Rinderpest: Our Vets Turned the Tide

A Defining Moment



Dr. Piedy Sreeramulu

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Dedicated to the innumerable Vets, Paravets, Administrators,
Policy-makers, and the major stake-holders -
the Livestock farmers who made it possible
to eradicate the centuries-old Rinderpest disease from the Globe

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It is a cliche but so many people have contributed to my knowledge and understanding of Rinderpest disease that it would be impossible to list them all. So I won't try.

Prologue

'A story to be effective usually should be one's own story with expression, experiences and emotions," said a noted Japanese short story writer, Shigo. He also stated that the story is not to stir the reader's heart but it is 'pour out' of the story teller. Reader's reactions give satisfaction to the story teller, but the reader also has a choice of not reacting at all. In my case, there was only one topic on which I could write with which I had fascinating experiences during my thirty-five years of professional career.

Here is the story of rinderpest and its fierce journey through the livestock population. The story takes us inside the frantic internation effort to understand, control and eradicate rinderpest virus as if peering over the shoulders of the brilliant veterinary scientists and practising vets who led the chase.

'The story of a pandemic(1714-2011) is a story about 'rinderpest' a dreaded disease that devastated lives and livelihoods of several millions of people on the globe for more than three centuries. The knock-on effects of the pandemic were larger than those caused by rinderpest disease itself and lingered long after the pandemic had ended often. The story is a long one of death and destruction, failures and successes, hope and frustration – all combinations of exactly opposite feelings of those who worked for its eradication and succeed. It is a story containing political intrigue and initially reluctant institutional change. It is also a story of scientific, political and institutional innovations that, despite some failings initially, achieved dramatic success and changed world history. Rinderpest also played a key role in the development of veterinary and medical sciences in general and microbiology in particular.

Smallpox disease eradication was the greatest success in the history of medicine. It once killed huge numbers of lives as many as half a billion people in the 20th century alone—and blinded and disfigured many more. The rinderpest disease, the most dangerous animal infection recurred throughout the history killing millions of cattle, buffaloes, yaks and wild artiodactyls impacting livelihoods of millions of people and ability to fend off famines.

The fight against rinderpest – by slaughter and quarantine policy – was successful in driving down case numbers even before the invention of potent vaccines. Developments in vaccine technology, serological and virological

techniques during the 20th century have contributed to the eradication of rinderpest disease. The eradication of rinderpest virus has been described as the biggest achievement in veterinary history which saved the lives and livelihoods of millions of poor people in the world. It is an extremely important achievement because it highlights what can be done by people working together. There were many unsung heroes of the whole thing who strived, yearned, struggled and ultimately won.

Memories are always special. Sometimes we laugh, rejoice by remembering the days we cried, wept, and are saddened and we cry by remembering the days we rejoiced. That is life.

I was associated with this malady almost for thirty-five years (1971-2005). My fascinating journey started with dreams. Dreams created desires. Desires created determination. Determination led me to my destination. I wanted to share this truthful story in which I had the most satisfying role. As a team, we were highly motivated and fired-up by the challenge. In the end we completed the task. The campaign against rinderpest disease was barometer on the dedication of Veterinarians hard work. It is an extraordinary story of a group who anticipated, traced and hunted in rinderpest virus; who understood the need to think differently, to learn from history, to question everything to act to save lives, communities, society itself. It is also a story about the workings of human mind, judgement and imagination.

Looking back, I know what has happened to me is the most beautiful thing anyone can experience. It is real, but I also know that I probably would not have believed it unless I had experienced it myself. And what I have shared are a few insights and experiences of this wonderful journey and a truthful story which I will always carry in my heart. One of the best outcomes of writing this was the chance to reconnect and reminisce with friends and colleagues(peers). 'Ubuntu',in the Xhosa culture of an African tribe means, 'I am because we are'.

"When someone shares something of value with you and you benefit from it, you have a moral obligation to share it with others" — a Chinese proverb. I loved it. I practised it. I will continue to practice.

Contents

A. Story of Rinderpest disease 11

1. Eureka Moments 12
2. The Problem and its role 14
3. Rinderpest in Ancient History 14
4. Rinderpest in Modern History 16
   - i. Europe 16
   - ii. Africa 16
   - iii. Americas and Australia 17
   - iv. Asia 17
5. Traditional wisdom in Rinderpest control 18
6. The Beginning of the End 19
7. The Quest for Rinderpest vaccine 20
8. The Rinderpest virus and Mathematics 22
9. The Science of Bovine Minds 24
10. Global Rinderpest Eradication Programme (GREP) 27
11. The Odyssey of Rinderpest eradication in India 28
    - i. National Rinderpest Eradication Programme (NREP) 31
    - ii. National Project on Rinderpest Eradication (NPRE) 33

B. The Elevating Memories 39

Rinderpest vaccination campaigns 40

1. Inauguration of Rinderpest Vaccination campaign (NPRE) 41
2. Vaccine diluent and the Dilemma 42
3. A Rancorous Issue 43
4. Tactical Message 44
5. Transport Vehicles dilemma 45
6. Cold chain chuckle 46

7. Confusion galore 46
8. The Stubborn Medical Practitioner 47
9. Marriage venue and the NPRE 48
10. My Obsession and Boss's suspicion 48
11. Vaccination campaign and the Driver's empathy 49
12. Vaccination campaign and bizarre incidents 49
13. Officer with bedrock stamina 51
14. Vaccination campaigns and my embarrassments 51
15. Procurement of Transport vehicles for campaigns - A dilemma 53
16. Successful campaign — Unawareness of farmers 54
17. NPRE-Emotions of top bureaucrats 55
18. My interaction with the EC team 56
19. Rinderpest Eradication and Maruti 800 cars 58
20. Travails of Sero-monitoring 59
21. Walk-in Deep Freeze episode 60

C. A Flashback- Rinderpest Eradication Scheme 61

1. As Asst. Rinderpest Officer at Kurnool 62
   i. The curious and weird scenario on the other side of the border 64
   ii. Rinderpest Outbreak, Triple Ride and a Policeman 66
   iii. Connecting dots……. 67
   iv. Rinderpest Check-post Frolics 69
   v. The naked truth 70
   vi. The Shocking Truth 71
   vii. A rendezvous sojourn 72
2. At Rinderpest vaccine laboratory 73
   i. Goat rectal temperature Frolic 73
   ii. The Vaccine Daze 75
   iii. Post-mortem examination -dilemma 76
   iv. The demise of the Bull virus 77

3. At District Clinical Laboratory 78
i. Shellshock with outer shell of thermos flask 78
ii. Cognisant of constraints 79
4. On the banks of the river Mahendratanaya 80
i. The New moon day 80
ii. Reminiscence of send-off and reception 83
iii. River crossing 84
iv. Weekly shandy episode 84

D. The Image Makers 87

1. Dr. M. Rajasekhar 88
2. Dr. William P.Taylor 88
3. Dr. S. Ramachandran 89

Epilogue 90

Annexures 93

Abbreviations 98

Pictures 100



A. Story of Rinderpest disease



1. Eureka Moments

On Tuesday, 28 June 2011, the United Nations held a special ceremony for an event so rare that it had only happened once thirty years back in 1980, when smallpox was eradicated from the globe, while this time, the UN officially declared that another disease was wiped off the face of the world. The disease was Rinderpest. Everyone has heard of smallpox but very few have heard of its runner-up. 'rinderpest', an animal disease. The name means 'cattle plague' in German, and it is a relative of the measles virus that infects cloven-footed animals, including cattle, buffaloes, large antelopes, yaks, deers, and pigs. The most virulent strains killed 95 per cent of the herds they attacked.

I felt suddenly freed, buoyant, and full of joy. The news was simply electrifying, uplifting beyond words indeed. I was on 'Cloud Nine' when I saw the news item on the website. It was a 'watershed moment. The watershed moments are more than important. They are events where a hard line can be drawn between before and after. On one side of the line is the life we knew, on the other is the life we know, and the two look nothing like each other. It is not often that history has one issue, featuring multiple watershed moments, but this one does. Each one of these events is a marker that divides history into a distinct period of before and after.

Rinderpest disease is the first animal disease to be eradicated from the globe. The first human disease eradicated from the globe was 'smallpox 'in 1980. The eradication of rinderpest disease is a tremendous achievement for every veterinarian on the globe and it shows the progress of the veterinary profession both in developed countries and still developing countries. When you invest in veterinary medicine, you are investing in the well-being of society because of the pivotal role of animals in society. "Gaavah prathista sarva bhutaanaam"- cattle are the sustenance for all the living-beings as quoted in the longest epic of the world' Mahaabhaarat'.

Immediately I shared this information with one of my mentors, Dr. V. Narayana Rao, former Director of Animal Husbandry (DAH), Andhra Pradesh, presently editor of 'Annadata' a Telugu monthly magazine of Agriculture and allied sectors. He had been its editor for the past 23 years. He was the one who had inspired me in the struggle against this disease in 1980s. He too felt happy with the news and asked me to send a brief write-up on the spectacular fete. In an hour, I prepared a write-up and sent it to him by FAX which was published in the Telugu magazine for the benefit of the farmers

who were active partners in the National Project on Rinderpest Eradication (NPRE) campaign initiated in 1992.

I felt so elated, as I considered myself always, as one of the foot soldiers leading in front in the Rinderpest Eradication programme in the state of Andhra Pradesh. I shared this happy event with all the stakeholders in different forums for the next few weeks. Every Veterinary professional should be proud of this event. The day of declaration was a red-letter day for the livestock farmers, veterinary practitioners, scientists, governments, and the world public as this was the deadliest pest of animals over three centuries which posed a great challenge to mankind.

Unfortunately, I did not find news about this achievement either in print media or in electronic media at the national or regional level in the country at the level this eminently measurable pragmatic triumph deserves.

I have been fascinated with Rinderpest disease since my entry into the veterinary profession in 1971 facing challenges as a diagnostician, in rinderpest vaccine production, in disease control activities at district, regional and provincial levels till 2005 which gave me the greatest satisfaction in my professional career. For me, the most indelible and treasured experience had been my association with rinderpest disease. The eradication of rinderpest can be viewed as an achievement on par with the eradication of smallpox from the human population. This remarkable feat was accomplished, thanks to the efforts of scientists around the world to develop and perfect vaccines and just as important to the international collaboration coordination aimed at monitoring the disease and eliminating it wherever it lingered. Rinderpest eradication was the outcome neither of a single project nor the efforts of a single agency: rather, it was a result of a series of periodic, internationally coordinated efforts built on the ongoing national programmes for many decades.

The long but little-known campaign to conquer rinderpest is a tribute to the skill and bravery of veterinarians who fought the disease in remote and sometimes war-torn areas-across arid stretches of Africa bigger than Europe, in the Arabian desert, and on the Mongolian steppes. Dr Juan Luborth, the Chief Veterinary Officer of the FAO at the venue of Tuesday's ceremony lamented,' "The role of veterinarians in protecting the society is under-appreciated. We do more than just take care of fleas, bathe mascots and vaccinate pooch."

One cannot undermine the sacrifices, the hard work, the pain, the amazing efforts that vets put in.

2. The Problem and it's role

Nations, during the successive phases of their evolution on the globe, in which they advance from a state of infancy and barbarism and barbarism to one of virility and civilisation, from civilisation to decadence or senility and from decadence to their final extinction, are liable to numberless calamities. Our presumption and ignorance alone could account for the establishment we manifest, not only when we witness great general calamities,

The calamities are produced by moral causes, and then called 'social reforms; and in other instances, from physical causes, and they are termed as cataclysms, epidemics, or epizootics. Calamities always leave behind them disasters and victims, but they also bequeath a precious legacy. Nations that are called upon for fresh and progressive efforts find in the experience they have gained a new source of strength and means of future greatness. This will be the case with every nation, though helpless for the moment and unable to stop the cattle plague which ravaged the country, the authorities will in future be better prepared to resist the inroads of such dreadful enemies.

In times of national calamity, it behooves everyone to contribute in proportion to his talents, fortune, or abilities, to alleviate the effects of the common misfortune. The poor man's might, and honest intention of the most insignificant when added to the budget of common efforts, have their relative value.

Throughout history, the establishment of the disease had been a side effect of the growth of civilisation. Historian's broader thesis is that infectious diseases have shaped social evolution no less powerfully than wars, revolutions, and economic crises.

3. Rinderpest in Ancient History

Rinderpest is the German word for a disease caused by a virus, known in English as 'cattle plague'. Farmers have confronted the scourge of rinderpest ever since cattle were domesticated some ten thousand years ago. For centuries, humankind has depended on livestock for draught power, milk, meat, skins, and manure. This disease in its severest form can kill ninety-five per cent or more of the animals it infects – has had devastating effects, blighting the lives of farmers. It has been described as the most dreaded cattle plague known that has changed the course of history.

The mooted question of determining where rinderpest had come from such and such place, a subject of dubious debate among some professional men, amongst leading writers of the public journal, and also amongst agriculturists and farmers. Rinderpest is thought to have had its origins as far back as the domestication of cattle in Asia, possibly in the region of the Indus River in modern-day Pakistan. Dr. Suryadevara Ravikumar, one of my classmates in my B.V.Sc course is a versatile scholar in Telugu as well as Sanskrit; in one of his write-ups, made a mention about large-scale deaths resulting from rinderpest-like disease symptoms and sure death of cattle quoting fourteenth century poet, 'Yerrapragada's work 'Hari Vamsam'(6-45). Yerrapraada was one of the three poets who translated Sanskrit Mahabharat into Telugu.

Rinderpest disease, the plague of 212 AD swept away all the inhabitants of Sicily, cattle as well as people. Those days, a piece of iron, representing the sign of the cross was heated in the fire and the red hot applied to the forehead of the sick animals and this remedy was looked upon as the most effective they could apply. According to historical documents, the rinderpest epizootic of 376-386 AD was possibly the very first to be recorded formally.

The disease had a severe impact not only on domesticated ruminants and swine, but also on many wild animals such as African buffaloes, giraffes, and water hogs. Rinderpest is a contagious disease characterised by ulcers and erosions throughout the digestive tract. Affected animals develop a high fever, discharges from the eyes, erosions of the soft lining in the mouth, shooting bloody diarrhoea, and death. Animals that recover are debilitated and suffer a long convalescence-although they are thereafter immune to the virus. That means the recovered animals get lifelong immunity.

Rinderpest epizootics were also blamed for speeding the fall of the Roman Empire, aiding the conquests of Genghis Khan, and hindering those of Christian Europe by Charlemagne, opening the way for the French Revolution, the impoverishment of Russia, and subjugating East Africa to colonisation and extensive famines in Africa.

Until recently it was assumed that the disease existed wayback since 10,000 B.C. when cattle were domesticated in the Indus Valley (now in Pakistan). It was blamed for an epidemic in Egypt in 3000 B.C. (the fifth plague of Moses fell on the pharaoh's herds) and the widespread die-offs that starved the Roman empire in the face of fourth-century invaders. In the ninth century, it was the chief suspect in the mortality of the horned animals in the British Isles. Some experts believed that the disease arose in the grey

oxen of the Central Asian steppes and was swept forward in the trains of baggage and beasts that followed the Mongol armies in 1200 A.D. as they conquered Eurasia from China to Poland.

4. Rinderpest in Modern History

Warfare was a potent vehicle for spreading rinderpest throughout Asia, Europe, and the African continent, and the Middle East with marauding armies. The Huns and Mangol invaders brought the disease from Asia into Europe, where it was spread by the movement of livestock meant for food. For many centuries, no European countries were consistently free from the disease. The 'Industrial revolution' accelerated the rinderpest spread. The major event of the 19th century was steam power that enabled the shipment of live cattle by rail, and sea in large numbers previously impossible.

i. Europe

Everybody, especially the Vets knew that the First modern Veterinary School was established in 1762 in Lyons in France to tackle rinderpest disease. Those days the rinderpest disease consequences were horrific and from 1857 to 1866 Europe was almost denuded of cattle. Britain did not escape the cattle plague of 1865-67 and it was a national disaster. This calamity led to the establishment of the State Veterinary Service. In 1920, rinderpest reoccurred unexpectedly in Belgium as a result of infected zebu cattle which originated from India and destined for Brazil, stopping in transit at the port of Antwerp. Concerned over the international spread, France called for an international conference of Chief Veterinary Officers from different regions of the world in Paris in March, 1921. This led to the creation of OIE (Office des Internationale Epizooties) in 1924; so, good was born of bad, the rise of hope from ashes of the war.There upon World War II led to a major resurgence of the disease throughout East and South-East Asia.

ii. Africa

Despite its proximity to Eurasia, the African continent was spared until 1887. When the Italian Army, struggling to conquer Abyssinia, imported cattle from India for food and draught power from the port of Massawa now in Eritrea, the virus exploded so fast that it reached South Africa and within a decade it doomed East Africa's wandering herders, subsisting on milk with cow blood. Rinderpest set off what came to be known infamously as the 'Great

African Pandemic' affecting all countries killing close to two hundred thirty million head of cattle between 1888-1897. The outbreak in Ethiopia triggered the 'Great Ethiopian Famine' (1888-1892), ravaging the country where millions of Ethiopians died of starvation. Flashback for a moment to the 1890s, once the virus affected a herd, it spread and was nearly one hundred percent fatal. There were no animals to plough fields, to use for travel, or for people to eat. This led to mass starvation so severe that an estimated one-half to two-thirds of the human population of East Africa died. The cattle plague devastated Europe, Asia, and the African continents for almost the last three centuries. The wars in Europe and the colonisation activities of European countries hastened the process of the devastation of cattle and wild ruminants as well.

Like smallpox, rinderpest settled into a pattern of irregularly recurring pandemics, sometimes touched off by imports of Russian steppe cattle, in which the disease smouldered but rarely killed. The longer the waves, the more victims died. The livelihoods of livestock farmers were battered and bruised.

iii. Americas and Australia

Except for a brief, contained outbreak in Brazil in 1920, rinderpest did not reach the Americas. It touched Australia in 1923, but it was stamped out by slaughtering three thousand cattle. But this episode of rinderpest outbreak led to establishment of the Veterinary Hygiene branch-Quarantine Service in Commonwealth Department of Health for the first time.

iv. Asia

The disease was still leaping from water barriers as late as 1987 when Indian Peace Keeping Forces(IPKF) in Sri Lanka imported goats from India. Until 1999, internal militant-torn Sri Lanka was one of the world's last pockets of rinderpest. The decision of sending IPKF costed the life of the then Prime Minister of India in a Sri Lankan militant suicide bomb blast leading to some political unrest in India in 1992. 'The major obstacle', is man's inhumanity to man. Rinderpest thrived in the milieu of armed conflicts and fleeing refugee masses. Until world peace is secured, the nays win the argument. We know Somalia, Sudan, Sri Lanka, Yemen, and Kurdish parts of Iraq and Turkey as areas where armed struggles drove animals and their owners over borders and life was risky for vaccinators. Before 1949, for instance, the civil war and Japanese occupation of China impeded the government's efforts to control the disease and save the farmers' economy. Herds, flocks like forests and clouds scarcely obeyed the lines on maps.

5. Traditional wisdom in Rinderpest control

For the first half of the twentieth century, near-annual outbreaks of rinderpest disease claimed the lives of hundreds of thousands or millions of cattle each year. Dubbed as the disease of war, rinderpest thrived in chaos and the poverty of that battle damaged the country. Being incurable and highly lethal, the disease wreaked havoc on farmers by depriving them of draught power, manure for fertigation and fuel, protein-rich foods such as milk, and meat. For cattle themselves, the illness was excruciating and always terminal.

As rinderpest advanced and receded over the centuries, it led to some important scientific advances. It is not out of the space to mention at this juncture that in eighteenth-century Pope Clement XI was so alarmed by the number of deaths in the Papal herds, he instructed his physician Dr Lancisi, to take action to control the plague and the physician concluded, quite correctly but in a little detail than of course that the causative agent was exceedingly fine and pernicious particles that pass from one body to another body, the language of that day. Accurately deduced that rinderpest spread by the 'virulently poisoned breath of an ox and its excretions and hide -not by fogs, astrology, or other popular theories. In 1713, Dr Lancisi prescribed quarantine measures, Charlatan cures were banned; priests were ordered to stop relying on healing prayers, herds with any sick members were to be slaughtered and buried in lime, The penalty for transgressors, like workers, farmers, laymen who resisted or cheated. The church officials, the disobeying priests, were treated as guilty and were sent on the long flagships with sails for rowing or to work in kitchens on the ship (the galleys). The Papal edicts were not popular but their strict application did get rid of rinderpest in nine months in the Papal States.

In the rest of Europe where Protestants disdained papal orders it persisted for a century and killed two hundred million cattle.

By the 1750s, dairymen in England and the Netherlands were experimenting with a crude early form of inoculation; soaking a cloth in a diseased cow's mucous, then sewing it into a cut in a healthy cow. This was fifty years before Dr Edward Jenner became famous for preventing smallpox by vaccinating a boy with pus from a milkmaid's cowpox blister. But Dr Jenner was not the first; he got the credit because he successfully repeated the vaccination twenty-three times and published his results. An 1893 version

made from the bile of convalescent animals was used in Europe.

In Asia, ethnically Tibetan herdsmen practised a primitive inoculation method called 'gabao', in which blood was extracted from a wild sheep or cow that had died of rinderpest, dried blood powder was stored and kept in a cool dark place, mixed with sheep milk or some other diluent – the concoction was fed to healthy cattle. Specialists in the tribes and temples made this and stored this, which was a secret formula that was passed down through families. Some qualified vets scientifically verified and put forth that it was indeed an attenuated virus and a reliable vaccine. Most tribesmen/ local herdsmen were completely confident and allowed it. It was an example of local learning and cultural transmission. But virulence varied widely, and the practitioner must be guided solely by experience. Credible though, 'gabao's risks were much more substantial.

In that decade, the new Soviet Union finally realised the old Czarist goal of eradicating rinderpest among steppe cattle. The Russian Emperor employed a group led by Professor Semmer to develop an anti-rinderpest vaccine. The group had sought to experimentally immunise animals with an inactivated preparation of blood and nasal mucous which could have worked but ran into bureaucratic constraints.

By 1897 Robert Koch of Germany advocated immunisation with the bile of infected cattle which reportedly worked but not always. The later 'simultaneous serum-virus' method became the standard prophylactic procedure until 1920s. In 1920s, many scientists succeeded in active immunisation of cattle using inactivated preparations based on lipid solvents which seemed cheaper than the costly and laborious 'simultaneous serum-virus' method. However, in later years such practices were replaced by vaccines developed in goats, rabbits, and chicken embryos, finally in laboratory cell lines.

A series of control programmes in Europe from the 17th century, often credited as the first attempts to organise disease control, sought to contain and eliminate rinderpest. Historically, rinderpest was registered in one hundred and fourteen countries located on every continent.

6. The Beginning of the End

From century to century, not to say from year to year, rinderpest disease swept around Europe, Africa, and Asia with every military campaign

resulting in disaster, death, and devastation espcially for almost the last three centuries. Other European countries also followed France and established Veterinary schools to train veterinarians to tackle rinderpest disease. The foundation for the modern eradication campaign began with the establishment of FAO under the United Nations Organisation in 1945. But it became feasible only after development of improved vaccines..

7. The Quest for Rinderpest vaccine

The first attempts to prevent the disease by inoculation of virulent products were made in Great Britain in 1754 and in the Netherlands in 1755. Of all the inoculation trials carried out, those of Geert Reinders(1735-1815) in the Netherlands deserve special mention. During the course of his experiments Reinders noticed that calves born of a few mothers which had overcome the infection were themselves resistant to inoculation; which is probably the world's first observation of maternal immunity.

In 1926, Dr J.T.Edwards working at the Imperial Veterinary (Bacteriological) Laboratory, Mukteswar, India began an attempt to exclude bovine piroplasms from the inoculum to be used in the serum-virus simultaneous method through rabbits. But when the Mukteshwar rabbit colony was lost, he attempted to adapt the virus to goats. He found that after about six-hundred serial passages in goats, the rinderpest virus got attenuated and triggered an immune response in cattle without the addition of immune-serum. Goat tissue vaccine (GTV), as it became known, was widely used in India since 1930s. Can anybody imagine when goat adapted rinderpest vaccine (GTV) technic was out , in the hilly terrains of India and Nepal, people used to get some goats injected with the virus and carried these animal vaccine reservoirs from place to place to vaccinate their cattle, yaks, Mithuns, etc. Such enormous efforts in a way characterise the drive towards rinderpest eradication around the world.

In Africa, the Kenyan 'Kabete O' strain of rinderpest was separately attenuated in goats around the 1940s. Around that period in Korea, Dr Junji Nakamura developed rinderpest vaccine attenuated in rabbits (lapinised rinderpest vaccine-LRV) and used it in that area. The advent of freeze drying technology in 1906 eased the process of improving the keeping quality of rinderpest vaccines in India and elsewhere.

In 1960s, Walter Plowright, a British veterinary researcher(as an officer in Royal Army Veterinary Corps), working at the East African Veterinary

Research Organisation, Muguga in Kenya (1955-1970), achieved a breakthrough growing virus in bovine kidney cell culture in the laboratory instead of in animal hosts. After sixty passages this vaccine was found safe and effective for cattle of all breeds of all age groups, unlike the Goat tissue rinderpest vaccine which was not suitable for exotic cattle, crossbred cattle, and calves. The handicap was that it had to be kept at lower temperatures unsuitable for African countries. But development of this vaccine was an important milestone in rinderpest control that gave impetus to the first coordinated effort to eradicate rinderpest in Africa. Plowright's vaccine was one of the finest vaccines ever developed in human or veterinary medicine. Dr Plowright was the first veterinarian to receive the 'World Food Prize Award' for his contribution to the world.

However, in the late 1980s, Dr Jeffrey C. Mariner's group developed a variant of tissue-culture rinderpest vaccine called Thermovax that could be kept at ambient temperatures in the tropics for up to four weeks. However, the new vaccine was made available for purchase by 1992 only due to hurdles. This vaccine was widely used in community-based vaccination programmes in remote areas of African countries.

In some Asian countries like Philippines, Thailand, Sri Lanka inactivated rinderpest vaccines (phenol, formalin, glycerol) were used as late as 1963. Safety was a distinct advantage but with a shorter duration of immunity (two years) that too only in cattle. In Burma and Bangladesh these inactivated vaccines were used until 1990 both in cattle and buffaloes.

'All India National Campaign in 1954' with spectacular results in five years using goat-tissue rinderpest vaccine (GTRPV) was unique. That time Dr P.L.Narayana Rao, our former Professor of Medicine at Tirupati Veterinary college was Rinderpest Officer with headquarters at Eluru in Andhra State province in India, which he narrated proudly in 1967 in our fourth year of Bachelor of Veterinary Sciences course.

With the availability of vaccines, countries and regions began adopting major campaigns to eliminate rinderpest. In 1948 in western China rinderpest was killing millions of cattle, buffaloes and yaks. The Chinese undertook heroic measures to combat the disease. No outbreak has occurred there since 1955 and vaccination was stopped in 1956. Success in China came early.

The intractable problem was Africa. The disease was in thirty-two countries there and many had pastoralist tribes who lived on the borderless fringes and drove cattle up to fifty to sixty kilometres a day, having virtually no contacts with government agencies and getting no bulletins. According to

some Vets, it was the biggest problem to convince the farmers to bring in their animals for vaccination in 1960s and 1970s. They believed vaccination brought disease. They believed in the traditional method, smearing of dung from infected animals in the mouths of healthy ones. Just reaching them was hard. Land Rovers broke down, gasoline and cash ran short. The, vaccine was packaged with salt so it can be reconstituted at the spot, but in remote areas, salt was so valuable that often it was stolen.

Announcing vaccination days was advertising to rustlers (cattle thieves) where the herds would be that day. African veterinary officers were paid so poorly that they survived only through secondary jobs like breeding chickens or mending watches. Despite all the drawbacks, by 1979 the effort looked successful and was ended but by the mid-1980s rinderpest returned.

An array of sanitary measures such as the culling of infected animals combined with the government compensations for farmers, the safe disposal of carcasses, sanitary cordons around infected farms, and strong legal enforcement was gradually adopted across Europe in the eighteenth and nineteenth centuries, setting the stage for the control and eventual eradication of rinderpest. But as in much of Africa and Asia, rinderpest remained a persistent scourge throughout the twentieth century.

8. The Rinderpest virus and Mathematics

Even the minuscule organisms on earth are incredibly capable of historical agency. Viruses invisible to human eyes without the aid of an electron microscope have proven to be profound agents in human history. A virus is essentially an information system (encoded in DNA or RNA) surrounded by a protective coat and shaped by evolution to ensure its own replication and survival unlike bacteria which carry all the molecular machinery needed for their replication. Viruses grow only in living cells and they can infect everything.

The Rinderpest virus is a loathsome virus and extremely fatal to bovines. Rinderpest had devastated cattle herds and the psyches of cattle farmers throughout its history. Death by rinderpest for cattle was a brutal experience and at the very least an unsightly one for cattle owners because the rinderpest virus (RNA), a Morbillivirus, caused some painful and visually disturbing symptoms. Upon infection, most cattle would die off the disease in a period of six to twelve days.

Rinderpest virus needs close contact between infected and healthy animals. Understanding the kinetics of infectious virus shedding is critical to guide infection prevention and control strategies. Still I vividly remember the statement of my Professor of Medicine that the spread of rinderpest infection can be controlled simply by avoiding direct contact between infected and healthy cattle. Theoretically 'yes' but in reality simply not practicable in herded cattle.

Rinderpest, along with breaking 'economic backbone, also initiated a breakdown of long-established ecological balance and contributed to mass famine.

As devastating as the rinderpest pandemic had been, it had showcased how mathematics helped to explain the world that we lived in and could drive effective change. Mathematics has been variously described as an ideal reality, a formal game and poetry of logical ideas.

One of the features of Rinderpest disease was its rate of infection (Ro). Ro is pronounced as "R naught" and is a mathematical term that indicates how contagious and infectious disease is. As an infection is transmitted to new animals it reproduces itself. The phrase 'exponential growth' came into everyday use. But what is exponential growth?

Rinderpest's infectivity rate was believed to be 4.6 that means highly infectious. Each animal that contracts rinderpest will infect 4.6 other animals on average if no measures are taken to limit the spread. Each of those new infections would spread the disease to 4.6 animals and so on. This type of growth (increase in numbers) where the sum factor was multiplied over and over, was called exponential growth.

What does this mean? The number of infected cattle in a country is growing exponentially if it increases by a fixed multiple R each day: if N animals are infected today, then R times N are infected tomorrow. The size of the growth-rate R determines how rapidly the virus is spreading. An example should make this clear.

Suppose that, on day 'zero', there is one infected animal; one is enough to start an epidemic! We assume, for simplicity, that an animal is infectious for just one day. Suppose each infected animal transmits the virus to two others, after one day, there are two infected animals, after two days there are four, after three days eight, with the number doubling each day. That is exponential growth, with a doubling time of one day.

From the initial case, the daily infection numbers continue with 2, 4, 8, 16 and 32. The numbers are small, but not for long. The 10th term is about

1,000 and the 20th term is about a million. Under these highly simplified conditions, the vast majority of the cattle population in a place has been infected within 22 days. One has to imagine if the Ro is 4.6, what could be the number of infected animals in a three weeks period. Mind-boggling.

Almost invariably, rinderpest spreads between herds and to new areas by the movement of infected animals. Infected cattle start shedding the virus one or two days before the appearance of clinical signs. They continue to shed the virus for about nine to ten days after the onset of fever and generally harbour the virus for no more than three weeks. Transmitted primarily by inhalation of expired air contaminated by infected droplets or by contact with secretions and excretions from infected animals. Transmission occurs mainly over short distances but occasionally may occur over distances up to a hundred meters. The importance of distinguishing epidemic growth versus continued growth in areas of older infection sites is very important. Spread can occur too rapidly and vaccination appears less effective because tiny fractions of individuals can start an outbreak in a new location.

The combination of silent infections, exponential growth, and calamitous timing of the movement of animals is a 'Nivuru gappina nippu'(tinderbox).The number of cases initially seems to be small until they are not and then it is too late.

The world was gripped by the rinderpest epidemic. News bulletins suddenly became Maths lessons with graphs, rates, and forecasts appearing every day.

9. The Science of Bovine Minds

Statistical data from archival and secondary literature show the instrumental role of cattle in the economic and political developments since ages. Bovines 'served the people' in two distinct and related ways. Bovines and human counterparts were made to serve the community by contributing to wars and economic revolution. In a broader sense, these animals also found themselves in a hierarchy of species that subordinated the labour, bodies, and interests of non-human life forms to the needs of humanity, Homo sapiens. The relationships among humans, bovines, and microbes inside them were flexible and complex. One species sometimes benefitted at the expense of another, yet cooperation and coexistence also existed whether their bonds were exploitative or supportive, the welfare of humans and bovines were always independent.

Do you believe cattle have personalities and intelligence? Yes, cattle do have personalities and intelligence. They are not robotic. Cattle show distinct individual behavioural consistencies that reflect personality traits. Intelligence varies considerably. When given step-by-step learning opportunities with increasing difficulty they too learn to navigate a complex maze. Still, I remember the feats of two bullocks named 'Ramudu and Lakshmanudu' in a South Indian Telugu film 'Namminabantu' (faithful servant) in 1960. As young school students, we were wonderstruck. Later in my professional career, I happened to see such things very often. Bullocks know the route back home after the visit to a market yard or agricultural fields after work. They used to move fast while returning home. I remember the Panchayat or Municipal carts pulled by bullocks, stopping at every community dustbin positioned on the roadside to facilitate the collection of domestic wastes by the workers.

Cattle also react emotionally. We can observe behavioural consistency during social separation. Cattle form social bonds. A strong specific bond would form between a cow and her calf within just five minutes of birth. Just like gregarious animals such as man, monkeys cattle are better able to resist and recover from physical and mental stresses when among companions conversely isolation or disruption of their social groups can be highly distressing for individual animals as evidenced by elevated heart rate, increased vocalisation, and potentially injurious attempts.

Vagaries of war, economics, and government policies often resulted in the shifting of these sensitive social animals to the detriment of their wellbeing. Cattle also experience emotions that they express in observable ways. One common metric is 'percentage of visible eye-white as a dynamic indicator of the frustration and satisfaction with more eye-white visible when distressed. Other measures such as ear postures, nasal temperature, and levels of stress hormones such as cortisol are also indicative of emotional stress.

If the cattle act merely as a vital asset and colleague for millions of rural households, if they were merely inert tools or property, these cattle still exert considerable agency in the world by dint of their dispensable draught power and bodily products.

It is difficult to overstate the importance of animal draught labour. Until 1970s animal traction and human muscle were the sources of power in the countryside. But it is still relevant to tribes in remote areas and small landholders as well.

My colleagues from the African continent at MDF in Ede, in the Netherlands during my stay for eight weeks of management training, used to share their feelings of pastoralists and farmers' relationship with cattle. Mr Hailu from Ethiopia told me, "Our lives revolve around our cattle. If our cattle die then we start worrying to think about the future of children and we cry. Sometimes if our cattle die we have to move away from our areas". Another colleague Mr Ali of Sudan who works with an NGO for pastoralists in Sudan narrated, "The cow is considered to be our grandmother. You see me now; I am alive because of the cow. I do not drink beer, I take only milk and the best drink is milk". Mr Ali also shared with me about a pastoralist friend supposed to be a rich guy. Mr Ali continued that his friend had thirty-eight wives and boasted himself saying that he had not enslaved them but bought them with cows in good times. His wealthy pastoralist friend stated with emotion, "If my wife is infertile I struggle to take her to the hospital. It is the same for our cows because without our cows our children will die". Mr Wilson, another NGO executive from Kenya, told me how a literate tribesman reacted, "if I want to write I look for a pen, if I want to live, I look for a cow".

In India, also people have similar emotions to cattle. In the North coastal Andhra Pradesh state many a time I heard the rural farmers refer to their cattle as 'sommulu' meaning money. In Indian culture, the cow is adored as a fortune giver and 'gao matha' as one of the five mothers' to an individual—Biological mother, Bhoomatha (Mother Earth), Mother Goddess, and Desamatha (Motherland-country).

The longest Indian epic with one hundred thousand Sanskrit slokas and more than one million words, Mahabharata with eighteen chapters, as mentioned in the thirteenth chapter about the importance of cattle.

Gavo Lakshmaah Sadaa Muulam Goshtu Papamava Vidyate
Annameva Sadaa Gavo Vevanaam
Nivashitha Gokulam Yatra Nirbhayah
Viraajayathi Tam Deham Paapam Chasyapa Karshati

(Cattle are mirror images of Goddess Lakshmi (Goddess of wealth). Mear seeing them one will be sanctified. They provide us with valuable nutrients through milk, curd(yogurt), and ghee. Where cattle live with comfort without fear that area will be sanctified with peace and divinity.)

Indians believe that any harm to cattle means there will be unrest in society. They believe that cattle are their rich possession. For that matter across nations, cattle are treated as prized possessions. Due to

interdependence of the animal populations and humans, veterinary disease control became a priority.

If animals could write their history, the past century would stand out as a time of unusual turmoil. As animals do not produce records, historians rely on documents created by the people who work, cure, feed, monitor or interact with them.

10. Global Rinderpest Eradication Programme (GREP)

Some countries like China and India managed to control rinderpest within their borders through their own national programmes,but the need for global coordination to wipe out the disease in other parts of the world was felt. The GREP, the final stage of global rinderpest eradication initiative, was a concept conceived and developed by a relatively small number of farsighted people in 1992-93. Worldwide the GREP was initiated in 1994 under the auspices of FAO with the support of OIE and the International Atomic Energy Agency (IAEA). FAO provided coordination support and IAEA offered technical guidance. GREP was largely funded by European countries. The United States, which never had rinderpest, also contributed money. The effort of GREP consisted of support to massive rinderpest vaccination campaigns in needed countries. This was made possible and more practicable with a version of the new rinderpest vaccine that required no refrigeration by two American researchers.

The one weakness of GREP was that it lacked in-depth analysis of socio-economic impact of rinderpest disease and benefits likely to accrue from its eradication that would have been useful for persuading economists and other decision makers that rinderpest eradication merited funding and dissuading the factors of eradication. When GREP began , authorities had no clear picture of the rinderpest occurrence or how the virus survived and spread. Once scientists established the geographic extent of rinderpest infection and recognised hidden reservoirs that were giving rise to visible epidemics in normally unaffected populations, it became possible to develop a strategy for its progressive elimination.

GREP set a deadline of 2010 for global freedom from rinderpest based on internationally coordinated rinderpest-control activities on three fronts: Africa, West Asia and South Asia. GREP helped spread information on the

prevalence and risk of rinderpest, the focus of rinderpest control shifted from vaccination to surveillance – but this shift did not always occur quickly or easily. All these efforts paved the way for elimination of Rinderpest disease. The last known case of the disease worldwide occurred in Kenya in the year 2001. Experience showed that the last and most difficult steps of GREP were far more time-consuming and devoured more resources than had been expected.

From 1999 to Feb, 2011 more than two hundred fifty countries (provinces) have submitted dossiers requesting for official recognition of freedom from 'rinderpest infection'.

However, one cannot undermine the sacrifice, the hard work, the pain, the amazing efforts that veterinary personnel put in for eradication of rinderpest disease.The eradication process of rinderpest from 1945 to 2011 is estimated to cost the equivalent of 2017-US Dollars, Five and half billion.

The longest and largest international programme against the most dangerous animal disease converted successfully the research findings into worldwide practice and made it a historical achievement overriding many complexities and challenges.The fact that the GREP was successful and it owes much to the foresight and dedication of many including those who made significant inputs into rinderpest control and eradication during the last fifty years, this world ever be grateful.

The Global declaration of 'Rinderpest Eradication is a defining moment in the history of 'Animal World'. Rinderpest Eradication is also ' A Vet's Tour de Force'

11. The Odyssey of Rinderpest eradication in India

In the Indian subcontinent, somewhat surprisingly reports of rinderpest occurrence became frequent only in the late eighteenth century and increasingly in the nineteenth century. From that time epidemics occurred regularly killing a significant proportion of cattle and buffaloes which influenced rinderpest ecology in the whole of the south, south-east and east Africa.

Rinderpest had been persistent in India for more than two centuries, infecting animals such as cattle, wild and domestic buffaloes, nilgai, and

even sheep and goats. The disease, according to medical historians, probably got introduced into the country through the North Eastern route from Mongolia/China around the mid-eighteenth century. This murrain was first recognised in Assam in 1722 and by about 1820 it was known to cause widespread outbreaks in almost all parts of the country.

Rinderpest was certainly one of the epizootic diseases for which the most historical information exists. There was no doubt due to the spectacularly high mortality that it causes and the speed with which it spreads, giving it all the hallmarks of an economic and social disaster which explains why the people of Europe, Africa, and Asia held painful memories of an incursion of this disease.

The Indian Cattle Plague Commission appointed by the then Government of India (1868) stated that this disease carried away hundreds of thousands of cattle every year and the deaths from this disease far exceeded those by all other causes put together. About the turn of the century, the disease was enzootic in almost every district in the country including the region which later became Pakistan.

Efforts to control it could be traced back to the establishment of the Cattle plague commission. Like elsewhere in the world, in India, the continuing extensive prevalence of the disease and the impact it had on the agro-based economy led to the initiation of veterinary research in the country with the establishment of the Imperial Bacteriological / Veterinary Laboratory in Pune in 1889 which was later shifted to Mukteshwar in the Kumaon hills, presently Indian Veterinary Research Institute. An offshoot of this was the establishment of the Indian Civil Veterinary department in 1891.

At the turn of the century the disease was enzootic in almost every district in the country. Can anyone imagine the loss of more than two million cattle succumbing to the disease during the period from 1923 to 1927 and 1930 to 1938. Alas, almost 14.5 percent of the cattle population succumbed to the malady.

Despite heroic attempts for many decades in the twentieth-century and progress in limiting the disease impact and area affected, little progress was made in eliminating rinderpest infection until 1990s. In rural India rinderpest disease was maintained by a large heterogeneous population of animals with sufficient addition of new susceptibles i.e., new births and the endemic areas had been with large and dense cattle populations. In highly susceptible populations rinderpest behaved in pandemic fashion with the virus infecting virtually all susceptible individuals. Over the years, vaccinations never

covered adequate numbers in specified time because of ignorance of virus spread dynamics at field functionary level and lack of adequate seriousness at policy level, say policy paralysis.

The earlier efforts for rinderpest control depended on various vaccines of doubtful value and containment of outbreaks, mainly on the organised cattle farms by using the hyperimmune anti-rinderpest serum. Around that time in South Africa, a new method called 'serum simultaneous method' for immunisation of cattle was in vogue wherein the blood of infected cattle would be injected into healthy ones to elicit an immune response, while at the same time serum containing antibodies against the virus would also be injected to protect the animals from the live virus. IVRI was shifted to Mukteshwar from Pune mainly because of the serum production activities that the institution undertook.

Though this method had a few drawbacks it was widely used in organised farms. Immunised cattle had to be isolated for some days as they could infect other healthy cattle. This method did not always protect the animals from the disease. It was a very costly affair to produce a large quantity of serum and potential risks of handling the infected materials for inoculation. Moreover, this method gave immunity for not more than six months, necessitating repetition of inoculation. This method was limited to only a few farms and was not suitable for mass immunisation programmes.

Inoculation of in-contact animals with anti-rinderpest serum from IVRI was only the method of control of rinderpest in the then Bombay Presidency till 1935. Though this was a useful form of prophylactic treatment, its value was very limited due to i) immunity setup was of a very short duration of nine days only ii) it was practicably not possible to inoculate every ninth day and iii) lastly the serum simultaneous method which conferred immunity of longer duration could not be adopted on a large scale due to financial constraint.

In 1930s the goat adapted rinderpest vaccine developed by J.T. Edwards triggered antibody production and provided lifelong immunity to cattle. Goat Tissue Vaccine (GTV) production units were established at various centres in the country and this proved to be useful in controlling rinderpest outbreaks. I felt elated for undergoing a three-week training programme in that laboratory during the fiftieth anniversary of J.T. Edward's vaccine development.

The first step for control of rinderpest disease was taken up in 1934 in India. However, owing to financial constraints and the lack of trained

veterinary human resources, this vaccination uptake rate was only 15 to 20 percent which not surprisingly made little impact on the six-figure annual rinderpest death rate. Tears of travail persisted in the country despite possession of effective vaccine those days. The vaccination effort lacked structure and some scientists opined that rinderpest eradication became more of a management problem rather than a vaccination problem.

i. National Rinderpest Eradication Programme (NREP)

The effectiveness of GTV and the realisation that rinderpest disease as a major problem in India had catalysed the launch of the first mass rinderpest vaccination campaign in 1954 — the National Rinderpest Eradication Programme (NREP). The objective of the campaign was to build up an eighty percent prevalence of immunity within a three-hundred million bovine population in a five years period and then to continue with annual vaccination campaigns in yearlings. The state governments' Veterinary Services were responsible for implementing the programme.

Starting in 1954 with the States in Peninsular India, the mass vaccination programme was extended to northern and north-eastern States, central India, and finally to western India. Initially, encouraging results were achieved and within five years the number of outbreaks declined from 8,516 in 1956 to 960 in 1960 and dropping further to 300 outbreaks in 1964 and by1978 to 143 outbreaks.

The NREP in India had only limited success despite more than twenty-six million rinderpest vaccinations being done as the first attempt to systematise rinderpest vaccination campaigns. Later the National Commition on Agriculture (NCA) outlined a strategy for a final thrust to wipe out the disease from the country. This was followed in 1983 by the 'Operation Rinderpest Zero(ORZ) prgramme. The ORZ failed to take off and there was no perceptible impact of the programme.

Since 1954, we have been vaccinating for more than twenty five years continuously and the number of vaccinations we had was more than the world's bovine population. But the disease was still lingering in the country because the vaccine quality, and vaccinations were never monitored.

The gargantuan task of vaccinating 1.5 billion cattle over thirty-five years (1954 to 1990) was not very satisfying though the disease was largely controlled in the northern, eastern, western, central, and north-eastern regions.It surfaced in a big way in the southern states of Tamil Nadu, Karnataka and Kerala later spreading to State of Andhra Pradesh. The data

highlights many lingering unknowns. Nevertheless, outbreaks of rinderpest continued resulting in morbidity and mortality among livestock in 1980s. A passive disease reporting system was maintained by the veterinary departments of the States of the country. The Department of Animal Husbandry and Dairying (DAH & D), Ministry of Agriculture, Government of India maintained a national disease reporting system to include details of the occurrence of all epizootic diseases of livestock. State Veterinary Services adopted minimalist strategies which essentially ensured the perpetuation of the virus.

An inherent weakness in the programme lay in the fact that, while rinderpest was widely endemic across southern states (more than 62 percent of outbreaks in the country) the remaining being sporadic in other parts of the country, The NREP adopted a phased approach with uptake progressing from the southern states, northwards and westwards. In most states, the initial thrust was greatly reduced and there was a general failure to eliminate the 'virus'. Then with inter-state movement of cattle proving difficult to control, the virus gradually reasserted an enzootic profile despite annual vaccinations for such a long period. Although much had been achieved, this 'vaccination only model' seemed destined to fail in eradicating the disease. Our GTV vaccine had some drawbacks—it sometimes caused an adverse reaction in the vaccinated animals. It could not be used in crossbred and exotic cattle. The NREP campaign did not address the field-based problems of the cold chain, mobility, quality of vaccines, extension education, post-campaign sero surveillance, improved diagnostic laboratory infrastructure, and above all a timeframe for the ultimate eradication of the disease.

By the late 1980s, it became clear that rinderpest outbreaks in the country had bottomed out to an irreducible level and a final thrust towards total eradication was necessary. However, four decades of mass vaccination work was proving to be a major drain on the country's finances , veterinary manpower, and the farming community.

In the veterinary field, the most extreme method of limiting excretion of the causative virus was the slaughter and disposal of infected animals by rapid incineration or burial. For rinderpest control such measures were necessary wherever there was a danger that transmission might overrun existing defence mechanisms or where no defence mechanism had been created. At a lesser extreme, rinderpest infected animals may be allowed to endure the course of the disease but under conditions where their ability to transmit the infection to other animals was greatly reduced by quarantine

measures. Such zoo-sanitary controls represent cheap, rapid, and effective ways of stamping out rinderpest. But in India where individual stock holdings were usually small, the failure to invoke zoo-sanitary controls in the fight against rinderpest was probably much more a question of an unwillingness by the community at large to accept the consequences of this approach. Moreover, Indian public sentiment is flatly opposed to the slaughter of cattle, especially cows. Both zoo sanitary controls and vaccination campaigns had a role to play in the eradication of rinderpest, but ultimate success comes from using these as complementary mechanisms. Unfortunately, the Rinderpest Act enacted by individual States could not be implemented effectively with public resentment. The problem in the countryside was that animals are allowed to share common grazing lands. Besides movement of animals between various states and mixing of these animals with local animals contributed to transmission. Further during the festival season animals are transported to various places. These unrestricted movements contributed significantly to the epidemiology of the disease in the country.

Although much had been achieved, the 'vaccination only model' seemed destined to fail in eradicating rinderpest in India. In the late 1980s, it became abundantly evident that India's problem with rinderpest emanated from a reservoir of enzootic persistence in the southern states. In the late 1970s, the cell culture vaccine of Walter Plowright (1960) from South Africa revolutionised production and it was very potent, safe, and cheap. Unlike GTV, the cell culture vaccine was safe even for exotic, crossbred cattle and sheep & goats. With one calf kidney, six hundred thousand doses could be harvested while it was only one hundred thousand doses with one goat spleen. The introduction of cell culture vaccines in our country has eased the pressure on vaccine production.

ii. National Project on Rinderpest Eradication (NPRE)

Our learning has been a process of gradual expansion of our understanding. We are introduced to a concept that is within the bounds of our conception and gradually the concept is expanded making it more complex, more robust and eventually much more comprehensive compared to what we started with. This is how we started learning. More than that, social trust is crucial to successful public health initiatives and ultimately to our survival. To build long-term trust, our leaders must learn more about the concerns and priorities of stake-holders and shift research and regulatory priorities to address them for the success of the programme. Reacting quickly and transparently during a crisis is not enough, especially because people often

do not share the same priorities. Instead, establishing and maintaining public trust requires systematic solutions.

In 1987, in consultation with the European Commission (EC), a six-year National Project for Rinderpest Eradication (NPRE) was formulated. EC supported the project and extended financial assistance (20 percent) to it. As part of the Eighth Five year Plan, the NPRE was launched on the First April 1992.The project adopted the OIE Pathway with the objective of eradicating the disease by 1998 (Office Internationale Epizooties later renamed as World Organisation for Animal Health). This coincided with the formation of South Asia Rinderpest Eradication (SAREC) on the lines of similar programmes for rinderpest eradication in other regions of the world like Pakistan, Bangladesh, Nepal, Burma etc.

Hitherto the rinderpest control programme was implemented by states in the country in a bureaucratic style. To my knowledge for the first time the rinderpest eradication programme in the country was taken up in the 'project mode' headed by a Project Coordinator with a Project Managing Unit acting as a coordinating cell at the national level. It had outlined the eradication strategy for twenty-five states and seven Union Territories. Dr W.P.Taylor, one of the well-known names on rinderpest disease control, was the Project Advisor at the national level. The project work in the state was planned, supervised, and monitored by a nodal officer. The state governments, however, continued to bear the manpower cost. The eradication programme in India during the period between 1990 and 1998 was, therefore, all the more remarkable. The success proved a turning point in the history of veterinary services in India.

Under the project it was planned to vaccinate a minimum of eighty percent of cattle and buffaloes in the country within one year. Then take up disease surveillance for two years without any further rinderpest vaccinations. In case of no incidence during this two year period the country would go with self declaration of ''freedom from rinderpest disease', When no disease is reported in further block of two years, the country would be declared with the status of 'Freedom from rinderpest infection' by intense sero-surveillance. We, in our country, expressed our helplessness to follow the regimen of completion of vaccination work in one year.

Accordingly, under NPRE the country was divided into four zones (A, B, C, and D based on the occurrence of rinderpest in the past decade in various parts of the country with geographical contiguity. The seven states of north-

east India, which were free of endemic infection from 1986 without vaccination were grouped as Zone A; the States of north-central India(15 States)with no evidence of infection were grouped into Zone B. They continued to vaccinate bovines in villages to the depth of 30 kilometres in the States bordering neighbouring countries like Pakistan in the West, Nepal and Bhutan in the North, Bangladesh and Myanmar in the East and Zone C States(southern states). A sanitary cordon was maintained from 1994 to 1998 in North Central India and no rinderpest vaccination was used on two-hundred million bovines in the area to ensure meaningful clinical disease surveillance.. The decision to maintain this unvaccinated population as a sentinel population emboldened several lines of reasoning; one is that earlier mass vaccination campaigns had eventually achieved their objective and were, therefore, an obsolete exercise. Another important factor was the conviction that surveillance was safer than vaccination as a means of ensuring that the disease did not re-enter the population. Last but not the least, this policy was adopted to meet the OIE epidemiological standards and to be free of international trade restrictions. These states were encouraged to end vaccination before joining the OIE Pathway. At the time, this was seen as involving considerable risk but central to the time limit.

Zone C states, Andhra Pradesh, Karnataka, Kerala, Puducherry, and Tamil Nadu had reported 830 rinderpest outbreaks from 1986 to 1994 and were endemic. The states were asked to continue to intensify the vaccination work covering all susceptible populations in border districts and undertake systematic regulation of the movement of animals. Systemic disease surveillance had been carried out clinically in village searches and in the laboratory by serosurveillance.

Zone D, consisting of Union Territories (Andaman & Nicobar Islands, Lakshadweep, and Minicoy Islands) had not recorded rinderpest disease from 1980 onwards so no rinderpest vaccinations were envisaged.

The intensive vaccination programme in the Zone C States was started in March 1994 and completed by March 1996 successfully.

A glimpse of Rinderpest vaccination programme under NPRE in Andhra Pradesh state in 1994-1996 period speak of success of the Veterinarians who achieved this feat of vaccination of Twentyseven million large ruminants against odds with sheer dedication, devotion and determination in three phases in villages including hamlets,thandas and all sorts of human habitations with animals (23000) spread over an area of 0.28 million square

kilometers area by jeeps, walks and trekking. It is unbelievable, amazing and astonishing but it is true. If figures can speak of success, here they are……

Phase	Period of vaccination	Number of districts	Number of villages covered	Number of Bovine vaccination done (in millions)
1	March to September 1994	Four districts of Rayalaseema region and Nellore	5,442	8.58
2	October 1994 to March 1995	Five districts of Telangana region	4,705	6.91
3	April to March, 1996	Four districts of coastal Andhra and Five districts of Telengana region	12,970	11.65
Sentinal Districts (No Rinderpest vaccinations) 1. West Godavari 2. Krishna 3. Guntur 4. Prakasam (Costal Andhra) 5. Nalgonda				

We know the art of facing the challenge. The success has steeled our will to do even more in the coming years. We were not miracle makers—sheer hard work and will to win led us to win this battle against rinderpest disease.

The last outbreak reported in Kerala was in October 1994, in Karnataka in January 1995, in Andhra Pradesh in February 1995 and in Tamil Nadu occurred in September 1995.

With the success of this strategy, the entire Indian territory had been declared **'Provisionally Free' from rinderpest disease from First of March, 1998.**

After the expiry of the EU funding on July 31, 1998 Government of India continued funding the project for sero-surveillance and monitoring across

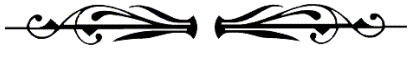
the country to rule out hidden pockets of infection in the animal population in three consecutive phases between November 2001 and October 2004.

After the submission of the relevant data and dossiers on the Indian 'zero rinderpest situation', India was **declared by OIE as 'Free from rinderpest disease' in May 2004**, which constitutes the second stage of the OIE's three-stage process of accrediting a country free from rinderpest. **Finally, on May 25, 2006,** based on the final dossier submitted on August 22, 2005, **India was declared 'Free from Rinderpest Infection'** , the OIE's third and final stage of accreditation. It took six more years for the world body to declare 'Globe is free from rinderpest infection'.

The rinderpest eradication programme in India was unique because the country had to overcome two challenges that other countries did not face. One was that because the cow was considered to be a sacred animal, the large-scale slaughter of cattle to contain the disease (which contributed to the elimination of the disease from Europe, and Russia in the early 20th century) was not possible. The other problem was that sheep and goats were also infected with the rinderpest virus, unique to the South Indian States. It was a hard time to convince other international organisations that there was no rinderpest virus foci in India.

Earlier people didn't even believe that rinderpest disease can manifest in small ruminants, because the clinical symptoms were not so apparent. But they were carriers of the virus and they could spread to cattle. At the same time the existence of another disease caused by a closely related virus of the rinderpest virus family, Peste des Petits Ruminants (PPR), was confirmed for the first time in Tamil Nadu in 1979. Based on that, NPRE decided to vaccinate small ruminants also in the Zone C States. This made the vaccination programme more difficult but it also made the country extremely secure against the disease.

In all, the Indian government spent about Rs.3.41 billion on NPRE with an EU share of Rs.640 million (about 20 percent mostly in the form of technology transfer, cold chain equipment and cost of external experts).





B. The Elevating Memories



Rinderpest Vaccination Campaign

My tryst with Rinderpest disease was my soul-satisfying activity in my professional career. See the strange coincidences. I started my career as a Special Veterinary Assistant Surgeon (VAS) in charge of the Rinderpest Eradication Scheme at Pathapatnam of Srikakulam district, Andhra Pradesh. Initial twelve years I was associated with clinical diagnosis, laboratory diagnosis, rinderpest vaccine production and vaccine standardisation. Again, my first career elevation was as Assistant Rinderpest Officer (ARO) of a region. After a gap of another eight years, I was handling the 'vaccination campaign' under NPRE as Special Officer Rinderpest Eradication Scheme in the state of Andhra Pradesh.

Another strange coincidence in late 1971, was that two months after assuming the responsibility of Rinderpest VAS, I had to attend the examination for my Master's degree in G.B.Pant University of Agriculture Technology, Pantnagar and my examiner was Dr. S.C. Adlakha, Assistant Commissioner (Rinderpest disease control) in Government of India, New Delhi.. The first question he asked me was where I was working. To my reply, he said," Oh that is nice. Keep it up. No more questions." Only gave suggestions to correct some typographic errors in my thesis document. My examination was over.

I took the challenging responsibility of the assignment of Special officer, RES on the insistence and encouragement of the then DAH, Dr Krishna Ashrit, a Doctorate in Microbiology. He was very enthusiastic about NPRE. He made a lot of efforts to convince the higher level bureaucrats in the government to get me posted to this assignment. More than a twenty-five year old memory i.e. in 1993, On the day of meeting of rinderpest officers of Southern states at Hyderabad Dr. Krishna Ashrit,DAH said to the Principal Secretary, Govt. of Andhra Pradesh," Sir, now I have full confidence on Dr.Sreeramulu and his tenacity that he can make this rinderpest eradication campaign a success in our state." The confidence reposed on me by my Director boosted my morale and increased my responsibility. This special remark struck fire in my mind and imagination. This assignment was the most rewarding experience of my professional career.

On Aug 15, 2011, the Indian Independence Day, I happened to attend the flag hoisting ceremony at "Vet Home" with a congregation of serving veterinarians and a few retired veterinarians like me. I was given an

opportunity to talk for a few minutes as one of the guests. I shared my excitement about the declaration of global eradication of rinderpest disease with the gathering. To my surprise, none of them heard about the declaration of global eradication of rinderpest disease, a spectacular achievement. I felt so sad knowing that there was no official communication about this important achievement even to state Governments.

For me, this incredible achievement was all due to teamwork. I consider that a team was not a mere mechanism but an organism. Each subgroup within a team and each person was not a mere cog but had a unique vibrancy to contribute. For me, a team was also like an iceberg, what meets the eye was only a small part that was above the surface of the water, in reality, a larger part holds the former on its shoulders while itself being out-of-breath underwater.

This was the event to be celebrated from village to national level but unfortunately there was no communication from official channels nor news channels. This is how we in the veterinary profession celebrate our achievements. I pitied myself. However, let the future say to our generation that we sent forth mighty currents of hope and we worked together to heal the world by eradication of rinderpest, the first animal disease, from the globe.

1. Inauguration of Rinderpest Vaccination campaign (NPRE)

In Andhra Pradesh we planned to launch rinderpest vaccination campaign in all the four Rayalaseema districts bordering Tamil Nadu and Karnataka states to start with and got the nod from the then Chief Minister of the state Sri.K. Vijaya Bhaskara Reddy. Arrangements were afoot for the launching ceremony at Yemmiganur in Kurnool district in March 1994. I was coordinating the activities with the assistance of the District Joint Director.

Three days before the dotted date, my wife had an eye injury resulting from the blasting of the pressure cooker in the kitchen. After first-aid, she was given an appointment at L.V.Prasad Eye Institute for a detailed examination of the affected eye a day before the launching ceremony of the vaccination campaign. I planned in such a way to reach the venue by evening a day before, to oversee final touches.That morning I accompanied my wife to the eye institute, but I was stuck up at the hospital till lunch time. I was

perturbed but my wife advised me to leave for Yemmiganur as she can manage herself. With a heavy heart leaving her at the hospital I left for the venue which took seven hours drive by road. The next day our departmental staff came from the four districts with a fleet of vehicles awaiting the arrival of the chief-guest. At 4 pm we saw the helicopter hovering above and we were on our toes. Police security came into alert, pushing the crowds to maintain order. To our surprise, the helicopter did not come down but disappeared in the sky. Then one of the high-level police functionaries announced that the chief-minister had to cancel this programme due to unavoidable reasons. We, along with some more departments, who had come to launch new programmes felt disappointed. Subsequently, it was learnt that it was cancelled due to the announcement of a bye-election in adjacent constituency an hour before with election code with immediate effect.

Looking at my frustrated mood, the Chief engineer sarcastically commented, "Imagine my plight. I have spent one lakh rupees on a pylon to commemorate the inauguration of the irrigation channel at this venue." When I expressed my anguish to the Director, he consoled me, "Dr Sreeramulu, such things do happen, don't worry. We start our programme immediately without any formalities". The very next week vaccination campaign was started in all the four districts of Rayalaseema area without any fan-fare. followed by districts in Andhra and Telangana areas leaving five districts as 'Sentinel' districts' (West Godavari, Krishna, Guntur, Prakasam, and Nalgonda districts) and vaccination campaign was completed by the first quarter of 1996.

2. Vaccine diluent and the Dilemma

The massive Rinderpest vaccination programme under NPRE demanded very detailed planning. Sometimes, a too-clever-by-half-plan can backfire. I have faced a laundry list of challenges and some of which might seem unsurmountable. In one of the meetings in VBRI chaired by Dr. V. Narayana Rao, the Director of Animal Husbandry (DAH), the joint director assured that the diluent for reconstitution of freeze-dried cell-culture rinderpest vaccine would be supplied by the concerned district diagnostic laboratory. Everybody agreed to the suggestion but I had some apprehensions about this activity with my earlier experience in the districts. The problem of electricity and water supply, the capacity of laboratories to handle such a large volume and supply chain- I had spelt out these problems and expressed my doubts.

The steel in my voice was unmistakable. Everybody started murmuring about the issues raised by me. DAH said that Indian Immunologicals and BAIF expressed their helplessness to supply diluent to the AP state as they had to handle their rinderpest vaccine marketing.

This issue has been puzzling me since then. I happened to meet Dr V.A. Srinivasan, the Technical Director of M/S Indian Immunologicals Limited (IIL) one of my contemporaries during my Master's degree, at the marriage venue of Dr Krishna Ashrit's daughter. During our chit-chat, I wanted his help for the supply of diluent. He expressed his inability. With my persistence for the supply of diluent (phosphate buffer saline) in five-hundred ml quantity bottles, he promised to explore the possibility and talk back to me. On the third day he agreed to supply, and it was a great relief for us. In the middle of the programme, he had to answer to the Drug Authority for production and supply of this non-listed- item by IIL. We sent a letter from the government about our request and requirement which eased his problem with the Drug Authority. The supply was uninterrupted and the vaccination campaign went well as scheduled. One day, Dr Srinivasan talked to me on phone complaining that some of the joint directors did not pay the bills resulting in inconvenience for him from the management. Then I had to make tough-talking with the district officers to hasten up the payments for the supplies already made by IIL as I could understand the reason.

3. A Rancorous Issue

In the first phase of mass vaccinations under NPRE in the Rayalaseema region, during transport of the vaccine, the van broke down on the way to Kurnool for two days. Then I advised the district officer not to distribute the vaccine immediately to vaccination teams and await the vaccine titre report. A few weeks back I was given the understanding that the facility for vaccine titration was available in our rinderpest laboratory at VBRI,Hyderabad. When samples were sent, the in-charge expressed his inability. I was desperate to know the titres as I did not want to give false assertions to my peers and farmers about the quality of the vaccine. To discard, the volume of one hundred thousand doses of vaccine my conscience was not permitting me. I was in a great dilemma. Then I requested one of my colleagues in M/S Indian Immunologicals Limited (IIL) and he agreed to help me. I had sent the samples officially. But my Additional Director expressed his disgust and unhappiness for my action.He said, "Dr Sreeramulu! you want to expose VBRI to our

competitors". I said," No Sir, I do not want to waste the vaccine, the energies, and efforts of field staff, and the false promise of protection with the vaccine in the stranded truck without a proper cold chain. I want to be truthful".

At a later point, he appreciated my concern and action taken which reinforced the trust of field officers and farmers on the vaccination campaign.

4. Tactical Message

During the vaccination campaigns (1994-1995), I was going around the districts for monitoring and interacting with the field level functionaries to understand the field level inadequacies for taking up corrective measures to minimise the operational inconveniences, to enthuse my peers in the field and build up public awareness also. In the process, I had scintillating, amusing, amazing, and a few unpleasant experiences.

I was at Madakasira, a big village in Anantapur district around 4.30 pm. I found Dr Narasimha Reddy, the VAS, with a frail body but with an authoritative loud voice, updating his records for that day at his clinic. After the exchange of greetings, while going through the register of rinderpest vaccinations, I enquired, "Dr Reddy, what is the percentage of vaccination coverage in your jurisdiction?".

With no pause, he replied," Sir, the coverage is one hundred percent in all my villages except in this village. Already I sent a word to the concerned farmer who has twenty-one cattle, to bring his two heifers which escaped from vaccination that day. Now it is time for animals to return from the grazing area. As it was already 5.30 pm, I told him," Okay doctor, I appreciate your good work. I know you can do it. Now it is time for me to leave".

He pleaded with me to stay for another ten minutes as he wanted to vaccinate those two remaining animals in my presence. The farmer's backyard was just a hundred meters away from the Veterinary Dispensary (VD). To avoid disappointment, I agreed to stay back, and accompanied him to the farmer's backyard. Dr Reddy introduced me to the farmer, an elderly person. The farmer commented," Sir, the problem with this good-natured doctor is, he will not sleep nor allow us to sleep peacefully till he completes the work." Smiling at the farmer I was checking the 'notch' marks on the left ears of the vaccinated animals entering the sheds. At last, they could isolate the two heifers that missed vaccination and Dr Reddy vaccinated them and again one heifer escaped from ear-notching; I heard Dr Reddy, shouting at workers

to catch hold of the escaped heifer for ear-notching. The workers were pleading with the VAS to leave it as it was uncontrollable. Dr Reddy was chiding the workers," You dullards! in-spite of explaining several times you do not understand. Unless the ear is notched and a drop of blood drops on the ground, the drug (vaccine) does not give strength, risking the animal's life".

I was intrigued with this new twist to the ear-notching process as till now I was insisting on this for the identification of a vaccinated animal from unvaccinated ones. I kept silent at that moment. The farmer pleaded with me to stay back that night and have dinner with him as he had all the facilities at his modern house. Thanking him I expressed my inability to stay with them and moved a few yards to get into my vehicle. I overheard the farmer saying to VAS, "Doctor Reddy sir, probably your officer is hesitating to take food in my house" and Dr Reddy replying him," No, no in an hour he has to reach Hindupur for a meeting with local doctors and plan for next day visits to some more villages".

While getting into my vehicle, I asked, "Dr Reddy! probably the farmer might have felt offended for not accepting his request to stay for dinner with him". He replied, "No sir, he felt that you did not accept his invitation for fear of the notoriety of this village". I looked at him with a question mark. Dr Reddy explained," Sir, this place is infamous for sorcery. People acquainted with this village avoid food or night stay in this village. It was an age-old bad name for this village but not now-a-days".

I could not resist my temptation to get clarified about his assertion with the farm-workers in that cattle shed about dropping of blood onto the ground for the efficacy of vaccination. Before I finished my query, he clarified," No sir, unless we tell them like that, they will not be serious for ear-notching after vaccination". I never imagined a need for such an explanation. Nodding my head, thanked him, and left the place. A new tip for me for publicity on 'ear-notching'.

5. Transport Vehicles dilemma

I was on tour to Kurnool and Cuddapah districts to oversee the ongoing vaccination work during the first phase. I met the Joint Director, Kurnool, and pleaded with him to allocate three newly purchased jeeps to three VASs for covering the cattle in their jurisdiction for a week or ten days depending on the population size in each Mandal so in a month twelve Mandals could

be covered. I assured him and the VASs that the fuel charges incurred by them would be paid back as and when the budget was released. The VASs gladly agreed to my suggestion. The VASs felt self esteem as a gesture of recognition of their role in the rinderpest eradication programme. I requested the JD to allot new jeeps to VASs as he kept all the vehicles with him for a long time waiting for the release of fuel budget. Sometimes, the responsible authorities with no apathy do not apply their common sense.

6. Cold chain chuckle

The next morning traversing through Kurnool district, I stopped at the outskirts of a roadside village, Jupadu Bungalow watching a big herd of cattle and buffaloes and a sheep flock and teams in the process of vaccination. I went to the teams and watched the vaccination work. Suddenly I asked the vaccinators to show me the reconstituted vaccine bottle and to my utter shock, I found the bottle was not cool enough and I discarded the entire content of the reconstituted vaccine and asked them to proceed only when they have enough ice to maintain the cooling temperature of diluent and reconstituted vaccine. They showed me an adequate stock of ice in four iceboxes. Then I suggested precool enough diluent bottles then use for reconstitution of the vaccine and left the place.

7. Confusion galore

That was about 5 pm when I reached Duvvuru village on the outskirts of Cuddapah town, where I found teams busy with rinderpest vaccination work. Stayed in the village till sunset observing vaccination work. To my utter dismay, I noticed ear-notching of vaccinated animals was done very haphazardly. I inquired the VAS on the spot about it. and he fumbled for a while and replied that he gave instructions to 'animal attenders' as advised by the officers and I found the VAS also a little jittery. I pacified him not to worry. I asked all the para-vets and the attenders to assemble at one place after finishing work and demonstrated how to make ear-notching on the left pinna avoiding peripheral veins. I realised my folly that I misconstrued that the message goes down below undistorted but it did not. Before vaccination

campaigns, I organised divisional level training programmes for all field level functionaries but missed the attenders group which was very important in the vaccination programme. I requested the Joint Director of Animal Husbandry to immediately organise a half-day orientation programme for veterinary hospital attenders also at Mandal level to avoid confusion.This issue was taken care of well in advance in next group of districts.

8. The Stubborn Medical Practitioner

The next day on my way back to Hyderabad, I was passing through Nandyal division and seeing a big gathering of cattle and buffaloes on the road-side village I got down from the vehicle, traversing through the animals and accompanying animal attenders, I entered into the compound of a Rural Veterinary Dispensary. I found a group of para vets and Vets vaccinating the animals. Looking at me the Vet moved towards me, greeting me. Reciprocating his greetings I looked into the face of the exhausted vet and enquired about the progress of the rinderpest vaccination work. He had complained to me,' Sir, I could convince all the people except one gentleman about ear-notching of his Ongole bulls after vaccination. God-sent, you are here at the nick of the time. Can you help me to convince that gentleman?' I nodded my head and approached the trevis where one bull of the pair was still in the trevis after vaccination. The vet introduced me to that gentleman, a medical practitioner with a passion for rearing prized Ongole breed bulls. Greeting the medical practitioner, I explained the need for identification of vaccinated animal in this campaign to meet the stipulations of the World Organisation for Animal Health in Paris for sero-monitoring and sero-surveillance programmes to facilitate 'Global declaration of freedom from rinderpest disease' emphasising that rinderpest would be the first animal disease to be wiped out if people like him, wholeheartedly support our vaccination campaign.I added, "Doctor, now your bull will be prized one with this identification mark after vaccination". Being a medical professional he appreciated my briefing and allowed 'ear-notching' of his Ongole bulls after vaccination. Later I understood that the message went viral in and around the district.

9. Marriage venue and the NPRE

A few weeks later I was at Proddatur town en route to Chittoor district and Dr. C.Ranganayakulu, the Divisional Assistant Director was busy at the venue of his son's marriage. That day I found many VASs, para vets, and district Joint Director(JD) at the place to attend the marriage function. I greeted Dr Ranganayakulu and his son on the occasion and understood that there was some delay in serving lunch. So, I took the permission of JD and addressed the gathering of the animal husbandry department about the ongoing NPRE programme in the country and state and shared my experiences for about forty minutes, clarified a few queries on the ongoing campaign in the district.Hearing the announcement about lunch is ready we disbursed. The JD commented," Dr Sreeramulu! You grab any opportunity to talk about your NPRE".I thanked him with a genial smile.

10. My Obsession and Boss's suspicion

On another occasion in 2004, as Additional Director I was with the Joint Secretary(JS) of the AH Department in Adilabad district on tour. During slow drive whenever cattle and buffaloes crossed the roads, I was opening the glass windshield and looking at cattle, at times talking with high pitch with the herdsmen/women watching the animals with a focus on the left side of ears for ear-notch markings to ascertain the vaccination status of the herd.I explained to him what I was doing when he asked me what was so interesting for me. Some of the Vets whom we met used to narrate their experiences in the Rinderpest vaccination campaign. They said," With the NPRE banner about vaccination programmes on our vehicles, we had unhindered free passage even in Naxal infested areas where even police do not dare to move. Another interesting aspect was on the last day of the vaccination campaign in many areas, the villagers hosted a 'feast' to our vaccination teams in appreciation of their hard work in tribal villages where no govt. officials entered to render any service". Listening to these comments, the Joint Secretary expressed his appreciation for the good work of the department. Similarly, the JD(AH) Anantapur had his apprehensions about the threat of Naxalites in certain pockets of the district. To everybody's surprise, the vaccination teams sharing their experiences in those areas, expressed their gratitude to the Naxalites and their sympathisers and people for their active

support in the rinderpest vaccination campaign in remote areas for their physical help in carrying their luggage and helping to mobilise animals for rinderpest vaccination.

11. Vaccination campaign and the Driver's empathy

In Nellore district vaccination campaign, I had an unusual experience shared by Dr. D. Subbaiah, the Assistant Director, Kavali, and his vets about the rare feat of an ex-army driver, Mr.Krishnaji, of our department deputed from Krishna district for mobilisation of vaccination teams to work spots. It appears that the driver used to get up early in the morning, go to the ice factory, get the ice, packed in flasks, and ice carriers; at times investing money from his pocket when team leaders were asleep or out for their morning course. The driver used to mobilise farmers with his talkativeness and help the vaccination team to get tea and snacks and force the team members to relax for some time during the work. They complimented that his presence was itself an elixir to them.

12. Vaccination campaign and bizarre incidents

An unfortunate and bizarre incident happened in Vizianagaram district during the campaign. Dr. B. Vijay Kumar, VAS, VD, Bonangi while doing vaccination, a ferocious bullock, charged at him, resulting in fracture of his leg bone, and was in bed for six weeks. Otherwise, some frontline workers had minor bruises, injuries during vaccination or ear notching exercise in the campaign.

On another ocasion I was on my way back to Hyderabad from Nalgonda after visiting the Joint Director and District Diagnostic Laboratory to oversee the facilities available for monitoring of rinderpest disease and preparedness of the field functionaries. I asked my driver to have some tea and snacks at a road-side tea shop in a village on the way. He said that he had it already and that he can drive with ease. The sun already started disappearing from the sky and it was darkening quickly as it was the month of November, our vehicle was on the run. By the time I realised what was happening both of

us were in a big ditch of about fifteen feet deep. Both of us were in shock and in the next three minutes there was a small crowd above with somebody lighting with matchsticks. Meanwhile three or four people reached us down; helped us to get out of the vehicle. Fortunately, both of us could stand erect with no injuries. They were all the farmworkers returning to their village from agriculture fields. Two of them helped us to get out of the ditch. Meanwhile somebody passing by on a motorcycle got down and enquired how it had happened. Mr Syed Ali, my driver, was still in daze and could not say anything. I requested them to help us to get the vehicle out. The gentleman on the motorcycle looked into the spot and assured us not to worry. In another twenty minutes they brought a tractor with some ropes and pulled our vehicle out. All this took about one hour altogether. Fortunately the vehicle was intact. Mr. Syed Ali gained back his senses. The villagers requested us to stay back for that night in their village but thanking them we proceeded to Hyderabad an hour drive from that place, but it took us two hours as the driver was extra- cautious on the slow drive. I did not say anything to him. The next day he revealed to me that he was feeling inconvenient to drive in the dark. Since then, I used to take another driver in his place during long journeys.

That was in 1995 and the rinderpest vaccination campaign was in full swing. I was going through the reports on the progress of vaccination work in different districts in the state. Dr Damodar Reddy, Assistant Rinderpest Officer came to me and said, "Sir, sad news." I raised my head and looked into his face inquiringly. He informed me that Mr Ashraf Khan, VBRI driver, died this morning at about 5 am in a tragic road accident forty kilometres away on his way to Mahabubnagar to deliver rinderpest vaccine. The new Bajaj van was found mangled in one to one head-on collision under heavy downpour and poor visibility. One lakh doses of rinderpest vaccine was also lost in the mele. For a moment I could not believe this tragic incident. Mr. Ashraf was always with a smiling face and dedicated person. I travelled with him several hundreds of kilometres in the van at a stretch for four to five days with night halts on the way at suitable places. I informed Dr. M. Yogi Reddy, the then director and we went to the morgue at Osmania hospital and paid our respects to the departed soul. The agony of his family members with small kids was indescribable. Personally, I felt I lost an important soldier in the war against rinderpest disease.

13. Officer with bedrock stamina

I was on my roundup of visits in Ranga Reddy district to have first-hand information about the preparedness of the field units for the vaccination campaign. After interacting with many of the field Veterinarians, I reached the Chevella divisional office. I was told that the Asst. Director was expected anytime. I waited for him for a while and started back home. After ten minutes of travel, seeing me from the opposite direction, a jeep was found stopped on the other side of the road, Dr. B. Subbarayudu, the divisional AD, Chevella,getting down from the driver's seat greeted me and informed me that he had been to an ice-factory in Shamshabad to procure ice in bulk for the vaccination campaign in his division. To my suggestion that he could have sent somebody for the job, he said," Sir, my driver fell sick, so I am constrained to go for it to avoid interruption in the schedule of the vaccination campaign." That was the spirit exhibited by all the soldiers of the department in the saga of the rinderpest vaccination campaign.

14. Vaccination campaigns and my embarrassments

As a special officer, RES at the directorate, before the actual vaccination campaign, I was attending every district level and many divisional level meetings to brief about the NPRE programme since 1993. Every month, I used to communicate with district and divisional level officers about my visit to their place. During such a process, I happened to visit Visakhapatnam and requested the joint director for twenty minutes of time-space to interact with field-level vets and para-vets about the NPRE program at the scheduled district meeting.

The Joint Director, Dr O. Sreemannarayana, in a lighter vein, commented, "What is new about this programme, Dr Sreeramulu? I have been hearing this for the last twenty five years. Okay,as you came all the way from Hyderabad, after completion of my agenda items, if there is some time then you can talk to them.". Nodding my head, I kept quiet waiting for my turn. At last, his agenda items were finished by 1.40 pm. Then the JD asked me, "Dr Sreeramulu, now you can talk to them. Finish in ten minutes as it is already time for lunch."

I started talking to the gathering with the projection of slides. The audience was attentive althrough. It was 2.30 pm by the time I finished. The JD was looking at me with an expression of awe, commenting, "Dr Sreeramulu, for the first time I heard many new things about the programme, if you want to continue for some more time, you can." I thanked him and said, "No sir, I have finished my part."The audience asked for many clarifications.I smiled at them. During lunch break, I interacted with the field staff to clarify some of their doubts.

I faced a similar situation in Warangal. The Joint Director, Dr Ranga Reddy, gave me ten minutes space at the end. I started by quoting an anecdote of Einstein's episode. One enthusiast asked Einstein, "Sir, you speak so eloquently, how much time do you take to prepare to speak for fifteen minutes?" Einstein replied, "Three to four hours,". The gentleman again queried, "To talk for three hours?" Einstein quipped, "No preparation time at all." Continuing my talk, I briefly glimpsed the NPRE programme in fifteen minutes and ended by saying, "I need a minimum of one hour to talk on this subject impressively." Then the joint director requested me to visit their district once again to interact with field functionaries. Amused at his request I nodded my head.

At the Nizamabad district convention, still I vividly remember an incident; one of the young Vets excitedly shouted, Jai Hind, Jai Hind looking at the first slide on the screen to the embarrassment of the gathering with pin drop silence. I stopped for a while requesting the concerned to put on the lights..I affectionately called that Vet, patted him on his back appreciating his national spirit with an advice to show it in his work during the vaccination campaign in his jurisdiction villages.I also felt excited at his excitement.While introducing the topic on NPRE I used to project the slide showing our India map and national flag then follow rinderpest story past,present and eradication programme for one hour.

On another occasion I was at Mahboobnagar convention.The gathering was very attentive and I spent more time clarifying the doubts of field vets.and paravets for more than one hour after my talk on NPRE. That day Dr.Krishna Ashrit ,the Director was also there during my presentation.He reminded me', Dr.Sreeramulu! It is time for you to leave as you have to leave for Vizianagaram otherwise you miss your train at Secunderabad station. He also said,'Take my vehicle to Hyderabad.Rush'.When I Looked at him, he said, 'Don't worry. I come back to Hyderabad in another vehicle.You please proceed immediately. I hesitated as we both came in his car to attend the district meeting on that day.

One of the most challenging hurdles to the successful delivery of vaccines relates to the fears, doubts and uncertainties surrounding the practice of vaccination. A host of purely practical difficulties must be overcome in order to provide vaccine doses.Vaccine delivery throughout the complex places along with media campaigns to keep the livestock farmers informed and promote the uptake of vaccinations. But there is more to it than that for effective management of the vaccination campaign. I believed that the persons who understand its importance well, will deliver better. In the awareness meetings on rinderpest vaccination campaign with Vets, Para-vets, farmers and peoples' representatives at various levels, I used to dwell upon three powerful requirements: What had happened? What did it mean? What can we do about it?

These meetings used to be energetic, engaging and immersive to bring responsible participation in the campaign. Strongly I believed that words arising from deep conviction go deep down the hearts forever. Accordingly, I nurtured them with passion, and this was done at a speed and with a smile. I strongly believed that to maintain trust, experts should inform about and not persuade without any unintended meaning and intended ambiguity. Methods based on understanding, compassion and gentleness can work even in difficult circumstances. My buzzword 'symphony'-the beauty of unity in action, proved very helpful in the success of the rinderpest vaccination campaign in the state of Andhra Pradesh.

15. Procurement of Transport vehicles for campaigns - A dilemma

Originally, it was the responsibility of the concerned state governments to accomplish coverage of all cattle and buffalo populations by rinderpest vaccination with their resources. Unfortunately, for such a time-bound vaccination programme, our department did not have enough resources like vehicles for transport of vaccination teams and materials to villages in the nook and corner of the state. With protracted persuasion, the central government sanctioned an amount just sufficient for fifteen jeeps only for the purpose against our request for ninety jeeps to cover two crore animals (twenty million) in 6,000 villages in 23 districts. As usual, bureaucratic government procedures, the files moved at a snail's pace for administrative sanctions at the state level. Meanwhile, the state government imposed a ban on the purchase of new vehicles and it had become a stumbling block. With

great difficulty, with several rounds of discussions at different levels in the state government, at last our department got an exemption to this programme.

The then state Animal Husbandry minister was interested in a particular dealer. Unfortunately, that dealer did not have the brand of vehicles of our choice suitable for country tracks, rough roads. It was easier to deal with God than with His Angels and easier to seek forgiveness than permission. After dilly-dallying for more than four months, my DAH persuaded me, "Dr Sreeramulu, what is it that we can do? For a while forget about the long-term usefulness of the vehicle brand, do not count this number, feel as though we do not have these fifteen vehicles. Already it is very much delayed, let us go ahead with this procurement." I could not say anything to his practical suggestion.

In several meetings at Delhi and regional state capitals, I pleaded with the NPRE authorities to allocate at least one hundred jeeps for effective vaccination campaigns, post-vaccination disease surveillance, sero-monitoring, and sero-surveillance activities to satisfy the stipulations of OIE for declaration of 'Freedom from Disease' and 'Freedom from rinderpest infection' in the next four years period. Subsequently, NPRE agreed to provide an extra sixty-five jeeps for vaccination campaigns. Because of the earlier unpleasant experience, I pleaded with the project about my helplessness to purchase vehicles at the state level because of the ban on the purchase of new vehicles. I requested the project to procure the vehicles at their level and allocate them to our state. Under NPRE, the state AHD got another sixty jeeps to hasten up the vaccination campaign in 1995.

16. Successful campaign - Unawareness of farmers

Somewhere in 1998, it so happened that I was at Palasa, a small town, known for processing and export of cashew nuts in Srikakulam district as Project Director ISPA to oversee the activities of 'cluster extension cell' supported by the project in nearby VD, Govindapuram. I was at VD by 8.30 am, the veterinary assistant informed me that the VAS was out to attend an emergency case and expected to be in an hour. By that time many cases with their attendant owners were gathered in the premises. Meanwhile one of my colleagues from the project started examining animals with a record of insemination for pregnancy and I was looking at the gathered animals holding

left ears. Looking at my smiles while looking at the ears, some of the farmers asked me, "Sir, why are you examining the ears of our animals?" Showing them the ear-notching mark, I asked them, "What are these cuts on the ears and that too only on the left ears?" In reply, they said, "Three years back our doctor and some more people gave injections to our animals and put a 'cut' on the left ear saying for the effectiveness of the injected drug. "Despite my repeated questions, they informed me that they did not know about the injection but on their doctor's advice they got all their animals injected, not only in their village but also in all villages around. I have to appreciate the popularity and goodwill of my peers in the department. But I felt inconvenient with the innocence of the villagers who voluntarily participated in this saga of the rinderpest eradication campaign without knowledge about the programme in general.

17. NPRE-Emotions of top bureaucrats

During the full swing of the vaccination campaign in the state, in 1994, a review meeting was held at Trivandrum, the capital city of Kerala state. All the DAHs and rinderpest officers from 'Group C' states were there in the meeting. The project coordinator, Dr Y.P.Nanda, and EU expert advisor, Dr W.P.Taylor appreciated the vaccination campaign in Andhra Pradesh and highlighted the AP state's efforts in convincing the farmers to 'ear notching' their vaccinated animals. When DAHs from other states expressed their inability to do ear notching of vaccinated animals in their states because of vehemence of farmers. The coordinator requested Dr Krishna Ashrit, the DAH of AP to share his experiences. Without a pause, Dr Ashrit told the gathering, "My rinderpest officer, Dr Sreeramulu is the right person to explain our experiences."

The coordinator looked at me sitting in the second row to speak while Dr Taylor smiled at me. I introduced myself and looking at the gathering I said politely, "Respected state directors and commissioners, kindly bear with me for my query." Everybody was gazing at me. Without hesitation I asked them, "Kindly tell me, Sirs, how serious personally and professionally you are about the necessity of identification of vaccinated animals in this programme?" Nobody responded. Eerie silence. I continued, "My DAH, whatever the occasion, wherever it is, many a time without any context also, used to speak about the importance of this NPRE programme and identification of vaccinated animals by' ear notch' in different forums at the state level or

district level. Two or three times I heard him talking about NPRE in a' National Food and Nutrition Convention' and other such unrelated meets also. Over time, it went well into veterinary and para veterinary staff, other officials and farmers. Naturally, when any message goes well deep down into field staff, it will do miracles. If the top man is not serious, the results cannot be to our satisfaction. Kindly bear with me for my statement of the fact. Thank you, sirs." I concluded.

During an interlude, the commissioner of the Maharashtra AH department, a young IAS officer, asked me a few questions to clarify his doubts and appreciated my way of sharing an important experience.

18. My interaction with the EC team

It was in 1996 when I was back from discussions with the Managing Director, APSCCFC (AP State Scheduled Caste Development Finance Corporation), my colleague, Mr Gupta, Executive Engineer informed me, "Dr Sreeramulu, the PA to the Director of Animal Husbandry, requested you to speak to the DAH as soon as you are back to your seat." On contact, the DAH requested me to proceed to Chittoor district, the next day to receive and brief the team from the European Commission coming from Karnataka state passing through our Rinderpest Check-post, at V.Kota to Chennai. To my doubt about the latest updates as I left that post on promotion a few months back as Joint Director, he assured me that the present Special officer would accompany me with the information and make all travel arrangements. In the end, he told me that the National Coordinator, NPRE, wanted my presence there. I had to take permission from the Managing Director of the organisation I am working for. On the third day, I was at the venue wherein I could meet the Joint Director, Chittoor also. A stream of vehicles reached the venue, where I could meet my earlier counterparts from Karnataka to see off the EC team and Tamil Nadu team to receive them. The Tamil Nadu team hastened the departure of the EC team from the spot after a few minutes of their stay at APRP Check-post. The National Coordinator asked me to get into his car with the EC team for Madras (Chennai). Saying goodbye to AP, Karnataka state officers, I got into the car. On prompting by the National Coordinator, I briefed the EC team about the programme in my state (Andhra Pradesh). There were more queries about government Finance systems in my state which I could clarify. One of the EC members posed me an embarrassing question, "Dr Piedy! If you don't mind, can you clarify my doubt?". I looked

into his face. He continued, “Why do bureaucrats venture to attend technical meetings from your country while only technical heads of the country from other parts of the world attend in international forums?” I have no ready answer and a sudden screeching stop of the car negotiating a buffalo herd across the road saved the situation. In a lighter vein, I commented, “In my country, the buffaloes have the freedom to move as they like when the herdsmen are relaxing under a tree”. Everyone in the car burst into laughter for a while.

We could reach the Tamil Nadu Directorate by 3 pm after a brief stopover at the Institute of Veterinary Preventive Medicine, Ranipeta, the premier institute of Tamil Nadu state. One hour after the conclusion of discussions, I started moving out with others. The Tamil Nadu director requested me,” Dr. Sreeramulu, please stay back for one more day with us. Tomorrow, please accompany one of the EC team members for the visit of our Veterinary Hospitals while other members accompany in other directions.” I was a little bit hesitant. Then he said,” No hesitation, I know you can communicate in Tamil also. You can be back by evening. I will arrange your travel back to Hyderabad for tomorrow”. I nodded my head in affirmation as I could not say no to him.

The next day I accompanied one of the EC members towards the north coast area. Visited three veterinary institutions, interacted with Vets, some livestock farmers both men and women. On the way, we got down in two or three villages to understand their livestock practices as requested by the visitor. We had travelled for about sixty kilometres. It was noon and lunchtime. The driver informed us about the non-availability of decent hotels around and suggested a seaside resort. When we reached there, to our dismay, it was found closed but I could find a few small thatch roof eateries thronged with people bear-chested with loincloths on wooden benches waiting for their turn of fried fish straight from the ovens fired with wood with smoke around but with tempting roasted fish smell. I liked the smell and feeling hungrier. The EC member, a Britisher, suddenly asked me, “Dr Piedy, Can I have them?” For a moment, I got puzzled,” Are you sure?” I asked him. “Why not?”, he shot back. I looked at the driver and he was also found with a surprised face.I said,” It will be very spicy, but I can ask them to reduce the chilli powder. Please relax in the car, I will arrange it there”. He retorted, “I don’t eat my food in the bedroom”. Hesitantly I nodded my head and took him to the eatery and the the hotelier cleared a bench for us and we ate at the same place”. He enjoyed the fish only but I and the driver were looking

for rice also.. On the way back the, EC member thanked me for such a wonderful lunch which he enjoyed the most. Thanking him I looked at the driver and thanked him for the good fish fry.

19. Rinderpest Eradication and Maruti 800 cars

In 2012, I was at 'Garladinne' a Mandal headquarters village about twenty kilometres from Anantapur town (AP) with my team of four biotechnology scientists to organise a public awareness programme on agriculture biotechnologies from Agri Biotech Foundation, Hyderabad where I was a faculty member after my retirement from government service in 2005. The venue was at the meeting hall in the Mandal Praja Parishad office. It was 10 am, farmers were slowly gathering in and some volunteers were arranging chairs. I asked the local organisers about how long to wait to start the programme. Knowing that it would take a minimum of another thirty minutes,I went out for a stroll. Finding a Veterinary Dispensary nearby, I went in. The VAS was found busy treating an animal kept in the trevis. Finishing his work in about three minutes, he turned back, looking at me suddenly he expressed his surprise and greeted me and hurried his attendant to get water and a towel to wash his hands.

I remember his face but could not recollect his name. With a smile on his face, he inquired, "Sir, how come you are here so suddenly?" Expressing my regrets for my inability to recollect his name, I told him how I got there. He invited me to his office room and I started moving. Suddenly he asked me, "Sir, kindly come with me for a minute." Saying this he took me to the rear-side of the dispensary building and showed me a 'Maruti Alto' car. He narrated, "Sir, whenever I am at the wheel, I recollect your words." I did not get him and seeing my face, he continued, "Sir, in your whirlwind tours in the districts explaining about the importance of rinderpest eradication program in 1993, almost 19 to 20 years back, you used to exhort us saying, "Once rinderpest is eradicated our livestock and products will have no trade barriers and our farmers will be wealthier and field Vet's stature will improve. I dream of all my field vets to attend their dispensaries, at least in small Maruti cars". The Vet continued, "I always tell my wife and kids about this". Seeing his happiness, my eyes wetted with the excitement of joyfulness. He continued, "Sir I purchased this car with some savings and bank loans." Congratulating him I took leave of him, looking at my watch as it was already five minutes to 11 am. A scintillating experience.

20. Travails of Sero-monitoring

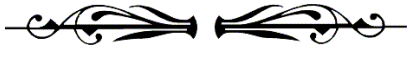
Sometime in September, 1994, three months after the start of vaccination campaign in Rayalaseema districts, as per the advice of Central sero-monitoring laboratory (ADMAS, Bangalore) I proceeded to Kurnool to oversee the serum sampling in the designated village in Kurnool district a day ahead. At the Animal Health Centre, I understood that the remote village was about eighty-five kilometres away, necessitating us to start for the village early morning by 4.30 sharp. I was a little bit hesitant as the accompanying officer was a lady vet watching my hesitation, the young lady vet. Dr Arunakumari assured me not to worry and she would be at the laboratory by 4-15 am, politely declining my offer of pick-up at her house.

As soon as we entered the designated village, there was no hint of the sun through the scudding clouds though it was six-thirty am. We saw some women and men walking towards agricultural lands with a surprised gaze at us in the jeep at that early hour. Suddenly I found an armed policeman stopping our vehicle and enquiring the driver about the details as the police man could not understand the writing on the jeep 'National Project on Rinderpest Eradication' instead of Government Vehicle, AP. I was wondering why there was an armed reserve police man in this remote village. According to him, an armed police camp had been there since four days in the village due to a faction fight that erupted last week. Meanwhile, finding an elderly man passing by, I stopped him and informed about the purpose of our visit to the village. The gentleman whom I stopped happened to be 'the village-head'. I requested him to get into our vehicle and he assured us," Do not worry sir, I will organise the required number of animals in a few minutes." He asked us to sit at the village centre where the police camp was housed in the Panchayat office. In another thirty minutes, twenty animals were gathered category wise. Half of the village gathered around us including the policemen bare-chested with toothbrushes in their mouth and towels on their shoulders and a few were sipping tea from a nearby tea shop. While the lady vet was collecting serum samples, I assisted her in labelling and talking to people about the rinderpest vaccination campaign and the purpose of blood sample collection. Some of them were listening to me with attention with mouths wide open while some were jostling. Meanwhile some policemen who got ready in their uniform were asking the people to clear the place and go back to their houses and not to stay outside. I assured the policemen that we would be leaving the village as soon as the collected blood samples clot, which may take thirty minutes in all. For a while it was an unpleasant moment, but we could complete our task and get back.

21. Walk-in Deep Freeze episode

By mid-year of 1993 we had plans to increase production capacity of tissue culture rinderpest vaccine from twenty lakh doses to forty- lakh doses in VB & RI, Hyderabad. We had a dedicated team lead by Dr. Sudhakar Damle, Asst.Director who had rich experience in rinderpest cell culture vaccine and he was one of the resource persons in cell culture rinderpest vaccine production. His team members, Dr. Venkateswara Reddy, Dr Ram Singh,Dr.Hanumantha Rao and Dr. N. Jyothi were an asset for the state who worked tirelessly overtime for vaccine production to meet the demands of the vaccination campaign under NPRE. The team was a towering strength for me during the rinderpest vaccination campaign.

Accordingly, a hither to non-existent automatic glass vial filling unit was installed. Also obtained government sanction for installation of a walk-in-deepfreeze facility with funding from NPRE the previous year itself to increase storage capacity for rinderpest vaccine and other viral vaccines. Unfortunately, the State Finance department was not releasing the granted amount of rupees ten lakh for the purpose due to the state financial crunch in spite of repeated pleas from NPRE and DAH as well. Closing deadline date was fast approaching but the treasury authorities were not accepting even the presentation of the bill itself for the clearance as the govt. capped the bill amount to be less than Rs. Five lakh only to limit the government expenditure. I was jittery as if this time the bill was not paid to the company it would take another year to pay the dues to the company. Apart from that we would not be in a position to store sufficient vaccines for our rinderpest campaign. I had a smart Accounts Officer, looking at my gloomy face he said, "Sir let me try as a last resort through one of my friends in the Finance department". In desperation I nodded my head and stayed back in the office till his return. At about 7.30 pm he came to me with a jubilant smile, informing me that the Finance Secretary him-self endorsed the bill to admit the bill for necessary action. The accounts officer assured me that the next day being the last day he himself would go to the concerned office and see that the bill was passed as he knew somebody in the Pay & Accounts office also. This prized possession, our walk-in-deep-freeze unit was only the largest facility available in a government institution in Hyderabad at that time.





C. A Flashback - Rinderpest Eradication Scheme



1. As Assistant Rinderpest Officer at Kurnool

That was in January 1980, to be more exact, on 6th day, the day of completion of my orientation training as newly recruited Assistant Director of Animal Husbandry. The Office Manager, while handing over my posting orders, told me to stay back for a while as the Director of Animal Husbandry wanted to speak to me at 6 pm.

I was in the chamber of Dr V. Narayana Rao, the then Director of Animal Husbandry, at the stroke of 6 pm. Looking at me, he signalled me to sit while talking to another senior officer. After the dispersal of the senior officer, leaning back relaxedly in his chair, he looked at me and asked, "When are you planning to join in your new assignment?" In reply, I said, 'The day after tomorrow, sir".

Next question he asked me, "Are you disappointed with your posting orders?" Without waiting for my reply, he continued, "All these years only sick and crippled officers were given this assignment, as none of the earlier directors felt the importance of this post of Assistant Rinderpest Officer (ARO); apart from that, there was a misnomer that the post was unimportant, so officers not in good looks of the then directors were posted as a punishment also. He continued, "I feel it is a very important assignment for you. To me, you are the only person in your batch to handle it professionally. For you, besides this, the other task is to visit all the six district Disease Diagnostic Laboratories and guide them, inspire them and get them involved technically, seriously in disease surveillance and control of livestock diseases apart from your task of Rinderpest disease surveillance and control in your jurisdiction of six districts (Rayalaseema districts plus Nellore and Mahabubnagar districts). I will try to provide you with all the facilities' and wished me all the best in my new assignment.

When I took the charge of the post at Kurnool, I understood that I was the only person with no support staff. Many of my colleagues and even some district officers started showing sympathy for me, whispering among themselves that I was posted to this position by the director with some vengeance. I laughed it off and I took it as a challenge. I was the youngest ever officer holding this post with post-graduation qualification. My predecessor Dr.G.V. Appa Rao,the grandson of the noted writer and poet Sri Gurajada Appa Rao and class-mate of my father-in-law was relieved on his transfer nearer to his native district just three years before his retirement from government service..

I used to send handwritten official communications to my superior officers and peers, and sit in somebody's office as I had no specific office accommodation. I was constrained to take secretarial help from the personnel of the offices where I was allotted a room to sit as my office in Kurnool. I had to tour four districts of the Rayalaseema region, Anantapur, Chittoor, Cuddapah, and Kurnool and Nellore & Mahabubnagar districts, mostly by bus as there was no convenient railway connectivity.During weekends I used to spend some time on the heights of Konda Reddy Buruju in the heart of the town.It is an iconic tower around which the town developed.Sitting on the tower we enjoyed the breeze of river Tungabhadra flowing a few yards away.

Almost for twenty days a month, I used to travel in districts attending Rinderpest disease outbreak villages, attend district meetings, divisional meetings to bring awareness among the field Veterinarians & para-veterinarians about the importance of rinderpest disease, diagnosis, and management of disease outbreaks with portable audio-visual equipment regularly. Those days it was customary to first make a courtesy call on the joint director of the district and then tour the district. Many a time, they used to express surprise on my visit and ask me, "How come you are here when we have not reported any incidence of rinderpest disease in our district? In reply, with a smile, I used to say, "Yes. There is no report of rinderpest disease, but I came here to discuss with field vets about rinderpest disease dynamics to avoid and minimise the losses resulting from the incidence of disease. Earlier practice was that ARO would be visiting places only when there was a report of the disease outbreak. Initially, I was an unwelcome guest, subsequently, field officers used to invite me to organize technical discussions about the disease.

In six districts, RP mobile vaccination squads at district headquarters, RP check posts on interstate borders, to check and vaccinate animals coming into the state on foot or by truck to contain RP outbreaks, and RP immune belts were located along the interstate borders to take up vaccinations to the depth of 16 kilometres to build up immune belts. All the personnel in these units were under the administrative control of different divisional units in the district and the allocated tasks were done very routinely with no or little technical guidance. I strongly believed in strengthening the knowledge base of functionaries at the field level associated with the rinderpest control programme: my strong belief was that if one understands well the purpose of allocated tasks clearly, the output would be better both qualitatively and quantitatively.

My perception proved correct with the activities I had taken up to orient the RP staff and other field staff as well. I used to be always on the run for four to five days at a stretch leaving my wife and small kids, enraging my young wife at times. Once she had to manage herself with no help from a sudden severe flood threat as we lived adjacent to the Tungabhadra river bank in Kurnool. Many times, she had to manage the medical emergencies of my young children, alone.

i. The curious and weird scenario on the other side of the border

On one Sunday in October 1980, an attender of the Veterinary Hospital, Kurnool came to my residence at about 7 am and informed me that the Director of Animal Husbandry, Hyderabad wanted me to speak to him on phone in next one hour. I rushed to Veterinary Hospital, nearby my home, and booked a trunk call and luckily, I got the call matured immediately as it was a public holiday and from the other side the Director at his home asked me, "Dr Sreeramulu, did you see today's Hindu newspaper page number so and so?" I looked at the newspaper on the table and the news was about the heavy toll of sheep with weird photographs in the bordering Bellary district of Karnataka state. On my 'yes' response on the phone, he asked me," Could you go there and find out the situation?". I said, 'Yes, sir'.

I requested the Assistant Director, Animal Health Centre (AHC), Kurnool to send one of his Veterinary Assistant Surgeons, Dr. Y. Hari Babu (who later entered into academics and retired as Dean of Veterinary Sciences, Karnataka Veterinary University, Bidar, presently in 2018 Vice-Chancellor, Sri Venkateswara Veterinary University, Tirupati) to assist me. The same day after lunch, we proceeded to Adoni by bus. The next day, I took the jeep belonging to Asst. Director and proceeded to Bellary, Karnataka, visited some villages, interacted with shepherds with gloomy faces who lost their sheep. The scenario was very ghastly with hundreds of carcasses strewn on either side of the roads outside the villages.

I requested the laboratory VAS to collect samples for diagnosis and proceed back to the diagnostic lab by that evening bus and inform the result by the next day evening as I have decided to stay back that night with the request of the local Veterinary officer to visit a few more villages which recorded heavy sheep mortality.

With their help the next day also, I could visit some more villages where shepherds could communicate well in my language (Telugu) as they were earlier with AP state. The scenario was grotesque and bizarre in my ten years of professional career. The course of the disease, symptomatology,

morbidity, mortality pattern gave a clue of the cause of the malady, but I did not spell it out despite the insistence of the local officers, requesting them to wait till evening as I was expecting the laboratory results from my colleague at Kurnool.

Post-lunch, I was interacting with the local officers to understand their working conditions, facilities, etc. By 3 pm I got the laboratory result on the phone from Kurnool which confirmed my presumptive diagnosis, rinderpest disease. I informed the local officer, meanwhile his telephone rang. I heard him talking to the other side about my presence from the neighbouring state in Kannada language and saying, 'yes sir' at the end. I was looking at his face with a question mark. He told me, "Dr Narayana Swamy, the Director of Veterinary Services, Karnataka is likely to reach this place by evening and he wanted to see you". The local officer requested me to stay for some more time. I had to wait till 7 pm. I paid my respects while introducing myself to the Director, Karnataka. The first question he asked was,' "How come you are here?" The next question was, "How can you emphatically say that the disease is Rinderpest?"

I explained to him, "Sir, already we have the incidence of disease in AP especially in Rayalaseema districts; my director asked me to find out the reason for this un-explicable large-scale mortality among sheep in this area as our state has a substantial sheep population all along the bordering districts and there is a practice of migration of sheep to these parts from AP and to take up precautionary measures." To the second question I told him, 'Sir, the traditional diagnostic test Agar gel precipitation test (AGPT) takes minimum of 24 hours for the result whereas, in Kurnool Diagnostic Laboratory, we do Immuno-Peroxidase Test (IPT) which gives more dependable results in just two hours". Dr. Narayana Swamy looked at his Deputy Director (RP) accompanying him, and the deputy director informed him that they were not aware of the new test and still depend on the former test only.

The director asked me to join him for dinner. During dinner he was inquiring how we were tackling this crisis — I told him, "I am advocating vaccination in unaffected flocks and very quick disposal off apparently healthy sheep in affected flocks for slaughter". He retorted, "As a person to help them, how can you advise them to dispose off their flocks?". Very politely, I narrated to him, "Our experience shows that if we vaccinate already affected flock, the disease spreads very fast as the virus is already in the flock" and told the pathetic incidence of two shepherds committing suicide on the loss of flock of two to three thousand sheep ignoring our practical advice. "Though the advice is unpalatable and harsh, the truth is total loss. I could convince and advise

our shepherds about the reality of disposing of healthy sheep from the affected flock at the earliest for slaughter to minimise the monetary loss". I added that if somebody claims otherwise, the claim stretches credulity. I stressed, "Sir, I understand this is an unorthodox approach to this issue, but the field situation is different". My solution had not impressed him as I observed his expressions. It appeared to me that the real truth eludes him still.

His deputy was whispering something in his ears looking at me. The Director told me. "Dr.Sriram, we do not have enough vaccine stock with us. Can you help me with some vaccine?". I told him, "Sir, we may not be in a position to supply the entire quantity—but definitely can provide 20,000 doses of vaccine after putting a word to my director as it is an issue of mutual interest". He was very much pleased.

Taking leave of him I said, "Sir, this large-scale mortality is not merely an allegory, it is also the tale of a devastating calamity for shepherd families." The gloom, the agony, the helplessness of shepherds, and the cluelessness of the veterinary department in controlling the disease pinched my heart.

By the time I left Bellary for my travel back to Kurnool, it was 10 pm. After two hours of the journey, I found the jeep driver was sleepy and dozing. I told him to stop the vehicle and take rest for a while. On that full moon day, my- self and the driver slept on culvert bunds on either side of the road. At 3 am, the driver woke me up and said, "Sir, I am alright, we can move". I was dozing in the jeep and reached Kurnool for breakfast travelling over 170 kilometres.

At the end of my two-year tenure, I applied for study leave and left for the PhD programme. Thanking the Director, for supporting me to show what could be done by an Asst. Rinderpest Officer, I had submitted a detailed report on RP disease status past, present, and forecast for the next five years with analytical interpretation of vaccination status vis a vis susceptible population and herd immunity status. My prediction of explosive rinderpest disease outbreaks for the next five years in the region, later, came true according to my former colleagues in the region when I was at Tirupati for my Ph.D programme.

ii. Rinderpest Outbreak, Triple Ride and a Policeman

Somewhere in March 1980, I was in Nellore district. I made a courtesy call on the Joint Director to know about the status of RP disease outbreaks in the district; he suggested me to visit Chakalakonda village of Kavali division where a large number of buffaloes (219) suffered from the disease

with a record of one seventy-nine death toll (179). After meeting the Divisional Asst. Director Kavali I understood that the disease was a lingering outbreak for the last two months. He gave me his office jeep as there was no frequent bus facility to that village (65 kilometres) and sent his office typist to take me to that place.

The jeep broke down on the way suddenly. The typist assured me," Don't worry Sir, fortunately, we are in my native village. I will get a motorcycle from my friend as we have to travel another eighteen kilometres". He came back with his friend and said," Sir, we leave the jeep here with the driver, my friend will take both of us." I nodded my head and we started for the village. His friend was with the handle-bar, he was in the middle and I was at the rear-side on the motorcycle, a triple ride indeed. In another five minutes, we have to take a diversion from the main road into a Kacha road leading to the village. Suddenly we found a Police Sub-inspector on his motorcycle in the opposite direction. He stopped us. Feeling embarrassed I walked a few yards away. I heard both of them pleading with the policeman explaining the circumstances that led us for a triple ride. Since then, I have never volunteered for a triple ride on a motorcycle.

In another fifteen minutes we reached the destination and it was pitch dark. The local para-vet arranged food, a cot, and a bed in a primary school for my night stay. In the morning, the local Sarpanch and a few villagers assisted me in the house-to-house search for ailing animals. I understood the pathetic situation they were in and the disease spread to a few more villages around.

I thanked all the people and asked both of my accomplices to go back to their place as I had decided to visit a few more outbreak villages en route to Nellore. I had spent another three days visiting the places with the help of local veterinarians. That year Nellore district recorded the highest number of outbreaks. A horrific tragedy resulting from a lethal blend of non-seriousness and decision paralysis on the part of the district administration.

iii. Connecting dots...

I was at IVRI, Mukteshwar in May 1980 for a 21-day summer Institute on' Rinderpest disease (RP) — Epizootiology, Diagnosis, and Control'. The iconic British buildings and the clubhouse with century-old billiards tables were very impressive amidst the picturesque surrounding forest. Mukteshwar was a hill station where the first Veterinary laboratory "Imperial Bacteriological Laboratory" was established by the British in 1895 for research

and vaccine production. This was Asia's first veterinary institute that also worked on Foot & Mouth Disease.

In the late 1920s Dr. J. T. Edwards, working with the rinderpest disease virus, developed the Goat Tissue Rinderpest (GTRP) vaccine with six hundred serial passages in goats for the first time in the world and this vaccine had helped in controlling rinderpest disease considerably reducing the losses to farmers in India. A strange coincidence is that exactly in the Fiftieth year of the GTRP vaccine I had the opportunity of training in this laboratory.

It was customary that each participant had to present a paper on the disease status in respective states; when I wanted to present a paper on "Epizootiological observations on rinderpest disease in small ruminants", the Director of Summer institute did not allow me to talk on the subject, ridiculing that there was no reported record of the incidence in small ruminants in any state in the country or other countries.

When I was sharing my experiences about the disease in small ruminants in Andhra Pradesh informally during free time with my other colleagues from different states of India, many of the participants also had complained about the incidence of similar disease in their states of Gujarat, Rajasthan, Maharashtra, Tamil Nadu, and Karnataka.

One of my colleagues from the state of Madhya Pradesh posed a peculiar issue he faced during 'auditing of accounts of his biologicals production unit by the Audit party of the Accountant General of India. The query was "Why a huge amount was spent every year for the production of rinderpest vaccine though it was claimed that the vaccine gives lifelong immunity and the number of vaccinations done over the years exceeded the number of existing cattle population three times? Every one of us pondered over the query as the status was the same in most of the states.

In those days, Andhra Pradesh was considered as the hot bed for the indence of all the notified diseases and the AP state was always in Red (Yellow), signifying the importance of true reporting in the country. This was because of assurance given by the then Director of Animal Husbandry, Dr V. Narayana Rao to field staff not to hide any disease incidence. Earlier in those days the field veterinarians used to feel harassed whenever they reported any incidence of diseases, especially rinderpest.disease.

Four years later, with a 'starred' question in the parliament session, the national premier institute, Indian Veterinary Research institute realized the significance and importance of the malady in small ruminants as by that time it was almost in pandemic proportions in the southern part of the country,

AP, Tamil Nadu, and Karnataka states, a large number of sheep and goats succumbed to the rinderpest-like disease. Meanwhile, reports started trickling in about the nature of the disease as PPR (Peste des Petits Ruminants) a closely related virus to rinderpest virus from Tamil Nadu state, investigated by both Tamil Nadu Veterinary University and Indian Institute of Science Bangalore. Then RP vaccination was only the way, as there was no availability of PPR vaccine in the country

With my suggestion, the then Director, Dr. V. Narayana Rao agreed to establish a regional laboratory exclusively for Rinderpest and related diseases at Kurnool, and actions were initiated in that direction. I was coordinating those activities at Kurnool with the willing cooperation of the concerned officers at VBRI Hyderabad.

iv. Rinderpest Check-post Frolics

With regularity, I used to visit RP check posts located on interstate borders and at times, made surprise visits also. In one such surprise inspection in 1980 to one RPCP at Tada of Nellore district bordering Tamil Nadu state, I could reach the place at 1 pm and none of the staff members could be seen at the spot. On seeing me, a person in the adjacent revenue check-post told me, Sir, the staff went for lunch and will soon be here". As I was very tired because of traveling for more than 400 KM overnight by buses; I felt like lying down on a long bench in the check-post with my briefcase as a pillow and immediately I slept. I woke up with a call from a stranger; before I had reacted, he put a book in my hands for signature. For a moment, I did not realize what was happening till he prompted that is 'C' book for signature with a ten-rupee note inside. After a pause for a few seconds, I had realized that he was a truck driver and had to pass through the check-post, then I directed him to the adjacent revenue check-post.

I was sitting alone brooding over the Rs.10/- note, a routine unofficial dole. Just then my Veterinary Asst. Surgeon (VAS) and vaccinators entered the check post after lunch expressing their apologies for their absence at the time of my arrival. They also brought some food for me. I narrated to them about the incident that just happened. The VAS smiled and explained, "Sir, it is a routine, daily a minimum of a thousand trucks pass through the check post mostly late at night. This offer of a ten-rupee note is just a token minimum. At times with heavily loaded trucks with improper waybills had to pass through; then it will be a bonanza for the staff at revenue check-post; whereas for us, it is only scoldings, unsavoury remarks, and sometimes

physical threats when we force them to get their animals vaccinated. "He continued, "Most of the time, we have to get into the trucks and vaccinate the 'in-transit' animals. The truck fellows curse us if there was a delay due to animals struggling", ended with a heavy gasp. I consoled him saying, "Our work is different; we have to put up with such inconveniences at times."

v. The naked truth

Sometime later in 1981, I was in Hyderabad to attend the RP officers conference. Whenever any officer was at Hyderabad, it was customary to make a courtesy call on the Director. So I visited his office, met him, and informed that I was here to attend the review meeting by the Special Officer, Rinderpest Eradication Scheme. I was in the meeting with my special officer reviewing the vaccination status. I received a message from DAH to attend the Disease investigation officers meeting at VBRI that evening. Then I informed the Special Officer about the message, he said, "Don't worry, I am also attending that meeting at 4 pm after finishing our meeting here".

The Director was in the chair along with Dr. S. S. Krishna Murthy, the Additional Director (Health). Both the Joint Directors of VBRI, four Dy. Directors, sixteen Assistant Directors and twenty-four VASs of VBRI were in the meeting hall and all were looking at me as an "Odd entity" with a question mark. The director was reviewing disease status, vaccine production in the state. Turning to JD (Disease Investigation), he asked, "What is the situation at the Large Scale Sheep Breeding Farm (LSSBF)". The Asst. Director (Sheep Disease Investigation) and JD (DI) were answering the queries from the director. The director suddenly looked at me sitting in the last row, asked me to come to the front row, and told me to stay back that night and visit the sheep farm the next day. He asked the Joint director (DI) to organize a vehicle and assistance for me for the visit. It was an embarrassing situation for me as I was only an Assist Director cadre officer. Unconcerned with my designation that too-after asking the opinion of the very senior JD (DI), the director asked me to visit the sheep farm, I felt very irksome. Observing my feelings, the director said, "Dr Sreeramulu, do not worry, I wanted to know the second opinion also".

The next day after visiting the Farm in the morning I came back and briefed the director about my observations on the course of the disease, symptomatology, (confusing), and mortality pattern and told my opinion that the diagnosis at VBRI was not conclusive. I requested the Director for two

days for a laboratory investigation at Kurnool. On the third day, I intimated the Director, "Sir, the disease episode at the farm cannot be Rinderpest but it could be Foot and Mouth Disease". After hearing me the DAH said, "Do you understand why I have asked you to visit the Farm?"

vi. The Shocking Truth

I was at Chittoor from Kurnool to visit some villages near Palamaner town with suspected cases of Rinderpest disease in crossbred-cows in 1981. It was a coincidence that the same day Dr. Acharya, one of the Disease Investigation Officers from VBRI, Hyderabad was also there. On his request, I joined him in his hotel room and we shared our experiences that evening after dinner. The next morning, I was readying to leave for Palamaneru by bus. Just at that time, I heard somebody at the door pressing the calling bell. On opening the doors, to my surprise, I found Dr C. Hanumantha Rao, the Joint Director (Chittoor district) at the door. After greetings, he requested me to visit Mini Semen Bank at Madanapalle on my way back to Kurnool to find out the problem among the breeding bulls stationed there. He also requested Dr. Acharya to make it convenient to accompany me. He left the place hurriedly as he had to go to the District Collectorate for a meeting.

We were at Madanapalle and the in-charge officer explained the symptoms of the disease and I went through records. Earlier another DIO, Dr Rasheed Khan from VBRI visited the place and sent a report that the disease condition was Black-quarter (BQ disease) with an advisory. Meanwhile, a Veterinary Assistant came to the in-charge officer and whispered something into his ear. Turning towards us the semen bank in charge told us that two more bulls died just now. I and Dr. Acharya examined the bulls and found unusual swellings near brisket and thoracic regions with crepitating sounds on pressing. I requested the officer to arrange for a post-mortem examination. The mini semen bank was located on the premises of the Veterinary hospital(one of the oldest, established in 1916.) so the carcasses were removed to the place of burial and there post-mortem examination was done. The classical pathognomonic lesions were found in the intestines with severely congested emphysematous lungs. Materials were collected for confirmatory diagnosis at VBRI.

Watching the saddened semen bank in charge officer, I suggested to him it was only Rinderpest disease. In the exotic Jersey bulls, there would be severe rupture of the alveoli of lungs and the air escapes into the thorax and misleads the diagnosis. So, one should be more careful while pronouncing

the diagnosis. Dr Acharya expressed his surprise at my explanation and volunteered to take samples to VBRI for a confirmatory diagnosis.

After a late lunch at 3 pm, I prepared to go back to Kurnool. Thanking the semen bank in charge officer, I asked him, "How many more bulls do you have?" He replied, "Four". Without a pause, I told him, "Dear Doctor, get ready for more burials within two weeks. We can save none." With a dejected face, he stared at me.

vii. A rendezvous sojourn

During a mid-summer month in 1981, I was at Mahbubnagar with VASs of that division and interacted with them after my presentation on rinderpest disease. In the evening left for Narayanpet and stayed for that night in the office of the Divisional Assistant Director. After breakfast proceeded to Jalalpur for inspection of the RP Checkpost bordering Karnataka state. The record of vaccinations showed only on some particular days more number of cattle were passing through the checkpost in either directions..The VAS explained, only on days of weekly market at Narayanpet more cattle pass through the checkpost to Karnataka. No refrigerator was found for which the VAS explained that every day they pick up vaccine from Veterinary Hospital refrigerator as it is only six kilometers away. By 10.15 am I was back to attend meeting of VASs of the division. That day it was very hot.When I went to bathroom to ease myself, I was unable to pass urine for a few minutes and felt uneasy. Observing my uneasiness the Divisional Asst.Director sent somebody to get iced soda with lemon and advised me to take it at frequent intervals for relief. That was the first time I experienced such extreme dehydration. In spite of strong advice to take rest for that night I proceeded to Makthal after lunch a thirty minutes travel by bus.

Seeing me entering into the office, the VAS, RP Vigilance Unit, Makthal sent an attender to R&B guest house for my night stay and got it confirmed. After talking to the vaccinators, I was going through the records as a part of an inspection of the unit. It was 7 pm.The VAS reminded me about the dinner. I requested for one banana and two chapatis. By 7.30 pm I finished my dinner and readied myself to move to R&B guest house.The VAS said,' Let us go for a movie". When I said it is already 7.30 pm. "No, no Sir, the film starts at 8 pm only, it is just a five minutes walk". It was a touring theatre screening an old film 'PUNADIRALLU',the first film of the noted actor Mr.Chiranjeevi. I gave Rs.50 note to VAS for purchase of tickets for the show. He said, "Now it is notnec essary. We can go and sit inside". I thought probably the VAS knew the theatre owner.Ten minutes after start of the film, a person with a

torchlight was coming to everybody and collecting the ticket money. That was the first and the last of noticing such practice,unique for Makthal a Taluk head quarters at that time.

It was 10.30 pm when we came out and we both proceeded towards R&B Bunglow. Our office attender was at the gate with my briefcase and bag. The VAS asked him, "Why you did not keep sir's luggage inside the allotted room?". When he was about to say something, the guest house caretaker came out running and informed the VAS that the allotted room was forcibly occupied by followers of a local political party leader and now they were not in moods as they were under the influence of liqour. The VAS became wild and shouted at the caretaker. He was pleading with the VAS, "What is that I can do? They came at about 8 pm. In spite of my telling, it was already reserved. for an officer from outside, they said they will leave the place in an hour. Immediately they started playing cards ,then bottles came and the local sub inspector joined the group later.Now, they are in full swing. Kindly bear with me. I am helpless" he gasped. Watching all this drama I said to VAS', Doctor, leave it, don't worry. At this stage it will be of nuisance value,I can sleep in your office. "The disappointed VAS cursing himself was apologetic. I pacified him to cool down and proceeded to his office room. A rendezvous sojourn indeed.

2. At Rinderpest vaccine laboratory

City of Pearls, Hyderabad, founded by the Qutb Shahi Sultan in 1591 AD in Deccan plateau is a pleasant city with growth of leaps and bounds in science research. The second largest institute under government sector catering to animal disease diagnosis, research and animal vaccine production unit, popularly known as VB&RI is located in Hyderabad. I had the privilege of working as a Research Assistant in this institute. Initially this institute was established in 1944 as Serum Institute in Nizam's reign.

i. Goat rectal temperature

During lunch hour, on a wintery day in November 1978, one of my senior colleagues, Dr Hari Rama Das, the in-charge of Goat Tissue Rinderpest vaccine (GTRPV) production unit was with me complaining that the goats inoculated with rinderpest seed virus were not exhibiting symptoms of pyrexia and it was puzzling him for last few days. To my query about the viability of seed virus material, he replied that it was a fresh one obtained from IVPM,

Ranipet, Madras state (now Tamil Nadu). I asked him, "Can I have a look at the records." On perusal of the recordings of the rectal temperature of experimental goats, it was found fluctuating between 100 F to 101 F. When I asked for temperature charts of uninoculated control goats, with a smiling expression he nodded his head inferring no; then I asked the lab technician, "Do you have some un-inoculated goats?' He said, " Yes, they are recent arrivals (last week) kept at a different shed". I suggested my senior colleague to get their rectal temperatures recorded. I also had some control goats whose rectal temperatures were recorded, very systematically. Charts were made for the last six months out of my curiosity to understand diurnal and seasonal variations in the rectal temperature of goats.

I suggested my colleague to go ahead with harvesting of goat spleens, if he records a rise in rectal temperature by two to three degrees compared to control goats. He expressed great relief for my suggestion.

One month after this interaction, one day I got a message to meet the joint director VBRI immediately after the lunch hour. At the dotted time, I was in his chambers. On seeing me, sarcastically he asked, "Dr Sreeramulu, do you think that you are smarter and intelligent?" For a moment with an embarrassment, I did not understand what he was saying and the context. Two of my senior colleagues already with him also looked at me with dismay. I maintained my calm demeanour though my heart was thumping like a drumbeat. Gaining back my consciousness, I spoke politely, "Sir, excuse me, I could not get you as I was not sure with which context you have quizzed me like that." Looking at me, the joint director asked me, "Then tell me what is the rectal temperature in goats? Humbly, I told him," It is 103 F plus or minus 1 F." I continued, "Sir, I found significant variation in the rectal temperature of goats in different seasons especially in winter months just like in buffaloes contrary to textbook references. To be very honest, I am neither very smart nor intelligent. I had this experience earlier also but at that time I could not maintain records for analysis but after coming to VBRI I started critical observations based on the factual recording". The Joint Director retorted, "Do you mean to say, those earlier officers did not make factual recordings". I replied, "Sorry Sir, I did not mean that. Out of my curiosity and enthusiasm, seeking special permission from my unit head, I started coming early to my laboratory for recording rectal temp. under my supervision and I have a significant number of recordings to establish statistically". The JD again asked, "How is that you advised your senior colleague to go ahead with the harvesting of spleens for Goat Tissue Rinderpest Vaccine production when goats were showing only 102 F which

actually should be two-degree rise above the normal rectal temperature of 103 F ie 105 F?" Rolling my eyes with exaggerated playfulness I told, "The experience is that the average normal rectal temperature recorded is 100 F in winter months; twenty-four hours to forty-eight hours post virus inoculation, the average rectal temperature is 102 F, a rise by 2 F from 100 F. A two-degree rise denotes viraemia and the decision to harvest spleens from virus inoculated goats is suggested. Kindly understand the logic sir". I stopped at that point. Then the joint director said, "Dr Sreeramulu! You are really smarter. You must have discussed this issue with me earlier". Thanking him, I left his chambers.

Later I came to know about the reason for this interrogation. At VBRI, we had two joint directors: one for vaccine production and administration responsibilities of the institute and the second one for the disease investigation wing. As the senior JD was on leave, the second joint director was looking after the responsibilities of the former. While going through the records for issuing 'pass orders' for the release of the GTRP vaccine, he asked the concerned assistant director who could not respond satisfactorily in the absence of the VAS with whom I had discussed this issue earlier. My responsibility ceased with reporting to my unit head i.e., the deputy director (biologicals) so there was no occasion to discuss this issue with the joint director (investigation) which caused serious embarrassment to me initially, but with my detailed explanation, the clouds were cleared.

ii. The Vaccine Daze

That was in March 1979, I was on special leave as I was laid down with severe chickenpox along with my four-year-old son and four-month-old daughter, and my wife alone was looking after all of us. One of my colleagues used to visit me to extend any needed help. During such interactions, I understood that many rinderpest outbreaks were being reported from different parts of the state, especially coastal districts. With anxiety, I used to probe about confirmatory diagnosis and availability of vaccine stocks as I oversaw the "standardization of rinderpest vaccines, GTRPV and Tissue culture vaccine (TCRPV). I was getting feedback that only a very limited stock of the TCRP vaccine was available at that time. Despite the availability of adequate stocks of GTRP vaccine, the authorities were hesitating to release GTRP vaccine, fearing outburst of disease as reports were pouring in that wherever containment vaccinations were attempted, there were rinderpest disease outbreaks and field functionaries were hesitant to take up vaccination work with the present stocks of GTRP vaccine.

On the very first day of my re-joining duty (the 11th day), I went to my Dy Director to discuss the gravity of the rinderpest disease incidence in the state. He inquired from me about the testing results as three brews were tested by me during October, November, and December months. I informed him, all three brews (batches) of the vaccine were released based on sterility and safety tests as usual. Those days the practice was to test the potency of every fifth brew of the vaccine. With my remembrance, I added that the contractor supplied goats in large numbers beyond our holding capacity after a gap of two months; there was no time for production-in-charge to maintain them for a stipulated quarantine period and screen the goats. Everything went hurriedly. We cannot fix the responsibility for those unfortunate outbreaks of the disease on anyone. I added, "Sir, the feedback is that wherever the vaccine is used, there is an outbreak officially and places where there is a record of vaccination with no actual vaccination, no incidence is reported' I continued, 'In such case, there must be something wrong with the vaccine despite passing through safety test among buffalo calves at our level. It could be that for each brew, we test with three dilutions in three sets of three buffaloes each, which might have passive immunity as we do not have a mechanism to screen buffalo- calves for homologous antibodies (rinderpest antibodies)".

Then I suggested a detailed study to understand where things went wrong, and I volunteered to do the task. The deputy director heard all my explanations patiently and looked at me for a few seconds and advised me, "Dr. Sreeramulu, I appreciate your concern and happy with your gesture to take up the investigation". With a deep breath, he continued, "Leave it at this stage, we will take extra care in future"

iii. Post-mortem examination - dilemma

Vividly I remember my responsibilities during my tenure in 'Rinderpest vaccine standardisation laboratory in VBRI at Hyderabad. To be exact, on 2nd August 1978 when I was about to leave for 'isolation facility in the city outskirts to examine the status of animals under rinderpest vaccine potency testing, I requested my Assistant Research Officer (ARO) to sanction leave for one day on 3rd August for my birthday to go out with my wife and four year –old son. He curtly said "No". I was staring at him with disbelief at his curtness. The reason put-forth for not accepting my leave letter, he explained, "Dr. Sreeramulu, I understand that one or two 'challenged control (test)

buffalo-calves are likely to die tomorrow. Your presence is a must for conducting a post-mortem examination. How can you go on leave?" Listening to our conversation, one of my colleagues volunteered to attend post-mortem examination in case of any death of test animals. Still the ARO vehemently did not agree. I kept quiet. Another senior colleague advised me to approach the Deputy Director. In my briefing about what had happened with ARO, the Deputy Director told me," Okay Dr. Sreeramulu, enjoy your birthday outing tomorrow. Do not worry. I will take care of the situation'. Thanking him, I left for 'isolation facility, examined the test animals. Informed both the ARO and Dy. Director by local phone about the clinical status of animals and assured that there is no likelihood of any death of test animals and left for home directly that evening".

iv. The demise of the Bull virus

The protocol was that after production of rinderpest vaccine either GTV or TCRV, the vaccine vials reach my laboratory (Standardisation Unit) from production units for safety, sterility and potency certification. Our laboratory was independent of production units. We were three Research Assistants (RA) with one ARO in the laboratory under the supervision of a Deputy Director. The other RAs one looked after poultry vaccines and the second one was responsible for bacterial vaccines.

But for rinderpest vaccine potency testing, the test animals were kept at a separate isolation facility away from habitations with cattle as a biosecurity measure to avoid risk of exposure of 'virulent rinderpest bull virus' used to challenge the vaccinated buffalo calves with three different dosage strengths for testing the potency of the vaccine. The transport vehicle we use to visit the isolation facility would be thoroughly sanitised while returning to avoid contamination by the virulent virus. I used to go home directly from the isolation facility to change my clothing and thoroughly wash myself. That day I avoided going to my laboratory. The 'bull virus' used for challenge would be stored in a deep freezer, locked and keys would be with the personal custody of the Deputy Director.

Later with the guidelines of international organisations, in the process of entry into the 'OIE pathway' the bull virus was destroyed in the year 2000 itself in the country and a declaration to that effect was submitted to the Govt.of India in turn to the OIE.

3. At District Clinical Laboratory

With a lovely pleasant breeze on the bank of the river Nagavali Srikakulam thrived with great historical significance in the medieval and period of Kalinga dynasty.

I was at Srikakulam from 1972 to 1975, the district headquarters as in-charge of the District Clinical Laboratory with a Laboratory Attender and an Attendant assisting me. My task was to assist veterinarians with laboratory diagnosis of clinical material samples sent by them to the laboratory, attend disease outbreak reports and maintain the vaccine depot and supply vaccines to veterinary institutions for prophylactic vaccination, obtain forecast indents for vaccines every month and procure from the State biological production unit, VB & RI Hyderabad. Those days, mostly GTRP vaccine and a small quantity of TCRP vaccine was in supply for exotic breeding bulls at Semen Collection Centres and crossbred cattle. Rinderpest vaccines and other viral vaccines in ampoules for both Visakhapatnam and Srikakulam were sent by AIR from Hyderabad to Visakhapatnam and in turn I used to pick up my district quota from Visakhapatnam Laboratory. On receipt of intimation about availability of vaccines the vets send their men to pick-up their allocated vaccine doses.

i. Shellshock with outer shell of thermos flask

During my first few days I observed a few of them bringing requisition letters for vaccine supply without thermos flasks. I refused to supply rinderpest vaccine. They used to plead, "Sir, If I don't get the vaccine back my doctor will take me to task". But I never yielded to their pleadings. Succeeding month finding flask with them I asked my Lab attender to give him the vaccine. Subsequent month, suspicious of a hospital attender pressurising my assistant to hasten up the supply of vaccine I asked him to show me the flask. On looking into the thermos flask I could not find the thermos unit inside. Denying him the vaccine supply I made a complaint to his doctor. The vet expressed his regret saying that his attender never informed him about broken thermos. This incident went viral and since then whenever anybody came for vaccine I used to check the thermos flask as well as the volume of ice inside. Unfortunately the last grade servants did not understand the importance of cold chain for rinderpest and other viral vaccines. Initially many of my peers were not so happy with my curtness but realising the importance of cold chain appreciated me later.

ii. Cognisant of constraints

During 1972 and early 1973, there were many reports of Rinderpest outbreaks in Tekkali and Parvatipuram areas in Srikakulam district. On the instructions of DVO I proceeded to Tekkali where my classmate Dr. A. Rama Rao was working in a nearby Nandigama Primary Veterinary Dispensary (PVD). Two other Vets Dr. S. Mohan and Dr. Satyanarayana Reddy were working in other PVDs around also joined me to visit households to track ailing animals in Nandigama and adjacent villages which we have trekked by foot till dusk across agriculture fields and in the process we lost our way. The hospital attender who accompanied us was new to that area. We found a few women peasants with small baskets on their loins on the right side and bundles of green grass on their heads passing by fifty metres away. One of our colleagues enquired about the way back to the road to the village with a very loud voice. In reply, the women replied in a chorus that they belong to Boddapadu village. I could not understand what they said. But my colleague explained to me that they belong to a village where the woman leader led the Peasants agitation (Naxal group) after the death of her husband four years back. My other colleague explained that it was a warning for us to be extra careful with them, Probably they mistook us that we were kidding them. Somehow, we reached Nandigama on foot and then to Tekkali by scooters for the night halt.

On some other occasion, I was asked by the DVO to visit Tallaburudi village where a Minor Veterinary dispensary was existing. Dr. Reddy, the VAS, had reported about the suspected cases of rinderpest disease in his village and an adjacent village. I went to Parvatipuram by bus for a night halt and the next day proceeded to the village which was about twelve kilometres from Parvathipuram. My senior colleague, Dr. Ch. Appa Rao Naidu, Rinderpest VAS, and another colleague from PVD M. R. Nagaram accompanied me on bicycles for about seven kilometres and we left our bicycles in a small hotel known to my colleague. From there we had to walk on bunds of agricultural lands with standing paddy crops on the ground. I enjoyed the pleasant breeze over the crop while walking chit-chatting with my colleagues. We finished more than three kilometres walk. Just then it started raining. One had to imagine my plight. Because of black soil, it was slippery and I slipped twice in the process with no damage to my bones but we all were fully drenched and my clothes were soiled.

I felt embarrassed with my-get up when we reached the village under a heavy downpour. Dr Reddy accommodated us in a local primary school. He

arranged lungis and shirts for us. After lunch, we visited households with suspected cases of rinderpest disease under umbrellas with our lungis on. Stayed for the night. Most of the night we were awake disturbed by the music of mosquitoes and the threat of snakes, though two villagers stayed with us as guards. Fortunately, the rain stopped in the night. The next day we got up early to visit an adjacent village with partially dried, soiled pants and shirts after tea. We found a few ailing animals. Briefed the farmers about precautions to be taken and palliative therapy. I have to return empty handed without any materials for further investigation though I examined dung samples with a microscope available at MVD. Advised the Vet to send post-mortem materials to the laboratory in case of any deaths. While returning, the path was slippery but we could reach the wayside hotel where we picked up our bicycles after breakfast and tea. Reached Parvathipuram. After spending some time in the Veterinary Hospital, finishing early lunch started my journey back to Srikakulam. I did not receive any materials from Tallaburudi. When asked during a monthly meeting, Dr. Reddy said that the owners did not agree to a post-mortem examination. The village Sarpanch was a Brahmin gentleman. I could say nothing. Those days in 1972 there was no bus facility to Tallaburudi village because of no connecting motorable road.

4. On the banks of the river Mahendratanaya

Pathapatnam was a big village bordering Parlakhemundi, a small town of Orissa State separated by a seasonal river 'Mahendratanaya'.

i. The New moon day

That day, 21 June 1971 it took me more than four hours to travel to Pathapatnam from Srikakulam on a crowded bus with a snout moving at the speed of a snail's pace to traverse about seventy kilometres. It was 2 pm when I disembarked at the so-called town centre. Somebody showed me the way to the Veterinary hospital (actually a Rural Veterinary Dispensary) located in the compound of the Primary Health Centre (PHC). A staff nurse on duty helped me to reach my new office by sending an escort. I found the office locked. A gentleman from an adjacent house looking at me inquired about me. I was feeling hungry and damn tired as it was a hot summer day. The gentleman informed me that he was the landlord of that office accommodation and gave me some cool water from an earthen pot. He sent a word to the Veterinary Livestock Inspector(VLI). The VLI came and

introduced himself as Mr. Sayaraju, in turn he sent for the vaccinator. On his arrival, asked him to get the VAS holding additional charge from Minor Veterinary Dispensary (MVD) Meliaputti, 20 km from Pathapatnam. The vaccinator immediately responded saying, "Sir, today I can find the VAS at Paralakhemundi(three kilometres away) itself as there is a new film release today, he must be out for tea during the interval around 3.30-3.40 pm" and left on his bicycle. Mr. Sayaraju was explaining to me that the VAS was very fond of films. Meanwhile, he opened the doors of the office, a reasonably big single room, and started showing me records on a rack, and other office accessories. After twenty minutes suddenly Mr. Sayaraju said, "Sir, the VAS has arrived" on hearing the sound of a motorcycle: the next minute the VAS was in the office room. Greeting him I looked at my wristwatch, it was 4.15 pm: apologetically I said, "I am sorry for disturbing you from watching the new movie".

The senior VAS with fifteen years of service, Dr Abdul Jabbar with an unshaven face and tired looks with a surprise in his eyes asked me, "Today is an Amavasya day (New moon day) and how is that you have decided to join the duty on a very inauspicious day that too, yours is the first entry into Govt service. Why don't you think once again and make a decision, you can join on the day after tomorrow, a good day for such occasions". Meanwhile, the landlord, a Brahmin gentleman, also advised me not to join duty that day. For a moment, I looked at them, thanked them for their elderly advice, and firmly said," I strongly believe in the Almighty, with your good wishes I want to join duty today itself". Then, Dr. Jabbar said, 'If you don't have any objection, I don't have any problem to handover the charge'. As I was new to the procedures, he organized the papers to be signed and told me," Mr. Sayaraju knows all about the files, registers and he can assist you in day-to-day activities being in-charge at the check-post at Pathapatnam itself".

In my first assignment as a Special Veterinary Assistant Surgeon, Rinderpest Eradication Scheme at Pathapatnam, a small taluk headquarters, say a big village bordering Parlakhemundi of Ganjam district of Orissa state was separated by a small seasonal river 'Mahendratanaya'. My responsibility was to monitor the movement of cattle and buffaloes through four RP check-posts (Balada, Pathapatnam, Goppili, and Purushothapuram villages) bordering Orissa state, all along extending in length to about 76 kilometres criss-crossing the interstate border. Apart from four check-posts, I had three immune belts(Chapara,Battili and MSPalli) to create an immune barrier by vaccinating all eligible cattle and buffaloes in all villages located 20 km deep

from state borders. Regular monitoring of cases of RP disease and vaccination of cattle & buffaloes gathered in cattle shandies (markets) once a week was also the responsibility of the Scheme staff. At times our staff was forced to take police help to vaccinate the animals and brand them on the left side of rump with branding ink which sometimes leads to maggoted wounds, especially during the rainy season. To carry out all this work I had a group of seven Veterinary Livestock Inspectors, fourteen vaccinators, and ten attenders stationed at strategic locations. I was told that in the late 1950s the VAS was provided with a four-wheeler to discharge his duty.

My task was to supervise, guide, monitor the work of my team and disease surveillance in villages in the immune-belt area and cattle markets in the area. In addition, those days, my task was to prepare pay bills/TA bills for all the staff, institution wise, sub-treasury wise, sign and send to District Veterinary Officer for counter-signature by 20th of every preceding month; after counter signature and return from DVO, send it to all the seven units for presentation in concerned Sub-treasury offices and draw the salaries. The staff of RPCP, Pathapatnam used to assist in my office work every month.

Due to the paucity of residential houses for bachelors in the village I was advised to stay in the office room itself till some accommodation was found, I used to get up very early by 5 am to ease myself a little away on the side of the main road, walking for one-kilometre. This served my purpose of morning walk also, but at times I used to feel embarrassed at the 'guard of honour like' activity by women folk easing on either side of the road while returning. One had to imagine the scenario.

On the third day of my taking charge, there was a message from DVO's office, that DVO was reaching Pathapatnam for a night halt on his way to Mandasa and Sompeta areas. As I was new to the job, I did not know what was expected of me. Mr Sayaraju told me not to worry: he contacted the R&B department for one guest room and he also took the responsibility of arranging homemade food for the DVO for dinner. Around 6.30 pm, we cordially welcomed the DVO at the guest house: after coffee, he enquired me how comfortable I was with the new assignment and suggested me to stay in the office itself as I was alone and it was a touring job and advised me to assign cooking responsibility to one of the attenders who are good at the art. Ten days later I got a message that Dr. B. A.Shirazi, DAH was visiting Ichapuram and was likely to inspect RPCP at Purushothapuram bordering Orissa state. The previous day, I reached the RPCP to know whether things were in order

and gave necessary instructions to the VLI in-charge and stayed that night at Ichapuram with my colleague Dr. Y. Ranganayakulu VAS, PVD, MS Palli. On the day of the visit, I was ready at the RPCP to receive the DAH along with my team.

On arrival, the DVO introduced the personnel at the RPCP: once or twice, the director enquired who was the VAS and who was VLI as the VLI was 50 years old and I was 26 years of age looking just like a student, a funny incident of course.

Dr G. Somasundaram, Regional Assistant Director (RAD) Rajahmundry who accompanied the Director, smiled at me and asked me to meet him at the R&B guest house. After lunch, the RAD explained me about the structure of RP control mechanism, along the interstate border, vigilance in cattle shandies — he asked me to take up a study on 'Nasal schistosomiasis' as the district was endemic; he told the DVO that this young chap had some spark, get him to district headquarters to be in charge of district clinical laboratory. That evening all the officers, district, regional, and state-level left the place and I went back to Pathapatnam.

ii. Reminiscence of send-off and reception

One day I got into the bus at Parlakhemundi to go to RPCP Balada twenty kilometres away. After ten minutes of leaving the place, the bus stopped at a roadside small tribal village and the whole village of about two hundred people surrounded the bus and about ten people tried their way into the already overcrowded bus. As I was sitting on the window side, I got amused at the scenario of seeing a young newly married couple with marriage decorations on the bride about 12 years and groom about 15 of age, being given a send-off by the whole village with parents hugging the bride and inconsolably wailing, not leaving the bride's hand. The passengers inside the bus were shouting impatiently for the delay. With constant 'honking' by the driver and shouting at the villagers to give way for the bus, it was a really funny scenario. At last, the bus could move with village youth taking the lead to clear the road. I was under the influence of a pleasant breeze at the window despite a lot of noise inside the bus; hardly the bus moved slowly for about ten minutes. Hearing the commotion, I opened my eyes and the bus stopped at a roadside with a screeching sound and the bride's party was getting down the bus to the sound of trumpets with a big crowd of villagers at the bus stop to receive the new couple. An unforgettable 'Farewell and Reception' to newly married couples within a distance of 10 km.

iii. River crossing

On some other day, I had proceeded to RPIB (Rinderpest Immune belt), Bathili by a narrow-gauge train up to Kasipatnam station from Parlakhemundi, then crossed the river Vamasadhara by a country boat. On the boat, some tribals watching me in pants and shirt, enquired about my whereabouts. To my reply, many of the tribals in the boat were whispering among themselves that the stranger was coming from a very long distance from the east. I wondered at their innocence and surprise stares. Reaching the destination, I went through the record of vaccinations and in the afternoon visited two small thandas (tribal habitats) on foot to check vaccinated cattle. Found many cattle with brand marks grazing nearer to habitats. To my query about the vaccination status of unbranded animals, Mr. Sanjeevi, the VLI informed that those cattle were vaccinated but not branded due to the objection of cattle owners for fear of maggot wounds. That night I had to stay in a primary school as there was no boat to cross the river after sunset for the return trip. Mr. Sanjeevi hosted me a simple dinner as I requested.

iv. Weekly shandy episode

Three weeks later one Saturday I got into an overcrowded bus at Pathapatnam for rinderpest disease surveillance and supervision of vaccination work in weekly Shandy (market) at Narayana Valasa village, the largest weekly market in Srikakulam district where about five to six hundred cattle gather apart from food items, clothing, etc. for sale. As the bus was overcrowded with people destined for the weekly market, I stood hanging in the rear side of the bus; two women with a little girl settled in a triple seat adjacent to me. One of the elderly village women, three times my size, with heavy bracelets on both arms and anklets on her legs with a loud voice, asked me to sit by her side. I was hesitating. Laughing at me, with her hoarse voice, she asked me, "Why do you hesitate? you are like my son, how long you can stand like that?" Without saying a word, I sat beside her carefully taking precautions not to touch her physically, fearing the way she commanded me at the top of her voice. At last, after almost one hour of snail's pace of travel, I got down at the destination. I found many of the eateries were invaded by people and houseflies as well in the marketplace. I did not dare to eat at such a place, and I had to skip my lunch.

I found my vaccination team at work in a corner of the cattle gathering. As soon as I reached that place, that day one of our vaccinators was found

assaulted a few minutes back. On my advice, the Veterinary Livestock Inspector gave a complaint to the police party on duty at the venue. A police constable intervened and other farmers pleaded to pardon the accused for his alleged arrogance. Our team left the issue to the cop and moved to another corner of the cattle gathering. I observed from a distance, the earlier gathering around the police constable did not disperse. Watching me looking at the earlier gathering, one of my vaccinators commented, "Sir, today the police constable will have a good collection from the accused fellow." I smiled and started interacting with other farmers about the need for rinderpest vaccination of cattle. Usually, farmers do not object to vaccination but a few objected to branding of their cattle after vaccination for fear of maggot wounds, consequent to branding on the left side of the rump especially in the rainy season.





D. The Image Makers



1. Dr. M. Rajasekhar

Dr. Rajasekhar is the founder Project Coordinator and Project Director, ADMAS, Banglore. His life is of epochal achievements in the field of sero-monitoring and sero-surveillance in the rinderpest eradication programme under NPRE. I have known him since 1980s. He is relentless, extremely data-driven with scientific curiosity and openness to divergent opinions. He is an absolutely fearless scientist. Extremely down to earth. He contradicted his bosses but never confronted them directly. I could understand his commitment to rinderpest eradication. Once he shared his commitment, "In the 1960s there was a massive rinderpest outbreak killing around 20,000 crossbred cows in and around Bangalore city devastating farmers and traders as well. We could not remove the animal carcasses. That ghastly scenario had moved me and since then I took whatever opportunity to work on rinderpest disease since then". Such was the deep impression the disease left on him.' He used to say with pride, "I have a list of 6.34 lakh villages of India in my computer and I could go back to any village and get serum tested from bulls, cows, sheep, and goats." He emotionally said, "There is so much enthusiasm and fervour like the freedom fighters during this fight against rinderpest disease." He captained epidemiological surveillance through specially designed 32 laboratories spread all over the country. He played a key role in the rinderpest eradication programme in India, providing dazzling proof of his abilities.

Dr M.Rajasekhar is honoured with a Medallion and certificate by FAO of the United Nations for his significant role in rinderpest eradication as one among the sixty such individuals globally in 2011.

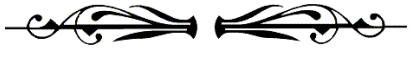
2. Dr. William P.Taylor

Dr. Taylor was Advisor to the National Project on Rinderpest Eradication Programme with extensive experience in rinderpest disease control programmes. I had the good fortune of acquaintance with him during the rinderpest eradication programme in the state of Andhra Pradesh from 1993. In 1994, once we were travelling together to Mahabubnagar as he wanted to acquaint himself with the facilities and skills available with district diagnostic laboratories in the state. While sharing his experiences on rinderpest

eradication programmes in African countries he emphasised, "Pastoralists played a major role and one-week trained African community workers were more than able to take up rinderpest vaccination work compared to government veterinary cadres. Would you be able to achieve this goal in India?" My national pride felt hurt. Looking at my facial contours he said, "Dr Piedy, I told you my experience, it is not to hurt you or undermine your capacities". Recovering from my sombre mood, I laughed it off and explained about the network of veterinary service centres, skills of personnel, awareness of farmers, and road networks unlike in African countries. We used to interact frequently in regional meetings in the south or at the project office in Delhi. Humility and natural modesty were his hallmarks. I got enriched with his experiences in Europe and the African continents.

3. Dr. S. Ramachandran

In 1970s, Dr. S. Ramachandran was working with Dr Gordon R. Scott, England, one of the titans on rinderpest disease control. Dr. S. Ramachandran was testing a new technique for monitoring rinderpest antibodies in cattle of Asian countries in a project funded by Edinburgh University, UK. He was at Visakhapatnam in 1972 to demonstrate and evaluate the new technique 'Measles Haemagglutination Inhibition (MHI) test. I was one of the candidates to undergo training on the new technique from Srikakulam district clinical laboratory for two days with an advice to bring a few serum samples from cattle and buffaloes with known history of rinderpest vaccination. It was an exhilarating experience watching him working along with us during the training process.He shared his emotional experiences with Dr.G.R.Scott with our group.Subsequently whenever he was in India I took the opportunity of meeting him and the interact with him on rinderpest disease, I learned new things, everytime it was a new experience for me. His wife Dr.Sakkubai is the first woman veterinarian in India and is also a scientist with IVRI. In the year 2004, she was at Vijayawada as a special guest at the Veterinarian's Meet, conferred on me a gold medal instituted in memory of Dr. S. Ramachandran. When someone introduced me to her along with my wife, Dr. Sakkubai blessed us and was overwhelmed with joy knowing that my wife is the daughter of her classmate Dr. D. Subbarayudu in Madras Veterinary College.



Epilogue

The Global Rinderpest Eradication Programme (GREP), 1994, supported by FAO, OIE, and International Atomic Energy Agency (IAEA) might well be the most significant achievement in veterinary history.

Considering that smallpox was the only disease that had been eradicated so far (1980) one might be curious to know which disease was more difficult to control. Intuitively one can say the rinderpest was much more difficult to control. For smallpox, maybe the children were small, they were all vaccinated. But for rinderpest, that was not the case. That was why many foci of infection remained in eastern Africa and also in war-torn Somalia. Vaccine pressure over decades eradicated smallpox. But the rinderpest virus was smart because it had alternate hosts. Whenever there was vaccine pressure in cattle it would take refuge in alternate hosts like sheep and goats and wild ruminants. Whenever there was an opportunity it would come back to cattle. Smallpox eradication was done on war footing; everybody would go and get vaccinated. But with animals it was difficult. The vaccine was not as robust as that of smallpox and the number of vaccinations to be done was much more. Rinderpest eradication efforts started before a vaccine against the disease was available and it took two hundred years between vaccine availability and disease eradication. Even though the last known rinderpest case was in 2001 in a wild buffalo in Kenya, it took a further ten years for OIE, FAO and UN to declare success with confidence since surveillance was harder with animal diseases.

The disease eradication programme is a development activity rather than scientific research. Its success owed much to several seminal research efforts in vaccine development and epidemiology and demonstrated what scientific decision making and management could accomplish with limited resources.

The rinderpest eradication experience also afforded some lessons that can be applied to the eradication of other diseases. Rinderpest remains a disease of awesome potential and can reinfect territories from which it has been eliminated. Eradication from a country is only a first step. Achieving a status of effective emergency preparedness through contingency planning is a relatively new concept in the field of animal health and it requires special skills.

The success of rinderpest control and eradication proved a rewarding experience and landmark for veterinary services in India, providing confidence

and capacity building among field veterinarians, researchers, policymakers and donor agencies, and other stakeholders to undertake a successful programme at the national level. The freedom of the country from rinderpest disease not only enabled the growth of the dairy industry but also boosted the export of meat and dairy products in recent decades. Today India is not only top in milk production but also the largest exporter of buffalo meat. Cost-benefit analysis indicated that every dollar invested in the rinderpest control programme gained about twenty dollars to the country from better livestock productivity.

Rinderpest eradication was a tremendous achievement for every veterinarian everywhere and it demonstrated the progress of the veterinary profession both in developed countries and other countries that are growing in their capacity and skill development in the veterinary infrastructure. I hope that effective and convincing post eradication surveillance will show national and international organisations such as the World Bank and UN agencies that veterinary medicine can solve global problems. When they invest in veterinary medicine they are in reality investing in the wellbeing of society because of the central role of animals in the society. I hope we will be ping-ponging our way into better animal health which always translates into better public health. Rinderpest eradication is not the end of it.

One of the more concerning developments in recent times is increased mistrust of science, as evidenced by the rise of anti-vaccination sentiment. Gaining and maintaining public trust in science and global health initiatives will be the linchpin for eradication campaigns. Smallpox and rinderpest eradications were the prototype for future eradication campaigns and provided valuable lessons, such as the need for political and bureaucratic frameworks to support vaccination efforts and the need to have clear, measurable, universal goals to track progress in any given region. Will disease eradication become the norm, or will smallpox and rinderpest remain outliers? Only time will tell

Arguably the global eradication of a disease agent should be the most sustainable of interventions for once extinct it should not be able to return. However, that scenario might not necessarily be quite the case as experience from the Smallpox Eradication Programme has shown. It is difficult to persuade countries to destroy their virus stocks; even international conventions ratified by all countries have not been sufficient to do so even for the officially held stocks.

If the rinderpest virus has ceased to circulate in the domesticated cattle, buffalo herds, and wild ungulates of the world that once served as its natural hosts, one has to ask if there is a risk that the disease could come back and how that could happen.

There are a few questions and several possibilities:

- Emergence of infection from a wildlife reservoir?
- Reversion to virulence of a live vaccine?
- The presence of an occult reservoir of infection?
- Malicious reintroduction or cnjudicious use of the Rinderpest virus—Agro-terrorism and misplaced scientific curiosity?
- Synthesis of Rinderpest virus De Novo?
- Reconstruction of the Rinderpest disease in cattle with another Morbillivirus?

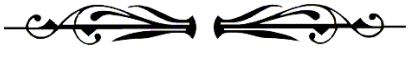
There needs to be a lot less speculation and a lot more investigation on these questions.

The global campaign to eradicate rinderpest offered three important lessons for the international community: the importance of scientific and technical prowess, the necessity of appreciating political, economic, and social contexts for implementing such campaigns and the wisdom of incorporating campaigns into existing programmes and organisations when possible. These lessons in some ways reinforce lessons from the smallpox eradication campaigns decades earlier but also demonstrate a unique understanding of international order in the contemporary era.

Infection is a two-player game and a change in either contender can affect the dynamics of a second confrontation. If rinderpest disease re-emerges the whole world is susceptible.It is a small risk but consequences would be disastrous.

We cannot allow this to happen. We are a symphony. We are stronger together.

In the 21st century the rinderpest eradication project to put an end to the malady through only vaccinations in India remains tantalisingly successful.



Annexures

Annexure 1: Timeline of Rinderpest eradication in India

Year	Description
1500 to 500 BC	Old treatises written on Palm leaves during the Vedic period in India suggest a description of Rinderpest-like disease in cattle.
1752	Presence of Rinderpest was traced in Assam area cattle in India for the first time
1868	Establishment of Indian Cattle Plague Commission
1871	Occurrence of Rinderpest was confirmed by the Indian Cattle Plague Commission.
1889	The Imperial Bacteriological Laboratory (IBL) was established at Pune.
1891	Establishment of Civil Veterinary Department in the country
1893	The IBL shifted to Mukteshwar, now known as Indian Veterinary Research Institute (IVRI) with rinderpest research as its thrust area.
1897	Robert Koch, accompanied by George Gaffky and Richard Pfeiffer visited IVRI at Mukteshwar to look into the Rinderpest problem. Based on studies conducted, it was concluded that the disease in India was similar to that of Rinderpest prevalent in South Africa. Bile from infected animals was attempted as a vaccine, but the results were not encouraging.
1899	Anti- Rinderpest serum was developed at IVRI, Mukteshwar for passive protection for two weeks.
1920	Serum simultaneous method of vaccination was standardized at Mukteshwar and shown to be superior to the Anti-Rinderpest serum.

1927	Dr.J.T. Edward at Mukteshwar made a breakthrough discovery by developing an attenuated immunogenic vaccine by serially passaging the virus in goats which provided lifelong immunity.
1931	Serum simultaneous method of vaccination was replaced by the Goat Tissue Rinderpest Virus (GTRV) Vaccine for plain cattle of India.
1936	Desiccated spleen powder developed at Mukteshwar laboratory was used in Punjab state under field conditions for the control of Rinderpest.
1947	Rinderpest in wild ruminants (in deer) was reported for the first time.
1948	Lapinised virus vaccine from China was introduced in India.
1954	A Pilot Project on RP vaccination was started in 18 districts of Andhra, Karnataka and Maharashtra.
1955-56	The National Rinderpest eradication programme (NREP) was launched by the Govt. of India. Mammoth freeze drying facilities were created which made it possible to undertake vaccination campaigns.
1955	Lapinised-avianised virus vaccine was introduced in India from Tokyo (Japan).
1956-64	Systematic vaccination campaigns were conducted in North, West, Central and East India.
1965-74	Systematic vaccination campaigns were conducted in Southern India.
1966-67	The Kabete' O' Virus Vaccine was introduced in India.
1968	Production of GTRV, Lapinised and Lapinised-avianised Rinderpest vaccines were stopped at IVRI, Izatnagar.
1971	Production of Rinderpest antiserum which lasted for fifty years (1921-71) was stopped.
1983	The Task force on Rinderpest was formed by the Govt. of India. The committee concluded that only 8 states were free from Rinderpest and divided the Indian states into three major

	categories i.e. high risk (>5 outbreaks), medium risk (2-5 outbreaks) and disease free.
1987	The Government of India, Ministry of agriculture submitted propals for EU assistance for combating various diseases of livestock.
1988	The European Union project evaluation mission visited India to evaluate the proposal of the government of India.
1989	Project ALA/89/04 "Strengthening of veterinary services of livestock disease control with special emphasis on Rinderpest eradication" was signed between the Govt. of India and the European Economic Commission.
1992	The National Project on Rinderpest Eradication (NPRE) was initiated by the government of India with financial support from the European Union.
1995	Last outbreak of Rinderpest occurred in the North Arcot district of Tamil Nadu in south India.
1998	The first stage of "Provisional freedom from Rinderpest disease" for the whole country was achieved.
1999-2000	All vaccinations against Rinderpest were stopped by October, 2000 in India.
2001-04	Sustenance of Rinderpest free status and preparedness for a surveillance program for the declaration of "Freedom from Rinderpest disease" initiated.
2004	India achieved "Freedom from Rinderpest disease" status from OIE.
2005	India submitted dossier to OIE for obtaining freedom from Rinderpest infection
2006	The international committee of the World Organization for Animal Health, (OIE) recognized India as free from Rinderpest infection.
2011	FAO, on June 28, 2011 in Rome declared Eradication of Rinderpest infection from the globe.

Annexure 2: Timeline of Global eradication of rinderpest: disease.

Year	Description
1711	Dr.Lancisi, physician of Pope Clement XI first recorded disease control strategies against rinderpest
1761	First modern veterinary school was found in Lyons in France to train veterinarians to control rinderpest
1863	First International Veterinary Congress held
1924	Creation of the Office of the International des epizooties(OIE) to coordinate scientific knowledge for the control of rinderpest and other animal diseases with 28 member countries.
1945	Founding of FAO- a wing of United Nations Organisation
1957	Veterinary scientific research led by Dr.Walter Plowright developed a stable, safe and cheap rinderpest vaccine
1980	Resurgence of rinderpest in Africa, the Middle-East and South Asia
1989	Expert consultation on rinderpest surveillance systems- the three stage OIE Pathway
1992	Launch of GREP by FAO with a targeted goal of eradication by 2010.
2001	Last reported incidence of rinderpest in a wild buffalo in Mount Meru National Park in Kenya
2011	Final vote of last official free status recognition at the OIEs 79th General Session in Paris(,May 24th) 28th June-FAO Declaration of global eradication of rinderpest disease

Annexure 3: OIE Pathway for Epidemiological Surveillance Systems for rinderpest, NPRE India (1992-2006)

Status	Condition	Reality statement	Date of declaration
Provisional freedom from disease	No clinical disease should have been for at least two years	Last rinderpest incidence reported in North Arcot district of Tamil Nadu state in September, 1995	1998 (self-Govt.of India)
	All rinderpest vaccinations will cease by the date of declaration	RP vaccinations ceased in 1996 in the whole country	
Freedom from disease	1. No clinical disease has been detected for at least five years	Last reported disease was in September 1995	2004 (OIE)
	2. No rinderpest vaccination has taken place for at least three years	Vaccinations even in international borders stopped in 2002	
	3. The country operates both clinical surveillance and disease reporting systems for rinderpest	Yes, continued clinical and sero-surveillance	
	4. Effective measures in force to prevent the reintroduction of the disease	Yes, effective measures in operation	
Freedom from infection	1. You should have been declared free from disease at least one year earlier	Yes, 2004	2006 (OIE)
	2. There should have been an effective sero -surveillance system in operation for a period of at least two years, and the findings must have been consistent with freedom from infection	Yes	

Abbreviations

– A –

AD	Assistant Director(Animal Husbandry)
APSCCFC	Andhra Pradesh Scheduled Castes Cooperative Finance Corporation
ARO	Assistant Rinderpest Officer

– B –

BAIF	Bhartiya Agro-Industries Foundation

– D –

DAH	Director of Animal Husbandry
DAH&D	Department of Animal Husbandry & Dairying
DVO	District Veterinary Officer
DNA	Deoxy Ribo Nucleic Acid

– E –

EC	European Commission
EU	European Union

– G –

GTV	Goat Tissue Vaccine
GTRV	Goat Tissue Rinderpest Vaccine
GREP	Global Rinderpest Eradication Programme
IAEA	International Atomic Energy Agency
ISPA	Indo Swiss Project
IVPM	Institute of Veterinary Preventive Medicine
IVRI	Indian Veterinary Research Institute

– J –

JD	Joint Director

– M –

MPP	Mandal Praja Parishat
MVD	Minor Veterinary Dispensary

– N –

NPRE	National Project on Rinderpest Eradication
NREP	National Rinderpest Eradication Programme

– O –

OIE	Office Internationaledes Epizooties

– P –

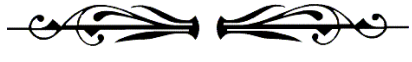
PA	Personal Assistant
PVD	Primary Veterinary Dispensary

– R –

RNA	Ribonucleic Acid
RP	Rinderpest
RPCP	Rinderpest Check Post
RPIB	Rinderpest Immune Belt

– V –

VAS	Veterinary Assistant Surgeon
VD	Veterinary Dispensary
VH	Veterinary Hospital
VLI	Veterinary Livestock Inspector



A HUNDRED YEARS AGO MARCH 9, 1918.

9/3/18
Hindu

Campaign against Rinderpest.

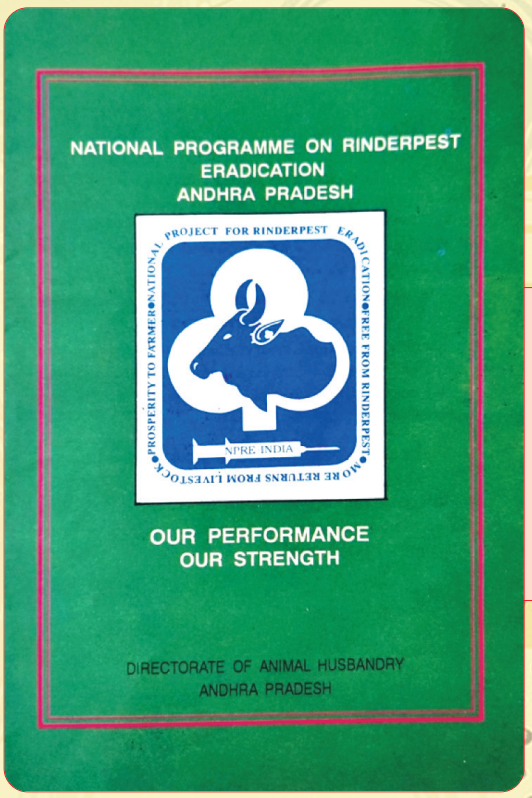
(From an Editorial)

The report of enquiry conducted by Mr. A.W. Shilston, Assistant Bacteriologist, Muktesar, regarding inoculation against rinderpest in the Madras Presidency, has now been published. Annually thousands of cattle are being carried away by the ravages of rinderpest and the ryots of the Presidency are being landed in severe loss as a consequence thereof. It has been noticed for the past few years by the Superintendent, Civil Veterinary Department, in his annual reports that the outbreaks of the epidemic usually follow the routes by which cattle enter the Presidency from the Native States of Mysore and Hyderabad; and thus one of the means of checking the disease is certainly that of controlling the importation of the disease in this way.

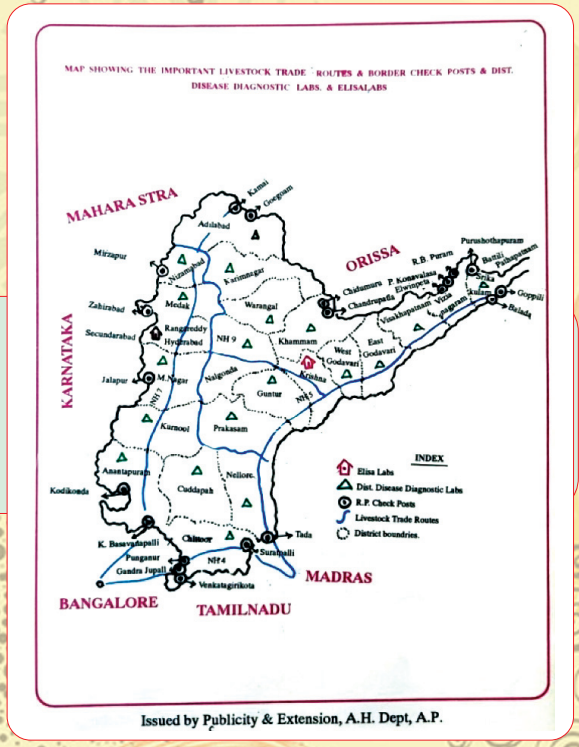
Press clipping from The Hindu newspaper dated 09/03/2018 about Rinderpest disease status in 1918 in India



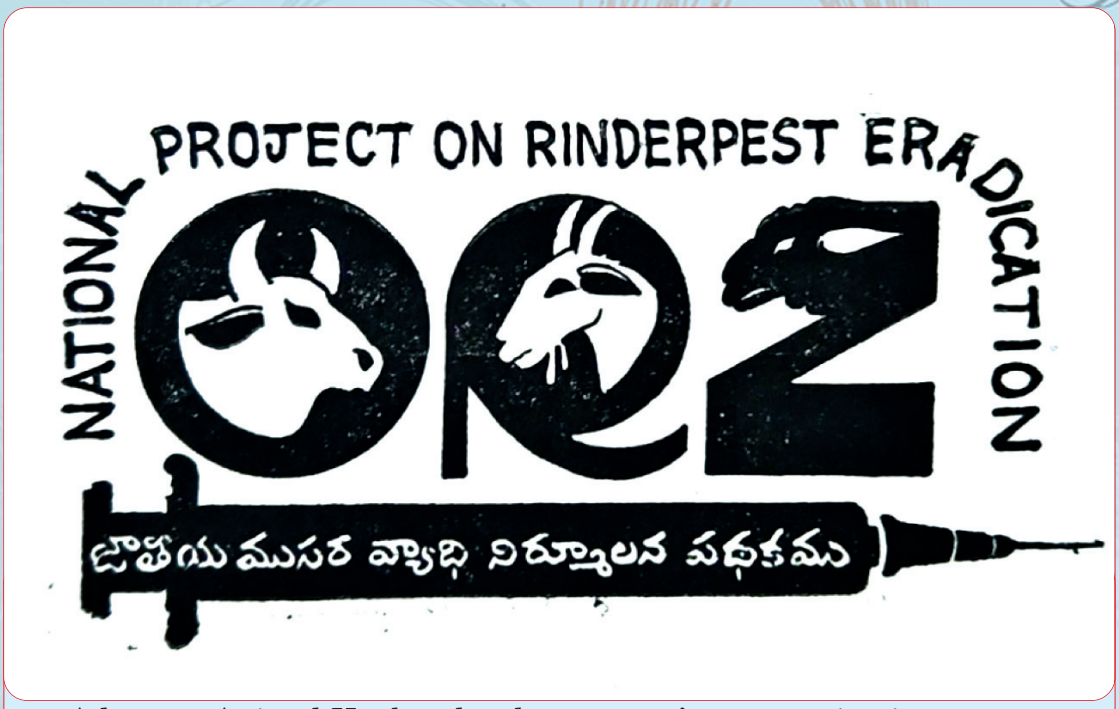
A national meet on Rinderpest eradication at Tirupati, 1980



A six page folder on National Project on Rinderpest Eradication in Andhra Pradesh, 1996



Map showing institutional set-up on Rinderpest Eradication in Andhra Pradesh, 1993



A logo on Animal Husbandry department's communication means, 1993-1995



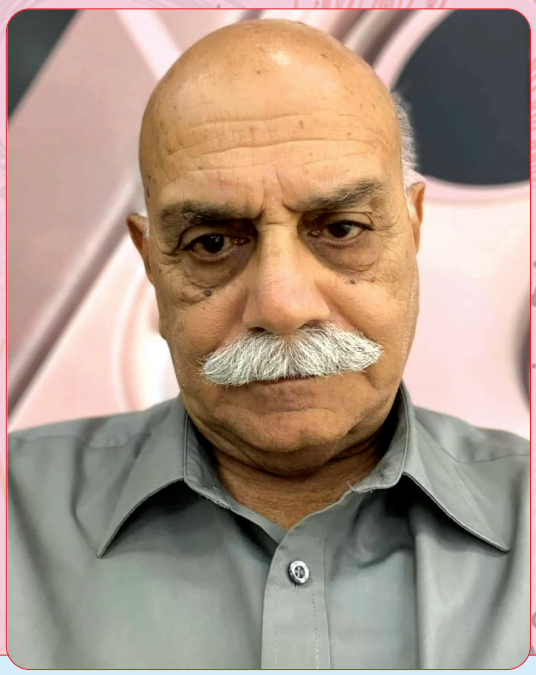
Dr Krishna Ashrit - DAH, Dr WP. Taylor - Consultant, NPRE, Dr R.P. Sharma - Asst. Commissioner, Rinderpest and Sri. Mahapatro - Prinicpal Secretary Govt. of AP, 1995



Rinderpest officers of Group 'C' states at Hyderabad



Presentation of RP Vaccination status in AP



Dr. M. Rajasekhar, Project Director
National RP Serosurveillance Laboratory Bangalore



Dr. S. Ramachandran with Dr. Gordon.R Scott at Edinburgh, England