If there is a complete dominance, additive variance is maximal when the frequency of recessive allele is**
(a) 0.25 (b) 0.50
(c) **0.75** (d) 1.00

62. **Microsatellite / SSR loci consist of repeating unit of**
(a) 1-6 **bp** (b) 10-15 bp
(c) 10-60 (d) 20-25bp

63. **Gene frequency of an autosomal gene becomes equal in two sexes of progeny in**
(a) **2nd generation of RM** (b) 1st generation of RM
(c) 6th generation of RM (d) 3rd generation of RM

64. **Selection may change the gene frequency in following way (find correct one)**
(a) Through natural difference of fertility
(b) Through artificial selection
(c) Through natural difference of viability
(d) All

65. **Difference of mean phenotypic value between the offspring of selected parents and whole of parental generation before selection is known as -**
(a) Response to selection (b) Genetic change
(c) Genetic gain (d) **All**

66. **Superiority of selected parents over the population mean is known as-**
(a) Selection differential (b) Intensity of selection
(c) Breeding value (d) None of the above

67. **Regression of individuals B.V. on its phenotypic value is termed as-**
(a) **Heritability in narrow sense** (b) Heritability in broad sense
(c) Both (d) None

68. **Which of the followings is/are the cause of of asymmetrical response-?**
(a) Inbreeding depression (b) Maternal effect
(c) Selection differential **(d) All**

69. **Selection differential may be differ in upward and downward selected lines, because of–**
(a) Natural selection may aid artificial selection
(b) Fertility fluctuation
(c) Variance fluctuation
(d) **All**

70. **Most efficient method of multi trait selection**
(a) Tandem method (b) Independent culling level
(c) **Selection index** (d) None of the above

71. **In a random matting population, if genotypic frequencies of homozygotes are 68 %, what will be the allelic frequencies in that population?**
(a) 0.8 and 0.2 (b) 0.5 and 0.5
(c) 0.6 and 0.4 (d) 0.7 and 0.3

72. **Rex is a breed of**
(a) Rabbit (b) G. pig
(c) Rat (d) Cat

73. **Family selection is useful when**
(a) Family size and C- effects are large
(b) Family size and C- effects are small
(c) Family size is optimum and C- effects are low
(d) Family size and C- effects are optimum

74. **Variance on practicing of inbreeding in population is**
(a) Increase between lines
(b) Decrease within lines
(c) Increase within line but decrease between lines
(d) **Decrease within lines but increase between lines**

75. **On crossing of two well established cattle breeds, performance of offspring is mor than the mean parental value, because of**
(a) Additive genetic variance and overdominace
(b) Additive genetic variance and overdominace and directional dominance
(c) Additive genetic variance and overdominace and epistatic effect
(d) **Complementarity and Heterotic effect**

76. **The selection index method was introduced in animal breeding by**
(a) Lush
(b) **Smith and Hazel**
(c) Lerner
(d) Comstock

77. **Selection index using information from different sources is known as**
(a) Restricted selection index
(b) Multi stage selection
(c) **Multi trait multi source selection index**
(d) All the above

78. **Restricted selection index is constructed by**
(a) Lush
(b) Smith and Hazel
(c) Comstock
(d) **Kempthorne and Nordskog**

79. **The selection index followed for traits, which have negative genetic correlations**
(a) **Restricted selection index**
(b) Multi stage selection
(c) Multi trait multi source selection index
(d) All the above

80. **Genetic gain will be more in which method of selection**
(a) Tandem method
(b) Independent culling level
(c) **Selection index**
(d) None of the above

81. **Requirement to construct selection index**
(a) Economic value of the trait
(b) Genetic & Phenotypic variance all traits
(c) Genetic & Phenotypic covariance all traits
(d) **All the above**

82. **Which programme is used to calculates the aggregate breeding value of the individual**
(a) REML
(b) **BLUP**
(c) BLUE
(d) All the above

84. **Pedigree selection is more effective if the heritability of the trait is**
(a) Low
(b) medium
(c) **High**
(d) NOTA

85. **Culling can be practiced with few records if the repeatability of the trait is**
(a) **High**
(b) Low
(c) Medium
(d) NOTA

86. **In individual selection, animals are chosen on the basis of their**
(a) Progeny's performance
(b) Pedigree
(c) **Own phenotype**
(d) NOTA

87. **The most accurate aid to selection is**
(a) Individual selection
(b) **Progeny testing**
(c) Own phenotype
(d) Pedigree selection

88. **Mass selection is applicable for**
(a) Sex-limited traits
(b) Traits expressed late in life
(c) **Traits with high h^2**
(d) All the above

89. **For carcass traits in sheep the practical aid to selection is**
(a) Family selection
(b) Sib selection
(c) Progeny testing
(d) Individual selection

90. **Selection that cannot be used for sex-limited traits is**
(a) Individual selection
(b) Progeny testing
(c) Pedigree selection
(d) Family selection

91. **The environment effects, which are different for different families but same for all members of one and same family is known as.....**
(a) e-effects
(b) c-effects
(c) f-effects
(z) z-effects

92. **Which of the following aid to selection is used to identify the carrier individuals for harmful genes?**
(a) Mass selection
(b) Pedigree selection
(c) Sib selection
(d) Progeny testing

93. **Which index is utilized for sire evaluation of farm level and key – village level?**
(a) Yapp index
(b) Rice index
(c) Sunderasan index
(d) Mount hope index

94. **BLUP concept was pioneered by**
(a) Mount hope
(b) Lush
(c) Sundarasan
(d) Henderson

95. **Sire evaluation estimates**
(a) Breeding value of bulls
(b) Breeding value of progeny
(c) Breeding value of dam
(d) Breeding value of progeny and dam

96. **Yapp's formula can be expressed in term of**
(a) 5% fat correct milk
(b) 2% fat correct milk
(c) 4% fat correct milk
(d) 6% fat correct milk

97. **Which of the following statement is/are not appropriate for pedigree selection?**
(a) Pedigree selection is less accurate than individual selection
(b) It introduces non-random biases
(c) Helpful in multistage selection
(d) It cannot be applicable for sex limited

98. **Which of the following is/ are the advantages of pedigree selection?**
(a) Shortest generation interval
(b) Useful for preliminary selection
(c) Cost effective and applicable sex-limited and late expressed traits
(d) All of the above

99. **Full sib selection is more accurate than half sib selection but half sib selection is most favored, why?**
(a) Easy and large no half sib availability
(b) Rate of inbreeding is more in full sib
(c) "C – effect" greatly affect correlation among full sibs
(d) All of the above

100. **In presence of "C" effect, which of the following basis of selection is recommended?**
(a) Family selection
(b) Between family selection
(c) Within family selection
(d) Sib selection

101. Which of the following DNA is left handed-

(a) A-DNA
(b) B-DNA
(c) X-DNA
(d) Z-DNA

102. Satellite DNA is useful tool in-

(a) Genetic engineering
(b) Forensic science
(c) Sex determination
(d) Organ transplantation

103. The inheritance pattern in which the expression of nuclear is altered without altering its sequence-

(a) Epigenetics
(b) Maternal
(c) Gene imprinting
(d) Somatic mutation

104. Which component of transcribed RNA in eukaryotes is present in the initial transcript but is removed before translation-

(a) Intron
(b) 3'-Poly A tail
(c) Ribosome binding site
(d) None of these

105. Intra sire regression of offspring on dam estimates-

(a) Heritability of trait
(b) Repeatability of trait
(c) Half of heritability of trait
(d) Twice the heritability of trait

106. To study genetic diversity, IIIrd generation marker is-

(a) RFLP
(b) RAPD
(c) Microsatellite
(d) SNP

107. Most common DNA marker placed on avian genome-

(a) RFLP
(b) RAPD
(c) Microsatellite
(d) SNP

108. Farm animal genetic resources including animal species, breeds and strains and their wild relatives that are of economic, scientific and cultural interest to human kind in terms of food and agriculture for present or in future, it is called as-

(a) Biodiversity
(b) Domestic animal diversity
(c) Animal genetic resources
(d) Gene pool

109. Which is true for threshold traits-

(a) Possess points on liability scale around which phenotypic classes change
(b) Individual exhibit categorical phenotypic classes with discontinous variation
(c) Influenced by environment
(d) The model for describing the phenotypic value of individual is the same as that of quantitative trait
(e) All of the above

☆☆☆

Dr. Somesh Gaikwad

Animal Nutrition

Table 1: Differences between Hay & Silage

S.N.	Item	Hay	Silage
1.	Define	Sun dried forage	Method of preserving green fodder for a long period of time through anaerobic fermentation
2.	Moisture content	**12-14%**	**60-70%**
3.	Best crop	**Oat** (*Avena sativa*)	**Maize** *(Zea mays)*
4.	Preferred plant	**Leafy Plant with thin stem**	Plant with **thick stem**
5.	Method of manufacturing	Hay curing	Ensiling
6.	Harvesting time	a) In case of crop:- Flowering/ blossom stage b) In case of Cereals:- Milk stage c) In case of Legumes:- Tender pod formation stage	Between flowering and milk stage
7.	Type of roughage	Dry	Succulent

Note:-

- **Best hay** is prepared with **Oat** (*Avena sativa*)
- **Best legume hay** is prepared with **Lucerne (Alfa-alfa,** *Medicago sativa*)

♦ **Advantages of hay making:**

- **Sorghum (Jowar) lost its cyanide toxicity** during drying due to denaturation of enzymes.
- **Vitamin D (Vit. D_2: Ergocalciferol) content is very high** in hay due to sun drying.

♦ **Disadvantages of hay making:**

- **Vitamin A content of forage is lost up to 90%** due to sun drying.
- If hay made with high moisture legume, it results in fermentation & heat production leads to the formation of **Brown hay or mow-burnt hay**.
- **The brown colour of hay** is due to **Maillard-type of reaction**.
- **Lysine amino acid** is mainly susceptible to Maillard type reaction.
- **Nutritive value of hay is less** than that of silage.

♦ **Kinds of hay:**

1. **Legume hay:** Lucern, Berseem
2. **Non-legume hay:** Oat, Barley
3. **Mixed hay:** Lucern + Oat, Berseem + Barley

♦ **Silage:**

Ensiling/Silage making: Process of **preserving green fodder** by **anaerobic fermentation**

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Table 2: Types of fermentation during ensiling

S.N.	Items	Lactic acid fermentation	Butyric acid fermentation
1.	Occur in which condition	When fodder is rich in **soluble sugar or carbohydrate**	**When fodder is rich in protein content**
2.	Quality of silage formed	**Good & High quality**	**Bad odour & not good silage**

Table 3: Classification of Silage

S.N.	Items	Very good silage	Good silage	Fair silage
1.	pH	**3.5 - 4.2**	4.2-4.5	4.8 or above
2.	Ammonical N_2 in total N_2	**Less than 10%**	10-15%	20% or above
3.	Butyric acid	Nil	Trace	Some amount

Note:-

(1) Colour of good silage: **Yellowish or Brownish-green**

(2) During silage production, chlorophyll present in leaves reacts with organic acids and turns into **Phaeophytin**, which is responsible for normal colour of silage.

(3) Sodium metabisulphite is used to reduce smell in silage.

(4) Legume crops do not produce good quality silage because its buffering capacity increases due to high content of moisture, minerals and protein. Due to this, change in pH is stopped and pH does not decrease and poor quality silage is formed.

(5) In silage production, 80-85% of nutritive value of green fodder is preserved.

(6) The dry matter content should be 30-35% while making silage.

(7) Haylage: When grass & legume which are meant for hay are ensiled

- Moisture content of haylage is **45-55%**
- Having characteristics of both hay & silage

(8) Wastelage: Anaerobically fermented animal waste (poultry dropping, poultry litter, swine excreta, and bovine dung) with the help of **lactic acid producing bacteria**

(9) A.I.V. method of silage making:-

- A.I.Virtanen in Finland proposed an ensiling method by using **acid additives like-H_2SO_4 & HCl**
- pH of silage in AIV method should be **less than four.**

♦ **Special points about silage making:-**

- Toluene distillation method is used for estimation of dry matter in silage.
- **Crops rich in soluble sugar** such as maize, sorghum, bajra are most **suitable for ensiling**
- Crops with less soluble carbohydrate can also be used for ensilage by the addition of **3-3.5% molasses.**
- Mixture of **grass/cereal fodder & legume** used for ensilage should be in the **ratio of 3:1**
- **Urea @ 1% & salt @ 0.5%** are added to cereals & grasses in order to improve N_2 content & palatability
- Pit silos are more common in India. The depth of this pit is 2.4-3 meter.
- 400 kg fodder can be ensiled in 1 m^3 space. Silage gets ready in two months.
- **Flieg-index** is commonly used method for **evaluation of silage quality.**
- **Silage conditioners/ Silage preservatives:** Molasses, Salt, Cereal grains, Citrus pulp.

- **Conditions for success in silage making:**
  → Moisture content in plant should be 65 %
  → There should be anaerobic condition in silo.
  → Temperature of silo should be 30 ^{0}C- 38 ^{0}C.

Table 4: Anti-Nutritional Factors (ANFs)

- **ANF:-** Substance which are found in diet, which by themselves or their metabolic products exhibit harmful effect on the health of animal. ANFs are commonly found in raw material.

S.N.	Plant	Anti-Nutritional Factors	Detoxification
1.	Soyabean	**Kunitz inhibitor (Trypsin inhibitor),** Anti vitamin-A Anti vitamin-D	Autoclaving **(121^{0}C/15 lbs/15 min)**
2.	Castor bean	Ricin/Lectin	By moist heat
3.	Groundnut cake (GNC)	**Aflatoxin (B_1 Aflatoxin is most toxic)**	Treated with **NH_3 or NH_4OH**
4.	Lucerne (Alfa-alfa)	Saponin, Estrogenic substances	Mineral oil, Simethicone (Bloatosil)
5.	Cotton seed cake	**Gossypol**	Iron supplement or $FeSO_4$
6.	Subabool	**Mimosine**	Iron supplement or $FeSO_4$
7.	(a) Jowar (Sorghum), Sudan grass (b) Linseed, Cassava (tapioca) (c) Bitter almond	**Cyanide poisoning** (a) Dhurrin (b) Linamarin (c) Amygdalin	**$NaNO_2$ (Sodium nitrite) + Na-thiosulphate**
8.	Brassicaceae family plants:- Mustard, Rapeseed, Cabbage, Cauliflower, Turnip	**Glucosinolate** (mainly as goitrogens & causing goiter	Iodine supplement
9.	Oat hay poisoning	**Nitrate poisoning**	**1% solution of Methylene Blue**
10.	Mollases,Napier grass,Bajra	Oxalate	$CaCO_3$ supplement
11.	Neem	Nimbin, Nimbidin, Azadirachtin	
12.	Top feeds, Khejri leaves, Babul seeds, Salseed meal	Tannin	
13.	Wheat	Arabinoxylans	
14.	Barley, Oats	β - glucans	
15.	Raw kidney bean	Antivitamin E	Autocalving
16.	Maize, Wheat bran	Anti-niacin (anit-vit B_3)	Vitamin B_3
17.	**Raw fish, Bracken fern**	**Thiaminase** (anti-vitamin B_1)	Vitamin B_1

18.	Raw egg white (raw albumin)	**Avidin**	Biotin
19.	Sweet clover poisoning, warfarin, sulfa drug	Dicoumarol (antivitamin K)	
20.	Mahua Cake/seeds	Mowrin	
21.	Cassia torra seeds	Crysophanic acid	
22.	Jatropha seeds/cake	Curcin	
23.	Guar meal	Guar gum, Trypsin inhibitor	

Note:-

- **Avidin**: **Egg white injury factor**
- **Biotin: Anti- egg white injury factor**
- Horse is resistant to gossypol poisoning
- A fodder crop having retarded growth due to drought & regain its growth after rains will cause **Cyanide poisoning**
- Nitrate is not toxic to ruminants. It converts into nitrite in the rumen. Nitrite converts hemoglobin (ferrous iron) to methemoglobin (ferric iron) and this methemoglobin is not able to transport oxygen. Blood becomes chocolate colored and brownish discolouration of non pigmented areas of skin and mucous membrane.

Table 5: Vitamins deficiency diseases

S.N.	Vitamin	Other name	Deficiency diseases
1.	Vita.A	Retinol; Anti-infective vit.	(a) **"Nutritional roup"** in poultry (b) Xerophthalmia in animals (c) Night blindness in human
2.	Vita.D	**Cholecalciferol (D_3)/ Act as hormone; Ergocalciferol (D_2);** Anti-racheitic vit.	(a) Rickets in children (b) Osteomalacia in adults **(c) "Penguin like squat"** posture in hens
3.	Vita.E	Alpha- Tocopherol; Anti-oxidant vit.; Beauty vit.; Anti-sterility vit.	**(a) Crazy chick disease/Encephalomalacia** (cerebellum degenerating disease of chicken) (b) Nutritional muscular dystrophy **(Stiff lamb disease, white muscle disease, mulberry heart disease)** (c) Exudative diathesis in chicken (d) **Syncope syndrome in pigs** (e) **Yellow fat disease or Pansteatitis in cat** **(f) Tying up** condition in horse
4.	Vita.K	Anti-haemorrhagic factor	(a) No blood clotting (b) Bleeding disease (c) Haemorrhagic sweet clover disease
5.	Vita.B_1	**Thiamin;** Anti-neuritic vit.	**(a) Polyneuritis in birds** (chicken sits on its flexed legs & draw its head backward assuming **"star gazer position"**) (b) **Polioencephalomalacia** (PEM) or Cerebrocortical necrosis (CCN) in ruminant

			(c) Beri-Beri disease in human **(d) Chastek paralysis** in fox
6.	Vita.B_2/ Vita.G	**Riboflavin**	**(a) "Curled toe paralysis"** in chicken **(b) "Clubbed down condition"** in chicks
7.	Vita.B_3	Niacin/ Nicotinic acid	(a) Pellagra/rough skin (b) Black tongue in dog and man
8.	Vita.B_5	Pantothenic acid; Filtrate factor	"Goose-stepping" in pigs
9.	Vita.B_6	Pyridoxine: antidermatitis factor	"Goose-stepping" in pigs
10.	Vita. B_7/ Vita. H	Biotin	(a) **Fatty liver kidney syndrome (FLKS)** in poultry (b) Sudden death syndrome in broiler (c) "Spectacle eye" in rat (d) **"Parrot beak"** in chicks
11.	Vita. B_{12}	**Cyanocobalamine, Anti-pernicious anemia factor, Animal protein factor, Chick growth factor**	**(a) Pernicious anemia** (Macrocytic hyper-chromic anemia) (b) Methyl malonic aciduria in ruminants
12.	Vita. C	L-Ascorbic acid; Anti-rabies vit.; Anti-ageing vit.; Anti-viral vit.; Anti-stress vit.	**(a) Scurvy/bleeding gums** **(b) 'Pithed frog'** conditions in baby

Note:-

- **Vitamin A, D, E & K are fat-soluble** while Vita.B-complex & Vita.C are water-soluble.
- **Vitamin E & selenium** show a **synergistic effect.**
- **Vitamin D acts as a hormone**. It synthesized in skin & cause calcium absorption through GIT.
- **Choline** acts as **"lipotropic factor"** which is responsible for prevention of fatty liver.
- 4 % Cobalt is found in Vit. B_{12}
- Folic acid is also known as Vita. M/ Pteroylmonoglutamic acid.
- Oral contraceptives & drug therapy of tuberculosis act as antagonistic to vita.B_6
- Race horses are most susceptible to Vit. B_1 deficiency.
- High dietary propionic acid intake in ruminants causes Vit. B_{12} deficiency.

Table 6: Diseases due to minerals deficiency & toxicity

S.N.	Mineral deficiency or toxicity	Diseases
1.	**Copper deficiency**	**(a) Steely wool/Stringy wool** (particularly in Merino sheep) **(b) Enzootic neonatal ataxia** (staggering gait in lambs, kids & calves) also known as **Swayback/Swing back. Demyelination of CNS is a typical feature of this disease.** (c) Falling disease in cattle (d) Salt sickness (e) Spectacle eye in sheep (f) Dissecting aneurysm in chicken
2.	Zinc deficiency	(a) Parakeratosis in pigs **(b) Hyperkeratosis in cattle** **(c) Swollen hock syndrome in chickens** **(d) Frizzled feathers in chicks**

3.	Molybdenum deficiency	**Femoral head necrosis in chickens**
4.	Molybdenum toxicity	**Teartness/Peat scour in cattle** (persistent scouring with liquid faeces full of gas bubbles)
5.	Manganese deficiency	**(a) Perosis/Slipped tendon in chicken** (slippage of gastrocnemius or Achilles tendon from its condyles) (b) **Parrot beak condition**
6.	Cobalt deficiency	**(a) Enzootic marasmus/wasting disease**/pine in Sheep (b) Cattle coast disease
7.	Fluorine deficiency	**Dental caries** in children
8.	Fluorine toxicity	**Fluorosis** (bone & teeth loose their natural colour, mottled teeth)
9.	Selenium toxicity	**(a) Blind staggers** (Sub-acute poisoning) **(b) Alkali disease** (Chronic poisoning) **(c) Degnala disease of cattle** (Chronic poisoning)- dry gangrene of face, tail & hooves mainly in Punjab & Haryana
10.	Selenium deficiency	**(a) Ill thrift in lambs** **(b) Nutritional muscular dystrophy (Gizzard myopathy in turkey,** Stifflamb disease, white muscle disease, mulberry heart disease) (c) Exudative diathesis in chicken
11.	Iron deficiency	**Piglet anemia** (Characterized by spasmodic breathing known as **"Thumps", 2-4 weeks** piglets are **most susceptible**)
12.	Iron toxicity	**Siderosis** (excessive deposition of storage form of iron in liver, spleen & kidney). Iron stored in form of **ferritin & hemosiderin.** Iron occurs in blood serum in the form of **"transferrin"** (iron transporting protein)
13.	Calcium deficiency	**(a) Milk fever/Parturient paresis** (mainly occur in high-yielding cow **within 48 hours of parturition** & characterized by **hypothermia)** **(b) Eclampsia in bitch** (occur just after parturition)- small breeds or **toy breeds are most susceptible** such as the **pug, pomeranian, spitz & Chihuahua.**
14.	Phosphorus deficiency	**(a) Pica/Depraved appetite/Allotriophagia in cattle** (animal eat uneatable items such as woods, bones, rags etc.) **(b) Post-parturient hemoglobinuria (PPH)/Lahu-mutna/Hypophosphatemia** (mainly in high yielding dairy cows)
15.	Phosphorus toxicity	**Osteodystrophia fibrosa or Big head disease or Miller's disease or Bran disease** in horse fed bran (because bran contain low Ca and high P). It is due to high secondary parathyroidism (PTH) when diet is low in Ca and high in P.
16.	Magnesium deficiency	**Lactation tetany** or **grass tetany** or **winter tetany** or **Wheat staggers** or **grass staggers** (lactation tetany in all animals is caused by Mg deficiency but in case of **mare it is caused by Ca deficiency)**

Note:-

- Perosis/Slipped tendon in chickens: due to deficiencies of **Mn, Biotin, Choline, Folic-acid & Vita.B_{12}**
- Ca & P act as antagonistic to Mg.
- Sheep is most susceptible to Cu toxicity & Co deficiency.
- Sheep is less prone to phosphorus deficiency due to selective grazing
- Palm kernel cake (PKC) feeding causes copper toxicity in sheep.
- Wilson's disease in human is caused by copper toxicity.
- **Chromium** is known as "**glucose tolerant factor**"

♦ **Piglet anemia: 2-4 weeks piglets are most susceptible**

Prevention:

(1) **Drenching of saturated solution of $FeSO_4$**

(2) **Teat painting with $FeSO_4$**

(3) I/M injection of **Iron dextran** on **4th & 14th day after birth**

♦ **Sulphur:-**

1. Sulphur containing vitamins are **thiamine & biotin**
2. Sulphur-containing amino acids are methionine, cysteine, homocysteine, and taurine
3. Sulphur containing hormones are **insulin, ADH/vasopressin, oxytocin**
4. Wool contains 4% sulphur and wool is rich in cysteine amino acid while human hair keratin contains 14% sulphur
5. Recommended Nitrogen: Sulphur ratio in ruminant diet should be 10:1
6. Nitrogen: Sulphur ratio in wool is 5:1

♦ **Sodium (Na) & Potassium (K):-**

1. Major Cation of Extracellular fluid (ECF) is Na^+ while major anion is Cl^-
2. Major Cation of Intracellular fluid (ICF) is K^+ while major anion is PO_4^{-3}

♦ **Calcium (Ca) & Phosphorus (P):-**

1. Normal **blood calcium** level in ruminants is **8-12 mg/dl**
2. Normal **blood phosphorus** level in ruminants is **4-8 mg/dl**
3. Bone Ca:P ratio should be 2:1
4. The main path of excretion of **Ca & P is via faeces**
5. The main path of excretion of **Na^+& K^+ is via urine** (but in carnivores, the main path of P excretion is via urine).
6. Phosphorus play important role in nucleotides formation such as ATP, ADP

Table 7: Calcium regulating hormones

S.N.	Hormone	Secreted from	Action
1.	Calcitonin	Parafollicular cells of **thyroid gland**	Decreases blood Ca level
2.	Parathormone(PTH)	Parathyroid gland	Increases blood Ca level
3.	Vita.D_3 (act as hormone)	Synthesized in skin on exposure to sunlight	Absorption of Ca through intestine

Table 8: Difference between Roughage & Concentrate

S.N.	Items	Roughage	Concentrate
1.	Crude Fibre (CF)	**CF > 18%**	**CF < 18%**
2.	Total digestible nutrients (TDN)	**TDN < 60%**	**TDN > 60%**
3.	Energy content	Low	High
4.	Digestibility	Low	High
5.	Density of feed	Low	High
6.	Main function	**Belly-filling**	To **provide energy**
7.	Examples	**(A) Dry roughage:-** Straw, stover, hay **(B) Succulent roughage: -** Silage, tree leaves, pasture, green fodder	**(A) Energy-rich concentrate:-** (i) Grains (Maize, Wheat, Jowar, Bajra) (ii) Molasses (iii) Wheat bran **(B) Protein rich concentrate:-** (i) Animal origin (fish meal, meat meal, feather meal, blood meal) (ii) Plant origin (oil seed cakes, Cotton seed cake)

Note:-

- **Feed-stuff**: consists of roughage, concentrate & feed additives
- **Energy feeds/Basal feeds**: contains **less than 20% CP & less than 18% CF.** Generally, Energy feeds consist of cereal grains & it's by product
- **Protein supplements**: contains **more than 20% Crude protein and less than 18% crude fiber**
- **Soilage/Zero grazing**: Pasture, when cut & fed green to an animal in its own stall

♦ **Feeding requirements:-**

(A) Dry matter requirement (per animal per day):-

- Zebu cattle: 2- 2.5 Kg/100 Kg body weight
- Buffalo and crossbred cow: 2.5 - 3Kg/100 Kg body weight
- Sheep: 2.5 - 3 Kg per animal per day
- Lactating sheep: 4% of body weight
- Meat goat: 4% of their live weight
- Dairy goat: 4-6% of their live weight
- Camel: 2% of body weight
- Working & lactating camel: 3% of body weight

(B) Maintenance ration

- For Zebu Cattle: **4 Kg straw + 1 Kg Concentrate**
- For Buffalo & Cross-bred cow: **4-6 Kg straw + 2 Kg Concentrate**

(C) Production ration:-

- For Zebu Cattle: **1Kg concentrate/2.5 Kg milk**
- For Buffalo & Cross-bred cow: **1Kg concentrate/ 2 Kg milk**

(D) Gestation ration: during last trimester of pregnancy

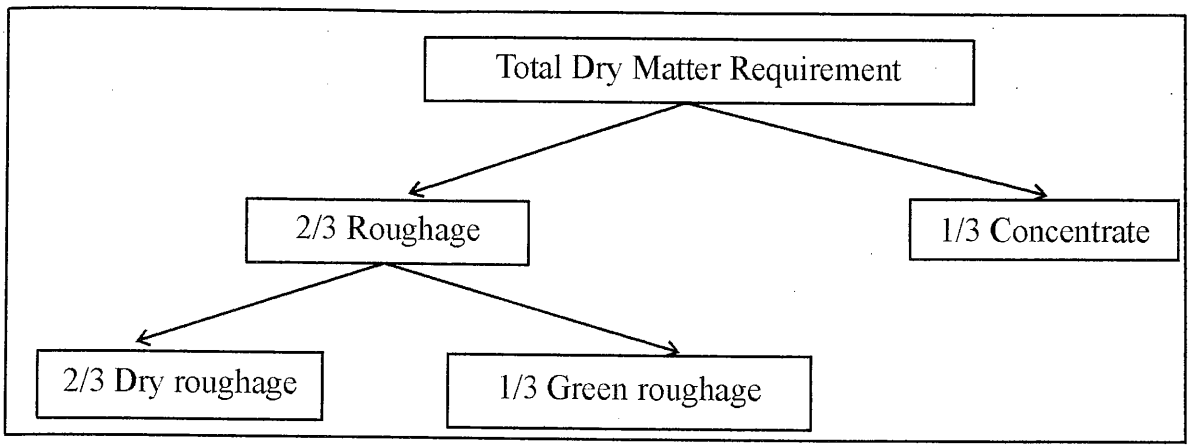
- For Zebu Cattle: **1.25 Kg concentrate**
- For Buffalo & Cross-bred cow: **1.75 Kg concentrate**

Note: - 1. Salt and mineral mixture should be given @ 1% of the concentrate mixture

2. Dry matter intake to water intake ratio in sheep is 1:4

Table 9: Cattle feed/Dairy compound feed

S.N.	Types of dairy compound feed	CP% (min.)	CF% (Max.)	Moisture% (Max.)	EE % (min.)	AIA% (Max.)
1	**BIS Type-I (Gold)**	22	7	11	3.0	2.4
2.	**BIS Type-II (General)**	20	12	11	2.5	3.0



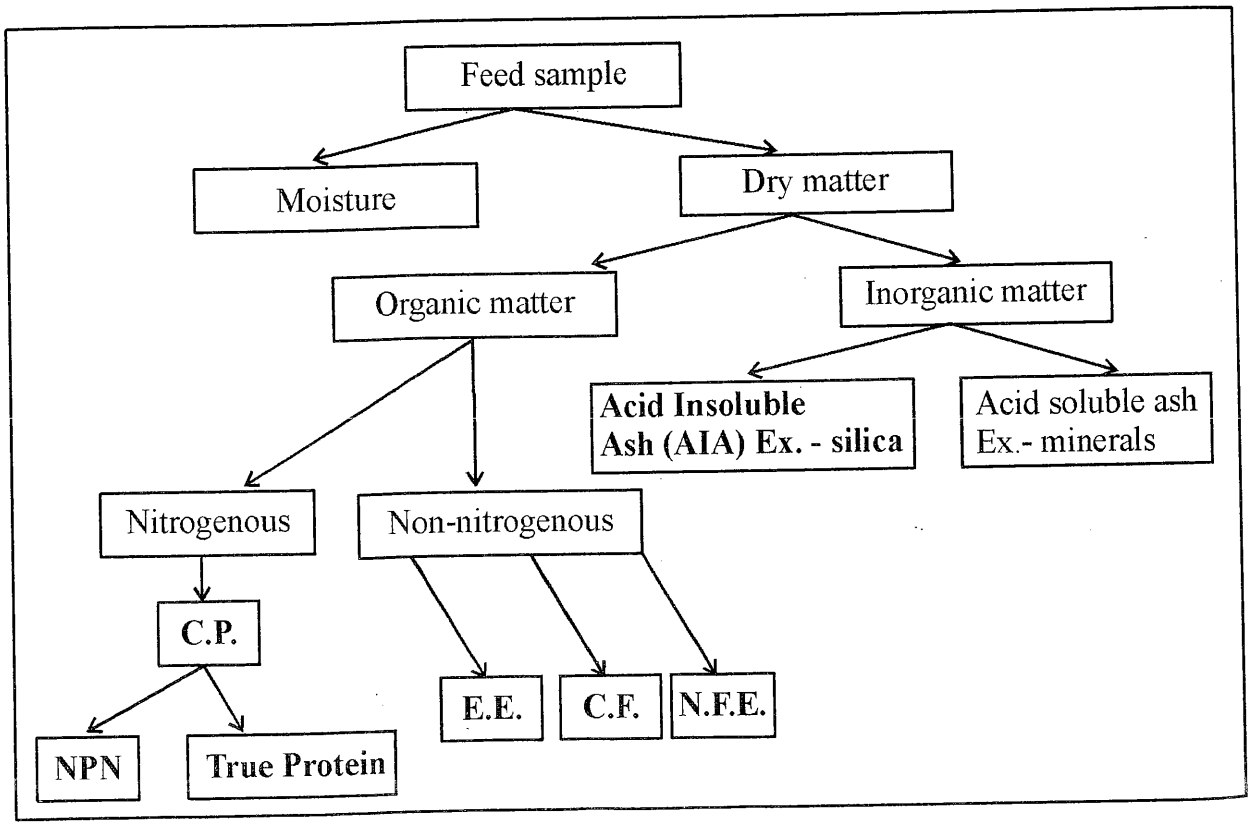
Note: If green fodder is legume, then roughage supplied **1/4 by green roughage & 3/4 by dry roughage**

- **The composition of animal body & plant body:**
  - Water, protein & ash content of a **fat-free animal body are in the ratio of 19:5:1 (75% water, 20-22% protein & 3% ash).**
  - **Total body water of an animal body is 60-70%** of total body weight.
  - The total mineral content of the animal body is 3% of total body weight. **(Ca-1.33%, P-0.74%**, K-0.19, Na-0.16, S-0.15, Cl-0.11, Mg-0.04)
  - The total blood content of the animal body is 8% of total body weight.
  - **Calcium & phosphorus** are the major inorganic components of **animals**
  - **Potassium & silicon** are the major inorganic components of **plants**
  - In amimal body composition to major variables are- water and fat.
- **Weende system of proximate analysis**:-
  1. **Proximate principles**-are various **nutrients of feed**, which are required for the nourishment of the animal body.
  2. **"System of analysis" proposed by** Henneberg & Stohmann at **Weende experimental station, Germany in 1865**.

Table 10: Proximate principles (six in number)

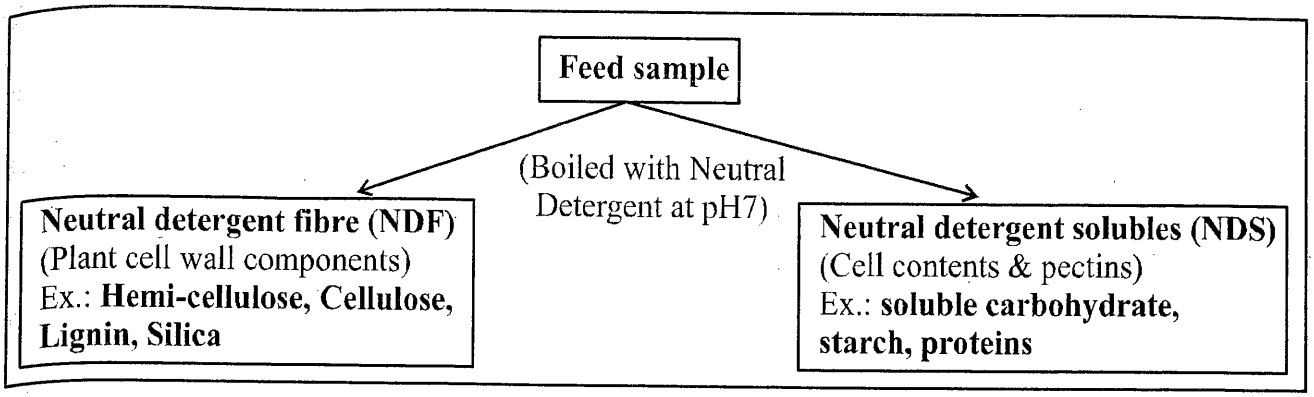
S.N.	Name of Proximate principles	Estimated by	Comments
1.	Water	**Drying feed sample in Hot air oven at 100 °C for 12 hours**	a. Succulent roughage contain 80% water b. Silage contain 60-70 % water c. Haylage contain 45-55 % water d. Straw contain 10% water e. Hay contain 12-14% water

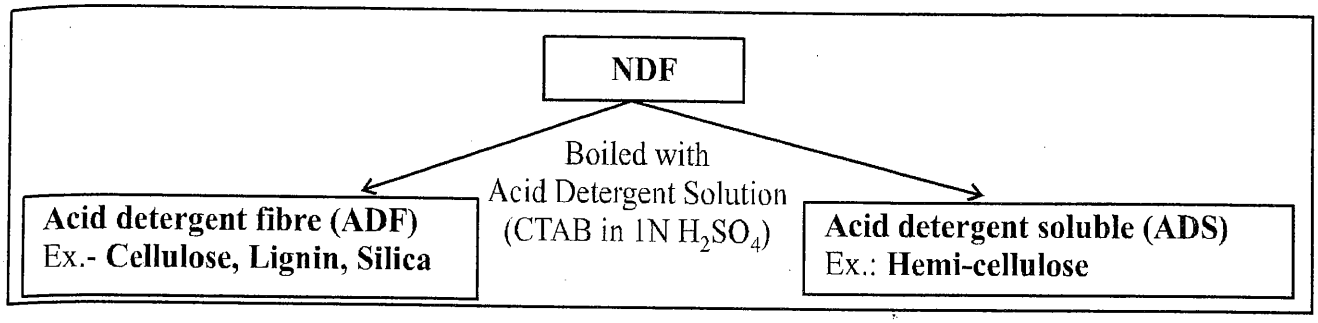
2.	Ether Extract (EE)	**Soxhlet apparatus**	All ether soluble substances such as fat soluble vitamins, carotene, cholesterols, wax etc.
3.	Crude protein (CP)	**Kjeldahl method, Dumas method**	a. **CP = N_2 content of feed×6.25** b. **CP** = True Protein + Non-Protein Nitrogen
4.	Crude fibre (CF)	Refluxing apparatus (1.25 % H_2SO_4 + NaOH)	a. Portion of carbohydrate which is not easily digestible Ex.-**cellulose, hemicellulose, lignin** b. Lignin is not a true carbohydrate because it contains 1-5 % nitrogen and 5-15 % methoxy group.
5.	Nitrogen-free extract (NFE)		Portion of carbohydrate which is easily digestible ex.- monosaccharides, disaccharides, pentose sugar and hexose sugar
6.	Ash	**Muffle furnace (600 ^{0}C for 2 hours)**	a. All the minerals found in animal feed like Ca, P, Mg etc. **b. Digestibility of ash cannot be determined because it does not contribute to the energy content of a feed.**



- **The detergent method of forage analysis/Van-Soest method:-**

Partition of carbohydrates by Weende system into CF & NFE is not realistic so to overcome this Detergent method of forage analysis was propose by Van-Soest.





Note:-

- NDF = ADF + ADS; ADF = NDF-ADS; ADS = NDF- ADF
- **NFE is only proximate principle that cannot be determined by analysis**
- NFE is simply calculated by subtracting CP, EE, and CF &Ash from 100
- **NFE% = 100 – (Water% + CP%+ EE% + CF% + Ash %)**
- **NFE% (DM basis) = 100 – (CP% + EE% + CF% + Ash %)**
- **Feed containing moisture > 14 percentage cannot be stored** for a long time.
- For estimating protein content of the feed, **Stutzer's reagent (alkaline $CuSO_4$)** is used.
- For calculating CP, we have to assume 2 things:-
  - (a) **All food protein contains 16% N_2** (factor 6.25 is coming from 100/16 = 6.25)
  - (b) All N_2 of food comes from true protein.
- TDN% = DCP% + DCF% + DNFE% + (DEE × 2.25)
- 1Kg TDN = 4.4 Mcal Digestible Energy
- **1Kg TDN = 3.6 Mcal Metabolic Energy** (because DE×0.82 = ME)
- 1 Kg TDN = 0.86 Starch Equivalent
- **0.32Kg TDN** is required by a cow for **1 litre of milk production**
- **400-500 ml blood** is circulating through out udder for the production of **1ml of milk.**
- Calf starter requires for proper rumen development and successful weaning. Since intake of dry feed initiates rumen development and allows early weaning.
- **Calf starter contains 18.5-19.5% DCP, 23-26% CP & 75% TDN**
- Flushing ration for sheep and goat: Feeding of extra 25% nutrients above the maintenance ration 2-3 weeks prior to breeding.
- Creep ration for lamb: It is animal protein supplimentation from 10 days of age to weaning age to promote growth and rumen development. In creep ration DCP is 17.4% TDN is 73%
- In kids, colostrum is given @ 100 ml per kg live weight.
- In kids creep ration is started from 15 days of age.

Table 11: Feeding of calf up to 3 months of age

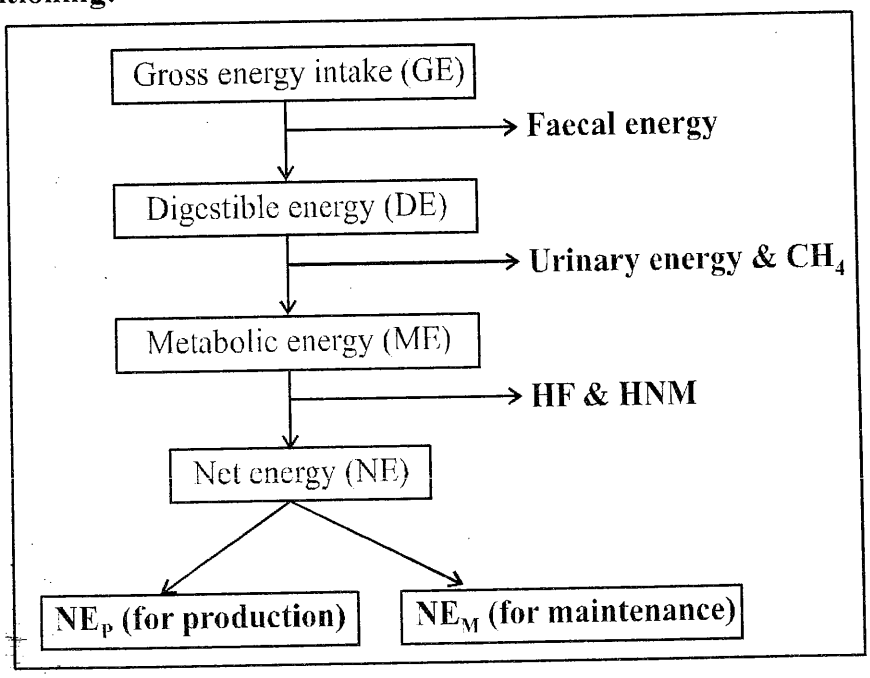
Age	Milk (Proportion of body wt.)	Calf starter	Hay
1-3 days	Colostrum (1/10)	—	—
4-14 days	Milk (1/10)	—	—
15-21 days	Milk (1/10)	A little	A little
22-35 days	Milk (1/15)	100 gm	*Ad lib*
2 months age	Milk (1/20)	250 gm	*Ad lib*
2-3 months age	Milk is gradually reduced	500 gm	*Ad lib*
3 months age	Weaning		

- **Metabolic/Oxidation water:**
  Amount of water produced in the body during various metabolic activities. It comprises of **5-10% of total intake of the water.**

Table 12: Metabolic water

S.N.	Substrate	Metabolic water produce
1.	1 g **Glucose or sugar**	**0.60g**
2.	1g Starch	0.56g
3.	1g Protein	0.40g
4.	1g Fat	1.07g

- **Energy partitioning:-**



Note: HF (Heat of fermentation) & HNM (Heat of nutrient metabolism)

1. Gross energy of animal feed is measured by Bomb calorimeter and in this Benzoic acid is used as chemical.
2. **Faecal energy loss**: Loss per unit feed intake increases with the level of feeding.
   - **Ruminant:** In the case of **roughages: 40-50% of GE intake (GE_i)**
     In the case of **concentrate: 20-30% of GE_i**

- **Horse: 35-40% of GE_i**
- **Pig: 20% of GE_i**

3. **Urinary energy loss:-**
   - **2-3% of GE_i in pigs**
   - **4-5% of GE_i in ruminants**
4. **Energy lost as methane (CH_4): 7% of GE**
   (Note: CH_4 contain 13.34 Kcal energy per gram)
5. **Physiological fuel value (PFV):**
   - Portion of gross energy, which is available for transformation in the body
   - Given by **Atwater**
   - **PFV = GE × Digestibility coefficient**

Table 13: Nutrients and their PFV

S.N.	Nutrients	GE (Kcal/g)	Digestibility coefficient	PFV(Kcal/g)
1.	Carbohydrate	**4.15**	0.98	**4.0**
2.	Fat	**9.4**	0.95	**9.0**
3.	Protein	5.65–1.25 = **4.4**	0.92	**4.0**

- **Feeding standards**
  - Feeding standards: Statements of the amount of nutrients required by animals
  - Albrecht Thaer published "Hay equivalent" in 1810.
  - Thaer used meadow hay as a unit to compare other feeds

Table 14: Types of feeding standards (3 types)

S.N.	Comparetive type	Productive type	Digestible nutrient type
1	Thaer's hay equivalent method	Armsby feeding standard	Wolff's standard
2.	Fjord's Scandinavian feeding standard	Kellner's feeding standard	Wolf-Lehmann standard
3.			Morrison's feeding standard (also known as Modified Wolf-Lehmann standard)

Note:-

- Grouven formulated first feeding standard in 1859, with protein, fat & carbohydrate.
- **Armsby feeding standard** is based on Net energy & True protein
- The book **"Manual of cattle feeding"** was published by **Armsby**
- **Kellner published "Starch equivalent system"** in 1907. It is based on Net energy & Digestible True protein
- **Wolff's standard**: -based on digestible protein, digestible fat & digestible carbohydrate. However, this standard has not taken care of the quantity & quality of milk produced.
- **Wolf-Lehmann standard**: -this standard considered the quantity of milk produced but not its quality.
- **Morrison's feeding standard** (also known as Modified Wolf-Lehmann standard):-

(a) Based on **DCP, TDN & DM**
(b) **Commonly used in Indian livestock**
(c) Published in 1915 in 15th edition of his own book **"Feeds & feeding"**

- Feeding standard of Sen & Ray (1964) is based on modified feeding standard of Morrison
- **ICAR feeding standard** was given by **Dr. S. K. Ranjhan**
- **ARC (Agricultural research council) Standard: -a feeding standard of United Kingdom (UK)** set up in 1959. ARC is now replaced by Agricultural & food research council (AFRC
- **NRC (National research council) Standard:- a feeding standard of USA set up in 1945.**

♦ <u>Straw & Stovers</u>:-

- Deficient in all minerals like Ca, P etc. but rich in silica
- Poor in protein content (DCP of straw is 0%) & poor in energy content (TDN is about 40%)
- Have low digestibility & high Crude fiber content
- **Wheat straw have 0% DCP, 3%CP & 40% TDN**
- **We can improve N_2 content, DCP, CP, TDN & digestibility of straw by urea treatment**

Table 15: Improvement of DCP, TDN and Digestibility of straw

S.N.	Items	DCP%	TDN%	Digestibility%
1.	Normal straw	0	40	46
2.	Urea treated straw	4-5	50	70

Table 16: Urea treatment of feed

S.N.	Feed	Urea treatment
1.	Dry roughage (straw)	@4% of straw (100Kg Straw + 40Lwater + 4Kg urea)
2.	Succulent roughage (Silage)	@0.5% of wet material
3.	Ration	@1% of the total DM of the ration
4.	Concentrate	Up to 3% of total concentrate of feed

Note: During urea treatment of straw, **water: urea ratio should be 10:1** for optimum utilization

♦ **Urea as an NPN source to the ruminants:-**

1. Substances in which nitrogen is found but these are not protein called Non Protein Nitrogen (NPN). Ex: - Urea, Biuret, Nitrate, Nitrite, Purine, Pyrimidine, Ammonia
2. Most widely used NPN substance in ruminant ration is urea
3. Urea is only used in ruminant ration
4. Urea should never feed to young calves (up to 6 months age) and monogastric animals (ex. horse, pig, dog etc.)

♦ **Characteristics of urea:-**

1. It is deficient in all minerals.
2. Nitrogen content of urea is 46.6% (in pure form)
3. It has no energy value
4. 100% degradable in rumen (quickly converted into NH_3 in rumen)

- **Factors affecting urea utilization**:-
  1. For optimum use of urea, **Nitrogen: Sulphur (N:S) ratio should be 10:1**
  2. **Starch: Urea ratio** in the diet should be **10:1** (1Kg starch require 100g urea)
  3. Rumen bacteria are unable to use NH_3 effectively if:-
     (a) Diet contain CP>13% or (b) **Rumen NH_3 concentration >5-8mg/100ml**
  4. **Adaptation period of rumen microbes** to dietary urea is **2-4 weeks.**

- **Urea toxicity in cattle**:-
  Urea toxicity results when **rumen NH_3 concentration exceeds 80mg/100ml** (or) when **blood NH_3 concentration exceeds 1mg/100ml**.

- **Treatment of urea toxicity in cattle**:-
  1. **Drenching 20-40 liters cold water** (cold water inhibits ureolytic activity)
  2. **Drenching 4-5 liters of 10% acetic acid** (acetic acid neutralize the releasing NH_3)

Table 17: Classification of Carbohydrate

S.N.	Classification	Examples
1.	Monosaccharides	Pentose sugar (Ribose, Deoxyribose, Xylose, Arabinose); Hexose sugar (Glucose, Galactose, Fructose, Mannose)
2.	Disaccharides	**Sucrose (Glucose + Fructose), Lactose (Glucose + Galactose), Maltose (Glucose + Glucose), Cellobiose (Glucose + Glucose)** Note: **Maltose have *a*-1,4-glycosidic linkage while cellobiose have β- 1,4-glycosidic linkage; Sucrose have *a*- 1, 2- glycosidic linkage**
3.	Trisaccharides	**Raffinose (Glucose + Galactose + Fructose)**
4.	Polysaccharides	Homo-polysaccharides (Cellulose, Glycogen, Starch, Dextrin); Hetero-polysaccharides (Hemicelluloses, Chitin, Pectin)

Table 18: Digestion & absorption of carbohydrate, protein & fat

S.N.	Index	Ruminant	Non-ruminant
1.	End product of carbohydrate digestion	VFA^s in rumen	Glucose
2.	Site of absorption of carbohydrate	Ruminal wall (through passive diffusion)	Small intestine (by active transport)
3.	End product of protein digestion	Amino-acids	Amino-acids
4.	Site of absorption of protein	Ileum (small intestine)	Duodenum & Jejunum (small intestine)
5.	End product of fat digestion	Fatty-acids	Fatty-acids
6.	Site of Absorption of fat	Proximal jejunum (small intestine)	Proximal jejunum (small intestine)

- **Metabolism of carbohydrate, protein & fat:-**

Net gain of ATPs by complete oxidation of one mole of substance is as follows

1. Glucose (aerobic oxidation) → 38 ATPs
2. Glucose (anaerobic oxidation) → 02 ATPs
3. Glycogen (aerobic oxidation) → 39 ATPs
4. Glycogen (anaerobic oxidation) → 03 ATPs
5. Glycerol → 22 ATPs
6. Acetate (VFA) → **10 ATPs**
7. Propionate (VFA) → **17 ATPs**
8. Butyrate (VFA) → **25 ATPs**
9. Palmitic acid → 129 ATPs

Table 19: Some common precursors

S.N.	Product	It's precursor
1.	Glucose	Propionate
2.	Vitamin C	Hexose sugar (Ex: Glucose)
3.	Cholesterol	Acetyl- CoA
4.	Vitamin D, All steroid hormones like-Testosterone, Estrogen, Progesterone etc.	Cholesterol
5.	Prostaglandins (PGs)	Arachidonic acid
6.	Thyroxin, Catecholamines(Epinephrine & Nor-epinephrine)	Tyrosine
7.	Niacin /Nicotinic acid, Melatonin, Serotonin	Tryptophan
8.	Oxalic acid	Vitamin C
9.	Taurine	Cysteine
10.	Lignin	Phenylalanine

Table 20: Ruminal microbiology

S.N.	Index	Ruminal ecosystem
1.	Normal ruminal pH	**6.5-6.8**
2.	Optimum temperature	**39°C**
3.	Gas production	**CO_2: CH_4 (65: 35)**
4.	VFA's profile	**Acetate : Propionate : Butyrate (65 : 20 : 10)**
5.	Ruminal microbial population (per ml of rumen liquor)	**Bacteria (10^{10-11}), Bacteriophage(10^9), Protozoa(10^6), Fungi (10^3)**
6.	Ruminal bacteria	**(a) Mostly bacteria are gram (–) ve & obligate anaerobes.** (b) However, lactic acid producing bacteria are facultative anaerobes & they are attached to the ruminal wall because some O_2 is present in the periphery. (c) Protein is also produced by ruminal bacteria (d) Ruminal bacteria are called as "Microflora"
7.	Ruminal protozoa	(a) The majority are ciliate protozoa. (b) The ruminal microbial population is decided by protozoa because protozoa eat on bacteria. (c) Protozoa are called "Mini-ruminant". (d) Ruminant protozoa are called "Microfauna". (e) They functions as methane emitters.

8.	Ruminal fungi	(a) Mostly flagellated fungi (b) Function: Substrate penetration (by breaking lingo-cellulosic bond of fiber-diet)
9.	Ruminal bacteriophage	Function: Lysis of bacterial cells so that bacterial protein is easily available to animals as a source of amino acids

Note:-

1. **Defaunation**: Selective removal of protozoa from the ruminal ecosystem
2. **Chemical defaunation**: **Copper sulfate & Sodium lauryl sulfate**
3. Rumen protozoa was discovered by Gruby and Delafond
4. Contribution of fungi to total rumen microbial biomass is 5-10%

♦ **Uses of volatile fatty acids (VFAs) produced during ruminal fermentation**:-

1. VFA^S provides 70% of ruminant energy needs
2. **Acetate:** It is responsible for milk fat synthesis
3. **Propionate:** It is **gluconeogenic**. It is responsible for milk sugar synthesis
4. **Butyrate:** Ruminal epithelial cells convert it into β-hydroxy butyrate (a ketone body)
5. In ruminants ratio of Ketogenic VFAs : Glucogenic VFAs = 4 :1
6. Propionate metabolism in ruminants required- vitamin B_{12} and biotin.

Note:-

1. High roughage diet: high milk fat% (because acetate production is high)
2. High concentrate or grain diet: high milk yield (because propionate production is high)

Table 21: Ruminal bacteria

S.N.	Types of ruminal bacteria	Examples
1.	Cellulose-digesting bacteria	***Fibrobacter (Bacteroides) succinogenes***, ***Ruminococcus albus***, *Ruminococcus flavefaciens*, *Clostridium longisporum*
2.	Hemicellulose digesting bacteria	***Butyrivibrio fibrisolvens***, *Bacteroids ruminicola*
3.	Starch-digesting bacteria	***Streptococcus bovis***, *Ruminobacter amylophilus*
4.	Methanogenic bacteria	***Methanobacterium ruminantium***
5.	Sugar/dextrin utilizing bacteria	*Succinivibrio dextrinosolvens*, *Succinivibrio amylolytica*, *Lactobacillus acidophilus*

♦ **Evaluation of animal feed quality:-**

A. Chemical analysis of feed stuff:

- Weende's system of proximate analysis
- Van Soest method of forage analysis/Detergent method of forage analysis

B. Methods of determining Digestibility:

1. In vivo method

a. Direct method- digestion and metabolism trial
b. Indirect method- by difference and indicators/markers

2. *In sacco* /semi *in vivo* methods:-

a. Nylon bag/Dacron bag technique
b. *In Vivo* artificial rumen technology (VIVAR)

3. *In vitro* method

a. Using rumen liquor
b. Using enzymes instead of rumen liquor
c. RUSITEC method

C. Estimation of energy content:

- Carbon-Nitrogen balance technique
- By Bomb calorimeter
- By calculating TDN from digestion trial
- From chemical composition

D. Evaluation of protein:

(1) For Non-ruminants:-

a. Protein efficiency ratio (P.E.R.)
b. Biological value (B.V.)

(2) For Ruminants:-

a. DCP estimation by digestion trial
b. Nitrogen balance experiment
c. Protein equivalent

- **Indicator method of digestibility determination:-**
  - **Internal indicators** (ex:- **lignin, silica, acid-insoluble-ash/AIA)**
  - **External indicators** (ex:- **chromic oxide**, ferric oxide, Mg-ferrite, radioisotopes like Cr-EDTA & Cerium)
- **The experimental period for digestibility determination**:-

(1) Preliminary period/Adjustment period: 10-12 days for ruminant & 7-10 days for horse & swine

(2) Collection period: 7-10 days for ruminants as well as non-ruminants

Note:-

- Two stage technique of *in vitro* digestibility was given by Tilley and Terry.
- RUSITEC is developed and designed by Czerkawski and Breckenridge
- In digestibility trial, male animals are preferred over female because in male both faeces & urine are collected separately.
- Castrated males are preferred over normal males
- In the digestibility trial, only faeces are used but in the metabolictrial, both faeces & urine are used.
- Chromic oxide is not used for herbivores. It is used for swine, avian and carnivores.
- In poultry, digestibility determination is difficult because faeces & urine are excreted by same opening cloaca
- In poultry, digestibility is determined by two ways: -surgically & chemically

- **Essential amino acids (EAAs)**:

1. Main EAA in **Pig: Lysine**
2. Main EAA in **Poultry: Glycine**
3. Main EAA in **Sheep: Methionine**
4. Main EAA in **Cat: Taurine**

Table 22: Number of essential amino acid in various animals

S.N.	Animal	Number of essential amino acid
1.	Cattle,buffalo,sheep,goat	0
2.	Pig	8
3.	Human	9
4.	Rat & fish	10
5.	Poultry	10

- **Essential fatty acids (EFAs)**:
  Linoleic acid, Linolenic acid & Arachidonic acid
  1. EFA in Cat: Arachidonic acid
  2. EFA in Pig & Poultry: Linoleic acid

Table 23: Types of amino acids with examples

S.N.	Types of amino acids	Examples
1.	**Ketogenic amino acid**	**Leucine**
2.	Glucogenic & Ketogenic amino acids	Isoleucine, Lysine, Phenylalanine, Tyrosin, Tryptophan, Threonine
3.	Glucogenic amino acids	All other amino acids are glucogenic

- **Caecotrophy/ Coprophagy/ Pseudo-rumination**–
  Ingestion of specially produced soft faecal pellets, which are usually produced at night in the domestic rabbit.
  - **In the rabbit, caecotrophy begins** at the **age of three weeks**.
  - Domestic rabbits produce **hard faeces during the day** & soft faeces during night.
  - In rabbits, the prevention of coprophagy leads to:
    (a) Decrease digestibility of food
    (b) Decrease protein utilization
    (c) Decrease nitrogen retention

Table 24: Some important metalloenzymes

S.N.	Metal	Enzymes
1.	Copper	Cytochrome oxidase, Uricase, Ceruloplasmin, Ascorbic acid oxidase, Tyrosinase
2.	Selenium	Glutathione peroxidase
3.	Zinc	Carbonic anhydrase, Alcohol dehydrogenase, Alkaline phosphatase, Lactic dehydrogenase, Glutamic dehydrogenase, Peptidase
4.	Magnesium	Succinic decarboxylase, Arginase, Deoxyribonuclease, Kinase
5.	Molybdenum	Xanthine oxidase, Aldehyde oxidase
6.	Iron	Catalase, Succinic acid dehydrogenase, NADH cytochrome reductase

- **Processing methods of grains:-**

A. Dry processing methods:

(1) Grinding
(2) Dry rolling
(3) Popping
(4) Extruding
(5) Micronizing
(6) Roasting

B. Wet processing methods:

(1) Soaking
(2) Steam rolling
(3) Steam flaking
(4) Pressure cooking
(5) Exploding
(6) Pelleting
(7) Reconstitution

- **Roughage processing methods**:-

A. Dry processing methods:

(1) Baling (2) Field chopped
(3) Grinding (4) Pelleting
(5) Cubing (6) Dehydration

B. Wet processing methods:

(1) Green chopped (2) Soaking

- **Methods of improving the nutritive value of poor quality roughage like straw:-**

A. Supplementation with deficient nutrients:

1. Enrichment with urea and molasses
2. Silage making
3. Supplementation with green fodder (Legume or non-legume)
4. Supplementation with legume straw
5. Supplementation with urea-molasses liquid supplements

B. Treatments:

1. Physical method:
Examples: soaking, chopping, grinding, pelleting, irradiation, steam under pressure

2. Chemical method:
Examples: Alkali ($NaOH$,$Ca(OH)_2$, KOH,NH_4OH); Ammonia (gaseous, aqueous, urea-ammonia); Acids (H_2SO_4, HNO_3); Salts ($NaCl$,Na_2CO_3); Gases (Chlorine,SO_2); Oxidizing agents (H_2O_2, Ozone)

3. Physio-chemical methods: combination of physical & chemical treatment
Example: NaOH/Pelleting

4. Biological methods:
Examples: Enzymes (cellulase), white-rot fungi, mushrooms

- **Temperature time protocol of some instruments**:

1. Autoclave: 121°C/15 lbs/15 min
2. Hot air oven: 160°C/1hour
3. Muffle furnace: 600°C/1-2 hours

- **Enteric fermentation emission (for developing countries):**

Methane inventory (Kg methane/animal/year)

(i) Buffalo = 55 (ii) Camel = 46 (iii) Horse = 18
(iv) Mule & ass = 10 (v) Sheep & Goat = 5 (vi) Swine = 1

- **Reference Books:-**

1. Animal Nutrition by L.A. Maynard, J.K. Loosli, H.F. Hintz and R.G. Warner, 7th edition
2. Animal Nutrition by P. McDonald, R.A. Edwards, J.F.D. Greenhalgh, C.A. Morgan, L. A., 7th edition
3. Principle of animal nutrition and feed technology by D.V. Reddy, 3rd edition
4. Applied nutrition by D.V.Reddy, 3rd edition
5. Textbook of feed processing technology by N.N. Pathak, 2nd edition

☆☆☆

Objective Questions

1. **MATCH THE COLUMN:-**

Table A	Table B
1. Starch equivalent system	(a) Armsby
2. Physiological fuel value	(b) Thaer
3. Hay equivalent system	(c) Atwater
4. DCP, TDN & DM system	(d) Kellner
5. NE & True protein system	(e) Morrison

2. **Which of the following pair is/are correctly matched-**
   (a) Sulphur-containing vitamins: thiamine & biotin
   (b) Sulphur-containingamino acids: Cysteine & methionine
   (c) Selenium-containing enzyme: Glutathione peroxidase
   (d) All the above
3. **Which of the following is/are sulphur-containing hormone(s)-**
   (a) Insulin (b) Oxytocin
   (c) Prolactin (d) All
4. **Metabolic water produced by oxidation of 1 gram of sugar-**
   (a) 0.60 g (b) 0.40g
   (c) 1.07g (d) None
5. **Energy loss in methane production is -**
   (a) 7- 9% of GE (b) 10-12% of GE
   (c) 3-4% of GE (d) None
6. **Gross energy content of methane is -**
   (a) 10.34 Kcal/g (b) 12.34 Kcal/g
   (c) 13.34 Kcal/g (d) None
7. **VFA responsible for milk fat synthesis-**
   (a) Acetate (b) Propionate
   (c) Butyrate (d) None
8. **VFA responsible for milk sugar (lactose) production is-**
   (a) Acetate (b) Propionate
   (c) Butyrate (d) None
9. **Match the column:-**

Table-A	Table-B
1. Brain sugar	(a) Lactose
2. Blood sugar	(b) Fructose
3. Milk Sugar	(c) Glucose
4. Cane Sugar	(d) Galactose
5. Fruit Sugar	(e) Sucrose

10. **Moles of ATP produced by metabolism of 1 mole of acetate, propionate & butyrate are respectively-**
    (a) 10, 17, 25 (b) 17, 10, 25
    (c) 10, 16, 24 (d) None
11. **Ratio of production of acetate: propionate: butyrate in rumen is-**
    (a) 65: 10: 20 (b) 65: 20: 10
    (c) 10: 20: 65 (d) None

12. **Milk replacer is-**
(a) Cow milk (b) Goat milk
(c) Camel milk (d) Mare milk

13. **Milk replacer is substitute for :-**
(a) Whole milk (b) Calf starter
(c) Colostrum (d) None

14. **For proper growth of calf, whole milk feeding is desired up to the age of-**
(a) 30 days (b) 60 days
(c) 90 days (d) 180 days

15. **Calf starter contains-**
(a) 19% DCP, 25% CP & 75% TDN (b) 22% DCP, 25% CP & 75% TDN
(c) 20% DCP, 18% CP & 70% TDN (d) None

16. **Metabolic water produces by oxidation of 1 g of protein-**
(a) 1.07g (b) 0.40 g
(c) 0.56g (d) None

17. **Match the column**:-

Table-A	Table-B
1. Anti-Vitamin A	(a) Avidin
2. Anti-Vitamin K	(b) Raw soybean
3. Anti-Vitamin B1	(c) Dicoumarol
4. Anti-Biotin	(d) Raw kidney bean
5. Anti-Vitamin E	(e) Raw fish

18. **Egg white injury factor is-**
(a) Biotic (b) Avidin
(c) Both (d) None

19. **Match the column: (anti-nutritional factor)**

Table-A	Table-B
1. Groundnut cake	(a) Oxalates
2. Soyabean	(b) Mimosine
3. Sorghum	(c) Amygdalin
4. Bitter almond	(d) Trypsin inhibitor
5. Subabool	(e) Aflatoxin
6. Molasses	(f) Dhurrin

20. **Faecal energy loss is _____% of gross energy intake in ruminants-**
(a) 5-10 (b) 20-30
(c) 35-40 (d) 40-50

21. **Faecal energy loss in case of horse is _____ % of gross energy intake is-**
(a) 5-10 (b) 20-30
(c) 35-40 (d) 40-50

22. **Faecal energy (FE) loss in case of pig is _____% of gross energy intake is –**
(a) 5-10 (b) 20
(c) 30 (d) 40

23. **Urinary energy loss in case of cattle is _____% of GE intake-**
(a) 2-3 (b) 4-5
(c) 7 -9 (d) 10-12

24. **Urinary energy loss in case of pig is _____% of GE intake-**
(a) 2-3 (b) 4-5
(c) 7 -9 (d) 10-12

25. **Which of the following pair is correctly matched-**
(a) 1 Kg TDN = 4.4 Mcal of DE (b) 1 Kg TDN = 0.86 Starch equivalent
(c) 1 Kg TDN = 3.6 Mcal of ME (d) All the above

26. **Match the column**: –

Product	**Moisture content**
1. Silage	(a) 45-55%
2. Haylage	(b) 12 -14%
3. Hay	(c) 60-70 %
4. Cereals	(d) 80-90%
5. Succulent fodder	(e) 11%

27. **In very good silage the pHand ammoniacal nitrogen concentration ranges between-**
(a) pH = 3.5-4.2, Ammoniacal N_2 is less than 10%
(b) pH= 4.2-4.5, Ammoniacal N_2 = 10-15%
(c) pH= Above 4.8, Ammoniacal N_2 = 20%
(d) None

28. **Which of the following statement is true-**
(a) Major inorganic elements of plants are potassium & silicon.
(b) Major inorganic elements of animals are calcium & phosphorus.
(c) Both a & b
(d) None of the above

29. **Match the column**:

Estimation	**Factor used**
1. Protein estimation of milk	(a) 1.25
2. Protein estimation of feed stuff	(b) 2.25
3. Energy estimation (TDN) of fat	(c) 6.25
4. Gross energy of protein	(d) 5.30
5. Protein estimation of cotton seed	(e) 6.38

30. **Match the column:-**

Vitamin	**Deficiency disease**
1. Riboflavin	(a) Goose-stepping in pigs
2. Vitamin E	(b) Curled toe paralysis
3. Thiamine	(c) Crazy chick disease
4. Vitamine B5	(d) Spectacle eye in Rats
5. Biotin	(e) Polyneuritis

31. **Match the column:-**

Mineral	**Deficiency disease**
1. Copper	(a) Parakeratosis in pig
2. Zinc	(b) Eclampsia in Bitch
3. Manganese	(c) Allotriophagia
4. Phosphorus	(d) Stringy wool
5. Calcium	(e) Perosis

32. **Enzootic neonatal ataxia is caused by deficiency of-**
(a) Copper (b) Manganese
(c) Zinc (d) Selenium

33. **Blind stagger, alkali disease, and degnala disease are caused due to the toxicity of-**
(a) Selenium (b) Copper
(c) Manganese (d) Zinc

34. **"Penguin-like squat" in the hen is due to deficiency of-**
(a) Vitamin C (b) Vitamin D_3
(c) Vitamin B (d) Vitamin A

35. **"Pithed Frog" position is due to deficiency of-**
(a) Vita. E (b) Vita. A
(c) Vita. C (d) Vita. K

36. **Feather pigment "turacin" contains -**
(a) Mo (b) Cu
(c) Zn (d) Mg

37. **Limiting amino acid in pulses is methionine while in cereals is-**
(a) Lysine (b) Glycine
(c) Methionine (d) Arginine

38. **Glucose tolerance factor is-**
(a) Cu (b) Co
(c) Cr (d) None

39. **"Flieg-index" is commonly used method for evaluation of -**
(a) Hay quality (b) Silage quality
(c) Haylage quality (d) Soilage quality

40. **Sun dried forage is-**
(a) Haylage (b) Hay
(c) Silage (d) Soilage

41. **Green succulent fodder can be preserved for a long time by————making-**
(a) Silage (b) Haylage
(c) Soilage (d) None

42. **Best crop for hay & silage making are respectively-**
(a) Oat & Maize (b) Maize & Oat
(c) Maize & Jowar (d) None

43. **Anaerobically fermented animal waste with the help of lactic acid producing bacteria is known as-**
(a) Haylage (b) Soilage
(c) Wastelage (d) None

44. **Green forages that are cut & fed in fresh condition to the animals is known as-**
(a) Green chop (b) Soilage
(c) Both a & b (d) Haylage

45. **Metabolic water comprises about————% of total water intake of domestic animals-**
(a) 5-10 (b) 10-15
(c) 15-20 (d) None

46. **DCP % of GNC is-**
(a) 45% (b) 26%
(c) 28% (d) None

47. **TDN % in cotton seed cake is-**
(a) 60% (b) 70%
(c) 80% (d) 90%

48. **DCP of wheat straw is-**
(a) 0% (b) 0.62%
(c) 1.2% (d) None

49. **Essential amino acid and essential fatty acid in the cat are respectively-**
(a) Taurine & Arachidonic acid (b) Glycine & Linoleic acid
(c) Lysine & Linolenic acid (d) None

50. **Starch equivalent based energy system is given by-**
(a) Morrison (b) Kellner
(c) Armsby (d) None

51. **VFA having maximum absorption rate-**
(a) Acetate (b) Propionate
(c) Butyrate (d) None

52. **Domesticated ruminant with highest BMR & highest normal body temperature-**
(a) Sheep (b) Goat
(c) Cattle (d) Buffalo

53. **Which of the following is true about ruminal bacteria-**
(a) The majority of rumen bacteria are gram (–)ve & obligate anaerobes.
(b) Population of rumen bacteria per ml of rumen liquor is 10^9-10^{11}
(c) They are well growing at 39°C temperature
(d) All the above

54. **Removal of protozoa from rumen is known as-**
(a) Defaunation (b) Belching
(c) Burping (d) All

55. **Chemical agents used for defaunation-**
(a) Copper sulphate (b) Sodium lauryl sulphate
(c) Both a & b (d) None

56. **Animal protein factor, chick growth factor & anti-pernicious anemia factor are other names of-**
(a) Vita. B_1 (b) Vita. B_{12}
(c) Vita. C (d) Vita. A

57. **Anti-infective vitamin is –**
(a) Vita. A (b) Vita. C
(c) Vita. E (d) Vita. D

58. **Anti sterility vitamin is-**
(a) Vita. A (b) Vita. C
(c) Vita. E (d) Vita. D

59. **Anti stress vitamin is –**
(a) Vita. A (b) Vita. C
(c) Vita. E (d) None

60. **Roughage contains-**
(a) CF > 18% & TDN < 60% (b) CF < 18% & TDN >60%
(c) CF > 18% & TDN > 60% (d) None

61. **Basal feed or energy feed are the feed stuff that contain –**
(a) CP > 20% & CF < 18% (b) CP > 20% & CF >18%
(c) CP < 20% & CF < 18% (d) None

62. **Microflora of rumen contains-**
(a)Bacteria (b) Fungi
(c) Protozoa (d) All the above

63. **Microfauna of rumen contains-**
(a) Bacteria (b) Fungi
(c) Protozoa (d) All the above

64. **Rumen microbes consists of –**
(a) Bacteria (b) Fungus, protozoa
(c) Bacteriophage, oscillospira (d) All the above

65. **Microbial population in rumen is controlled by-**
(a) Bacteria (b) Fungi
(c) Protozoa (d) All the above

66. **Dry matter requirement for zebu cattle is-**
(a) 2.5 Kg/100 Kg body weight (b) 2 Kg/100 Kg body weight
(c) 3 Kg/100 Kg body weight (d) None

67. **Dry matter requirement for buffalo & cross-bred cow is-**
(a) 2.5 Kg/100 Kg body weight (b) 2 Kg/100 Kg body weight
(c) 3 Kg/100 Kg body weight (d) None

68. **Maintenance ration for zebu cattle is –**
(a) 4kg straw & 1 kg concentrate (b) 1 Kg concentrate per 3 kg milk
(c) 6 kg straw & 2 kg concentrate (d) None

69. **Production ration for zebu cattle is-**
(a) 1 Kg concentrate per 2 kg milk (b) 7kg straw & 2 kg concentrate
(c) 1 Kg concentrate per 2.5 kg milk (d) None

70. **Production ration for buffalo & cross-bred cow is-**
(a) 1 Kg concentrate per 2 kg milk (b) 1 Kg concentrate per 3 kg milk
(c) 1 Kg concentrate per 2.5 kg milk (d) None

71. **Which of the following microbe is also known as "mini-ruminant" according to Vo Soest-**
(a) Bacteria (b) Protozoa
(c) Fungi (d) None

72. **Optimum concentration of rumen NH_3 is -**
(a) 10-15 mg/dl (b) 15-20 mg/dl
(c) 5-8 mg/dl (d) None

73. **Urea never be incorporated in the diet of-**
(a) Young cal (b) Horse & pig
(c) Dog (d) All the above

74. **Urea toxicity results in cattle when-**
(a) Rumen NH_3 level exceeds 80mg/dl (b) NH_3 concentration in blood exceeds 1mg/dl
(c) Both are correct (d) None

75. **Urea toxicity can be treated by-**
(a) 5% acetic acid (b) 10% acetic acid
(c) Drenching cold water (d)Both b & c

76. **Urea treatment of straw will increase-**
(a) DCP (b) TDN
(c) Palatability & digestibility (d) All the above

77. **Which of the following pair is/are correctly matched-**
(a) Se-containing enzyme: Glutathione peroxidase
(b) Cu-containing enzyme: Cytochrome oxidase & Uricase
(c) Zn-containing enzyme: Carbonic anhydrase & Alcohol dehydrogenase
(d) All the above

78. **Most commonly used NPN in ruminant ration-**
(a) Biuret (b) Urea
(c) DAP (d) None

79. **Which of the following statement is not true –**
(a) Copper & molybdenum act as antagonist
(b) Vitamin E & selenium act synergistically
(c) Alkali disease is caused by deficiency of selenium
(d) Teartness is caused by toxicity of molybdenum

80. **Which of the following is true about straw & stovers (poor quality roughage)-**
(a) Deficient in minerals (b) Poor digestibility
(c) Poor in crude protein (d) All the above

81. **Which of the following is true about roughage feed stuff –**
(a) These are bulky & low-density feed (b) Poor in digestibility
(c) Low in energy content (or) TDN (d) All the above

82. **Which of the following is not classified under roughage-**
(a) Straw & Stovers (b) Molasses
(c) Hay & Silage (d) Husk & Hull

83. **Which of the following is true about concentrate feedstuff –**
(a) High-density feed (b) Highly digestible
(c) High energy content or TDN (d) All the above

84. **Which of the following is/are not an *In-vivo* method of digestibility estimation-**
(a) Nylon/Dacron bag technique (b) VIVAR technique
(c) Both a & b (d) None

85. **Internal/natural indicator used in digestibility estimation -**
(a) Lignin (b) Silica
(c) Acid Insoluble Ash (AIA) (d) All the above

86. **Example(s) of external indicator in digestibility estimation –**
(a) Chromic oxide (b) Carmine red dye
(c) Magnesium ferrite (d)All the above

87. **MATCH THE COLUMN:-**

Nutrients & conditions	Resp.quotient (RQ)
1. Protein	(a) < 0.7
2. Fat	(b) 1
3. Carbohydrate	(c) 0.7
4. Rapidly fattening hogs	(d) > 1
5. Fasting/Hibernating animal	(e) 0.8

88. **Digestibility cannot be determined for which of the following proximate principle-**
(a) Total Ash (b) NFE
(c) CF (d) CP

89. **Which of the following proximate principle is not determined by analysis but simply calculated by difference-**
(a) CF (b) NFE
(c) CP (d) Total ash

90. **Match the column:-**

Proximate principle	Analysis method
1. Crude protein	(a) Calculated by difference
2. Ether extract	(b) Hot air oven
3. Total Ash	(c) Kjeldahl method
4. Moisture	(d) Soxhlet apparatus
5. NFE	(e) Muffle furnace

91. **In "Weende system of proximate analysis", Weende is the name of a-**
(a) Scientist (b) Experimental station
(c) Veterinary college (d) None

92. **Portion of carbohydrate which is not easily digestible like:cellulose, hemicellulose, lignin are fall under category of -**
(a) NFE (b) CF
(c) EE (d) TDN

93. **In detergent method of forage analysis, Acid detergent fiber (ADF) not includes:**
(a) Cellulose (b) Hemicelluloses
(c) Lignin (d) Silica

94. **MATCH THE COLUMN:- (Von Soest method)**

TABLE-I	TABLE-II
1. Acid detergent fibers (ADF)	(a) Sodium Lauryl-Sulphate
2. Neutral detergent	(b) CTAB
3. Acid detergent	(c) Cellulose, lignin, silica
4. Acid detergent soluble (ADS)	(d) Hemicellulose

95. **Digestibility of Ash cannot be determined because-**
(a) It does not contribute to energy content of a feed
(b) It is not a source of protein
(c) it is not a source of carbohydrate
(d) None

96. **In digestibility trial; _____ animals are preferred –**
(a) Female (b) Males
(c) Castrated males d) Castrated female

97. **In Digestibility trial, which is/are used & collected for estimation-**
(a) Urine (b) Faeces
(c) Both (d) None

98. **In metabolic trial, which is/are used & collected for estimation –**
(a) Urine (b) Faeces
(c) Both (d) None

99. **Collection period in digestibility trial in ruminants as well as non-ruminants should be-**
(a) 4- 5 days (b) 7 – 10 days
(c) 14 -21 days (d) None

100. **Example(s) of liquid phase marker/indicator for digestibility estimation –**
(a) Polyethylene glycol (PEG) (b) Cobalt EDTA
(c) Chromium EDTA (d) All the above

101. **Faecal material contain about ——————————% water.**
(a) 40 (b) 50
(c) 60 (d) 80

102. **Match the column:-**

Glucose &minerals	Normal range
(1) Blood glucose level in Non-ruminants	(a) 40-60 mg/dl
(2) Blood glucose level in Birds	(b) 8 -12 mg/dl
(3) Blood calcium level in animals	(c) 80 -120 mg/dl
(4) Blood phosphorus level in animals	(d) 250 mg/dl
(5) Blood glucose level in ruminants	(e) 4-8 mg/dl

103. Major cation & anion in extra-cellular fluid (ECF) -

(a) Na^+, Cl^- (b) K^+, PO_4^{-3}

(c) Na^+, PO_4^{-3} (d) None

104. Major cation & anion in Intra-cellular fluid (ICF)

(a) Na^+, Cl^- (b) K^+, PO_4^{-3}

(c) Na^+, PO_4^{-3} (d) None

105. Main path of excretion of Ca & P is faeces while main path of excretion of Na^+& K^+ is–

(a) Faeces (b) Urine

(c) Sweat (d) None

106. Main route of phosphorus excretion in carnivores is –

(a) Faeces (b) Urine

(c) Sweat (d) None

107. Which of the following is not a method of estimation of energy content of feed –

(a) C – N balance technique (b) By Bomb calorimeter

(c) Nitrogen balance technique (d) By calculating TDN from digestion trial

108. Balance study used to determine energy content of a feed –

(a) Carbon balance (b) Nitrogen balance

(c) C-N balance (d) None

109. Instrument used for measuring gross energy of a feed –

(a) Bomb calorimeter (b) Kjeldahl apparatus

(c) Butyrometer (d) None

110. Method used for estimation of protein quality in ruminants as well as non-ruminants is–

(a) Nitrogen balance (b) Biological value

(c) DCP estimation by digestion trial (d) Protein equivalent

111. The energy of fat is how many times that of carbohydrate & protein-

(a) 1.25 (b) 2.25

(c) 6.25 (d) None

112. DCP content of straw is practically————————while the TDN is about————

(a) 0% and 40 % (b) Nil and 40%

(c) 0 % and 50% (d) Nil and 50 %

113. Ad-libitum feeding means-

(a) Restricted feeding (b) Selective feeding

(c) Unrestricted feeding or free of choice (d) None

114. NPN feed-ingredient is added to ruminant diet at what % of concentrate mixture-

(a) 3 % (b) 1%

(c) 5% (d) 4%

115. Glucose is used for the formation of which vitamin-

(a) Niacin (b) Folic acid

(c) Ascorbic acid (d) Vita. B_2

116. If lipid content in the ruminant diet increases above 10% then-

(a) Activity of rumen microbes are reduced

(b) The fermentation of fiber retarded because fatty acids are absorbed on their surface.

(c) Feed intake fall

(d) None

117. Metabolic faecal nitrogen (MFN) depends upon-

(a) Dry matter intake (DMI) (b) Protein content of feed

(c) Energy content of feed (d) None

118. Which of the following is/are true about endogenous urinary nitrogen (EUN)-

(a) EUN is highest for young animal & lowest during hibernation

(b) EUN reflect the energy metabolism

(c) The normal value of EUN is 2 mg/kcal of BMR.

(d) All the above

119. Which of the following statement is correct about MFN (metabolic faecal nitrogen)

(a) It is directly proportional to dry matter intake.

(b) It consists of abraded intestinal mucosa, spent digestive enzymes & rumen bacterial nitroge

(c) Both are correct

(d) None

120. Chromic oxide is commonly used marker in digestion trial of –

(a) Avian (b) Swine

(c) Carnivores (d) All the above

121. Chromic oxide is not commonly used in ————————because it does not give accurat results –

(a) Herbivores (b) Carnivores

(c) Birds (d) None

122. Metabolic body weight is equals to-

(a) $W^{0.50}$ (b) $W^{0.75}$

(c) $W^{2.25}$ (d) None

123. Nitrogen content of urea is _____% -

(a) 46.6 (b) 18

(c) 40 (d) None

124. Nitrogen and phosphorus content of DAP fertilizer-

(a) 18% & 46% respectively (b) 20% & 40% respectively

(c) 26% & 46% respectively (d) None

125. Maximum degradability of urea in rumen is –

(a) 100 % (b) 80%

(c) 60% (d) 0%

126. The main path of urea recycling is –

(a) By way of saliva (c) Through ruminal wall /portal blood

(b) Both a & b (d) None

127. Match the column:-

Product	Their precursor
1. Vitamin C	(a) Bili-verdin
2. Catecholamines	(b) Cholesterol
3. Vitamin D	(c) Hexose sugar
4. Niacin	(d) Tyrosine
5. Prostaglandin	(e) Tryptophan
6. Bilirubin	(f) Arachidonic acid

128. Precursor of cholesterol is-

(a) Glucose (b) Acetyle CoA

(c) Citric acid (d) Tryptophan

129. **Molasses is a –**
(a) Pellet binder
(b) Energy rich concentrate
(c) Both
(d) None

130. **Cerebro-cortical necrosis (or) polio-encephalo-malacia in cattle is caused by deficiency of -**
(a) Thiamine
(b) Riboflavin
(c) Vitamin C
(d) Vitamin A

131. **Rice is richest source of –**
(a) Mn
(b) Mg
(c) Mo
(d) Co

132. **Brans are the richest source of-**
(a) Calcium
(b) Phosphorus
(c) Both a & b
(d) Copper

133. **Lactation tetany is caused by deficiency of magnesium but in mare it is caused by deficiency of**
(a) Mg
(b) Ca
(c) P
(d) Cu

134. **Match the column:-**

Deficiency & metabolic diseases	**Associated elements**
1. Piglet anaemia	(a) Magnesium
2. Eclampsia & milk fever	(b) Phosphorus
3. Grass tetany	(c) Molybdenum
4. Pica & PPH	(d) Iron
5. Femoral head necrosis	(e) Calcium

135. **Storage form of iron in liver, spleen and kidney is-**
(a) Hemosiderin
(b) Ferritin
(c) Transferrin
(d) Both a & b

136. **Iron transport protein in blood is -**
(a) Hemosiderin
(b) Ferritin
(c) Transferrin
(d) All the above

137. **Pernicious anemia is caused due to deficiency of –**
(a) Iron
(b) Folic acid
(c) Vitamin B_{12}
(c) All

138. **Colostrum feeding in calf is done at the rate of-**
(a) 5% of body weight
(b) 10% of body weight
(c) 15 % of body weight
(d) 20% of body weight

139. **Match the column:-**

Table-A	**Table-B**
1. Raffinose	(a) Monosaccharide
2. Cellobiose	(b) Homopolysaccharide
3. Fructose	(c) Disaccharide
4. Cellulose	(d) Heteropolysaccharide
5. Hemicellulose	(e) Trisaccharide

140. **Which of the following is a ketogenic amino acid-**
(a) Leucine
(b) Alanine
(c) Glutamic acid
(d) Isoleucine

141. Glycolysis takes place in cytoplasm under –

(a) Aerobic condition (b) Anaerobic condition
(c) Both a & b (d) None

142. Kreb's cycle taken place in mitochondria under-

(a) Aerobic condition only (b) Anaerobic condition only
(c) Both a & b (d) None

143. Which of the following is an example of Natural By-pass protein-

(a) Maize & feather meal (b) Urea & casein
(c) Maize & urea (d) All the above

144. Which of the following is example of a very low bypass protein-?

(a) Urea & casein (b) Maize, feather meal, blood meal
(c) Soybean meal (d) None

145. MATCH THE COLUMN:-

Table-I	Table-II
1. Limiting amino acid in cat	(a) Glycine
2. Limiting amino acid in pig	(b) Arachidonic acid
3. Limiting amino acid in sheep	(c) Taurine
4. Limiting amino acid in Poultry	(d) Linoleic acid
5. Essential fatty acid in pig & poultry	(e) Lysine
6. Essential fatty acid in cat	(f) Methionine

146. Limiting amino acid (or) deficient amino acid in pulses & cereal grains are respectively

(a) Methionine & Lysine (b) Leucine & methionine
(c) Lysine & methionine (d) Methionine & Leucine

147. ARC (Agricultural research council) feeding standard was developed by-

(a) United Kingdom (b) United states of America
(c) Russia (d) None

148. National research council (NRC) feeding standards was developed by-

(a) U.K. (b) U.S.A
(c) Russia (d) India

149. Which of the following is true about urea treatment of feed-

(a) Straw is treated @ 4% of straw
(b) Succulent roughage (eg. silage) is treated @ 0.5% of wet material
(c) Urea is incorporated up to 3% of the concentrate
(d) Urea is incorporated up to 1% of the total dry matter of ration
(e) All the above

150. Urea treatment of 100 kg of straw is done by-

(a) 4 Kg urea + 40 liters of water (b) 1 Kg urea + 40 liters of water
(c) 5 Kg urea + 40 liters of water (d) None

151. For optimum use of urea, N : S ratio in diet should be –

(a) 10 :1 (b) 15:1
(c) 20:1 (d) None

152. Starch : urea ratio in diet should be -

(a) 10 :1 (b) 15:1
(c) 20:1 (d) None

153. For urea treatment of any dry roughage (eg. straw), water : urea ratio should be –

(a) 5 :1 (b) 10:1
(c) 15:1 (d) 20 :1

154. $\left[\frac{\text{TDN} - \text{DCP}}{\text{DCP}}\right]$ **Represents -**

(a) Nutritive ratio (b) Net Protein utilization

(c) PER (d) None

155. Net protein utilization is-

(a) $\frac{\text{Retained N}}{\text{Intake N}} \times 100$ (b) Biological value × Digestibility coefficient

(c) Both correct (d) None

156. Protein equivalent is.

(a) $\frac{\%\text{DCP} + \%\text{DTP}}{2}$ (b) $\frac{\text{TDN} - \text{DCP}}{\text{DCP}}$

(c) $\frac{\text{TDN} + \text{DCP}}{2}$ (d) None

157. Protein equivalent of urea and biuret are respectively-

(a) 281, 219 (b) 219, 281

(c) 225, 300 (d) 300, 225

158. Which of the following assumption(s) is/are true for calculation of crude protein-

(a) All feed protein contains 16% Nitrogen

(b) All Nitrogen of food comes from true protein

(c) Both a & b

(d) All Nitrogen comes from crude protein

159. NFE mainly represents-

(a) Cellulose, hemicelluloses & lignin (b) Protein

(c) Monosaccharide & Disaccharide (d) None

160. Fat soluble vitamins, carotene, and sterols are fallen under the category of-

(a) NFE (b) EE

(c) TDN (d) CF

161. NDF– ADF represent-

(a) Cellulose (b) Hemicellulose

(c) Lignin (d) Silica

162. Which is true about VFA production in ruminants-

(a) The total VFA concentration varies from 80 to 120 mEq/Litre of rumen liquor.

(b) Total VFA produces at the rate of 4 kg per day in an adult cow.

(c) Acetate is produced in maximum concentration.

(d) All the above

163. Rate of gas production in cow during fermentation-

(a) 30 Litre/hour (b) 5 Litre/hour

(c) 10 Litre/hour (d) None

164. Rate of VFA absorption is-

(a) Butyrate > Propionate > Acetate (b) Propionate > Acetate > Butyrate

(c) Acetate > Propionate > Butyrate (d) None

165. The absorption of VFA occurs in ruminant by-

(a) Active transport (b) Passive diffusion

(c) Facilitated transport (d) None

166. Microbial protein contains about.....% CP-

(a) 40 (b) 50

(c) 65 (d) 80

167. Legumes are difficult to ensiled (the process of silage making) due to-

(a) High buffering capacity (b) High calcium & phosphorus content
(c) High protein content (d) None

168. The browncolour of Hay is mainly due to-

(a) Maillard type reaction (b) Butyrate reaction
(c) Lactic acid production (d) Acetate production

169. An amino acid which is mainly susceptible to Maillard type reaction-

(a) Leucine (b)Lysine
(c) Methionine (d) None

170. Which is true about A.I.V. method of silage making-

(a) A.I.V. method is given by A.I. Virtanen in 1925
(b) pH of silage should be less than 4
(c) Acid additives (2N H_2SO_4 + 2N HCl) used as preservatives
(d) All the above

171. Crop suitable for silage making-

(a) Crop with thick stem (b) Leafy fodder
(c) Crop with thin hollow stem (d) All the above

172. Crop suitable for hay making-

(a) Crop with thin hollow stem (b) Leafy fodder
(c) Both a & b (d) None

173. Which of the following is/are true about hay and silage-

(a) Nutritive value of silage is generally more than that of hay.
(b) Losses during conservation are high in hay making.
(c) Urea is incorporated @ 1% & salt is added @ 0.5% during silage making.
(d) All the above

174. In Grass silage, molasses is added @————————% to improve sugar content-

(a) 3-3.5% (b) 5%
(c) 10% (d) 15%

175. Ratio of grass : legume in silage making should be -

(a) 2:1 (b) 3:1
(c) 4:1 (d) 5:1

176. Hay is rich sources of-

(a) Vitamin A (b) Vitamin C
(c) Vitamin D (d) Vitamin E

177. Colour of good silage is-

(a) Yellowish or brownish-green (b) Red
(c) Green (d) Greenish-Yellow

178. The brown colour of silage is due to-

(a) Chlorophyll (b) Lactic acid
(c) Phaeophytin (d) Butyric acid

179. "Chastek" paralysis is due to deficiency of-

(a) Riboflavin (b) Thiamin
(c) Vitamin C (d) Niacin

180. Maximum level of dietary lipid in ruminant ration without affecting fibre digestion-

(a) 5% (b) 10%
(c) 15% (d) 20%

181. 1 calorie is equal to.....Joule.

(a) 0.23 (b) 2.18
(c) 4.18 (d) None

182. Father of Animal Nutrition-

(a) Lavoisier (b) Armsby
(c) Kellner (d) Laplace

183. 1 mole of ATP on hydrolysis yields.....energy

(a) 7.3 kcal (b) 14.8 kcal
(c) 30.5 Kcal (d) None

184. 1 gram of Propionic acid can theoretically provide————(g) of glucose-

(a) 1.23g (b) 5.6 g
(c) 0.23 g (d) 3.6 g

185. .....% of the dietary true protein escapes ruminal digestion-

(a) 30 (b) 40
(c) 50 (d) 60

186. Pink discoloration of egg white is due to-

(a) HCN (b) Gossypol
(c) Dicoumarol (d) None

187. Mineral mixture (or) salt is added to ruminant diet @————% of concentrate-

(a) 0.5 (b) 1
(c) 2 (d) 5

188. Mineral constituents have how much % of body weight of animal-

(a) 1% (b) 3%
(c) 5% (d) 7%

189. One sheep unit comprises of -

(a) 30 Ewes + 1 Ram (b) 20 Ewes + 1 Ram
(c) 30 Ewes + 3 Ram (d) 10 Ewes + 1 Ram

190. One goat unit comprises of-

(a) 30 Doe + 1 Buck (b) 30 Doe + 2 Buck
(c) 10 Doe + 1 Buck (d) 20 Doe + 1 Buck

191. Feed conversion ratios of broiler, pig and cattle are respectively-

(a) 2, 3, 4 (b) 2, 3, 2
(c) 2, 3, 5 (d) 1, 2, 3

192. Caecotrophy is common in-

(a) Dog (b) Cat
(c) Rabbit (d) Poultry

193. Which of the following is/are example(s) of pellet binder is/are.

(a) Molasses (b) Sodium bentonite
(c) Guar meal (d) All the above

194. Sodium bentonite is a-

(a) Pellet binder (b) Mycotoxin binder
(c) Buffer (d) All

195. Kunitz inhibitor is present in

(a) GNC (b)Soybean
(c) Fish meal (d) Sunflower oil cake

196. Which of the following is a "Goitrogenic agent"-

(a) Gossypol (b) Glucosinolate
(c) Mimosine (d) All

197. Gossypol poisoning and mimosine toxicity are treated by-

(a) $FeSO_4$ (b) Iodine supplement
(c) $CaCO_3$ (d) 1% methylene blue

198. **Anti nutritional factor present in tapoica/cassava is-**
(a) Saponin (b) Linamarin
(c) Dhurrin (d) Glucosinolate

199. **Feline central retinal degeneration (FCRD) is a degenerative disease of the retina of a cat, caused by a deficiency of-**
(a) Arachidonic acid (b) Linoleic acid
(c) Taurine (d) Glucose-6-phosphate

200. **"Impaired glucose tolerance" is due to deficiency of-**
(a) Chromium (b) Molybdenum
(c) Copper (d) Zinc

201. **Most toxic amino acid is methionine while most toxic mineral is-**
(a) Copper (b) Selenium
(c) Zinc (d) Nickle

202. **Vitamin C is not synthesized in the body of a human, guinea pig, cat and poultry due to the absence of an enzyme-**
(a) Xanthine oxidase (b) *L-gulonolactone oxidase*
(c) Cytochrome oxidase (d) Carbonic anhydrase

203. **Urea can replace about.....% of DCP requirement in animals-**
(a) 10 (b) 20
(c) 30 (d) 40

204. **Match the column**:-

Cereals/fodder	**Antinutritional factor**
1. Wheat	(a) Glucosinolate
2. Barley	(b) Aflatoxin
3. Cabbage	(c) Arabinoxylans
4. Molasses	(d) Amygdalin
5. Ground nut cake	(e) β-glucans
6. Bitter almond	(f) Oxalates

205. **Collagen is the richest source of-**
(a) Glycine (b) Proline
(c) Hydroxyproline (d) cysteine

206. **Collagen is deficient in-**
(a) Cysteine (b) Tryptophan
(c) Both a & b (d) Lysine

207. **Blood-meal is richest in lysine amino acid while deficient in-**
(a) Leucine (b) Isoleucine
(c) Proline (d) Glycine

208. **Brunner's gland which produces alkaline secretions are present in-**
(a) Submucosa of Duodenum (b) Submucosa of Jejunum
(c) Mucosa of Duodenum (d) Submucosa of Ileum

209. **Match the column**:-

Ruminal microbes	**Population**
1. Bacteria	(a) 10^{4} per ml of ruman liquor
2. Yeast/Fungi	(b) 10^{9-11} per ml of ruman liquor
3. Oscillospira	(c) 10^{6} per ml of ruman liquor
4. Protozoa	(d) 10^{3} per ml of ruman liquor

210. Which of the following is a polyether Ionophore antibiotic-

(a) Monensin (b) Lasalocid
(c) Both a & b (d) Amprolium

211. Which is/are true about polyether ionophore antibiotics-

(a) Monensin (trade name-Rumensin) is produced by *Streptomyces cinnamonensis*
(b) Lasalocid (trade name-Bovitec) is produced by fungus *streptomyces lasaliensis*
(c) Lasalocid is more potent than monensin
(d) All the above

212. Which of the following is an effect of monensin & lasalocid on rumen fermentation-

(a) They increase ruminal propionate & decrease ruminal acetate concentration so it decrease Acetate: Propionate ratio
(b) Decrease CH_4 production
(c) Inhibit biohydrogenation
(d) Depress the activity of urease so less Ammonia is formed
(e) All are correct

213. Fish meal should not be fed more than————————% in diet of pig otherwise fishy flavor may develop in pork-

(a) 5% (b) 10%
(c) 15% (d) 20%

214. Which of the following is/are example(s) of hind gut fermenters (fermentation in caceum & colon)-

(a) Horse (b) Rabbit
(c) Ostrich (d) All the above

215. Example of foregut fermenters -

(a) Ruminants (b) Pig
(c) Horse (d) Dog

216. "Silo filler disease" is due to inhalation of oxides of.

(a) Nitrogen (b) Sulphur
(c) Carbon (d) Phosphorus

217. Selenium accumulator plant is-

(a) Astragalus (b)Leucaena
(c) Zea mays (d) Babool

218. Match the column:-

Plant/grass/legume	Botanical name
1. Maize	(a) *Trifolium alaxandrium*
2. Oat	(b) *Vigna ungiculata*
3. Subabul	(c) *Melilotus albus*
4. Sweet Clover	(d) *Avena sativa*
5. Lucerne	(e) *Medicago sativa*
6. Berseem	(f) *Zea mays*
7. Cow pea	(g) *Leucaena leucocephala*

219. The chief acid produced during silage making-

(a) Lactic acid (b) Butyric Acid
(c) HCl (d) Acetic Acid

220. Yellow fat disease/Pansteatitis in cat is caused due to deficiency of-

(a) Vita. A (b) Vita. E
(c) Vita. B (d) Vita. C

221. Reference standard used in Bomb calorimeter is

(a) Butyric acid (b) Benzoic acid

(c) Cyclophosphamide (d) Carotene

222. Ruminant which is most prone to cobalt deficiency & copper toxicity-

(a) Sheep (b) Goat

(c) Cattle (d) Buffalo

223. Biological value of microbial protein is-

(a) 60 (b) 70

(c) 80 (d) 90

224. The concentration of NH_3 & total VFA in the rumen is highest in-

(a) Sheep (b) Goat

(c) Cattle (d) Buffalo

225. Urea supplementation is not recommended, If crude protein content of ruminant diet is more than-

(a) 18% (b) 15%

(c) 13% (d) 25%

226. Main pathway of propionate production in animals consuming high fiber diet is-

(a) Succinate pathway (b) Acrylate pathway

(c) Lactate pathway (d) None of the above

227. DCP % is highest for-

(a) Lucerne hay (b) Berseem hay

(c) Oat hay (d) Wheat hay

228. Microbes capable of breaking Ligno-cellulose bond of feed (substrate penetration) -

(a) Bacteria (b) Fungi

(c) Protozoa (d) Bacteriophage

229. An important component which inhibits digestibility of straw is-

(a) Lignin (b) Silica

(c) Pectin (d) None

230. Urea supplementation is not recommended, If crude protein content of concentrate mixture is more than-

(a) 18% (b) 13%

(c) 30% (d) 25%

231. The toxic principle present in *Cassia torra* seeds is

(a) Crysophanic acid (b) Curcin

(c) Mowrin (d) Saponin

232. Which of the following is precursor of lignin-

(a) Tyrosine (b) Phenylalanine

(c) Hexose (d) None

233. Fermented hay is known as-

(a) Brown hay (b) Mow-burnt hay

(c) Both (d) None

234. The method of hay making is known as-

(a) Hay Curing (b) Sun drying

(c) Hay forming (d) None

235. Anti-dermatitis factor is-

(a) Vita. B_6 (b) Vita. C

(c) Niacin (d) Vita. D

236. Digestibility of Untreated straw & urea treated straw are respectively-

(a) 46% & 70% (b) 10% & 50%

(c) 30% & 60% (d) None

237. Chemical change(s) occur during ensiling of green fodder is/are-

(a) Conversion of chlorophyll into "phaeophytin" which provide brown colour to silage

(b) Formation of amines like betaine, adenine and panta-methylene diamine responsible for off smell of silage

(c) Both correct

(d) None

238. Leguminous leafy fodder like lucerne and berseem are.-

(a) Liable to produce bloat (b) 2-3 % DCP & 12% TDN on fresh basis

(c) Wide Ca:P ratio (d) All correct

239. To prevent piglet anemia, iron-dextran injection should be given on-

(a) 4^{th}& 14^{th} day of age (b) 5^{th}& 15^{th} day of age

(c) 1^{st}& 10^{th} day of age (d) 1^{st}& 11^{th} day of age

240. Caecotrophy begins in the young rabbit at about————————weeks of age.

(a) 1 (b) 2

(c) 3 (d) 5

241. Caecotrophy is also known as-

(a) Pseudo rumination (b) Coprophagy

(c) Refection (d) All the above

242. Creeper ration in the pigs should be introduced at 7-10 days of age & continued up to 56 days of age (weaning age). Creep ration contain-

(a) 16% CP (b)18% CP

(c) 20% CP (d) None

243. Which of the following is/are physical form of feed—

(a) Mash (b) Crumble

(c) Pellet (d) All the above

244. To avoid selective feeding, the best method of feeding in poultry for commercial production is-

(a) Whole grain feeding (b) Pellet feeding

(c) All mash feeding (d) Crumble feeding

245. Selective feeding is maximum in poultry under_____ system of feeding which leads to deficiency diseases -

(a) Whole grain feeding (b) Pellet feeding

(c) All mash feeding (d) Crumble feeding

246. Whole grain feeding system in poultry is also known as-

(a) Cafeteria (b) Free Choice feeding system

(c) Ad-libitum (d) All the above

247. Which feeding system avoids the wastage of feed & selective feeding is also nil but it is 10% more expensive than All mash feeding-

(a) Crumble feeding (b) Pellet feeding
(c) Whole grain feeding (d) None

248. Which of the following feed is best for chick stage-

(a) Crumble (b) Whole grain
(c) Pellet (d) Mash

249. Most popular method of feeding in case of duck-

(a) Wet Mash feeding (b) Dry Mash feeding
(c) Pellet feeding (d) Crumble feeding

250. Optimum pellet size (diameter) for poultry feed is-

(a) 2mm (b) 4mm
(c) 6 mm (d) 10 mm

251. During grinding of the poultry feed commonly used mill is-

(a) Roller mill (b) Hammer mill
(c) Both (d) None

252. ————type mixer is commonly used for mixing all ingredients of poultry feed during feed milling-

(a) Ribbon type mixer (b) Horizontal mixer
(c) Vertical type mixer (d) None of these

253. In Pearson square method of ration formulation, a major consideration is given to-

(a) Protein only (b) Carbohydrate only
(c)Vitamins & minerals (d) All

254. The quality of straw can be improved by-

(a) Alkali Treatment (b) Urea Treatment
(c) Silage making with succulent fodders (d) All the above

255. The Water intake of an adult cattle for every kg of dry matter intake is

(a) 2-3 litre (b) 3-5 litre
(c) 6-7 litre (d) More than 7 litre

256. Protein supplement contains-

(a) Less than 18% crude protein and more than 20% crude fiber
(b) More than 20% Crude protein and less than 18% crude fiber
(c) Less than 20% crude protein and less than 18% crude fiber
(d) More than 20% Crude protein and More than 18% crude fiber

257. Crop suitable for silage making-

(a) Crop rich in soluble carbohydrate (b) Crop rich in protein
(c) Crop rich in fat content (d) None of the above

258. Energy requirement for cattle in India is calculated as-

(a) DCP (b) TDN
(c) DM (d) CP

259. Temperature-time protocol for sterilization inside autoclave-

(a) 121°C/15 lbs/15 min (b) 121°C/15 lbs/15 sec
(c) 121°C/21 lbs/15 min (d) 111°C/15 lbs/15 min

260. Temperature-time protocol for sterilization inside hot air oven-

(a) 160°C/1hour (b) 170°C/ 40 min

(c) 180°C/ 20 min (d) All the above

261. Prevention of coprophagy in rabbit will leads to-

(a) Decrease in the ability to digest food (b) Decrease in protein utilization

(c) Decrease in nitrogen retention (d) All the above

262. The major cation & anion of extracellular fluid (ECF) are respectively-

(a) Na^+, Cl^- (b) K^+, PO_4^{-3}

(c) Na^+, PO_4^{-3} (d) None

263. The major cation & anion of intracellular fluid (ICF) are respectively-

(a) Na^+, Cl^- (b) K^+, PO_4^{-3}

(c) Na^+, PO_4^{-3} (d) None

264. Live cultures of non-pathogenic organisms which are administered orally is known as-

(a) Prebiotics (b) Probiotics

(c) Feed additive (d) Feed supplement

265. Which of the following is a wet processing method of grains-

(a) Popping (b) Roasting

(c) Pelleting (d) Micronizing

266. The protein digestibility of Paddy straw is approximate-

(a) 0.0% (b) 0.2%

(c) 0.5% (d) 2.0%

267. Which of the following is not an example of biological treatment for improving the nutritive value of poor quality roughage-

(a) Treatment with cellulase enzyme (b) Treatment with lactobacillus bacteria

(c) Treatment with white-rot fungi (d) Treatment with mushrooms

268. Chemical not suitable for the treatment of poor quality roughage-

(a) Sodium hydroxide (b) Chlorine

(c) Ozone gas (d) Acetic acid

269. If an animal consumes 10 Kg Dry matter and excretes 15 Kg of faeces with 80% moisture, the digestibility coefficient will be:

(a) 20% (b) 40%

(c) 50% (d) 70%

270. A Bull consumed 10 Kg grass hay with 10% moisture and excreted 4 Kg of dung dry matter. The digestibility coefficient will be:

(a) 44.6% (b) 55.6%

(c) 66.6% (d) 10%

271. Fibrobacter succinogen is a-

(a) Cellulose-digesting bacteria (b) Hemicellulose digesting bacteria

(c) Starch-digesting bacteria (d) Sugar utilizing bacteria

272. Streptococcus bovis is a-

(a) Cellulose-digesting bacteria (b) Hemicellulose digesting bacteria

(c) Starch-digesting bacteria (d) Sugar utilizing bacteria

273. Butyrivibrio fibrisolvens is a-

(a) Cellulose-digesting bacteria (b) Hemicellulose digesting bacteria
(c) Starch-digesting bacteria (d) Sugar utilizing bacteria

274. Ruminococcus albus is a-

(a) Cellulose-digesting bacteria (b) Hemicellulose digesting bacteria
(c) Starch-digesting bacteria (d) Sugar utilizing bacteria

275. Caecotrophy is the-

(a) Re-ingestion of soft faeces by rabbit (b) Eating of feed-stuff by rabbit
(c) Eating of own species (d) All the above

276. Caecotrophy is the essential process of digestive system of rabbit because it recycles-

(a) Unabsorbed nutrient (b) Returning protein
(c) Vitamin B rich bacteria (d) All the above

277. Which of the following chemical used as hay preservative-

(a) Propionic acid (b) Acetic acid
(c) Lactic acid (d) Butyric acid

278. In well preserved silage, ratio of ammonia N: total N should be-

(a) 1 : 10 (b) 10 : 1
(c) 1 : 2 (d) 2 : 1

279. Which vitamin has a greater chance of toxicity?

(a) Vit. A (b) Vit. C
(c) Vit. B_1 (d) Vit. B_{12}

280. In preparation of artificial colostrum which oil is used to promote laxative action-

(a) Mustard oil (b) Castor oil
(c) Olive oil (d) Soyabean oil

281. Ascorbic acid is a dietary essential for-

(a) Rat (b) Guinea pig
(c) Mice (d) Pig

282. Anti nutritional factor present in fish meal which causes black vomit in broiler-

(a) Gossypol (b) Trypsin inhibitor
(c) Tannin (d) Gizzerosine

283. Which of the following is not a byproduct of sugarcane industry-

(a) Bagasse (b) Filter coke
(c) Pressmud (d) Husk

284. Least degradable feed stuff in rumen is-

(a) Urea (b) Groundnut
(c) Casein (d) Barley

☆☆☆

Answer Key

1	1-d, 2 –c, 3 –b, 4-e, 5-a	2	All the above
3	All the above	4	0.60 g
5	7- 9% of GE	6	13.34 Kcal/g
7	Acetate	8	Propionate
9	1-d, 2-c, 3-a, 4-e, 5- b	10	10, 17, 25
11	65 : 20 : 10	12	Goat milk
13	Whole milk	14	90 days
15	19% DCP, 25% CP & 75% TDN	16	0.40 g
17	1-b, 2-c, 3-e, 4-a, 5-d	18	Avidin
19	1-e,2-d,3-f,4-c,5-b,6-a	20	40-50
21	35-40	22	20
23	4-5	24	2-3
25	All the above	26	1-c, 2-a, 3-b, 4-e, 5-d
27	pH = 3.5 – 4.2, Ammoniacal N_2 is less than 10%		
28	Both a& b	29	1-e, 2-c, 3-b, 4-a, 5-d
30	1-b, 2-c, 3-e, 4-a, 5-d	31	1-d, 2-a, 3-e, 4-c, 5-b
32	Copper	33	Selenium
34	Vitamin D_3	35	Vita. C
36	Cu	37	Lysine
38	Cr	39	Silage quality
40	Hay	41	Silage
42	Oat & Maize	43	Wastelage
44	Both a & b	45	5-10
46	45%	47	80%
48	0%	49	Taurine & Arachidonic acid
50	Kellner	51	Butyrate
52	Goat	53	All the above
54	Defaunation	55	Both a & b
56	Vita. B_{12}	57	Vita. A
58	Vita. E	59	Vita. C
60	CF > 18% & TDN < 60%	61	CP < 20% & CF < 18%
62	Bacteria	63	Protozoa
64	All the above	65	Protozoa
66	2.5 Kg/100 Kg body weight	67	3 Kg/100 Kg body weight
68	4 kg straw & 1 kg concentrate	69	1 Kg concentrate per 2.5 kg milk
70	1 Kg concentrate per 2 kg milk	71	Protozoa
72	5-8 mg/dl	73	All the above
74	Both are correct	75	Both b & c
76	All the above	77	All the above
78	Urea	79	Alkali disease is caused by deficiency of selenium
80	All the above	81	All the above
82	Molasses	83	All the above
84	Both a & b	85	All the above
86	All the above	87	1-e, 2-c, 3-b, 4-d, 5-a
88	Total Ash	89	NFE
90	1-c, 2-d, 3-e, 4-b , 5-a	91	Experimental station
92	CF	93	Hemicelluloses
94	1-c, 2-a, 3-b, 4-d	95	It does not contribute to energy content of a feed
96	Castrated males	97	Faeces

98 Both
99 7 – 10 days
100 All the above
101 80
102 1-c,2-d,3-b,4-e,5-a
103 Na^{+}, Cl^{-}
104 K^{+}, PO_4^{-3}
105 Urine
106 Urine
107 Nitrogen balance technique
108 C – N balance
109 Bomb calorimeter
110 Nitrogen balance
111 2.25
112 Nil and 40%
113 Un-restricted feeding or free of choice
114 3 %
115 Ascorbic acid
116 The fermentation of fiber retarded because fatty acids are absorbed on their surface.
117 Dry matter intake (DMI)
118 All the above
119 Both are correct
120 All the above
121 Herbivores
122 $W^{0.75}$
123 46.6
124 18% & 46% respectively
125 100 %
126 Both a & b
127 1-c,2-d, 3-b, 4-e, 5-f, 6-a
128 Acetyle CoA
129 Both
130 Thiamine
131 Mn
132 Phosphorus
133 Ca
134 1-d, 2-e, 3-a, 4-b, 5-c
135 Both a & b
136 Transferrin
137 Vitamin B12
138 10% of body weight
139 1-e,2-c, 3-a, 4-b,5-d
140 Leucine
141 Both a & b
142 Aerobic condition only
143 Maize & feather meal
144 Urea & casein
145 1-c, 2-e, 3-f, 4-a, 5-d, 6-b
146 Methionine & Lysine
147 United Kingdom
148 U.S.A.
149 All the above
150 4 Kg urea + 40 liters of water for 100 Kg straw
151 10:1
152 10:1
153 10:1
154 Nutritive ratio
155 Both correct
156 (%DCP+%DTP)/2
157 281, 219
158 Both a & b
159 Monosaccharide & Disaccharide
160 EE
161 Hemicellulose
162 All the above
163 30 Litre/hour
164 Butyrate > Propionate > Acetate
165 Passive diffusion
166 65
167 High buffering capacity
168 Maillard type reaction
169 Lysine
170 All the above
171 Crop with thick stem
172 Both a &b
173 All the above
174 3-3.5%
175 3:1
176 Vitamin D
177 Yellowish or brownish-green
178 Phaeophytin
179 Thiamin
180 10%
181 4.18
182 Lavoisier
183 7.3 kcal
184 1.23g
185 40
186 Gossypol
187 1
188 3%
189 30 Ewes + 1 Ram
190 10 Doe + 1 Buck
191 2, 3, 5
192 Rabbit
193 All the above
194 All
195 Soybean
196 Glucosinolate
197 $FeSO_4$
198 Linamarin

199 Taurine
200 Chromium
201 Selenium
202 *L-gulonolactone oxidase*
203 30
204 1-c, 2-e, 3-a, 4-f, 5-b, 6-d
205 Glycine(Hint- Collagen contains (i) 35% Glycine (ii) 21% proline + Hydroxyproline)
206 Both a & b
207 Isoleucine
208 Submucosa of Duodenum
209 1-b, 2-d, 3-a, 4-c
210 Both a & b
211 All the above
212 All are correct
213 10%
214 All the above (fermentation occurs after completion of true digestion)
215 Ruminants (fermentation occurs in rumen before true digestion)
216 Nitrogen
217 Astragalus
218 1-f, 2-d, 3-g, 4-c, 5-e, 6-a, 7-b
219 Lactic acid
220 Vita. E
221 Benzoic acid
222 Sheep
223 80
224 Goat
225 13%
226 Succinate pathway
227 Lucerne hay
228 Fungi
229 Silica
230 18 %
231 Crysophanic acid
232 Phenylalanine
233 Both
234 Hay curing
235 Vita. B_6
236 46% & 70%
237 Both correct
238 All correct
239 4^{th}& 14^{th} day of age
240 3 week
241 All the above
242 20% CP
243 All the above
244 All mash feeding
245 Whole grain feeding
246 All the above
247 Pellet feeding
248 Crumble
249 Wet Mash feeding
250 4mm
251 Hammer mill
252 Ribbon type mixer
253 Protein only
254 All the above
255 3-5 litre
256 More than 20% Crude protein and less than 18% crude fiber
257 Crop rich in soluble carbohydrate
258 TDN
259 121^0C/15 lbs/15 min
260 All the above
261 All the above
262 Na^+, Cl^-
263 K^+, PO_4^{-3}
264 Probiotics
265 Pelleting
266 0.2% (Note: DCP% of wheat straw is 0.0%, DCP% of Paddy straw is 0.2%, DCP% of Bajra karbi is 0.8%, DCP% of Jowar karbi is 1.0% & DCP% of Gram bhusa is 2.2%)
267 Treatment with lactobacillus bacteria
268 Acetic acid
269 70% [Note: % Digestibility coefficient on DM basis = (DM intake – DM excreted)/DM intake × 100] % DC = (10–3)/10×100 = 70; out of 15 Kg faeces 20% is dry matter so DM excreted is 3 Kg
270 55.6%
271 Cellulose-digesting bacteria
272 Starch-digesting bacteria
273 Hemicellulose-digesting bacteria
274 Cellulose-digesting bacteria
275 Re-ingestion of soft faeces by rabbit
276 All of above
277. Propionic acid
278. 1 : 10
279. Vit. A
280. Castor oil
281. Guinea pig
282. Gizzerosine
283. Husk
284. Groundnut

☆☆☆

Table 1: Zoological classification of various domestic animals

Taxonomic system	Cattle	Buffalo	Sheep	Goat	Swine	Camel	Equine
Kingdom	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata	Chordata	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia	Mammalia
Order	Artio-Dactyla	Artio-dactyla	Artio-dactyla	Artio-dactyla	Artio-dactyla	Artio-Dactyla	**Perisso-dactyla**
Family	Bovidae	Bovidae	Bovidae	Bovidae	Suidae	Camelidae	Equidae
Genus	Bos	Bubalus	Ovis	Capra	Sus	Camelus	Equus

Note:

(1) Artiodactyla: Even-toed animals

(2) Perissodactyla: Odd-toed animals

Table 2: Zoological name and chromosome number of various animals

S.N.	Animal	*Scientific name*	Chromosome number (2N)
1.	Zebu cattle	*Bos indicus*	60
2.	Exotic cattle	*Bos taurus*	60
3.	Goat	*Capra hircus*	60
4.	Sheep	*Ovis aries*	54
5.	River buffalo/Water buffalo	*Bubalus bubalis*	50
6.	Swamp buffalo	*Bubalus carabanesis*	48
7.	Pig	*Sus domesticus*	38
8.	Horse	*Equus caballus*	64
9.	Donkey	*Equus asinus*	62
10.	Camel (single humped)	*Camelus dromedaries*	74
11.	Camel (double humped)	*Camelus bactrianus*	74
12.	Cat	*Felis domesticus*	38
13.	Dog	*Canis familiaris*	78
14.	Chicken	*Gallus domesticus*	78
15.	Rabbit	*Oryctolagus cuniculus*	44
16.	Yak	*Bos grunniens*	60
17.	Mithun	*Bos frontalis*	58

Note: Double humped camel are mainly found in Ladakh region of J&K

Table 3: The gestation period of common domestic animals

S.N.	Animal	Gestation period
1.	Cattle	283 days (9 month+ 9days)
2.	Buffalo	310 days (10months+10days)
3.	Sheep	145 days (5 months–5days)
4.	Goat	155 days (5months+5days)
5.	Bitch	62 days (2months+2days)
6.	Sow	114 days (3months+3weeks+3days)
7.	Mare	341 days (11months+11days)
8.	She-camel	390 days (1year+1month+1day)
9.	Rabbit	32-35 days
10.	Cat	56-64 days

Table 4: Zoological name and gestation period of common laboratory animals

S.N.	Lab. Animal	Scientific name	Gestation period
1.	Mice	*Mus musculus*	20 days (19-21 days)
2.	Rat	*Rattus norvegicus*	21 days (21-22 days)
3.	Guinea Pig	*Cavia porcellus*	65 days (59- 72 days)
4.	Hamster	*Mesocricetus auratus*	16-18 days
5.	Rabbit	*Oryctolagus cuniculus*	30-32 days

Table 5: Water requirement of domestic animals

S.N.	Animal	Drinking water requirement per animal per day	Avg. daily amount of dung produced per animal
1.	Sheep & Goat	5-10 litres	1.75 Kg (1-2.5)
2.	Poultry (100 birds)	25 litres (250 ml per bird)	3.0 Kg (2.5-3.5)
3.	Pig	22-25 litres	4.0 Kg (3-5)
4.	Horse	36 litres	13.50 Kg (9-18)
5.	Dairy Cattle	30-35 litres	24 Kg (18-30)
6.	Buffalo	30-35 litres	32.50 Kg (25-40)

Note: Water requirement is directly proportional to dry matter intake

Table 6: Water intake per Kg dry matter intake of various animals

S.N.	Animal	Water intake per Kg dry matter intake
1.	Adult cattle	3-5 liters
2.	Milking cattle	3-5 liters & additional amount of 4-5 liters of water per Kg of milk produced should be given
3.	Suckling calf	6-7 liters
4.	Sheep/Goat	4 liters
5.	Swine	3 liters
6.	Horse	2-4 liters
7.	Poultry	2 liters

Metabolic water: Amount of water produced in the body during various metabolic activities. It comprises of **5-10% of total intake of the water.**

Table 7: Metabolic water

S.N.	Substrate	Metabolic water produce
1	1 g **Glucose or sugar**	**0.60g**
2	1g Starch	0.56g
3	1g Protein	0.40g
4	1g Fat	1.07g

Table 8: Types of animals

S.N.	Items	Ruminant	Pseudo-ruminant	Non-ruminant or Monogastric
1.	Rumination	✓	✓	×
2.	Stomach (No. of chamber)	**4**	**3 (Omasum absent)**	**1**
3.	Examples	Buffalo, Cattle, Sheep,Goat, Deer, Yak, Mithun, Giraffe, Nilgai	Camel, llama, Alpaca, Vicuna	**Horse**, Zebra, Donkey, Mule, **Pig, Dog**, Cat, Rabbit, Elephant

Note:-

- Livestock comprises of all farm animals having economic importance (milk/meat/wool/draught purpose) Ex. Cattle, Buffalo, Sheep, Goat, Camel, Pig, Horse, Mule, Donkey, Pony etc.
- 1-Livestock unit =**1 adult cattle/buffalo = 2 Pigs = 3 Calves = 5 Sheep/Goat**
- Poultry, dog, cat and rabbit are not fallen under category of livestock
- Fowl stomach is 2-chambered (Proventriculus + Gizzard/Ventriculus)
- The proventriculus is known as glandular stomach while gizzard is known as the muscular stomach

Table 9: Terminologies related to various domestic animals

S.N.	Animal	Adult male	Adult female	Group of animal	Act of mating	Act of parturition	New born	Young male	Young female
1.	Cattle	Bull	Cow	Herd	Serving	Calving	Calf	Bull calf	Heifer calf
2.	Sheep	Ram	Ewe	Flock/ Hurtle	**Tupping**	Lambing	Lamb	Ram lamb	**Ewe lamb (Gimmer)**
3.	Goat	Buck/ Billy	Doe/ **Nanny**	Trip or band	Serving	Kidding	Kid	Buckling	**Goatling**
4.	Pig	Boar	Sow	Drove	**Coupling**	**Farrowing**	Piglet	Boarling	**Gilt**
5.	Horse	Stallion /Stud	Mare	Pack	**Covering**	Foaling	Foal	**Colt**	Filly
6.	Camel	Maiya/ oont	Sand	Tola	**Lakhana**	Calving		Tordia	Tordi
7.	Dog	Dog	Bitch	Kennel		**Whelping**	Pup		
8.	Cat	Tom	Queen / Pussy	Clowder		Queening/ kittening	Kitten		

Table 10: Terminologies

S.N.	Animal	House	Castrated male	Sound	Female with its offspring	Castrated female
1.	Cattle, Buffalo	Barn/Byre	Bullock / Steer	Bellowing	Calf-at-foot	Spayed
2.	Sheep,goat	Pen	Wedder / Wether	Bleating	Suckling	Spayed
3.	Pig	Sty	Hog/Stag/Barrow	Grunting	Suckling	Spayed
4.	Horse	Stable	Geld /Gelding	Neighing		Spayed
5.	Dog	Kennel	Altered Dog	Barking		Spayed
6.	Cat	Cattery	Neuter	Mewing		Spayed

Note:-

1. **Bullock:** Castrated bull for draught purpose
2. **Steer:** Castrated bull for meat purpose
3. **Teaser bull:** Vasectomised bull (by cutting & ligating the vas deferens) used for heat detection & teaser bull is not castrated.
4. **Heifer:** A female cow above 1 year, which has not yet calved
5. **Buller cow/Nymphomanic cow:** A cow remains always in heat.
6. **Crit /Card/Runt:** Smallest piglet in a litter usually last to be farrowed.

Table 11: Various reproductive stages/periods of the dairy cow

S.N.	Name of period/time	Number of days	Estimation
1.	Lactation length (LL)	305 days (10 months)	Date of dry-Date of calving
2.	Dry period (DP)	60 days (2 months)	Date of calving-Date of previous lactation
3.	Resting period	0 day	
4.	Calving interval	365 days (12 months)	Date of calving-Date of previous calving; LL + DP; SP + GL
5.	Gestation period (GL)	283 days	Date of parturition-Date of conception; Least variable
6.	Service period (SP)	85 days postparturient	Date of conception-Date of previous calving; Most variable

BREEDS OF VARIOUS DOMESTIC ANIMALS

- A total number of indigenous breeds on 16/08/2021 in the country are 202, which include 50 for cattle, 19 for buffalo, 34 for goat, 44 for sheep, 7 for horses & ponies, 9 for camel, 10 for pig, 3 for donkey, 1 for yak, 19 for chicken, 2 for duck, 1 for geese and 3 of dog.

(A) BUFFALO BREEDS:-

Table 12: Classification of Buffalo breeds according to region

S.N.	Murrah group	Gujarat group	UP group	South India group	Central India group
1.	Murrah	Surti	Bhadawari	Toda	Nagpuri
2.	Nili Ravi	Jaffarabadi		Bargur	Marathwadi
3.		Mehsana		Dharwadi	Kalahandi
4.		Banni			Chilika
5.					Pandharpuri
6.					Manda
7.					Chhattisgarhi

Table 13: Description of buffalo breeds

S.N.	Breed (Other name)	Origin & Distribution	Horns	Milk Fat%	Characters
1.	Murrah (**Delhi buffalo/ Kundi/ Kunni**)	Rohtak, Hisar (Haryana), Punjab, Delhi	**Tightly curled horns**	7%	**Jet black colour body, Highest milk producing breed of buffalo**
2.	Nili-Ravi (**Panch-kalyani/ Panchbhadra**)	**Ferozpur** (Punjab)	**Tightly curled horns**	**4% (minimum fat % in buffalo breeds)**	Wall eye appearance
3.	Jaffarabadi	Gir forest (Gujarat)	**Dropping horns**	9-10%	**Heaviest buffalo breed,** Sleepy eye appearance
4.	Surti	Surat, Kaira, Baroda (Guj.)	**Sickle-shaped horns**		Two white collar (chevrons)-one round the jaw and the other at the brisket
5.	Mehsana	Mehsana (Guj.)			**Mixture of Murrah & Surti blood; Only buffalo with black switch of tail; Longest lactation period in buffaloes**
6.	Bhadawari	Agra, Etawah (UP), Gwalior (MP)		**14% (Highest fat % in buffalo**	**Wedge shape body, Copper colour body coat, two white lines 'Chevron (Kanthy)' are present at the lower side of the neck**
7.	Toda	Nilgiri hills (Tamilnadu)			**Grey skin, most violent breed of buffalo**
8.	Nagpuri (Elitchpuri/ Barari)	Nagpur (Maharashtra)	Sword-shaped horn		
9.	Pandharpuri	Maharashtra	Sword-shaped horn		

(B) CATTLE BREEDS:-

1. **Exotic breeds of cattle (Humpless cattle)**
   - Dairy breeds: -Jersey, Holstein-Friesian (HF), Brown Swiss, Ayrshire, Guernsey
   - Beef breeds: -Hereford, Angus, Shorthorn

Table 14:Description of exotic cattle breeds

S.N.	Breed	Origin	Characters
1.	Jersey	Island of Jersey (England)	**Longest lactation period among cattle (365 days), Highest milk fat among cattle (5.5%),** Smallest & most hardy exotic cattle breed
2.	HF	Netherland/Holland	**Highest milk producer in world (6150 Litres/lactation);Lowest milk fat (3.5%)**
3.	Ayrshire	Scotland	**Most beautiful dairy breed**
4.	Brown Swiss (BS)	Switzerland	**Highest milk lactose (5%),** The maximum heat tolerance exotic breed of cattle
5.	Hereford	England	

Table 15: Crossbreds of cattle

S.N.	Crossbred	Origin	Cross
1.	Jersind	Allahabad	Jersey × Red Sindhi
2.	Frieswal	Meerut	HF×Sahiwal
3.	Jerthar	Bangalore	Jersey ×Tharparkar
4.	Karan Swiss	NDRI Karnal	Brown Swiss×Sahiwal
5.	Karan Fries	NDRI Karnal	HF×Tharparkar
6.	Sunandini	Munnar (Kerala)	Brown Swiss×Non descript
7.	Jamaica Hope	Jamaica	80%Jersey,15%Sahiwal,5%HF
8.	Taylor	Patna	Short horn bull× Native cow
9.	Phule Triveni	Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri	Holstein Friesian (50 per cent), Jersey (25 per cent) and Gir (25 per cent)
10.	Vrindavani	ICAR-IVRI, Izatnagar	50–75% inheritance from exotic cattle breeds concerning Holstein-Friesian, Jersey and Brown Swiss and 25–50% from indigenous Hariana breed

Note:

1. Taylor: first crossbred cattle developed in India

Table 16: Indian cattle breeds

S.N.	Milch breeds	Dual purpose breeds	Draught breeds
1.	Gir	Hariana	Amritmahal
2.	Sahiwal	Nari	Nagori
3.	Red Sindhi	Kankrej	Khillari
4.	Tharparkar	Mewati	Malvi
5.	Rathi	Dangi	Bachaur
6.		Deoni	Bargur
7.		Nimari	Siri
8.		Ongole	Ponwar
9.			Hallikar
10.			Kangayam

Table 17: Description of milch breeds

S.N.	Breed	Other names	Origin & Distribution	Characters
1.	Gir	Kathiawarhi, Surati, Bhodali	Gir forest (Guj.)	**Longest lactation period among desi breeds (325 days), Best beef breed, Half moon shape horn, Long, pendulous leaf like ears.**
2.	Sahiwal	**Lola, Multani,** Lambi-bar, **Montgomery**	Montgomery (Pakistan), Punjab, Haryana	**Best Indian milch breed, Loose skin (Lola), Well developed dewlap and naval flap**
3.	Red-Sindhi	Red-Karachi	Karachi, Hyderabad (Sindh)	
4.	Tharp-arkar	**Malani, White-Sindhi, Thari,** Grey Sindhi	Tharparkar (Pakistan), **Malani (Jaisalmer, Rajasthan)**	**Highest disease resistant, Colour change property**
5.	Rathi		Alwar, Bikaner (Rajasthan)	**It is a mixture of Red Sindhi, Sahiwal, Tharparkar & Dhanni**

Table 18: Description of dual- purpose breeds

S.N.	Breed	Origin & Distribution	Mixture	Characters
1.	Hariana	Rohtak, Hisar (Haryana)		**Best dual purpose breed**
2.	Kankrej	Kutch ka Rann (Guj.)		**Heaviest Indian Cattle breed, Famous gait "Sawai-Chal"**
3.	Mewati (Kosi)	Alwar, Bharatpur (Rajasthan)	**Gir, Rathi & Nagori**	
4.	Dangi	Maharashtra, Gujarat		
5.	Nimari	Narmada Valley (MP)	**Gir, Khillari**	
6.	Ongole	Ongole (AP)		**Cattle with pure white colour**
7.	Deoni	Hyderabad (Telangana)	**Gir, Dangi & local animal**	
8.	Nari	Pali, Sirohi (Rajasthan); Banas Kantha, Sabar Kantha (Gujarat)		**Spirally outward/forward curved horns**

Table 19: Description of draught- purpose breeds

S.N.	Breed	Origin	Characters
1.	**Amritmahal**	Karnataka	**Best draught- purpose breed of India;** Famous for power of endurance
2.	Nagori	Rajasthan	Best draught- purpose breed of Rajasthan
3.	Khillari	Maharashtra	Best draught- purpose breed of Maharashtra
4.	**Vechur**	Kottayam (Kerala)	**Smallest cattle breed in the World**
5.	Bachaur	Sitamari (Bihar)	Best draught- purpose breed of Bihar
6.	**Siri**	Sikkim, Darjeeling	
7.	**Ponwar**	Pilibhit (UP)	

8.	**Kangayam**	Coimbatore (Tamil Nadu)	**Pride of Tamil Nadu**
9.	Bargur	Tamil Nadu	
10.	Malvi	Malva (MP)	
11.	Hallikar	Karnataka	
12.	Badri	Uttarakhand	Also known as **pahadi cow or hill cow**

- **Hilly breeds of cattle:** - Siri, Ponwar & Badri
- **Pulikulam** breed of Tami Nadu is used for **Jallikattu** (riding event) on the day of Pongal festival

(C) SHEEP BREEDS:-

Table 20: Crossbreds of sheep

S.N.	Crossbred	Origin	Cross
1.	Hissardale	Govt.Livestock Farm, Hisar	**Bikaneri ewe (Magra) × Australian Merino ram**
2.	Avikalin	CSWRI, Avikanagar	Rambouillet ram × Malpura ewe
3.	Avivastra	CSWRI,Avikanagar	Rambouillet ram × Chokla ewe
4.	Avimans	CSWRI, Avikanagar	Malpura & Sonadi × Dorset & Suffolk
5.	Avishaan	CSWRI, Avikanagar	Garole & Malpura × Patanwadi
6.	Bharat Merino	CSWRI, Avikanagar	Chokla & Nali × Merino & Rambouillet
7.	Kashmir Merino		Gaddi, Bhakarwal & Poonchi × Merino & Rambouillet
8.	Indian Karakul	Bikaner	Marwari, Malpura & Sonadi × Karakul
9.	Nilgiri Synthetic	Tamilnadu	Nilgiri × Merino & Rambouillet
10.	Patanwadi Synthetic	GAU, Dantiwara	Patanwadi × Merino & Rambouillet

- **Exotic sheep breeds:-**
  1. Fine wool breeds: -Merino, Rambouillet
  2. Furbreeds: -Karakul
  3. Mutton breeds: -Dorset, Suffolk, Southdown
  4. Long coarse wool breeds: -Lincoln, Leicester

Table 21: Description of exotic sheep breeds

S.N.	Breed	Origin	Characters
1.	Merino	**Spain**	**Best fine wool breed in the world, Ewes polled & rams have spiral horns**
2.	**Rambouillet**	**Rambouillet (France)**	Developed from Spanish Merino
3.	Lincoln	England	**Largest & heaviest breed in the world**
4.	Leicester	England	Purest English breed
5.	Southdown	England	**Mousey grey face**, Oldest English breed
6.	Karakul	Bukhara province of Uzbekistan (Central Asia)	**Best Pelt (good quality fur) producing** breed in the world
7.	Suffolk	England	**Best mutton breed**
8.	Dorset	England	

Table 22: Indian sheep breeds

S.N.	North temperate region breed	Northwestern arid & semi-arid region breed	Southern peninsular region breed	Eastern region breed
1.	Gaddi	**Chokla (Shekhawati)**	Nellore	Garole
2.	Bhakarwal	Nali	Mandya	Ganjam
3.	Poonchi	Marwari	Deccani	Chottanagpuri
4.	Gurez	Jaisalmeri	Hassan	
5.	**Rampur Bushair**	Pugal	Bellary	
6.	Karnah	**Magra (Bikaneri)**	Madras Red	
7.	Changthangi	Malpura		
8.		Patanwadi		

Table 23: Description of Indian sheep breeds

S.N.	Breed	Origin & Distribution	Characters
1.	**Chokla (Shekhawati, Chapper, Raata munda)**	Sikar, Churu & Jhunjhunu (Rajasthan)	**Roman nose/ Parrot mouth appearance**, medium size compact body; Also known as "**Merino of Rajasthan"**
2.	Nali	Ganganagar, Churu & Jhunjhunu (Rajasthan)	**Canary coloration of wool (yellow wool)**
3.	Marwari	Marwar reg. (Rajasthan)	**Highest disease resistant, Triple purpose sheep breed, Most exodus** (moving sheep over long distance in search of fodder and water) is seen
4.	Pugal	Bikaner (Rajasthan)	**Yellow streak above eyebrow**
5.	Jaisalmeri	Jaisalmer (Rajasthan)	**Roman nose**
6.	Sonadi (Chanothar, Laapdi, Bhagli)	Udaipur (Rajasthan)	Long and flat ears touching ground while grazing
7.	Nellore	Nellore (Andhra Pradesh)	**Tallest breed** of sheep in India, **Best mutton** breed of India, Also known as **"goat-like sheep" (No wool)**
8.	**Mandya (Bannur)**	**Karnataka**	**Smallest sheep breed**
9.	**Garole**	**Sundarban (WB)**	**Most prolific sheep breed of India (Fec-B gene)**
10.	**Ganjam**	**Ganjam (Orissa)**	
11.	**Gaddi (nomadic tribe Gaddis** rear this breed)	Kullu & Kangra Valleys (HP)	**Very sturdy & very good climber Polled ewes & horned rams,** Undercoat used for making **"Kullu shawls" & blankets**
12.	Bhakarwal **(nomadic tribe** Bhakarwal rear this breed)	Jammu & Kashmir	**Rams horned but ewes hornless, "Loei"** is obtained from this breed
13.	Gurez	Kashmir	**Biggest among Kashmir breeds**

(D) GOAT BREEDS:-

Table 24: Exotic goat breeds

S.N.	Breed	Origin & Distribution	Characters
1.	Saanen	Switzerland	Also known as **"milk queen"**, Highest milk producing goat breed
2.	**Alpine**	**Africa**	
3.	Angora	Turkey	**"Mohair"** (white soft silky hairs) producing breed of goat. Also known as **"sheep like goat"**
4.	Anglo-Nubian	England	**Roman nose**, also known as "Jersey of goat" **most outstanding dual-purpose** goat breed widely used for the upgrading of desi stock
5.	Toggenburg	Switzerland	**Horn absent,** maximum adaptability in exotic breeds
6.	Boer	Southern Africa	**Meat type breed used for cross-breeding for meat**
7.	Orenberg	Kazakhstan	

Table 25: Indian goat breeds

S.N.	North temperate region breed	Northwestern arid & semi-arid region breed	Southern peninsular region breed	Eastern region breed
1.	Chegu	Jamunapari	Malabari	Black-Bengal
2.	Changthangi	Barbari	Osmanabadi	Ganjam
3.	Gaddi	Jhakrana	Sangamneri	
4.		Beetle		
5.		Sirohi		
6.		Kutchi		
7.		Marwari		

Table 26: Description of Indian goat breeds

S.N.	Breed	Home tract	Characters
1.	**Jamunapari**	**Etawah** (UP)	**Biggest & most majestic** breed of Indian goat, **"Roman nose" (parrot mouth appearance), Most beautiful Indian goat, Creamy white body colour with shining hair,** Thick growth of hairs on buttocks known as **"Feathers"**, Highest milk producing goat breeds
2.	**Barbari (City breed)**	Etawah, Agra (UP), Bharatpur (Raj.)	**Origin: Barbera city (East Africa) Dwarf breed highly suitable for stall feeding &** generally found in cities so it is also known as **"city breed", Indian goat with maximum milk fat (5%)**

3.	Beetle	Punjab, Haryana	**Buck possesses marked beard but females are beardless, roman nose**
4.	Jhakrana	Alwar (Raj.)	Skin popular for **tanning purpose**
5.	Kutchi	Kutch (Guj.)	**Cork screw shaped horns**
6.	Black Bengal	Nadia (WB)	**Best chevon breed of India, Highly prolific goat breed of India**
7.	Chegu	Lahul & Spiti valleys (HP)	Pashmina producing breed
8.	**Changthangi** (also known as **Pashmina**)	Changthang (Ladakh)	Pashmina producing breed, Pashmina used for making high-quality **Kashmiri "Rug or Shawl"**
9.	Malabari	Malabar (Kerala)	
10.	Osmanabadi	Osmanabad (Maharashtra)	
11.	Sangamneri	Pune, Ahmednagar (Maharashtra)	

Note:-

1. Chegu & Changthangi goat breeds produce Pashmina while other breeds of North temperate region (Gaddi) produce medullated fibres.
2. **Pashmina**: fine costly hairs harvested from both Chegu & Changthangi (Goat breeds)

(E) PIG BREEDS:-

Table 27: Indian breeds of pig

S.N.	Breed	Home tract
1.	Ghoongroo	West Bengal
2.	Niang Megha	Meghalaya
3.	Agondagoan	Goa
4.	Tenyi Vo	Nagaland
5.	Nicobari	Andaman & Nicobar
6.	Doom	Assam
7.	Zovawk	Mizoram
8.	Ghurrah	Uttar Pradesh
9.	Mali	Tripura
10.	Purnea	Bihar

- **Exotic breeds of pig:**
  1. **England breeds:** -LWY, MWY, Berkshire, Tamworth
  2. **Denmark breeds**: -Landrace
  3. **U.S.A. breeds**: - Duroc, Chester-White, Poland-China

Table 28: Description of exotic breeds of pig

S.N.	Breed	Home tract	Characters
1.	Large White Yorkshire (LWY)	England	**Heaviest breed of pig**
2.	Middle White Yorkshire (MWY)	England	**Excellent pork breed**
3.	Berkshire	England	Black colour with 6 white marks on body

4.	Tamworth	England	**Golden red colour body, Large, long & tall breed known for lean meat**
5.	Landrace	**Denmark**	**Highest quality bacon** in the world, White colour breed with some black skin spots known as **"Freckles"**

(F) BREEDS OF HORSES & PONIES

Table 29: Indian horse breeds

S.N.	Breed	Home tract	Characters
1.	Kathiawari	Kathiawar (Guj.)	**Best breed of horse**
2.	Manipuri	Manipur	**Manipuri horses are known for their intelligence so used for polo, military & racing**
3.	Marwari	Marwar (Raj.)	
4.	Spiti	Himachal Pradesh	
5.	Zanskari	Leh & Ladakh (J & K)	
6.	Bhutia	Sikkim, Darjeeling	
7.	Kachchhi-Sindhi	Gujarat and Rajasthan	

(G) CAMEL BREEDS

- Indian Camel Breeds registered in NBAGR are 9 as:-
  1. Breeds of Rajasthan: - Bikaneri, Jaisalmeri, Mewari, Mewati, Marwari, Jalori
  2. Breeds of Gujarat: -Kutchi, Kharai
  3. Breeds of MP: -Malvi

Table 30: Description of Indian camel breeds

S.N.	Breed	Home tract	Characters
1.	Bikaneri	Bikaner (Raj.)	**Best camel breed**
2.	Jaisalmeri	Jaisalmer (Raj.)	(a) Nanchana village is world famous for camels (b) It is also known as "Racing camel" (c) Famous for camel safari (d) Famous for camel dance and camel polo (e) This breed is used by BSF to guard the border in the desert areas of country
3.	Mewari	Udaipur (Raj.)	
4.	Kutchi	Kutchch (Guj.)	
5.	Kharai	Bhuj (Guj.)	Also known as **"swimming camel".**It can swim up to 3 Km.in to the sea in search of **mangrove (primary food). Tolerant to high saline water**
6.	Malvi	Mandsaur (MP)	(a) Smallest camel breed (b) Higher resistant to trypanosomiasis

Note:-

- Indian camels are mainly two types- Plain camels & Hill camels
- Plain camels includes- Riverine camels & Desert camels
- Hill camels & Riverine camels are Baggage type whereas Desert camels are Riding type
- Desert camel breeds are Bikaneri & Jaisalmeri

Table 31: New registered breeds in 2018 as per ICAR-NBAGR

S.N.	New breed	Home tract
Cattle		
1.	Ladhaki	Jammu and Kashmir
2.	Konkan Kapila	Maharshtra and Goa
Buffalo		
3.	Luit (Swamp Buffalo)	Assam and Manipur
4.	Bargur	Tamil Nadu
5.	Chhattisgarhi	Chhattisgarh
Sheep		
6.	Panchali (Sheep)	Gujarat
Goat		
7.	Kahmi	Gujarat
8.	Rohilkhandi	Uttar Pradesh
9.	Assam Hill	Assam and Meghalaya
10.	Bidri	Karnataka
11.	Nandidurga	Karnataka
12.	Bhakarwali	Jammu and Kashmir
Pig		
13.	Ghurrah	Uttar Pradesh
Donkey		
14.	Halari	Gujarat
Chicken		
15.	Uttara	Uttarakhand

Table 32: New registered breeds in 2020 and 2021 as per ICAR-NBAGR

S.N.	New breed	Home tract
Cattle		
1.	Poda Thurpu	Telangana
2.	Nari	Rajasthan and Gujarat
3.	Dagri	Gujarat
4.	Thutho	Nagaland
5.	Shweta Kapila	Goa
6.	Himanchali Pahari	Himanchal Pradesh
7.	Purnea	Bihar
Buffalo		
8.	Gojri	Punjab and Himanchal Pradesh
9.	Dharwadi	Karnataka
10.	Manda	Odisha
Sheep		
11.	Kajali	Punjab
Pig		
12.	Mali	Tripura
13.	Purnea	Bihar
Donkey		
14.	Kachchhi	Gujarat

Duck		
15.	Maithili	Bihar
Chicken line		
16.	PD2 (Vanraja Female) Line	ICAR-DPR, Hyderabad
Dog		
17.	Rajapalayam	Tamil Nadu
18.	Chippiparai	Tamil Nadu
19.	Mudhol Hound	Karnataka

- **Milking Methods:-**
  - **A. Hand milking**: - a common practice among individual farmers. Less than 20 cattle and buffalo are required.
  - **B. Machine milking**: -commonly practised in an organised farm. More than 20 cattle and buffalo are required.

Table 33: Hand milking (three types)

S.N.	Types of hand milking	Procedure	Special points
1.	**Full hand method/ Fisting**	Grasp the teat with all five fingers & pressing it against the palm	**Best method of milking dairy animals**
2.	Stripping	Holding the teat between thumb & forefinger & drawing it down the length (mainly used in sheep & goat)	It is used in following conditions:- (a) **to remove left milk after machine milking** (b) When **teats are too small** (c) towards completion of milking
3.	Knuckling	Bend thumb against teat	**Wrong method of milking** (injury may occur in teat tissues)

Note:-

- Cow are milked from the left side
- The hindquarters of the udder are slightly larger than the front ones and contain more milk.
- The approximate ratio of milk is 60:40 (Hindquarter: Forequarter) for cattle.
- Oxytocin is called as "Milk let-down hormone".
- Epinephrine is called as "Milk holding up hormone"
- Milking interval should be 12 hrs. between two consecutive milkings.

- **Methods of Drying:-**
  1. **Incomplete milking**: **Best method of drying off a cow**
  2. Intermittent milking
  3. Complete cessation: Wrong method of drying off a cow
- **Methods of age determination of animals:-**
  1. By record keeping
  2. By physical appearance of animal
  3. By counting no. of horn rings (**Age=N+2**; where N is no. of horn ring)
     - This method is applicable to cattle/buffalo whose calving interval is 1 year; in **cattle, first horn ring appearsat the age of 3 years.**
  4. By dentition: **-most commonly used method for age determination. In this, age is determined only on the basis of incisors teeth of the lower jaw.**

Table 34: Dental formulae of various animals

S.N.	Animal	Dental formula(permanent)	Comments
1.	Ruminants (Cow, Buffalo, Sheep Goat)	$2(I^0/_4 C^0/_0 PM^3/_3 M^3/_3) = 32$	(a) Incisors are absent from upper jaw in all ruminant & their place is taken up by **"dental pad"** **(b) Canines are absent in all ruminants** (c) In livestock, least number of permanent teeth is in ruminants
2.	Horse (Stallion)	$2(I^3/_3 C^1/_1 PM^3/_3 M^3/_3) = 40$	
3.	Mare	$2(I^3/_3 C^0/_0 PM^3/_3 M^3/_3) = 36$	**Canines are absent in mare**
4.	Pig	$2(I^3/_3 C^1/_1 PM^4/_4 M^3/_3) = 44$	In livestock, maximum number of permanent teeth is in pigs.
5.	Dog	$2(I^3/_3 C^1/_1 PM^4/_4 M^2/_3) = 42$	
6.	Camel	$2(I^1/_3 C^1/_1 PM^3/_2 M^3/_3) = 34$	

Note:-

- Full mouth condition: -Age at which all permanent teeth appear
  [Sheep: 4 years (b) Horse: 4.5 years (c) Goat, Cattle & Buffalo: 5 years (d) Camel: 7 years]
- Broken mouth condition: -Age at which one or more teeth have disappeared.
- **Gummer: - an animal that has lost it's all teeth.**
- Cheek teeth: Pre molars & molars together known as cheek teeth
- **Dental Star** (mark on central pulp cavity of incisors) & **Galvayne's groove** (a groove in upper corner incisor) **are related to incisors of horses**.
- **Tusk teeth** are found in pigs and elephant. In pigs these are modified canines and in elephant these are modified incisors.
- **Wolf teeth** are found in pigs, horse and camels. These are 1st Pre-molars and found as rudimentary.

Table 35: Methods of identification of animals & Poultry

S.N.	Permanent methods	Temporary methods
1.	Branding	Ear tagging
2.	Tattooing	Hoof marking (for horse)
3.	Ear notching (for pig)	Horn marking (for cattle)
4.		Wool marking (for marking flock of sheep)
5.		Wing tagging (for poultry birds)
6.		Neck chain (for dog)

Note:-

- Branding is most suitable for marking of cattle, buffaloes, camels & horses. It causes partial burning of tissue & produces a permanent scar. The lower part of the thigh is the best site for branding. Branding is of two types: -
  - ✓ **Cold branding:** It is done by liquid nitrogen (-196 °C) or dry ice/solid CO_2 (-79 °C). Cold branding is mainly done in horse by liquid nitrogen.
  - ✓ **Hot branding:** It is done by hot iron rod. Hot branding is mainly done in cattle, buffalo and camel.

- Tattooing is the best method for identification of sheep, goat & newborn calves. Best site for tattooing is inside the ear between large veins. Tattooing is not suitable for black coloured animals.
- Ear notching is commonly used in pigs. It is done in a V-shape manner on the borders of the ear
- Wing tagging is commonly used in poultry birds & done on the 1st day of hatching
- In the case of Sheep, tattooing & ear tagging are used for identification

♦ **Cattle housing system:-**

1. **Loose housing system**
2. **Conventional dairy barn/ Stanchion dairy barn**

Table 36 (A): The requirement of loose housing system

S.N.	**Types of animals**	Floor space per animal for **Covered area** (Sq.feet)	Floor space per animal for **Open area** (Sq.feet)	**Manger length** per animal (inches)
1.	Young stock	15-20	50-60	15-20
2.	**Cows**	**20-30**	**80-100**	**20-24**
3.	Buffaloes	25-35	80-100	24-30
4.	**Pregnant cows**	**100-120**	**180-200**	**24-30**
5.	Bulls	120-140	200-250	24-30

Table 37: Requirements of loose housing system as per BIS

S.N.	**Types of animals**	Floor space per animal for **Covered area** (m^2)	Floor space per animal for **Open area** (m^2)	**Manger length** per animal (cm)	**Maximum number of animals per fen**
		For cattle and buffalo			
1.	Young calves	1.0	2.0	40-50	30
2.	**Cows**	**3.5**	**7.0**	**60-75**	**50**
3.	Bullocks	3.5	7.0	60-75	50
4.	Bulls	12	120	60-75	1
5.	Buffalo	4	8	60-75	50
		For sheep and goat			
6.	Lamb/Kid	0.4	—	30-35	75
7.	Ewe/Nanny	1	—	40-50	60
8.	RamBuck	3.4	—	40-50	—

♦ **Conventional dairy barn:-**

1. Cow-shed
2. Calving box (100-150 Sq.ft)
3. Isolation box (150 Sq.ft)
4. Young stock shed
5. Bull shed (150 Sq.ft)

♦ **Cow-shed arrangement:-**

1. Single row- If herd is small (less than 10 cows)
2. Double row- If herd is large (more than 10 cows)

- Tattooing is the best method for identification of sheep, goat & newborn calves. Best site for tattooing is inside the ear between large veins. Tattooing is not suitable for black coloured animals.
- Ear notching is commonly used in pigs. It is done in a V-shape manner on the borders of the ear
- Wing tagging is commonly used in poultry birds & done on the 1st day of hatching
- In the case of Sheep, tattooing & ear tagging are used for identification

- **Cattle housing system:-**
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3.	Buffaloes	25-35	80-100	24-30
4.	**Pregnant cows**	**100-120**	**180-200**	**24-30**
5.	Bulls	120-140	200-250	24-30

Table 37: Requirements of loose housing system as per BIS

S.N.	Types of animals	Floor space per animal for **Covered area** (m^2)	Floor space per animal for **Open area** (m^2)	**Manger length** per animal (cm)	**Maximum number of animals per fen**
		For cattle and buffalo			
1.	Young calves	1.0	2.0	40-50	30
2.	**Cows**	**3.5**	**7.0**	**60-75**	**50**
3.	Bullocks	3.5	7.0	60-75	50
4.	Bulls	12	120	60-75	1
5.	Buffalo	4	8	60-75	50
		For sheep and goat			
6.	Lamb/Kid	0.4	—	30-35	75
7.	Ewe/Nanny	1	—	40-50	60
8.	RamBuck	3.4	—	40-50	—

- **Conventional dairy barn:-**
  1. Cow-shed
  2. Calving box (100-150 Sq.ft)
  3. Isolation box (150 Sq.ft)
  4. Young stock shed
  5. Bull shed (150 Sq.ft)
- **Cow-shed arrangement:-**
  1. Single row- If herd is small (less than 10 cows)
  2. Double row- If herd is large (more than 10 cows)

- **Double row housing:-**
  1. *face to face* system (Face in)
  2. *tail to tail* system (Face-out)

Note:-

- **Desirable slope of floor** in animal house should have a **gradient of 1:40** or **(1 inch per 10 feet length)**
- **Ratio of open area: covered area in case of loose housing system is 2:1**
- The long axis of house of cattle, buffalo and poultry should be in **East-west direction** so that hot winds in summer and cold winds in winter do not directly hit the animal body.
- The long axis of dairy barn should be in **North-South direction** so that sunlight directly falls on the floor and floor is disinfected.
- Angle of slope of roof: -
  - ✓ **For thatched roof 35^0**
  - ✓ **For tiled roof 25^0-30^0**
  - ✓ **For sheet roof 12^0-18^0**
- **The angle of slope of roof should never exceed 45^0**

Table 38: Average life span & age at puberty

S.N.	Animal	Average life span	Onset of Puberty
1.	Canine	10 years	7-10 months
2.	Swine	6-10 years (8 years)	6-7 months
3.	Sheep	12 years	7-10 months
4.	Goat	**15 years**	7-10 months
5.	Horse	20 years	18 months(1.5 year)
6.	Dairy cattle	20 years	12 months
7.	Zebu cattle	20 years	18-24 months
8.	Buffalo	20-25 years	18-24 months
9.	Camel	**40 years**	3-4 years

Table 39: Age of castration & weaning

S.N.	Animal	Age of castration	Age of weaning
1.	Calf	8-10 weeks	90 days (8-12 weeks)
2.	Lamb	2 weeks	14 weeks
3.	Kid	2-4 weeks	16 weeks
4.	Piglet	1 week	8 weeks

- **Methods of castration:-**

A. Open method/surgical method- Removal of both testicles through incision

B. Closed method-

1. **Burdizzo castrator: It separately crushes each spermatic cord.**
   - It is a **bloodless castration**
   - **It is the best method of castration**
2. **By Rubber ring method**

♦ **Special points**:-

- Castration in female is known as **spaying or ovariohysterectomy** (removal of both ovaries & uterus)
- Castrated female is known as **Spayed**
- Castrated fowl is known as Capon & process is caponisation
- Castrated Tom (male cat) is known as Neuter & process is neutering

Weaning: the process of separating the baby from its mother at a very early age, up to this age whole milk feeding is desired.

Note: Early weaning is difficult in buffaloes due to high motherly instinct.

Dehorning/Disbudding: - the process of removing horns/horn buds of an animal after birth.

- **Best age of dehorning in calf: before 10th day old** (up to this time horn button does not attach to the skull)

♦ **Methods of dehorning**:-

1. Chemical method - **KOH (caustic potash)** is used
2. Electrical method - **Electrical dehorner (1000°F/10 seconds)**
3. Mechanical-by clipper saws or by rubber bands

Table 40: Differences between riverine buffaloes & swamp buffaloes

Index	Riverine buffalo/Water buffalo	Swamp buffalo
Zoological name	*Bubalus bubalis*	*Bubalus carabanesis*
Chromosome no.	50	48
Types	Mostly dairy breeds	Draught-cum-meat buffaloes
Wallowing	Clear water of rivers, canals & ponds to wallow	Prefer mud/swamp area
Native	India, Pakistan, Arab	Philippines, China, Malasia, Thailand, Burma
Horns	Small & more coiled	Large, massive & less coiled

Note: Breed of swamp buffalo in India: Luit

♦ **Reference Books:-**

1. A Textbook of Animal Husbandry by G.C.Banerjee, 8th edition
2. Handbook of Animal Husbandry by V.K.Tanja, 3rd revised edition
3. Livestock Production and Management by Thomas & Sastry

***

Objective Questions

1. **Match the column:-**

Table- A	Table –B
1. IVRI	(a) Makhdoom
2. CSWRI	(b) Hisar
3. NRCC	(c) Avikanagar
4. NRCE	(d) Hyderabad
5. CIRG	(e) Izatnagar
6. NRCM	(f) Bikaner

2. **Match the column:-**

Table-A	Table-B
1. NBAGR	(a) Jhansi
2. DPR	(b) Jodhpur
3. CAZRI	(c) Hyderabad
4. IGFRI	(d) Jharnapani
5. NRCMI	(e) Karnal

3. **Match the column:**

Animal	Chromosome no.
(1) Cat	(a) 78
(2) Horse	(b) 38
(3) Mule	(c) 64
(4) Camel	(d) 63
(5) Poultry	(e) 74

4. **Match the column:-**

Animal	Gestation period
(1) Cattle	(a) 341 days
(2) Mare	(b) 114 days
(3) Sow	(c) 390 days
(4) Bitch	(d) 62 days
(5) She-Camel	(e) 283 days

5. **Match the column:-**

Animal	Meat
(1) Goat	(a) Game
(2) Cattle	(b) Buffen
(3) Buffalo	(c) Pork
(4) Pig	(d) Beef
(5) Rabbit	(e) Veal
(6) Calf	(f) Chevon

6. **Match the column:-**

Animal meat	Dressing %
(1) Broiler	(a) 57%
(2) Pork	(b) 50%
(3) Beef	(c) 55%
(4) Mutton	(d) 72%
(5) Chevon	(e) 49%
(6) Carabeef	(f) 70%

7. **Match the column:-**

Terms	Related animals
(1) Nanny	(a) Sheep
(2) Clowder	(b) Swine
(3) Tupping	(c) Cat
(4) Farrowing	(d) Camel
(5) Rut	(e) Goat

8. **Match the column:-**

Sound	Animal
(1) Bleating	(a) Elephant
(2) Grunting	(b) Horse
(3) Neighing	(c) Fowl
(4) Crowing	(d) Cattle
(5) Bellowing	(e) Pig
(6) Trumpeting	(f) Goat

9. **Match the column:-**

Cross-bred	Cross
(1) Hissardale	(a) HF × Sahiwal
(2) Avikalin	(b) Jersey × Red Sindhi
(3) Karan Swiss	(c) Rambouillet Ram × Malpura Ewe
(4) Jersindh	(d) Brown Swiss × Sahiwal
(5) Frieswal	(e) Merino Ram × Magra Ewe

10. **Match the column:-**

Animal Breed	Peculiar character
(1) Bhadawari	(a) Mohair
(2) Surti	(b) Roman nose
(3) Jamunapari	(c) 14% milk fat
(4) Angora	(d) Mixture of Murrah & Surti
(5) Mehsana	(e) Sickle shape horn

11. **Heaviest & largest breed of sheep is————————**
12. **Most popular fine wool-producing breed in the world is————————**
13. **Mohair producing breed of goat is————————**
14. **Goat breed which is also known as milk queen is————————**
15. **Breed of cattle producing highest milk & lowest milk fat is————————**
16. **Longest lactation period (365days) & highest milk fat containing breed of cattle is————**
17. **Buffalo breed with minimum milk fat (4%) is————————**
18. **Highest milk fat (14%) & copper colour body coat are features of ———————— breed of buffalo.**
19. **Longest lactation period among buffaloes is of———————— & longest lactation period among cattle is of ————————**
20. **Most violent breed of buffalo is————————**
21. **Canary colouration of wool (yellow colour of wool) is characteristic of a ———————— breed of sheep.**
22. **Breed of sheep with roman nose & finest wool producing in India, which is also known as merino of Rajasthan ————————.**
23. **————————is triple purpose breed of sheep.**
24. **Tallest breed of sheep is————————while smallest is————————**

25. Best mutton breed of India is———— & best chevon breed of India is————.
26. Tallest breed of goat in India is————————————
27. Most prolific sheep breed is————————&most prolific goat breed is————.
28. NBAGR registered breeds of duct are ————————
29. ————————breed of sheep is used for pelt (good quality fur) production.
30. Sheep breed with horned rams & polled ewes is————————————.
31. ————————is the best dairy breed of cattle in India & is also known as Lol (because of its loose skin).
32. Nimari is admixture of————————
33. Rathi is admixture of ————————.
34. Heaviest Indian cattle breed with famous gait 'sawai-chal'is————————.
35. Highest disease resistant & colour change property is characteristics of a ———— breed of cattle.
36. Best dual purpose cattle breed of India is————————-
37. Best draught purpose cattle breed of India is————————
38. Biggest, most majestic &handsome breed of goat having "roman nose"& creamy white body colour with shining hair is————————
39. Indian goat breed with maximum milk fat (5%) is————————
40. ————————breed of goat is also known as Pashmina.
41. Soviet Chinchilla is breed of————————
42. ————————is the best breed of horse.
43. ————————breed of horse is used in polo & military.
44. Sheep like goat is ————————& goat-like sheep is————————
45. Best layer breed having bird-like appearance is————————
46. All chicken breeds lay brown tinted eggs but ————————breeds produce white coloured eggs.
46. Blue shelled eggs are produced by the ———————— breed of chicken.
48. Match the column:-

Table-A	Table-B
(1) Nili-Ravi	(a) Andhra Pradesh
(2) Bhadawari	(b) Madhya Pradesh
(3) Gir	(c) Gujarat
(4) Nimari	(d) Uttar Pradesh
(5) Aseel	(e) Punjab

49. Match the column:-

Table-A	Table-B
(1) Colt	(a) Cat
(2) Gilt	(b) Camel
(3) Nanny	(c) Goat
(4) Maiya	(d) Swine
(5) Mewing	(e) Horse

50. Match the column:-

Periods of dairy cow	Time duration
(1) Lactation period	(a) 85 days post-parturient
(2) Gestation period	(b) 12 months
(3) Dry period	(c) 0 days
(4) Resting period	(d) 2 months
(5) Calving interval	(e) 305 days
(6) Service time	(f) 283 days

51. **Match the column:-**

Animals	Generation interval
(1) Sheep, goat	(a) 4.5 years
(2) Cattle	(b) 0.65 years
(3) Swine	(c) 2.5 years
(4) Poultry	(d) 4 years
(5) Buffalo	(e) 3 years

52. **Highest fat% in cattle-**
(a) Jersey (b) HF
(c) Brown Swiss (d) Red Sindhi

53. **Coimbatore district of Tamilnadu has ——————————cattle breed-**
(a) Kangayam (b) Nimari
(c) Khillari (d) Hallikar

54. **Horn marking is used for identification of –**
(a) Cattle (b) Goat
(c) Buffalo (d) Sheep

55. **Hoof marking is used for identification of-**
(a) Cattle (b) Horse
(c) Goat (d) Pig

56. **Ear notching is most commonly used identification method for-**
(a) Goat (b) Cattle
(c) Horse (d) Pig

57. **Best method of identification of large ruminant, camel & horse is-**
(a) Tattooing (b) Branding
(c) Ear tagging (d) Ear notching

58. **Best method of identification of sheep, goat & newborn calves is-**
(a) Tattooing (b) Branding
(c) Ear tagging (d) Ear notching

59. **Which of the following is temporary method of identification of animal-**
(a) Tattooing (b) Branding
(c) Ear tagging (d) Ear notching

60. **Best site for hot branding in large animals is-**
(a) Lower part of the thigh (b) Upper part of the thigh
(c) Left Paralumbar fossa (d) Inside ear between large veins

61. **Best site for tattooing in sheep & goat is-**
(a) Lower part of left thigh (b) Lower part of right thigh
(c) Inside ear between large veins (d) Right horn

62. **Shortest generation interval among meat producing livestock-**
(a) Pig (b) Poultry
(c) Sheep (d) Cattle

63. **Livestock comprises of-**
(a) Cattle, Buffalo, Sheep, Goat, Pig, Horse, Camel
(b) Cattle, Buffalo, Sheep, Goat, Pig, Dog, Cat
(c) Cattle, Buffalo, Sheep, Goat, Pig, Poultry
(d) Cattle, Buffalo, Sheep, Goat, Pig, Dog, Horse

64. **One livestock unit comprises of-**
(a) 1 Adult bovine or 2 pigs or 3 calves or 5 sheep
(b) 1 Adult bovine or 3 pigs or 3 calves or 4 sheep
(c) 1 Adult bovine or 3 pigs or 3 calves or 3 sheep
(d) 1 Adult bovine or 2 pigs or 3 calves or 2 sheep

65. **Match the column:-**

Activities	Optimum age
(1) Docking	(a) 18 months
(2) Dubbing	(b) 8-12 months
(3) Debeaking	(c) 1-day old chick
(4) Bull nose ring insertion	(d) 3-day old chick
(5) Bull training start for semen collection	(e) 3-5 days

66. **Canine teeth & upper incisors are absent in which animal-**
(a) Goat & Sheep (b) Cattle
(c) Buffalo (d) All the above

67. **In all animals, which of the following teeth are used for age determination-**
(a) Incisors of lower jaw (b) Incisors of upper jaw
(c) Canines of lower jaw (d) Canines of upper jaw

68. **If 4 rings are present in horn of cattle find out the age of same cattle-**
(a) 6 years (b) 4 years
(c) 5 years (d) 7 years

69. **Full mouth condition in Sheep, Horse & Camel are respectively-**
(a) 4 years, 4.5 years & 7 years (b) 4 years, 4.5 years & 9 years
(c) 5 years, 4.5 years & 9 years (d) 5 years, 4.5 years & 7 years

70. **Incisors are absent in upper jaw & their place is taken by dental pad in which animal-**
(a) All Ruminants (b) Horse
(c) Camel (d) Pig

71. **Match the column:-**

Special about dentition	Related animal
(1) Wolf teeth	(a) Pig
(2) Dental pad	(b) Dog
(3) Dental star	(c) Ruminants
(4) Highest teeth in livestock	(d) Camel & Pig
(5) Total 42 teeth in adult animal	(e) Horse

72. **In loose housing system, covered area for pregnant cow should be-**
(a) 100-120 sq.ft. (b) 120-140 sq.ft.
(c) 180-200 sq.ft. (d) 200-250 sq.ft.

73. **Slope of the floor in loose housing system of cattle should be-**
(a) 1 inch for every 10 feet length (b) 1 inch for every 100 feet length
(c) 1 foot for every 10 feet length (d) 1 foot for every 100 feet length

74. **Match the column-**

Table-A	Table-B
(1) Thermo-neutral zone for pig & cattle	(a) 21-24°C
(2) Thermo-neutral zone for poultry	(b) 21.1°C
(3) Physiological zero temperature for poultry	(c) 18-21°C
(4) Comfort zone for pig & cattle	(d) 13-24°C
(5) Comfort zone for poultry	(e) 20-26°C

75. **Which of the following is not correctly match-**
(a) Chick- Brooder (b) Egg- Incubator
(c) Layer- Deep litter (d) Broiler- Cage

76. **Total floor space required per bird in folding unit system is-**
(a) 4 sq. ft. (b) 2 sq. ft.
(c) 6 sq. ft. (d) 8 sq. ft.

77. **In deep litter housing system floor is covered by litter up to depth of-**
(a) 8-12 inches (b) 12-16 inches
(c) 0-6 inches (d) 10-16 inches

78. **Most intensive type of housing system for poultry-**
(a) Cage/Battery system (b) Folding unit
(c) Deep litter system (d) Free range system

79. **In deep litter housing system of poultry, turning of litter should be done at least-**
(a) Once weekly (b) Twice weekly
(c) Once monthly (d) Twice monthly

80. **In Artificial brooder, temperature & floor space requirement per chick during 1st week of age should be-**
(a) 95°F, 100-120 sq.ft. (b) 100°F, 120-140 sq.ft
(c) 85°F, 250-300 sq.ft. (d) 100°F, 100-120 sq.ft

81. **Match the column:-**

Table-A	Table-B
(1) Flushing	(a) Feeding of extra concentrate in last 6-8 weeks of pregnancy
(2) Steaming up	(b) Feeding of extra concentrate 2-3 weeks prior to breeding
(3) Eyeing	(c) Shearing of locks of wool from dock of ewe
(4) Ringing	(d) To prevent wool blindness
(5) Tagging	(e) Clipping of wool at the region of penis

82. **Which of the following is an advantage of steaming up in sheep**
(a) It increase the no. of viable lambs
(b) It increase milk yield of ewe
(c) It increase the growth rate of lambs
(d) It increase the quality & quantity of wool clip
(e) All are correct

83. **The significance of flushing ration in sheep is/are-**
(a) Multiple ovulations to give multiple births.
(b) Feeding of 250g grains per ewe daily results in an increase in the lamb crop of 10-20%
(c) Both are correct
(d) None of the above

84. **Calving interval equals to-**
(a) Lactation period + Dry period (b) Gestation period – Service period
(c) Lactation period + Service period (d) Lactation period + Service period

85. **A Teaser bull is a-**
(a) Vasectomized male (b) Castrated male
(c) Uncastrated male (d) Cryptorchid male

86. **A Teaser bull is maintained to-**
(a) Detect heat (b) Keep the herd moving
(c) Inseminate cow (d) None

87. **Which of the following is/are hilly breeds of cattle-**
(a) Ponwar (b) Siri
(c) Badri (d) All the above

88. **The distinguishing feature between Red Sindhi & Sahiwal is-**
(a) Horn (b) Muzzle
(c) Poll (d) Brisket

89. **Red Sindhi has dark colour muzzle while Sahiwal has-**
(a) Lighter colour muzzle (b) Yellow colour muzzle
(c) Black colour muzzle (d) Grey colour muzzle

90. **Breed of cattle having whitish ring along the eyes is-**
(a) Sahiwal (b) Gir
(c) Red Sindhi (d) Ongole

91. **An average number of days between latest two successive calving dates for all cows in the herd is known as-**
(a) Calving interval (b) Calving index
(c) Generation interval (d) Herd average

92. **MATCH THE COLUMN:-**

TABLE-A	TABLE-B
(1) Generation interval	(a) Interval from conception to calving
(2) Calving interval	(b) Average milk production of a herd
(3) Calving index	(c) Average age of parents when their offspring are born
(4) Gestation period	(d) Interval between two successive calving of an animal
(5) Herd average	(e) Average interval between two successive calving of a herd

93. **Cattle has————————times more no. of sweat glands than buffalo.**
(a) 5 times (b) 15 times
(c) 10 times (d) 20 times

94. **Breed of cattle famous for trotting & as a draught animal-**
(a) Amritmahal (b) Bachaur
(c) Nagori (d) Khillari

95. **Best method of drying off for high yielding dairy cow-**
(a) Intermittent milking (b) Incomplete milking
(c) Stripping (d) Abrupt cessation

96. **Match the column:-**

Breed	Horn pattern
(1) Surti	(a) Between Murrah & Surti
(2) Jaffarafadi	(b) Sickle shape
(3) Gir	(c) Tightly curled horn
(4) Murrah	(d) Dropping horn
(5) Mehsana	(e) Half moon shape

97. **Mastitis is common in-**
(a) High yielder (b) Moderate yielder
(c) Poor yielder (d) None

98. **Match the column:-**

Table-A	Table-B
(1) Bellowing	(a) Ability to give birth to large no. of young ones
(2) Wallowing	(b) Sound produced by Bovine
(3) Prolificacy	(c) Rolling in mud or in water
(4) Fecundity	(d) Capacity to induce conception & thus produce offspring
(5) Fertility	(e) Measure of fertility

99. Wallowing is necessary for-

(a) Buffalo & Pig (b) Buffalo & Goat
(c) Cattle & Buffalo (d) Buffalo & Sheep

100. Significance of wallowing in animals-

(a) To eradicate ectoparasite (b) To regulate body temperature
(c) Both a & b (d) None

101. Grooming/brushing is a part of daily routine in well-kept dairy herd because-

(a) It removes dirt, loose hairs & ectoparasites from the body
(b) It is essential for clean milk production
(c) It improve blood circulation in periphery which is responsible for shining of skin
(d) All are correct

102. First faeces voided by a newborn calf is known-

(a) Meconium (b) Mucine
(c) Manure (d) Faeces

103. The average quantity of manure produced by one adult animal unit is?

(a) 70 kg per day (b) 40 kg per day
(c) 20 kg per day (d) 60 kg per day

104. Best method of carcass disposal-

(a) Burial method (b) Incineration
(c) Surface burning (d) Flame gun

105. Indubrasil is a cross-bred of cattle derives from crossing of-

(a) Gir × Kankrej (b) Red Sindhi × Tharparkar
(c) Tharparkar × Kankrej (d) Red Sindhi × Kankrej

106. Wall-eyes are peculiarity of-

(a) Murrah (b) Nili-Ravi
(c) Bhadawari (d) Surti

107. Newborn pig mortality is due to-

(a) Piglet anemia (b) Cannibalism
(c) Crushing by mother (d) Enteritis

108. Farrowing pen with guard rails is necessary to-

(a) Avoid crushing of piglets (b) Avoid crowding
(c) Control parasite (d) Avoid disease outbreak

109. Canary colouration in the wool of indigenous sheep breed occur during-

(a) Autumn (b) Monsoon
(c) Winter (d) Summer

110. Which of the wool type possess more crimp-

(a) Fine wool (b) Carpet wool
(c) Medium wool (d) Coarse wool

111. The long axis of the poultry house, animal houses is in————————direction.

(a) East-West (b) North-West
(c) North- South (d) South-East

112. The long axis of dairy barns should set in————————————direction.

(a) East-West (b) North-West
(c) North- South (d) South-East

113. The average daily amount of dung produced by an adult cattle-

(a) 20-30 Kg (b) 40-50 Kg
(c) 30-40 Kg (d) 10-20 Kg

114. The average daily amount of dung produced by an adult pig-

(a) 2 kg (b) 10 kg
(c) 4 kg (d) 15 kg

115. A dairy cattle require————————litres of water per day for drinking-

(a) 30-35 (b) 45-50
(c) 50-60 (d) 20-30

116. Match the column:-

Animal house	Animal
(1) Sty	(a) Dog
(2) Barn	(b) Horse
(3) Stable	(c) Camel
(4) Shed	(d) Goat/Sheep
(5) Pen	(e) Cattle/Buffalo
(6) Kennel	(f) Pig

117. Pulliculam, a newly registered breed from Tamil Nadu is being used for Jellicut during Pongal festival, is a breed of-

(a) Cattle (b) Horse
(c) Buffalo (d) Goat

118. Calf starter should be introduced from

(a) 1st week (b) 2nd week
(c) 3rd week (d) 4th week

119. Farm quarters should be constructed at the –

(a) Windward side of the shed (b) Leeward side of the shed
(c) Backward side of the shed (d) Opposite to the shed

120. Disinfectant of choice at the time of FMD outbreak-

(a) 4% Na_2CO_3 (b) 5% NaCl
(c) KOH (d) HCHO

121. Best time for heat detection-

(a) Early morning (b) Late evening
(c) Midnight (d) None

122. Annual culling rate in a dairy unit is-

(a) 25% (b) 30%
(c) 40% (d) 50%

123. Most prolific sheep & goat breeds are respectively-

(a) Chokla, Black Bengal (b) Malpura, Changthangi
(c) Garole, Black Bengal (d) Malpura, Black Bengal

124. Small & tightly curled horn(s) is/ are characteristic of-

(a) Murrah (b) Nili-Ravi
(c) Both a & b (d) None

125. Tallest sheep breed is Nellore while tallest goat breed is-

(a) Jamunapari (b) Barbari
(c) Beetle (d) None

126. Which of the following statement(s) is/are true-?

(a) Zebu cattle are humped while buffalo & exotic cattle are humpless.
(b) The dewlap is present in cattle while absent in buffalo.
(c) Cattle horns are rounded while buffalo horns are compressed.
(d) Horn & dewlap are well developed in zebu cattle while less developed in exotic cattle.
(e) All the above

127. Zebu cattle can be distinguished from exotic cattle by the presence of-

(a) Hump (b) Dewlap
(c) Horn (d) Poll

128. Method used for controlling ectoparasites in winter season-

(a) Spraying (b) Hand bath
(c) Swim bath (d) Dusting

129. For controlling ectoparasite in sheep, which of the following method is used-

(a) Deworming (b) Weaning
(c) Dipping (d) Culling

130. Match the column:

Table-A	Table-B
(1) Deworming	(a) Choosing of parent for next generation
(2) Culling	(b) Bloodless castration
(3) Weaning	(c) To control endoparasite
(4) Burdizzo castrator	(d) Segregation of unproductive animals from good ones
(5) Selection	(e) Making the calf independent of its mother

131. Method(s) of controlling ectoparasite in sheep is/are-

(a) Dipping (hand bath+swim bath) (b) Spraying
(c) Dusting & Pouring (d) All the above

132. Match the column:-

Table-A	Table-B
(1) Shearing	(a) Wool covering of sheep
(2) Clipping	(b) Removal of wool from sheep
(3) Fleece	(c) Removal of hair from goat
(4) Eyeing	(d) Shearing from belly mainly around penis of ram
(5) Crutching	(e) Removal of wool around the eye
(6) Ringing	(f) Removal of wool around the inguinal & perennial region

133. Ectoparasiticides can be applied to sheep affected with scab, maggots & has open wound is by-

(a) Swim bath (b) Hand bath
(c) Spraying (d) Pouring

134. Ectoparasiticides can be applied to pregnant ewe & breeding ram by-

(a) Swim bath (b) Hand bath
(c) Spraying (d) Pouring

135. Chemical shearing is done with-

(a) Cyclophosphamide (b) Phenol
(c) Ethanol (d) Chloroquine

136. Which of the following is/are correct about dipping of sheep –

(a) Sheep are to be dipped at least once in a year.
(b) Sheep are dipped to eradicate ectoparasites like lice, ticks etc.
(c) Dipping should be done before shearing.
(d) All the above

137. Dipping is essential for sheep due to -

(a) To eradicate ectoparasites like ticks, lice etc.
(b) To prevent the attack of blow-flies & consequent infestation with maggots.
(c) To remove dust, dung& other waste materials from fleece.
(d) All are correct

138. Which of the following dip is not correctly matched with respective ectoparasites.

(a) Maggots- Sulphur dip (b) Lice- DDT, Dieldrin

(c) Scab- Na_2CO_3 dip (d) Tick- BHC, Arsenic

139. Dipping should be done-

(a) Immediately before shearing (b) Immediately after shearing

(c) At any time (d) During rainy season

140. Which of the following is/are true about shearing in sheep?

(a) Removal of wool from sheep is known as shearing.

(b) In India, sheep are generally shorn immediately after end of winter season

(c) Both a& b

(d) None of the above

141. Which of the following is/are true about spraying in sheep farm?

(a) It comprises a weak fly repelling dip solution.

(b) Spraying should be done in the form of fine mist.

(c) Spraying sheep at regular intervals is very effective in controlling ticks infestation

(d) All the above

142. Which of the following is/are true about foot- bath in sheep farms-

(a) It is used to control FMD & Foot-rot disease.

(b) It is most effective in monsoon season.

(c) It is provided at the entrance of the farm to control the spread of contagious disease.

(d) All the above

143. Just prior to breeding season, shearing of sheep flock is important because-

(a) It makes them more active & in many cases will improve their fertility

(b) It reduces fertility.

(c) It enhance feed intake

(d) All the above

144. Which of the following is an indigenous pig breed-

(a) Niang Megha (b) LWY

(c) Rampur Bushair (d) Both a & c

145. Pashmina is -

(a) Wool of Sheep (b) Hairs of goat

(c) Skin of sheep (d) None

146. Karakul sheep is famous for pelt production. Pelt is mainly obtained by—

(a) Adult sheep (b) Very young lamb

(c) Fetal lamb (d) Both b & c

147. Barbari breed is originated from-

(a) India (b) South Africa

(c) East Africa (d) Spain

148. Smallest or most dwarf cattle breed in the world is-

(a) Vechur (b) Bachaur

(c) Nagori (d) Siri

149. Manger length for a cow should be-

(a) 20-24 inch (b) 24-30 inch

(c) 15-20 inch (d) None

150. Best rabbit breed for production of fur is-

(a) German Angora (b) British Angora

(c) Russian Angora (d) None

151. **Which of the following is not a pseudo-ruminant-**
(a) Yak (b) Camel
(c) Llama (d) Alpaca

152. **Which of the following camel is also known as "swimming camel"-**
(a) Bikaneri (b) Kutchi
(c) Kharai (d) Mewari

153. **Kaunayen is newly registered breed of-**
(a) Pig (b) Chicken
(c) Goat (d) Cattle

154. **Dental formula of female horse-**
(a) $2(I^0/_4 C^0/_0 PM^3/_3 M^3/_3)$ (b) $2(I^3/_3 C^1/_1 PM^3/_3 M^3/_3)$
(c) $2(I^3/_3 C^0/_0 PM^3/_3 M^3/_3)$ (d) $2(I^3/_3 C^1/_1 PM^4/_4 M^3/_3)$

155. **Canine teeth are absent in-**
(a) Cattle (b) Mare
(c) Stallion (d) Both a & b

156. **Castration of female animal is known as-**
(a) Spaying (b) Ovariohysterectomy
(c) Both a & b (d) Neutering

157. **Castrated male horse is known as-**
(a) Stag (b) Gelding
(c) Capon (d) Wedder

158. **Best age of dehorning/disbudding in calf-**
(a) 3-10 days (b) 10-20 days
(c) 20-30 days (d) 30-40 days

159. **Commonly used chemical for dehorning is-**
(a) KOH (b) $NaHCO_3$
(c) $CaSO_4$ (d) Na_2CO_3

160. **Application temperature & time of electric dehorner to destroy horn cells should be-**
(a) 600°F/10sec. (b) 1000°F/10sec.
(c) 1000°C/10sec. (d) 1000°F/10min

161. **Which of the following is not a milch breed of cattle-**
(a) Tharparkar (b) Sahiwal
(c) Red-Sindhi (d) Kankrej

162. **Best age of castration in calf-**
(a) 2-4 weeks (b) 4-6 weeks
(c) 8-10 weeks (d) 12-16 weeks

163. **Which disinfectant is commonly used during treatment of navel cord after birth-**
(a) 90% Phenol (b) 10% Formalin
(c) 30% Tincture iodine (d) None

164. **Which of the following statement(s) is/are not true about Pseudo-ruminants-?**
(a) They possess three-chambered stomach (b) Abomasum is absent in these animals
(c) They perform rumination (d) They are foregut fermenters

165. **True stomach of cattle is-**

(a) Rumen (b) Reticulum

(c) Omasum (d) Abomasum

166. **Raikas & Rabaries are primarily————————rearing communities-**

(a) Yak (b) Goat

(c) Camel (d) Mithun

167. **MATCH THE COLUMN:-**

TABLE-A	TABLE-B
(1) Ship of snow	(a) Goat
(2) Ceremonial ox	(b) Sheep
(3) Ship of desert	(c) Mithun
(4) Poor man's cow	(d) Yak
(5) Tupping	(e) Camel

168. **NBAGR registered breeds of donkey-**

(a) Halari (b) Kachchhi

(c) Spiti (d) All of the above

169. **Rampur Bushair is a breed of-**

(a) Cattle (b) Sheep

(c) Goat (d) Dog

170. **Which of the following is/are the objective(s) of castration?**

(a) To prevent reproduction (b) To increase faster weight gain

(c) To make animal docile & easier to handle (d) All the above

171. **The desirable slope of floor in tail to tail system is-**

(a) 1:10 (b) 1:30

(c) 1:40 (d) 1:50

172. **Cattle shed arrangement having lesser danger of spread of disease –**

(a) face to face system (b) Both

(c) tail to tail system (d) None

173. **In cleaning & milking the cows which cattle shed arrangement is convenient-**

(a) face to face system (b) tail to tail system

(b) Both a & b (d) None

174. **During feed distribution which of the following Cattle shed arrangement is convenient-**

(a) face to face system (b) tail to tail system

(c) Both (d) None

175. **In cattle rearing (dairy), feed cost alone account for% of total farm expenses-**

(a) 60-65% (b) 80%

(c) 90% (d) 50-55%

176. **In case of pig farming, feed cost alone account for% of total farm expenses?**

(a) 60-65% (b) 80%

(c) 90% (d) 50-55%

177. **Average life span of goat is-**
(a) 10 years (b) 15 years
(c) 20 years (d) 25 years

178. **Average life span of Camel is-**
(a) 20 years (b) 30 years
(c) 40 years (d) 50 years

179. **Average life span of Cattle is-**
(a) 15 years (b) 20 years
(c) 30 years (d) 40 years

180. **Which of the following is a utility of Yak-**
(a) Travel & trade (b) Milk
(c) Hairs (d) All the above

181. **Which of the following is a browser -?**
(a) Sheep (b) Goat
(c) Camel (d) Both b & c

182. **Which of the following is a grazer -?**
(a) Sheep (b) Cattle
(c) Goat (d) Both a & b

183. **Which of the following statement is not true about camel-?**
(a) Both male & female camel have a well-defined season of breeding particularly from November to March
(b) Cocking of tail is a method of pregnancy diagnosis in camel
(c) Common cause of abortion in Indian camel is trypanosomiasis or scarcity of fodder
(d) 99% of pregnancies in camel are right horned

184. **In India, double humped camel (*Camelus bactrianus*) are found in-**
(a) Rajasthan (b) Ladakh
(c) Rann of Kutch (d) Himachal Pradesh

185. **The example of baggage type of camel is-**
(a) Desert camel (b) Hill camel
(c) Riverine camel (d) Both b& c

186. **Skin of unborn calf is called as-**
(a) Kip (b) Murrain
(c) Slunk (d) Kid

187. **Maintenance of lactation is termed as-**
(a) Galactopoiesis (b) Lactogenesis
(c) Mammogenesis (d) Lactation

188. **Reuff's method is most common and efficient method of casting of**
(a) Cattle & buffalo (b) Horse
(c) Sheep & goat (d) Pig

189. **Which animal categories are individually less than 0.5 adult animal unit-**
(a) Adult buffalo (b) Young calf
(c) Sheep/Goat (d) Both b & c

190. Breed(s) of rabbit have their origin from USSR/Russia-

(a) Chinchilla (b) Grey giant
(c) White giant (d) All of these

191. Choose the breed name which is not found in either sheep or goat-

(a) Gaddi (b) Ganjam
(c) Chegu (d) Changthangi

192. Banni is the registered breed of which species-

(a) Cattle (b) Buffalo
(c) Goat (d) Camel

193. A new breed of cattle and buffalo will be registered if it has minimum no. of-

(a) 100 (b) 1000
(c) 10000 (d) 100000

194. Under natural matings of cow with bulls, the ratio of cows to bulls at the farm-

(a) 100 : 1 (b) 150 : 1
(c) 50 : 1 (d) 20 : 1

195. The goat kid should be fed whole milk during the first 30 days at the rate of-

(a) $1/10^{th}$ of their body weight (b) $1/6^{th}$ of their body weight
(c) $1/8^{th}$ of their body weight (d) $1/15^{th}$ of their body weight

196. Which of the following is the most limiting resource at a dairy farm enterprise-

(a) Land (b) Labour
(c) Capital (d) Livestock

197. Hight producing cows need to be rest daily for a period of-

(a) 10-12 hours (b) 12-14 hours
(c) 8-10 hours (d) 6-8 hours

198. One livestock unit is equivalent to a body weight of-

(a) 300 kg (b) 400 kg
(c) 500 kg (d) 600 kg

199. Which of the following gives the fixed cost of milk production at a dairy farm-

(a) Cost of building (b) Interest on capital
(c) Expenditure on feed (d) Cost of transportation of animals

200. A heifer above 2 years of age is equal to one of the following adult unit-

(a) 1 adult unit (b) 1/2 adult unit
(c) 1/3 adult unit (d) 2/3 adult unit

201. Kids starts to nibble the grass from 15 days of age and are effective grazers after which of the following age-

(a) 4-5 weeks (b) 5-6 weeks
(c) 6-7 weeks (d) 8-9 weeks

202. The buffaloes are used as a triple purpose animal. These are-

(a) Milk, Meat, Skin (b) Milk, Dung, Bone
(c) Milk, Meat, Draft (d) Milk, Draft, Dung

203. Which of the following parameter is needed to be controlled in order to ensure one calf in every year per cow in the herd-

(a) Gestation length and dry period (b) Lactation length and dry period
(c) Service period and dry period (d) Lactation yield and lactation length

☆☆☆

Answer Key

1	1-e, 2-c, 3-f, 4-b, 5-a, 6-d	2	1-e, 2-c, 3-b, 4-a, 5-d
3	1-b, 2-c, 3-d, 4-e, 5-a	4	1-e, 2-a, 3-b, 4-d, 5-c
5	1-f, 2-d, 3-b, 4-c, 5-a, 6-e	6	1-f, 2-d, 3-c, 4-b, 5-e, 6-a
7	1-e, 2-c, 3-a, 4-b, 5-d	8	1-f, 2-e, 3-b, 4-c, 5-d, 6-a
9	1-e, 2-c, 3-d, 4-b, 5-a	10	1-c, 2-e, 3-b, 4-a, 5-d
11	Lincoln	12	Merino
13	Angora	14	Saanen
15	Holstein Friesian	16	Jersey
17	Nili Ravi	18	Bhadawari
19	Mehsana, Jersey	20	Toda
21	Nali	22	Chokla
23	Marwari	24	Nellore, Mandya
25	Nellore, Black Bengal	26	Jamunapari
27	Garole, Black Bengal	28	Maithili and Pati
29	Karakul	30	Gaddi
31	Sahiwal	32	Gir & Khillari
33	Red Sindhi, Sahiwal, Tharparkar & Dhanni	34	Kankrej
35	Tharparkar	36	Hariana
37	Amritmahal	38	Jamunapari
39	Barbari	40	Changthangi
41	Rabbit	42	Kathiawari
43	Manipuri	44	Angora, Nellore
45	White Leghorn	46	Mediterranean
47	Andalusian	48	1-e, 2-d, 3-c, 4-b, 5-a
49	1-e, 2-d, 3-c, 4-b, 5-a	50	1-e,2-f,3-d,4-c,5-b,6-a
51	1-e, 2-d, 3-c, 4-b, 5-a	52	Jersey
53	Kangayam	54	Cattle
55	Horse	56	Pig
57	Branding	58	Tattooing
59	Ear tagging	60	Lower part of the thigh

61 Inside ear between large veins

62 Pig (Note: -Generation interval of pig is 2.5 years & of poultry is 0.6 years but poultry is not included in livestock category)

63 Cattle, Buffalo, Sheep, Goat, Pig, Horse, Camel

64 1Adult Bovine or 2 Pigs or 3 Calves or 5 Sheep

65 1-e, 2-d, 3-c, 4-b, 5- a

66 All the above

67 Incisors of lower jaw

68 6 years (Hint: Age of cattle = No.of horn rings +2);1st horn ring appears in 3 year age)

69 4 years, 4.5 years & 7 years

70 All Ruminants

71 1-d, 2-c, 3-e, 4-a, 5-b

72 100-120 sq.ft.

73 1inch for every 10 feet length

74 1-e, 2-d, 3-b, 4-a, 5-c

75 Broiler- Cage

76 4 sq. ft.

77 8-12 inches

78 Cage/Battery system

79 Once weekly

80 95°F, 100-120 sq.ft.

81 1-b, 2-a, 3-d, 4-e, 5-c

82 All are correct

83 Both are correct

84 Lactation period + Dry period

85 Vasectomized male

86 Detect heat

87 All the above

88 Muzzle

89 Lighter colour muzzle

90 Sahiwal

91 Calving index

92 1-c, 2-d, 3-e, 4-a, 5 –b

93 10 times

94 Nagori

95 Incomplete milking

96 1-b, 2-d, 3-e, 4-c, 5-a

97 High yielder

98 1-b, 2-c, 3-a, 4-e, 5-d

99 Buffalo &Pig

100 Both a & b

101 All are correct

102 Meconium

103 40 kg per day

104 Burial method

105 Gir × Kankrej

106 Nili Ravi

107 Crushing by mother

108 Avoid crushing of piglets

109 Autumn

110 Fine wool

111 East-West (Note: To avoid maximum solar exposure during summer)

112 North- South (Note: The long axis of the dairy barns should be set in the north-south direction to have the maximum benefit of the sun)

113 20-30 Kg

114 4 kg

115 30-35

116 1-f, 2-e, 3-b, 4-c, 5-d, 6-a

117 Cattle

118 2nd week

119 Windward side of the shed

120 4% Na_2CO_3

121 Early morning

122 25%

123 Garole, Black Bengal

124 Both a& b

125 Jamunapari

126 All the above

127 Hump

128 Dusting

129 Dipping

130 1-c, 2-d, 3-e, 4-b, 5-a

131 All the above

132 1- b, 2-c, 3- a, 4 –e, 5-f, 6-d

133 Pouring

134 Hand bath

135 Cyclophosphamide
136 All the above
137 All are correct
138 Scab- Na_2CO_3 dip
139 Immediately before shearing
140 Both a& b
141 All the above
142 All the above
143 It makes them more active& in many cases will improve their fertility
144 Niang Megha
145 Hairs of goat
146 Both b & c
147 East Africa
148 Vechur
149 20-24 inch
150 German Angora
151 Yak
152 Kharai
153 Chicken
154 $2(I^3/_3C^0/_0PM^3/_3M^3/_3)$
155 Both a & b
156 Both a &b
157 Gelding
158 3-10 days
159 KOH (also known as Caustic potash)
160 1000^0F/10sec.
161 Kankrej
162 8-10 weeks
163 30% Tincture iodine
164 Abomasum is absent in these animals
165 Abomasum
166 Camel
167 1-d, 2-c, 3-e, 4-a, 5-b
168 All of the above
169 Sheep
170 All the above
171 1:40
172 tail to tail system
173 tail to tail system
174 face to face system
175 60-65%
176 80%
177 15 years
178 40 years
179 20 years
180 All the above
181 Both b & c
182 Both a & b
183 99% of pregnancies in camel are right horned (Correct statement is-99% of pregnancies in camel are left horned)
184 Ladakh (J&K)
185 Both b& c
186 Slunk
187 GalactopoiesisNote: (1) Mammogenesis- growth & development of mammary gland (2) Lactogenesis- initiation of milk secretion
188. Cattle & buffalo
189. Both b & c
190. All of these
191. Chegu
192. Buffalo
193. 1000
194. 50 : 1
195. 1/6th of their body weight
196. Labour
197. 12-14 hours
198. 500 kg
199. Cost of building
200. 2/3 adult unit
201. 5-6 weeks
202. Milk, Meat, Draft
203. Service period and dry period

☆☆☆

Table 1: Standards for SNF according to Prevention of Food Adulteration Act (PFA-1976)

S.N.	Solid Not Fat (SNF)	Animals milk
1.	9.0%	Buffalo milk, Sheep milk, Goat milk, Double toned milk
2.	8.7 %	Skim milk
3.	**8.5 %**	**Cow milk**, Toned milk, **Standard milk**, Recombined milk

Table 2: Standards for milk fat according to PFA-1976

S.N.	Milk fat	Animals milk
1.	0.5 %	Skim milk
2.	1.5 %	Double toned milk
3.	3.0 %	Toned milk, Sheep milk, Goat milk, Recombined milk
4.	**3.5 %**	**Cow milk**
5.	**4.5 %**	**Standard milk**
6.	5.0 %	Buffalo milk

FSSAI Standards for All over India for Fat and SNF: Cow milk: 3.2% Fat, 8.3% SNF; Buffalo milk: 5% Fat, 9% SNF; Goat/Sheep Milk: 3% Fat, 8% SNF; Camel milk: 2% Fat, 6% SNF; Mixed milk: 4.5% Fat, 8.5% SNF; Full cream milk: 6% Fat, 9% SNF

Table 3: Chemical composition of milk of different animals

S.N.	Animal	Water	Fat	Protein	Lactose	Ash
1.	Cow	86.6	4.6	3.4	4.9	0.7
2.	Buffalo	84.2	6.6	3.9	5.2	0.8
3.	Sheep	79.4	8.6	6.7	4.3	1.0
4.	Goat	86.5	4.5	3.5	4.7	0.8
5.	Camel	86.5	3.1	4.0	5.6	0.8
6.	Sow	89.6	4.8	1.3	3.4	0.9

Table 4: Methods of pasteurization (for the preservation of milk)

S.N.	Methods	Temperature-time combination
1.	Low-Temperature-Long Time (LTLT) method/ Batch/Holding pasteurization	63°C /30 minutes
2.	High-Temperature-Short-Time (**HTST**) pasteurization/Flash pasteurization	**72°C /15 seconds**
3.	**Stassanization**	**74°C /7 seconds**
4.	Ultra high temperature (UHT) pasteurization	130-135°C /fraction of second
5.	Ultra-pasteurization (Uperization)	150°C / fraction of second
6.	Vacuum pasteurization (Vacreation)	By **Vacreator** instrument (direct steam)

Note:-

- **HTST is the modern method of pasteurization** and used at commercial level
- In Vacuum pasteurization, milk is pasteurized **under reduced pressure by direct steam**
- Vacreator is used to remove feed & other volatile off-flavors from cream & pasteurize it for **butter making.** This process dilutes the cream and it will lower the fat percentage of cream up to 6-8%.

♦ **Advantages & disadvantages of pasteurization**

- Diminishes the nutritive value of milk
- Reduces cream line or cream volume
- It causes complete destruction of **Phosphatase enzyme**
- It causes **100% destruction of pathogenic bacteria**
- It improves the keeping quality of milk by destruction of **almost all spoilage organisms (85-99** per cent.)
- It fails to destroy bacterial toxins in the milk
- Rennet cannot clot the pasteurized milk.

Note:-

- **Index organism for pasteurization is *Coxiella burnetti*** (causative agent of Q-fever)
- Phosphatase enzyme in normally present in raw milk, but it is destroyed by pasteurization so phosphatase test for pasteurized milk is negative. Hence, **phosphatase test is used to detect inadequacy of pasteurization.**

Table 5: Quality control tests for milk

S.N.	Name of test	Purpose (to detect or to determine)
1.	**Organoleptic test**	**Colour, flavour& taste of milk**
2.	**Hansa test**	**Mixing of cow & buffalo milk**
3.	Lactometer reading, freezing -point depression test	Adulteration of milk with water
4.	**Coliform count test**	**Possible faecal contamination (E.coli)**
5.	**Clot-on-boiling(COB)test**	**Heat stability of milk**
6.	Acidity test, Alcohol precipitation test	Acidity of milk
7.	Alcohol -Alizarin test	pH & heat stability of milk
8.	Dye reduction test(methylene blue reduction test, resazurin test)	Extent of bacterial contamination
9.	Direct microscopic count(DMC)	Types of microbes present in milk (Total number of bacteria=both live +dead)
10.	Standard plate count(SPC)	Extent of bacterial contamination (Total number of viable bacteria)

Table 6: Other tests for milk

S.N.	Tests/Reagents	Significance (to detect)
1.	California mastitis test (CMT), Strip cup test, CAMP test, Bromo-Cresol-Purple test (BCP), Bromo-Thymol-Blue test (BTB), Hotis Miller test	Diagnosis of Mastitis

2.	**Phosphatase test**	**Inadequacy of pasteurization**
3.	Delvo kit test	Presence of antibiotic &sulphur residue in milk
4.	**Iodine solution test**	**Starch adulteration in milk**
5.	**Storch's peroxidase test**	**Mixing of heated milk in fresh milk**
6.	Bromo-cresol-purple solution	**Detergent in milk**
7.	Picric acid solution	Gelatin in milk
8.	p-dimethyl amino benzaldehyde reagent	Urea in milk

(1) Standard plate count (SPC) of raw milk

Objective: -To estimate total no. of viablebacteria in milk

Table 7: Interpretation of SPC

S.N.	Plate count of raw milk (per ml)	Grade of milk
1.	Less than 2 lakhs	Very good
2.	2 -10 lakhs	Good
3.	10-50 lakhs	Fair
4.	More than 50 lakhs	Poor

Note: Plate count for pasteurized milk shouldnot exceed 30,000 per mlof raw milk

(2) Methylene blue reduction test

Objective: -To determine the extent of bacterial contamination in milk

Principle: - Time taken to reduce M.B. is a measure of its bacterial contamination

Table 8:Interpretation of Methylene blue reduction test

S.N.	Time taken to reduce M.B.(in hours)	Grade of milk
1.	5 hours or more	Very good
2.	3-4 hours	Good
3.	1-2 hours	Fair
4.	0.5 hour or less	Poor

(3) Cow milk composition

- **It contains 87% water & 13% total solids (TS/dry matter)**
- Total Solids is categorized under (a) Fat/Lipid (b) Solid Not Fat(SNF)
- Fat includes: Phospholipids, Cholesterol, Carotene & Fat soluble vitamins(A,D,E,K)
- **SNF includes: Lactose(milk sugar), Proteins, Ash(minerals)** &others
- Milk proteins includes- (a) Casein protein (b)Whey proteins/milk serum proteins
- **Whey proteins includes:- *a*-lactalbumin & β -lactoglobulin**
- Riboflavin is a greenish-yellow pigment that provides characteristic colour to whey.

Note:-

- Cow milk contains **2.5% casein** while buffalo milk contains **3.0% casein**
- Casein contributes about **80%** of total milk protein
- Casein exists in milk in the form of **Calcium-caseinate-phosphate complex**
- Casein is responsible for **viscosity & white colour**of milk

- There are three types of casein protein: α, β, γ
- α-casein consists of two components namely α_s-casein (calcium-sensitive casein) and K-casein (calcium-insensitive casein)
- α_s-casein is precipitated by calcium ion while K-casein is not precipitated by calcium ion.

Table 9: Milk constituents

S.N.	Milk constituents	Form in which they exist in the milk
1.	**Fat**	Emulsion
2.	**Casein protein**	Colloidal suspension
3.	Whey protein	Colloidal solution
4.	**Lactose**	True solution
5.	**Ash**	Partly colloidal and partly true solution

Table 10: Emulsions types

S.N.	Items	Types of emulsion
1.	Milk, Cream	Fat/oil in water
2.	**Butter**	**Water in fat/oil**
3.	Meat	Fat/oil in water

(4) Milking methods:-

A. Hand milking- most common practice among individual farmers

B. Machine milking- practiced in organized government & military dairy farm

Table 11: Comparision of fisting, knuckling and stripping

S.N.	3 Types of hand milking	Procedure	Special points
1.	Full hand method/fisting	Grasp the teat with all five fingers & pressing it against the palm	**Best method of milking dairy animals**
2.	Knuckling	Bend thumb against teat	Wrong method of milking (injury may occur in teat)
3.	Stripping	Holding the teat between thumb & forefinger & drawing it down (Mainly used in sheep & goat)	It is used in following conditions: (a) **To remove left milk after machine milking** (b) When **teats are too small** (c) Towards completion of milking

Note:-

- The cow should be **milked from the left side**
- First few strips of milk should not mix with rest of the milk because **fore- milk contains large no. of bacteria**

(B) Machine milking:-

It performs two basic functions:-

(a) It opens the streak canal with partial vacuum, allowing the continuous flow of milk

(b) It massages the teats that **prevent congestion of blood in the teat.**

Note:-

- Minimum herd size for machine milking is = **20**
- Recommended vacuum in machine milking is **10-15 inches**
- The optimum pulsation rate in machine milking: **60 cycles/minute**
- Pulsation rate should not less than 40 cycles/minute & not more than 120 cycles per minute
- Pulsator is also known as "heart of milking machine"
- Pulsation ratio of milking machine- (a) For cattle: 60/40(b) For buffalo: 50/50
- Ideal vacuum of milking machine- (a) For cattle: 352 mmHg (b) For buffalo: 400 mmHg

(5) Colostrum/1st milk/Beestings:-

- Colostrum is fed to newborn calf @ **10 % of its body wt. (or) 2-2.5 liters per day up to 3-4 days.**
- Placental transfer of antibodies (globulin protein) does not occur in ruminants so their neonates depend upon colostrum as a source of antibodies.
- **Colostrums provide passive immunity** to the calf.
- It act as **laxative & clears the meconium(1stfaeces voided by new born calf)**
- Colostrum of ruminant contains a **trypsin inhibitor** that protects the immunoglobulins from digestion in G.I.T. of the calf.
- Milk lost its colostral property within 3-4 days after parturition.

Table 12: Composition of Bovine Colostrum & whole milk

S.N.	Constituents	Colostrum (%)	Whole milk (%)
1.	Water	76	87
2.	Total Solids	24	13
3.	Protein	14.3 (6%Ig^s)	3.2 (0.09% Ig^s)
4.	Fat	6.7	4
5.	Lactose	2.7	5.0
6.	Ash	1.1	0.7

Note:-

- Predominant immunoglobulin in bovine colostrum is IgG while in human colostrum is IgA
- Immune factors present in bovine colostrum are lactoferrin and immunoglobulins like IgG > IgM > IgA > IgG 2 (according to decreasing order of their concentration).
- Lactoferrin is an iron-binding protein, very important during mammary involution.
- High yielding breed produce lower fat %
- **Final stripping contains higher fat percentage than foremilk.**
- Evening milk contains higher fat than morning milk.

Table 13: Physico-chemical properties of milk

S.N.	Physical property	Measured by (at what temperature)	Normal value	Comments
1.	Specific gravity	Quevenne lactometer (15.6°C)	**Cow milk:-1.028-1.030 Buffalo milk:- 1.030-1.032 Skim milk:-1.035-1.037 Colostrum:-1.070**	Specific gravity of milk dependson its SNF content
2.	Density	Hydrometer or Pycnometer(20°C)		
3.	Refractive index	**Zeiss refractrometer** (20°C)	Refractive index of milk is **1.344 to 1.348**	
4.	Viscosity	(25°C)	1.5-2.0 Centipoises	
5.	Surface tension	(20°C)	54.5 dyne/cm	
6.	Freezing point	**Hortvet cryoscope**	Average freezing point depression of Cow milk is 0.547°C andBuffalo milk is 0.549°C	
7.	Fat%	**Gerber's butyrometer (Best method),** Soxhlet apparatus		
8	pH		**Cow milk:-6.4-6.6 Buffalo milk:-6.7-6.8**	Higher pH of fresh milk indicates **udder infection(mastitis)**
9.	Acidity		**Cow milk:-0.13-0.14% Buffalo milk:-0.14-0.15%**	**Freshlydrawn milk is amphoteric to litmus**
10.	Boiling point		**100.5°C**	

Recknagel phenomenon: The specific gravity of freshly drawn milk is low. It increases by 0.001 as time advances. This is due to partial cooling and solidification of fat, hydration of protein, loss of CO_2 and escape of air bubbles.

Note:-

(1) Specific gravity:-

- **Specific gravity of milk = 1+ CLR/1000**(where CLR is CorrectedLactometer Reading)
- **The specific gravity of water is one**
- Specific gravity of milk is lowered by addition of water or by addition of cream/fat
- Specific gravity of milk is increased by addition of skim milk or by removal of cream/fat

(2) Freezing point:-

- The freezing point of pure distilled water is 0°C while freezing point of milk is slightly lower than that of water due to the presence of soluble constituents like lactose, mineralsetc., which depress the freezing point.
- Lactose and chloride are primarily responsible for depressing the freezing point.
- Freezing point of cow or buffalo milk ranges from (–) 0.535°C to (–)0.550°C **with an average of (–)0.545°C**

- The addition of 1% water to milk will raise its freezing point by 0.006°C.
- Mastitis milk shows thenormal freezing point.

Udder (Mammary gland)

- Mammary glands are modified sudoriferous (sweat) glands.
- Udder is ectodermal in origin
- Mammary glands are innervating with only sympathetic fibers. Parasympathetic fibers are absent in udder.
- **Inter milking interval:** time interval between subsequent milking. The ideal inter- milking interval is 12 hours.

The proportion of milk stored in cistern/alveolus:-

- **Goat-80:20, Sheep:-50:50 , Cattle:-30:70 , Buffalo & Camel :-5:95 , Sow:- 0:100**
- Dairy cows store only 30% of the total milk yield volume in the cisterns after a normal milking interval. However, the **cisternal milk accounts for up to 80% in dairy goats that is why we can draw milk at any time from goat because there is no oxytocin reflex is required in case of goat for a letdown.**
- **Pandharpuri buffalo have multiple milk let down capability.** Farmer takes animals to customer's door and milks as per requirement. Then the animals are taken to the next customer and are milked again.

Circulatory system:-

- **Arterial blood supply: -by external pudic artery(mammary artery)**
- **Venous return(3 primary routes)**
  (a) **Subcutaneous abdominal vein (milk vein)-1st route**
  (b) External pudic vein-2nd route
  (c) Perineal vein-3rd route
- **Subcutaneous abdominal vein** act as an **"index for milking ability"**

Suspensory structures of udder

(a) Median suspensory ligament
(b) Two lateral suspensory ligament
(c) Skin

- Median suspensory ligament is elastic while laterals are non-elastic
- The median suspensory ligament is primarily responsible for udder "break-down".
- There is no communication among all 4 quarters of the udder. It will minimize the spread of infection within the udder.
- **Note:400-500 ml of blood must pass through udder for producing 1 ml of milk.**

Table 14: Animals with their teat numbers

S.N.	Animal	Number of pairs of teat	No. of teat canal or streak canal per teat
1.	Cattle, Buffalo	2	1
2.	Sheep, Goat	1	1
3.	Camel	2	2
4.	Bitch	5	8-14
5.	Mare	1	2
6.	Sow	7	2

Table 15: Disease transmitted to human via milk (milk-borne diseases)

S.N.	Way of transmission	Examples of diseases
1.	Infection of milk directly from the cow	**Bovine T.B., Malta fever or undulant fever**
2.	Infection from man to cow& than to milk	**Septic sore throat; Scarlet fever; Diphtheria**
3.	Direct contamination of milk by human	Typhoid fever or Para-typhoid fever, gastroenteritis, dysentery
4.	Indirect contamination of milk by human	Typhoid fever or Para-typhoid fever, Diarrhoea or Dysentery

Table 16: Classification of Indian dairy products

S.N.	Types of Indian dairy products	Examples
1.	Concentrated / partially desiccated products	**Khoa/Mawa, Rabri, Basundi**
2.	Heat and acid coagulated productsmilk product	**Paneer, Channa**
3.	Fermented products	**Dahi, Misti Dahi, Chakka, Shrikhand,Shrikhand wadi**
4.	Fat rich products	Ghee, Makkhan (desi butter), Malai
5.	Frozen dairy products	Kulfi, Malai ka baraf, Milk ice
6.	Cereal based puddings	Kheer, Payasam

Khoa: It is partially dehydrated whole milk concentrated product

Table 17: Classification of Khoa

S.N.	Types of Khoa	Fat%	Specific sweets prepared
1.	**Pindi**	**21-26%**	**Burfi, Peda etc.**
2.	**Dhap**	**20-23%**	**Gulabjamun,Pantooa etc.**
3.	**Danedar**	**20-25%**	**Kalakand, Gourd barfi etc.**

Note: Milk of high acidity produces a granular khoa known as Danedar

Table 18: The chemical composition of khoa (Percentage)

S.N.	Milk used for khoa making	Moisture	Fat	Protein	Lactose	Ash	Iron
1.	Cow milk	25.6	**25.7**	19.2	25.5	3.8	**103 ppm**
2.	Buffalo milk	19.2	**37.1**	17.8	22.1	3.6	**101 ppm**

Note: Milk normally contains only 2"4 ppm of iron. But the high iron content of khoa is because of karahi is made up of iron.

- **Special points about khoa**
  - Buffalo milk is preferred
  - A minimum fat level of 4% in cow milk & 5% in buffalo milk is necessary to obtain good quality khoa.
  - Normal yield of khoa: 17-19% from cow milk & 21-23% from buffalo milk

- **Dahi/Indian curd:** It is a fermented milk product

  Types of dahi-

  (a) **Sweet/Sour dahi: 0.5-1% starter** (previous day's dahi or buttermilk)

  (b) **Sweetened dahi:** famous in Eastern region of India (mainly in West Bengal)& prepared by adding 6.25% cane sugar to milk. It is also known as **Mistidahi/Lal dahi or payodhi**

- **Some special points:-**
  - **Buffalo milk** is **white** in colour due to **casein protein** while **cow milk is yellow** in colour due to **â-carotene**.
  - **Least variable** component of milk is **lactose** while a **most variable** component of milk is **fat.**
  - **Most commonly used adulterant in milk is water.**
  - **The real acidity of milk** is due to **lactic acid** formed by bacterial action.
  - Milk sourness is due to Volatile acids.
  - Milk sweetness is due to lactose while bitterness or saltiness is due to chloride.
  - Milk – Milk Serum= Coagulum
  - Milk –Milk Fat= Skim milk
  - Fishy odour in milk is due to kephalin while fishy odour in the egg is due to E.coli.
  - Fishy odour in butter is due to rancidity
  - Butter contain all fat soluble vitamins (Vita.A, D, E& K)
  - Flavoring agent used in butter is **Diacetyl (not more than 4ppm)**
  - Yellow colour of butter is due to **Annatto**
  - Colouring agents used in milk are: -Annatto, Coal tar dye & Turmeric
  - Cooked flavor of heated milk is due to formation of **Sulfhydryl compounds**
  - **Thickening agents** used in milk are: **Canesugar (sucrose), Starch, Gelatin**
  - **Preservatives used in milk** are: Boric acid, Borax, Benzoic acid, Formalin, H_2O_2, Salicylic acid, Na_2CO_3, $NaHCO_3$
  - Natural preservatives present in milk are -Lactoperoxidase,Lactoferrin, and Conglutinin.
  - **Homogenization of milk**: - theprocess of making a stable emulsion of milk serum & milk fat by use of a homogenizer.

  (a) We cannot separate cream from homogenized milk

  (b) Size of fat globule in homogenized milk is **2 microns**.
  - **Bactofugation**: the process of removing 99.99% bacteria by use of centrifugal forces.It **triples the shelf life** of market milk
  - Milk letdown hormone is **oxytocin** while hormone responsible for **holding up of milk is epinephrine.**
  - Lactation period of dairy cattle divided into three phases: Early phase (1 to 100 days), Mid-phase (101 to 200 days) and Late phase (201 to 305 days)
  - Peak milk yield in cattle is in **6-8 weeks after parturition**. Milk yield increases over lactation. Maximum milk yield occurs between 4^{th}-6^{th} lactation in cow & fourth lactation in buffalo.
  - In dairy cattle, dry matter intake is at peak during mid-phase of lactation.
  - **Residual milk**: It is the amount of milk left in the udder after normal milking.It can obtain **only after oxytocin injection or by remilking.**

  (a) Older cows have a higher percentage of residual milk than first-calf heifers.

  (b) % of residual milk is more in low yielders than high yielders

  (c) A cow with a high percentage of residual milk shows a lower persistency of lactation.

- **Acetate** (VFA) is responsible for **milk fat synthesis.**
- **Vitamin B_1 & Vitamin C** are lost during process of pasteurization& sterilization of milk.
- **Irradiated milk:** Vitamin D content of the milk is increased by U.V.rays treatment.
- **Stainless steel and aluminium alloy** mainly used for the manufacturing of the dairy utensils.
- Milking utensils should be sanitizing with **hypochlorite** before use.
- Cottage cheese is skim milk product.
- Milk sterilization temperature = 108-111 ^{0}C/ 25-30 min.
- Limiting amino acid for milk and for milk protein = Methionine
- R-M number confirms the purity of butter.
- Mineral absent in milk = Iron (Fe)

A1 Vs A2 Milk:

- Casein is the chief component of the milk proteins of which about 30-35 percent is beta-casein. The major beta- casein variants are A1 and A2.
- A2 beta-casein possesses proline at 67th position of its 229 amino acid chain while A1 beta casein has histidine at the respective position owing to a mutation that occurred in due course of time.
- Breeds like Jerseys, Asian and African cows produce A2 milk while Holsteins and Ayrshire predominantly produce A1 milk.
- Beta-casomorphin-7 (BCM-7) is a bioactive seven-amino peptide released by digestive enzymes exclusively from the A1-beta-casein protein. Several researchers have reported BCM-7 interacts with the human gastrointestinal tract, internal organs and brainstem. BCM7 adversely affects the immune response and is also considered as a risk factor for type 1diabetes.
- Beta-casomorphin-9 (BCM-9) is a bioactive nine-amino peptide released by digestive enzymes exclusively from the A2-beta-casein protein. A2 milk is considered safe for human consumption.

Milk products standards

Sr. No.	Product	Standard
1	Cream	Milk Fat -not less than 25% (Table, light, coffee cream: 20-25%; Whipping, heavy: 30-40%; Plastic: 65-85%)
2.	Butter	Milk Fat - not less than 80% by weight, Common Salt - not more than 3% by weight, Curd - not more than 1.5% by weight, Diacetyl - 4 ppm, Moisture - not more than 16%
3.	Ice cream	Weight (g/Litre) (min): 525; Total solids (% wt) (min): 36.0; Milk fat (%wt) (min)-10.0; Acidity (% lactic acid) (max)-0.25; Stabiliser / emulsifier (%wt) (max)-0.5; Sucrose (%wt) (max)-15.0
4.	Condensed Milk	Total Solids-31 %, Fat- Not less than 9%, Sucrose-40%
5.	Skim sweetened condensed milk	Total Solids-26 %, Fat- Not more than 0.5%, Sucrose-40%
6.	Whole milk powder	Moisture (%wt.) (max)-4; Total milk solids (%wt.)-96
7.	Skimmed milk powder	Moisture (%wt.) (max)-5; Total milk solids (%wt.)-95
8	Ghee	Moisture (%)-Not more than 0.3Free fatty acid (% oleic): Special grade Agmark Red label-Not more than 1.4; General Grade Agmark Green label-Not more than 2.5

Contamination in milk

S. No.	Contamination	Due to
1.	Ropiness	*Alcaligenes viscolactis*
2.	Materials responsible for ropiness	Gums and mucin
3.	Fruity aroma	*Pseudomonas fragi* (ester production)
4.	Malty flavor	*S. lactis var. maltigenes* (aldehyde production)
5.	Unclean flavor	Dimethyl sulfide by gram –ve bacteria
6.	Food borne intoxication	*Staph. aureus*
7.	Fishy odour	Kephalin
8.	Blue discoloration	*Pseudomonas syncyanea* and *S. lactis*
9.	Slime production	*Leuconostoc* of LAB
10.	Types of rancidity	Hydrolytic, Oxidative and Ketonic

Packaging material for dairy products

S. No.	Dairy products	Packaging material
1.	Liquid milk	Low Density Poly Ethylene (LDPE) -70 gauge
2.	Milk powder	Polyethylene (PE) and N2 gas is used for packaging
3.	Butter	Vegetable parchment paper
4.	Cheese	Aluminum foil laminate, PVDC coated cellophane
5.	Ghee	High Density Poly Ethylene (HDPE)
6.	Cream	LDPE
7.	Ice cream	a) Cups: - High impact polystyrene b) Bar/Stick: - PE
8.	Fresh meat	LDPE, life span of fresh meat at 4°C is 5-7 days

- **Reference Books:**

1. Outlines of Dairy Technology by Sukumar De
2. A Textbook of Animal Husbandry by G.C.Banerjee, 8th edition
3. Handbook of Animal Husbandry by V.K.Tanja, 3rd revised edition

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Objective Questions

1. **Standard milk contains-**
   (a) 4.5% Fat & 8.5% SNF (b) 5% Fat & 8.5% SNF
   (c) 3% Fat & 9% SNF (d) 5% Fat & 8.7% SNF
2. **Temperature-time protocol for HTST pasteurization-**
   (a) 72° C / 15 seconds (b) 72° C / 7 seconds
   (c) 63° C / 30 min (d) 74° C / 7 seconds
3. **Most commonly used adulterant in milk-**
   (a) Urea (b) Water
   (c) Detergent (d) NoneF
4. **For proper growth of calf, whole milk feeding is desired up to the age of-**
   (a) 60 days (b) 90 days
   (c) 120 days (d) 160 days
5. **The hormone responsible for holding up of milk-**
   (a) Oxytocin (b) Epinephrine
   (c) Vasopressin (d) Calcitonin
6. **Most variable component of milk-**
   (a) Lactose (b) Fat
   (c) Casein (d) SNF
7. **The fat content of milk is calculated by-**
   (a) Garber's Butyrometer (b) Pycnometer
   (c) Lactometer (d) Hortvet apparatus
8. **The carcass of lungs, trachea & heart is known as-**
   (a) Pluck (b) Bung
   (c) Giblet (d) Paunch
9. **Fat is present in milk as-**
   (a) Solution (b) Suspension
   (c) Emulsion (d) None
10. **Hortvet apparatus is used to measure which physical property of milk-**
    (a) Refractive index (b) Freezing point
    (c) Specific gravity (d) Colour
11. **Match the column: -**

TABLE-I	TABLE-II
(1) Bung	(a) Gizzard, Liver & heart
(2) Pluck	(b) Diaphragm
(3) Weasand	(c) Oesophagus
(4) Skirt	(d) Lungs, trachea & heart
(5) Giblet	(e) Rectum

12. **Lactose & ash present in milk as-**
    (a) True Solution (b) Suspension
    (c) Emulsion (d) None
13. **Index organism for pasteurization-**
    (a) Coxiella (b) Mycobacterium
    (c) Leptospira (d) Listeria
14. **By product of cheese is-**
    (a) Buttermilk (b) Whey
    (c) Skim milk (d) Butter oil

15. **Peak milk yield in dairy cattle-**
(a) 6-8 weeks of lactation (b) 4-6 weeks of lactation
(c) 8-12 weeks of lactation (d) 2-4 weeks of lactation

16. **In machine milking, pulsation rate (per min.) should be-**
(a) 35 – 45 (b) 55 – 65
(c) 65 – 75 (d) None

17. **In Buffalo, maximum milk yield takes place in which lactation-**
(a) 3rd (b) 4th
(c) 6th (d) 8th

18. **Match the column: -**

TABLE-I	TABLE-II
(1) Coliform test	(a) 72° C / 15 seconds
(2) HTST	(b) Mixing of cow & buffalo milk
(3) Hansa test	(c) 74° C / 7 seconds
(4) Stassanization	(d) Detergent adulteration of milk
(5) Bromo-cresol-purple test	(e) Faecal contamination of milk

19. **Match the column: -**

TABLE-I	TABLE-II
(1) Casein protein	(a) Real acidity of milk
(2) Lactic acid	(b) Sourness of milk
(3) Volatile acids	(c) Yellow colour of cow milk
(4) β - Carotene	(d) Bitterness of milk
(5) Chloride	(e) White colour of buffalo milk

20. **Which of the following statement(s) is/are true about khoa-**
(a) It is concentrated whole milk product (b) Khoa of cow milk contain 103ppm iron
(c) Danedar khoa is used to make kalakand (d) All the above

21. **Match the column: -**

TABLE-I	TABLE-II
(1) Dahi	(a) Sweetish-sour-fermented curd
(2) Ghee	(b) Concentrated whole milk product
(3) Khoa	(c) Pure clarified butter fat
(4) Lassi	(d) Indian curd
(5) Srikhand	(e) Desi butter milk
(6) Yoghurt	(f) Frozen dairy product
(7) Ice cream	(g) Coagulated product

22. **Kefir & Kumiss are-**
(a) Lactic acid-alcohol fermented milk (b) Lactic acid-phenol fermented milk
(c) Acetic acid- alcohol fermented (d) Lactic acid-acetic acid fermented milk

23. **Which of the following pair is correctly matched-**
(a) Fortified milk- Mineralized & Vitaminized milk
(b) Irradiated milk -Vitamin D content is increased by U.V. exposure
(c) Both a& b
(d) None

24. **Which is/are true about Kefir-**
(a) It is self-carbonated milk beverage containing 1% lactic acid & 1% alcohol
(b) Fermenting agents for Kefir are known as Kefir grains
(c) Kefir grains contains Str.lactis, Kefir bacilli & lactose fermenting yeast
(d) All the above

25. **Which is/are true about Kumiss-**
(a) It is lactic acid – alcohol fermented milk obtained by mare milk
(b) It is fermented by lactobacillus acidophilus & finished product contain 2.5 % alcohol
(c) Both a &b
(d) None

26. **Water content of cow & goat milk is-**
(a) 87% (b) 84%
(c) 90% (d) 83%

27. **Dry matter% of sow milk is-**
(a) 10% (b) 15%
(c) 17% (d) 20%

28. **Average lactose content of cow milk & buffalo milk respectively-**
(a) 5.2%, 4.9% (b) 4.9%, 5.2%
(c) 4.5%, 4.8% (d) None

29. **Phospholipid(s) present in milk is/are-**
(a) Lecithin (b) Cephalin
(c) Sphingomyelin (d) All the above

30. **An excellent emulsifying agent, which stabilize milk fat emulsion is:**
(a) Lecithin (b) Lipid
(c) Wax (d) Lactose

31. **For the production of 1ml of milk, the quantity of blood passes through secretary tissues of the mammary gland is about-**
(a) 500 ml (b) 100 ml
(c) 1000 ml (d) 200 ml

32. **TDN required by cow for 1 liter of milk production-**
(a) 0.45 kg TDN (b) 0.32 kg TDN
(c) 0.50 kg TDN (d) 0.55 kg TDN

33. **The correct method of milking dairy animal is-**
(a) Fisting (b) Knuckling
(c) Stripping (d) None

34. **Plate count for pasteurized milk should not exceed _____ per ml of milk-**
(a) 30,000 (b) 50,000
(c) 1 Lakh (d) 2 lakhs

35. **Which is true about colostrum feeding in calf-**
(a) Colostrum provides passive immunity to the calf
(b) Colostrum is fed @ 10% of its body weight daily
(c) Colostrum act as laxative & clears the meconium
(d) All the above

36. **If CLR of milk is 28, find out the specific gravity of milk-**
(a) 1.028 (b) 1.025
(c) 0.28 (d) 1.28

37. **The specific gravity of milk is decreasing by:**
(a) Addition of water (b) Addition of fat
(c) Addition of skim milk (d) Both a & b

38. **The size of fat globule in homogenized milk is-**
(a) 2μ (b) 3μ
(c) 4 μ (d) 5μ

39. _____ is a self carbonated milk beverage-
(a) Kefir (b) Kumiss
(c) Both (d) None

40. Alcohol content of Kefir & Kumiss are respectively-
(a) 2.5% & 2% (b) 1% & 2.5%
(c) 2% & 3% (d) 1% & 5%

41. Kumiss is originally prepared only from-
(a) Mare milk (b) Sheep milk
(c) Buffalo milk (d) Goat milk

42. Viscosity & white colour of milk is due to-
(a) Casein protein (b) α – lactalbumin
(c) β – lactoglobulin (d) All the above

43. Which of the following sentence is/are true about total nitrogen present in milk-
(a) Casein constitutes about 80% of the total nitrogen present in milk
(b) NPN constitutes about 5% of the total nitrogen in milk
(c) Both are true
(d) None

44. Which is known as milk sugar-
(a) Lactic acid (b) Lactose
(c) Glucose (d) Galactose

45. Which is true about milk lactose-
(a) Least variable component of milk
(b) Lactose is present in the milk in the form of true solution
(c) The average lactose content of cow & buffalo milk is 4.9 & 5.2% respectively
(d) All the above

46. The Casein contents of buffalo milk & cow milk are respectively-
(a) 4.3% & 3% (b) 3 % 4.3%
(c) 4% & 3% (d) 5% & 7%

47. Adulteration of milk fat with hydrogenated vegetable oils like vanaspati is detected by-
(a) Baudoin test (b) Benedict test
(c) Hansa test (d) Iodine test

48. A coagulated product obtained from pasteurized or boiled standardized milk by lactic fermentation is-
(a) Shrikhand (b) Yoghurt
(c) Channa (d) Lassi

49. A Frozen dairy product made by the rapid freezing of pasteurized milk is-
(a) Ice -cream (b) Cream
(c) Srikhand (d) Channa

50. _____ milk is always preferred for Khoa making-
(a) Camel (b) Cattle
(c) Buffalo (d) Goat

51. _____ milk is best for Channa making-
(a) Camel (b) Cattle
(c) Buffalo (d) Goat

52. The product obtained by acid coagulation of hot milk & subsequent drainage of whey is-
(a) Channa (b) Khoa
(c) Paneer (d) Rasogolla

53. **Channa is used as a base & filler for the preparation of-**
(a) Rasogolla (b) Sandesh
(c) Chum-chum, Ras-malai, Raj-bhog (d) All the above

54. **Which of the following is a fermented dairy product:**
(a) Kefir & Kumiss (b) Dahi & Lassi
(c) Srikhand (d) All the above

55. **Which of the following statement(s) is/are true about Srikhand-**
(a) It is a semi-soft, sweetish-sour-fermented curd
(b) As per Indian standards, Srikhand should contain minimum of 8.5% fat & maximum of 72.5% sugar (on dry basis)
(c) Both a& b
(d) None

56. **Pure clarified butter fat prepared chiefly from cream or desi butter (Makhan) to which no coloring agent is added is known as:**
(a) Buttermilk (b) Ghee
(c) Butter oil (d) None

57. **The best method of ghee making is:**
(a) Pre-stratification method (b) Ghee from butter
(c) Direct cream method (d) None

58. **An indigenous frozen milk product is:**
(a) Ice-cream (b) Kulfi
(c) Milk ice (d) Lassi

59. **Khoa is used for the production of:**
(a) Burfi (b) Kalakand
(c) Gulabjamun (d) All

60. **Which of the following statement(s) is/are true about Khoa-**
(a) Danedar Khoa is used for preparation of Kalakand
(b) Pindi khoa is used for preparation of Burfi &Peda
(c) Gulabjamun is prepared from Dhap Khoa
(d) All are true

61. **Yield of khoa from cow & buffalo milk are respectively-**
(a) 18 %, 22% (b) 20%, 25%
(c) 25%, 35% (d) 30% , 40%

62. **Flavoring agent in butter is-**
(a) Diacetyl (b) Annatto
(c) Cane sugar (d) Gelatin

63. **Diacetyl content in butter should be-**
(a) 4ppm (b) 5ppm
(c) 8ppm (d) 10ppm

64. **A thickening agent used in milk-**
(a) Cane Sugar (b) Gelatin
(c) Starch (d) All the above

65. **Stall-fed cow yield-**
(a) Yellow colour milk (b) White-greenish milk
(c) White colour milk (d) White-yellowish milk

66. **Grass-fed cattle yield:**
(a) Yellow colour milk (b) White-greenish milk
(c) White-yellowish milk (d) White colour milk

67. **The organoleptic test is used to detect-**
(a) Colour of milk (b) Flavour of milk
(c) Taste of milk (d) All the above

68. **Match the column: -**

TABLE-I	TABLE-II
(1) Picric acid solution	(a) Detection of Antibiotic & sulphur residue in milk
(2) Bromo-cresol purple solution	(b) Detection of urea in milk
(3) 1% solution of Iodine	(c) Detection of starch in milk
(4) P- dimethylamino benzaldehyde reagent	(d) Detection of detergent in milk
(5) Delvokit test	(e) Detection of gelatin in milk

69. ***a*- Lactalbumin & β- Lactoglobulin are known as-**
(a) Whey protein (b) Milk serum protein
(c) Both (d) None

70. **Which of the following statement is not true-**
(a) Final stripping contains higher fat than fore-milk
(b) Evening milk contain lesser fat than morning milk
(c) Bacterial count is higher in foremilk than in final stripping
(d) None

71. **Residual milk is only obtained after-**
(a) Oxytocin injection (b) Epinephrine injection
(c) Re-milking (d) Both a &c

72. **The ideal interval between two successive milking should be-**
(a) 24 hours (b) 12 hours
(c) 18 hours (d) 14 hours

73. **In which method of milking, bending of thumb against teat is done-**
(a) Fisting (b) Knuckling
(c) Stripping (d) None

74. **After machine milking, left milk is removed by-**
(a) Fisting (b) Knuckling
(c) Stripping (d) None

75. **The cow should be milked from-**
(a) Left side (b) Right side
(c) Either side (d) None

76. **For machine milking, minimum herd size should be-**
(a) 10 (b) 12
(c) 15 (d) 20

77. **Pasteurization of milk under reduced pressure by direct steam is known as-**
(a) Uperization (b) Stassanization
(c) Vacuum pasteurization (d) HTST

78. **The presence of coliform bacteria in milk is indicative of-**
(a) Faecal contamination (b) Dirty water contamination
(c) Blood contamination (d) Nitrate contamination

79. **The test used to detect inadequacy of pasteurization-**
(a) Catalase test (b) Phosphatase test
(c) Resazurin test (d) Turbidity test

80. **Solid-Not-Fat (SNF) of milk is composed of-**
(a) Protein (b) Lactose
(c) Ash (d) All the above

81. Colostrum of ruminant contains _____ which protect immunoglobulins from digestion in GIT of calf-

(a) Phosphatase (b) Trypsin inhibitor
(c) Gossypol (d) Catalase

82. Most constant property of milk is-

(a) Freezing point (b) Surface tension
(c) Viscosity (d) None

83. The specific gravity of cow milk is 1.028 to 1.030 while of buffalo milk is-

(a) 1.028 to 1.030 (b) 1.030 to 1.032
(c) 1.032 to 1.034 (d) None

84. Typical taste of milk is due to-

(a) Lactose & iron (b) Calcium & iron
(c) Lactose & chloride (d) None

85. The average size of fat globules in milk is-

(a) 2 -5 μ (b) 0 – 2 μ
(c) 5 – 8 μ (d) 8 – 10 μ

86. Casein exists in milk in the form of-

(a) Calcium-caseinate-phosphate (b) Calcium-chloride-phosphate
(c) Calcium-caseinate-chloride (d) Calcium-chloride-caseinate

87. Mastitis milk higher in-

(a) Casein Content (b) Lactose content
(c) Chloride & Catalase content (d) All the above

88. The specific gravity of milk is determined at 15.6^0 C by using Lactometer but the density of milk is determined by-

(a) Hydrometer at 20^{0}C (b) Lactometer at 20^{0}C
(c) Refractometer (d) None

89. The refractive index of milk at 20^{0}C is ranged from-

(a) 1.30 – 1.35 (b) 1.344 – 1.348
(c) 1.44 – 1.55 (d) None

90. Which are primarily responsible for depressing the freezing point of milk-

(a) Lactose & chloride (b) Lactose & Calcium
(c) Lactose & Phosphate (d) Lactose & Casein

91. Which of the following statement is/are true about physical properties of milk-

(a) The viscosity of whole milk at 25^{0}C is about 2.0 centipoise
(b) Surface tension of milk is about 50 dyne cm^{-1} at 20^{0}C
(c) Both a & b
(d) None

92. Match the column: -

TABLE-I	TABLE-II
(1) Viscosity of milk	(a) Lactometer
(2) Refractive index of milk	(b) Hydrometer
(3) Density of milk	(c) Dyne cm^{-1}
(4) Specific gravity of milk	(d) Zeiss apparatus
(5) Surface tension of milk	(e) Centipoise

93. Biological value of cow & buffalo milk is respectively-

(a) 86.90 & 84.04 (b) 86.90 & 55
(c) 86.90 & 80 (d) None

94. **Milk proteins contain essential amino acidsin an adequate amount. They are particularly rich in-**
(a) Lysine & Valine (b) Lysine & Tyrosin
(c) Lysine &Isoleucine (d) Lysine & Tryptophan

95. **The colour of fat is depended upon its-**
(a) Riboflavin content (b) Carotene content
(c) Thiamine content (d) None

96. **Milk component responsible for the texture & miscibility of milk products is-**
(a) Lactose (b) SNF
(c) Fat (d) Ash

97. **Which is true about vitamins present in milk-**
(a) Milk is a poor source of vitamin C
(b) Cow milk is particularly rich in vitamin A & carotene
(c) Milk is a good source of thiamine & riboflavin
(d) All the above

98. **Commercially most important constituent of milk is-**
(a) Lactose (b) Fat
(c) SNF (d) Ash

99. **The Boiling point of milk ranges from-**
(a) 99 – 100°C (b) 100 – 101°C
(c) 101 – 102°C (d) 102 – 103°C

100. **Melting point of different fats in milk is range from-**
(a) 33 – 35.5°C (b) 30 – 33°C
(c) 35 – 45°C (d) 45 – 50°C

101. **Colostrum contains _____ times the amount of vitamin A found in normal milk**
(a) 3 – 5 (b) 5 – 15
(c) 15-20 (d) None

102. **With the increase in the temperature of the milk, the viscosity of milk will be-**
(a) Increase (b) Decrease
(c) No change (d) None

103. **After homogenization, the viscosity of milk will be-**
(a) Increase (b) Decrease
(c) No change (d) None

104. **Irradiated milk is produced to increase the content of-**
(a) Vitamin A (b) Vitamin C
(c) Vitamin D (d) Vitamin E

105. **Adulteration of milk with water is the best judge by determination of-**
(a) Specific gravity (b) Freezing point
(c) SNF (d) Fat

106. **Cow milk proteins possess _____ as compare to buffalo milk proteins:**
(a) High digestibility & high biological value
(b) High digestibility & low biological value
(c) Low digestibility & low biological value
(d) Low digestibility & high biological value

107. **Milk lost its colostral properties & become normal within _____ hours after calving-**
(a) 72 (b) 48
(c) 24 (d) None

108. Major immunoglobulin present in human milk is IgA but in ruminant milk majorimmunoglobulin is-

(a) Ig G (b) Ig A
(c) Ig M (d) Ig D

109. Primary function of colostrum feeding in calves is-

(a) To fortify calf disease resistance
(b) Act as laxative & clears the meconium
(c) Accelerate the weight gain in calf
(d) None

110. Immunoglobulin's present in bovine milk is/are-

(a) IgG1, IgG2 (b) IgM
(c) IgA (d) All

111. "Pigeon Milk" is white slimy substance produced by_____-

(a) Crop (b) Mammary gland
(c) Both (d) Gizzard

112. Mammary glands are-

(a) Modified sudoriferous (sweat) glands (b) Sebaceous glands
(c) Sweat glands (d) None

113. Ligament, which is elastic & responsible for udder breakdown-

(a) Lateral suspensory ligament (b) Median suspensory ligament
(c) Both (d) None

114. Pairs of teats present in bitch, sow & mare respectively-

(a) 5 pairs, 7 pairs & 1 Pair (b) 7 pairs, 5 pairs & 1 pair
(c) 5 pairs, 7 pairs & 2 pairs (d) 5 pairs, 6 pairs & 1 pair

115. Greenish-yellow colour of whey & bluish colour of skim milk is due to-

(a) Carotene (b) Riboflavin
(c) Thiamine (d) None

116. Animal having two streak canals per teat is-

(a) Bitch (b) Mare
(c) Sow (d) Ruminants

117. Cream is a _____ type of emulsion-

(a) Fat in water (b) Water in fat
(c) Both (d) None

118. Butter is a _____ type of emulsion-

(a) Fat in water (b) Water in Fat
(c) Both (d) None

119. Khoa prepared from cow milk has fat% of –

(a) 15% (b) 20%
(c) 25% (d) 35%

120. Lal dahi, popular in the eastern region of India is which type of dahi -

(a) Salted dahi (b) Sweetened dahi
(c) Plain stored dahi (d) None

121. Milking utensils should be sanitizing with _____ before use.

(a) Detergent (b) Washing powder
(c) Hypochlorite (d) None

122. Material that is mainly used for the manufacturing of the dairy utensils-

(a) Aluminum/Stainless steel (b) Copper
(c) Iron (d) Bronze

123. Which of the following is known as heart of milking machine-

(a) Vacuum pump (b) Regulator
(c) Pulsator (d) Teat cup shell

124. Pulsation ratio of milking machine in case of cattle-

(a) 60/40 (b) 50/50
(c) 70/30 (d) 30/70

125. Ideal vaccum of milking machine in case of cattle-

(a) 352 mmHg (b) 400 mmHg
(c) 450 mmHg (d) 500 mmHg

126. The official test for judging the efficiency of sterilization of milk-

(a) Phosphatase test (b) Sterility test
(c) COB test (d) Turbidity test

127. The ratio of forequarters milk: hindquarters milk in cattle is-

(a) 50:50 (b) 40:60
(c) 60:40 (d) 20:80

128. Storage site of milk in animals-

(a) Alveoli (b) Glands
(c) Cisterns (d) All the above

129. K-casein present in milk is-

(a) Calcium-sensitive casein (b) Potassium- sensitive casein
(c) Calcium-insensitive casein (d) Potassium- insensitive casein

130. Why we can draw milk at any time from goat-

(a) Oxytocin reflex is not required in case of goat for letdown
(b) Goat store up 8.0% of their milk in the cisterns
(c) Goat store up 80% of their milk in the alveoli
(d) Both a and b

131. Due to homogenization, surgace area of milk fat increases by

(a) 3 times (b) 4 times
(c) 5 times (d) 6 times

132. Ricotta cheese is prepared from

(a) Cow milk (b) Goat milk
(c) Cheese whey (d) Mare milk

133. The buffalo breed of India famous for high percentage of milk is

(a) Murrah (b) Jaffrabadi
(c) Mehsana (d) Bhadawari

134. In the year 2019-20, the people of which state had maximum per capita availability of milk

(a) Haryana (b) Gujarat
(c) Rajasthan (d) Punjab

135. Cottage cheese is

(a) Soft and unripened (b) Hard and unripened
(c) Soft and ripened (d) Hard and unripened

136. Soggy texture in icecream is due to

(a) Low overrun (b) High sugar content
(c) High content of stablizer (d) All the above

137. Main flavouring compounddiacetylaverage content in butter is

(a) 1.0 ppm (b) 2.5 ppm
(c) 4.0 ppm (d) 8.0 ppm

138. The test for ensuring adequate sterilization

(a) Phosphatase (b) Turbidity

(c) ATP count (d) Resazurin reduction

139. Redox potential of milk _____ during heating

(a) Decreases (b) Increases linearly

(c) Increases curvilinearly (d) Increase two fold than increase in temperature

140. Time to destroy 90% of the organisms from food commodities is known as

(a) TDT (b) D value

(c) F value (d) Z value

141. The moisture content is highest in _____ variety of Khoa.

(a) Pindi (b) Dhap

(c) Danedar (d) Mawa

142. Gritty texture of butter is due to

(a) Incorrect churning process (b) Incorrect neutralization of cream

(c) Incorrect salting process (d) Incorrect working of butter

143. Kumiss is formerly prepared in Russia from _____ milk

(a) Cow (b) Goat

(c) Mare (d) Sheep

144. Test for finding the mixing of cow and buffalo milk is _____

(a) Alcohol (b) Turbidity

(c) Baudoin (d) Hansa

145. Dairy Cooperatives in India follows

(a) 2-tier system (b) 3-tier system

(c) 4-tier system (d) 5-tier system

146. Name the milk product which is prepared from khoa

(a) Rasgulla (b) Rajbhog

(c) Rabri (d) Pantooa

147. The best quality gulabjamuns can be prepared from which of the following type of khoa

(a) Pindi (b) Dhap

(c) Danedar (d) Mawa

148. Green colour of whey is attributed to

(a) Vitamin C (b) Riboflavin

(c) Vitamin D (d) Iron

149. Which of the following phospholipids provides richness to the flavor of milk.

(a) Lecithin (b) Cephalin

(c) Sphingomyelin (d) Cholesterol

150. The commonest adulterant in India is water and it can be best detected by

(a) Lactometer (b) Depression in freezing point

(c) Hydrostatic balance (d) Hansa test

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Answer Key

1. 4.5% Fat & 8.5% SNF
2. 72^0 C / 15 seconds
3. Water
4. 90 days
5. Epinephrine
6. Fat
7. Garber's Butyrometer
8. Pluck
9. Emulsion
10. Freezing point
11. 1-e, 2-d, 3-c, 4-b, 5-a
12. True solution
13. Coxiella
14. Whey
15. 6-8 weeks of lactation
16. 55-65 (Note: The optimum pulsation rate in machine milking: 60 cycles/minute)
17. 4^{th}
18. 1-e,2-a,3-b,4-c,5-d
19. 1-e, 2-a, 3-b, 4-c, 5-d
20. All the above
21. 1-d, 2-c, 3-b, 4-e, 5-a, 6-g, 7-f
22. Lactic acid-alcohol fermented milk
23. Both a& b
24. All the above
25. Both a &b
26. 87%
27. 10%
28. 4.9%, 5.2%
29. All the above
30. Lecithin
31. 500 ml
32. 0.32 kg TDN
33. Fisting
34. 30,000
35. All the above
36. 1.028 (Specific gravity of milk = 1+ CLR/1000)
37. Both a & b
38. 2μ
39. Kefir
40. 1% & 2.5%
41. Mare milk
42. Casein protein
43. Both are true
44. Lactose
45. All the above
46. 4.3% & 3%
47. Baudoin test
48. Yoghurt
49. Ice -cream
50. Buffalo
51. Cattle
52. Channa
53. All the above
54. All the above
55. Both a& b
56. Ghee
57. Pre-stratification method
58. Kulfi
59. All
60. All are true
61. 18 %, 22%
62. Diacetyl
63. 4ppm
64. All the above
65. White-yellowish milk
66. Yellow colour milk
67. All the above
68. 1-e, 2-d, 3-c, 4-b, 5-a
69. Both
70. Evening milk contain lesser fat than morning milk
71. Both a &c
72. 12 hours
73. Knuckling
74. Stripping
75. Left side

76. 20 (Note: Hand milking up to 20 animals after that machine milking is preferred)
77. Vacuum pasteurization
78. Faecal contamination
79. Phosphatase test
80. All the above
81. Trypsin inhibitor
82. Freezing point
83. 1.030 to 1.032
84. Lactose & chloride
85. 2 -5 μ
86. Calcium-caseinate-phosphate
87. Chloride & Catalase content
88. Hydrometer at 20°C
89. 1.344-1.348
90. Lactose & chloride
91. Both a & b
92. 1-e, 2-d, 3-b, 4-a, 5-c
93. 86.90 & 84.04
94. Lysine & Valine
95. Carotene content
96. Lactose
97. All the above
98. Fat
99. 100-101°C
100. 33-35.5°C
101. 5-15
102. Decrease
103. Increase
104. Vitamin D
105. Freezing point
106. High digestibility & high biological value
107. 72
108. Ig G
109. To fortify calfs disease resistance
110. All
111. Crop
112. Modified sudoriferous (Sweat) glands
113. Median suspensory ligament
114. 5 pairs, 7 pairs & 1 Pair
115. Riboflavin
116. Mare
117. Fat in water
118. Water in Fat
119. 25%
120. Sweetened dahi
121. Hypochlorite
122. Aluminum/Stainless steel
123. Pulsator
124. 60/40
125. 352 mmHg
126. Turbidity test

(Note: Phosphatase test is used to detect inadequacy of pasteurization. Phosphatase test is not applicable to sterilized milk)

127. 40:60
128. All the above
129. Calcium-insensitive casein
130. Both a and b
131. 5 times
132. Coagulation of Cheese whey
133. Bhadawari
134. Punjab
135. Soft and unripened
136. Low overrun, high sugar content andstabilizer
137. 2.5 ppm
138. Turbidity test
139. Decreases
140. D value
141. Dhap
142. Incorrect salting process of butter
143. Mare milk
144. Hansa test
145. Three tier
146. Pantooa
147. Dhap
148. Riboflavin
149. Lecithin
150. Lactometer

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Meat Science

Table 1: Animal meats & their dressing percentage

S.N.	Animal	Meat	Color of meat	Dressing percentage
1.	Goat	Chevon	Light red	49 %
2.	Sheep	Mutton	Light to dark red	50 %
3.	Cattle	Beef	Cherry red	55 %
4.	Buffalo	Cara-beef/Buffen	Cherry red	57 %
5.	Pig	Pork	Greyish pink	72 %
6.	Poultry	White meat/Chicken	Grey-white	65-70 %
7.	Rabbit	Game	Pearly white	
8.	Calf	Veal	Brownish pink	
9.	Deer&Antilope	Venison		
10.	Horse	Chevalin		

- **The composition of animal meat:-**
  75% water & remaining 25% DM (DM consists of **19% Protein, 2.5% Fat, 1.2% carbohydrates and 2.3% Miscellaneous)**

Note:-

- **Bright red** color of meat is due to **oxymyoglobin**
- **Brown color** of meat is due to **metmyoglobin**
- **Pink color** of cured meat is due to **nitroso-haemochromogen**
- **Variety meat/organ meat:** -organs such as tongue, brain, thymus, heart, liver and kidney are known as variety meat
- **Pork contains 5-10 times more vitamin B_1 (thiamin) than beef and mutton.**
- Folic acid & vitamin B_{12} is higher in beef & mutton
- **Bacon:** meat from the sides and the back of a pig
- Bacon is preserved by curing with brine
- **Ham:** meat of the thigh or buttocks of a pig
- **Prime pork**: carcass of castrated male & virgin female of a pig
- Poultry meat is known as white meat while the meat of other animals is known as red meat
- **Vitamin B_{12}**: Vitamin found in highest amount in animal meat.
- **Niacin:** Vitamin found in highest amount in poultry meat.
- Vitamin A is present in beef and mutton but absent in buffalo meat, chevon or pork
- Vitamin absent in meat, egg and milk = Vit. C
- Mineral absent in meat = Calcium
- Least Myoglobin content is found in muscles of rabbit so its meat is white colored and bright.
- In horse meat, glycogen content and myoglobin content is highest.
- In horse fat, iodine no. and linoleic acid content is highest.

- **Pale, soft & exudative meat/PSE meat/Watery pork:**
  It commonly occurs in **stress-susceptible animal's where pH fall very quickly to 5.8 – 5.6**
  - **Most commonly found in pork**
  - PSE meat has lower water binding properties and loses weight rapidly during cooking resulting in a decrease in processing yields.

- **DFD meat/Dark, Firm and Dry meat/Dark cutting in beef animals**:-

It commonly occurs in **animals which have not been fed for a period before slaughter, or which have been excessively fatigued during transportation and lairage.**

- Most of the muscle glycogen has used already. Thus, **muscle pH does not fall below pH 6.0**.
- The high pH causes the muscle proteins to retain most of their bound water and they absorb most of the light striking the meat surface, giving a dark appearance.
- In pork, if DFD like conditions occurs, termed as **glazy bacon**.

Note:

- **Casing**: - Sub-mucosal lining of intestine cleaned and used for stuffing sausages.
- **Sausage**: - Meat filled casing is known as sausage

- **Terminology related to casing industry**:
  - Rounds: -casing from small intestines of sheep, goat
- **Cattle casings**:
  - Runners: Casing from small intestine of cattle
  - Middles: Casing from large intestine of cattle
  - **Bung**: Casing from caecum of cattle
  - **Weasand**: Casing from esophagus of cattle
- **Pig casings**:
  - Maws: -Casing from pig stomach
  - Chitterlings: - casing from large intestine of pig
- **The optimum growth temperature of bacteria**:
  - **Psychrophilic bacteria: Below 20^{0}C**
  - **Mesophilic bacteria: 20-45^{0}C**
  - **Thermophilic bacteria: Above 45^{0}C**

Table 2: Properties of animal's meat

S.N.	Animal meat	Consistency of meat	Odour of meat	Body fat
1.	Chevon	**Very firm**	**Buck odour**	
2.	Mutton	Firm & dense	**Ammonical**	**Maximum intra-muscular fat (marbling of meat)**
3.	Beef	Fairly firm		Intramuscular fat
4.	Veal			No intra-muscular fat
5.	Pork	**Very soft**	**Urine like**	**Maximum Subcutaneous fat among all animals (Intra-muscular fat also). Minimum water content among all meat**
6.	Chicken			**Mostly subcutaneous**

Table 3: Ante-mortem examination

S.N.	Ante-mortem Judgement	Examples of diseases
1.	Emergency slaughter	Acute pain, fracture of limb, pregnancy toxaemia andenterotoxaemia in sheep
2.	Casualty slaughter	Chronic condition eg.obturator paralysis, post-partum paraplegia
3.	Unfit for slaughter	Emaciation, rabies, anthrax, B.Q, H.S, F.M.D, tetanus
4.	Suspect	Pneumonia, T.B, mastitis, actinobacillosis, actinomycosis
5.	Delayed slaughter	Fatigued, excited, transit sickness

Table 4: Meat proteins are three types

S.N.	Index	Myofibrillar protein	Sarcoplasmic protein	Stroma or Connective tissue proteins
1.	Solubility	Salt-soluble	Water soluble & Salt-soluble	Almost insoluble
2.	Examples	Actin, Myosin, Tropomyosin Desmin, Desmin, Desmin, Connectins Troponins-T,C,I	Myoglobin,Glycolytic enzymes	Collagen, Reticulin, Elastin
3.	Composition	50-60% of total muscle proteins	30-35% of total muscle proteins	10-15% of total muscle proteins

Note:-

- Physical changes in stored meat: (1) Shrinkage (2) Sweating (3) Loss of bloom
- Freezing losses in meat: (1) Bone darkening (2) Freezer burn (3) Drip loss

♦ **Methods of disposal of carcass:-**

(1) Burial method: Most commonly used method of disposal of carcass

(2) Burning or Incineration method: Preferred method of disposal for anthrax carcass

- Incinerator temperature for carcass disposal is 600-800^{0}C

(3) Chemical treatment: Lime water (1:20) or suspension of bleaching powder (1:20) is mainly used.

♦ **Methods of preservation of meat:-**

(1) Chilling/Refrigeration: At **4±1^{0}C**,

- Method of choice for short-term preservation because it slows down the microbial growth and enzymatic activities

(2) Freezing: At **(–) 18±2^{0}C**,

- Method of choice for long-term preservation because it stops the microbial growth and enzymatic activities

♦ **The shelf life of frozen meat at (–) 18^{0}C:-**

- For mutton, chevon, beef, and carabeef: 6 months
- For pork and chicken meat: 4 months
- For cured and salted meat: 2 months

(3) Curing: **Oldest method of preservation of meat**

- Commonly used curing agents: Salt, sugar, nitrite, nitrate etc
- The permissible level of **nitrate is 500 ppm and nitrite is 200 ppm**

(4) Smoking: to develop flavor, aroma, and color in meat

(5) Thermal processing: Pasteurization and Sterilization

(6) Canning: Sterilization of product in thermatically sealed container at **121^{0}C**

(7) Dehydration: Removal of water from meat

(8) Irradiation:

- **Gamma rays are cheapest and most frequently used radiation** in food preservation
- Gamma-rays are obtained from isotopes like **Co^{60} and Cs^{137}**

- **Abattoir/Slaughter house:-**

(1) Area requirement for abattoir:-

- 1 Buffalo/Cattle = 1 Livestock unit
- 1 Pig = 0.5 Livestock unit
- 1 Sheep/Goat = 0.2 Livestock unit
- 1 Calf = 0.3 Livestock unit
- 1 Livestock unit = 1 buffalo/cattle= 2 pigs=3 calves=5 sheep/goat

Table 5: Types of abattoir

S.N.	Types of abattoir	Area required	No. of livestock unit slaughtered per day
1.	Small abattoir slaughtering	1-2 Acres	Less than 100
2.	Medium abattoir slaughtering	2-4 Acres	100-200
3.	Large abattoir slaughtering	4-6 Acres	More than 200

(2) Water requirement for both clean & unclean operations in abattoir per animal per day

- Potable water with adequate pressure (20psi) in the mains pipeline must besupplied to all parts of the plant.
- For cleaning hot water at a temperature not less than 82°C shall be made available.

FAO (1978)

- Cattle/Buffalo: 1000 liters
- Pig: 450 liters
- Sheep/goat: 100 liters

EEC Directives

- Pigs : 454 liters/day per pig
- Bovine : 272 litres/day per bovine
- Sheep/Goat : 45 litres/day per sheep/goat

Plus 25% at a reasonable pressure of 15psi

(3) The light requirement in abattoir:

- For inspection & packing point: 550 Lux or 50 ft candle
- For work room: 220 Lux or 20 ft candle
- For chilling room: 110 Lux or 10 ft candle

Note:

These intensities are measured at a height of 0.9 meters from the floor but in case of inspection point, it is measured at a height of from 1.5 meters.

(4) Chill rooms:-

- Chilling temperature should not exceed 7^0C for carcasses and 4^0C for offals.
- Rail spacing in chill room should be 0.9 m for buffalo,0.7 m for pig and 0.5 m for sheep/ goat carcasses

Note:

For proper drainage, abattoir building should have a floor gradient of 2 cm per meter or (1:50)

- **Lairage:-**

Before slaughter, animals need a rest of nearly 24 hours to restore their normal physiological condition.

- Arrangement of feeding, watering andantemortem inspection.
- Animals are protected from cold, rain and heat.

- Space required in lairage per animal: 2.8 m^2 for buffalo/cattle and 0.6 m^2 for small animals.
- A standard lairage shall hold 3 days supply of cattle/ buffalo and2 days supply of sheep/ goat/ pig.

♦ **Race**: It is a narrow space between lairage & slaughter hall. It should be at least 10 meters.

✓ **Height of bleeding and dressing rail**

Species	Height of Bleeding Rail	Height of Dressing Rail
Cattle	4.9m	3.4m
Sheep/Goat	2.7m	2.3m
Pigs	3.8 m	3.4m

♦ **Methods of slaughter**:-

There are two methods (A) Scientific/humane (B) Ritual

(A) **Scientific /Humane slaughter**: -Scientific slaughter avoids unnecessary pain and suffering to the animals.

Stunning: process use to create a state of immobility or unconsciousness at the time of slaughter.

- **Stunning time: 30 seconds to 1 minute**
- Stunning is performing only in case of humane slaughter, not in ritual slaughter.

♦ **Stunning techniques are three types**:-

(1) **Mechanical stunning**:
- Instruments used: Captive bolt pistol, percussion stunner etc
- Commonly used in cattle and buffaloes

(2) **Electrical stunning**:
- Commonly used in stunning of Sheep, Goat, Pigs and Poultry
- Instrument used: Elther apparatus (alternating current of high frequency (250mA) and low voltage (75 volts) is passed through the brain for 10 seconds.

(3) **Chemical stunning/Gas stunning**:
- It is most suitable for pigs
- 70% CO_2 and 30% O_2 used for 45 seconds
- CO_2 gas blocks the nerve endings.

Note:-

(1) **Sticking/bleeding in animals**: By severing carotid arteries & jugular veins

(2) **Back bleeding/over sticking**: If knife reaches too far in the chest during sticking, blood may be aspiratedin the thoracic cavity and lungs become contaminated.
- It mainly occurs in pigs slaughtered by the Evernazine method.

♦ **The average yield of blood per animal & their bleeding time:**

(1) Buffalo/cattle: **10-12 Kg** in **6 min**

(2) Pig: **2-3 Kg** in **5 min**

(3) Sheep/Goat: **1-1.5 Kg** in **5-6 min**

(4) Fowl: **30-50g** in **1.5-2 min**

(B) **Ritual slaughter**:

(1) Jewish method/Schechita method

(2) Muslim method/Halal method

(3) Sikh method/ Jhatka method

(4) Evernazine method/Neck Stab method

Note:-

- Feeding& watering is done before slaughter in both Jhatka and Halal method of ritual slaughter
- Jugular veins& carotid arteries are severed in the case of Jewish & Muslim methods of slaughter
- The neck is separated by a sharp object in case of Jhatka & Evernazine methods of slaughter.
- **Carcass fit for Jewish consumption** is stamped with **"Kosher seal"** on brisket
- **Carcass unfit for Jewish consumption** named as **"Terepha"**
- In India, buffaloes and most of the sheep & goat are slaughtered by the Halal method
- In the case of the Evernazine method of slaughter, a double-edged knife **"Puntilla"** is used.
- Puntilla separates the neck at the occipito-atlantal joint and severing the medulla oblongata.
- In the case of Jhatka and Evernazine method of slaughter, bleeding remains incomplete because medulla oblongata is damaged during the slaughtering
- The five principles of schechita: Neck should be severed **without pause, pressure, stabbing, slanting or tearing.**
- **Talmud:** The body of the Jewish law and legend, which specify the ritualmethod of slaughter as per Torah.
- **Kosher Meat**: Meat fit for Jewish consumption, which has been obtained fromanimals slaughtered and dressed according to the ritual method
- **Porging**: removal of large blood vessels in fore quarter in Jewish method of slaughter.
- **Shechita:** The act of killing of animals for food.
- **Shochet:** The person or the trained slaughter men who performs Shechita.
- **Terefa / Tref**: The meat unfit for consumption by the Jewish community
- **Chalef**: The razor sharp knife, roughly twice the width of the animals neck,which is devoid of any notch of flaw and has been examined before theslaughter of each animal.
- **Fouchet's reagent** (Trichloroacetic acid and ferric chloride) is used detection of timing of bruising.
- **Malachite Green Test**is used for detection of efficiency of Bleeding.
- In **line system of dressing**, the slaughter rate for different categories
  a. Gravity rail system: 10-40 Cattle/hr
  b. Intermittent Powered System: 10-75 Cattle/hr
  c. Continuous Power System: 40-120Cattle/hr
  d. Canpak System: 50-150Cattle/hr
- **Scalding:** This is the process of immersion or exposure of the bled birds to a wate bath at a temperature, which facilitates the release of feathers. The temperature ofscalding depends on the age and the type/class of the birds. Based on the temperature used the scalding process can be classified into four types:
  a. Soft Scalding: 50 °C for 150 seconds
  b. Semi Scalding: 53-55 °C for 1-2 minutes
  c. Sub Scalding: 59-60° C for 45-90 seconds
  d. Hard Scalding: Excess of 60° C.
- **Singeing** – small hair like feathers (Filoplumes) are removed by use of blowlamp or singers.
- In Poultry, Heart, Liver, and Gizzard are together called as **Giblet.**
- **Two toning:** A single carcass mayshow both PSE and DFD condition in different muscles.
- **Stamping ink**: A solution containing 1-2 % Fuchsine in acetic acid is used.
- In beef and lamb,**loin eye or rib eye area is the cross sectional area of Longissimus dorsii muscle between the 12 th and 13 th rib and in pigs between10 th and 11 th rib.** Measurement of loin eye area is a good indicator of muscle development.

- **Sequestering agents**: Sequestering agents are used to bind calcium and magnesium and prevent the formation of insoluble calcium and magnesium salts by the interaction of hard water or dirt with the detergent.Common in use are EDTA (ethylenediamintetraacetate), NTA (nitrilotriacetic acid) and different phosphates.
- **Automated Cleaning system: Three types**
  a. Cleaning-in-place (CIP): Common in dairy industry
  b. Central cleaning system (CCS): Common in meat plant
  c. The self- contained cleaning system (SCCS)

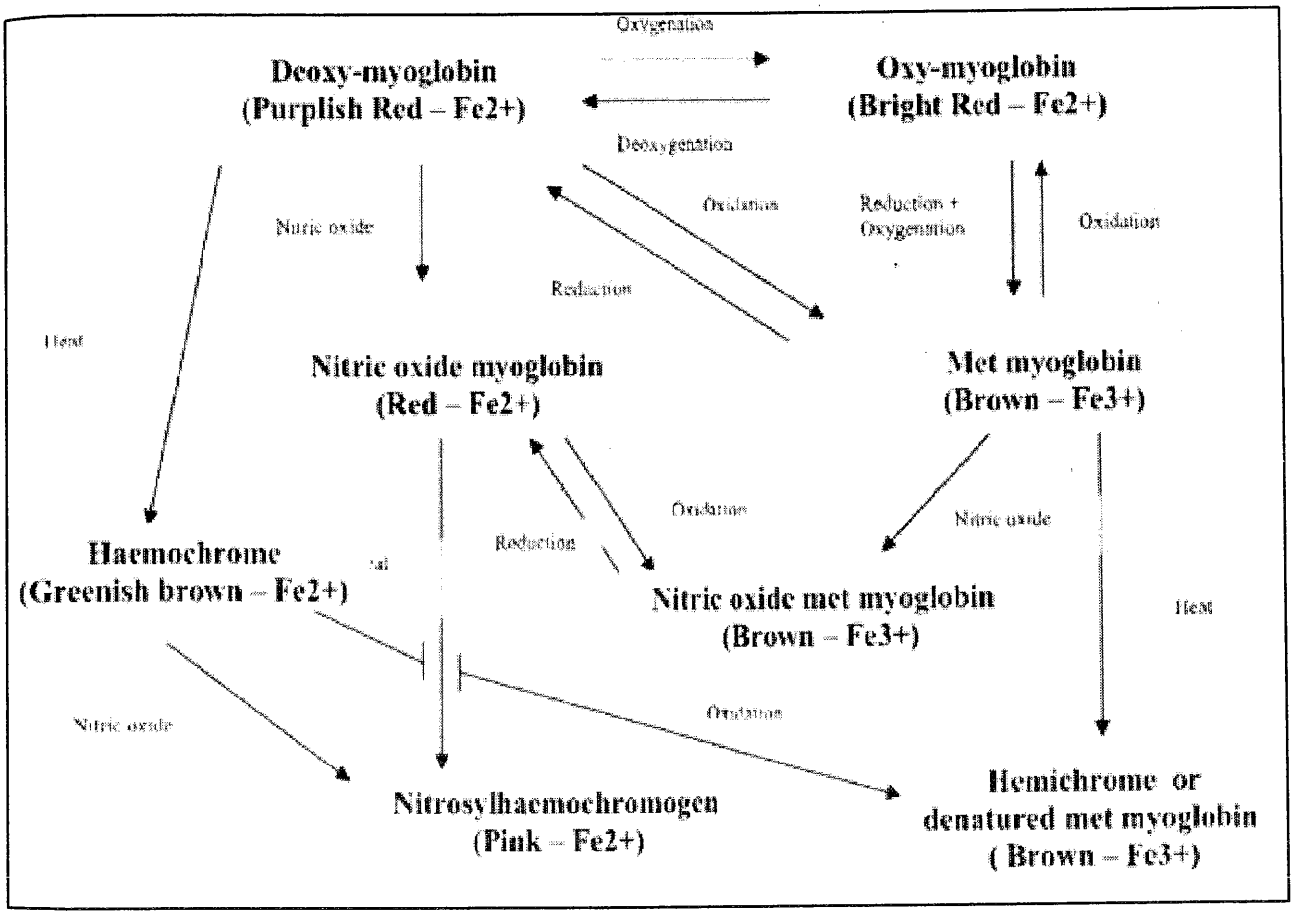
Cure salts and addtivies used in meat processsing

Curing salts and additives	Amount used	Functions
(1) Sodium chloride	1.5 to 3.0%	Preservative, improves texture
(2) Sodium nitrate	0.15 to 1.5%	A source of nitrite
(3) Sodium nitrite	500 to 1000 ppm	Preservative gets reduced by meat enzymes to nitric oxide, which combines with myoglobin (the uncured meat pigment) forms nitroso- myoglobin, the cured meat pigment.
(4) Poly phosphates	2 to 4%smoking,	Reduce cooking losses and during improve texture.
(5) Sugars eg: Sucrose	1 to 4%	Improve flavour by masking the harshness of the salt
(6) Sodium ascorbate	0.2 to 1%	Reducing agent, improves colour formation and stability by effecting rapid reduction of nitrite to nitric oxide in the meat
(7) Monosodium glutamate	500 ppm	Flavour enhancer

- **Important points:**
  - Proteolytic enzymes of plant origin such as **Papain (papaya), Ficin (Fig) and Bromelin (Pineapple)** have been either injected into animals before slaughter or applied or injected into the meat directly to cause tenderization.
  - Thenatural proteolytic enzymes related to tenderization process include Calpain -Calpastatin, Cathepsin - Cystatin and the Proteosome or macropin.
  - Palatability of meat is defined in terms ofAppearance, Tenderness and Texture, Juiciness, Flavour and Aroma, Accepted Nutritive Value.
  - **Hydrodyne process**: Placing of carcass in water and then setting off a controlledexplosion in water instantly tenderizes the meat. The supersonic shock wavesinstantly fracture the muscle fibers.
  - **Warmed over flavour**: The most important aspect of curing of meat with nitrite and forming nitrosylhemochrome is to immobilize the iron in the complex, which retards thecatalytic activity of Iron in formation of warmed over flavor. Iron catalyzes thebreakdown of unsaturated fatty acids leading to formation of volatile substances and offflavour.
  - Classification of sausages
    (i) Based on degree of chopping: a) Coarse ground sausageb) Emulsion type sausage
    (ii) Based on moisture content: a) Fresh sausageb) Smoked uncooked sausages c) Cooked sausagesd) Dry and semi-dry sausage
    (iii) Based on fermentation: a) Fermented sausageb) Non-fermented sausage

- Biological oxygen demand (BOD): It is the amount of oxygen required during the first five days for decomposition of organic matter at 20° C by aerobic biological action. It is generally used to determine the concentration of pollutant remaining after treatment and prior to discharge.
- **Chemical oxygen demand (COD):** It is the measure of oxygen required forthe oxidation of all organic matter in a known volume of effluent. The COD is a cheaper and more accurate means of determining the oxygen requirementsof an effluent before treatment.
- Higher the BOD level, higher the organic matter content and greater its pollution capability.
  a. Domestic sewage – BOD – 250-300 mg/L
  b. Slaughter houses - BOD – 1500-2000 mg/L

Various meat pigments with their colour and oxidation state of Iron



- **Reference Books**:-

1. Meat hygiene by Gracey, 11th edition
2. Meat and meat product technology by B.D.Sharma
3. Modern abattoir practices and by-products technology by B.D.Sharma
4. Principles of Meat Science byAberle, Forrest, Gerrard and Mills (5th Edition)

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Objective Questions

1. **Pale- Soft & Exudative (PSE) meat is common in-**
   (a) Pig (b) Cattle
   (c) Buffalo (d) Goat
2. **PSE meat is also knownas-**
   (a) Slimy pork (b) Watery pork
   (c) Watery beef (d) None
3. **Dry, Firm & Dark (DFD) meat is common in-**
   (a) Pig (b) Cattle
   (c) Buffalo (d) Goat
4. **Veal is a meat of-**
   (a) Deer & Antelope (b) Lamb
   (c) Calf (d) None
5. **The bright red colour of meat is due to-**
   (a) Myoglobin (b) Oxymyoglobin
   (c) Carboxymyoglobin (d) None
6. **The browncolour of meat is due to-**
   (a) Myoglobin (b) Metmyoglobin
   (c) Oxyhemoglobin (d) None
7. **Myofibrillar proteins are soluble in-**
   (a) Oil (b) Water
   (c) Fat (d) Salt
8. **PSE condition is a direct result of-**
   (a) Rapid fall of muscle pH (b) Very less fall of muscle pH
   (c) Neutral pH of muscle (d) None
9. **Intramuscular fat is known as marbling of meat while intermuscular fat is known as-**
   (a) Seam Fat (b) Lard
   (c) Tallow (d) None
10. **Which of the following statement(s) is/are true about optimum growth temperature-**
    (a) Optimum growth temperature for psychrophilic bacteria is below 20^0C
    (b) Mesophilic bacteria grow well in 20 – 45^0C temperature
    (c) Thermophilic bacteria grow well above 45^0C temperature
    (d) All the above
11. **Eating of horse flesh is known as hippophagy while eating of dog flesh is known as-**
    (a) Caninephagia (b) Kynophagy
    (c) Canophagy (d) Coprophagy
12. **Buffalo meat is also known as-**
    (a) Buffen (b) Carabeef
    (c) Both (d) None
13. **The carcass of castrated male & virgin female of pig is known as-**
    (a) Pork (b) Bacon
    (c) Prime Pork (d) Lard
14. **Which of the following sentence(s) is /are correct about Animal fat-**
    (a) Pig fat is known as lard (b) Raw beef or mutton fat is known as suet
    (c) Omental fat is known as caul fat (d) Tallow is processed from suet
    (e) All the above

15. **Cooked testicles of calf, lamb & pigs are commonly known as-**
(a) Rocky mountain oysters (b) Prairie oysters
(c) Calf fries (d) All the above

16. **Cooked testicles of lamb used as food are known as-**
(a) Lamb fries (b) Calf fries
(c) Both (d) None

17. **Recovery of fat from the dead carcass is known as-**
(a) Rendering (b) Bruising
(c) Simmering (d) None

18. **The process of tanning sheep skin with fish oil to make it soft & pliable is known as-**
(a) Bruising (b) Shammoying
(c) Flaying (d) None

19. **Which of the following sentence(s) is/are true-**
(a) Heparin is extracted from cattle lungs
(b) Rennet is prepared from abomasum of suckling calf
(c) Pepsin is extracted from mucosal lining of pig Stomach
(d) All the above

20. **Myofibrillar proteins are soluble in-**
(a) Salt (b) Water
(c) Both (d) None

21. **Sarcoplasmic proteins (e.g. myoglobin) are soluble in-**
(a) Salt (b) Water
(c) Both (d) None

22. **Stromal proteins (e.g.-collagen, reticulin & elastin) are insoluble in-**
(a) Water (b) Salt
(c) Both (d) None

23. **Horn raw material is used to produce-**
(a) Gelatin (b) Iron tablet
(c) Salami (d) Colouring material

24. **For tandoori chicken best age of broiler is-**
(a) 4 week (b) 6 weeks
(c) 8 weeks (d) 2 weeks

25. **Ultimate pH of meat is in the range of-**
(a) 5.5 – 5.7 (b) 7 – 7.2
(c) 5.3 – 5.5 (d) None

26. **Vitamin C is almost absent in-**
(a) Milk (b) Lean meat
(c) Eggs (d) All the above

27. **Thiamine (vitamin B_1) content is maximum in-**
(a) Pork (b) Beef
(c) Mutton (d) Chevon

28. **Meat is generally a good source of all minerals except-**
(a) Calcium (b) Iron
(c) Magnesium (d) None

29) **Lean meat is an excellent source of the ————vitamin.**
(a) C (b) A
(c) B-complex (d) E

30. **The firmness of meat is measured by-**
(a) Shear force apparatus (b) Penetrometer
(c) Both (d) None

31. **Which statement is true-**
(a) Thymus is known as neck sweet bread
(b) Pancreas is known as gut sweet bread
(c) Parotid gland is known as cheek/ear sweet bread & sublingual glands are known as tongue sweet bread
(d) All the above

32. **Which of the following is commonly known as sweet bread-**
(a) Thymus (b) Pancreas
(c) Both a & b (d) Spleen

33. **The protein content of the chicken egg is 13% while protein content of chicken meat is-**
(a) 21% (b) 13%
(c) 15% (d) 28%

34. **The ultimate pH of meat is-**
(a) 5.6 (b) 5.0
(c) 6.0 (d) 7.2

35. **An amino acid which forms amajor part of collagen-**
(a) Proline (b) Hydroxyproline
(c) Glycine (d) Tryptophan

36. **Collagen is arich source of-**
(a) Glycine, proline, hydroxyproline (b) Cysteine, tryptophan
(c) Both a & b (d) None

37. **Amino acids deficient in collagen are-**
(a) Cysteine, Tryptophan (b) Isoleucine
(c) Lysine (d) None

38. **Blood meal is arich source of-**
(a) Lysine (b) Isoleucine
(c) Tryptophan (d) None

39. **Match the column: -**

TABLE-I	TABLE-II
(1) Schochet	(a) Double edge knife
(2) Schechita	(b) Unfit carcass
(3) Kosher	(c) Carcass fit for jewish consumption
(4) Terepha	(d) Act of killing in jewish slaughter
(5) Puntilla	(e) Butcher

40. **Slaughter without prior stunning is known as-**
(a) Humane Slaughter (b) Ritual Slaughter
(c) Both (d) None

41. **Back bleeding/over-sticking is common in-**
(a) Pig slaughtered with Evernazine method
(b) Pig slaughtered with Halal method
(c) Cattle slaughtered with Evernazine method
(d) Cattle slaughtered with Halal method

42. **Puntilla is used in-**
(a) Evernazine method (b) Jhatka Method
(c) Halal Method (d) None

43. **In Muslims, consumption of _____ is forbidden-**
(a) Dead animal (b) Blood
(c) Pork (d) All the above

44. **Carcass fit for Jewish consumption is stamped with-**
(a) Kosher seal on brisket (b) Terepha on brisket
(c) Kosher seal on dewlap (d) None

45. **In which of the following method of ritual slaughter bleeding remains incomplete due to damage of medulla oblongata-**
(a) Jhatka& Halal (b) Halal & Jewish method
(c) Jhatka & Evernazine method (d) Only Jhatka method

46. **Instrument(s) used in mechanical stunning is/are-**
(a) Captive bolt pistol (b) Percussion stunner
(c) Both (d) None

47. **Consumption of pork was strictly prohibited for Jews (Jewish people) as a safeguard against-**
(a) Tapeworm (b) Nematode
(c) Fluke (d) None

48. **Most widely used method of stunning in case of cattle & buffalo -**
(a) Chemical (b) Electrical
(c) Mechanical (d) None

49. **The most suitable method of stunning in pigs-**
(a) Chemical (b) Electrical
(c) Mechanical (d) None

50. **Pre-slaughter anesthesia with CO_2 is mainly used for stunning in-**
(a) Sheep (b) Cattle
(c) Pig (d) Goat

51. **The concentration of CO_2& exposure time in case of chemical stunning should be-**
(a) 70% CO_2 for 45 seconds (b) 65% CO_2 for 60 seconds
(c) 80% CO_2 for 60 seconds (d) 50% CO_2 for 30 seconds

52. **Recommended electric current for sheep, goat & pig during electrical stunning-**
(a) Alternating current of 250 mA & 75 volts for 10 second
(b) Direct current of 250 mA & 75 volts for 10 second
(c) Alternating current of 250 mA & 75 volts for 30 second
(d) Direct current of 250 mA & 75 volts for 50 second

53. **In which of the following method feeding & watering is done before slaughter-**
(a) Jhatka & Evernazine method (b) Jhatka & Halal method
(c) Evernazine & Halal method (d) None

54. **Bleeding time required for cattle is 6 minutes while for pig, sheep & goat is-**
(a) 6 minutes (b) 5 minutes
(c) 2 minutes (d) None

55. **Respective yield of blood from cattle, pig & sheep at the time of bleeding-**
(a) 10 - 12 kg , 2 – 3 kg & 1 – 1.5 kg (b) 8 – 10 kg , 2 – 3 kg & 1 – 1.5 kg
(c) 12 – 15 kg , 2 – 3 kg & 1 – 1.5 kg (d) None

56. **During the halal method, head of the animal is directed towards-**
(a) Pakistan (b) Mecca
(c) America (d) Afghanistan

57. **Too high current & too low current during electrical stunning may causes-**
(a) Splash & missed shock respectively (b) Missed shock & splash respectively
(c) Both a & b (d) None

58. **The appearance of petechial hemorrhages throughout subcutaneous tissue in pigs during electrical stunning is known as-**
(a) Splash (b) Missed shock
(c) Both (d) None

59. **The main function of CO_2 in gas stunning is-**
(a) It blocks the nerve endings (b) Blackening of subcutaneous tissue
(c) Hemorrhage of subcutaneous tissue (d) None

60. **Neck incision shall be completed without pause, pressure, stabbing, slanting or tearing are the five rules which of the following method of ritual slaughter-**
(a) Halal method (b) Jewish Ritual slaughter
(c) Jhatka method (d) None

61. **Animal should be bled within ————————seconds after electrical stunning to avoid muscle splashing-**
(a) 10 (b) 30
(c) 60 (d) 120

62. **Recommended light intensities at inspection point, work room & chilling room are respectively-**
(a) 550 Lux, 220 Lux & 110 Lux (b) 110 Lux , 220 Lux & 550 Lux
(c) 550 Lux, 110 Lux & 220 Lux (d) None

63. **Recommended water requirement for a pig per day in an abattoir-**
(a) 1000 Litres (b) 450 Litres
(c) 100 Litres (d) 750 Litres

64. **A narrow distance between lairage & slaughter hall is known as race, the length of race should be-**
(a) 10 Meters (b) 20 Meters
(c) 5 Meters (d) 30 Meters

65. **Which of the following statement(s) is/are true about abattoir-**
(a) Chilling temperature should not exceed 7^0C for carcasses & 4^0C for offals
(b) Temperature of cutting room should not exceed 10^0C
(c) Humidity of carcass chilling room should be 90%
(d) All the above

66. **The strength of chlorine required for sanitation of abattoir plant is in the range of-**
(a) 130 – 250 ppm (b) 100 – 150 ppm
(c) 500 – 750 ppm (d) None

67. **Which is true about the effluent treatment of abattoir-**
(a) Biological filters are efficient in reducing the biochemical oxygen demand by 95%
(b) BOD of effluent is reduced as much as 75 – 80% during primary treatment
(c) Both a & b
(d) None

68. **Average biochemical oxygen demand (BOD) of effluent of an abattoir is-**
(a) 1500 – 2000 mg / liter (b) 500 – 600 mg / liter
(c) 200 – 400 mg / liter (d) 500 – 800 mg / liter

69. **Stiffness during rigor mortis is mainly due to the formation of-**
(a) Sarco-myosin bond (b) Acto-myosin bond
(c) Denaturation of sarcoplasmic protein (d) None

70. **The organ which is quickly affected by rigor mortis, usually within one hour of slaughter is-**
(a) Liver (b) Kidney
(c) Thigh muscle (d) Heart

71. **Meat which is most susceptible to develop oxidative rancidity is-**
(a) Pork (b) Beef
(c) White meat (d) Chevon

72. **Vitamin B-complex is maximum in-**
(a) Beef (b) Pork
(c) Mutton (d) Chevon

73. **Liver is the richest source of vitamin-**
(a) Vitamin A (b) Vitamin B
(c) Vitamin D (d) Vitamin E

74. **Captive bolt pistol is useful for slaughter rates up to-**
(a) 100 cattle / hour (b) 500 cattle / hour
(c) 250 cattle / hour (d) None

75. **Area intended for providing rest to the animals arriving at the abattoir for slaughter is known as-**
(a) Race (b) Lairage
(c) Isolation block (d) None

76. **The best system of dressing of carcasses for medium to large size Abattoir is-**
(a) Rail/line system (d) Cradle/ Semi-line system
(c) Booth system (d) None

77. **Ruffle fat is a fat around-**
(a) Kidney (b) Liver
(c) Mesentery (d) None

78. **Cattle fat is known as-**
(a) Lard (b) Tallow
(c) Caul fat (d) None

79. **Bound water form _____ % of total water content in meat is-**
(a) 4 – 5% (b) 5 – 6%
(c) 6 – 7% (d) 10 – 12%

80. **Meat cutting room should have-**
(a) 15 -20°C temperature & 80% RH (b) 10-15°C temperature & 90% RH
(c) 5 -10°C temperature & 90% RH (d) None

81. **Which of the following pair is not correctly matched-**
(a) Pork – uremic odour (b) Mutton – ammonicalodour
(c) Chevon – buck odour (d) Pork – firm meat

82. **Permitted level of nitrates & nitrites in cured meat are respectively-**
(a) 500 ppm & 200 ppm (b) 200 ppm & 500 ppm
(c) 100 ppm & 400 ppm (d) None

83. **Recommended floor gradient of abattoir should be-**
(a) 1 : 20 (b) 1 : 30
(c) 1 : 40 (d) 1 : 50

84. **Meat: bone ratio in dressed broiler is-**
(a) 2 : 1 (b) 3 : 1
(c) 4 : 1 (d) 5 : 1

85. **The most widely used method of preservation of meat for short term storage is-**
(a) Chilling (b) Freezing
(c) Curing (d) Smoking

86. **The method of choice for long-term preservation of meat is-**
(a) Chilling (b) Freezing
(c) Curing (d) Smoking

87. **Recommended temperature for chilling & freezing of meat are respectively-**
(a) 4^0C & (–) 18^0C (b) 18^0C & (–) 10^0C
(b) 4^0C & (–) 10^0C (d) 10^0C & (–) 18^0C

88. **Chilling retards the microbial growth in the meat while the freezing of meat-**
(a) Stops the microbial growth (b) Retard microbial growth
(c) Accelerate microbial growth (d) None

89. **The shelf life of carabeef, beef, mutton and chevon at freezing temp of – 18^0C is-**
(a) 6 months (b) 4 months
(c) 2 Months (d) 8 Months

90. **The shelf life of pork & poultry meat at freezing temperature of (–) 18^0C is-**
(a) 6 months (b) 4 months
(c) 2 Months (d) 8 Months

91. **The shelf life of cured & salted meat at freezing temperature of (–) 18^0C is-**
(a) 6 months (b) 4 months
(c) 2 Months (d) 8 Months

92. **The shelf life of beef, pork & cured meat at freezing temperature of (–) 10^0C are respectively-**
(a) 6 month, 4 months, 2 months (b) 3 months, 2 months, 1 month
(c) 12 months, 8 months, 4 months (d) None

93. **The oldest method of preservation of meat is-**
(a) Chilling (b) Freezing
(c) Curing (d) Smoking

94. **Which of the following is a curing ingredient-**
(a) Sodium chloride (b) Sodium nitrate & sodium nitrite
(b) Sugar (d) All the above

95. **Traditionally, curing of meat is limited to-**
(a) Beef (b) Carabeef
(c) Pork (d) None

96. **The stable pink pigment produced after smoking of cured meat is-**
(a) Nitroso-haemochromogen (b) Met-myoglobin
(b) Oxy-myoglobin (d) None

97. **Which of the following is act as a flavour enhancer in cured meat-**
(a) Nitrate / Nitrite (b) Mono-Sodium-Glutamate
(c) Salt (d) Sugar

98. **Which of the following is act as a colour fixative in cured meat-**
(a) Nitrate / Nitrite (b) Salt
(c) MSG (d) Sugar

99. **Nitrate / Nitrite inhibits the growth of which bacteria-**
(a) Clostridium botulinum (b) Bacillus anthracis
(c) Both a& b (d) Clostridium tetani

100. **Greening / green ring formation in cured meat is due to-**
(a) Excess nitrite (b) Lack of nitrite
(c) Excess salt (d) None

101. **Cheapest & most frequently used radiation for food preservation is-**
(a) X – rays (b) Alpha rays
(c) Gamma rays (d) U.V. – rays

102. **Gamma radiations are emitted mainly from-**
(a) Co^{60}& Cs^{137} (b) I^{131}
(c) Both (d) None

103. Rays commonly used for surface sterilization of meats is-

(a) Alpha (b) Gamma
(c) Beta (d) U.V. rays

104. Which of the following is a physical change in stored meat-

(a) Loss of Bloom (b) Shrinkage
(c) Sweating (d) All the above

105. Loss of weight during storage of meat is known as-

(a) Sweating (b) Shrinkage
(c) Bloom (d) Weep

106. Condensation of water vapour on meat, brought from a cold store to ordinary room temperature is called as -

(a) Sweating (b) Shrinkage
(c) Bloom (d) Weep

107. Rupture of muscle & tissue due to large ice crystal formation is known as-

(a) Weeping of meat (b) Sweating
(c) Shrinkage (d) None

108. Bright red colour of meat due to the presence of oxymyoglobin is known as-

(a) Drip (b) Bloom
(c) Both (d) None

109. Canned meat products have a shelf life of at least _____ at ambient temperature-

(a) 1 year (b) 2 years
(c) 3 years (d) 4 years

110. Cured flavour of the meat is due to the reaction of-

(a) Fatty acids & sodium Nitrite (b) Common salt & sodium nitrate
(b) Sugar & salt (d) None

111. Cured flavour of the meat is the due formation of-

(a) Benzonitrile & pheylacetonitrile (b) Benzene & phenol
(c) Benzonitrile & acetone (d) None

112. Curing & smoking is mainly done for-

(a) Pig meat (b) Goat meat
(c) Poultry meat (d) Sheep meat

113. 50% of the smoke component is made up of-

(a) Phenol & formaldehyde (b) Acetone & formaldehyde
(c) Phenol& acetone (d) None

114. Phenol act as bacteriostatic while formaldehyde act as-

(a) Bactericidal (b) Bacteriostatic
(c) Both (d) None

115. Smoke is produced by combustion of sawdust or hardwood in smoke house at a temperature of -

(a) 300°C (b) 400°C
(c) 600°C (d) 160°C

116. Which of the following is a loss during freezing of meat-

(a) Bone darkening (b) Freezer burn
(c) Drip loss (d) All the above

117. 12-D concept is mainly used in-

(a) Dairy industry (b) Canning industry
(c) Wool industry (d) None

118. Ground meat, which is salted & stuffed in the animal casing is-

(a) Sausages (b) Nuggets
(c) Loaf (d) None

119. Meat is the———————— typeemulsion-

(a) Oil in water (b) Water in oil
(c) Fat in water (d) None

120. Cleaning- in- place (CIP) system is generally used in-

(a) Meat industry (b Fish industry
(c) Dairy industry (d) None

121. Central cleaning system (CCS) is generally used in-

(a) Abattoir & meat processing plant (b) Fish Industry
(c) Dairy Industry (d) None

122. Which of the following is/are automated cleaning system-

(a) Central cleaning system (CCS) (b) Self-contained cleaning (SCC) system
(c) Cleaning-in-place (CIP) system (d) All the above

123. Most commonly used anti-oxidant in foods-

(a) Butylated Hydroxyl Anisole (BHA) (b) Butylated Hydroxyl Toluene (BHT)
(c) Sodium hypochlorite (d) Sugar

124. Multiplication of bacteria is highest during-

(a) Lag phase (b) Log phase
(c) Stationary phase (d) None

125. Bacterial cells are increased in size but no multiplication takes place in-

(a) Lag phase (b) Log phase
(c) Stationery phase (d) None

126. Preservation enhances the shelf life of meat because of preservative technique-

(a) Prolongs the lag phase of bacterial growth
(b) Prolongs the log phase of bacterial growth
(c) Reduces the lag phase of bacterial growth
(d) Reduces the log phase of bacterial growth

127. Glycogen content & myoglobin content is highest in-

(a) Horse meat (b) Goat meat
(c) Pig meat (d) Cow meat

128. Vitamins lost during cold sterilization-

(a) B_1 (b) B_2
(c) C (d) All the above

129. Match the column: -

TABLE-I	TABLE-II
(1) Comminution of meat	(a) Mixing of curing ingredients with ground meat in a specified proportion
(2) Falsification of meat	(b) Incorporation of non-meat food items in meat product
(3) Meat extension	(c) Mixing of different animal meat
(4) Preblending of meat	(d) Reducing of raw meat into pieces

130. Cooking methods of meats are-

(a) Dry heat cooking (b) Moist heat cooking
(c) Microwave cooking (d) All

131. Which of the following sentence(s) is/are true about cooking methods of meat-

(a) Dry heat cooking involves Broiling, Roasting & Frying

(b) Moist heat cooking involves pressure cooking, stewing & simmering

(c) Moist heat cooking recommended for tough cuts of meat

(d) All the above

132. Recommended method of cooking for tender cuts of meat such as pork chops, chops of lamb, ground & comminuted meat etc. is-

(a) Dry heat cooking (b) Moist heat cooking

(c) Microwave cooking (d) None

133. Natural casings are prepared from-

(a) Mucosa (b) Submucosa

(c) Serosa (d) None

134. A canned product prepared from pork along with some cereal component is-

(a) Meat patties (b) Luncheon meat

(c) Meat nuggets (d) Meat loaves

135. Bloom is a property of-

(a) Cooked meat (b) Fresh meat

(c) Frozen meat (d) Cured meat

136. Myofibrillar proteins are-

(a) Fibrous (b) Globular

(c) Both a & b (d) None

137. Catgut (absorbable suture material) obtained from submucosa of small intestine of-

(a) Cat (b) Sheep

(c) Pig (d) Cattle

138. Meat product prepared from minced & seasoned meat & formed into cylindrical shape by natural or synthetic casings is known as-

(a) Sausages (b) Nuggets

(c) Humectant (d) Loaves

139. Mortadella, hot dog, bologna, salami & frankfurters are-

(a) Types of Sausages (b) Types of Casings

(c) Dairy products (d) None

140. Maws, chitterlings, middle, rounds & weasand are-

(a) Sausages (b) Casings

(c) Dairy product (d) None

141. Intestine which is used as food container is known as-

(a) Casings (b) Sausages

(c) Nuggets (d) None

142. Besides intestines, casings are also obtained from-

(a) Oesophagus (b) Urinary bladder

(c) Liver (d) Both a & b

143. Bung is a-

(a) Casing of rectum (b) Casing of caecum

(c) Both (d) None

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(c) Both (d) None

144. Match the column: -

TABLE-I	TABLE-II
(1) Hot dog	(a) Cured emulsion type meat sausage
(2) Mortadella	(b) Fresh emulsion type sausage
(3) Bologna	(c) Emulsion type sausage prepared from old animal meat
(4) Salami	(d) Dry sausage in cattle bladder
(5) Frankfurters	(e) Spicy sausage in weasand

145. Various additives employed for lowering water activity of food are known as-
(a) Humectants (b) Oxidising agent
(c) Reducing agent (d) None

146. Most commonly used humectants are-
(a) Glycerol,Sorbitol (b) Propylene glycol
(c) Nacl,Sugar (d) All

147. A ground meat item generally used as filling for burger roll or sandwich is-
(a) Meat patties (b) Luncheon meat
(c) Meat balls (d) Meat Loaves

148. Meat balls is also known as-
(a) Meat kofta (b) Meat Loaves
(c) Luncheon meat (d) None

149. A meat product which obtained by cutting meat loaves into small cuboidal pieces approximately (4 cm x 1.5cm x 1.5cm) dimensions is known as-
(a) Meat ball (b) Meat Nuggets
(c) Meat kofta (d) None

150. Which is referred as inspectors lymph node-
(a) Bronchial (b) Poplitial
(c) Mediastinal (d) None

151. Bacterial spoilage in chilled meat is due to-
(a) Psychrophilic bacteria (b) Mesophilic bacteria
(c) Thermophilic bacteria (d) Microaerophilic bacteria

152. Casings prepared from large intestine of Pig-
(a) Weasand (b) Bung
(c) Round (d) Chitterlings

153. Colour of Pigment Nitroso- haemochromogen is-
(a) Pink (b) Bright Red
(c) Brown (d) Red

154. The Indicator of faecal contamination is-
(a) E. coli (b) Staph. aureus
(c) Salmonella (d) S. faecalis

155. Measly beef is caused by-
(a) Cysticercus bovis (b) Cysticercus cellulosae
(c) Coenurus (d) None

156. Measly pork is caused by-
(a) Cysticercus bovis (b) Cysticercus cellulosae
(c) Coenurus (d) None

157. Instrument used to measure smoke density in smoke houses-
(a) Electric eye (b) Densitometer
(c) Anemometer (d) None

158. Commercial method for stunning of pig is-

(a) CO_2 gas stunning (b) Captive bolt pistol
(c) Electric stunning (d) None

159. Commercial method for poultry stunning is-

(a) CO_2 gas stunning (b) Captive bolt pistol
(c) Electric water bath (d) None

160. Common defect in cans due to under processing is/are-

(a) Flipper (b) Springer
(c) Soft Swell & Hard swell (d) All

161. Most important kind of chemical spoilage of canned meat is-

(a) Hydrogen swell (b) Flat Sour
(c) Flipper (d) Springer

162. TA spoilage of canned meat is caused by-

(a) Clostridium thermosaccharolyticum (b) Bacillus coagulans
(c) Clostridium nigrificans (d) None

163. Flat sour of canned meat is caused by-

(a) Bacilluscoagulans (b) Both a & b
(c) Bacillus stearothermolyticum (d) Clostridium spp.

164. Blackening of the inner surface of the can due to the production of H_2S gas occur mainly in-

(a) Flat sour (b) Sulphur strinker spoilage
(c) T.A. Spoilage (d) Hydrogen swell

165. Consistency of pork is-

(a) Very soft (b) Firm
(c) Very firm (d) None

166. National research center on meat is situated at-

(a) Hyderabad (b) Chennai
(c) Bangalore (d) Delhi

167. Intra- muscular fat is maximum in-

(a) Mutton (b) Beef
(c) Pork (d) Poultry meat

168. Subcutaneous fat is common in-

(a) Pork (b) Poultry meat
(c) Both a & b (d) Chevon

169. Maximum fat & minimum water content present is which meat-

(a) Pork (b) Poultry meat
(c) Beef (d) Chevon

170. Very firm consistency of meat is related to-

(a) Chevon (b) Mutton
(c) Beef (d) Pork

171. Glycogen content & myoglobin content are highest in-

(a) Horse meat (b) Beef
(c) Mutton (d) Pork

172. Iodine number, refractive index & linoleic acid content are highest in-

(a) Horse fat (b) Cow fat
(c) Sheep fat (d) Pig fat

173. Iodine number of horse fat is-

(a) 75 – 80 (b) 35 – 46
(c) 5 – 70 (d) None

174. **Surimi is a product of-**
(a) Meat (b) Fish
(c) Milk (d) Rice

175. **Organ meat is extremely rich in-**
(a) Vitamin B_{12} (b) Vitamin C
(c) Vitamin D (d) Vitamin E

176. **Intra-muscular fat is common in-**
(a) Mutton (b) Beef
(c) Both a & b (d) Poultry

177. **Cold shortening & Thaw rigor is commonly occurred in-**
(a) Pre-rigor meat (b) Rigor meat
(c) Post-rigor meat (d) None

178. **When pre-rigor meat is fast chilled below 15^{0}C up to 0^{0}C & 40% muscle shortening takes place is known as-**
(a) Cold shortening (b) Thaw rigor
(c) Cold Injury (d) None

179. **When pre – rigor meat is frozen, a severe type of rigor mortis occurs during thawing & 60-80% muscle shortening takes place is known as-**
(a) Cold Shortening (b) Thaw rigor
(c) Cold injury (d) None

180. **Vitamin maximum in poultry meat-**
(a) Niacin (b) B_1
(c) B_{12} (d) A

181. **Pneumonia at ante-mortem examination is-**
(a) Suspect (b) Unfit
(c) Condemned (d) Emergency Slaughter

182. **Best age of broiler for tandoori chicken-**
(a) 2 weeks (b) 4 weeks
(c) 6 weeks (d) 8 weeks

183. **Broilers with about————————of dressed weight are preferred for chicken Barbecue-**
(a) 500 g (b) 750 g
(c) 1000 g (d) None

184. **In India, the working of the slaughterhouse is governing by-**
(a) MFPO (b) PFA
(c) FSSAI (d) AGMARK

185. **Hyaluronidase enzyme is extracted from-**
(a) Bull or Ram tests (b) Boar testes
(c) Stallion tests (d) None

186. **Average conversion of raw bone-to-bone meal is-**
(a) 3 : 1 (b) 4 : 1
(c) 5 : 1 (d) None

187. **Average conversion of raw blood-to-blood meal is-**
(a) 3 : 1 (b) 4 : 1
(c) 5 : 1 (d) None

188. **Bone collagen is known as-**
(a) Ossein (b) Demineralized bone
(c) Both a & b (d) Bone Ash

189. Glue is a crude form of-

(a) Gum (b) Gelatin

(c) Collagen (d) None

190. In Cattle , the average hide yield is 7% of live weight while in sheep & goat average yield of skin is _____ % of live weight-ø

(a) 7% (b) 10%

(c) 11% (d) 15%

191. Skin of cattle & buffalo is known as hide while pig skin is known as-

(a) Skin (b) Hide

(c) Rind (d) Lard

192. Sole leather is obtained from which area of animal hide-

(a) Brisket (b) Butt

(c) Back (d) Leg

193. Boston butt, Jowl, Ham & Picnic-shoulder are the wholesale cuts of-

(a) Beef (b) Pork

(c) Mutton (d) Chevon

194. Chuck & Sirloin are wholesale cuts of-

(a) Beef & Carabeef (b) Pork

(c) Mutton (d) Chevon

195. Most tender cut of the beef carcass-

(a) Sirloin (b) Rump

(c) Chuck (d) Flank

196. Pig's foot used as food is known as-

(a) Trotter (b) Surimi

(c) Salami (d) None

197. Animal casings are graded mainly on the basis of-

(a) Colour (b) Length

(c) Diameter (d) Tensile strength

198. Bacon is prepared from-

(a) Jowl (b) Boston butt

(c) Ham (d) Belly

199. Technical fat is used in the manufacturing of-

(a) Edible Oil (b) Soap

(c) Lubricants (d) All

200. A cattle suffering from compound fracture of femur can be slaughtered as-

(a) Condemned (b) Emergency Slaughter

(c) Casualty Slaughter (d) None

201. Emergency slaughter in done in Animals suffering from-

(a) Acute pain

(b) Fracture of limb

(c) Pregnancy toxaemia & enterotoxaemia in sheep

(d) All the above

202. Prolong feeding of pigs on fish meal may lead to-

(a) White muscle disease (b) Mulberry heart disease

(b) Brown fat disease (d) None

203. Green rot in the egg is caused by-

(a) Pseudomonas (b) Serratia

(c) Cladosporium (d) Clostridium

204. Most common & best method of disposal of carcass is-

(a) Burial (b) Incineration

(c) Chemical method (d) None

205. Preferred method of disposal of an anthrax carcass is-

(a) Burial (b) Incineration

(c) Chemical method (d) None

206. Temperature of incinerator for carcass disposal is-

(a) 600 – 800°C (b) 120°C

(c) 400 – 600°C (d) None

207. Lime water (1:20) or suspension of bleaching powder (1:20) is mainly used in which method of carcass disposal-

(a) Burial (b) Incineration

(c) Chemical method (d) None

208. Proper sequence of meat cutting is-

(a) Carcass → Primal cuts → Sub-primal cuts → Retail cuts

(b) Carcass → Retail cuts → Primal cuts → Sub-primal cuts

(c) Carcass → Sub-primal → Primal → Retail cuts

(d) Carcass → Sub-primal → Retail cuts → Primal

209. All animal meant for slaughter should be rested at least for the————-hours&such animal should not be fed for at least————hours before slaughter but they should be provided with plenty of water-ø

(a) 24 hours, 12hours (b) 24 hours, 24 hours

(c) 12 hours, 24 hours (d) 24 hours, 48hours

210. Long axis of an abattoir should face in————————direction-

(a) East or West (b) North or South

(c) North or East (d) North or West

211. <u>Match The Column</u>:-

<u>TABLE- A</u>	<u>TABLE-B</u>
(1) Emergency slaughter	(a) Excited &Transit sickness
(2) Casualty slaughter	(b) Pneumonia
(3) Unfit for slaughter	(c) Emaciation
(4) Suspect	(d) Chronic conditions
(5) Delayed slaughter	(e Acute pain & fracture of limb

212. Headquarter of *Office International des Epizooties* (OIE) is at

(a) Paris (b) Rome

(c) Geneva (d) New Delhi

213. **International organization having headquarter at Geneva-**

(a) WTO (b) WHO

(c) ISO (d) All the above

214. **The World Organization for Animal Health (OIE) is an intergovernmental organization coordinating, supporting and promoting animal disease control was established in-**

(a) 1990 (b) 1946

(c) 1924 (d) 1995

215. **The carcass of lungs, trachea & heart is known as-**

(a) Pluck (b) Bung

(c) Giblet (d) Paunch

216. **The carcass of Gizzard, liver, and heart is known as-**

(a) Pluck (b) Bung

(c) Giblet (d) Paunch

217. **Match the column: -**

TABLE-I	TABLE-II
(1) Bung	(a) Gizzard, Liver & heart
(2) Pluck	(b) Diaphragm
(3) Weasand	(c) Oesophagus
(4) Skirt	(d) Lungs, trachea & heart
(5) Giblet	(e) Rectum

218. **Ready-to-eat comminuted meat product prepared from ground meat or meat emulsion or both is-**

(a) Meat balls (b) Meat nuggets

(c) Meat loaves (d) Meat patties

219. **Captive bolt pistol is not effective in**

(a) Cattle (b) Sheep

(c) Calves (d) Pig

220. **All meat inspection points in an abattoir should have light intensity of**

(a) 110 lux (b) 220 lux

(c) 440 lux (d) 540 lux

221. **Quaternaery ammonium compounds are surface active agents and commonly used for cleaning purpose due to their**

(a) Good wetting capabilities only (b) Biocidal effects only

(c) Better odour only (d) Good wetting capabilities as well as biocidal effect

222. **Which of the following agencies is responsible for the development of meat export?**

(a) FSSAI (b) AGMARK

(c) APEDA (d) BIS

223. **The presence of a metal piece in a box of processed meat producs is an example of**

(a) Chemical hazard (b) Physical hazard

(c) Biological hazard (d) Biochemical hazard

224. **Isoelectric focusing is applicable to detection of**

(a) Bacteria in meat products (b) Pesticide residues in meat

(c) Antibiotics in meat products (d) Meat adulteration

225. Which of the following techniques prevents cold shortening muscle abnormality

(a) Rapid chilling of prerigor meat (b) Electrical stimulation of carcass

(c) Rapid freezing of carcass (d) Hot boning and chilling

226. Which of the following muscle abnormalities are associated with genetics and breeding

(a) DFD meat (b) PSE meat

(c) Hot rigor meat (d) Cold shortening and thaw rigor

227. The phenomenon of severe shortening of muscles during chilling of pre-rigor meat is called

(a) Thaw rigor (b) Hot meat

(c) Cold shortening (d) Freezer burn

228. Retort products are generally packed in

(a) Acid resistant coated cans only (b) Sulphur resistant coated cans only

(c) Oil resistant coated cans only (d) Eithersulphur or oil resistant coated cans only

229. Which one of the following fibres has the highest crimpt count?

(a) Mohair (b) Camel hair

(c) Angoora wool (d) Fur fiber

230. The smoky flavor is due to

(a) Phenols (b) Organic acids

(c) Carbonyls (d) Gases

231. Egg nog is a popular egg product in England and is prepared with egg and

(a) Milk (b) Fish

(c) Milk (d) Cereals

232. Spray drying is used for whole egg powder manufacturing whereas albumen flakes are manufactured by

(a) Belt drying (b) Freeze drying

(c) Pan drying (d) Sun drying

233. Prerigor meat is preferred in preblending of emulsion formation due to

(a) Low cost only (b) Better flavor only

(c) Better emulsifying capacity only (d) Low cost as well as better flavor

234. Microwaves with frequency of 915 MHz are preferred over microwaves with frequency of 2450 MHz due to

(a) Safety (b) Faster and uniform heating

(c) Lower electricity consumption (d) Economical

235. Majority of sheep and goat reared for meat in India are from

(a) Extensive grazing system (b) Intensive grazing system

(c) Semi-intensive grazing system (d) Composite rearing system

236. Approximate water requirement in a sheep and goat slaughter house for hygienic meat production is

(a) 45-50 liter per animal (b) 20-25 liter per animal

(c) 100-125 liter per animal (d) 272 liter per animal

237. Electrical water bath stunning is generally followed in _____ meat plant

(a) Sheep and goat (b) Poultry

(c) Buffalo (d) Pig

238. Transportation stress in meat animals lead to

(a) Increase in glycogen level in tissue (b) Decrease in glycogen level in tissue
(c) Decrease in cortisol in blood (d) Increase in fat in uscles

239. Which one of the following condition justifies the emergency slaughter?

(a) Chronic diseases (b) Healthy animals
(c) Severe fracture (d) Paralysis

240. The major objective of stunning during the slaughter process is to

(a) Reduce pain and suffering of animal (b) Increase blood loss
(c) Reduce the blood splash (d) Increase blood glycogen

241. Which one of the following is not an objective method of quality assessment of food?

(a) Flavour profile test (b) Texture profile test
(c) Colour profile test (d) Difference test of analysis

242. Spoilage of fresh meat stored in refrigerator starts when the bacterial population on the surface reaches between

(a) Log 4-Log 5 (b) Log 7-Log 9
(c) Log 10-Log 12 (d) Log 2-Log 5

243. Which of the following groups of bacteria predominate in the meat spoilage?

(a) Pseudomonas and Acinetobacter spp
(b) Salmonella and Acinetobacter spp
(c) Staphylococcus and Pseudomonas spp
(d) Salmonella and Staphylococcus spp

244. Which one of the following is not a parasitic disease originating from meat and meat products?

(a) Trichinellosis (b) Toxoplasmosis
(c) Hydatidosis (d) Brucellosis

245. Which one of the following bacteria is a major problem in poultry products marketed in India?

(a) Campylobacter jejuni (b) Yersinia enterocolitica
(c) Pseudomonas stutzeri (d) Listeria inocula

246. Which one of the following classes of proteins has the highest biological value?

(a) Soy proteins (b) Meat proteins
(c) Cereal proteins (d) Legume proteins

247. Which of the following proteins are degraded by calpains during ageing?

(a) Troponin-T and Desmin (b) Titin and Myosin heavy chain
(c) Actin and Myosin (d) Actomyosin

248. Postmortem decrease of muscle pH is due to

(a) Proteolysis (b) Lipolysis
(c) Glycolysis (d) Glucogenosis

249. Red muscle fibres contain a higher content of

(a) Lipid and mitochondrial numbers (b) Glycogen and lipid
(c) Myoglobin and glycogen (d) Glycolytic cells

250. Which of the following bacteria can be found in spoiled canned meat?

(a) Pseudomonas spp. (b) Salmonella and Acinetobacter spp.
(c) Bacillus spp. (d) Acinetobacter spp.

☆☆☆

Answer Key

1. Pig
2. Watery pork
3. Cattle
4. Calf
5. Oxymyoglobin
6. Metmyoglobin
7. Salt
8. Rapid fall of muscle pH
9. Seam Fat
10. All the above
11. Kynophagy
12. Both
13. Prime Pork
14. All the above
15. All the above
16. Lamb fries
17. Rendering
18. Shammoying
19. All the above
20. Salt
21. Both
22. Both
23. Gelatin
24. 6 weeks
25. 5.5 – 5.7
26. All the above
27. Pork
28. Calcium
29. B-complex
30. Both
31. All the above
32. Both a & b

    [Note: Sweetbreads term used for the thymus & pancreas. thymus is also known as throat, gullet, or neck sweetbread while the pancreas is also known as heart, stomach, or belly sweetbread]
33. 21%
34. 5.6
35. Glycine
36. Glycine, proline, hydroxyproline
37. Cysteine, tryptophan
38. Lysine
39. 1-e, 2 –d, 3 –c, 4-b, 5 –a
40. Ritual Slaughter
41. Pig slaughtered with Evernazine method
42. Evernazine method
43. All the above
44. Kosher seal on brisket
45. Jhatka & Evernazine method
46. Both
47. Tapeworm
48. Mechanical
49. Chemical stunning
50. Pig
51. 70% CO_2 for 45 seconds
52. Alternating current of 250 mA & 75 volts for 10 second
53. Jhatka & Halal method
54. 5 minutes
55. 10 - 12 kg , 2-3 kg & 1-1.5 kg
56. Mecca
57. Splash & missed shock respectively
58. Splash
59. It blocks the nerve endings
60. Jewish ritual slaughter
61. 30
62. 550 Lux , 220 Lux & 110 Lux
63. 450 Liters
64. 10 Meters
65. All the above
66. 130-250 ppm
67. Both a & b
68. 1500-2000 mg /liter
69. Acto-myosin bond
70. Heart
71. Pork
72. Pork
73. Vitamin A
74. 250 cattle / hour
75. Lairage
76. Rail/line system

77. Mesentry
78. Tallow
79. 4 -5%
80. 15 -20°C temperature & 80% RH
81. Pork – firm meat
82. 500ppm & 200ppm
83. 1: 50
84. 4: 1
85. Chilling
86. Freezing
87. 4°C & (") 18°C
88. Stops the microbial growth
89. 6 months
90. 4 months
91. 2 months
92. 3 months, 2 months, 1 month
93. Curing
94. All the above
95. Pork
96. Nitroso-haemochromogen
97. Mono- Sodium- Glutamate (MSG)
98. Nitrate / Nitrite
99. Clostridium botulinum
100. Excess nitrite
101. Gamma rays
102. Co^{60} & Cs^{137}
103. U.V. rays
104. All the above
105. Shrinkage
106. Sweating
107. Weeping of meat
108. Bloom
109. 2 years
110. Fatty acids & sodium nitrite
111. Benzonitrile & pheylacetonitrile
112. Pig meat
113. Phenol & formaldehyde
114. Bactericidal
115. 300°C
116. All the above
117. Canning industry
118. Sausages
119. Oil in water
120. Dairy industry
121. Abattoir & meat processing plant
122. All the above
123. Butylated Hydroxyl Anisole (BHA)
124. Log phase
125. Lag phase
126. Prolongs the lag phase of bacterial growth
127. Horse meat
128. All the above
129. 1-d, 2-c, 3-b, 4-a
130. All
131. All the above
132. Dry heat cooking
133. Submucosa
134. Luncheon meat
135. Fresh meat
136. Both a& b
137. Sheep
138. Sausages
139. Types of sausages
140. Casings
141. Casings
142. Both a & b
143. Casing of caecum
144. 1-e, 2-d, 3-c, 4-b, 5-a
145. Humectants
146. All
147. Meat patties
148. Meat kofta
149. Meat Nuggets
150. Bronchial
151. Psychrophilic bacteria
152. Chitterlings
153. Pink
154. E. coli
155. Cysticercus bovis
156. Cysticercus cellulosae
157. Electric eye
158. CO_2 gas stunning
159. Electric water bath
160. All
161. Hydrogen swell
162. Clostridium thermosaccharolyticum
163. Both a & b
164. Sulphurstrinker spoilage

165. Very soft
166. Hyderabad
167. Mutton
168. Both a & b
169. Pork
170. Chevon
171. Horse meat
172. Horse fat
173. 75 – 80
174. Fish
175. Vitamin B_{12}
176. Both a & b
177. Pre-rigor meat
178. Cold shortening
179. Thaw rigor
180. Niacin
181. Suspect
182. 6 weeks
183. 750 g
184. FSSAI
185. Bull or Ram tests
186. 3: 1
187. 5: 1
188. Both a & b
189. Gelatin
190. 11%
191. Rind
192. Butt
193. Pork
194. Beef & carabeef
195. Sirloin
196. Trotter
197. Diameter
198. Belly
199. Soap
200. Emergency slaughter
201. All the above
202. Brown fat disease
203. Pseudomonas
204. Burial
205. Incineration
206. 600 – 800°C
207. Chemical method
208. Carcass àPrimal cuts àSub-primal cuts àRetail cuts
209. 24 hours, 12hours
210. East or West
211. 1-e, 2-d, 3-c, 4-b, 5-a
212. Paris
213. All the above
214. 1924
215. Pluck
216. Giblet
217. 1-e, 2-d, 3-c, 4-b, 5-a
218. Meat loaves
219. Pig
220. 540 lux
221. Good wetting capabilities as well as biocidal effect
222. APEDA
223. Physical hazard
224. Meat adulteration
225. Electrical stimulation of carcass
226. PSE meat
227. Cold shortening
228. Sulphur resistant coated cans only
229. Mohair
230. Gases
231. Milk
232. Pan drying
233. Better emulsifying capacity only
234. Faster and uniform heating
235. Extensive grazing system
236. 45-50 liter per animal
237. Poultry
238. Decrease in glycogen level in tissue
239. Severe fracture
240. Reduce pain and suffering of animal
241. Difference test of analysis
242. Log 7-Log 9
243. Pseudomonas and Acinetobacter spp
244. Brucellosis
245. Campylobacter jejuni
246. Meat proteins
247. Troponin-T and Desmin
248. Glycolysis
249. Lipid and mitochondrial numbers
250. Bacillus spp.



Poultry Science

Table 1: Parts of oviduct & their contribution

S.N.	Parts of oviduct in a sequential manner	Length	Time taken by egg in each part	Their contribution
1.	Infundibulum	10 cm	15 min.	Collection of yolk from ovary
2.	Magnum	38 cm	3 hours	Secrete albumin (egg white)
3.	Isthmus	10 cm	1h,15 min.	Decide shape of Egg, Secretes shell membranes
4.	Uterus	10 cm	21 hours	Secretes shell, shell pigment & cuticle
5.	Vagina	5 cm	-	Hold egg until it is laid

Note:-

- **Oviposition**: Act or process of **egg laying in birds**
- Total time taken: **24-26 hours**
- Hormone responsible: **Arginine vasotocin (AVT)** from posterior pituitary
- **Incubation period:** time-period from oviposition to hatching of an egg
- Chicken egg of 58 g (standard size) has **74% water & 26% dry matter** (dry matter includes-**13% protein**, 11% fat,1% carbohydrate & 1% ash)
- A whole egg of chicken consists of **11% shell & shell membrane, 58% albumin & 31% yolk**
- **Eggshell consists of 96% inorganic matter** (94% calcium carbonate, 1% magnesium carbonate & 1% calcium phosphate) **4% organic matter**
- **Vitamin C is absent in eggs, meat & milk**

Table 2: Zoological name and incubation period of different species

S.N.	Species	Zoological name	Incubation period	Standard egg wt.
1.	Domestic fowl/chicken	*Gallus domesticus*	**21 days**	58 g
2.	Duck	*Anas platyrhynchos*	**28 days**	70 g
3.	Turkey	*Meleagris gallopavo*	**28 days**	85 g
4.	Quail	*Coturnix coturnix japonica*	**17 days**	10 g

♦ **Terminology related to poultry:-**

- **Layer:** - poultry raised for the purpose of egg production
- **Broiler/Fryer**: - young chicken of either sex up to 8 weeks of age used for meat purpose.
- **Roaster**: - young chicken of either sex up to 9-11 weeks of age used for meat purpose & heavier than the broiler
- **Capon**: - castrated male fowl less than 10 month of age
- **Cockerel**: - male fowl under 1 year age
- **Pullet**: - female chicken lay 1st time
- **Loafer**: - unproductive layer
- **Cock /Rooster**:- adult male fowl
- **Hover:** -heat source for brooding
- **Clutch**: -a batch of an egg laid by the hen on consecutive days.

Candling of eggs: done twice by electric Candler in a dark room

(1) **First candling**: On the **7th day** of incubation **to discard infertile eggs**

(2) **Second candling**: On **18th day** of incubation **to discard dead-in-shell**

- **Types of incubator**: - (2 types)
  - (1) **Natural draft incubator**/flatetype: - it is usually of **small capacity**. It is further two type (a) hot water type (b) hot air type
  - (2) **Forced draft incubator/cabinet type: -used commercially.**
- **Factor essential for proper incubation**:-
  - **(A) Temperature:**
    - (i) During first 18 days of incubation:-37.5 to 37.7 ^{0}C (99.5 to 99.9 ^{0}F)
    - (ii) During last 3 days of incubation:-37 ^{0}C (98 ^{0}F)
  - **(B) Humidity:**
    - (i) During first 18 days of incubation:- 50-60% (84 to 86 ^{0}F in wet bulb)
    - (ii) During last 3 days of incubation:- 75% (90 ^{0}F in wet bulb)
  - **(C) Ventilation: by O_2 & CO_2**

(A) Optimum O_2 level of incubator is 21% **Condition:-**	(B) Optimum CO_2 level of incubator is 0.5% **Condition:-**
(1) For every 1% fall in O_2 level from 21%, hatchability falls by 5%	(1) For every 1% rise in a CO_2 level beyond 0.5%, embryonic mortality rises.
(2) For every 1% rise in O_2 level from 21%, hatchability rises by 5%	(2) If CO_2 level rises beyond 5% for a prolong period, then all embryo died & hatchability reaches to 0%

Note:-

(1) **Position of eggs in the incubator**: - position of the egg with respect to setter & hatcher tray

(a) **In Setter(first 18 days of incubation):- Upright position (broad end upward)**

(b) In Hatcher (last 3 days of incubation): - Horizontal position

(2) **Turning of eggs**: - occur at 45^0 vice-versa

(a) Objective:- to prevent embryo sticking to the shell membrane

(b) Turning: for optimum hatchability at least 8 times in a day during first 18 days of incubation

- **Egg and its properties**:-
  - (1) **Haugh unit:**
    - **Albumin quality** of egg is measured in term of haugh unit
    - It measures the height of albumin.
    - **Haugh unit of standard chicken egg is 72** (range = 65-85)
  - (2) **Yolk index:**
    - Yolk quality is measured in term of yolk index
    - It reflects the spherical nature of yolk
    - **Yolk index of std. egg is 0.50** (range = 0.40-0.50)
    - Yolk index = Yolk height/Yolk width
  - (3) **Egg shape index (ESI):**
    - It is measured by **Vernier Caliper**
    - ESI = Maximum width/Maximum length × 100
    - ESI of chicken egg is 74, ESI of Duck egg is 72, ESI of quail egg is 78
    - Interpretation: - (1) high-valueESI: -more rounded egg (2) lower value of ESI: - more elongated egg.

(4) **Shell strength of egg**:
- It is directly proportional to shell thickness.
- It is measured by **Screw gauge**
- Shell thickness or Strength of std. egg = 0.30-0.50mm

(5) **The specific gravity of egg**:
- Determined by brine flotation technology
- Specific gravity of egg = 1.060-1.090
- Higher specific gravity indicates thick-shelled egg.

Note:-
- 100 gm chicken meat contain 60 mg cholesterol.
- Cholesterol content of 58 g standard egg of a chicken is 230 mg.
- Albumin of egg consists of four layers: Outerthin, outerthick, inner thin, inner thick.
- An inner thick layer of albumin: Chalaziferous layer (which holds the yolk in position)
- Physiological zero temperature: - the temperature at which embryonic growth is arrested. its value is 21.1°C or 70°F
- Best age of debeaking: day-old chick
- Time of Marek's disease vaccination (HVT-MD Vaccine): day-old chick
- Broilers are vaccinating against only three diseases: - Marek's disease, Gumboro & Ranikhet
- Brooding: Process of providing extra heat to the chickens until they become well feathered (0-8 weeks)
- One Brooding unit: 250 chicks, four 60-watt bulbs hanging at 6-inch height, a brooder guard of 5 feet radius, 3 feeders (egg tray) & 4 waterers

Table 3: Artificial brooder

S.N.	Age of chicks	Floor space per chick (in cm^2)	Temperature of brooder	Water space
1.	1st week	**100-120**	**95°F**	4 waterers per brooder
2.	2nd – 4th weeks	250-300	2nd week:-90°F 3rd week:- 85°F 4th week:- 80°F	4-6 waterers of 3 litre capacity per brooder & fill waterer at least twice daily
3.	5th-8th weeks	700-800	80°F	Use water trough with adjustable stand

- **Classification of poultry breeds**:-

(1) **American breeds**: Rhode Island Red (RIR), New Hampshire, Plymouth Rock, Jersey black giant, Araucana

(2) **Mediterranean breeds**: Leghorn,Minorca,Ancona, Andalusian

(3) **English breeds**: Cornish, Orpington, Australorp, Sussex, Dorking

(4) **Asiatic breeds**: Brahma, Cochin, Langshan

(5) **Indian breeds**: Aseel, Kadaknath, Busra, Chittagong, etc.

Note:-
- All poultry breeds laid brown tinted eggs while **Mediterranean breeds laid white shelled eggs**
- White Leghorn is best layer breed in the world while Cornish is best broiler breed in the world.
- **Jersey black giant** is heaviest breed & **kadaknath** is the lightest breed of poultry in the world.
- Andalusian breed laid **blue shelled eggs**

- Araucna breed gives blue/green coloured eggs.
- English breeds are known as table bird
- Indigenous breeds (desi hen) are the best mother for hatching
- All American breeds are dual purpose breeds

Table 4: Important poultry breeds

S.N.	Breed	Origin&distribution	Characters
1.	**Aseel/Indian game/Lucknow ka murga/ Fighting cock**	Chhattisgarh, Orissa and Andhra Pradesh	• Known for its high stamina, **majestic gait, and excellent fighting quality** • Meat type breed • Pea comb which is small & firmly set on the head • Wattles & earlobes are bright red & beak is short. • **Broodiness is most common**, hen is a good setter & **best mother** • Std. wt. of cock is 4.5Kg & of the hen is 3.5Kg.
2.	Kadaknath	Jhabua & Dhar districts of M.P.	• Also known as **"Kalamasi"** (fowl with black flesh) • **The comb, wattles & tongue are purple** • **Maximum disease-resistant** poultry breed • It's meat having **aphrodisiac property** (stimulate sexual desire) • It is medicinal purpose breed • Std. wt. of cock is 1.5Kg & of the hen is 1.0Kg
3.	Chittagong	Meghalay and Tripura	• Also known as **"Malay"**
4.	Busra	Gujarat,Maharashtra	
5.	Brahma	Brahmaputra valley	
6.	Cochin	Shanghai (China)	• Also known as **"Shanghai fowl"**
7.	Leghorn	Itlay	• **Best layer breed in the world** • All commercial layer hybrid derived from this breed • Bird like appearance • Std. wt. of cock is 2.7Kg & of hen is 2.0Kg
8.	Rhode Island Red		• Std. wt. of cock is 3.8Kg & of hen is 2.8Kg
9.	Jersey black giant		• **Heaviest breed in the world** • Std. wt. of cock is 5.9 Kg & of hen is 4.5Kg

Table 5: Requirement of broiler feed& layer feed (According to BIS 2007)

S.N.	Index	Broiler Prestarter (Ist week)	Brolier starter (2nd - 3rd weeks)	Brolier finisher (4th - 6th (weeks)	Layer Chick	Layer Grower	Layer Phase-I	Layer Phase-II
1.	Salt% (max.)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
2.	Moisture content (max.)	11	11	11	11	11	11	11
3.	Linoleic acid (g/ 100g fee(d) min.	**1.1**	**1.1**	**1.1**	1.0	1.0	**1.0**	**1.0**
4.	CP% (min.)	23	22	20	20	16	18	16
5.	CF% (max.)	5.0	5.0	5.0	7.0	9.0	9.0	10
6.	AIA% (max.)	2.5	2.5	2.5	4.0	4.0	4.0	4.5
7.	EE% (min.)	3.0	3.5	4.0	2.0	2.0	2.0	2.0
8.	Ca% (min.)	**1.0**	**1.0**	**1.0**	1.0	1.0	**3.0**	**3.5**
9.	Phosphorus %(min.)	0.7	0.7	0.7	0.7	0.65	0.65	0.65
10.	ME(Kcal/g) min.	3000	3100	3200	2800	2500	2600	2400
11.	Aflatoxin B_1 (pp(b), max.	20	20	20	20	20	20	20

Note: Broiler ration should contain 22-24% crude protein and layer ration should contain 16-18% crude protein

- **Modern feed additives for poultry**:-
  - (1) **Additives that promote feed intake or selection:**
    - (a) **Antioxidants:** Butylated hydroxytoluene (BHT); Santoquin; Ethoxyquin; Butylated hydroxyanisole (BHA); DPPD (Diphenyl paraphenyl diamine)
    - (b) **Flavoring agents:** Poultry nector
    - (c) **Pellet binder:** Sodium bentonite (clay); Molasses; Guar meal; By-product of wood pulp industry consisting mainly- hemicelluloses & lignin
  - (2) **Additives that enhance the colour or quality of the marketed product:**
    Examples: - Xanthophylls, Maize, Canthaxanthin
  - (3) **Additives that facilitate digestion & absorption:**
    - (a) **Grit**- oyster shell & lime-stone
    - (b) **Chelates** - EDTA
    - (c) **Enzymes – beta-glucanase enzymes preparations** such as Agrozyme, Diazyme
    - (d) **Probiotics – beneficial strains of lactobacillus & streptococcus**
    - (e) **Antibiotics** – penicillins, streptomycins
    - (f) **Feed antioxidant– Ethoxyquin**
  - (4) **Additives that alters metabolism**
    (a) Hormones – Diethylstilbesterol (DES); Thyroxine; **Dienestrol diacetate**
  - (5) **Additives that alters health status**
    (a) Antifungal additives
    (b) Anticoccidial drugs
    (c) Anthelmintic drugs

- **Methods of sexing of chicks:**
  (1) **Japanese method/Vent method/Cloaca method**: -it is the **best method of sexing in** which genital eminence of **day old chick is seen**
  (2) **Proctoscope method**
  (3) **Autosexing**: **-By sex-linked characters** such as (a) Colour of plumage (barred plumage in poultry) (b) feather growth(slow feathering or rapid feathering)

- **The reproductive system of poultry:-**
  - At birth, two ovaries & two oviducts are there but in adult poultry **only left ovary & left oviduct remains functional**

- **The digestive system of fowl:-**
  - **Fowl has two-chambered stomach** (proventriculus & Gizzard)
  - **Crop**: -It is the enlargement of esophagus having the function of **temporary storage of food**. It is **absent in Duck.**
  - **Proventriculus**: **Glandular stomach**
  - **Ventriculus/Gizzard/Muscular stomach: It is the largest single organ of the body.** Its secretions contain **"koilin"** which makes it hard.

  Function: Crushing & grinding of food
  - **Cloaca**: -It connects large intestine to the Vent. It is a common opening for the digestive, reproductive, and urinary tracts.

- **Cannibalism (eating of own species) & feather picking in poultry**:-
  - Reason: It occurs in flocks fed fibre-free diets
  - The chicken diet should contain 3-4% crude fiber.
  - This problem is more with pelleted & crumbled diet.

- **Egg producing carrier of a laying hen**:-
  - Egg production starts at 22 weeks of age (5.5 months) then rise sharply
  - Peak egg production: 32-35 weeks of age
  - Then egg production gradually declines @ 0.5 per week
  - Replace the layer at the age of 72 weeks (18 months)

Table 6: Egg production cycle divided into three phases

S.N.	Phases of egg production	Period of phases	Events
1.	Phase –I	from 22 weeks to 42 weeks of age	Egg production reaches to 0 to peak. Approximately 85% production Layer attains mature body wt.Size of egg gradually increases (36gms per egg at 22 weeks of age & 58gms per egg at 42 weeks of age)
2.	Phase –II	from 43 weeks to 62 weeks of age	Egg production declines up to 65%
3.	Phase –III	from 63 weeks to 72 weeks of age	Egg production is less than 65%

- **Abnormal eggs**:-

(1) **Double-yolked eggs**:

- **Reason**: two ova ripening at the same time or one ovum pushed back into oviduct at the same time when another ovulation takes place.
- **More common in Pullet than older hens**

(2) **Meat spot & blood spot**: -result of hemorrhage in the ovary or in the oviduct

(a) **If the spot is in yolk**: **hemorrhage of ovary or infundibulum**

(b) **If spot is in albumin**: **hemorrhage of magnum**

(3) **An egg within an egg condition**: due to **reverse peristalsis of the oviduct**

- **Special points**:-

(1) **Moulting**: Process of shedding & renewing feathers

- During the moult, the bird has a complete rest from laying. It normally occurs once in a year.
- Normal order of moulting is: **Head(1st), Neck, Body, Wing & Tail (last)**
- Three types of moulters: Early, medium & late
- **Early moulters are poor layer**
- **Late moulter are good layer**
- Early moulter takes a longer break from laying so they should be culled

(2) **Broodiness**: external evidence of the maternal instinct

- It is a dominant sex-linked character
- **Good layers are less broody** such as Leghorn
- **Prolactin hormone** is responsible for broodines

(3) **Depigmentation**:

- Order of disappearance of pigment from the body is: Vent (1st), eye ring & ear lobes, beak, shanks (last)
- Depigmentation firstly occurs in those body parts having good blood circulation.

(4) **Temperament**: -A good layer is more active, alert & easy to handle than a poor layer.

(5) **Persistency**: - Bird continues to lay well towards the end of her first laying year.

- **Methods of feeding**:

(a) **Whole grain feeding**: Selective feeding is maximum in this method of feeding

(b) **Grain& mash feeding**: Slightly better than whole grain feeding

(c) **All mash feeding**: Best method for all types of poultry housing. This method prevents selective feeding.

(d) **Pellet feeding**: Minimize the wastage during feeding but pellets are 10% more expensive than other feed.

(e) **Restricted or controlled feeding**

- **Different types of housing system of poultry**:

(A) **Free range system/Extensive system**: oldest method of poultry housing

(B) **Semi-intensive system**

(C) **Folding unit system**:

- Floor space requirement per bird: 1square foot in house & 3 sq.ft. in run (total: 4 sq.ft.per bird)

(D) **Intensive system**:-

(1) **Deep litter system: for both broiler & layer housing**
- Depth of the litters: **8-12 inches**
- Floor space: 3.5 - 4 sq.ft. per bird
- To maintain dryness of the litter: Superphosphateor hydrated lime is mix with litter @ 0.5 Kg per 15 sq.ft. of floor space.
- **Turning of litter**: once weekly (at least)

(2) **Cage system (Battery system): for layer housing only**
- Floor space per layer: 14 × 16× 17 $inch^3$

♦ **Preservation of eggs**:-

(A) **Methods of preserving fewer numbers of eggs:**
(1) **By using earthen pot**
(2) **Immersion in liquids:** by lime water treatment or water glass treatment
(a) Lime water treatment [$CaO + H_2O \rightarrow Ca(OH)_2$], film of calcium carbonate seals the pores of egg shell (preserve for 1 month at room temperature)
(b) Water glass treatment: 1part sodium silicate in 10 parts of water, silica seals the pores
(3) **Oil coating method**
(4) **Refrigeration**

(B) **Methods of preserving more numbers of eggs** (Commercial preservation):-
(1) **Cold storage method**
(2) **Thermo-stabilization method**: stabilization of albumin quality **(oil bath at 55°C for 15 min. or 58°C for 10 min)**
- It cause coagulation of thin layer of albumin just below the shell membrane there by blocking the passage of air & moisture

(3) **Pasteurization**

♦ **Some important poultry diseases**:-
- **Viral:**Ranikhet, Gumboro, Marek's disease, Fowl pox, Infectious bronchitis(I.B.)
- **Bacterial**: Pullorum, Chronic respiratory disease, Infectious coryza
- **Fungal**: Aspergillosis(Brooder pneumoni(a) & Aflatoxicosis
- **Vitamins& minerals deficiency diseases**: Nutritionalroup (vita. A); Polyneuritis (vita. B_1); Curled toe paralysis (vita. B_2); Crazy chick disease/Encephalomalacia (vita. E); Perosis/ Slipped tendon (Mn, Biotin, Choline, Folic acid); Swollen hock syndrome (Zn); Fatty liver kidney syndrome/FLKS (Biotin); Femoral head necrosis (Mo)

♦ *Important points:-*

1. Projects and Institutes whose efforts to develop poultry industry in India:
   - All India Poultry Development Project
   - Central Breeding Poultry Farms
   - Random Sample Units
   - Central Poultry Development Organization and Training Institute (CPDO & TI)
   - Central Avian Research Institute (CARI)
   - All India Coordinated Research Projects on Poultry Breeding and Poultry Nutrition
   - National Egg Coordination Committee (NECC)
   - The National Agricultural Co-operative marketing Federation of India (NAFED)
2. Chicken are able to digest all disaccharides except **lactose** because lack of enzyme lactase.
3. Avian bile contain only one bile salt **taurocholate** for emulsification of fat.
4. Essential amino acid for poultry: - Glycine and Serine
5. Egg collection at least 5 times in a day in deep litter system and 2 times in a day in cage system.
6. Pellet feeding increases body weight and improve feed conversion in broilers and layers.
7. Pellet feeding is economically advantageous for broilers but not for layers.

8. Gable type roof is mostly preferred in poultry house.
9. In deep litter system, litter contains 12 % moisture. If it exceeds 30 % than "balls" formation occur and birds bear balls in their clasw tips and it is sign of bad litter.
10. Recycling of nutrient is found in deep litter system and absent in cage system.
11. Shelled eggs are mostly preserved by thermostabilization with oil and cold storage.
12. **Prebiotics:** - Non-digestible food substances that selectively stimulate the growth of favourable species of bacteria in gut. These are work as feed materials for probiotic bacteria. Ex: - Inulin, Oligofructose, MOS, FOS
13. **Probiotics:** - Live cultures of of non-pathogenic organisms that given orally and they maintain microbes balance in small intestine in animal body. Ex: - favourable bacterial strain of Lactobacillus and Streptococcus
14. Synbiotics = **Prebiotics + Probiotics**
15. Spoilage of eggs: -
    - Green rot develop due to spoilage of *Pseudomonas*
    - Black rot develop due to spoilage of *Proteus*
16. **Zoological classification of Poultry**

(a) In order galliformis-
- Family meleagridiae- Turkey
- Family Phasianidae- Japanese quail, Fowl, Pheasant

(b) In order ansariforms-
- Family antidae- Duck
- Family anseridae- Muscovy duck, Geese
- Family Numitidae- Guinea fowl

Table 5: Requirement of broiler feed (According to ICAR 2013)

S.N.	Index	Chicks (0-4 wk)	Grower (5-18 wk)	Pre-breeder (19-23 wk)	Breeder (24 wk onwards)
1.	CP%	20	16	16.5	16
2.	Ca%	1	1	1.5	3
3.	Phosphorus%	0.45	0.45	0.38	0.35
4.	ME(Kcal/kg)	2800	2650	2700	2700

Table 5: Requirement of layer feed (According to ICAR 2013)

S.N.	Index	Laying pullet (0-8 wk)	Laying pullet (8-16 wk)	Laying pullet (16-18 wk)	Laying pullet pullet (18-30 wk)	Laying pullet (>30 wk)
1.	Linoleic acid %	1	0.8	0.8	1.1	1
2.	CP%	18.5	15.5	15	20	16.5
3.	Ca%	1	0.8	2	3.8	3.6
4.	Phosphorus%	0.4	0.35	0.32	0.36	0.32
5.	ME(Kcal/kg)	2600	2600	2700	2750	2600

♦ **Reference Books**:-

1. A Textbook of Animal Husbandry by G.C.Banerjee, 8th edition
2. Handbook of Animal Husbandry by V.K.Tanja, 3rd revised edition
3. Poultry Production by R A Singh

Objective Questions

1. **Chicken egg with more than 70 g weight is known as-**
   (a) Pee-wee egg (b) Jumbo egg
   (c) Large sized (d) Normal egg
2. **Underweight egg (less than 40 g) is generally known as-**
   (a) Pee-wee egg (b) Jumbo egg
   (c) Small sized (d) None
3. **Average weight & energy provided by a standard poultry egg is-**
   (a) 58 g, 75 calorie (b) 65g, 75 calorie
   (c) 50g, 85 calorie (d) 58 g, 90 calorie
4. **The length of the ovulatory cycle is hen is-**
   (a) 16-18 hours (b) 18-20 hours
   (c) 24-26 hours (d) 26-28 hours
5. **Guards of eggs are-**
   (a) Ovomucoid (b) Conalbumin
   (c) Lysozyme (d) All the above
6. **Early moulters are-**
   (a) Poor layer (b) Good layer
   (c) Both (d) None
7. **Order of moulting in layers (from 1st to last) –**
   (a) Head, neck, breast, body, wings, tail (b) Head, breast, body, neck, wings, tail
   (c) Tail, wings, body, breast, neck, head (d) Tail, wings, body, Neck, breast, head
8. **Order of depigmentation in layer (from 1st to last)-**
   (a) Vent, Eye ring &Earlobes, Beak, Shank
   (b) Shank, Beak, Earlobes, Vent
   (c) Vent, Beak, Shank, Body, Earlobe
   (d) Vent, Beak, Shank, Earlobe, Body
9. **Broodiness, feather growth &colour of plumage are-**
   (a) Sex-linked traits (b) Sex-limited traits
   (c) Sex-influenced traits (d) None
10. **Which of the following statement(s) is/are true about late moulters-**
    (a) Late moulters are good layer
    (b) In late moulters, moulting starts in october& completed in 6 weeks
    (c) They continue to lay eggs during moulting period
    (d) All the above
11. **Which of the following is true about early moulter-**
    (a) Early moulters are poor layer
    (b) In Early moulters, moulting starts in June, July& completed in 3-4 months
    (c) Early moulters do not lay eggs during moulting period
    (d) All the above
12. **Commercial housing system of poultry housing is?**
    (a) Deep litter system (b) Cage system
    (c) Extensive system (d) Both a & b
13. **Commercial housing system used for layer housing is?**
    (a) Deep litter (b) Cage system
    (c) Both (d) None

14. **The commercial system used for Broiler housing is-**
(a) Deep litter only (b) Cage system only
(c) Both (d) None

15. **Poultry stomach is-**
(a) 2 chambered (b) 3 chambered
(c) 4 chambered (d) 1 chambered

16. **Glandular stomach & muscular stomach of poultry are respectively-**
(a) Proventriculus & Gizzard (b) Ventriculus & proventriculus
(c) Proventriculus & Ventriculus (d) Both a & c

17. **The characteristic yellow colour of egg yolk is due to-**
(a) Xanthophyll (b) Carotene
(c) Riboflavin (d) Biotin

18. **Egg yolk with blood spot is indicative of-**
(a) Haemorrhage in ovary & infundibulum (b) Haemorrhage in Magnum
(c) Haemorrhage in uterus (d) None of the above

19. **Egg albumin with blood spot is indicative of-**
(a) Haemorrhage in magnum (b) Haemorrhage in infundibulum
(c) Ovarian haemorrhage (d) None

20. **Soft shelled eggs are due to deficiency of-**
(a) Calcium in feed (b) Phosphorus in feed
(c) Carotene in feed (d) None

21. **An egg within egg condition is due to-**
(a) Double yolk egg (b) Reverse peristalsis of oviduct
(c) Calcium deficiency in diet (d) Feeding of cotton seed cake

22. **The greenishcolour in egg white (albumin) is usually due to-**
(a) Carotene (b) Riboflavin
(c) Xanthophyll (d) Iron sulfide (FeS)

23. **Darkening of egg yolk is a hardboiled egg is due to the formation of-**
(a) H_2S (b) Iron sulfide
(c) H_2gas (d) Riboflavin

24. **Off coloured egg production by layer is mainly due to?**
(a) Feeding of cotton seed cake (b) Feeding of biotin
(c) Feeding of maize (d) None

25. **MATCH THE COLUMN:-**

TABLE – I	TABLE – II
1. Ovomucoid	(a) Unproductive layer
2. Yolk index	(b) Iron chelating
3. Conalbumin	(c) Castrated male fowl
4. Haugh unit	(d) Yolk quality
5. Capon	(e) Trypsin inhibitor
6. Loaffer	(f) Albumin quality

26. **Most intensive type of poultry housing is-**
(a) Cage system/Battery system (b) Deep litter system
(b) Folding unit system (d) Semi-intensive

27. **The depth of litter material in deep litter system of housing should be-**
(a) 8-12 inches (b) 0-3 inches
(c) 3-6 inches (d) 12-18 inches

28. **In Artificial brooder, temperature & floor space requirement per chick during the 1st week of age should be-**
(a) 95°F, 100-120 sq. cm (b) 70°F, 150-200 sq. cm
(c) 90°F, 250-300 sq. cm (d) 80°F, 250-300 sq. cm

29. **Average protein content of chicken meat & egg are respectively-**
(a) 21% & 13% (b) 13% & 21%
(c) 21% & 15% (d) None

30. **Cholesterol content of 58g standard egg of poultry is-**
(a) 250 mg (b) 100 mg
(c) 500 mg (d) 750 mg

31. **The process of egg laying in poultry is known as-**
(a) Hatching (b) Oviposition
(c) Egg laying (d) None

32. **The incubation period for chicken & duck are respectively-**
(a) 21 days, 28 days (b) 21 days, 26 days
(c) 28 days, 21 days (d) None

33. **Cannibalism & feather picking in poultry is mainly due to-**
(a) Fibre-free diet (b) Fat-free diet
(c) High fiber diet (d) High carbohydrate diet

34. **Position of egg in setter (1st 18 days of incubation) & hatcher (last 3 days of incubation) are respectively-**
(a) Upright & Horizontal (b) Horizontal & Horizontal
(c) Horizontal & upright (d) None

35. **Albumin is secreted by which part of oviduct-**
(a) Infundibulum (b) Magnum
(c) Uterus (d) Isthmus

36. **Which of the following is a quality of good layer-**
(a) Lack of broodiness (b) Alertness
(c) Late moulting (d) All

37. **Optimum concentration of CO_2& O_2 in incubator should be respectively-**
(a) 0.5% & 21% (b) 1% & 21%
(c) 2% & 21% (d) None

38. **Most critical factor during incubation is-**
(a) Temperature (b) Humidity
(c) Turning of egg (d) None

39. **Albumin forms————————% of the egg weight-**
(a) 58% (b) 31%
(c) 11% (d) None

40. **Shell & shell membrane together form————————% of egg weight-**
(a) 58% (b) 31%
(c) 11% (d) None

41. **Contribution of inorganic & organic matter in egg shell should be respectively-**
(a) 96% & 4% (b) 90% & 10%
(c) 80% & 20% (d) None

42. **Germinal disc of fertile egg & infertile egg are respectively known as-**
(a) Blastoderm & Blastodisc (b) Blastodisc & Blastoderm
(c) Blastoderm & Blastopore (d) None

43. **Which of the following is an incubation related problem?**
(a) Early embryonic death (b) Piped egg
(c) Dead-in-shell (d) All

44. **Dead-in-shell condition of chicken embryo is due to-**
(a) Poor ventilation (b) Faulty turning of eggs
(c) Both a & b (d) Low moisture in incubation

45. **Optimum temperature & moisture during 1-18 days of incubation are respectively-**
(a) 37.5°C & 60% R.H. (b) 45°C & 90% R.H.
(c) 37.2°C & 70% R.H. (d) 35°C & 80% R.H.

46. **Turning of egg in the incubator should be at-**
(a) 45° vice-versa (b) 90° vice-versa
(c) 60° vice-versa (d) None

47. **Egg fails to hatch (piped egg condition) is mainly due to-**
(a) Low moisture in Incubator (b) Poor ventilation
(c) Low temperature (d) None

48. **The early embryonic death of the chicken embryo is due to?**
(a) Too high or too low temperature in incubator
(b) High humidity in incubator
(c) Less humidity in incubator
(d) None

49. **Immersing of the birds in hot water for the purpose of loosening of feathers is known as-**
(a) Singing (b) Scalding
(c) Pinning (d) None

50. **Passing of carcass over the blue flame for the purpose of the burning of hair like appendages is known as-**
(a) Scalding (b) Singing
(c) Picking (d) None

51. **Poor ventilation in poultry house may cause?**
(a) Accumulation of CO (b) Accumulation of NH_3
(c) Wet litter condition (d) All the above

52. **Feed requirement for a layer per day is-**
(a) 110g (b) 100g
(b) 120g (d) 140g

53. **For every 1% drop is the O_2 content of incubator, the hatchability will drop-**
(a) 5% (b) 6%
(c) 1% (d) 10%

54. **Essential fatty acid & essential amino acid for poultry are respectively-**
(a) Linoleic acid & Glycine (b) Arachidonic acid & Lysine
(b) Linolenic acid & Glycine (d) None

55. **The Longest part of poultry oviduct is?**
(a) Infundibulum (b) Magnum
(c) Isthmus (d) Uterus

56. **Egg yolk, Albumin & Shell membranes of the chicken egg are respectively secreted by?**
(a) Infundibulum, Magnum, Isthmus (b) Ovary, Magnum, Isthmus
(c) Magnum, Infundibulum, Isthmus (d) None

57. **Incubation period for Japanese quail egg is?**
(a) 21 days (b) 28 days
(c) 17 days (d) None

58. **Range of haugh unit for chicken egg should be**
(a) 65-80 (b) 40-60
(c) 80-90 (d) None

59. **A chalaziferous layer of albumin is?**
(a) Outer thick layer (b) Inner thin layer
(c) Outer thin layer (d) Inner thick layer

60. **Haugh unit & yolk index of the egg are respective measures of-**
(a) Height of albumin & Spherical nature of yolk
(b) Width of albumin & Elliptical nature of yolk
(c) Both
(d) None

61. **Peak egg production in a layer is at the age of-**
(a) 32-35 weeks (b) 42 weeks
(c) About 1 year (d) None

62. **To avoid selective feeding, the best method of poultry feeding for commercial production is-**
(a) Whole grain (b) All mash feeding
(c) Pellet feeding (d) Crumble feeding

63. **The cloaca is a common opening for-**
(a) Digestive system (b) Urinary system
(c) Reproductive system (d) All

64. **Daily water requirement for 100 hens-**
(a) 20-30 litres (b) 30-40 litres
(c) 10-20 litres (d) None

65. **Total feed requirement for a broiler during whole life (0-6 weeks) is-**
(a) 2 kg (b) 3.8 kg
(c) 6 kg (d) 8 kg

66. **Total feed requirement during laying period (21-72 weeks) is?**
(a) 40kg (b) 18 kg
(c) 25 kg (d) 50 kg

67. **Light requirement for layer is-**
(a) 10 hours (b) 16 hours
(c) 18 hours (d) 20 hours

68. **Light requirement for broiler is?**
(a) 23 hours (b) 16 hours
(c) 18 hours (d) 10 hours

69. **Which method is better for slaughtering chicken on large scale-**
(a) Halal with stunning (b) Halal without stunning
(c) Jhatka with stunning (d) Jhatka with stunning

70. **Chilled dressed chicken can be stored for 7 days at a temperature of.**
(a) 2^0C (b) 4^0C
(c) 8^0C (d) 10^0C

71. **The broiler is commonly vaccinated against-**
(a) Marek's disease, Ranikhet & Gumboro
(b) Marek's disease, chicken pox, Gomboro, Ranikhet
(c) Marek's disease, chicken pox, Gomboro
(d) Marek's disease, chicken pox, Ranikhet

72. **Age of Debeaking & Marek's disease vaccination in chicken is-**
(a) 1 day old (b) 1 week
(c) 1 month (d) None

73. **Removal of comb, wattles & Earlobe in poultry is known as-**
(a) Docking (b) Dubbing
(c) Culling (d) Debeaking

74. **Age of Dubbing in poultry-**
(a) 3-day old chick (b) 1-day old chick
(c) 3 weeks old chick (d) None

75. **How many baby chick drinkers should be provided for brooding management of 250 chicks-**
(a) 3 (b) 4
(c) 5 (d) 6

76. **Maximum numbers of eggs that can be hatched by a broody hen is?**
(a) 15 eggs (b) 20 eggs
(c) 30 eggs (d) None

77. **Maximum weight loss during incubation of egg-**
(a) 12.6% (b) 15.6%
(c) 10% (d) 20%

78. **A 1000 egg capacity incubator would need how much breeding birds to keep it full?**
(a) 125 (b) 250
(c) 500 (d) 1000

79. **Turning of the chicken egg during incubation should be done-**
(a) During first 18 days only (b) Last 3 days only
(c) All 21 days (d) None

80. **Average weight of new born chicken chick-**
(a) 58g (b) 18g
(c) 28g (d) 38g

81. **Best layer breed of chicken is-**
(a) RIR (b) Leghorn
(c) New Hampshire (d) None

82. **Which of the following poultry breed lay white eggs?**
(a) Minorca (b) Aseel
(c) RIR (d) New Hampshire

83. **Purple coloured comb, wattles & tongue are characteristics of-**
(a) Aseel (b) Kadaknath
(c) RIR (d) None

84. **Percent calcium level in broiler & layer feed should be respectively-**
(a) 1% & 3-3.5% (b) 2% &3%
(c) 1% &4% (d) None

85. **Vitamin not synthesized in poultry?**
(a) Vitamin A (b) Vitamin B
(c) Vitamin C (d) Vitamin K

86. **Floor space requirement for a layer in a cage-**
(a) 14 × 16 inches& the height of 17 inches per layer
(b) 14 × 15 inches& the height of 16 inches per layer
(c) 12 × 14 inches& the height of 16 inches per layer
(d) 10 × 12 inches & the height of 14 inches per layer

87. **Generally, poultry do not require which vitamin in the feed-**
(a) B_1 (b) B_2
(c) C (d) Niacin

88. **The average egg production of an improved strain of White Leghorn is -**
(a) 180 (b) 220
(c) 300 (d) 360

89. **The most essential nutrient in poultry feed is?**
(a) Water (b) Protein
(c) Fat (d) Fiber

90. **The colour light used to control cannibalism-**
(a) Yellow (b) Red
(c) White (d) Dark

91. **As per BIS, the salt concentration in poultry feed should be-**
(a) 0.5% (b) 1%
(c) 2% (d) 5%

92. **Maximum permissible limit of NH_3 in poultry house should be-**
(a) 5 ppm (b) 15 ppm
(c) 25 ppm (d) 50 ppm

93. **Feed conversion ratio for a broiler chicken should be-**
(a) 2 (b) 1.8
(c) 1.4 (d) 1.2

94. **Giblet is thecarcass of-**
(a) Gizzard, Liver & Heart (b) Liver, Gizzard, Neck
(c) Heart, Neck, Liver (d) Liver, Gizzard, Neck

95. **Chemical used for fumigation of poultry house-**
(a) $KMNO_4$& H_2SO_4 (b) $KMNO_4$& Formalin
(c) Formalin & Lactic acid (d) None

96. **Which of the following statement(s) is/are correct-**
(a) Safe upper limit for salt in drinking water for poultry is 3000 ppm
(b) Safe upper limit of fluoride in water is 2 ppm
(c) Water containing 1000 ppm TDS (Total dissolved solids) is good for poultry.
(d) All the above

97. **MATCH THE COLUMN:-**

Vitamins	Deficiency diseases
1. Vitamin E	(a) Polyneuritis
2. Thiamine	(b) Crazy Chick disease
3. Riboflavin	(c) Penguin like posture
4. Biotin	(d) Curled toe paralysis
5. Vitamin D	(e) Fatty liver kidney syndrome

98. Energy requirement of poultry is expressed in term of?

(a) GE (b) DE

(c) ME (d) NE

99. Egg white injury factor is-

(a) Avidin (b) Biotin

(c) Vitamin C (d) None

100. Water glass used for egg preservation is-

(a) Sodium carbonate (b) Sodium Silicate

(c) Sodium sulphate (d) Sodium Chloride

101. Optimum egg-shell thickness should be?

(a) 0.30-0.50 mm (b) 0.10-0.20 mm

(c) 0.30 μm (d) 0.50 nm

102. Scalding temperature-time for broiler should be-

(a) 58°C/1 min (b) 60°C/1 min

(c) 62°C/1 min (d) 65°C/1 min

103. Scalding temperature-time for layer should be-

(a) 58°C/1 min (b) 60°C/1 min

(c) 62°C/1 min (d) 65°C/1 min.

104. Precursor of Niacin is

(a) Tryptophan (b) Tyrosine

(c) Phenyl alanine (d) None

105. The site of fertilization in animals is ampulla while the site of fertilization in poultry is?

(a) Ampulla (b) Infundibulum

(c) Magnum (d) Isthmus

106. Perosis is not caused by a deficiency of-

(a) Thiamine (b) Mn

(c) Choline (d) Biotin

107. Linoleic acid requirement for laying hen for maximum egg size should be-

(a) 1% (b) 2%

(c) 3% (d) 5%

108. The fishmeal should not be fed at a level higher than————% as otherwise fishy flavor may develop in pork-

(a) 5% (b) 10%

(c) 15% (d) 20%

109. Optimum shell thickness for best hatching

(a) 0.33 mm (b) 0.22 mm

(c) 0.43 mm (d) 0.50 mm

110. MATCH THE COLUMN:-

TABLE-I	TABLE-II
1. Phallus	(a) Unproductive layer
2. Capon	(b) Male fowl under 1 year age
3. Pullet	(c) Heat source for brooding
4. Cockerel	(d) Penis of fowl
5. Hover	(e) Castrated male fowl
6. Loaffer	(f) Female chicken lay 1st time

111. Egg stay maximum time in which part of oviduct-

(a) Infundibulum (b) Uterus
(c) Isthmus (d) Magnum

112. The major objective of turning of the egg during incubation is-

(a) It prevent embryo sticking to shell membrane
(b) It prevent piped egg condition
(c) It prevent Early embryonic death
(d) None

113. During incubation of chicken egg, turning is done at least.....times in a day up to.....days for optimum hatchability.

(a) 8 times, 18 days (b) 10 times, 7 days
(c) 8 times, 21 days (d) 6 times, 7 days

114. During incubation of chicken egg, candling is done by electric candler in a dark room at-

(a) 7^{th}& 18^{th} day of incubation (b) 14^{th}& 21^{th} day of incubation
(c) 7^{th}& 14^{th} day of incubation (d) None

115. During incubation of chicken egg, first candling is done at 7^{th} day of incubation to discard-

(a) Infertile egg (b) Dead-in-shell
(c) Piped egg (d) None

116. During incubation of chicken egg 2^{nd} candling is done at 18^{th} day of incubation to discard-

(a) Dead-in-shell (b) Piped egg
(c) Infertile egg (d) None

117. Blood ring seen on candling of the chicken egg will reflect.

(a) Infertile egg (b) Piped egg
(c) Early embryonic death (d) All

118. An excellent method for commercial preservation of egg-

(a) Cold storage method (b) Thermo-stabilization
(c) Pasteurization (d) All

119. In cold storage method of preservation oil coated eggs can be preserve for————months at 14^0C & 90% R.H.-

(a) 4 months (b) 6 months
(c) 8 months (d) 12 months

120. In cold storage method of preservation Non-oil coated eggs can be preserved for————months at 14^0C & 90% R.H.

(a) 4 months (b) 6 months
(c) 8 months (d) 12 months

121. Poultry capital of India is.

(a) Andhra Pradesh (b) Karnataka
(c) Uttar Pradesh (d) Tamil Nadu

122. Which of the following is not true?

(a) Central Avian Research Institute (CARI) is situated at Izatnagar, Bareilly (U.P.)
(b) Directorate of poultry Research (DPR) is situated at Rajendra Nagar, Hyderabad
(c) Central training Institute for poultry production & management (CTIPPM) is situated at Hessarghatta, Bangalore (Karnatak(a)
(d) Central Institute for Research on Cattle (CIRC) is situated at Mathura

123. Air cell is the space between inner & outer shell membrane of egg situated at-

(a) Narrow end of egg (b) Broad end of egg
(c) Both a & b (d) None

124. Which of the following is true about the chicken egg?

(a) Head of the embryo is formed towards the broad end because maximum numbers of pores for gaseous exchange are located on broad end.
(b) The air cell is located at the broad end of the egg.
(c) The depth of air cell in the freshly laid egg is 1-3 mm.
(d) All the above

125. Diameters of germinal disc for fertile & infertile eggs are respectively.

(a) 4.5 mm & 3.5 mm (b) 6.5 mm & 5.5 mm
(c) 3.5 mm & 4.5 m (d) 4.5 mm & 5.5 mm

126. Vitelline membrane of egg separates-

(a) Yolk from albumin (b) Albumin from egg shell
(c) Albumin from shell membrane (d) None

127. Which of the following is true about home preservation of egg-

(a) In water glass method, sodium silicate seals the pores of egg shell
(b) In lime water method, $CaCO_3$ seals the pores of egg shell
(c) By lime water & water glass methods, eggs can be preserved for 1 month
(d) All the above

128. During incubation, all embryos are died & hatchability is zero, if CO_2 concentration in incubator is above then-

(a) 1% (b) 3%
(c) 5% (d) 10%

129. Singing time for poultry is-

(a) 5-10 seconds over blue flame (b) 10-20 seconds over blue flame
(c) 20-25 seconds over blue flame (d) None

130. Specific gravity of egg is determined by-

(a) Brine floatation technique (b) Line floatation technique
(c) Vernier caliper (d) All

131. Egg shape index (ESI) of the egg is measured by Vernier caliper while shall strength is measured by.

(a) Vernier caliper (b) Screw gauge
(c) Brine floatation (d) All

132. Egg shape index of chicken egg is.

(a) 74 (b) 72
(c) 76 (d) 80

133. Higher ESI is indicative of————shape while lower ESI of the egg will indicate ———egg shape.

(a) Rounded, Elongated (b) Elliptical, Circular
(c) Elongated, Rounded (d) Elliptical, Rounded

134. In adult chicken-

(a) Only left ovary is functional (b) Only right ovary is functional
(c) Both functional (d) None

135. Shape of ovary in poultry-

(a) Bunch of grapes (b) Almond shape
(c) Bean shape (d) None

136. Which of the following is a viral disease of poultry-

(a) Ranikhet (b) Gumboro

(c) Marek's disease (d) All the above

137. Encephalomalacia in poultry is caused due to deficiency of-

(a) Vitamin B1 (b) Vitamin B2

(c) Vitamin E (d) Biotin

138. Chances of selective feeding is maximum in which method of poultry feeding-

(a) All mash feeding (b) Whole grain feeding

(c) Pellet feeding (d) None

139. Maximum limit of aflatoxinB_1 (pp(b) in broiler& layer feed-

(a) 10 ppb (b) 15 ppb

(c) 20 ppb (d) 50 ppb

140. Typical broiler ration containscrude protein-

(a) 18-20% (b) 16-18%

(c) 12-16% (d) 22-24%

141. Typical layer ration containscrude protein-

(a) 14-16% (b) 16-18%

(c) 18-20% (d) 22-24%

142. Which of the following is an example of pellet binder-

(a) Molasses (b) Sodium bentonite

(c) Guar meal (d) All the above

143. Live culture of useful bacteria is known as-

(a) Antibiotics (b) Probiotics

(c) Enzymes (d) Prebiotics

144. Which of the following statement is true about cage layer fatigue-?

(a) It is a type of osteoporosis, commonly found in layers in the cage system.

(b) It is due to deficiencies calcium, phosphorus & vitamin D

(c) Lack of exercise may be the reason for this disease

(d) All the above

145. Which of the following statement is not true about tibial dyschondroplasia-?

(a) It is a leg disorder in broilers

(b) It is a leg disorder in layers

(c) Abnormal formation of cartilage in leg bones

(d) High dietary level of chloride may increase incidence

146. Hormone responsible for broodiness in poultry-

(a) Growth hormone (b) Prolactin

(c) Vasotocin (d) Oxytocin

147. Hormone responsible for oviposition in poultry-

(a) Growth hormone (b) Prolactin

(c) Vasotocin (d) Oxytocin

☆☆☆

Answer Key

1	Jumbo egg	2	Pee-wee egg
3	58 g, 90 calorie	4	24-26 hours
5	All the above	6	Poor layer
7	Head, neck, breast, body, wings, tail	8	Vent, Eye ring &Earlobes, Beak, Shank
9	Sex-linked traits	10	All the above
11	All the above	12	Both a & b
13	Both	14	Deep litter only
15	2 chambered	16	Both a & c
17	Carotene	18	Haemorrhage in ovary & infundibulum
19	Haemorrhage in magnum	20	Calcium in feed
21	Reverse peristalsis of oviduct	22	Riboflavin
23	Iron sulfide	24	Feeding of cotton seed cake
25	1-e, 2-d, 3-b, 4-f, 5-c, 6-a	26	Cage system/Battery system
27	8-12 inches	28	95°F, 100-120 sq. cm.
29	21% & 13%	30	250 mg
31	Oviposition	32	21 days, 28 days
33	Fibre-free diet	34	Upright & Horizontal
35	Magnum	36	All
37	0.5% & 21%	38	Temperature
39	58%	40	11%
41	96% & 4%	42	Blastoderm & Blastodisc
43	All	44	Both a & b
45	37.5°C & 60% R.H.	46	45° vice-versa
47	Low moisture (or) lack of moisture in Incubator		
48	Too high or too low temperature in incubator		
49	Scalding	50	Singing
51	All the above	52	110g
53	5%	54	Linoleic acid & Glycine
55	Magnum	56	Ovary, Magnum, Isthmus
57	17 days	58	65-80
59	Inner thick layer	60	Height of albumin & Spherical nature of yolk
61	32-35 weeks	62	All mash feeding
63	All	64	20-30 litres
65	3.8 kg	66	40kg
67	16 hours	68	23 hours
69	Halal with stunning	70	2°C
71	Marek's disease, Ranikhet & Gumboro	72	1 day old
73	Dubbing	74	3-day old chick
75	4	76	15 eggs

77 12.6%

78 125(Hint: -No. of layers required = 1/8th of the total egg capacity of the incubator)

79 During first 18 days only

80 18g

81 Leghorn

82 Minorca

83 Kadaknath

84 1% & 3-3.5%

85 Vitamin C

86 14 × 16 inches& the height of 17 inches per layer

87 Niacin

88 300

89 Water

90 Red

91 0.5%

92 25 ppm

93 2

94 Gizzard, liver & heart

95 $KMNO_4$& Formalin

96 All the above

97 1-b, 2-a, 3-d, 4-e, 5-c

98 ME

99 Avidin

100 Sodium silicate

101 0.30-0.50 mm

102 58^{0}C/1 min.

103 60^{0}C for 1 min.

104 Tryptophan

105 Infundibulum

106 Thiamine

107 1%

108 10%

109 0.33 mm

110 1-d, 2-e, 3-f, 4-b, 5-c, 6-a

111 Uterus

112 It prevent embryo sticking to shell membrane

113 8 times, 18 days

114 7th& 18th day of incubation

115 Infertile egg

116 Dead-in-shell

117 Early embryonic death

118 Cold storage method

119 8 months

120 6 months

121 Andhra Pradesh

122 Central Institute for Research on Cattle (CIRC) is situated at Mathura

123 Broad end of egg

124 All the above

125 4.5 mm & 3.5 mm

126 Yolk from albumin

127 All the above

128 5%

129 5-10 seconds over blue flame

130 Brine floatation technique

131 Screw gauge

132 74

133 Rounded, Elongated

134 Only left ovary is functional

135 Bunch of grapes

136 All the above

137 Vitamin E

138 Whole grain feeding

139 20 ppb

140 22-24%

141 16-18%

142 All the above

143 Probiotics

144 All the above

145 It is a leg disorder in layers

146 Prolactin

147 Vasotocin (Contraction of the uterus is caused by the action of AVT/arginine vasotocin)

☆☆☆

Animal Physiology

Table 1: Types of animals

S.N.	Items	Ruminant	Pseudo-ruminant	Non-ruminant or Monogastric
1.	Rumination	Yes	Yes	**No**
2.	Stomach (No.of chamber)	**4**	**3 (Omasum absent)**	**1**
3.	Examples	Cattle, Buffalo, Sheep, Goat, Deer, **Yak, Mithun**, Giraffe, Nilgai	**Camel, Llama**, Alpaca, Vicuna	**Horse**, Zebra, Donkey, Mule, **Pig, Dog**, Cat, Rabbit, Elephant

Table 2: Comparison between normal GIT animal, foregut fermenter & hindgut fermenter

S.N.	Items	Normal GIT animal	Foregut fermenter	Hindgut fermenter
1.	Examples	Pig, Dog, Human	Ruminants, Pseudoruminants	**Horse, Rabbit, Ostrich**
2.	Definition	No fermentation chamber	Fermentation occurs before digestion in the stomach (mainly in rumen)	Fermentation occurs after digestion in the stomach (mainly in caecum & large intestine)
3.	Cellulose digestion	Not adapted	Adapted	Adapted

- **Prehensile organ of different animals:**
  - Horse- **sensitive mobile lips**
  - Cow, Dog & Cat- tongue
  - Sheep- tongue & incisors teeth
  - Pig- pointed lower lip
  - Goat, Camel- lips

Note:-

- Common grazing animals - Cattle, Sheep
- Common browsing animals- Goat, Camel
- The **gall bladder** is **absent** in **horse as well as in all pseudo-ruminants** like-camel, llama, alpaca, vicuna.

Table 3: Normal physiological parameters

S.N.	Animal	Normal temperature	Respiration rate (per min)	Pulse rate (per min)
1.	**Camel**	99.5°F	**5-12**	25-32
2.	Horse	100.5°F	**8-12**	35-42
3.	**Cattle**	**101.5°F**	12-16	**45-65**
4.	Pig	102°F	8-16	70-80
5.	Sheep	102°F	12-20	70-80
6.	Goat	103°F	12-20	70-80
7.	Dog	102°F	**15-30**	90-120
8.	**Fowl**	**107°F**	**15-30**	**130-160**

- **Classification of the nervous system**

  (A) According to location:-
  - Central Nervous System (CNS): Brain & Spinal cord
  - Peripheral Nervous System (PNS): Cranial nerves & Spinal nerves

  (B) According to function:-
  - Autonomic Nervous System (ANS): Sympathetic & Parasympathetic
  - Somatic Nervous System(SNS): Somatic sensory nerves & Somatic motor nerves

Note:-
- The largest endocrine gland of the body is thyroid while smallest is pineal
- Largest endocrine organ of the body is GIT
- The largest gland of the body is liver
- The largest organ of the body is the skin
- Total body water of animal body: **60-70%** of body weight
- Total blood volume in animal body: **8%** of body weight
- Plasma volume in animal body: 5% of body weight
- Mineral content of animal body: 3% of body weight
- The weight of animal heart: **0.6%** of body weight

- **Total body water (TBW) is classifying under two categories**
  - Intracellular fluid (ICF): **40%** of animal body weight
  - Extracellular fluid (ECF): **20%** of animal body weight
- **ECF is further classified into three categories**
  - Interstitial fluid (ISF): 15% of animal body weight
  - Plasma volume/Intravascular fluid (PV/IVF): 5% of animal body weight
  - Transcellular fluid (TCF): Found in body cavities. It includes cerebrospinal fluid, synovial fluid, intraocular fluid, urine, bile & fluid of digestive tract.

Note:
- Volume of different fluid compartments: ICF > ECF > ISF > PV > TCF
- Heavy water (deuterium oxide) & radioactive water (tritium oxide) are use to measure total body water (TBW)
- Inulin is use to measure **ECF & glomerular filtration rate (GFR)**
- **Evans blue dye** (*T*-1824) is use to measure **plasma volume**
- ICF cannot be estimated directly but it is measured by subtracting ECF from TBW.

- **Water loss from the body:-**

  (1) Sensible water loss: urine, stool

  (2) Insensible water loss: sweating, respiratory water loss

- **Blood:**
  - Fluid connective tissue consists of formed elements suspended in plasma
  - Normal pH=7.4
  - Venous blood is more acidic than arterial blood because of CO_2
  - Blood cells are more acidic than blood plasma
  - 55% of total blood volume is plasma & remaining 45% is formed elements.
  - Red colour of blood is due to hemoglobin present in RBC
  - Colour of plasma is due to presence of bilirubin
- **Formed elements & their main functions**
  - RBC/Erythrocytes: Oxygen transport
  - WBC/Leukocytes: Body defense
  - Platelets/Thrombocytes: Blood clotting

- **Blood profile on centrifugation:**
  - Upper layer- Plasma (55%)
  - Middle layer/interface/**buffy coat: Leukocytes & Platelets (< 1%)**
  - Lower layer: Erythrocytes (45%)
- **Leukocytes are two types:**
  - **Granulocytes**: Neutrophils, Eosinophils & Basophils
  - **Agranulocytes**: Monocytes, Lymphocytes (B-cells, T-cells & Natural Killer cells)

Table 4: Functions of leukocytes

S.N.	Specific leukocyte	Function
1.	Neutrophils	**First line of defense**; highly phagocytic
2.	Eosinophils	There no. increases during allergic reactions & parasitic infections It inactivate allergens like histamines
3.	Basophils	Release heparin (natural anticoagulant) & histamine (allergen)
4.	Monocytes	**Largest leukocyte**; highly phagocytic, their number increases in chronic infections like Tuberculosis
5.	Lymphocytes	Antibodies production against infection

Note:

- Serum = Plasma – (Fibrinogen + Other clotting factors)
- Immature/young neutrophils: **Band cells**
- Mature neutrophils: **Segmented cells**
- Birds have nucleated erythrocyte & nucleated thrombocytes while mammals not have.
- Order of size or diameter of blood cells: WBC > RBC > Platelet
- No. of blood cells per µl of blood: RBC > Platelets > WBC
- Monocyte: Largest blood cell or largest leukocyte
- Monocytes transformed into macrophage on entering the tissues
- **Most numerous leuko cytesin ruminants**, pig & poultry: **Lymphocyte** (60-65%)
- Most numerous leukocytes in **horse, dog & cat**: **Neutrophils** (60-65%)
- **Plasma cells derived from B-Lymphocytes** & produce antibodies against infections.
- Plasma cells have **Cartwheel shape nucleus.**
- **Agranulocytes** are also known as **Peripheral Blood Mononuclear Cells (PBMCs)**
- **Granulocytes** are also known as **Polymorphonuclear leukocytes (PMN/PML/PMNL)**

- **Macrophages with their anatomical locations**:-
  - Monocyte: Bone marrow/Blood
  - Kupffer cell: Liver
  - Dust cell/Alveolar macrophage: Lungs
  - Microglia: Brain
  - Glomerular mesangial cell: Kidney
  - Hofbauer cell: Placenta
  - Osteoclast: Bone

Note:-

- The largest size of RBC found in the dog (7 µm) & smallest in goat (4 µm)
- Heterophils: Avian neutrophils
- Red colour of blood is due to hemoglobin present in the RBC

- Basophils resemble with mast cell histologically. Both cells produce heparin, histamine, serotonin, bradykinin & lysosomal enzymes in areas of inflammation
- Basophils enhance allergic reactions, whereas eosinophils tend to dampen them.
- Spleen is the largest lymphoid organ of the animal body

♦ **Lymphoid organs:**

- **Primary lymphoid organs** (sites of lymphopoiesis): Places where the B & T- lymphocytes differentiate from stem cells.
  Examples: -Thymus, Bone marrow, Bursa of Fabricius
- **Secondary lymphoid organs**:
  Examples: -Spleen, Lymph nodes, Tonsils & adenoids, Peyer's patches & appendix

♦ **Antigen presenting cells (APCs):**
It includes **dendritic cells, macrophages & B-lymphocytes**& they present antigens to T-helper cells.

Table 5: Comparison between B and T Lymphocytes

S.N.	Index	B-Lymphocytes	T-Lymphocytes
1.	Site of maturation	Bone marrow	Thymus
2.	Type of immunity	Humoral immunity (antibody-mediated immunity)	Cell mediated immunity
3.	Secretory product	Antibodies	Lymphokines
4.	Life span	Short	Long

Table 6: Types of Immunoglobulins/Antibodies

S.N.	Types of antibody	% of total	Characteristics & functions
1.	IgG	**80%**	Most abundant Ig^S in body; **Crosses the placenta** & provides natural passive immunity to the newborn
2.	IgA	10-15%	It is mainly found in sweat, tears, saliva, mucus, colostrum, intestinal secretions so it is also known as **"secretory antibody"**
3.	IgM	5-10%	(1) 1st antibody produced by B-Lymphocytes at the time of infection. (2) Natural occurring antibody against RBCs in case of blood incompatibility
4.	IgD	0.2%	Mainly found on the surfaces of B- cells as antigen receptors, where it **activates B- cells for antigen recognition**
5.	IgE	< 0.1%	Protection against allergy, parasitic diseases & hypersensitivity

♦ **Anemia:** abnormal reduction in the number of RBCs or hemoglobin content or both
(A) According to size of RBC & concentration of hemoglobin

- Normocytic & Normochromic: occurs in chronic disease
- Microcytic & Hypochromic: due to deficiency of iron
- Macrocytic & Hyperchromic: due to deficiency of cobalt, vitamin B_{12} & folic acid

(B) Aplastic anemia: due to lack of functional bone marrow

- **Immunity:**
  (1) **Innate immunity/Non-specific immunity**: By-birth immunity. It consists of a first & second line of defenses.
    - **First line of defense**: Skin, mucous membranes, secretions like gastric HCl, tears, saliva etc
    - **The second line of defense**: Inflammation, fever, interferons, complementsystem, natural killer cells (NK cells) phagocytes such as neutrophils, macrophages & eosinophils

  (2) **Acquired/Adaptive/Specific immunity**: Develops during the course of life when any foreign antigen is entering in the body.
    - It consists of the **3rd line of defense** that includes B and T Lymphocytes & antigen presenting cells.

- **Types of acquired immunity:**
  (A) **Active Immunity**: It develops when the body cells produce antibodies in response to infection or vaccine.
    - Natural active immunity: By any infection
    - Artificial active immunity: Vaccination, Tetanus toxoid/*Tetanus* vaccine

  (B) **Passive immunity:** by direct antibody inoculation
    - Natural passive immunity: Antibodies transfer from mother to foetus via placenta or via colostrum
    - Artificial passive immunity: Injection of antiserum that contains antibodies e.g.- anti-tetanus serum (ATS)

Note:

Tetanus toxoid (TT) has prophylactic action while anti-tetanus serum (ATS) has curative action. TT is used to prevent tetanus while ATS is used to cure tetanus.

- **Hemoglobin (Hb) & its forms:**
  (1) **Oxy-haemoglobin/HbO_2/Bright red colour**: formed by oxygenation of Hb
  (2) **Carboxy-haemoglobin/HbCO/Bright cherry red colour**: Hb combines with carbon monoxide.
  (3) **Met-haemoglobin/Chocolate brown colour**: formed by oxidation of Hb (eg: Nitrate poisoning, chlorate poisoning)
    - It is true oxidation product of Hb
  (4) **Carbaminohaemoglobin**: Hb combines with Carbon dioxide ($HbCO_2$)

- **Terminology**:-
  - **Anemia:** Deficiency of RBCs or hemoglobin in the blood
  - **Polycythemia:** An increase in the total RBC mass of the blood
  - **Anisocytosis: Unequal size of red blood cells**
  - **Poikilocytosis: Abnormally shaped red blood cells**

Table 7: Some abnormal leukocyte conditions

S.N.	Clinical condition	Definition	Associated diseases
1.	Neutrophilia	Increase number of circulating neutrophils	Bacterial diseases, Pneumonia, lungs diseases
2.	Neutropenia (Leucopenia)	Decreased number of circulating neutrophils	Viral diseases

3.	Eosinophilia	Increase number of circulating eosinophils	Allergy, Anaphylactic shock, Parasitic diseases
4.	Lymphocytosis	Increase number of circulating lymphocytes	Cancer/Tumor/Neoplasm/leukaemia
5.	Monocytosis	Increase number of circulating monocytes	Chronic diseases like-Tuberculosis

Note:-

- A Suffix eg.-**cytosis** or -**philia** indicates an **increase in a number** of that particular cell type.
- A suffix eg.-**penia** indicates a **decrease in the number** of that particular cell type.

Table 8: Average diameter & life span of RBC, WBC & platelets

S.N.	Index	Erythrocytes	Leukocytes	Platelets
1.	Number in per μl blood of cattle	7-10 millions	7000-10,000	3-6 lacs
2.	Average diameter (μm)	4-7	8-20	3
3.	Average life span	**Chicken : 20-30days** Duck: 30-40 days **Cat: 70 days** Lamb,Calf: 50-100days Dog, Human: 120 days **Ruminant:125-150 days** Horse: 140-150 days	Granulocytes: 6-20 hours Monocytes: 1 day B-Lymphocytes: 3-4 days T-Lymphocytes: 1-3 years	**8-11 days**

Table 9: Various hematological parameters

S.N.	Animal	Hemoglobin level (g/dl)	PCV (%)	ESR (mm/hr)	Blood glucose (mg/dl)	Blood pressure (mmHg, Syst/ Diast)
1.	Cattle	8-15	24- 45	**0**	**40-80**	134/88
2.	Sheep	9-15	27- 45	**0**	**40-80**	114/68
3.	Goat	8-12	24-38	**0**	**40-80**	120/84
4.	Pig	10-16	32-50	1-14	80-120	169/108
5.	**Horse**	**11-19**	**32-53**	**45-90**	60-110	80/50
6.	Chicken	7-13	22-35	1-3	**130-270**	131/95
8.	Dog	12-18	37-55	6-10	70-120	148/100

Note:

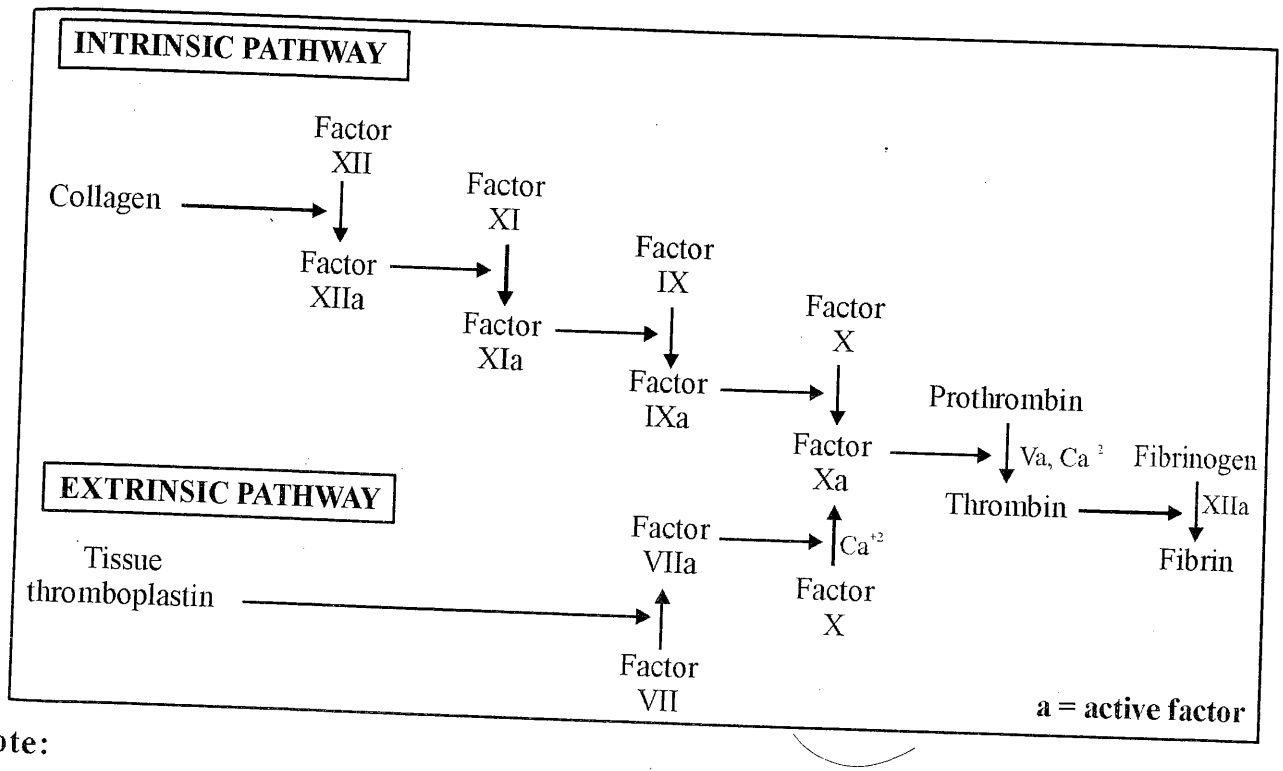
- The value of packed cell volume (PCV) is generally 3 times that of hemoglobin value.
- Erythrocyte sedimentation rate (ESR) is highest in the case of horse & lowest in the case of ruminants
- Stroke volume: Amount of blood pumped out by the left ventricle in one contraction
- Cardiac output: Amount of blood pumped by heart per minute
- Cardiac output = Stroke volume × Heart rate
- Pulse pressure = Systolic pressure – Diastolic pressure

- Mean arterial pressure (MAP) = Diastolic pressure + 1/3 Pulse pressure
- MAP = Cardiac output × Total peripheral resistance

♦ **Blood clotting factors:**

- Factor I: Fibrinogen
- Factor II: Prothrombin
- Factor III: **Tissue factor/ Tissue thromboplastin**
- Factor IV: **Calcium ion** (Ca^{+2})
- Factor V: Proaccelerin (Labile factor)
- Factor VII: Proconvertin (Stable factor)
- Factor VIII: Antihemophilic factor A/**Antihemophilic globulin (AHG)**
- Factor IX: Antihemophilic factor B/**Christmas factor**/Plasma thromboplastin component **(PTC)**
- Factor X: Stuart factor (Prothrombokinase)
- Factor XI: Plasma thromboplastin antecedent **(PTA)**
- Factor XII: Hageman factor
- Factor XIII: Fibrin-stabilizing factor

♦ **Blood clotting pathways:**



Note:

- Blood clotting pathways: Intrinsic pathway & extrinsic pathway
- Extrinsic pathway/tissue factor pathway: initiated due to release of tissue factor (factor III) at the site of injury
- Extrinsic pathway is faster than intrinsic pathway
- Both pathways are common after activation of factor X to factor Xa
- Enzyme responsible for clot lysis: Plasmin
- Key enzyme in blood coagulation or hemostasis: Thrombin

♦ **Blood anticoagulants:**

- Heparin: **Natural** or ***In-vivo*** **anticoagulant**, produced by mast cells & basophils
- Sodium citrate: used in **blood transfusion** in animals & for study of blood coagulation

- EDTA: used in study of **blood morphology**, RBC index determination & PCV determination
- Sodium fluoride: used for **glucose estimation**

♦ **Vasodilators:**
- Nitric oxide (most potent); Atrial natriuretic peptide (ANP); histamine, heparin, bradykinin, vasoactive intestinal peptide (VIP), Platelet activating factor (PAF), Substance P, Prostacyclin (PGI_2), PGE_2

♦ **Vasoconstrictors:**
- Endothelin (most potent), vasopressin (ADH), Angiotensin II, norepinephrine, dopamine, thromboxane, neuropeptide Y (NPY)
- Epinephrine acts as both vasoconstrictors as well as a vasodilator.
- When epinephrine acts on alpha receptors it causing vasoconstriction & on beta receptors causing vasodilation. The affinity of epinephrine for beta-receptors is greater than its affinity for alpha-receptors.

Table 10: Classification of Carbohydrate

S.N.	Classification	Examples
1.	Monosaccharides	Pentose sugar (Ribose, Deoxyribose, Xylose, Arabinose); Hexose sugar (Glucose, Galactose, Fructose, Mannose)
2.	Disaccharides	**Sucrose (Glucose + Fructose), Lactose (Glucose + Galactose),Maltose (Glucose + Glucose), Cellobiose (Glucose+Glucose)**Note: **Maltose have *a*- 1,4 glycosidic linkage while cellobiose have β-1,4 glycosidic linkage**
3.	Trisaccharides	**Raffinose (Glucose + Galactose + Fructose)**
4.	Polysaccharides	Homo-polysaccharides (Cellulose, Glycogen, Starch, Dextrin); Hetero-polysaccharides (Hemicelluloses, Chitin, Pectin)

Table 11: Digestion & absorption of carbohydrate, protein & fat

S.N.	Index	Ruminant	Non-ruminant
1.	End product of carbohydrate digestion	VFA^s in rumen	Glucose
2.	Site of absorption of carbohydrate	Ruminal wall (through passive diffusion)	Small intestine (by active transport)
3.	End product of protein digestion	Amino-acids	Amino-acids
4.	Site of absorption of protein	Ileum (small intestine)	Duodenum & Jejunum (small intestine)
5.	End product of fat digestion	Fatty-acids	Fatty-acids
6.	Site of Absorption of fat	Proximal jejunum (small intestine)	Proximal jejunum (small intestine)

Table 13: Some common precursors

S.N.	Product	It's precursor
1.	Glucose	Propionate
2.	Vitamin C	Hexose sugar
3.	Cholesterol	Acetyl- CoA
4.	Vitamin D, All steroid hormones like-Testosterone, Estrogen, Progesterone etc.	Cholesterol

5.	Prostaglandins	Arachidonic acid
6.	Thyroxin, Catecholamines (Epinephrine, Nor-epinephrine & Dopamine)	Tyrosine amino acid
7.	Niacin /Nicotinic acid	Tryptophan

Table 14: Ruminal microbiology

S.N.	Index	Ruminal ecosystem
1.	Normal ruminal PH	**6.5-6.8**
2.	Optimum temperature	**39^{0}C**
3.	Gas production	**CO_2: CH_4 (65: 35)**
4.	VFA^S profile	**Acetate : Propionate : Butyrate (65 : 20 : 10)**
5.	Ruminal microbial population (per ml of rumen liquor)	**Bacteria (10^{10-11}), Protozoa(10^6), Fungi (10^3), Bacteriophage (10^9)**
6.	Ruminal bacteria	**Mostly bacteria are gram (–) ve & obligate anaerobes.** However, **Lactic acid producing bacteria are facultative anaerobes** & they are attached to the ruminal wall because some O_2 is present in the periphery
7.	Ruminal protozoa	The majority are ciliate protozoa.The ruminal microbial population is decided by protozoa because protozoa eat on bacteria
8.	Ruminal fungi	Mostly flagellated fungi; Function, Substrate penetration (by breaking lingo-cellulosic bond of fiber diet)
9.	Ruminal bacteriophage	Function: Lysis of bacterial cells so that bacterial protein is easily available to animals as a source of amino acids

Note:-

- **Defaunation**: Selective removal of protozoa from the ruminal ecosystem
- **Chemical defaunation**: **Copper sulfate & Sodium lauryl sulfate**

♦ **<u>Uses of volatile fatty acids (VFAs) produced during ruminal fermentation</u>**:-

- VFA^S provides 70% of ruminant energy needs
- **Acetate:** It is responsible for **milk fat synthesis**
- **Propionate:** It is **gluconeogenic**. It is responsible for milk sugar synthesis
- **Butyrate:** Ruminal epithelial cells convert it into β -hydroxy butyrate (a ketone body)

Note:-

- High roughage diet: high milk fat% (because acetate production is high)
- High concentrate or grain diet: high milk yield (because propionate production is high)

Table 15: Some important hormones and their functions

S.N.	Hormones	Gland secreting	Major function
1.	Growth hormone (GH)	Anterior pituitary	Stimulate growth of body
2.	Thyroid stimulating hormone (TSH)	Anterior pituitary	Stimulate synthesis & secretion of thyroid hormones
3.	Adrenocorticotropic hormone (ACTH)	Anterior pituitary	Stimulate synthesis & secretion of Adrenal cortex hormones
4.	Prolactin	Anterior pituitary	**Stimulate milk secretion**

5.	Leutinizing hormone (LH)	Anterior pituitary	**Stimulate testosterone synthesis in Leydig cells** of testes; **stimulate ovulation**; formation of CL & maintain progesterone secretion from CL
6.	Follicle stimulating hormone (FSH)	Anterior pituitary	Growth of follicles in the ovaries
7.	Melanocyte-stimulating hormone (MSH)	**Intermediate lobe of pituitary**	Increased deposition of melanin
8.	Oxytocin	Posterior pituitary	It stimulates milk ejection (**"Milk let-down hormone"); contraction of the uterus during parturition**
9.	Vasopressin/Antidiuretic hormone (ADH)	Posterior pituitary	**"Water regulating hormone"** It increases water reabsorption by the kidney
10.	Thyroxine (T_4) & Tri-iodothyronine (T_3)	Thyroid	Increase body metabolic rate (BMR)
11.	Calcitonin	**Thyroid (Parafollicular cells or "C" cells)**	Promote deposition of calcium in the bones & **Decrease blood calcium level**
12.	Parathormone (PTH)	**Parathyroid glands (four in number)**	**Increase blood calcium level** (Increase calcium reabsorption & phosphorus excretion from kidney tubules)
13.	Aldosterone	Adrenal cortex	Increase renal **Na^+ reabsorption and K^+ secretion & H^+ secretion**
14.	Cortisol	Adrenal cortex	Controlling the metabolism of protein, fat & carbohydrate
15.	**Catecholamines (Epinephrine, Nor-epinephrine, Dopamine)**	**Adrenal medulla**	Epinephrine is known as **'3F'** hormone (Fright, fight & flight) or Emergency hormone
16.	Glucagon	Pancreas (*a*-cells of islets of Langerhans)	Increase blood glucose level
17.	Insulin	Pancreas (β-cells of islets of Langerhans)	Promote glucose entry in many cells thereby **decrease blood glucose level**
18.	Somatostatin	Pancreas (delta-cells of islets of Langerhans)	Inhibits insulin & glucagon release
19.	Testosterone	Testes **(Leydig cells)**	Promote development of male reproductive system & **male secondary sexual characteristics; Sex drive (libido) in males**
20.	Estrogen	Ovary **(Granulosa cells of Graafian follicle)**	Responsible for **heat**/estrus behavior; Development of **female secondary sexual characteristics**; Responsible for growth of **duct system of mammary gland**

21.	Progesterone (Also known as "**Pregnancy hormone**")	Ovary (Corpus luteum/CL)	**Prepares uterine endometrium for implantation**; Maintains pregnancy; Responsible for **alveolar growth of mammary gland**
22.	Renin	Kidney	Catalyze the conversion of Angiotensinogen to Angiotensin-I
23.	1,25-Dihydroxy-cholecalciferol (active form of vita.D)	Kidney	Increase intestinal absorption of calcium & bone mineralization
24.	Erythropoietin	Kidney	Increase RBCs production
25.	Atrial natriuretic peptide **(ANP)**	Heart	Increase renal **Na^+ secretion & K^+ reabsorption**; **reduce blood pressure**
26.	Leptin (**"Satiety hormone"**)	Adipose tissue	**Inhibits appetite**, simultaneously speeding up metabolism
27.	**Asprosin**	Adipose tissue	Stimulates the liver to release glucose into the blood stream
27.	**Ghrelin ("Hunger hormone")**	Gastrointestinal tract (GIT)	**Hunger stimulant**
28.	Gastrin	Stomach (G-cells)	Stimulates secretion of **gastric acid (HCl) by the parietal cells of the stomach**
29.	Secretin	Duodenum & Jejunum (small intestine)	Stimulate pancreatic acinar cells to release bicarbonate & water
30.	Cholecystokinin/ CCK/Pancreozymin	Duodenum (small intestine)	Stimulate gall bladder contraction & release of pancreatic enzymes

Note:

- **Renin** (secreted by kidney) while **Rennin** (secreted by stomach)
- **Ileum** (part of small intestine) while **Ilium** (part of hip bone)
- **Kidney hormones**: Erythropoietin, calcitriol (1,25- dihydroxycholecalciferol) and renin.

Table 16: The difference between diabetes insipidus & diabetes mellitus

S.N.	Particulars	Diabetes Insipidus (DI)	Diabetes Mellitus (DM)
1.	Cause	Deficiency of antidiuretic hormone (ADH)	Deficiency of insulin hormone
2.	Symptoms	(1) Blood glucose level normal (2) Urine free from glucose (3) Polyuria/excess urine output (4) Polydipsia/ excessive thirst (5) Appetite is normal (6) Specific gravity of urine is lower than normal	(1) Hyperglycemia (2) Glycosuria (3) Polyuria/excess urine output (4) Polydipsia/excessive thirst (5) Polyphagia/excessive appetite (6) Specific gravity of urine is greater than normal because of glycosuria

(2) **Transport of CO_2:**

- 70% in the form of bicarbonate (HCO_3^-)
- 23% in the form of carbaminohemoglobin (inside RBC)
- 7% in dissolved plasma

Note:-

- One molecule of hemoglobin contains four atoms of iron (in Fe^{++}state) & can transport four molecules of O_2
- 1 gram of Hb carries 1.34 ml of oxygen
- Normal Hb concentration in the blood is 15g/dl hence 100 ml of blood carries 20 ml of oxygen.

♦ **The oxygen-hemoglobin dissociation curve:-**

- It is used to describe loading & unloading of oxygen from Hb.
- The causes of the shift to right are increases in CO_2, Acid, 2, 3-DPG, Exercise and Temperature. It can be memorizing by mnemonic "**CADET**, face Right!"
- Factors that cause right shift are those physiological states where tissues require more oxygen. For example, during exercise, muscles have a higher metabolic rate and require more oxygen, produce more carbon dioxide and lactic acid & thus their temperature rises.
- 2, 3-DPG is Diphosphoglycerate now known as 2, 3-BPG (Bisphosphoglycerate).

Note:-

- **Bohr effect**: effect of CO_2 & H^+ on the ability of hemoglobin to yield or receive oxygen
- **Haldane effect**: The effect of O_2 on H^+ & CO_2 loading & unloading from hemoglobin

♦ **Terminology related to respiration:-**

- Eupnea: Normal breathing
- Dyspnea: Difficult breathing
- Apnea: Complete cessation of breathing
- Polypnea: Rapid shallow breathing (frequency increase but depth decrease)
- Hyperpnea: Breathing characterize by increase depth, frequency or both
- Tachypnea: Rapidity of breathing
- Bradypnea: Slowness of breathing

♦ **Mechanism of breathing:-**

- Respiration cycle of animals consists of an inspiratory phase & an expiratory phase.
- During inspiration, the diaphragm & external intercostal muscle contract
- During expiration, these muscles relax.
- Expiration is a passive process

♦ **The difference between mammalian & avian respiration:-**

- **Diaphragm is absent in birds.**
- In birds, inspirations, as well as expiration both, are active process while in the case of mammals, expiration is a passive process & inspiration is active
- Birds have a larynx, but it is not used to make sounds. In birds **"syrinx"** serves as the "voice box."
- Birds have lungs and **nine air sacs** (two cervical, two anterior thoracic, two posterior thoracic, two abdominal, **unpaired clavicular)**
- Site of gaseous exchange in birds: **Parabronchi or tertiary bronchi**
- Two types of parabronchi:**paleopulmonic (ancient lung) & neopulmonic (new lung)**
- Paleopulmonic parabronchi is found in all birds
- Air flow in paleopulmonic parabronchi is unidirectional

- Air flow in neopulmonic parabronchi is bidirectional
- **In penguin & emu, neopulmonic parabronchi is absent**
- **In fowl & song birds, neopulmonic is more developed than paleopulmonic**
- There is no gaseous exchange in air sacs because **air sacs are avascular**
- Respiratory system of birds is more efficient than mammals
- In mammals, alveoli of lungs are lined by surfactant-secreting cells known as **type-II pneumocytes** while birds have **granular cells**
- Surfactant: surface tension lowering agent
- **Dipalmitoylphosphatidylcholine (DPPC)** or Dipalmitoyl lecithin, act as a pulmonary surfactant.

- **Regulation of respiration:-**

Table 20: (A) Respiratory centers

S.N.	Name of respiratory center	Location of respiratory center	Functions
1.	Dorsal respiratory group (DRG)	Dorsal medulla oblongata	Primarily responsible for **inspiration** & generate basic rhythm of breathing
2.	Ventral respiratory group (VRG)	Ventral medulla oblongata	Primarily responsible for expiration (mainly during **forced expiration)**
3.	Pneumotaxic center	Upper pons	**To terminate inspiration,** therefore, regulates inspiratory volume & respiratory rate.
4.	Apneustic center	Lower pons	Associated with **deep inspiration (apneusis)**

(B) Chemoreceptors:

(1) Central chemoreceptors (H^+ & PCO_2 sensitive receptors)

- Located in the medulla oblongata .
- They are stimulated by increased PCO_2 via an associated change in H^+ concentration of an interstitial fluid of brain.

(2) Peripheral chemoreceptors (PO_2, H^+ & PCO_2 sensitive receptors)

- These are **carotid body& aortic arch**, located at the bifurcation of carotid arteries & aortic arch respectively
- They are stimulated by decreased PO_2, increased PCO_2 & increased H^+ concentration in the arterial blood
- **Carotid body** send their signal to respiratory centers via **Glossopharyngeal nerves**
- **Aortic arch** sends their signal to respiratory centers via **Vagus nerves**

Spirometry technique: to examine pulmonary & lung volumes

Table 21: Lung volumes & capacities

S.N.	Lung volume	Definition
1	Tidal Volume (TV)	Volume of air inspired or expired during normal breathing
2	Inspiratory Reserve Volume (IRV)	Maximum volume of air inhaled at the end of normal inspiration
3	Expiratory Reserve Volume (ERV)	Maximum volume of air exhaled at the end of normal expiration
4	Residual Volume (RV)	Volume of air remains in lungs after maximal expiration
5	Inspiratory Capacity (IC)	Maximal volume of air inhaled after normal expiration **(TV+IRV)**
6	Functional Residual Capacity (FRC)	Volume of air that remains in lung at the end of normal expiration **(ERV+RV)**
7	Vital Capacity (VC)	Maximum volume of air which can be forcefully inspired after forced expiration **(IRV+TV+ERV)**
8	Total Lung Capacity (TLC)	Total volume of air present in lungs after forceful inspiration **(IRV+TV+ERV+ RV)**

- **Renal physiology:**
  Functional unit of kidney: Nephron
- **Two types of mammalian nephron:**
  (1) **Cortical nephron**: Short loop of Henle located in cortex & its main function is reabsorption & secretion of substances
  (2) **Juxtamedullary nephron**: Long loop of Henle extended deep in the renal medulla & its main function is concentrating the urine
  - Percentage of JM nephron (long looped nephron) in various species (Beaver: 0%, Pig: 3%, Human: 14% Cat & Dog: 100%)
  - Transport of tubular fluid from Bowman's capsule to renal pelvis occurs due to hydrostatic pressure gradient
  - Transport of urine from renal pelvis to urinary bladder occurs due to peristalsis in the ureters
- **Two countercurrent mechanism of the kidney:-**
  - Countercurrent multiplier (loops of Henle)
  - Countercurrent exchanger (vasa recta)
- **Juxtaglomerular (JG) apparatus:**
  Specialized structure formed at the junction of DCT & Glomerular afferent arteriole
  It consists of three cells:
  (1) **Macula densa**: Specialized epithelial cells in DCT that detect sodium concentration in tubular fluid
  (2) **Juxtaglomerular cells** (JG cells): smooth muscle cells of afferent arterioles that secrete **renin** hormone
  (3) **Extraglomerular mesangial cells (Lacis cells)**

Note:

- Generally, protein molecules are not filtered through glomerulus because of their large molecular size & polyanionic nature
- Micturition/Urination: process of emptying urinary bladder
- Micturition is parasympathetic activity, sympathetic nerve has no effect on micturition.
- Yellow colour of urine is due to urobilin

- Principal nitrogenous component of mammalian urine is Urea (NH_3 converted to urea in liver)
- Principal nitrogenous component of avian urine is Uric acid (NH_3 converted to uric acid in liver & kidney)

Glomerular filtration rate (GFR): Volume of the plasma filtered by all nephrons of both kidneys per unit time.

- Normal GFR of human = 125 ml/min or 180 L/day
- GFR can be measured by **creatinine clearance or inulin clearance**
- High plasma concentration of creatinine is an indication of kidney disease

Diuretics: agents/drugs that increase urine output, these are useful for treating edema & hypertension.

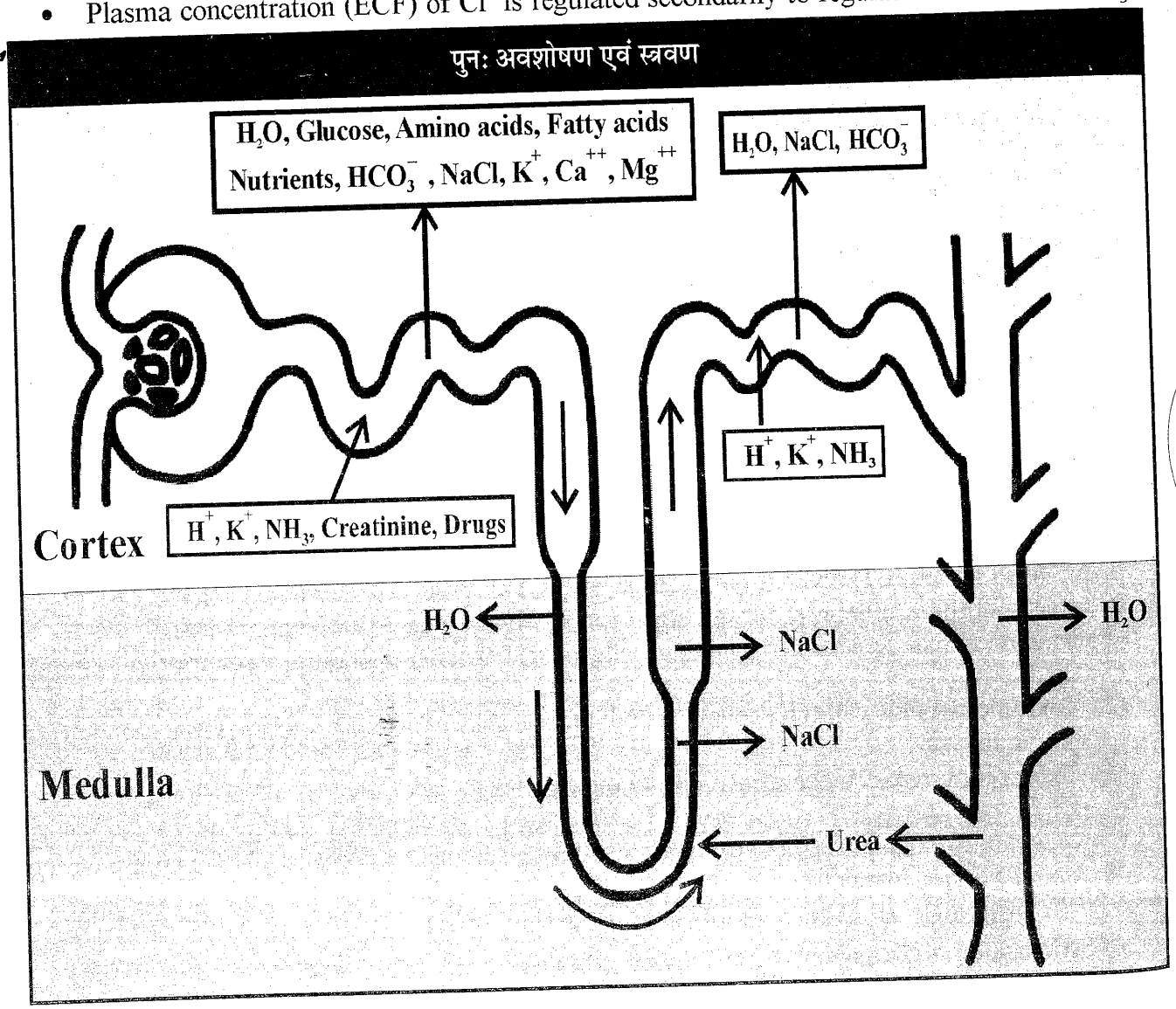
- **Loop diuretics (furosemide):Inhibiting Na^+-K^+-$2Cl^-$ cotransport** in luminal membrane of **thick ascending limb of loop of Henle**
- **Osmotic diuretics (mannitol):** inhibit water & solute reabsorption **by increasing effective osmotic pressure of tubular fluid of PCT**

♦ **Types of diabetes insipidus**

- Neurogenic diabetes insipidus/**central diabetes insipidus**: due to **deficiency of ADH**
- **Nephrogenic diabetes insipidus**: when **kidneys do not respond** normally to ADH

Note:

- Plasma concentration (ECF) of Na^+ is regulated by **Osmoreceptor-ADH-Thirst system**
- Plasma concentration (ECF) of K^+ is regulated by **Aldosterone**
- Plasma concentration (ECF) of Cl^- is regulated secondarily to regulation of Na^+ & HCO_3^-



- **Resting membrane potential (RMP):-**
  (1) Skeletal muscle: (–) 95 mV (2) Cardiac muscle: (–) 90 mV
  (3) Smooth muscle: (–) 50 mV (4) Neuron: (–) 70 mV
  (5 SA-node: (–) 55 mV (6) AV-node: (–) 65 mV
  (7) Photoreceptor cells: (–) 40 mV
- **Conduction speed of various parts of heart:-**
  (1) Internodal fibers: 1m/second
  (2) **AV-node: 0.05m/second (minimum speed)**
  (3) Bundle of His: 0.12m/second
  (4) **Purkinje fibers: 4m/second (maximum speed)**
  (5) Atrial muscle fibers: 0.3 m/second
  (6) Ventricular muscle fibers: 0.5 m/second
- **Important instruments and their uses:-**
  - **Sphygmomanometer**: to measure blood pressure
  - **Stethoscope**: to measure heart rate
- **Instruments of weather station are used to measure:-**
  - **Stevenson screen**: It is used to protect meteorological instruments against rainfall and heat radiation from outside sources
  - **Anemometer**: Wind speed
  - **Wind vane:** to detect the direction of the wind
  - **Hygrometer**: Humidity
  - **Sling Psychrometer: Relative humidity**
  - **Pyranometer**: Solar radiation
  - **Barometer**: Atmospheric pressure
  - **Thermometer:** Air and sea surface temperature
  - **Rain gauge**: Rainfall or precipitation
  - **Infra-red thermometer**: **Skin surface temperature** without touching the surface

Pheromones: chemical messengers that carry information between individuals of the same species
- These are **olfactory stimulus** detected by **Vomeronasal organ** (VNO) or organ of Jacobson
- During estrus, vaginal secretion of bitch contain **methyl-p-hydroxy benzoate** (a pheromone)
- Boar saliva contain **5*a*-androstenone** (a pheromone)

- **Classical phenomena in mice by pheromones**:-
  - **Whitten effect**: synchronization of estrus in female mice due to **release of GnRH** (when a male mouse introduced into a group of female mice)
  - **Bruce effect**: termination of pregnancy due to **blockage of prolactin release** (when a male mouse introduced into a group of recently bred mice)

Note:
- **Ram effect** is similar to Whitten effect (but occur in ewes)
- **Blood brain barrier:** Brain endothelial cells, which are connected by tight junctions
- **Blood CSF barrier**: Epitelial cells of choroid plexus
- **Blood testes barrier**: Sertoli cells along with myoid cells

- **Reference Books:-**

1. Dukes' physiology of domestic animals by William O. Reece, 12th edition
2. Dukes' physiology of domestic animals by William O. Reece, 13th edition
3. Textbook of Medical Physiology by Guyton & Hall

☆☆☆

Objective Questions

1. **Center for osmoregulation and thermoregulation are situated in-**
   (a) Hypothalamus (b) Pituitary
   (c) Thyroid (d) Cerebellum
2. **Match the column: -**

TABLE-I	TABLE-II
(1) Pregnancy	(a) FSH
(2) Super-ovulation	(b) Progesterone
(3) Estrus synchronization	(c) Estrogen
(4) Heat	(d) Thyroxin
(5) B.M.R	(e) Insulin
(6) Glucose metabolism	(f) PGF_2a

3. **Which of the following is a lipotropic factor-**
   (a) Folic acid (b) Choline
   (c) Biotin (d) Vitamin A
4. **Normal pH of rumen is-**
   (a) 6.5- 6.8 (b) 6.2 - 7.2
   (c) 5 - 6 (d) 4 - 5
5. **Normal pH of blood is-**
   (a) 7.4 (b) 7.2
   (c) 7.8 (d) 7.0
6. **Overall pH of abomasal content is-**
   (a) 2.0 (b) 4
   (c) 5.8 (d) 8
7. **Which of the following hormone is secreted by kidney-**
   (a) Renin (b) Erythropoietin
   (c) 1, 25-Dihydroxycholecalciferol (d) All the above
8. **The hormone responsible for reabsorption of water through DCT and collecting duct is-**
   (a) ADH (b) Aldosterone
   (c) Cortisol (d) Oxytocin
9. **Severe proteinuria condition is encountered when degeneration occurs in-**
   (a) PCT (b) DCT
   (c) Glomerulus capillaries (d) Collecting duct
10. **Photoreceptors are located in-**
    (a) Hypothalamus (b) Pituitary
    (c) Gonads (d) None
11. **Match the column: -**

TABLE-I	TABLE-II
(1) Troponin C	(a) Cellular immunity
(2) Thrombocytes	(b) Humoral immunity
(3) B- lymphocytes	(c) Decompression sickness
(4) T- lymphocytes	(d) Phagocytosis
(5) N_2 in blood	(e) Blood coagulation
(6) Macrophage	(f) Calcium

12. **When destruction of RBC rapidly occurs, the concentration of which of the following is increase in the blood-**
(a) α & β Hemoglobin
(b) Bilirubin
(c) Plasma cells
(d) Biliverdin

13. **Pepsinogen is converted into its active form pepsin in the presence of-**
(a) Gastric HCl
(b) Trypsin
(c) Enterokinase
(d) None

14. **Trypsinogen is converted into its active form trypsin in the presence of-**
(a) Gastric HCL
(b) Insulin
(c) Enterokinase
(d) Glutathione

15. **Sympathetic & parasympathetic divisions are the part of-**
(a) Central nervous system / CNS
(b) Peripheral nervous system / PNS
(b) Somatic nervous system / SNS
(d) Autonomic nervous system / ANS

16. **Absorption of VFA occurs in ruminants by-**
(a) Active transport
(b) Passive diffusion
(c) Facilitated transport
(d) None of the above

17. **Rate of VFA absorption is-**
(a) Butyrate < Propionate< Acetate
(b) Acetate < Propionate < Butyrate
(c) Propionate < Acetate < Butyrate
(d) None of the above

18. **One mole of lactose on digestion yields-**
(a) Glucose + Glucose
(b) Glucose + Galactose
(c) Glucose + Fructose
(d) None

19. **Photoreceptors are located in the retina of the eye, these are-**
(a) Rods
(b) Cones
(c) Both
(d) None

20. **Einthoven's triangle is related to-**
(a) Electrocardiography (ECG)
(b) Electromyography (EMG)
(c) Electroencephalography (EEG)
(d) Both a & b

21. **Which of the following statement(s) is/are true about vision-**
(a) Cones are required for daylight vision while rods are required for night vision
(b) Majority (95%) of the photoreceptor cells are rod cells
(c) Rod cells are about 300 times more sensitive to light than are cone cells
(d) All the above

22. **Electromyography (EMG) records the electrical activity of-**
(a) Skeletal muscles
(b) Smooth muscles
(c) Cardiac muscles
(d) Both a& b

23. **Cerebrospinal fluid (CSF) is produced by-**
(a) Choroid plexus
(b) Ependymal lining of ventricles of brain
(c) Both a & b
(d) Cerebellum

24. **Blood volume of an animal is generally _____ % of its body wt-**
(a) 8%
(b) 4%
(c) 12%
(d) 6%

25. **Erythrocytes (RBC) & thrombocytes (platelets) are nucleated in-**
(a) Fowl
(b) Camel
(c) Dog
(d) Cattle

26. **In birds, neutrophils are known as-**
(a) Heterophils
(b) Rubricyte
(c) Heterocytes
(d) Rubriblast

27. **Erythrocyte sedimentation rate (ESR) is highest in the blood of-**
(a) Sheep (b) Horse
(c) Goat (d) Cattle

28. **Buffy coat on centrifugation of blood reflects-**
(a) WBC (b) RBC
(c) Platelets (d) Both a & c

29. **Plasma cells are derived from-**
(a) B-lymphocytes (b) T-lymphocytes
(c) Both (d) None

30. **Plasma without fibrinogen & other clotting factors is known as-**
(a) Serum (b) Rubricyte
(c) Mucus (d) Clot

31. **Life spans of chicken, cat, and cattle erythrocyte are respectively-**
(a) 30 days, 70 days, 125-150 days (b) 70 days, 30 days, 100-120 days
(c) 10 days, 30 days, 70 days (d) 30 days,45 days,70 days

32. **Humoral immunity is provided by-**
(a) B-lymphocytes (b) T-lymphocytes
(c) T-helper cell (d) None of the above

33. **Vaccination and tetanus toxoid provides-**
(a) Active immunity (b) Passive immunity
(c) Innate immunity (d) None of the above

34. **Colostrum and anti-tetanus serum (ATS) provides-**
(a) Active immunity (b) Passive immunity
(c) Innate immunity (d) None

35. **RBC_s with unequal size is termed as-**
(a) Anisocytosis (b) Poikilocytosis
(c) Oligocythemia (d) None

36. **Leucopenia (mainly neutropeni(a) condition occurs in-**
(a) Bacterial disease (b) Viral disease
(c) Allergy (d) Parasitic disease

37. **Eosinophilia condition occurs in-**
(a) Allergy & Parasitic disease (b) Bacterial disease
(c) Viral disease (d) None

38. **Match the column**: -

TABLE-I	TABLE-II
(1) Oxyhemoglobin	(a) Hb (Fe^{++})
(2) Carbaminohemoglobin	(b) Hb+CO
(3) Carboxyhemoglobin	(c) $Hb+CO_2$
(4) Methemoglobin	(d) $Hb+O_2$

39. **The product of oxidation of hemoglobin is known as-**
(a) Oxyhemoglobin (b) Methemoglobin
(c) Carboxyhemoglobin (d) None

40. **Which center regulates point of cessation of inspiration-**
(a) Pneumotaxic center of Pons (b) Dorsal respiratory center
(c) Ventral Respiratory center (d) Lateral respiratory center

41. **Match the column: -**

TABLE-I	TABLE-II
(1) Costo-abdominal Respiration	(a) Ventral respiratory center
(2) Costal Respiration	(b) Dorsal respiratory center
(3) Abdominal Respiration	(c) Ruminants
(4) Inspiration	(d) Cat, Dog
(5) Forced expiration	(e) Horse, Mule, Donkey

42. **98.5% of oxygen transport in the blood takes place in which form-**
(a) Dissolved in plasma (b) Oxyhemoglobin
(c) Carb-amino-hemoglobin (d) None of the above

43. **70% of CO_2 transport in the blood takes place in which form-**
(a) Bicarbonate ion (b) Carbaminohemoglobin
(c) Carboxyhemoglobin (d) None

44. **Oxygen-hemoglobin dissociation curve shifts to the right when-**
(a) There is increase in temperature (b) There is increase in CO_2, DPG
(c) There is increase in pH (d) All the above

45. **Which of the following chemical directly affect the respiration-**
(a) CO_2 (b) H^+
(c) O_2 (d) Both a & b

46. **Hering-Breuer receptors are activated when lung volume becomes _____ times of tidal volume-**
(a) 3 (b) 5
(c) 10 (d) 15

47. **Largest & smallest endocrine glands of the animal body are respectively-**
(a) Thyroid & Pituitary (b) Thyroid & Pineal
(c) Liver & Pituitary (d) Liver & Pineal

48. **The stimulus for oxytocin release-**
(a) Stretch of cervix (b) Suckling of teats
(c) Both a & b (d) None

49. **The major stimulus for release of ADH-**
(a) Hyperosmolarity of blood (b) Hyposmolarity of blood
(c) Hypovolemia (d) Hypervolemia

50. **The major stimulus for release of aldosterone-**
(a) Decreased blood volume (b) Decrease blood osmolarity
(c) Increase K^+ (d) Decrease Na^+

51. **Atrial natriuretic peptide (ANP) is a hormone produced by atria of heart mainly in response to-**
(a) Decreased blood volume (b) Increased blood volume
(c) Increased Na^+ (d) Decreased Na^+

52. **The oxidation product of hemoglobin is methemoglobin while oxygenation product of hemoglobin is-**
(a) Met-hemoglobin (b) Oxy-hemoglobin
(c) Carboxy- hemoglobin (d) None

53. **QRS complex of ECG represents-**
(a) Ventricular repolarization (b) Atrial depolarization
(c) Ventricular depolarization (d) Ventricular repolarization

54. **True sweating species are-**
(a) Human, Horse, Camel (b) Cattle, Camel, Goat
(c) Birds, Dog, Cat (d) Cattle, Buffalo, Goat

55. **True panting species are-**
(a) Human, Horse, Camel (b) Cattle, Camel, Goat
(c) Birds, Dog, Cat (d) Cattle, Buffalo, Goat

56. **Maximum panting occurs in-**
(a) Birds (b) Dog
(c) Cat (d) Pig

57. **Which of the following is true about RBC-**
(a) Largest size of RBC is found in dog while smallest is in goat
(b) Maximum numbers of RBC per il of blood are found in goat
(c) Dog's RBC are typically biconcave
(d) All the above

58. **Mean arterial pressure is-**
(a) Average of systolic & diastolic pressure
(b) Systolic pressure + 1/3 pulse pressure
(c) Diastolic pressure + 1/3 pulse pressure
(d) Systolic pressure + diastolic pressure

59. **Juxta-Glomerular (JG) apparatus of the kidney is made up of which of the following cells-**
(a) JG-cells of afferent & efferent arterioles (b) Macula densa cells of DCT
(c) Extraglomerular mesangial cells (d) All the above

60. **Renin hormone is secreted by which cells of the kidney-**
(a) JG cells (b) Macula densa
(c) Mesangial cells (d) Intercalated cells of collecting ducts

61. **Which of the following pair of hormones act antagonistic to each other-**
(a) Calcitonin & PTH (b) Aldosterone &Atrial natriuretic peptide (ANP)
(c) Insulin & Glucagon (d) All the above

62. **The major site of lipogenesis in ruminants is-**
(a) Liver (b) Adipose tissue
(c) Kidney (d) None

63. **The main site of Kreb's cycle & β- oxidation of fatty acid is-**
(a) Cytoplasm (b) Mitochondria
(c) Endoplasmic reticulum (d) Golgi bodies

64. **Which of the following is an amphibolic (catabolic + anabolic) Pathway-**
(a) Kreb's cycle (b) Glycolysis
(c) Lipogenisis (d) Gluconeogenesis

65. **Salivary amylase is present in the saliva of-**
(a) Ruminants (b) Horse
(c) Cat (d) Pig

66. **Absorption of glucose in non-ruminants occurs by-**
(a) Active transport (b) Passive diffusion
(c) Facilitated transport (d) None of the above

67. **Raffinose is a-**
(a) Monosaccharide (b) Disaccharide
(c) Trisaccharide (d) None

68. **The increase in the total red blood cell mass of the blood termed as-**
(a) Anemia (b) Polycythemia
(c) Poikilocytosis (d) Anisocytosis

69. **Which of the following condition occurs in chronic diseaseslike tuberculosis-**
(a) Neutrophilia (b) Eosinophilia
(c) Lymphocytosis (d) Monocytosis

70. **The major substrate of glucose in gluconeogenesis-**
(a) Propionate (b) Lactate
(c) Glucogenic Amino acid (d) None

71. **Digestion of protein in non-ruminants starts from-**
(a) Mouth (b) Stomach
(c) Duodenum (d) None

72. **Excess carbohydrate diet in ruminants & non-ruminants leads to-**
(a) Metabolic acidosis & hyperglycemia respectively
(b) Metabolic Alkalosis & hypoglycemia respectively
(c) Hyperglycemia & metabolic acidosis respectively
(d) Hyperglycemia & hypoglycemia respectively

73. **Which of the following is a hindgut fermenter-**
(a) Horse (b) Rabbit
(c) Ostrich (d) All the above

74. **The rumen is a-**
(a) Open & continuous ecosystem (b) Closed & continuous ecosystem
(c) Open & discontinuous ecosystem (d) None

75. **Site of absorption of fatty acid in ruminants as well as non-ruminant is-**
(a) Rumen (b) Proximal duodenum
(c) Proximal jejunum (d) Large intestine

76. **In pseudo-ruminants like camel & llama, which part of the stomach is absent-**
(a) Rumen (b) Reticulum
(c) Omasum (d) Abomasum

77. **Cholesterol & arachidonic acid are the respective precursors of-**
(a) Steroid hormone & prostaglandins (b) Melatonin & prostaglandins
(c) Epinephrine & steroids (d) Epinephrine & prostaglandins

78. **The precursor of cholesterol is-**
(a) Acetyl CoA (b) Tryptophan
(c) Hexose sugar (d) Glucose

79. **Match the column**: -

TABLE-I	TABLE-II
(1) Rumen	(a) Many-plies
(2) Reticulum	(b) Rennet bag
(3) Abomasum	(c) Honey comb & Tool box
(4) Omasum	(d) Paunch

80. **Regurgitation initiates in-**
(a) Rumen (b) Reticulum
(c) Abomasum (d) Omasum

81. **Main function of aldosterone is-**
(a) Na^+ reabsorption & K^+ secretion by collecting tubules
(b) K^+ reabsorption & Na^+ secretion by collecting tubules
(c) Na^+ reabsorption & K^+ reabsorption by collecting tubules
(d) None

82. Match the column: -

TABLE-I	TABLE-II
(1) Prolactin	(a) Super-ovulation
(2) PMSG	(b) Pseudo-pregnancy
(3) ADH	(c) Broodiness in poultry
(4) Prostaglandin	(d) Water-regulation
(5) MSH	(e) Luteolysis

83. **Calcitonin secreted by-**
(a) Parathyroid (b) Thyroid
(c) Pituitary (d) Pineal

84. **Which is true about the diurnal fluctuation of body temperature of animal-**
(a) Body temperature is minimum in early morning & maximum in late afternoon (about 3 PM)
(b) Body temperature is minimum in night & maximum in afternoon
(c) Body temperature is constant whole day
(d) None of the above

85. **Thermostability is lowest in————————& highest in————————**
(a) Camel, Buffalo & Sheep (b) Camel & Goat
(c) Goat & Sheep (d) None

86. **Evaporation from the respiratory tract is the most important mechanism for heat loss in-**
(a) Sheep (b) Goat
(c) Birds (d) Dogs

87. **Adaptive change in response to a single climatic variable is-**
(a) Acclimation (b) Weather
(c) Acclimatization (d) Climate

88. **The normal rate of ruminal motility in cattle is-**
(a) 3 cycles per 2 minutes (b) 2 cycles per 3 minutes
(c) 3 cycles per minute (d) 3 cycles per 3 minutes

89. **Gastrin is secreted by G-cells of the stomach, which in turn stimulates-**
(a) Parietal cells to secrete HCl & intrinsic factor (IF)
(b) Chief cells to secrete pepsinogen
(c) Both a & b
(d) None of the above

90. **Three phases of gastric secretions are-**
(a) Cephalic , Gastric & Intestinal (b) Cephalic, Reflex & Gastric
(c) Reflex, Cephalic & Intestinal (d) None

91. **Which of the following phase of gastric secretion is absent in herbivores-**
(a) Cephalic / Reflex phase (b) Gastric phase
(c) Intestinal phase (d) None

92. Match the column: -

CONTENTS	pH
(1) Ruminal Content	(a) 8.0
(2) Abomasal Content	(b) 7.4
(3) Saliva of Ruminant	(c) 2.0
(4) Blood	(d) 6.5-6.8

93. **Liquid phase of reticulo- rumen has an oxidation-reduction potential (redox potential) about-**
(a) (–) 350 mV (b) (+) 350 mV
(c) (+) 500 mV (d) (–) 500 mV

94. Normal secretion of saliva per day by an adult cow is about-
(a) 150 Litres / day (b) 50 Litres / day
(c) 100 Litres / day (d) 250 Litres / day

95. In which of the following animals, ingesta forms distinct layers in rumen-
(a) Cattle, Buffalo, Sheep (b) Camel, Goat
(c) Cattle, Sheep, Goat (d) Cattle, Buffalo, Sheep, Goat

96. There is no stratification of ruminal content is seen in-
(a) Cattle, Buffalo, Sheep (b) Camel, Goat
(c) Cattle, Sheep, Goat (d) All the above

97. At the time of birth, all neonate animals have -
(a) A sterile intestinal tract (there are no bacteria, fungi or protozo(a)
(b) Some bacteria, fungi in rumen
(c) Only bacteria in intestine
(d) None of the above

98. Order of layers from top to bottom in a stratified ruminal content-
(a) Gas cap, raft, rumen liquor (b) Gas cap, rumen liquor, raft
(c) Raft, rumen liquor, gas cap (d) None

99. Raft layer & rumen liquor contains-
(a) Longer forage particles & finer particle respectively
(b) Finer particles & longer forage particles respectively
(c) Both a & b
(d) None of the above

100. Process of the release of gas from the digestive tract through the mouth-
(a) Eructation (b) Belching
(c) Burping (d) All the above

101. Normal body temperature & normal pulse rate of poultry is-
(a) 107°F & 250-300 per minute (b) 109°F & 250-300 per minute
(c) 105°F & 200 per minute (d) None

102. Normal body temperature & pulse rate of cattle is-
(a) 101.5°F & 45-65 per minute (b) 100°F & 30-40 per minute
(c) 105°F & 60-70 per minute (d) 103°F & 50-70 per minute

103. Normal range of hemoglobin in cattle is-
(a) 8-15 g/dl (b) 8-15 mg/dl
(c) 8-15 % (d) None

104. Which of the following relationship is correct-
(a) PCV% $\simeq$ Hb × 3 (b) Heart rate $\simeq$ R.R × 4
(c) Spermatogenesis $\simeq$ 4.6 spermatogenic cycle (d) All the above

105. The endocrine cells of testes are-
(a) Sertoli cells (b) Leydig cells
(c) Both (d) None

106. Correct sequence of RBC formation-
(a) Rubriblast → Prorubricyte → Metarubricyte → Rubricyte → Reticulocyte → RBC
(b) Rubriblast → Prorubricyte → Rubricyte → Meta-rubricyte → Reticulocyte → RBC
(c) Reticulocyte → Rubricyte → Prorubricyte → Metarubricyte → Rubriblast → RBC
(d) Reticulocyte → Rubricyte → Prorubricyte → Rubricyte → Metarubriblast → RBC

107. Principle erythroid growth factor is-
(a) Erythropoietin (b) Vita. B_{12}
(c) Thyroxin (d) Folic acid

108. General factors required for RBC formation-

(a) Erythropoietin (b) Thyroxin

(c) Haemopoietin growth factor (d) All the above

109. Maturation factors of RBC-

(a) Vitamin B_{12} (b) Folic acid

(c) Intrinsic factor of castle (d) All the above

110. During blood clotting, factors responsible for platelets activation-

(a) Collagen (b) Thrombin & Platelet activation factor (PAF)

(c) ADP & Ca^{++} (d) All the above

111. Extrinsic castle (gastri(c) factor is-

(a) Vitamin B_{12} (b) Folic acid

(c) Choline (d) Copper

112. Intrinsic castle (gastri(c) factor is secreted by-

(a) Parietal cells of stomach (b) Chief cells of stomach

(c) G-cells of stomach (d) None

113 In severe grain engorgement, the ruminal pH becomes-

(a) 4 (b) 6

(c) 7.5 (d) 9

114. Peak secretion of melatonin hormone occurs mainly during-

(a) Early morning (b) Afternoon

(c) Late evening (d) Midnight

115. Cranial nerves & spinal nerves are the part of -

(a) Central nervous system / CNS (b) Peripheral nervous system / PNS

(c) Somatic nervous system / SNS (d) Autonomic nervous system / ANS

116. Antigen-presenting cells includes-

(a) Dendritic cells (b) Macrophages

(c) B-Lymphocytes (d) All the above

117. Match the column:-

TABLE-I	TABLE-II
(1) Spleen	(a) Dust cells
(2) Basophils	(b) Largest lymphoid organ
(3) Plasma cell	(c) Microglial cells
(4) Neutrophils	(d) Cart-wheel shape nucleus
(5) Liver	(e) Kupffer cells
(6) Brain	(f) First line of defense
(7) Lungs	(g) Heparin

118. Match the column:-

TABLE-I	TABLE-II
(1) Neutrophils	(a) Plasma volume
(2) Skin	(b) Sow
(3) Endotheliochorial placenta	(c) Largest organ of body
(4) Epitheliochorial placenta	(d) Heterophils
(5) Inulin	(e) Bitch
(6) Evan's blue dye	(f) GFR

119. **Match the column:-**

TABLE-I	TABLE-II
(1) Bone marrow	(a) Secretory antibody
(2) Spleen	(b) Cross the placenta
(3) IgG	(c) Active immunity
(4) IgA	(d) Passive immunity
(5) Vaccination	(e) Secondary lymphoid organ
(6) Colostrum	(f) Primary lymphoid organ

120. **Arrange the different fluid compartments in decreasing order of their volume-**

(a) ICF > ECF > ISF > PV > TCF (b) ECF > ICF > ISF > PV > TCF

(c) ECF > ICF > PV > ISF > TCF (d) ICF > ECF > ISF > TCF > PV

121. **Inulin is used to measure-**

(a) Plasma volume (b) ECF

(c) GFR (d) Both b & c

122. **The fluid, which is found in body cavities & includes intra-ocular fluid, cerebrospinal fluid, synovial fluid, urine, bile& fluid of digestive tract, is-**

(a) Interstitial fluid (b) Plasma volume

(c) ICF (d) Transcellular fluid

123. **Which of the following is an example of primary lymphoid organs-**

(a) Bone marrow (b) Thymus

(c) Bursa of Fabricius (d) All the above

124. **Match the column:-**

TABLE-I	TABLE-II
(1) Innate immunity	(a) Intercalated disc
(2) Eosinophilia	(b) Insulin
(3) Diabetes Insipidus	(c) Non specific
(4) Diabetes Mellitus	(d) Allergy
(5) Skeletal muscle	(e) Antidiuretic hormone
(6) Cardiac muscle	(f) syncytium

125. **The basic unit of gaseous exchange in birds is-**

(a) Lungs (b) Air sacs

(c) Alveoli (d) Parabronchi

126. **Pepsinogen and HCl is secreted in ruminants by-**

(a) Rumen (b) Reticulum

(c) Abomasum (d) Omasum

127. **Hormone responsible for preparation of uterine endometrium for implantation-**

(a) Estrogen (b) Progesterone

(c) FSH (d) LH

128. **Match the column:-**

TABLE-I	TABLE-II
(1) Testosterone	(a) Hunger hormone
(2) Epinephrine	(b) Milk let down
(3) Leptin	(c) Adrenal medulla
(4) Ghrelin	(d) Kidney
(5) Erythropoietin	(e) Leydig cells
(6) Oxytocin	(f) Satiety hormone

129. **Match the column:-**

TABLE-I	TABLE-II
(1) Rumen	(a) Natural pacemaker
(2) Reticulum	(b) Vocal organ of mammals
(3) SA node	(c) Largest chamber of ruminant stomach
(4) ANP	(d) Vocal organ of birds
(5) Larynx	(e) Heart muscles
(6) Syrinx	(f) Smallest chamber of ruminant stomach

130. **Match the column:-**

TABLE-I	TABLE-II
(1) Troponin C	(a) Thin muscle filament
(2) Troponin T	(b) ATPase
(3) Myosin head	(c) Distance between two Z-lines
(4) Actin	(d) Tropomyosin
(5) Sarcomere	(e) Calcium

131. **Immediate source of energy for muscle contraction (up to first 4 seconds) is-**

(a) ATP (b) Glucose
(c) Glycogen (d) Creatinine-PO_4

132. **During strenuous exercise up to 10 seconds the energy comes from-**

(a) Fat (b) Glucose
(c) Creatinine-PO_4 (d) Protein

133. **The primary fuel for muscle contraction during prolonged endurance exercise-**

(a) Creatinine-PO_4 (b) Fatty acids
(c) Glucose (d) Glycogen

134. **During early fasting/starvation stage, the energy is supplied by-**

(a) Glycogen (b) Creatinine-PO_4
(c) Fatty acid (d) Protein

135. **During starvation, the sequence of fuel utilization is-**

(a) Glycogen, Protein, Fatty acids, Ketone
(b) Creatine-PO_4, Glycogen, Protein, Fatty acids, Ketone
(c) Glycogen, Fatty acids, Ketone, Protein
(d) Creatine-PO_4, Fatty acids, Glycogen, Protein

136. **Cell organelle having their own DNA is/are-**

(a) Mitochondria (b) Ribosome
(c) Chloroplast (d) Both a &c

137. **Which of the following statement(s) is/are true about mitochondria-**

(a) It is a double membrane bound cell organelle act as site of cellular respiration
(b) It is also known as powerhouse of cell
(c) It shows maternal inheritance
(d) All the above

138. **Match the column:-**

TABLE-I	TABLE-II
(1) Lysosome	(a) Reductional division
(2) Ribosome	(b) Crossing over
(3) Golgi bodies	(c) Equational division
(4) Meiosis-I	(d) Suicide bag
(5) Meiosis-II	(e) Protein factory
(6) Pachytene	(f) Transport & packaging of protein

139. **Match the column:-**

TABLE-I	TABLE-II
(1) Nucleus	(a) Shortest phase of mitosis
(2) Ribosome	(b) Metakinesis
(3) Meiosis	(c) Smallest cell organelle
(4) Mitosis	(d) Largest cell organelle
(5) Anaphase	(e) Occurs in somatic cells
(6) Metaphase	(f) Occurs in germ cells

140. **Which of the following cell organelles pair(s) is/are correctly matched-**
(a) Double membrane - Nucleus, Mitochondria, Golgi bodies, ER
(b) Single membrane - Lysosomes
(c) Membraneless - Ribosomes, Centrioles
(d) All the above

141. **Match the column:-**

TABLE-I	TABLE-II
(1) PBMCs	(a) Fluid connective tissue
(2) PMN	(b) Plasma " Fibrinogen
(3) Blood	(c) Fluid part of blood
(4) Lymph	(d) Granulocytes
(5) Serum	(e) Agranulocytes
(6) Plasma	(f) Cisterna chyli

142. **Which of the following statement is true about lymph-**
(a) It is derived from the interstitial fluid
(b) It is generally similar to blood plasma except that it also contains white blood cells
(c) Absorption of fat in the form of chylomicrons is taken place through lymphatics
(d) All the above

143. **Cisterna chyli act as –**
(a) Storage house of lymph
(b) Organ of phonation
(c) Storage house of CSF
(d) Graveyard of RBC

144. **Which of the following is a mixed gland (exocrine as well as endocrin(e)-**
(a) Pancreas
(b) Ovary
(c) Testes
(d) All the above

145. **Testis temperature of domestic animals is-**
(a) 4-5^{0}C less than body temperature
(b) 7-8^{0}C more than body temperature
(c) 1-2^{0}C less than body temperature
(d) 4-5^{0}C more than body temperature

146. **In which of the following species gall bladder is absent -**
(a) Horse
(b) Camel
(c) Llama
(d) All the above

147. **Prehensile organ of horse is-**
(a) Tongue
(b) Incisors teeth
(c) Sensitive mobile lips
(d) Oral cavity

148 **Prehensile organ of cattle is-**
(a) Tongue
(b) Incisors teeth
(c) Lips
(d) Oral cavity

149. **Normal value of glomerular filtration rate (GFR) in human-**
(a) 125 ml/min
(b) 150 ml/min
(c) 175 ml/min
(d) 200 ml/min

150. Which of the following pair(s) is/are correctly matched-

(a) Countercurrent multiplier- loop of Henle
(b) Countercurrent exchanger- vasa recta
(c) Yellow colour of urine- urobilin
(d) All the above

151. Slow, dropwise, painful discharge of urine caused by spasm of urethra and bladder

(a) Dysuria (b) Stranguria
(c) Anuria (d) Oliguria

152. Process of emptying of the bladder is known as-

(a) Parturition (b) Micturition
(c) Excretion (d) None

153. Which of the following is a type of nephron-

(a) Cortical nephron (b) Juxtamedullary nephron
(c) Both (d) None

154. The thin descending limb, thin ascending limb& thick ascending limb of loop of Henle-

(a) Have same lumen diameter
(b) Have same epithelial cell thickness
(c) Have lumen diameter corresponding to the limb being thin or thick
(d) None of the above

155. Renin is secreted by-

(a) JG granular cells of kidney (b) Chromaffin cells of kidney
(c) Gastric chief cells (d) Parietal cells of stomach

156. Diabetes insipidus is characterized by-

(a) Polyuria (b) Polydipsia
(c) Both a & b (d) None

157. Striated and multinucleated muscles are-

(a) Skeletal muscle (b) Cardiac muscle
(c) Smooth muscle (d) None

158. Striated, uninucleated muscle cells connected by intercalated discs are-

(a) Skeletal muscle (b) Cardiac muscle
(c) Smooth muscle (d) None

159. Functional unit of myofibril

(a) Sarcomere (b) Sarcolemma
(c) Myoglobulin (d) Myofilament

160. Contractile protein of muscle is-

(a) Actin (b) Myosin
(c) Both a & b (d) Troponin

161. Contractile protein of skeletal muscle involving in ATPase activity-

(a) Actin (b) Myosin
(c) Troponin (d) Tropomyosin

162 Light band or I-band or Isotropic band is composed of-

(a) Actin (b) Myosin
(c) Both a & b (d) Tropomyosin

163. Dark band or A-band or Anisotropic band is composed of-

(a) Actin (b) Myosin
(c) Both a & b (d) Tropomyosin

164. Which of the following sets of ions necessory for muscle contration-

(a) Na^{+} and Ca^{++} (b) Na^{+} and Mg^{++}
(c) Ca^{++} and Mg^{++} (d) Ca^{++} and K^{+}

165. 1 gram of hemoglobin carries————ml of oxygen.

(a) 1.34 ml (b) 1.55 ml
(c) 20 ml (d) 15 ml

166. Which of the following pair(s) is/are correctly matched-

(a) Anemometer-wind speed (b) Stevenson screen- instrument shelter
(c) Pyranometer -solar radiation (d) All the above

167. Anaemia caused by the deficiency of iron-

(a) Normocytic & Normochromic (b) Macrocytic & Hyperchromic
(c) Microcytic & Hypochromic (d) None of the above

168. Macrocytic & Hyperchromic anemia caused due to deficiency of

(a) Vitamin B_{12} (b) Folic acid
(c) Iron (d) Both a & b

169. Venous blood is more————than arterial blood.

(a) Acidic (b) Alkaline
(c) Deoxygenated (d) Watery

170. Number of oxygen molecules carried by each Hb molecule-

(a) 2 (b) 4
(c) 6 (d) 8

171. Which of the following pair is correctly matched-

(a) Band cells: young neutrophils (b) Birds neutrophils: heterophils
(c) Segmented cells: mature neutrophils (d) All the above

172. Clotting factor III, IV, IX, and X are called as-

(a) Fibrinogen, Prothrombin, Christmas factor and Stuart factor
(b) Tissue thromboplastin, Calcium, Christmas factor and Stuart factor
(c) Tissue thromboplastin, Calcium, Christmas factor and Hageman factor
(d) Fibrinogen, Prothrombin, PTA and Stuart factor

173. Factor responsible for initiation of extrinsic pathway of blood clotting-

(a) Collagen (b) Tissue factor
(c) Factor X (d) Both a &b

174 Which is true about speed of clotting cascade-

(a) Intrinsic is faster than extrinsic (b) Speed of both pathways is equal
(c) Extrinsic is faster than intrinsic (d) None of the above

175 Enzyme, which is responsible for clot lysis-

(a) Thromboplastin (b) Thrombin
(c) Fibrin (d) Plasmin

176. Which of the following pair (disease: due to deficiency of) is correctly matched-

(a) Haemophilia A: factor VIII (b) Pernicious anemia: Vitamin B_{12}
(c) Haemophilia B: factor IX (d) All the above

177. Pernicious anemia is

(a) Macrocytic hyperchromic (b) Macrocytic normochromic
(c) Microcytic hypochromic (d) Normocytic normochromic

178. Which of the following pair is correctly matched-

(a) Oxyhemoglobin: Bright red colour of blood
(b) Carboxyhemoglobin: Bright cherry red colour of blood
(c) Nitrate poisoning: Chocolate brown colour of blood
(d) All the above

179. Apneustic centre controls-

(a) Inspiration (b) Deep inspiration
(c) Forceful expiration (d) Inhibits inspiration

180. Pulmonary sufactant is-

(a) Dipalmitoylphosphatidylcholine/DPPC (b) Cyclophosphamide

(c) Sodium lauryl sulfate/SLS (d) None

181. Which of the following pair is correctly matched-

(a) Pulmonary surfactant-secreting cells in mammals: type-II pneumocytes

(b) Pulmonary surfactant-secreting cells in birds: granular cells

(c) Dorsal respiratory group: inspiration

(d) All the above

182. Which statement is not true about avian respiration-

(a) Respiratory system of birds is more efficient than mammals

(b) Diaphragm is absent in birds

(c) Birds have nine pair air sacs

(d) Both inspiration & expiration are active processes

183. Unpaired air sacs in birds-

(a) Anterior thoracic (b) Clavicular

(c) Cervical (d) Abdominal

184. Collapse of alveolar sacs is prevented by-

(a) Surfactant (b) Expansion of thoracic cavity

(c) Air in the lungs (d) Fluid in the pleural cavity

185. Reflexes, prevent over dilation of lungs during inspiration &collapse of lungs during expiration-

(a) Haldane reflex (b) Hering-Breuer reflex

(c) Bohr reflex (d) None of the above

186. First heart sound/lub/systolic sound is produced by-

(a) Closure of A-V valves (b) Closure of semilunar valves

(c) Opening of A-V valves (d) Opening of semilunar valves

187. Second heart sound/dub/diastolic sound is produced by-

(a) Closure of A-V valves (b) Closure of semilunar valves

(c) Opening of A-V valves (d) Opening of semilunar valves

188. Match the column:-

Table-I	Table-II
(1) Vital Capacity	(a) ERV+RV
(2) Inspiratory Capacity	(b) IRV+TV+ERV+ RV
(3) Functional Residual Capacity	(c) TV+IRV
(4) Total Lung Capacity	(d) IRV+TV+ERV

189. The volume of air inspired or expired during normal breathing-

(a) Vital capacity (b) Inspiratory capacity

(c) Tidal volume (d) Functional respiratory capacity

190. Normal dead space volume of lungs in human being-

(a) 125 ml (b) 150 ml

(c) 175 ml (d) 200ml

191. Example of forced expiration-

(a) Vomition (b) Cough

(c) Sneezing (d) Choke

192. Eructation is the elimination of———— from the rumen.

(a) Rumen liquor (b) Rumen solids

(c) Rumen gases (d) All the above

193. Vomition is caused by-

(a) Peristalsis (b) Segmentation
(c) Reverse peristalsis (d) Eructation

194. Food in GIT is moved forward by-

(a) Peristalsis (b) Pendular movement
(c) Segmentation (d) All the above

195. Rumen metabolism is inhibited in the presence of-

(a) Carbon dioxide (b) Oxygen
(c) Methane (d) Nitrogen

196. Rumen bacteria are classified according to their-

(a) Shape (b) Size
(c) Number (d) Substrate on which they eat

197. Normal level of VFA^s in the rumen liquor-

(a) 60-80 mEq/L (b) 120-160 mEq/L
(c) 80-120 mEq/L (d) 160-200 mEq/L

198. Normal population of rumen bacteria per ml of rumen liquor-

(a) 10^3 (b) 10^6
(c) 10^{10} (d) 10^{15}

199. In ruminants, propionate production can be enhanced by-

(a) High grain diet (b) High roughage diet
(c) High protein diet (d) All the above

200. In ruminants, acetate production can be enhanced by-

(a) High grain diet (b) High roughage diet
(c) High protein diet (d) All the above

201. Which is not true about avian respiration-

(a) Site of gaseous exchange in birds is air sacs
(b) Paleopulmonic parabronchi is found in all birds
(c) In fowl, neopulmonic is more developed than paleopulmonicparabronchi
(d) Tracheal rings are complete

202. Direction of air flow in paleopulmonicparabronchi in birds-

(a) Unidirectional (b) Bidirectional
(c) Both a and b (d) None

203. Key enzyme of hemostasis or blood coagulation -

(a) Fibrinogen (b) Thrombin
(c) Thromboplastin (d) Plasmin

204. Mast cells are abundantly found in-

(a) Liver (b) Lung
(c) Kidney (d) Spleen

205. Factor responsible for preventing intravascular coagulation in body-

(a) Smoothness of endothelium
(b) Thrombomodulin binds with thrombin
(c) Negatively charged endothelium repels platelets & clotting factors
(d) All the above

206. Gas exchange is efficient in birds than mammals is due to-

(a) Larger surface area of avian lung (b) Thinner mean harmonic thickness of avian lung
(c) Large number of air sacs (d) Both a and b

207. Maximum tubular reabsorption (about 80%) occurs at

(a) PCT (b) Loop of Henle
(c) DCT (d) Collecting Duct

208. Function of PTH on kidney tubules-

(a) Increase calcium reabsorption & phosphorus excretion
(b) Increase calcium excretion & phosphorus reabsorption
(c) Increase calcium & phosphorus reabsorption
(d) None of the above

209. Anticoagulant of choice during blood transfusion in animals-

(a) Heparin (b) Sodium fluoride
(c) EDTA (d) Sodium citrate

210. Which animal produce more concentrate urine

(a) Dog (b) Horse
(c) Cattle (d) Pig

211. Loop diuretics (ex-furosemide) act on

(a) Descending limb of loop of Henle (b) Thick ascending limb of loop of Henle
(c) Thin ascending limb of loop of Henle (d) None

212. Correct statement about loop of Henle-

(a) Descending limb is permeable to water & impermeable to solutes
(b) Ascending limb (thin+thick) is permeable to solutes & impermeable to water
(c) Both statements are correct
(d) Both statements are wrong

213. Generally, urine volume is about-

(a) 1% of total glomerular filtrate volume (b) 5% of total glomerular filtrate volume
(c) 10% of total glomerular filtrate volume (d) 20% of total glomerular filtrate volume

214 Which statement is not true about Vasa recta-

(a) Capillary branches arises from peritubular capillaries associated with JM nephrons
(b) They are absent or highly reduced in cortical nephrons
(c) They are permeable to solutes& impermeable to water throughout their length
(d) Blood flow to the vasa recta is sluggish

215. Which part of loop of Henle has the highest & lowest osmolality respectively-

(a) Ascending thin limb & hairpin loop (b) Descending limb & ascending thin limb
(c) Hairpin loop & ascending thick limb (d) Descending limb & ascending thick limb

216. Nephrogenic diabetes insipidus occurs due to-

(a) Deficiency of antidiuretic hormone
(b) Receptor of ADH does not respond
(c) Deficiency of ADH that occurs only during pregnancy
(d) Abnormal thirst & excessive intake of water

217. Most potent vasoconstrictor produced in the body-

(a) Vasopressin (b) Angiotensin II
(c) Endothelin (d) Nitric oxide

218 Most potent vasodilator produced in the body-

(a) Heparin (b) Prostacyclin
(c) Endothelin (d) Nitric oxide

219 Epinephrine is a-

(a) Vasoconstrictor (b) Vasodilator
(c) Both (d) None

220 Micturition is-

(a) Sympathetic activity (b) Parasympathetic activity
(c) Both (d) None

221 Which substance is not found in normal urine-

(a) Glucose (b) NaCl
(c) Creatinine (d) Urea

222. Reabsorption of glucose and amino acids in kidney is occurred at

(a) PCT by cotransport with Na+ (b) PCT by glut-2 protein
(c) DCT by ion channel (d) PCT by passive diffusion

223. About 65% of sodium, potassium, calcium &water reabsorption occurs at-

(a) PCT (b) Thick limb of loop of Henle
(c) DCT (d) Collecting duct

224. Creatinine clearance directly related to-

(a) Amount of protein metabolism (b) Functional renal mass
(c) Ability to concentrate urine (d) Muscle mass

225. Which statement is not true about creatinine?

(a) It is a nitrogenous byproduct of muscle metabolism
(b) Creatinine production depends on the amount of protein metabolism
(c) High plasma concentrations of creatinine is first indication of kidney disease
(d) Creatinine clearance is used to measure GFR

226. The site of conversion of ammonia into uric acid in birds-

(a) Liver (b) Kidney
(c) Both (d) None

227. Major Post renal modification of ureteral urine in birds takes place at-

(a) Cloaca (b) Colon
(c) Cecae (d) Kidney

228 Urinary bladder absent in-

(a) Horse (b) Fowl
(c) Camel (d) Both horse & camel

229 Consistency of horse urine is-

(a) Watery (b) Thick & syrupy
(c) Creamy (d) None

230 Mucus is generally present in urine of

(a) Horse (b) Fowl
(c) Dog (d) Both horse & fowl

231 Which is not true about salt glands (nasal glands) in birds

(a) It secretes NaCl and serves an extrarenal osmoregulatory function
(b) They are active only when there is a salt load
(c) They are absent in ostrich & penguin
(d) None of the above

232. Pheromones are-

(a) Visual stimulus (b) Tactile stimulus
(c) Olfactory stimulus (d) Auditory stimulus

233 Pheromones are detected by

(a) Vomeronasal organ (b) Jacobson organ
(c) Meckel's diverticulum (d) Both a & c

234 Main cause of Whitten effect in mice

(a) Release of GnRH (b) Release of prostaglandins
(c) Release of prolactin (d) Release of oxytocin

235. Main cause of Bruce effect in mice

(a) Release of GnRH (b) Blockage of prolactin release
(c) Release of prolactin (d) Release of oxytocin

☆☆☆

Answer Key

1. Hypothalamus
2. 1-b, 2-a, 3-f, 4-c, 5-d, 6-e
3. Choline
4. 6.5 – 6.8
5. 7.4
6. 2.0
7. All te above
8. A.D.H
9. Glomerulus capillaries
10. None
11. 1 -f, 2 - e, 3- b, 4-a, 5-c, 6 –d
12. Bilirubin (Hint: When RBC destruction occur rapidly &bilirubin concentration rapidly increases which leads to jaundice)
13. Gastric HCl
14. Enterokinase
15. Autonomic nervous system/ANS
16. Passive diffusion
17. Acetate < Propionate < Butyrate
18. Glucose + Galactose
19. Both
20. Electro Cardiography (ECG)
21. All the above
22. Skeletal muscles
23. Both a & b
24. 8%
25. Fowl
26. Heterophils
27. Horse
28. Both a & c
29. B-lymphocytes
30. Serum
31. 30 days, 70 days, 125-150 days
32. B-Lymphocytes
33. Active immunity
34. Passive immunity
35. Anisocytosis
36. Viral disease
37. Allergy & Parasitic disease
38. 1-d, 2-c, 3 –b, 4-a
39. Methemoglobin
40. Pneumotaxic center of pons
41. 1 -e, 2 –d, 3 –c, 4 -b, 5 –a
42. Oxyhemoglobin
43. Bicarbonate ion
44. All the above (Hint: shift to right can be memorizing by mnemonic "CADET, Face Right! for CO_2, Acid,2,3-DPG, Exercise& Temperatur(e)
45. Both a & b
46. 3
47. Thyroid & Pineal
48. Both a & b
49. Hyperosmolarity of blood
50. Decreased blood volume
51. Increased blood volume
52. Oxy-hemoglobin
53. Ventricular depolarization(Note: P-wave: Atrial depolarization;QRS-Complex:Ventricular depolarization; T-wave: Ventricular repolarization)
54. Human, Horse, Camel
55. Birds, Dog, Cat
56. Birds
57. All the above
58. Diastolic pressure + 1/3 pulse pressure
59. All the above
60. JG cells
61. All the above
62. Adipose tissue
63. Mitochondria
64. Kreb's cycle
65. Pig

66. Active transport
67. Tri-saccharide
68. Polycythemia
69. Monocytosis
70. Propionate
71. Stomach
72. Metabolic acidosis & hyperglycemia respectively
73. All the above
74. Open & continuous ecosystem
75. Proximal jejunum
76. Omasum
77. Steroid hormone & prostaglandins
78. Acetyl CoA
79. 1 -d, 2 -c, 3 -b, 4 –a
80. Reticulum
81. Na^+ reabsorption & K^+ secretion by collecting tubules
82. 1 -c, 2 -a, 3 -d, 4 -e, 5 –b
83. Thyroid
84. Body temperature is minimum in early morning & maximum in late afternoon (About 3 PM)
85. Camel, buffalo & sheep
86. Sheep
87. Acclimation
88. 3 cycles per 2 minutes
89. Both a & b
90. Cephalic, Gastric & Intestinal
91. Cephalic / Reflex phase
92. 1 -d, 2 -c, 3-a, 4-b
93. (–) 350 Mv
94. 150 Litres / day
95. Cattle, Buffalo, Sheep
96. Camel, Goat
97. Sterile intestinal tract (there are no bacteria, fungi or protozo(a)
98. Gas cap, raft, rumen liquor
99. Longer forage particles & finer particle respectively
100. All the above
101. 107°F & 250-300 per minutes
102. 101.5°F & 45-65 per minute
103. 8-15 g / dl
104. All the above
105. Leydig cells
106. Rubriblast '!Prorubricyte '!Rubricyte '!Meta-rubricyte'!Reticulocyte '! RBC
107. Erythropoietin(haemopoietin)
108. All the above
109. All the above
110. All the above
111. Vitamin B_{12}
112. Parietal cells of stomach
113. 4
114. Midnight
115. Peripheral nervous system/PNS
116. All the above
117. 1-b, 2-g, 3-d, 4-f, 5-e, 6-c, 7-a
118. 1-d, 2-c, 3-e, 4-b, 5-f, 6-a
119. 1-f, 2-e, 3-b, 4-a, 5-c, 6-d
120. ICF > ECF > ISF > PV > TCF
121. Both b & c
122. Transcellular fluid
123. All the above
124. 1-c, 2-d, 3-e, 4-b, 5-f, 6-a
125. Parabronchi
126. Abomasum
127. Progesterone
128. 1-e, 2-c, 3-f, 4-a, 5-d, 6-b
129. 1-c, 2-f, 3-a, 4-e, 5-b, 6-d
130. 1-e, 2-d, 3-b, 4-a, 5-c
131. ATP
132. Creatinine-PO_4
133. Fatty acids
134. Glycogen
135. Glycogen, Fatty acids, Ketone, Protein
136. Both a &c
137. All the above
138. 1-d, 2-e, 3-f,4-a, 5-c,6-b

139. 1-d, 2-c, 3-f, 4-e, 5-a, 6-b
140. All the above
141. 1-e, 2-d, 3-a, 4-f, 5-b, 6-c
142. All the above
143. Storage house of Lymph
144. All the above
145. 4-5°C less than body temperature
146. All the above
147. Sensitive mobile lips
148. Tongue
149. 125 ml/min
150. All the above
151. Stranguria (Note: Polyuria-increased urine output; Oliguria- decreased output; Anuria- no urine output; Dysuria-difficult or painful urin(e)
152. Micturition (It is also known as urination)
153. Both
154. Have same lumen diameter (Note: relative thickness is a result of differences in the epithelial cells)
155. JG granular cells of kidney (Rennin, also called chymosin, a protein-digesting enzyme that curdles milk by transforming caseinogen into insoluble casein. Renin converts angiotensinogen to angiotensin-1)
156. Both a&b
157. Skeletal muscle
158. Cardiac muscle
159. Sarcomere (It is the basic structural &functional unit of skeletal muscle fiber)
160. Both a&b
161. Myosin
162. Actin
163. Both a&b
164. Ca^{++} and Mg^{++}
165. 1.34 ml (Note: 1 gram of Hb carries 1.34 ml of oxygen & normal Hb concentration in the blood is 15g/dl hence 100 ml blood carries 20 ml of oxygen)
166. All the above
167. Microcytic & Hypochromic
168. Both a&b
169. Acidic (Note: Normal pH of blood is 7.4; Normal pH of arterial blood = 7.4; Normal pH of venous blood = 7.36; higher acidity of venous blood is due to CO_2 transport)
170. 4
171. All the above
172. Tissue thromboplastin, Calcium, Christmas factor and Stuart factor
173. Tissue factor/ Tissue thromboplastin
174. Extrinsic is faster than intrinsic
175. Plasmin
176. All the above
177. Macrocytic hyperchromic
178. All the above
179. Deep inspiration
180. Dipalmitoylphosphatidylcholine/DPPC or Dipalmitoyl lecithin
181. All the above
182. Birds have nine pair air sacs (Correct statement: Birds have nine air sacs)
183. Clavicular
184. Surfactant
185. Hering-Breuer reflex
186. Closure of A-V valves
187. Closure of semilunar valves
188. 1-d, 2-c, 3-a, 4-b
189. Tidal volume
190. 150 ml
191. Sneezing
192. Rumen gases

193. Reverse peristalsis
194. All the above
195. Oxygen (Because majority of bacteria are obligate anaerobes)
196. Substrate on which they eat
197. 80-120 mEq/L
198. 10^{10}
199. High grain diet (High grain diet-high propionate production-high milk production)
200. High roughage diet (High roughage diet- high acetate- high milk fat%)
201. Site of gaseous exchange in birds is air sacs(Correct statement: Site of gaseous exchange in irds is parabronchi)
202. Unidirectional (Note: In neopulmonic, it is bidirectional)
203. Thrombin
204. Lung (because lung is vulnerable to emboli & mast cell secrets heparin which is an anticoagulant)
205. All the above
206. Both a and b
207. PCT (About 80% of tubular reabsorption occurs in Proximal Convoluted Tubules)
208. Increase calcium reabsorption & phosphorus excretion
209. Sodium citrate
210. Dog
211. Thick ascending limb of loop of Henle
212. Both statements are correct
213. 1% of total glomerular filtrate volume
214. They are permeable to solutes& impermeable to water throughout their length(Correct statement: They are permeable to solutes & water throughout their length)
215. Hairpin loop & ascending thick limb
216. Receptor of ADH does not respond
217. Endothelin
218. Nitric oxide
219. Both
220. Parasympathetic activity
221. Glucose
222. PCT by cotransport with Na+
223. PCT(Proximal convoluted tubules)
224. Functional renal mass
225. Creatinine production depends on the amount of protein metabolism
226. Both
227. Colon
228. Fowl
229. Thick & syrupy
230. Both horse & fowl
231. They are absent in ostrich & penguin(Correct statement: They are present in ostrich & penguin, ducks, geese etc.)
232. Olfactory stimulus
233. Both a&c
234. Release of GnRH
235. Blockage of prolactin release

☆☆☆

Animal Reproduction

Gynaecology- Study of female reproductive system
Andrology- Study of male reproductive system

- **Types of animals based on estrous cycle**
  (1) Monoestrous animals: Bitch, wild animals
  (2) Polyestrous animals: Cow, Sow
  (3) Seasonal polyestrous animals are two types-
    - Long day breeder: Mare, cat
    - Short day breeder: Sheep, goat, buffalo, she-camel

Table 1: Estrous cycle & estrus phase (heat period) of various animals

S.N.	Animal	Length of estrous cycle	Length of estrus phase (heat period)
1.	Cattle	21 days	12-24 hours
2.	Mare	21 days	6 days
3.	Sow	21 days	2-2.5 days
4.	She-camel	23 days	3-5 days
5.	Ewe	17 days	36 hours
6.	Doe	19 days	48 hours
7.	Bitch	6-7 months	9 days

Table 2: Types of placenta

S.N.	Types of placenta	Examples
1.	Diffuse, Epitheliochorial, Non-deciduate	Mare, Sow, She-camel
2.	Cotyledonary, Syndesmochorial, Non-deciduate	Ruminants
3.	Zonary placenta, Endotheliochorial, Deciduate	Bitch, Cat
4.	Discoidal placenta , Haemochorial	Human, Monkey, Rodents

- **Terminology related to ruminant placentation:-**
  - **Cotyledon**: fetal side of the placenta
  - **Caruncle**: maternal side of the placenta
  - **Placentome**: a cotyledon and caruncle together

Table 3: The gestation period of common domestic animals

S.N.	Animal	Gestation period
1.	Cattle	283 days (9 month+ 9days)
2.	Buffalo	310 days (10months+10days)
3.	Ewe	145 days (5 months–5days)
4.	Doe	155 days (5months+5days)
5.	Bitch	62 days (2months+2days)
6.	Sow	114 days (3months+3weeks+3days)
7.	Mare	341 days (11months+11days)
8.	She-camel	390 days (1year+1month+1day)
9.	Rabbit	30-32 days
10.	Cat	56-64 days

- **Stage of gestation in bovines:-**
  (1) **Period of ovum**: fertilization to 10-12 days of pregnancy
  (2) **Period of embryo**: 13 to 45 days of pregnancy
    - Heart is formed & starts beating on 22nd day of pregnancy
  (3) **Period of foetus**: 45 days onwards until birth
    - Differentiation of organs and systems
- **Site of fertilization:-**
  (1) In birds: Infundibulum
  (2) In domestic animals: Ampullary-isthmic junction of the oviduct
- **Stages of parturition:-**
  (1) First stage: dilation of the cervix
  (2) Second stage: delivery of the newborn (birth)
  (3) Third stage: expulsion of fetal membranes & involution of uterus

Table 4: Average duration of different stages of parturition in farm animals

S.N.	Animal	First stage (hours)	Second stage (minute)	Third stage (hours)	Involution (days)
1.	Mare	1-4	12-30	1	8-12
2.	Cattle, buffalo	2-6	30-60	6-12	40-45
3.	Ewe	2-6	30-120	5-8	22-28
4.	Sow	2-12	150-180	1-4	20-28

- **Methods of artificial insemination in various animals:-**
  (1) Cattle & Buffalo - Rectovaginal method
  (2) Sheep & Goat- Vaginal speculum method
  (3) Swine - Corkscrew pipette method
  (4) Mare - Vaginal method (Man-O- Cervical method)

- **Methods of pregnancy diagnosis in various animals:-**
  (1) Cattle, buffalo, mare and she-camel -Rectal palpation
  (2) Sheep & goat - Abdominal palpation
  (3) She-camel - Cocking of tail, rectal palpation
  (4) Mare- Cuboni test (chemical test) & Aschheim-Zondek (A-Z) test (Biological test)
  (5) Cattle & buffalo- Barium Chloride test

Table 5: Insemination requirements

S.N.	Items	Bull	Ram	Stallion	Boar
1.	Average semen ejaculate (ml)	5-8	1	125	200-250
2.	Volume of semen for insemination (ml)	1	0.2	20-40	50
3.	Site of semen deposition	Utero-cervix or mid-cervix	Cervix	Uterus	Uterus
4.	Sperm conc. (million/ml)	1200	3000	120	270

5.	Time of insemination in female animal	**Mid heat or Standing heat**	12-24 hr after onset of heat	3rd day of heat	**2nd day of heat**
6.	Recommended diluent	Yolk citrate modification	Yolk glucose citrate	Glucose-gelatin	Yolk - glucose bicarbonate

Note:-

(1) Most commonly used **cryogen** in bull semen is **liquid nitrogen/LN_2 at (–)196^{0}C**

(2) Most commonly used **cryoprotective agent** in bull semen is **glycerol**

(3) **Thawing temperature** of frozen semen is **37- 40^{0}C for 30 seconds**

- **Types of the uterus:-**

(1) Bipartite uterus- mare

(2) Bicornuate uterus- ruminants, sow, she-camel, bitch

(3) Duplex uterus - rabbit

- **The shape of the uterus:-**

(1) Y-Shape uterus - ruminants

(2) T-Shape uterus - mare

(3) Between Y & T Shape - She-camel

(4) V-Shape uterus- Bitch

- **The shape of the ovary:-**

(1) Cattle, sheep, goat- Almond shape

(2) Mare-Bean shape or kidney shape

(3) Sow & poultry -Bunch of grapes shape

- **Male reproductive system:-**

(1) Primary sex organs (gonads) - testicles

(2) Secondary sex organs- epididymis, vas-deferens,penis

(3) Accessory sex glands- seminal vesicles, prostate, Cowper's gland

(4) Copulatory organ- penis

Note:-

- The male reproductive system develops from the Wolffian duct or Mesonephric duct.
- The female reproductive system develops from the Mullerian duct or Paramesonephric duct.

- **Testes:-**
  - Each testis is composed of mass of seminiferous tubules
  - Seminiferous tubule is made up of two types of cells
    (a) Germ cells - forms spermatozoa
    (b) Sertoli cells/sustentacular cells-act as "sperm mother cells" or "nurse cells"
  - In between seminiferous tubules, interstitial cells or Leydig cells are present which produce testosterone hormone
  - Temperature of testes is 4-5^{0}C less than body temperature in case of domestic animals

- **Epididymis**

Functions of epididymis-

- Maturation of sperms
- Concentration of diluted sperm suspension
- The tail (cauda) acts as storage house of sperms

Note:-

- Semen = Sperms + Seminal plasma
- Seminal plasma is the composite secretions of testicles, epididymis and accessory sex glands.

- **Accessory sex glands:-**

(1) **Ampullae:** Stallion ampullae secretion contains-ergothioneine

(2) **Seminal vesicles:** - contributes 60% of total semen volume.

- Secretion contains- fructose, prostaglandins, citric acid, riboflavin, vitamin C etc.
- The fructose is the main source of energy for the spermatozoa motility.
- Boar seminal vesicles secretion contains- inositol & ergothioneine
- Buck seminal vesicles secretion contains- lysolecithin

(3) **Prostate gland-** only unpaired accessory gland, found in all domestic animals

- Prostate fluid is alkaline; it helps to neutralize the acidity of the vaginal tract & provide the motility & fertility.

(4) **Bulbourethral glands/Cowper's glands**

Note:-

- Seminal vesicles & bulbourethral glands are absent in dog
- Preputial diverticulum is present in boar penis
- Double folded prepuce is found in stallion
- Glans penis is absent in boar & tom
- Os-penis is a visceral bone found in dog penis
- Corona glandis is found in stallion
- Bulbus glandis is the enlarged part of glans in dog
- Urethral process is found in glans penis of Ram and Stallion

- **Sigmoid flexure:-'S'-shaped curve** in the body of **non-erect penis**
  - Pre-scrotal sigmoid flexure-found in boar & camel
  - Post- scrotal sigmoid flexure-found in bull, ram & buck
  - Sigmoid flexure is absent in stallion, tom & dog penis

- **Female reproductive system:-**

(1) Primary sex organs (Gonads): Ovaries

(2) Reproductive tracts: Fallopian tube, uterus, cervix, vagina

(3) Copulatory organ: Vagina

Note:-

- Cervix is also known as 'neck of the womb'
- Vagina acts as **birth canal & copulatory organ**

♦ **Terminology**:-

- **Abortion**: expulsion of a dead foetus before completion of the gestation period
- **Stillbirth**: expulsion of dead foetus at the time of parturition (means it completes gestation period)
- **Premature birth**: the expulsion of a live foetus before completion of the gestation period

Table 6: Main infectious causes of abortion in various animals

S.N.	Animal	Main cause of abortion
1	Sheep, goat	*Campylobacter fetus (Vibriosis)*
2	Cattle	*Brucella abortus*
3	Bitch	*Brucella canis*
4	Swine	*Leptospira*
5	She-camel	*Trypanosoma evansi* (causative agent of Surra disease)

♦ **Trichomoniasis in cattle**-

- It is a **venereal disease (transmitted by coitus)**
- Causative agent: ***Tritrichomonas foetus*** (protozoan)
- It cause **post-coital pyometra** (potato soup like pus in uterus)
- ***Tritrichomonas foetus*** causes **abortion in the first trimester of pregnancy.**
- *Campylobacter* cause abortion in second trimester of pregnancy
- *Brucella, Leptospira, Mycobacterium and Listeria* cause abortion mainly in last trimester of pregnancy.

♦ **Maternal Recognition of Pregnancy (MRP):-**

Responsible factors & time of MRP:-

(1) Cattle: **bovine interferon tau**/bovine trophoblast protein-1 (bTP-1), **16-17 days**
(2) Sheep: ovine interferon tau/ovine trophoblast protein-1 (oTP-1), 12-14 days
(3) Mare: **transuterine migration of conceptus**, 12-14 days
(4) Pig: **estrogen** produced by conceptus, **11-12 days**
(5) Human: hCG, 8-10 days
(6) MRP is not necessary in case of bitch & cat

♦ **Reference Books**:-

1. *Arthur's Veterinary Reproduction and Obstetrics*, 8th edition
2. Reproduction in Farm Animals by Hafez, 7th edition

☆☆☆

Objective Questions

1. **Earliest sign of pregnancy on per rectal palpation in adult cattle is-**
   (a) Slippage of foetal membrane (b) Palpation of Amniotic vesicle
   (c) Fully developed C.L. on one ovary (d) Fremitus
2. **During pregnancy diagnosis in cattle by rectal palpation, the fremitus (palpation of a middle uterine artery) is seen at-**
   (a) 35-40 days of pregnancy (b) 70-80 days of pregnancy
   (c) 80-120 days of pregnancy (d) None
3. **The method of pregnancy diagnosis in small ruminants (sheep & goat) is-**
   (a) Rectal palpation (b) Abdominal palpation
   (c) Cuboni test (d) Cocking of tail
4. **Cocking of the tail is the method of pregnancy diagnosis in-**
   (a) Mare (b) Sow
   (c) She-camel (d) cattle
5. **Cuboni test & Ascheim-Zondek test (A-Z test) are the methods of pregnancy diagnosis in-**
   (a) Mare (b) Sow
   (c) She-camel (d) cattle
6. **Males of deer, elephant & camel show their sexual activity in———— (months) known as Rutting period-**
   (a) November to March (b) March to June
   (c) October to December (d) Feb to March
7. **MATCH THE COLUMN:-**

TABLE – I	TABLE – II
(1) Preputial diverticulum	(a) Ram & Stallion
(2) Double folded prepuce	(b) Dog
(3) Bulbus glandis	(c) Bitch
(4) Urethral process	(d) Stallion
(5) Ovulation Fossa	(e) Boar
(6) Ovarian bursa	(f) Mare

8. **MATCH THE COLUMN :-**

TABLE – I	TABLE – II
(1) Os-phrenic	(a) Sex cords of female
(2) Os-penis	(b) Camel
(3) Wolffian duct	(c) Male genitalia
(4) Mullerian duct	(d) Dog
(5) Cortical cords	(e) Cattle
(6) Os-cordis	(f) Female genitalia

9. **Study of male reproductive system is known as -**
   (a) Gynaecology (b) Andrology
   (c) Reproductive physiology (d) All the above
10. **Type of placenta present in bitch & cat is-**
   (a) Haemochorial (b) Syndesmochorial
   (c) Endotheliochorial (d) Epitheliochorial

11. **Which of the following pair(s) is/are correctly matched-**
(a) Cotyledonary placenta - ruminants (b) Zonary placenta- carnivores
(c) Diffused placenta- mare, sow & she-camel (d) All the above

12. **Most common cause of abortion in sheep & goat-**
(a) *Campylobacter fetus* (b) *Brucella abortus*
(c) *Brucella melitensis* (d) *Leptospira*

13. **Trichomonas foetus causes abortion in cattle during————————trimester of pregnancy-**
(a) 1st trimester (b) 2nd trimester
(c) 3rd trimester (d) All trimester

14. **"Twinning" is a very common cause of abortion in.**
(a) Bitch (b) Mare
(c) Sow (d) Sheep

15. **By Artificial insemination (A.I.) with frozen semen which of the following disease can be prevented**
(a) Vibriosis (b) F.M.D.
(c) I.B.R. (d) Trichomoniasis

16. **Which of the following is/are induced ovulator (or) reflexive ovulator-**
(a) Camel (b) Cat
(c) Rabbit (d) All the above

17. **MATCH THE COLUMN: –**

TABLE – I
(1) Pre-scrotal sigmoid flexure
(2) Post-scrotal sigmoid flexure
(3) Long day breeder
(4) Monoestrous animal
(5) Corona glandis

TABLE – II
(a) Bitch
(b) Stallion
(c) Bull
(d) Mare
(e) Boar

18. **MATCH THE COLUMN:-**

TABLE – I
(1) Bunch of grapes shape ovary
(2) Almond shape ovary
(3) Proestrus bleeding
(4) Waxing
(5) Abnomal sperms
(6) Dead sperms
(7) Decreased sperm motility

TABLE – II
(a) Teratozoospermia
(b) Sow
(c) Necrozoospermia
(d) Ewe
(e) Asthenozoospermia
(f) Bitch
(g) Mare

19. **MATCH THE COLUMN:-**

TABLE – I
(1) Danish model of artificial vagina
(2) Norwegian model of artificial vagina
(3) Mississippi model of artificial vagina
(4) Most commonly used cryogen
(5) Most commonly used cryoprotective agent

TABLE – II
(a) Glycerol
(b) Stallion
(c) Bull
(d) Boar
(e) Liquid N_2

20. **MATCH THE COLUMN :-**

TABLE – I	TABLE – II
(1) Recto-vaginal method of A.I.	(a) Sow
(2) Per-vaginal method of A.I.	(b) Cattle
(3) Vaginal speculum method of A.I.	(c) Prolactin
(4) Cork screw pipette method of A.I.	(d) Sheep
(5) Pseudo pregnancy	(e) Mare

21. **MATCH THE COLUMN :-**

TABLE – I	TABLE – II
(1) V-shape uterus	(a) Cow
(2) 99% of pregnancies are left horned	(b) Rabbit
(3) Almond shape ovary	(c) Mare
(4) Bipartite uterus	(d) Camel
(5) Duplex uterus	(e) Bitch

22. **Prostaglandins, fructose & ascorbic acid are secreted by-**
(a) Seminal vesicles (b) Prostate
(c) Cowper's gland (d) Epididymis

23. **Mare is a long day breeder while————is a short-day breeder-**
(a) Sheep (b) Buffalo
(c) Camel (d) All the above.

24. **Length of estrous cycle in ewe -**
(a) 36 hours (b) 17 days
(c) 48 hours (d) 19 days

25. **Length of estrus in ewe is-**
(a) 36 hours (b) 48 hours
(c) 17 days (d) 19 days

26. **Length of estrous cycle in she-camel is-**
(a) 21 days (b) 23 days
(c) 28 days (d) 19 days

27. **Duration of heat in mare-**
(a) 2 days (b) 6 days
(c) 9 days (d) 4 days

28. **MATCH THE COLUMN :-**

TABLE – I	TABLE – II
(1) Waxing	(a) Boar
(2) Pseudo pregnancy	(b) She-camel
(3) Cocking of tail	(c) Bitch
(4) Riding test	(d) Mare
(5) Balling up	(e) Sow

29. **Which of the following is an spontaneous ovulator-**
(a) She-camel (b) Rabbit
(c) Cat (d) Cattle

30. **Sigmoid flexure is absent in-**
(a) Stallion (b) Dog
(c) Boar (d) Both a & b

31. **Proestrus bleeding occurs in-**
(a) Cattle (b) Bitch
(c) Mare (d) Goat

32. **Post-estrus bleeding (or) metestrus bleeding takes place in cattle due to the withdrawal of———— hormone-**
(a) Progesterone (b) Estrogen
(c) FSH (d) Prostaglandins

33. **Maternal recognition of pregnancy (MRP) in sow is due to-**
(a) Luteal progesterone (b) Embryonic estrogen
(c) Placental lactogens (d) All the above

34. **Hormone responsible for preparation of uterine mucosa for implantation-**
(a) Progesterone (b) LH
(c) Estrogen (d) F.S.H

35. **The hormone responsible for the alveolar growth of mammary gland-**
(a) Estrogen (b) Progesterone
(c) Both (d) None

36. **The hormone responsible for the growth of duct system of mammary gland-**
(a) Estrogen (b) Progesterone
(c) Both (d) None

37. **MATCH THE COLUMN :-**

TABLE – I	TABLE – II
(1) Heat	(a) PGF_2a
(2) Pregnancy	(b) PMSG
(3) Super ovulation	(c) Estrogen
(4) Synchronization of oestrus	(d) Progesterone
(5) Pseudo pregnancy	(e) Prolactin

38. **Silent heat & temporary teat engorgement (TTE) is commonly seen in-**
(a) Cattle (b) Buffalo
(c) Mare (d) Sheep

39. **Split heat & foal heat is common in-**
(a) Cattle (b) Buffalo
(c) Mare (d) Sheep

40. **Recommended diluent in bull semen is-**
(a) Glucose-gelatin (b) Yolk-citrate modification
(c) Yolk-glucose citrate (d) All

41. **In domestic animals, fertile life span of spermatozoa in the female genital tract is 1-2 days but in mare & bitch, the fertile life span of spermatozoa is about-**
(a) 2-3 days (b) 4-6 days
(c) 8-10 days (d) 10-12 days

42. **The fertile life span of ovulated ova in domestic animals is 12-24 hours but in case of bitch, ova remain fertile in oviduct for-**
(a) 2-4 days (b) 4-8 days
(c) 8-12 days (d) 3-4 days

43. **In all domestic animals, ovulation occur during estrus but in cattle, ovulation occurs-**
(a) 12-14 hours before onset of estrus (b) 12-14 hours after end of estrus
(c) During estrus (d) None

44. In all domestic animals, ovulation occurs in secondary oocyte stage while in.....&....., ovulation occurs in primary oocyte stage-

(a) Bitch & mare (b) Bitch & sow
(c) Mare & sow (d) Cattle & mare

45. The site of fertilization in birds & domestic animals are respectively-

(a) Infundibulum & Ampulla (b) Isthmus & Magnum
(c) Magnum & Isthmus (d) Isthmus & Ampulla

46. The site of fertilization in cattle is-

(a) Ampullary-isthmic junction (b) Ampulla
(c) Isthmus (d) Uterus

47. Type & Shape of the uterus in she-camel-

(a) Bipartite, T-Shape (b) Bicornuate, Y-Shape
(c) Bicornuate, between T&Y (d) All the above

48. Sperm reservoir in cow, ewe & doe is-

(a) Vagina (b) Cervix
(c) Uterus (d) Utero-tubal junction

49. Which of the following act as sperm reservoir in sow-

(a) Vagina (b) Cervix
(c) Utero-tubal junction (d) Uterus

50. Anti-mullerian hormone (AMH), inhibin & androgen binding protein (ABP) are secreted by -

(a) Leydig cells (b) Sertoli cells
(c) Theca interna cells (d) All

51. Endocrine cells of testes are-

(a) Leydig cells (b) Sertoli cells
(c) Both a & b (d) None

52. Which is known as nurse cell-

(a) Sertoli cell (b) Germ cell
(c) Both a & b (d) Leydig cell

53. The function of pampiniform plexus of testes is-

(a) Osmoregulation (b) Thermoregulation
(c) Water regulation (d) All the above

54. MATCH THE COLUMN :-

Animal	Duration of heat
1. Cattle	(a) 9 days
2. Sheep	(b) 6 days
3. Goat	(c) 2-2.5 days
4. Sow	(d) 12-24 hours
5. Mare	(e) 36 hours
6. Bitch	(f) 48 hours

55. MATCH THE COLUMN:-

Animal semen	Sperm concentration(per ml)
1. Bull semen	(a) 7000 million
2. Ram Semen	(b) 120 million
3. Stallion Semen	(c) 3500 million
4. Boar Semen	(d) 3000 million
5. Fowl Semen	(e) 270 million
6. Turkey semen	(f) 1200 million

56. **Best time for inseminating a cow is-**
(a) Mid-heat (b) Standing heat
(c) 12-18 Hours after onset of estrus (d) All the above

57. **Best time for inseminating a sow is-**
(a) 1st day of heat (b) 2nd day of heat
(c) Anytime during estrus (d) None

58. **Time of insemination of mare-**
(a) 1st day of heat (b) 3rd day of heat
(c) 5th day of heat (d) 7th day of heat

59. **Storage temperature of frozen semen by liquid nitrogen (LN_2) is-**
(a) 0^0C (b) -190^0C
(c) -196^0C (d) -296^0C

60. **Thawing temperature for frozen semen is**
(a) 37- 40^0C for 30 seconds (b) 37- 40^0C for 15 seconds
(c) 37- 40^0C for 60 seconds (d) 50^0C for 60 seconds

61. **Most commonly used cryogen & cryoprotective agent in frozen semen are respectively-**
(a) LN_2 & Glycerol (b) Dry ice & LN_2
(c) Glycerol & LN_2 (d) Dry ice & Glycerol

62. **Effect of PMSG (Pregnant mare semen gonadotropin) is similar to-**
(a) LH (b) FSH
(c) PGF2*a* (c) Estrogen

63. **Effect of hCG (Human Chorionic gonadotropin is similar to-**
(a) LH (b) FSH
(c) PGF_2 (c) Progesterone

64. **PMSG (or) Equine chorionic gonadotropin (eCG) is secreted by Endometrial cups of the equineplacenta is a.....hormone-**
(a) Foetal origin (b) Maternal origin
(c) Both (d) None

65. **In case of pregnancy diagnosis in mare which test is used to detect estrogen in urine-**
(a) Casoni test (b) Cuboni test
(c) A-Z test (d) All the above

66. **Which of the following test is used to detect PMSG in the serum of pregnant mare-**
(a) Casoni test (b) Cuboni test
(c) Aschheim- Zondek test (d) All

67. **Half life of hormone is directly proportional to-**
(a) Sialic acid content (b) Carnitine content
(c) Prostaglandin content (d) Ascorbic acid content

68. **Correct order of half-life of hormones-**
(a) PMSG > hCG > FSH > LH > Oxytocin
(b) hCG > PMSG > LH > FSH > Oxytocin
(c) PMSG > hCG > LH > FSH > Oxytocin
(d) PMSG > hCG > FSH > LH > Oxytocin

69. **Best time for inseminating a cow-**
(a) Early heat (b) Mid-heat (standing heat)
(c) Late heat (d) All the above

70. **MATCH THE COLUMN:-**

HORMONE	HALF LIFE
1. Oxytocin	(a) 11hours
2. LH	(b) 6 days
3. FSH	(c) 60 minutes
4. hCG	(d) 2 minutes
5. PMSG	(e) 170 minutes

71. **Among domestic animals minimum semen volume & maximum sperm concentration is seen in-**
(a) Ram semen (b) Stallion semen
(c) Boar semen (d) Bull semen

72. **Maximum volume of semen per ejaculate is seen in-**
(a) Boar (b) Stallion
(c) Ram (d) Bull

73. **Site of deposition of semen in sow & mare during artificial insemination-**
(a) Vagina (b) Cervix
(c) Uterus (d) None

74. **The site of deposition of semen in cow & ewe during artificial insemination-**
(a) Vagina (b) Cervix
(c) Uterus (d) None

75. **The site of semen deposition in a cow during artificial insemination-**
(a) Vagina (b) Cervix
(c) Utero-cervix (d) Uterus

76. **Morphologically normal sperm in bull semen should be at least-**
(a) 70% (b) 80%
(c) 90% (d) 60%

77. **PMSG is secreted by-**
(a) Chorionic girdle (b) Endometrial cups
(c) Both (d) None

78. **MATCH THE COLUMN:-**

Hormone	**Secreted by**
1. Estrogen	(a) Adrenal medulla
2. Progesterone	(b) Sertoli cell
3. Testosterone	(c) Kidney
4. Prolactin	(d) Granulosa cells of GF
5. Anti-mullerian hormone	(e) Anterior pituitary
6. Epinephrine	(f) Corpus luteum
7. Renin	(g) Leydig cell

79. **Which of the following ovarian hormone is glycoprotein in nature & soluble in water-**
(a) Estrogen (b) Progesterone
(c) Relaxin (d) Androgen

80. **Most confirmatory sign of heat in cow-**
(a) Restlessness (b) Bellowing
(c) Vulvar discharge (d) Stand still on mounting

81. **MATCH THE COLUMN:-**

Heat signs/behaviour	**Animal**
1. Homosexual behavior	(a) Bitch
2. Frequent urination during heat	(b) Mare
3. Rhythmic erection of clitoris	(c) Cow
4. Pro-estrus bleeding	(d) Bull
5. Flehman's reaction	(e) Buffalo

82. **Which of the following are seasonal polyestrous animals-**
(a) Mare, Sheep, Buffalo, She-camel (b) Mare, Sheep, Goat, Sow, Cow
(c) Cow, Sow, Goat (d) Bitch, Wild animal

83. **"Riding test" in sow is used to detect-**
(a) Pregnancy (b) Heat
(c) Leptospirosis (d) None

84. **A cow which is always in heat is known as-**
(a) Buller (b) Nymphomanic
(c) Energetic (d) None

85. **Annular rings are present in the cervix of**
(a) Ruminants & she-camel (b) Ruminant & Mare
(c) Ruminant & sow (d) Ruminant & Bitch

86. **MATCH THE COLUMN:-**

TABLE – I	TABLE – II
1. Ring womb is common in	(a) Buffalo
2. Uterine torsion is common in	(b) Infundibulum
3. Uterine inertia is common in	(c) Ampullary-isthmic junction
4. Fertilization site in Birds	(d) Ewe
5. Fertilization site in Animals	(e) Sow

87. **In cattle, ovulation occur in which stage-**
(a) Pro-estrus (b) Oestrus
(c) Metestrus (d) Diestrus

88. **MATCH THE COLUMN:-**

TABLE – I	TABLE– II
1. Slippage of foetal membrane	(a) 50-100 days of gestation
2. Fremitus	(b) Liver like consistency
3. Cuboni test	(c) Mesonephric duct
4. A-Z test	(d) Paramesonephric duct
5. Mature C.L.	(e) 35-40 days of gestation
6. Female genitalia	(f) 80-120 days of gestation
7. Male genitalia	(g) 150-290 days of gestation

89. **1 Spermatogonia produce how many sperms-**
(a) 4 (b) 16
(c) 64 (d) 32

90. **From 1 primary spermatocyte, how many sperms are formed-**
(a) 1 (b) 4
(c) 16 (d) 64

91. **How many ova are produced by one primary oocyte-**
(a) 1 (b) 4
(c) 16 (d) 64

92. **How many primary spermatocytes are produce from one spermatogonia-**
(a) 1 (b) 4
(c) 16 (d) 64

93. **Fern pattern of cervical mucus is mainly due to-**
(a) High sodium chloride content (b) High potassium chloride content
(c) High hydrogen chloride content (d) Low sodium chloride content

94. **Fern pattern of cervical mucus reflect that animal is in**
(a) Heat (b) Shock
(c) Milk fever (d) Pregnancy

95. Most of the pregnancies in cattle & camel are respectively

(a) Left horned & Right horned
(b) Right horned & left horned
(c) Left horned & left horned
(d) None

96. Bull training starts for semen collection is about————————age-

(a) 18 months
(b) 24 months
(c) 12 months
(d) 6 months

97. Age of bull for maximum semen output should be-

(a 3-4 years
(b) 5-8 years
(c) 2-3 years
(d) 8-10 years

98. Best season for total sperm production in the bull is-

(a) Rainy
(b) Summer
(c) Autumn
(d) Winter

99. Semen collection should be done during————————for best result

(a) Morning before feeding
(b) Morning after feeding
(c) Evening before feeding
(d) Evening after feeding

100. MATCH THE COLUMN:-

ANIMALS	GESTATION PERIOD
1. Sow	(a) 390 days
2. Cattle	(b) 310 days
3. She-camel	(c) 114 days
4. Mare	(d) 283 days
5. Buffalo	(e) 155 days
6. Goat	(f) 341 days

101. Ferguson's reflex is initiated by

(a) Oxytocin
(b) ADH
(c) Epinephrine
(d) None

102. Curling of upper lip & sniffing behavior shown by bull is known as-

(a) Ferguson's reflex
(b) Flehman's reaction
(c) Both
(d) None

103. The second stage of parturition is characterized by-

(a) Dilation of the cervix
(b) Expulsion of fetal membranes
(c) Involution of uterus
(d) Delivery of the newborn

104. In case of bovine gestation, the period of foetus is started from-

(a) 13th day onward
(b) 45th day onward
(c) 30th day onward
(d) 60th day onward

105. Which of the following is a venereal disease-

(a) FMD
(b) Vibriosis
(c) Trichomoniasis
(d) Both b & c

106. Post-coital pyometra in cattle is caused by-

(a) Leptospira
(b) Listeria
(c) Trichomonas
(d) Campylobacter

☆☆☆

Answer Key

1 Fully developed C.L. on one ovary
2 80-120 days of pregnancy
3 Abdominal palpation
4 She-camel
5 Mare
6 November to March
7 1-e, 2-d, 3-b, 4-a, 5-f, 6-c
8 1-b, 2-d, 3-c, 4-f, 5-a, 6-e
9 Andrology
10 Endotheliochorial
11 All the above
12 Campylobacter fetus (Vibrio fetus)
13 Ist trimester
14 Mare
15 Vibriosis/campylobacteriosis
16 All the above
17 1-e, 2-c, 3-d, 4-a, 5-b
18 1-b, 2-d, 3-f, 4-g, 5-a, 6-c, 7-e
19 1-c, 2-d, 3-b, 4-e, 5-a
20 1-b, 2-e, 3-d, 4-a, 5-c
21 1-e, 2-d, 3-a, 4-c, 5-b
22 Seminal vesicles
23 All the above
24 17 days
25 36 hours
26 23 days
27 6 days
28 1-d, 2-c, 3-b, 4-e, 5-a
29 Cattle
30 Both a & b
31 Bitch
32 Estrogen
33 Embryonic estrogen
34 Progesterone
35 Progesterone
36 Estrogen
37 1-c, 2-d, 3-b, 4-a, 5-e
38 Buffalo
39 Mare
40 Yolk-citrate modification
41 4-6 days
42 4-8 days
43 12-14 hours after end of estrus
44 Bitch & mare
45 Infundibulum & ampulla
46 Ampullary-isthmic junction
47 Bicornuate, between T&Y
48 Cervix
49 Utero-tubal junction
50 Sertoli cells
51 Both a & b
52 Sertoli cell
53 Thermoregulation
54 1-d, 2-e, 3-f, 4-c, 5-b, 6-a
55 1-f, 2-d, 3-b, 4-e, 5-c, 6-a
56 All the above
57 2nd day of heat
58 3rd day of heat
59 – 196°C
60 37- 40°C for 30 seconds
61 LN_2 & Glycerol
62 FSH
63 LH
64 Foetal origin
65 Cuboni test
66 Ascheim Zondek test(A-Z)
67 Sialic acid content
68 PMSG > hCG > FSH > LH > Oxytocin
69 Mid-heat (standing heat)
70 1-d, 2-c, 3-c, 4-a, 5-b
71 Ram semen
72 Boar

73 Uterus
74 Cervix
75 Utero-cervix
76 80%
77 Both
78 1-d, 2-f, 3-g, 4-e, 5-b, 6-a, 7-c
79 Relaxin
80 Stand still on mounting
81 1-c, 2-e, 3-b, 4-a, 5-d
82 Mare, Sheep, Buffalo, She-camel
83 Heat
84 Nymphomanic
85 Ruminants & she-camel
86 1-d, 2-a, 3-e, 4-b, 5-c
87 Metestrus
88 1-e, 2-f, 3-g, 4-a, 5-b, 6-d, 7-c
89 64
90 4
91 1
92 16
93 High sodium chloride content
94 Heat
95 Right horned & left horned
96 18 months
97 5-8 years
98 Winter
99 Morning before feeding
100 1-c, 2-d, 3-a, 4-f, 5-b, 6-e
101 Oxytocin
102 Flehman's reaction
103 Delivery of the newborn
104 45th day onward
105 Both b& c
106 Trichomonas foetus

☆☆☆

Veterinary Extension Education

- **Some important points:-**
  - The **term extension** is the **latin** word "tensio" meaning "stretching" and "ex" meaning "out".
  - The literal meaning of extension: **Stretching out**
  - The term extension education was first coined by Cambridge University, London in 1873.
  - Father of university extension: **James Stuart**
  - Father of extension: **Dr. J.P. Leagans**
  - Father of extension in India: **Dr. K.N. Singh**
  - Extension is education for all people
  - Extension is changing knowledge, skill, and attitude of all the people
  - Extension is helping people to help themselves
  - Extension is **"learning by doing and seeing is believing"**
  - Extension is a **two-way channel between researcher & farmer**
  - Extension is a **continuous educational process**
  - Extension is **informal education** of rural people in an **out-of-school situation**
  - **Two level of extension- extension education & extension services**
  - **"To Do", "By Doing" and "For Doing"** are the fundamental objectives of learning
  - Three linkages in extension are: (a) Research (b) Teaching (c) Extension
  - **Principle of method demonstration**: **Learning by doing**
  - **Principle of result demonstration**: **Seeing is believing**
  - Aims of extension are: a) Human resource development b) Increasing production c) Bringing suitable changes in the cultural aspects.
  - **Needs** is the difference between **"What is & what ought to be".**
  - **Intelligence quotient (IQ) = Mental age/Chronological age × 100**
- **Principles of extension education:-**
  (1) Principle of **participation and cooperation**
  (2) Principle of **interests and needs**
  (3) Principle of **applied science and democracy**
  (4) Principle of **satisfaction**
  (5) Principle of **leadership**
  (6) Principle of **learning by doing**
  (7) Principle of **cultural differences**
  (8) Principle of **cultural change**
  (9) Principle of adaptability in the use of teaching methods
  (10) Principle of existing environment
  (11) Principle of developing program gradually
  (12) Principle of **using Grassroot organisations**
  (13) Principle of trained specialists
  (14) Principle of whole family approach
  (15) Principle of continuous evaluation
  (16) Principle of all classes of society
  (17) Principle of national policies
- **Steps in extension education process (Five steps)**: SOTER
  (1) Analyzing the situation (2) Objectives (3) Teaching (4) Evaluation (5) Reconsideration
- **Steps in extension teaching according to Wilson and Gallup (Six steps): AIDCAS**
  (1) Attention (2) Interest (3) Desire (4) Conviction (5) Action (6) Satisfaction

- **Extension teaching methods are three types:**
  (1) Individual method (2) Group method (3) Mass method
- **Five elements of learning situation are:**
  (1) Teacher (2) Learner (3) Subject matter (4) Physical facilities (5) Teaching Aids
  - The learner is the key figure in learning and teaching.
  - Learner occupies central position in learning situation.

- **Components of behavior by Paul Leagens(KASA)**
  (1) Knowledge: -what an individual knows?
  (2) Attitude: -what he thinks?
  (3) Skills:-(both physical &mental)-what he can do?
  (4) Action: -what he actually does?

- **Trilogy of mind/3-aspect of psychology:-**
  (1) Cognition - acquiring **knowledge**
  (2) Affection- feelings and emotions evoked by the person
  (3) Conation - desire to perform an action

- **Community Development (C.D.):-**
  - The fundamental objective of C.D.in India: Development of people or **"Destination man"**
  - Broad objectives: **Economic development, Social justice, and Democratic growth**

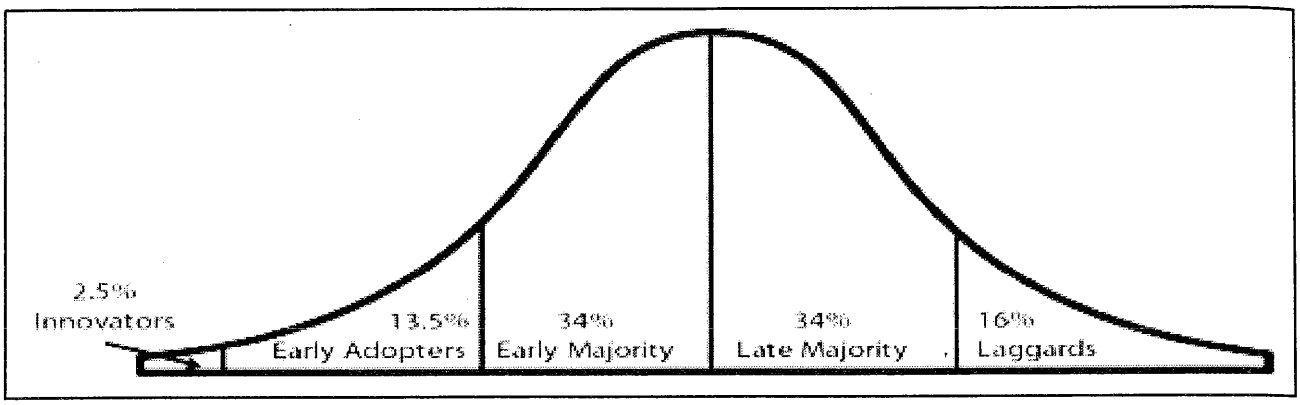
- **Panchayati Raj/Democratic Decentralization:-**
  - **Balwantrai Mehta committee** recommended a **three-tier system** of local government under Panchayati Raj.
  - Panchayati raj was inaugurated by **Jawahar Lal Nehru on 2nd october 1959 at Nagaur (Rajasthan)**

- **Animal Husbandry Co-operatives**
  - Co-operation means **"working together"**
  - Co-operative society: Voluntary democratic association of persons for their common benefits
- **Objectives of Co-operatives**
  (1) Economic objectives (2) Social objectives (3) Educational objectives
- **Rochdale principles of Co-operation**
  (1) Democratic control
  (2) Open membership
  (3) Limited interest on capital
  (4) Patronage divided
  (5) Cash trading
  (6) Political and religious neutrality
  (7) Promotion of education
- **Reformulated principles of co-operation:-**
  (1) Essential principles
  (a) Open membership
  (b) Democratic management
  (c) Limited interest on capital
  (d) Payment of dividend in proportion to transactions

(2) **Non-essential principles**
   (a) Religious and political neutrality
   (b) Cash trading
   (c) Education of members

- **Cone of experience by Edgar Dale (1965)**:-
  A/C to Dale, the cone of experience is a visual aid in explaining the inter-relationship of the various sources of experience.

- **Adopter Categories**: People are classified into five categories according to time of adoption of a new idea.



(1) Innovators: They are **venturesome**. They are first to adopt a new idea.
(2) Early adopters: They are **respectable** (Community adoption leaders)
(3) Early majority: They are **deliberate** (Local adoption leaders)
(4) Late majority: They are **skeptical**
(5) Laggards: They are **traditional.** They are last to adopt a new idea.

Adoption Process: by E.M.Rogers
- **Stages of adoption:**
  (1) Stage of Awareness
  (2) Stage of Interest
  (3) Stage of evaluation
  (4) Stage of trial
  (5) Stage of experience

Diffusion Process: the spread of new ideas from the source of origin to the ultimate users
- **Elements of Diffusion:**
  (1) Innovation
  (2) Communication channels
  (3) Social system
  (4) Overtime

- **Number of animals in one unit:**
  - Sheep unit:- 30 Ewe + 1 Ram
  - Goat unit:- 10 Goat + 1 Buck

- Poultry unit:- 100 Hens
- Brooding unit:- 250 Chicks
- Swine unit:- 3 Sow + 1 Boar
- Buffalo unit:- 1 Buffalo in milk
- Cow unit:- 1 or 2 Cows in milk
- Camel unit:- 1 Camel + 1 cart
- Bullock unit:- 1 Bullock + 1 cart

♦ **Social taboo in animal husbandry**:-
That **"ought not to do"** or **religiously prohibited**
- Sirvi community of Rajasthan considered milk as a religious object (Doodh becha- Poot becha)
- Raika/Rebari is a camel rearing community of Rajasthan. Camel slaughtering and eating of camel meat is religiously prohibited.
- Killing & hunting of deer & antelope among Bishnoi community of Rajasthan
- Cow slaughter in Hindu
- Pig rearing & pork eating in Muslims

♦ **National Dairy Development Board, Anand (Gujarat)**:-
- Founded by: Dr. Verghese Kurien (Milkman of India)
- Established in: 1965

♦ **Operation flood project**:
- Operation flood owes its origin to Mr. Lal Bahadur Shastri
- Launched on 1st July 1970 (during 4th five-year plan) by National Dairy Development Board (NDDB)
- World's largest dairy development program
- Single cooperative dairy behind the success of this program is AMUL

♦ **Operation Flood was implemented in three phases**:-
- Operation Flood Phase I (1970–1980)
- Operation Flood Phase II (1981–1985)
- Operation Flood Phase III (1985–1996)

♦ **Colour Revolutions in India**:-
- Blue revolution: - Fish Production
- Green revolution: - Food grains (Wheat, Rice)
- Red revolution: - Meat/Tomato production
- Silver revolution: - Egg/Poultry production
- White revolution: - Milk/Dairy production

Note:-
- Father of White revolution:- Dr. Verghese Kurien
- Father of Green Revolution:- Norman Ernest Borlaug
- Father of Green Revolution in India:- M.S. Swaminathan
- Father of Blue revolution:- Dr. Hiralal Chaudhuri, Dr. Arun Krishnan

Table 1: Community development programs

S.N.	Name of Programme	Implementation year
1.	Community Development Programme (CDP)	October 2, 1952
2.	National Extension Services (NES)	October 2, 1953
3.	Community Development Block (CDB)	1954
4.	Panchayati Raj/Democratic Decentralization	October 2, 1959

Table 2: Technical Development programs

S.N.	Name of Programme	Implementation year
1.	Intensive Agriculture District Programme (IADP)	1960
2.	Intensive Agriculture Area Programme (IAAP)	1964
3.	**Intensive Cattle Development Project (ICDP)**	**1965**
4.	High Yield Variety Programme (HYVP)	1966

Table 3: Other development programs

S.N.	Name of Programme	Implementation year
1.	**Key village scheme(KVS)**	**1952**
2.	Small Farmers Development Agencies (SFDA)	1971
3.	Drought Prone Area Programme (DPAP)	1973-74
4.	**Krishi Vigyan Kendra (KVK)**	**1974**
5.	**Training and Visit System (T&V System)**	**1974**
6.	Desert Development Programme (DDP)	1977-78
7.	**Integrated Rural Development Programme (IRDP)**	**1978**
8.	**Training of Rural Youth for Self Employment (TRYSEM)**	**15 August 1979**
9.	National Rural Employment Program (NREP)	1980
10.	**Development of Women and Children in Rural Areas (DWCRA)**	**1982**
11.	Rural Landless Employment Guarantee Programme (RLEGP)	15 August 1983
12.	Jawahar Rozgar Yojana (JRY)	1989
13.	Employment Assurance Scheme	2 October 1993
14.	**Mid-day meal scheme**	**15 August 1995**
15.	Jawahar Gram Samridhi Yojana (JGSY) Swarnjayanti Gram Swarozgar Yojana (SGSY)	1 April ,1999
16.	Pradhan Mantri Gram Sadak Yojana	25 December 2000
17.	Sampoorna Grameen Rozgar Yojana (SGRY)	2001
18.	Mahatma Gandhi National Rural Employment Guarantee Act – 2005	2006
19.	**Rashtriya Krishi Vikas Yojana (RKVY)**	**August 2007**
20.	**Rashtriya Gokul Mission**	**July 2014**
21.	National Dairy Development Program (NDDP)	2006
22.	National Dairy Plan (NDP)	2012
23.	**National Livestock Policy (NLP)**	**2013**
24.	**National Livestock Mission (NLM)**	**2014**
25.	National Policy for Bovine Breeding & Dairy Development (NPBBDD)	2014
26.	National Kamdhenu Breeding Centre (NKBC)	2014
27.	National Mission on Bovine Productivity (NMBP)	2016
28.	Galvanizing Organic Bio-Agro Resources Dhan (GOBAR-Dhan) Scheme	2018
29.	**National Animal Disease Control Program/NADCP**	**2019**

Note:-

(1) **Mann Ki Baat:** An Indian radio program hosted by **Prime Minister Narendra Modi** in which he addresses the people of the nation on All India Radio started from October 3, 2014

(2) **DD Kisan:** An Indian agriculture 24-hour television channel, which owned by Doordarshanand launched on **26 May 2015**

(3) **Kisan Call Centre toll-free number: 1800-180-1551**

Table 4: Early extension programs

S.N.	Name of programme	Implementation	Comment
1.	Scheme of rural reconstruction	1903, at Sundarban (W.B.)	By Sir Daniel Hamilton concept of Model village
2.	Servants of India society	1905, at Pune	By Gopal Krishna Gokhale
3.	**Gurgaon Experiment**	1920, at old Punjab	Mr. F.L. Brayne
4.	Marthandam project	1921	Dr.Spencer Hatch
5.	Rural Reconstruction institute	1921,at Shantiniketan	By R.N.Tagore
6.	Gandhian constructive program	1923, at Sevagram, Wardha	By Mahatma Gandhi
7.	Firka development scheme	1946, at old Madras	For gram swaraj
8.	Etawah pilot project	1948, at Etawah	By Albert Mayer, to rehabilitate 1000 persons displaced from Pakistan
9.	Mazdoor manzil	1948, at Nilokheri (Punjab)	By S.K.Dey (for refugee)
10.	Sarvodaya programme	1952, at old Bombay	By Acharya Vinoba Bhave

Table 5: Factors of production

S.N.	Factors of production	Meaning	Their reward
1.	Land	All natural resources	**Rent**
2.	Labour	All physical & mental efforts by man	**Wages**
3.	Capital	All man-made goods which are used for further production of wealth ex.- tools & machines or money	**Interest**
4.	Entrepreneur	Business owners	**Profit**

Note:-

- Land and labour are primary factors whereas capital and entrepreneur are secondary factors of production.
- The land is a passive factor whereas labour is an active factor of production.

♦ **Types of the market**:-

- Monopoly: -market with single producer/seller
- Monopsony: - market with single buyer
- Duopoly: - market with two sellers
- Duopsony: -market with two buyers
- Oligopoly: -market with more than two sellers
- Oligopsony: -market with more than two buyers

♦ **Marketing channels**:-

Producer → Commission agents / Brokers → Wholesalers → Retailers → Consumers

- Brokers & commission agents are known as agent middlemen
- Wholesalers & retailers agents are known as merchant middlemen

- **Types of farming**:-

(A) Specialized farming -when 50% or more income is derived from a single enterprise

- **Riskiest farming system** in India
- Ex: - commercial dairy farming, poultry farming etc.

(B) Mixed farming-

- Crop production + Livestock
- **Most common type of farming in India**
- **Livestock must contribute at least 10% of gross income** but its contribution must not exceed 49% of gross income.
- In mixed farming, **livestock mainly** includes milch cattle and buffaloes.
- Ex: Crop with dairy farming

(C) Diversified farming- A numbers of enterprises in a farm & no single enterprise will provide $\geq$ 50% of the gross income.

- Ex: Crop + Dairy + Poultry + Orchard

(D) Dry farming- adopted in the areas which receive less than 50 cm of annual rainfall

- Ex: Agro-forestry, Silviculture

(E) Irrigated/Garden land farming/Wetland farming ex.- Sericulture

(F) Extensive farming: area under operation is more to increase output.

- Ex: Deep litter system of poultry farming

(G) Intensive farming: When more capital is use in a small area.

- Ex: Multi-tier cage system of poultry farming

(H) Ranching or pastoral farming: - livestock is reared on pasture

(I) Small-scale farming: Flock or herd size is very small

(J) Large-scale farming: Flock or herd size is large

- **Systems of Farming**:-

(A) Collective farming/Kolkhozes-

- Both ownership & operatorship are under society
- The individual has no voice in this system
- Common in communist countries like- Russia

(B) Peasant farming:

- Farmer: owner, manager &organizer of the farm

(C) Estate farming/Capitalistic farming:

- Ownership & operatorship of the farm are under rich persons or capitalists
- It is very common in western countries like U.S.A and Canada & hilly regions of India.
- Ex: -tea or coffee farming

(D) State farming:

- Ownership & operatorship: Government officials or university
- It is not profitable

(E) Co-operative farming: All people pool their lands voluntarily & manage it jointly under a democratic set-up

(F) Contract farming:

- The farmers maintain the farms on contract & entrepreneur do all investment
- Ex: Broiler farming in India

Table 6: Types of ownership & operatorship in different farming systems

S.N.	System of farming	Type of ownership	Type of operatorship
1.	Cooperative better farming	Individual	Individual
2.	Cooperative Joint farming	Individual	Collective
3.	Cooperative tenant farming	Collective	Individual
4.	Cooperative collective farming	Collective	Collective
5.	Peasant farming	Individual	Individual
6.	Capitalistic farming	Individual	Individual
7.	Collective farming	Society	Society
8.	State farming	State	Paid management

Note:-

- **Agro forestry**: Arable crop + Forestry trees (may be timber, fuel or fodder use)
- **Silvi-culture**: Silvi (forest) + Culuture (growing) means growing forest trees for timber or fuel.
- **Silvi-pasture**: Forestry trees + Pasture + Grazing domestic animals

♦ **Key village scheme (KVS)**:-

- KVS was launched in **August 1952** during **first five-year plan**
- KVS started at government cattle breeding farms to produce stud bulls of recognized breeds in their breeding tracts.
- KVS is also known as **"mother of all schemes"**
- It was the first step initiated for systemic cattle improvement in the country.
- **Mass castration program** was also included to **eliminate scrub bulls**

♦ **Intensive Cattle Development Project (ICDP)**:-

- ICDP was launched in 1965 to replace KVS
- ICDPs were started in the milk-sheds of dairy projects
- Purpose: - Increasing milk production & other aspects of cattle improvement such as breeding, feeding, health care, extension activities & marketing facilities

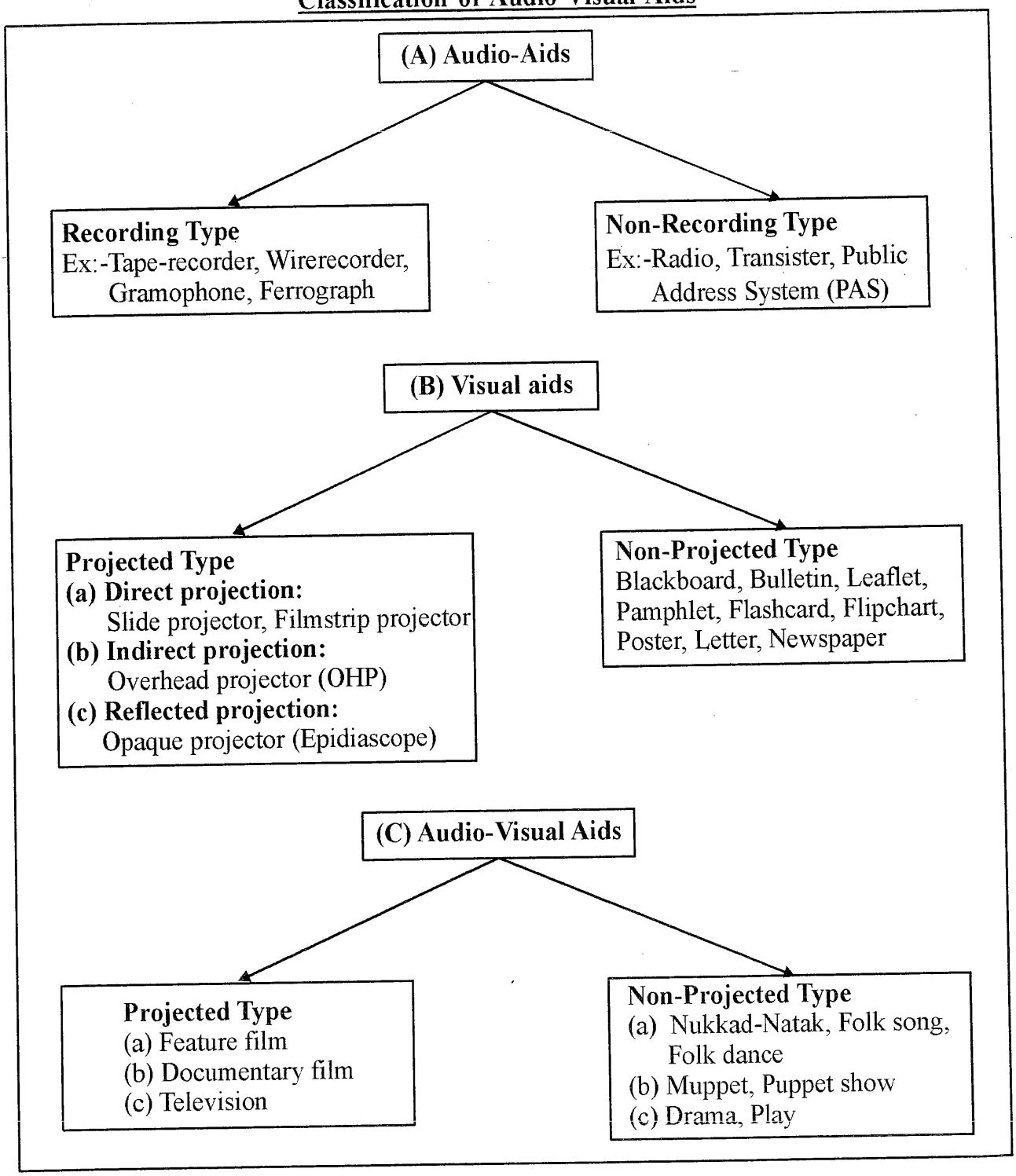
♦ **Gaushalas, Pinjrapoles & Gosadans**:-

- The 'Gaushalas' and 'Pinjrapoles' are charitable institutions established by the co-operation of the people.
- Cows, calves, and bulls are kept in gaushalas while other animals are kept in pinjrapoles
- Gaushala is a place where animal's especially productive cattle are kept
- Panjrapole is a place where animals that are nonproductive and of no use are kept and nurtured.

♦ **Gosadan Scheme**:-

- The scheme was launched during the first five-year plan
- The aim of the scheme: (a) to segregate the old, unproductive cattle from the good ones to control random mating (b) to relieve pressure on the limited resources of feed and fodder available for the productive animals
- It was launched to solve the problem of degraded cattle
- Generally located in remote forest area and waste lands
- In these Gosadans, the segregated cattle are housed in proper shelters or sheds
- In Gosadans, cattle are maintained on natural pastures & hay

Classification of Audio-Visual Aids



Note: Public Address System consists of a microphone (mike), amplifier and loudspeaker.

- **Non-Projected Visual Aids are two types**:-
  - (1) **Teaching type**: -Chalkboard/Blackboard, Flannel board, Bulletin board, Flashcards, Flannel Graph, Flipchart, Pictures/Photographs
  - (2) **Display type**: - Poster, Hoarding, **Exhibits & Displays**, Charts, Models
    - ABC of Poster: **Attractive, brief & clear**
    - Exhibits and displays have the common characteristics of posters
    - The exhibits are 3-dimensional, while displays are 2-dimensional

- **Extension literature**:-
  (1) **Leaflet/Flyer:** -A single sheet of paper containing preliminary information on a topic
  (2) **Folder:** - A single piece of paper folded onesor twice
  (3) **Pamphlet:** -Its size varies from 2-12 pages
  (4) **Bulletin**: -It contains a large amount of information. Its size varies from 12-20 pages
  (5) **Booklet:** - Its size varies from 20-50 pages
  (6) **Book:** It contains more than 50 pages

Table 7: Differences between Rural, Tribal, Urban Communities

S.N.	Parameters	Rural community	Tribal community	Urban community
1.	Nature of environment	Close association with nature	Living in **forest and hilly regions**	Living in **man-made environment**
2.	Homogeneity	Homogeneous	Degree of homogeneity is more than that of rural communities	**Heterogeneous**
3.	Occupation	**Agriculture & Animal husbandry**	**Hunting and gathering of forest products**	A wide range of occupations
4.	Size of community	Smaller	Smallest	Largest
5.	Density of population	Lower	Lowest	Highest
6.	The basis of Social stratification	people's ascribed status like- caste, creed, sex etc.	**No social stratification**	People's achieved status like- educational qualification, skills etc.
7.	Social mobility	Less social mobility	No social mobility	High social mobility
8.	Social interaction	Plain, informal and diffused	Limited to the members of the same tribe	A great deal of interaction & It is formal, manipulative, impersonal
9.	Social control	Laws are repressive and rigid	Highly rigid	Laws are formal and impersonal

Note:-

- **Culture:** It includes knowledge, beliefs, art, morals, law, customs and other habits acquired by man as a member of society
- **Acculturation:** contact between cultures when people of different cultures come in contact
- **Ethnocentrism:** tendency of man to consider his own culture superior to others
- **Customs:** accepted ways of doing things
- Customs: unidentified acts, convention, mores, taboos, and rituals
- **Norms:** These are social expectations that guide behavior
  Eg.- people shake hands before formal introduction

Table 8: Types of Norms

S.N.	Types of Norms	Definitions	Strictness	Examples
1.	Folkways	• **Everyday norms** • Weak social norms that describe socially acceptable behavior • **Do not have moral significance**	Not strictly enforced & their violation is not punishable	Salutation like: Ram-Ram Sa, Radhe-Radhe, Namaste, Jai Shree Ram
2.	Mores	• That **ought to do** • Mores have a great moral significance • Serious mores are formalizing as Laws	Strictly enforced norms	Standing up during the playing of the National Anthem
3.	Taboos	That **"ought not to do"** or **That are religiously prohibited**	Extremely strong norms	Cow slaughter is strictly prohibited in Hindu
4.	Laws	Written rules of conduct that are enacted & enforced by government	Enacted & enforced by government	The Prevention of Cruelty to Animals Act-1960

Note:-

- **Five basic Social institutions:** Family, religion, education, government (political institutions) and economy (economic institutions)
- **Sociology means *Socius* = companion, *logos* = study (Latin)**

Social Change: Observable differences in any social phenomenon over a period

Forms of social change: (a) Unilinear (b) Pendular (c) Evolutionary

- **Agencies of social change:**
  (a) Family (b) Religion (c) Education (d) Government/Political institution (e) Economy
  Government: most important influencing factor in the process of social change
- **Characteristics of social change:**
  (1) Social change is a universal phenomenon **(2)** Social change is a community change
  (3) Speed of social change is not uniform **(4)** Change is a law of nature
  (5) Prediction of social change is difficult
- **The Five Indictors of Social Change:**
  (1) Shift in Definition **(2)** Shift in Behavior **(3)** Shift in Engagement
  (4) Shift in Policy **(5)** Maintaining Past Gains

Note:-

- **Communication:** Process of passing information from a source to a receiver via channels
- **Fidelity**: Faithful performance of all the elements of the communication process
- **Feedback**: Response of receiver back to the source

- **Models of communication:-**
  (a) Aristotle's model: Speaker – Speech – Audience
  (b) Shannon & Weaver model: (Source-transmitter-channel-receiver-destination)
  (c) Berlo's model or "SMCR" model: Source- Message- Channel- Receiver
- **Reference Books:-**
  1. Textbook of Animal Husbandry & Livestock Extension by P. Mathialagan, 4th edition
  2. ICAR-Handbook of Animal Husbandry, 4th revised edition

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Objective Questions

1. **Tenure of Gram Panchayat is-**
   (a) 5 year (b) 4 year
   (c) 6 year (d) 3 year
2. **Key village scheme was launched in-**
   (a) August 1952 (b) September 1952
   (c) 2 Oct-1952 (d) 2 Oct-1953
3. **In Key village scheme (KVS), unrecognized bulls/scrub bulls should undergo-**
   (a) Included (b) Dehorning
   (c) Castration (d) Deworming
4. **Which color revolution is/are correctly matched-**
   (a) White revolution: Milk production
   (b) Red revolution: Meat production
   (c) Silver revolution: Egg production & Poultry farming
   (d) All the above
5. **A sustainable land management system in which forestry trees are grown along with arable crops. The trees may be of timber, fuel wood or fodder use is known as-**
   (a) Silvipasture (b) Mixed farming
   (c) Agroforestry (d) Rotational cropping
6. **"Nukkad Natak" is a-**
   (a) Visual aid (b) Audio aid
   (c) Non projected audio-visual aid (d) projected audio-visual aid
7. **Cooperative works on the principle of-**
   (a) Voluntary association (b) Equitable division of surplus
   (c) Democratic control (d) All are correct
8. **Rochdale principles (consists of 7- principles related to cooperation) was given by?**
   (a) Adam Smith (b) Leagens
   (c) Charles Howarth (d) Comte
9. **Match the column**: -

TABLE-I	TABLE-II
(1) Community development	(a) Devolution of central authority
(2 Cooperative	(b) Two way channel
(3) Tribal community	(c) Homogeneity
(4) Extension	(d) Rochdale principles
(5) Democratic decentralization	(e) Destination Man

10. **Minimum number of members essential to start milk producer's cooperative society?**
    (a) 5-10 (b) 60-70
    (c) 40-50 (d) 80-90
11. **Match the column**: -

TABLE-I	TABLE-II
(1) Social taboo	(a) Dynamic
(2) Need	(b) Using spoon while eating
(3) Culture	(c) What ought to do
(4) Customs	(d) Gap between what is & what ought to be
(5) Mores	(e) Ought not to do

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12. **"Man is a social animal" quoted by?**
(a) Aristotle (b) August Comte
(c) Leagen (d) Adam Smith

13. **Faithful performance of all the elements of the communication process is known as?**
(a) Communication Gap (b) Feedback
(c) Perception (d) Fidelity

14. **The process by which individual maintains contact with its environment?**
(a) Communication Gap (b) Feedback
(c) Perception (d) Fidelity

15. **Tendency of people to consider their own culture as superior to all others is known as?**
(a) Ethnocentrism (b) Fidelity
(c) Perception (d) Social taboo

16. **A lack between what is spoken by speaker & what is received by the audience is known as?**
(a) Communication Gap (b) Perception
(c) Fidelity (d) Communication channel

17. **The response of receiver back to the source is known as?**
(a) Perception (b) Feedback
(c) Fidelity (d) Communication Gap

18. **ABC of the poster-**
(a) Attractive, Brief, Clear (b) Attractive, Brevity, Clear
(c) Attractive, Brief, Colorful (d) Attractive, Brevity, Colourful

19. **3 R's of credit are?**
(a) Return (b) Repayment capacity
(c) Risk bearing (d) All the above

20. **3 C's of credit are?**
(a) Character (b) Capital
(c) Capacity (d) All the above

21. **Which of the following is an active factor of production-**
(a) Land (b) Labour
(c) Capital (d) Enterprise

22. **4 Factors of production are-**
(a) Land, Labour, Capital, Enterprise (b) Land, Labour, Capital, Asset
(c) Land, Labour, Wage, Asset (d) All the above

23. **Man-made factor(s) of production is/are-**
(a) Capital, Enterprise (b) Capital
(c) Enterprise (d) Land, Labour

24. **Natural factor(s) of production is / are?**
(a) Land, Labour (b) Capital, Enterprise
(c) Land (d) Labour

25. **Which of the following pair (factor of production & its reward) is not correctly matched?**
(a) Land: Rent (b) Labour: Labourer
(c) Capital: Interest (d) Enterprise: Profit

26. **Extension is a-**
(a) Two-way channel (b) Four-way channel
(c) Three-way channel (d) One-way channel

27. The extension has the principle of learning by-

(a) Seeing (b) Doing
(c) Thinking (d) All above

28. The extension is teaching through-

(a) Learning by doing & seeing is believing
(b) Learning by reading & Learning by hearing
(c) Learning by seeing & Learning by hearing
(d) All the above

29. Which of the following is/are type(s) of education?

(a) Informal education (b) Formal education
(c) Non-formal education (d) All the above

30. Education which is given in schools & colleges-

(a) Informal education (b) Formal education
(c) Non-formal education (d) All the above

31. Extension education is a-

(a) Formal education (b) Informal education
(c) Out of school education (d) Both b & c

32. The extension can be considered as a?

(a) Service (b) Profession
(c) Discipline (d) All the above

33. The basic concept of extension is-

(a) Education (b) Marketing
(c) Providing Jobs (d) Supply material

34. The extension is a living relationship between-

(a) Extension workers & Scientists (b) Extension workers & farmers
(c) Extension workers & organization (d) None

35. An out of school system of education for rural people is -

(a) Management (b) Extension
(c) Participation (d) Communication

36 An Extension worker is an-

(a) Local leader (b) Voluntary leader
(c) Professional leader (d) Lay leader

37. The best method of selection of a leader is-

(a) Election (b) Discussion
(c) Key informants (d) Sociometry

38. The method of selection of a local leader-

(a) Sociometric method (b) Discussion method
(c) Election method (d) All the above

39. A quantitative method for measuring social relationships is known as?

(a) Sociometry (b) Perception
(c) Ethology (d) Psychology

40. Innovators are first to adopt a new idea but————————are last to adopt a new idea-

(a) Early adopter (b) Laggards
(c) Early majority (d) Late majority

41. Match the column: -

TABLE-I	TABLE-II
(1) Innovators	(a) Know something
(2) Laggards	(b) Direction after feeling
(3) Cognition	(c) Religiously prohibited
(4) Conation	(d) Traditional
(5) Taboo	(e) Venturesome
(6) Affection	(f) Certain feeling

42. **Three aspects of psychology (human behavior) are?**
(a) Cognition, Affection, Conation (b) Cognition, Affection, Convection
(c) Cognition, Affection, Satisfaction (d) None

43. **Which of the following is a "basic unit of society" & "basic unit of extension work"-**
(a) Group (b) Family
(c) Block (d) Village

44. **The maximum risky farming system is India-**
(a) Diversified farming (b) Specialized farming
(c) Mixed farming (d) Collective farming

45. **Two factors on which the price of milk is decided by milk cooperatives-**
(a) Fat & SNF (b) Protein & Fat
(c) SNF & Protein (d) None

46. **Dairy cooperatives are performing well in which of the following state of India**
(a) Tamil Nadu (b) Gujarat
(c) Rajasthan (d) Maharashtra

47. Match the column: -

TABLE-I	TABLE-II
(1) Capitalistic farming	(a) Kolkhozes
(2) Mixed farming	(b) Most risky farming system
(3) Diversified farming	(c) Most common in western countries
(4) Specialized farming	(d) Crop + Livestock
(5) Collective farming	(e) Dairy + Poultry + Fisheries

48. **Most relevant & commonest farming system in India-**
(a) Mixed farming (b) Diversified farming
(c) Cooperative farming (d) Estate farming

49. **In mixed farming, the income from livestock should be-**
(a) At least 20% & Upper limit 49% of its gross income
(b) At least 10% & Upper limit 49% of its gross income
(c) At least 30% & Upper limit 49% of its gross income
(d) At least 5% & Upper limit 49% of its gross income

50. **In specialized farming, the income from major enterprise should be————————of total farm income-**
(a) > 50% (b) > 60%
(c) > 70% (d) > 80%

51. **In mixed farming, the livestock species that are used along with crop production are-**
(a) Sheep & goat (b) Cattle & buffalo
(c) Cattle, buffalo, sheep, goat (d) Only cattle

52. **The farming system adopted in an area with less than 50 cm annual rainfall-**
(a) Irrigated farming (b) Dry farming
(c) Extensive farming (d) Intensive farming

53. **In diversified farming, no single enterprise will provide————————of total farm income?**
(a) ≥ 50% (b) ≥ 40%
(c) 20% (d) 10%

54. **NECC (National egg coordination committee) fix the price of-**
(a) Broilers (b) Layers
(c) Eggs (d) All the above

55. **The charitable institution established by the cooperation of people is/are-**
(a) Gaushala &Pinjrapoles (b) Gosadans & Pinjrapoles
(c) Gaushala & Gosadans (d) None

56. **Which of the following is true about Gaushalas-**
(a) Gaushalas are the charitable institution established by cooperation of people for housing of productive animals
(b) Cows, calves, bulls & bullocks are kept in Gaushalas
(c) Both a & b
(d) None

57. **Which is true about Pinjrapoles?**
(a) Unproductive & unserviceable animals are kept
(b) Animals other than (Cow, calves, bulls, bullocks) are kept in Pinjrapoles
(c) Both a & b
(d) None

58. **Which of the following sentence is/are true about Gosadan scheme-**
(a) Gosadan scheme was launched during first five-year plan with aim to segregate the old unproductive & useless cattle from good ones
(b) In Gosadans, Segregated cattle are maintained on natural pasture & hay
(c) Gosadans are generally located in remote forest area & wastelands
(d) All the above

59. **Which scheme was launched to solve the problem of degraded cattle-**
(a) Gaushala (b) Gosadan
(c) Pinjrapoles (d) None

60. **The first KVK was established in 1974 at?**
(a) Puducherry (b) Nagpur
(c) Hyderabad (d) Ludhiana

61. **Correct sequence of steps of extension teaching is-**
(a) Attention – Interest – Desire – Conviction – Action – Satisfaction
(b) Attention – Interest – Desire – Conviction – Satisfaction – Action
(c) Attention – Interest – Desire – Action – Satisfaction – Conviction
(d) Attention – Desire – Interest– Action – Conviction – Satisfaction

62. **Cone of experience is devised by?**
(a) G.L. Ray (b) Smith
(c) Leagen (d) Edger Dale

63. **Which of the following statement is correct-**
(a) CDP (1952) is replaced by IRDP (1978-79)
(b) Key village scheme (1952) is replaced by ICDP (1965)
(c) KVS is also known as "Mother of all scheme"
(d) All the above

64. **World's largest dairy development program which is formulated by NDDB during 4th five-year plan is-**
(a) Operation flood (b) Silver revolution
(c) Green revolution (d) Intensive dairy development project

65. **Which is true about operation flood project-**
(a) It contain 3 phases & it is launched in India on 1st July 1970
(b) Operation flood phase II was started on 2nd Oct 1979
(c) It owes its origin to the late P.M. Mr. Lal Bahadur Shastri
(d) All the above

66. **Which is an example of indirect projection?**
(a) Slide projection
(b) Filmstrip projector
(c) Overhead projector
(d) Opaque projector

67. **To prove the value of a recommended practice in a local farm is the main purpose of-**
(a) Result demonstration
(b) Method demonstration
(c) Both
(d) None

68. **Opaque material can be projected through-**
(a) Slide projector
(b) Filmstrip projector
(c) OHP
(d) Epidiascope

69. **Drama, Folk dance & puppet show are the examples of-**
(a) Non-projected audio-visual aid
(b) Projected audio-visual aid
(c) Visual aid
(d) Audio aid

70. **Which statement is not true about Panchayati Raj-**
(a) In India, Balwant Rai Mehta committee recommended a three – tier system of local government under Panchayati Raj
(b) Panchayati Raj institution was inaugurated by Jawahar Lal Nehru on 2nd Oct – 1959 at Nagaur (Rajasthan)
(c) Tenure of Gram Panchayat is 6 year
(d) Zila Pramukh is the chairperson of Zila Parishad

71. **A single sheet of paper containing preliminary information on certain aspect is-**
(a) Leaflet
(b) Pamphlet
(c) Booklet
(d) Folder

72. **A single piece of folded paper is known as-**
(a) Leaflet
(b) Pamphlet
(c) Folder
(d) Booklet

73. **National Dairy Development Board (NDDB) was established in Anand (Gujarat) in which of the following year ?**
(a) 1965
(b) 1970
(c) 1975
(d) 1980

74. **Father of white revolution & milkman of India is?**
(a) Sardar Vallabhbhai Patel
(b) M.S. Swaminathan
(c) Verghese Kurein
(d) Lal Bahadur Shastri

75. **The executive officer of ICAR is?**
(a) Director General
(b) Union minister of Agriculture
(c) President of India
(d) Cabinet secretary of India

76. **The president of ICAR is-**
(a) Director general
(b) Union minister of Agriculture
(c) Both
(d) None

77. **Director General of ICAR is also secretary of?**
(a) DARE (Department of Agriculture Research & Education)
(b) IRDP (Integrated Rural Development Programme)
(c) IADP (Indian Agriculture Development Programme)
(d) TRYSEM (Training of Rural Youth for Self Employment)

78. **The current president of ICAR**
(a) Shri Narendra Singh Tomar (b) Dr. Sanjeev Balyan
(c) Shri Narendra Modi (d) Shri Pranab Mukherjee

79. **National Institute of Rural Development & Panchayati Raj (NIRDPR) is situated at-**
(a) New Delhi (b) Hyderabad
(c) Bangalore (d) Chennai

80. **National Institute of Agricultural Extension Management (MANAGE) is located at?**
(a) New Delhi (b) Bangalore
(c) Hyderabad (d) Chennai

81. **Market with single seller & single buyer is known as-**
(a) Monopoly (b) Bilateral Monopoly
(c) Monopsony (d) Oligopoly

82. **Match the column: -**

TABLE-I	TABLE-II
(1) Monopoly	(a) More than 2 buyer
(2) Monopsony	(b) More than 2 seller
(3) Duopoly	(c) Two buyer
(4) Duopsony	(d) Two seller
(5) Oligopoly	(e) Single buyer
(6) Oligopsony	(f) Single seller

83. **Which is true about given marketing channel-**
(Producer → Commission agents / Brokers → Wholesalers Retailers→ Consumers)
(a) Brokers & commission agents are known as agent middle-men
(b) Wholesalers & Retailers agents are known as merchant middlemen
(c) Agents come into play when item is perishable
(d) All the above

84. **Head office of Directorate of marketing & inspection (DMI) is located at-**
(a) Faridabad (b) Allahabad
(c) Hyderabad (d) Jaipur

85. **Match the column: -**

LIST-I	LIST-II
(1) Operation flood phase-I was started in	(a) 1978
(2) ICDP was launched in	(b) 1970
(3) KVS was launched in	(c) 1965
(4) IRDP was started in	(d) 1953
(5) NES was started in	(e) 1952

86. **In learning situation, the central & key element is-**
(a) Teacher (b) Learner
(c) Subject matter (d) Teaching material

87. **Which of the following is the first step of extension education-**
(a) Objective (b) Analysis of situation
(c) Teaching (d) Evaluation

88. **Component(s) of behavior is/are-**
(a) Knowledge (b) Attitude
(c) Skill (d) Action
(e) All the above

89. **Which of the following is not true about characteristics of Social change?**
(a) It is a universal Phenomenon (b) It is a law of nature
(c) It is a community change (d) It is a uniform change

118. The concept of extension education is-

(a) An applied science (b) Defined as educational process
(c) A behavioral science (d) All of the above

119. Rashtriya Krishi Vikas Yojana(RKVY) launched in-

(a) August 2007 (b) August 2009
(c) August 2011 (d) August 2014

120. Rashtriya Gokul Mission launched in -

(a) July 2011 (b) July 2015
(c) August 2013 (d) July 2014

121. The aim of Rashtriya Gokul Mission is

(a) To conserve and develop indigenous cattle breeds
(b) To conserve and develop indigenous as well as exotic breeds of cattle
(c) To conserve and develop exotic cattle breeds
(d) To conserve and develop indigenous breeds of cattle & buffalo

122. World Veterinary Day is celebrated on-

(a) Last Friday of April (b) Last Saturday of April
(c) Last Friday of May (d) Last Saturday of May

123. World Egg Day is celebrated on-

(a) Second Friday of September (b) Second Friday of October
(c) Last Saturday of April (d) Last Saturday of May

124. Match the column: -

TABLE-I	TABLE-II
(1) Social change	(a) Wages
(2) White revolution	(b) Cooperative
(3) Cone of experience	(c) Interest
(4) Rochdale principle	(d) Verghese Kurien
(5) Labour	(e) Edgar Dale
(6) Capital	(f) Universal phenomenon

125. Match the column: -

TABLE-I	TABLE-II
(1) Binet test	(a) Unproductive cattle
(2) Servants of India Society	(b) Manmade environment
(3) Balwantrai Mehta	(c) Gopal Krishan Gokhale
(4) Gaushala	(d) Intelligence Quotient
(5) Gosadan	(e) Panchayati Raj
(6) Urban community	(f) Productive cattle

126. DD Kisan is an Indian agriculture television channel launched on-

(a) 26 May 2015 (b) 15 August 2014
(c) 15 August 2000 (d) 26 May 2014

127. Match the column: -

TABLE-I	TABLE-II
(1) Rashtriya Gokul Mission	(a) 1952
(2) Krishi Darshan	(b) 1970
(3) DWCRA	(c) 1965
(4) Operation flood phase-I	(d) 1982
(5) KVS	(e) 2014
(6) ICDP	(f) 1967

128. The word extension is derived from-

(a) Greek (b) Latin
(c) Persian (d) Sanskrit

129. Extension is a two way channel between-

(a) Extension worker & farmer (b) Researcher & farmer
(c) Teacher & planner (d) Researcher & teacher

130. The extension worker is a-

(a) Friend (b) Philosopher
(c) Guide (d) All the above

131. Extension literally means-

(a) Taking about (b) Stretching out
(c) Education (d) None

132. Aim of extension is/are-

(a) Human resource development
(b) Increasing production
(c) Bringing suitable changes in the cultural aspects
(d) All the above

133. The main function of agriculture universities in India-

(a) Research, Training, Extension (b) Research, Teaching, Extension
(c) Technology generation & dissemination (d) None

134 National bank of agriculture and rural development was established in-

(a) 1962 (b) 1965
(c) 1978 (d) 1982

135. Three basic elements of communication are-

(a) Source-massage-receiver (b) Source-channel-receiver
(c) Source-massage-feedback (d) Source- channel-feedback

136. Five basic elements of communication are-

(a) Source-massage-channel-receiver-feedback
(b) Source- -channel- massage-receiver-feedback
(c) Source-massage-channel-receiver- effecter
(d) Source-massage-channel-receiver-decoder

137. Kisan call centre toll free number is-

(a) 1800-180-1553 (b) 1800-180-1551
(c) 1800-180-1555 (d) 1800-180-1558

138. Which of the following statement(s) is/are true about extension education?

(a) It is highly informal education with no fixed syllabus & no classrooms
(b) In this education system, learners are heterogenous
(c) Teaching is highly horizontal
(d) All the above

139. Mann Ki Baat- radio program started on All India Radio from-

(a) October 3, 2015 (b) November 1, 2014
(c) October 3, 2014 (d) November 1, 2015

140. Communication is a-

(a) Process (b) Method
(c) Technique (d) None

141. At break-even point there is-

(a) Profit (b) Loss
(c) No profit or loss (d) None of these

142. At breakeven point-

(a) Total expenses < Total revenue
(b) Total expenses > Total revenue
(c) Total expenses = Total revenue
(d) Any of the above

143. The break-even point is obtained at intersection of

(a) Total cost and variable cost line
(b) Total revenue and Total cost line
(c) Variable cost and fixed cost line
(d) Fixed cost and total cost line

144. Margin of safety is equal to

(a) Actual sales + Sales at Breakeven point
(b) Actual sales – Sales at Breakeven point
(c) Actual sales / Sales at Breakeven point
(d) Actual sales × Sales at Breakeven point

145. To increase margin of safety, which of the following measures can be taken

(a) Increase in sales price
(b) Reduce the fixed and variable costs
(c) Increase the output
(d) All the above

146. Nodal agency for carrying out livestock census in India-

(a) IVRI
(b) ICAR
(c) DAHD
(d) IASRI

147. Nodal agency for registration of new breeds of livestock and poultry in India-

(a) IVRI
(b) NBAGR
(c) DAHD
(d) IASRI

148. Headquarters of Animal Welfare Board of India is located in?

(a) New Delhi
(b) Haryana
(c) Hyderabad
(d) Kolkata

149. National Institute of Animal Welfare (NIAW) is located in-

(a) New Delhi
(b) Chennai
(c) Hyderabad
(d) Faridabad

150. Animal Welfare Board of India was established under-

(a) Prevention of Cruelty to Animals Act, 1960
(b) Prevention of Cruelty to Animals Act, 1965
(c) Prevention of Cruelty to Animals Act, 1982
(d) Prevention of Cruelty to Animals Act, 2006

151. ARYA is:

(a) Attracting and Reforming Youth in Agriculture
(b) Attracting and Retaining Youth in Agriculture
(c) Attention and Reform of Yield in Agriculture
(d) Aspirations of Rural Youth in Agriculture

152. The first bank to launch Kisan Credit Card

(a) State Bank of India
(b) Federal Bank
(c) Punjab National Bank
(d) ICICI

153. POSDCORB as management function was developed by:

(a) F.W.Taylor
(b) Frank Gilberth
(c) L.Gulick
(d) Henry Fayol

☆☆☆

Answer Key

1	5 year	2	August 1952
3	Castration	4	All the above
5	Agro Forestry	6	Non-projected audio-visual aid
7	All are correct	8	Charles Howarth
9	1-e,2-d,3-c,4-b,5-a	10	40-50
11	1-e,2-d,3-a,4-b,5-c	12	Aristotle
13	Fidelity	14	Perception
15	Ethnocentrism	16	Communication Gap
17	Feedback	18	Attractive, Brief, clear
19	All the above	20	All the above
21	Labour	22	Land, Labour, Capital, Enterprise
23	Capital, Enterprise	24	Land, Labour
25	Labour: Labourer	26	Two-way channel
27	Doing	28	Learning by doing & seeing is believing
29	All the above	30	Formal education
31	Both b & c	32	All the above
33	Education	34	Extension workers & farmers
35	Extension	36	Professional leader
37	Sociometry	38	All the above
39	Sociometry	40	Laggards
41	1-e, 2-d, 3-a, 4-b, 5-c, 6-f	42	Cognition, Affection, Conation
43	Family	44	Specialized farming
45	Fat & SNF	46	Gujarat
47	1-c, 2-d, 3-e, 4-b, 5-a	48	Mixed farming
49	At least 10% & Upper limit 49% of its gross income		
50	> 50%	51	Cattle & buffalo
52	Dry farming	53	$\geq$ 50%
54	Eggs	55	Gaushala & Pinjrapoles
56	Both a & b	57	Both a & b
58	All the above	59	Gosadan
60	Puducherry		
61	Attention – Interest – Desire – Conviction – Action – Satisfaction		
62	Edger Dale	63	All the above
64	Operation flood	65	All the above
66	Overhead projector	67	Result demonstration
68	Epidiascope	69	Non-projected audio-visual aid
70	Tenure of Gram panchayat is 6 year	71	Leaflet
72	Folder	73	1965
74	Verghese Kurien	75	Director General
76	Union minister of Agriculture		
77	DARE (Department of Agriculture Research & Education)		
78	Shri Narendra Singh Tomar	79	Hyderabad

80 Hyderabad
81 Bilateral Monopoly
82 1-f, 2-e, 3-d, 4-c, 5-b, 6-a
83 All the above
84 Faridabad
85 1-b, 2-c, 3-e, 4-a, 5 –d
86 Learner
87 Analysis of situation
88 All the above
89 It is a uniform change
90 Government / Political institution
91 August Comte
92 Tribal community
93 Urban community
94 Tribal community
95 1979
96 1-f, 2-e, 3-d, 4-c, 5-b, 6-a
97 Satisfaction
98 Marginal farmer
99 All the above
100 Method demonstration
101 Farm & Home visit
102 All the above
103 Result demonstration
104 Method demonstration
105 Pinjrapoles
106 All the above
107 Gram panchayat only
108 Family of origin or Orientation
109 Both a & c
110 Family of procreation
111 Lab to land program
112 All the above
113 Accuracy, Brevity, Clarity
114 Leaflet, pamphlet, bulletin, booklet, book
115 Exhibits
116 Development of individual
117 Heterogeneous
118 All of the above
119 August 2007
120 July 2014
121 To conserve and develop indigenous cattle breeds
122 Last Saturday of April
123 Second Friday of October
124 1-f, 2-d, 3-e, 4-b, 5-a, 6-c
125 1-d, 2-c, 3-e, 4-f, 5-a, 6-b
126 26 May 2015
127 1-e, 2-f, 3-d, 4-b, 5-a, 6-c
128 Latin
129 Researcher & farmer
130 All the above
131 Stretching out
132 All the above
133 Research, Teaching, Extension
134 1982
135 Source-channel-receiver
136 Source-massage-channel-receiver-feedback
137 1800-180-1551
138 All the above
139 October 3, 2014
140 Process
141. No profit or loss
142 Total expenses = Total revenue
143 Total revenue and Total cost line
144 Actual sales – Sales at Breakeven point
145 All the above
146 DAHD (Department of Animal Husbandry & Dairying) under Ministry of Fisheries, Animal Husbandry & Dairying
147 NBAGR-Karnal, Haryana
148 Haryana
149 Faridabad
150 Prevention of Cruelty to Animals Act, 1960
151 Attracting and Retaining Youth in Agriculture
152 Punjab National Bank
153 L.Gulick(Note: POSDCORB representing the functional responsibilities of a chief executive officer, as formulated by Luther Gulick and Lyndall Urwick. It stands for Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting.)

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