
Animal Health for Poverty Alleviation: A Review of Key Issues for India

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List of Abbreviations

ADMAS	Animal Disease Monitoring and Surveillance
AHW	Animal Health Worker
AI	Artificial Insemination
ASCAD	Assistance to states for Control of Animal Diseases
BAIF	Bharatiya Agro Industries Foundation
BQ	Black quarter
CADARD	Centre for Animal Disease Research and Diagnosis
CAHW	Community based animal health worker
CALPI	Capitalization of Livestock Program Experiences India)
DAH&D	Department of Animal Husbandry and Dairying
DDG	Deputy Director General
ET	Enterotoxaemia
FMD	Foot and Mouth Disease
GOI	Government of India
HS	Haemorrhagic septicaemia
IBD	Infectious Bursal Disease
ICAR	Indian Council of Agricultural Research
IPE	Institute of Public Enterprise
IVRI	Indian Veterinary Research Institute
NABARD	National Bank for Agriculture and Rural Development
NADEC	National Animal Disease Emergency Committee
NDDB	National Dairy Development Board
NETF	National Emergency Task Force
OIE	World Organization for Animal Health
PDADMAS	Project Directorate, Animal Disease Monitoring and Surveillance
PDFMD	Project Directorate on Foot and Mouth Disease
PPLPI	Pro-Poor Livestock Policy Initiative
PPR	Peste des Petits Ruminants
RD	Ranikhet disease
RVP	Registered Veterinary Practitioner
TMDD	Technology Mission on Dairy Development
VCI	Veterinary Council of India
VRS	Voluntary Retirement Scheme

1. Introduction

Economic reforms initiated by the Government of India (GOI) in the early 1990s hold considerable promise for enhancing the living standard of 300 million poor in India. Integration of domestic economy with the rest of the world and freeing domestic markets from the government controls offers tremendous opportunities for poverty reduction. At the same time, these developments pose new challenges. In absence of policies that proactively facilitate the participation of poor in expanding market opportunities, there is real danger of marginalization of resource poor areas and small-scale producers. It is therefore extremely important that the nation remains focused on the overarching objective of poverty alleviation. It has been documented, both internationally and within India, that sustained long term growth in agriculture sector is key to rapid poverty reduction. The growth strategy of the country will therefore need to pay special attention to this sector.

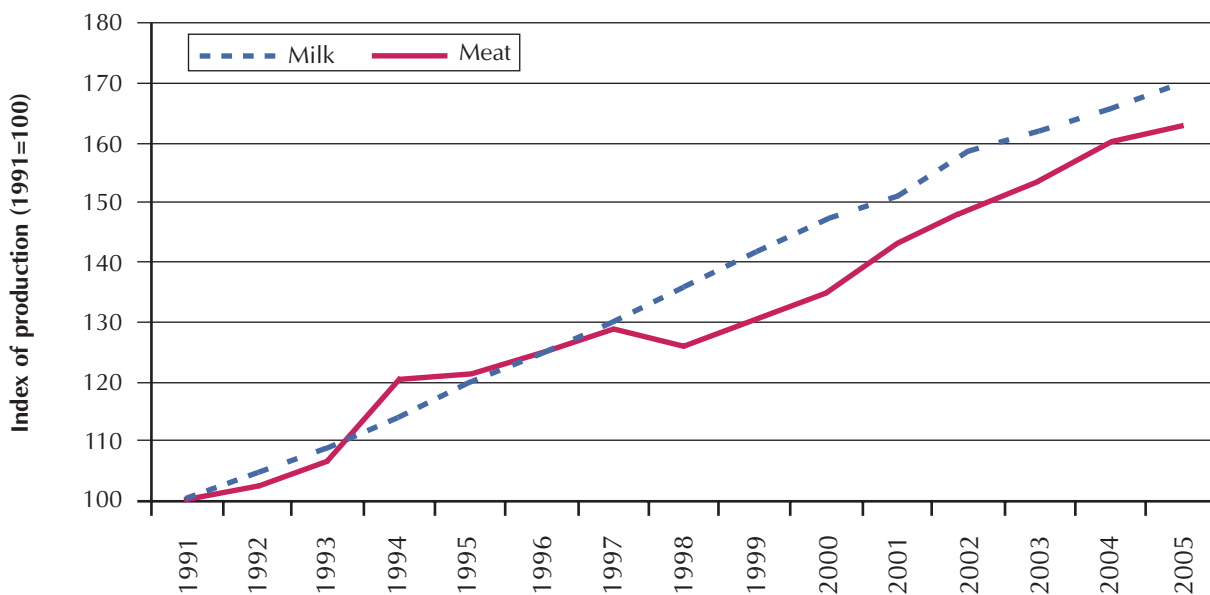
Efficient functioning of domestic and external agricultural input and output markets would be a pre-requisite for sustained growth in this sector. At what level of efficiency these markets function and how well these facilitate the participation of small-scale producers would depend crucially on the policies pursued by the central and the state governments. The key challenge in this context will be to identify and promote broad based income opportunities. Due to its very structure, the livestock sector offers a promising entry point for making a

significant difference in the livelihoods of a large number of poor. The sector supports the livelihood of over 200 million rural poor in India. A large majority of livestock owning households comprise of small and marginal farmers and landless households. Overall, the distribution of livestock has been found to be much more equitable than that of land, leading to more equitable distribution of gains from livestock production. Livestock is also one of the most important productive assets in the rural areas and an insurance mechanism to cope with household related crisis (Ahuja *et al.* 2000; World Bank, 1999; LID, 1999; de Haan, *et al.*, 2001).

India has been making steady progress in this sector with index of meat and milk production rising to about 170 in 2005 from the base of 100 in 1991, a sustained annual growth rate of more than 3.5 per cent (Figure 1). The value of livestock output has also grown at the same rate, and there are expectations of faster growth in demand for livestock products due to expectations of rising incomes combined with high income elasticity of demand for livestock products. The gross value of output from livestock sector at current prices was estimated at about Rs.130233 million during 1999-00, which was about 24 percent of the total value of agricultural output (GOI, 2001a).

Similarly, at the global level, the consumption of livestock products is growing faster than the cereals. Milk consumption has grown by over 3 percent per year since the early 1980s and is

Figure 1: Trends in Milk and Meat Production in India

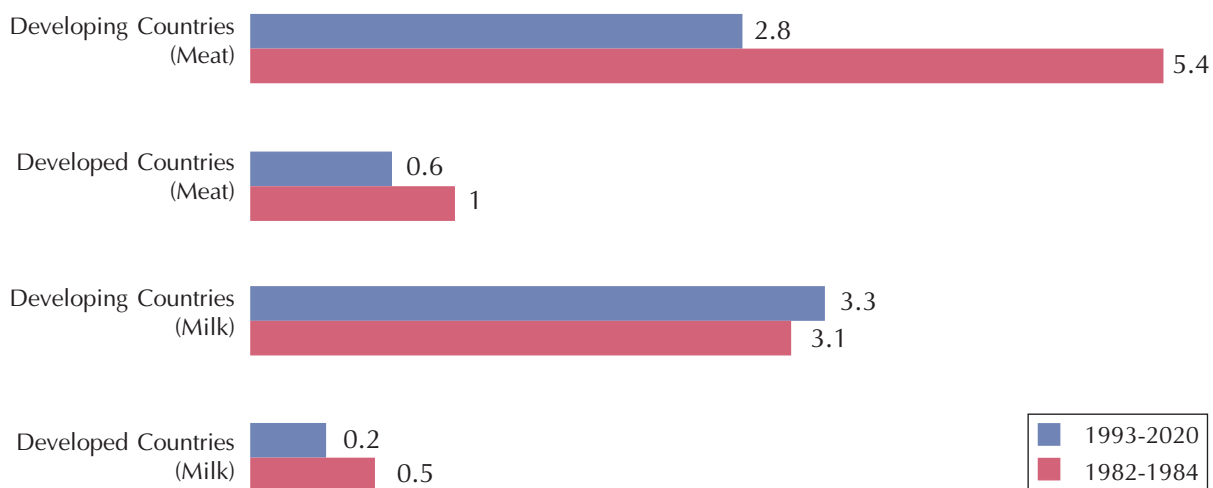


forecasted to grow even faster through 2020. Meat consumption has been growing about 5 percent per year and is expected to grow a little less than 3 percent per year through 2020 (Delgado *et al.*, 1999). Due to faster population growth, increasing urbanization, growing health concerns and overall rising incomes, future growth in demand for foods of animal origin is primarily expected to come from the developing countries (Figure 2). These developments are likely to have significant influence on global

economy in general and the economy of developing countries in particular. In view of these developments, the process has been described as the ‘livestock revolution’.

Given the size and distribution of India’s livestock population, these developments present significant opportunity for India to boost rural incomes and accelerate the pace of poverty reduction. But, successful capitalization of these opportunities requires a policy regime

Figure 2: Global Trends and Projections for Consumption of Livestock Products



Source: Delgado *et.al*, 1990

that facilitates growth in productivity at the farm as well as in the processing sector, builds institutions that encourage integration of small scale producers in the value chain, and effectively regulates markets to minimize failures and the negative external effects. The productive potential of animals depends crucially on the animal health system, and, on this count, India has a poor record. The quality of livestock support services remains poor and disease surveillance, control, diagnostics and reporting continue to be weak.

Currently, India has over 50,000 veterinary institutions run by various state governments. These institutions mostly provide clinical veterinary and breeding services and together employ over 100,000 veterinarians and para-veterinary staff. Over 75 percent of the staff are committed to delivery of curative veterinary care. The professional staff responsible for disease investigation and control is a meager 3.5 percent of the total, supplemented by limited vaccination input in the field. As a result, animal diseases like Foot and Mouth Disease, HS, and

Brucellosis, continue to inflict economic losses on livestock producers and restrict opportunities for trade. The recent Avian Flu outbreak also exposed critical weaknesses in the existing animal health systems from both the productivity and zoonotic disease standpoints. While efforts to develop vaccines and treatments should continue to be supported, the capacity and infrastructure of the existing institutions to implement disease eradication programs, respond to outbreaks, and establish effective surveillance programs need considerable improvement.

In the light of the foregoing, this paper attempts to explore key issues in animal health. More specifically, the paper attempts to (i) identify the major animal diseases that are affecting livestock in India, (ii) review the systems which are in place to deal with surveillance, prevention and control of major animal diseases, (iii) examine the role of different institutions dealing with animal health, and (iv) explore the role of the private sector and opportunities for public-private partnerships in animal health activities.

2. Disease Incidence, Institutional Infrastructure and Public Spending

India's huge livestock population is besieged by a large number of endemic infectious (bacterial, viral and protozoan) and parasitic diseases which cause considerable economic losses to predominantly poor, marginal and landless farming community. The disease related economic losses arise through morbidity, mortality, decreased production, reduced fertility, inefficient feed utilization resulting in inadequate weight gain and impaired draught power. Further, some of these diseases are zoonotic and have significant impact on public health especially among women who traditionally work with animals.

Unpredictable agrarian conditions influenced by weather, draught, floods, livestock migratory habits, poor animal nutrition, zoo-sanitary and healthcare practices invariably have resulted in high incidence and prevalence of livestock and poultry diseases, often round the year. Also, regional animal husbandry management practices and diverse agro-climatic conditions play pivotal role in sustenance of location-specific livestock diseases in the country. In the Indian context, most livestock diseases are

highly location-specific although FMD is truly 'Transboundary' and outbreaks occur round the year in most parts of the country.

India's performance in control of diseases has been and continues to be less than satisfactory. While the country has been declared provisionally free from Rinderpest by OIE, a number of other diseases like FMD, BQ, HS etc, continue to persist with high and sometime growing intensity. In small ruminants the outbreak of diseases like Peste des petits ruminant (PPR) and blue tongue is quite frequent and so is the case of New Castle disease, Infectious bursal disease (IBD) and chronic respiratory disease, in the case of poultry (Table 1)¹. Mortality data on account of these diseases is not available but scattered studies suggest substantial loss of production and value due to these diseases. According to one study, diseases cause an annual loss of INR 132 billion².

Among cattle the most widespread disease is foot and mouth disease (Figure 3). All four classical types of the FMD virus O, A, C and

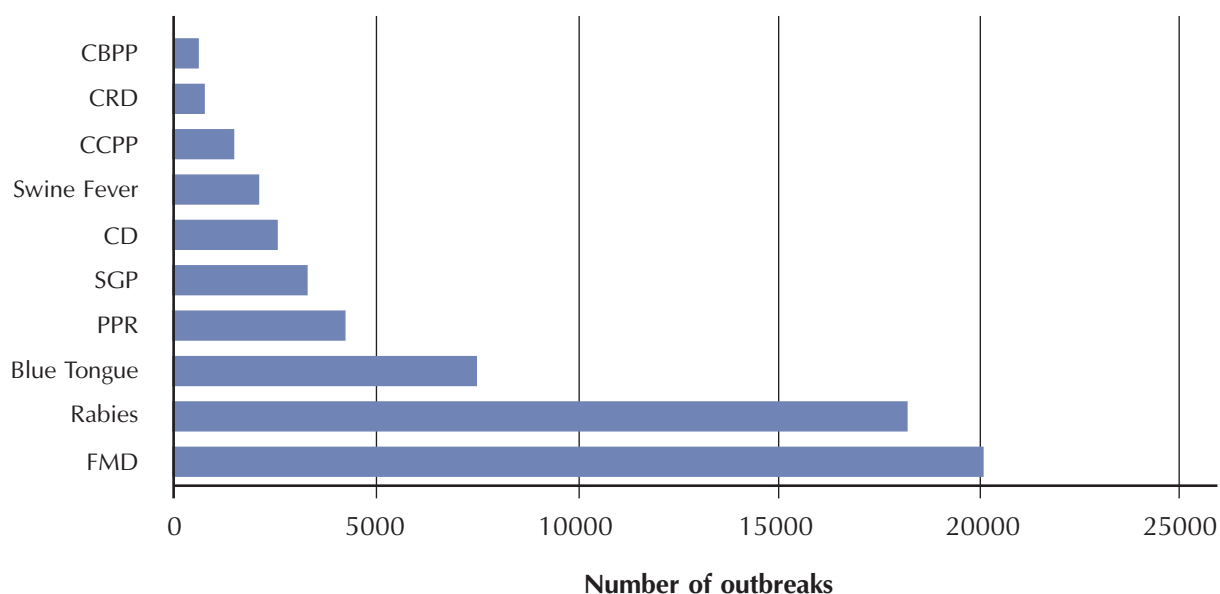
¹ The data presented in Table 1 is compiled from various official sources and is most likely a significant underestimate of the disease incidence due to severe under-reporting and non-reporting of outbreaks. Part of this under/non-reporting is due to poor diagnostic capacity at the field level but a significant part due to administrative apathy and poor design of reporting system. More on this aspect in Section III.

² This estimate is based on the information collected via focused group discussions with livestock producers in 54 villages spread in Andhra Pradesh, Bihar, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Uttar Pradesh and West Bengal. Loss due to a various causes were estimated by multiplying probability of occurrence of that cause, its period of occurrence and the difference in the maximum yield obtained under field conditions and the actual yield. For more information see Birthal ().

Table 1: Incidence of Animal Diseases in India: 1997 to 2005

Sr. No.	Disease	Outbreaks			Attacks			Deaths					
		1997	2001	2003	2005	1997	2001	2003	2005	1997	2001	2003	2005
Bovine													
1	FMD	6343	2680	1822	310	46022	69329	123560	67237	589	1396	2066	2315
2	Black Quarter	615	857	797	519	2592	3125	6527	2396	1351	1326	2864	956
3	Hemorrhagic septicemia	1251	1537	996	775	6751	8679	4522	4753	3594	3767	1411	2229
4	Anthrax	75	173	79	72	230	735	319	323	153	460	239	242
5	Fascioliasis	113	641	146	-	9341	49119	21993	-	105	4	10	-
Ovine													
1	FMD	54	21	76	34	2214	12583	5488	14304	200	208	378	416
2	Hemorrhagic Septicemia	22	11	.	-	559	1460	-	-	142	159	-	-
3	Anthrax	58	128	67	47	756	456	520	345	646	388	309	327
4	Peste des petits ruminant	82	321	623	1071	3456	35125	32933	65820	852	5479	6183	15864
5	Blue Tongue	29	710	391	1183	1018	17983	20047	280788	250	1884	2523	64086
6	Enterotoxaemia	94	421	260	-	1965	4340	2573	-	702	1694	1401	-
7	Sheep/Goat Pox	93	436	265	529	3831	7489	6771	21292	438	1910	1447	2834
Poultry													
1	Newcastle disease	766	1395	338	391	125531	71652	363901	72741	27823	28084	44302	13125
2	Infectious Bursal disease	1320	516	185	249	111913	153078	104401	112392	14066	10777	9431	11402
3	Chronic Respiratory disease	54	165	35	119	6258	129392	32905	108511	1119	4329	2737	7980
4	Coccidiosis	95	998	259	274	43340	191701	70283	73684	3179	12866	10208	4175
5	Salmonellosis	59	146	.	-	40714	205161	.	-	3753	5472	.	-

Source: Animal Husbandry Statistics, Various Years.

Figure 3: Outbreaks of Viral Diseases of Livestock During 1990-2005

Source: ICAR, 2006.

Asia-1, along with many variants of these strains are active in India, endemic in nature, causing outbreaks among susceptible species all over the country and throughout the year. FMD situation in India is particularly complicated by several factors such as:

- The presence of multiple serotypes of FMD virus causing disease
- Absence of systematic vaccination of susceptible livestock
- Unrestricted and seasonal livestock movement
- Abundant ‘virus carrier animals’ following outbreaks / infection
- Unapparent infection in small ruminants, which goes unnoticed

These factors contribute to “all the year round” disease situation practically in every part of the country. Though the rate of mortality is less than 5 percent in the infected animals, the morbidity rate is very high in the range of 40-60 percent and sometimes reaching 100 percent

Because of Antigenic plurality, and low antigenic quality of the virus, vaccination

against FMD is complicated and confers only a small duration immunity ranging from 4 to 6 months. It is difficult to eradicate but can be effectively controlled or at least its incidence brought down to manageable levels by regular vaccination of all susceptible livestock using a potent poly or monovalent vaccine. The question of total and repeat vaccination over longer periods is unthinkable on several counts – huge susceptible population, insufficient vaccine availability, potency of vaccine, massive financial input requirements, unrestricted movement of animals and virus incursion from outside the Indian boundaries.

Currently, FMD Control Programme (FMD-CP) is in place in 54 specified districts of the country in the first phase with 100% central funding towards cost of vaccine, maintenance of cold chain and other logistic support to undertake vaccination. The State Governments are providing other infrastructure and manpower. The tenth plan target included five rounds of vaccinations involving expenditure of Rs. 2000 million. About 150 million vaccination were expected to be carried during the five rounds of vaccination but the

information on actual progress on the ground could not be available.³

The idea of creating FMD free zones has found favor with Government agencies and meat exporters. Such thinking is based on the premise that presence of FMD in the country is a major obstacle to productivity and access to lucrative export markets and that the disease is the primary reason why poor livestock farmers are being excluded from a growth oriented livelihood intensive sector. However, given the production, cultural and market environment of India, it is important to recognize that the main burden of FMD is borne by relatively better off farmers in intensive dairy areas. The poorest farmers neither own high yielding dairy cattle nor do they participate in organized dairy chains with linkages to export markets. Besides, freedom from FMD is no guarantee that the dream of accessing premium export markets will be realized. Successful exportation of livestock products will require massive investment in market infrastructure and veterinary services of sufficiently high quality, reliability and trustworthiness. It is therefore important to understand distributional implications of the benefit of creating FMD free zones before committing large public resources towards such a strategy.

Important bacterial diseases of livestock, particularly of cattle, are HS, BQ, Anthrax and Enterotoxaemia (Figure 4). Tuberculosis and Brucellosis are both prevalent in India, and are Zoonotic diseases with great relevance to public health. HS and BQ outbreaks occur all over the country, even though there are effective

vaccines available in the country, to contain them. The duration of immunity against HS, post vaccination is short – only six months but BQ vaccine protects vaccinated animals for periods up to one year. Emerging diseases of bovines are infectious Bovine Rhinotracheitis, Blue Tongue, and Chlamydial Infection. Contagious Bovine Pleuropneumonia in India is confined to Assam and the North East, and is not prevalent in the rest of the country.

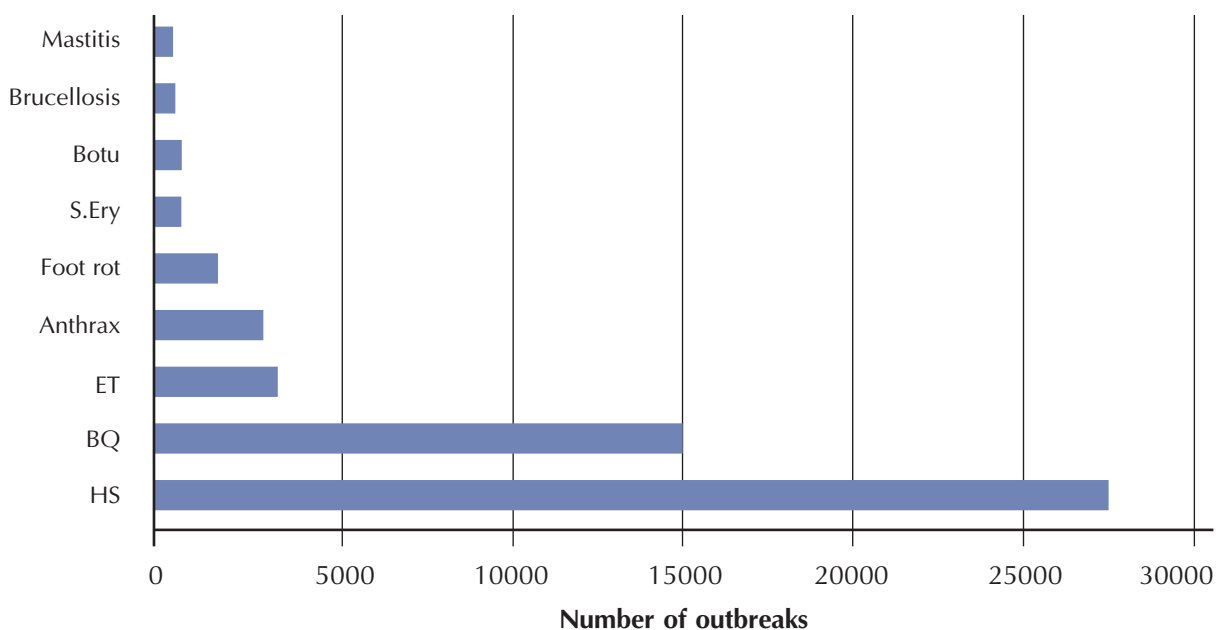
The small ruminants—sheep and goat, are mostly reared by the poorest households, those whose asset structure does not permit raising of cattle and buffalo. The Animal health system in the country has however been more tuned towards addressing the animal health needs of large ruminants. Overtime the outbreaks, attacks and deaths of sheep and goat due to PPR and Blue tongue has risen sharply. Between 1997 and 2005, the number of deaths reported due to these diseases was close to 80,000 compared about 1000 less than a decade ago. Whether such sharp increase in reported outbreaks and deaths is real or due to improved reporting or due to poor diagnosis,⁴ is a matter of conjecture, but the fact remains that such a high number of deaths and outbreak impose enormous disease burden on the poorest households.

Disease of the skin, and parasitic infestation – both ecto and endo parasitic, are the most economically important diseases of sheep and goats. Among infectious diseases causing losses due to morbidity, mortality and production losses are sheep and goat pox, enterotoxaemia, blue tongue, Rinderpest, PPR, Caprine Pleuropneumonia, contagious ecthyma,

³ Prior to initiation of this program, another FMD Control Programme was implemented in 32 districts spread over Kerala, Tamil Nadu, and Karnataka. The technical programme was tested in Nilgiri district over a 3 year period and then applied in the remaining districts in 3 phases, spreading out from Nilgiris. The plan included three rounds of six monthly vaccinations in each district, followed by continued vaccination in the border areas and established cattle routes. Over a 5 year period, the pattern of disease incidence changed drastically – from endemic to sporadic – number of outbreaks went down dramatically and the number of animals involved per outbreak too dropped. Outbreaks were contained and stamped out by ring vaccinations. This resulted in high benefit-cost ratio in areas such as Dakshina Kannada, Trichurapalli, Madurai and Periyar (Table 2)

⁴ There have been reports of emergence of Rinder Pest among the small ruminants. This problem is further complicated by the presence of PPR (Pest des Petits) – a disease with symptoms almost identical to RP affecting sheep and goat and with no differential diagnosis possible within the country. Samples have to go all the way to the OIE laboratory in Paris for diagnosis.

Figure 4: National level top bacterial diseases



Source: ICAR, 2006

pneumonia due to various causes, John's disease, Brucellosis, chlamydial and microplasmal diseases. Preventive vaccines against *most* of these diseases of sheep and goat are manufactured in the country.

The major diseases of Pigs are swine fever, swine influenza, FMD and swine pox. Pneumonia, enteritis and pneumo-enteritis are the major clinical conditions causing losses due to morbidity and mortality. These conditions are

Table 2: District and year-wise benefit-cost ratio of FMD control

Area/district	Animal population (million)	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94
Tamil Nadu							
Nilgiris	0.11	3.59	5.27	5.05	3.05	2.14	6.51
Coimbatore	0.71	19.0	10.8	21.5	12.3	11.4	2.69
Periyar	0.97	32.3	30.6	52.2	32.4	25.7	68.0
Dindigul and Madurai	1.44	66.2	39.8	87.1	51.2	36.8	56.2
Trichurapalli	0.69	1.02	10.3	43.2	28.7	20.3	71.0
Thanjavur	1.28	4.96	2.85	1.54	4.59	3.15	7.20
Karnataka							
Myosre	1.31	12.7	6.23	4.65	2.93	3.25	5.01
Mandya	0.77	15.8	7.32	10.3	6.55	6.71	6.58
Hassan	1.05	11.7	2.54	3.20	3.38	3.40	4.97
Coorg	0.71	..	1.86	2.19	1.52	2.77	0.74
Dakshina Kannada	0.86	12.5	27.1	33.3	35.2	36.8	81.4
Kerala							
Wynad	0.10	..	29.2	37.6	17.0	19.6	..
Malappauram	0.23	..	21.1	15.5	8.45	8.22	..
Kozhikode	0.26	17.9	51.6	49.7	44.3	29.9	..
Palghat	0.31	..	25.2	20.9	14.6	20.1	..
Cannanore	0.13	..	23.3	27.2	24.8	19.5	..

Source: Steering Committee Report, Annex page 22.

caused by bacterial infection, viral infections, and parasites. Pigs are also susceptible to tuberculosis and brucellosis. Vaccines against swine fever and other major diseases are available in the country. However, an oil adjuvant FMD vaccine – a special requirement for pigs is not yet made in India

Diseases of poultry are many and India has most of them, if not all. Vaccines against most of them are available in India and those not available, are imported. However, the data on demand and supply of vaccines for animal disease (of all kinds, not just poultry) is weak and scanty. Also, delivery systems to deliver the necessary skills and inputs to obtain minimum level of vaccine coverage extremely poor.

With respect to Avian Influenza, The first reports came from the village of Nawapur in the Nandurbar district of Maharashtra on 19th February 2006. Villagers reported a large number of bird deaths. Lab analysis proved that the poultry was indeed affected with the H5N1 virus. This was followed by outbreaks in Gujarat and Madhya Pradesh, mostly in backyard poultry believed to have been transmitted through migratory birds. Massive poultry culling, movement and trade restrictions coupled with active surveillance the diseases was effectively controlled and on 11th August 2006 India had declared itself to be bird flu-free.

Fresh bird flu outbreaks were reported on 16th January 2008 in West Bengal which rapidly spread to 13 districts in few weeks. There was local delay in outbreak reporting and disease containment also had some setback due to delay in culling process and non co-operation of farmers. Later outbreaks occurred in Tripura state – both adjoining to Bangladesh borders- and high poultry density followed by a moist cold climate has led to the quick spread of the virus in this region. With the high poultry, duck and migratory bird population density with highly endemic bird flu situations in adjacent Bangladesh, West Bengal and other north-eastern states have high risk of the deadly H5N1 virus spreading to humans. As per other

accounts, bird flu has spread to half of the state due to delayed action, bad planning and mismanagement by Government of West Bengal. In many villages, people led by ruling party leaders resisted culling operations. Shortage of staff for culling operation is one of the other reasons.

Country Programme for Containment of Bird Flu

The Government of India has worked out a Country Programme for Preparedness, Control and Containment of Avian Influenza, covering both the animal and public health dimensions. As far as animal health aspects are concerned, the strategy emphasizes the need for: (i) adequate bio-security measures; (ii) increased country capacity for surveillance and detection; (iii) strengthening of the early warning system; (iv) reduced opportunities for human infection from birds (v) efficient control measures in case of an outbreak and (vi) an effective communication strategy. There is an effective top-down action plan administrative and support to state governments with full costs borne by the central government. Also, co-ordination with the WHO, FAO and OIE are in place.

Successful containment of first outbreak of bird flu in three states during 2006 has provided India with opportunity to counter challenges faced at all operational levels in real time situations. This has fine-tuned national preparedness but the federal structure of the country has thrown open limitations that individual states may falter to even initiate timely disease reporting to central authorities and organise effective field culling and disposal of dead birds. Often poultry movement restrictions and sanitation procedures were inadequate resulting in free spread of disease as happened in West Bengal outbreaks. Each state has a nodal agency to deal with bird flu outbreaks. Diagnostic support is enhanced with establishment of additional high security laboratories in Pune and other places. The four Regional Diseases Diagnostic Laboratories of

GOI are strengthened to provide special training to field veterinarians from their constituent states in handling bird flu outbreaks. Also, GOI has provided most required administrative, financial and scientific/technical support to states affected by bird flu on priority basis and this gratifying situation has immensely helped to contain disease spread. GOI has indeed reprimanded few states deficit / lacking in their disease containment efforts.

Co-ordinating Mechanisms

Ministry of Health and Family Welfare is the nodal Ministry for all biological disasters including Avian flu/ Influenza Pandemic. The following Committees have been setup at the national level for coordination of HPAI actions:

- i) Joint Monitoring Group on Avian Flu with Director General of Health Services, Ministry of Health & Family Welfare and Animal Husbandry Commissioner as members.
- ii) A National Influenza Pandemic Committee (NIPC) with Secretary, Ministry of Health & F.W, Government of India as Chairman, Secretary, DADF; DGHS; Director General, Indian Council of Medical Research; Director, NICD; Animal Husbandry Commissioner; Joint Secretary (Disaster Management), Ministry of Home Affairs as members and Additional Secretary (DG), MOHFW as Convener.
- iii) The preparedness on Avian Influenza is regularly reviewed by the Cabinet Secretariat/Cabinet Secretary.

The following Committees have been setup by the DADF to review and monitor Avian Influenza:

- i) National Animal Disease Emergency Committee (NADEC) under the chairpersonship of Secretary, Animal Husbandry, Government of India.
- ii) State Animal Disease Emergency Committee (SADEC) at level of each State government under chairpersonship of State Secretary of Animal Husbandry.

- iii) An expert group on Bird Flu to review global situation and steps to be taken to prevent ingress of the disease under the chairpersonship of Animal Husbandry Commissioner (Chief Veterinary Officer of the country), Government of India.
- iv) A Committee under chairpersonship of Animal Husbandry Commissioner to interact with the poultry industry on a regular and sustainable basis.
- v) A Committee under chairpersonship of Animal Husbandry Commissioner with representation from poultry industry to formulate and approve the IEC campaign on the animal health side.

The High Security Animal Disease Laboratory (HSADL), Bhopal has been designated, as the National Level Laboratory for HPAI.

Surveillance & dispatch of samples

1. Random Sample surveillance in poultry is being carried out within the country. Over the last four years more than 30000 samples have been collected and have tested for HPAI.
2. Surveillance has been intensified in the recent past due to global threat of outbreak of Avian Influenza.
3. Targeted surveillance is being done in areas within trajectories of migratory birds identified by the M/o of Environment & Forests on account of the visit of migratory/ wild birds for winter nesting.
4. Surveillance has also been intensified in poultry farms located near or around water bodies/sanctuaries.
5. The samples collected from the field are forwarded for testing to the five Regional Disease Diagnostic Laboratories (RDDLs) at Pune/ Bangalore/ Kolkata/ Izzatnagar/ Jalandhar and to HSADL, Bhopal.
6. The Action Plan of the DADF emphasizes on diseases intelligence, active animal surveillance and strengthening of Early Warning System in the outbreak stage. The Veterinary Officer will visit the site immediately on receipt of preliminary

information regarding unusual morbidity / mortality of poultry / wild birds. Preliminary and clinical investigation to be conducted by veterinary personnel including the information to be gathered and composition of PPE/ Kit has been laid down. The format of the epidemiological enquiry report has been prescribed. Immediate report will be made to senior officers in case of suspicion of Avian Influenza. The manner of sample collection and further dispatch for testing has also been given in detail. Immediate intimation regarding dispatch of samples is to be given to HSADL, Bhopal and the Government of India.

7. In case of an unusual situation of suspicion of Avian Influenza arrangements have been put up in place to fly the samples from area to HSADL, Bhopal through Ministry of Home Affairs.
8. Non Governmental organizations like Bombay Natural History Society, Wetland International etc. are also assisting in surveillance and monitoring of migratory / wild birds.

Vaccination

The global strategy supports the use of good quality vaccines. FAO and OIE have made recommendations for the use of OIE approved HPAI vaccines in accordance with the FAO/OIE guidelines (FAO Position Paper, September, 2004). Vaccination protects against clinical disease in chickens by reducing mortality and production losses. Vaccination of poultry also reduces the virus pool contaminating the environment and thereby the risk of infection to poultry and humans. It increases resistance to infection and protects birds from diverse field viruses within the same hemagglutinin subtype. Several countries have adopted vaccination as a strategy in case of outbreak of HPAI. The Action Plan of this Department in respect of bird flu considers vaccination as an option in case of outbreak of disease as per requirements of the situation. The Government of India has developed a small strategic Reserve of H5 and

H7 vaccines. The Protocol for access and use of vaccines for Avian Influenza has been drawn up by the Department covering technical specifications of vaccines available in the Central Strategic Reserve, procedure to access vaccines, requirements to be met by the State Governments for receiving vaccines/utilizing vaccines, related issues such as Exit Strategy, DIVA and sentinel birds, data maintenance requirements, monitoring.

In addition to the Action Plan prepared by the Government of India for the strategic actions to be taken in case of suspicion and outbreak of Avian Influenza, a Country Program has also been developed for preparedness, control and containment of avian influenza. The Country Program deals with the animal health and the public health aspects **including** the macro issues of capacity building, infrastructural upgradation, HR development, networking, strengthening animal disease surveillance etc. It projects the costing of each component, timeline, activity schedule and parameters. The total cost of the Country Program is estimated at US\$m 27.53 (Rs. 123.92 crores).

On a long term basis, improving bio-security in poultry production and trade is an important strategy to guard against the damaging effects of HPAI. In principle, the main activities to be considered under this component are: (a) Mandatory Bio-security regimen in organised poultry farms, Grand Parent / Parent Breeding farms, (b) strengthening bio-security at producing and marketing sites, and (c) new regulations for national/international trade. In this context, this report recommends

- Introduction of mandatory registration of all Organised Poultry Farms, existing and new, by the state governments. This should be a one time, simple and across the table process, updated at periodic intervals.
- Formulation of mandatory bio-security norms (different levels for different size / kinds of farms) for all organised poultry / avian farms in the country.

- Mandatory annual certification of farms for their bio-security level. Certification should be an industry driven process based on the norms stipulated by the government and inspection and certification should be left to the Poultry Industry.
- Mandatory reporting of epidemics in general and those of zoonotic importance in particular for all organised poultry / avian farms.
- GoI has formulated and announced its policy on Avian flu vaccine in the country. The policy talks about using live attenuated vaccine following the DIVA Regimen. In a country where vaccination cannot be strictly monitored and regulated implementation of DIVA could be difficult. Therefore Government should consider the possibility of use of killed vaccines against HPAI in India.
- Commercial Avian flu vaccine production (live as well as non pathogenic strains) must be banned and all vaccine manufactures must confirm absence of a virulent Avian Influenza strains in their vaccines
- Formulation of the policy on use of killed H5N1 vaccine around 'migratory bird habitats' and as a measure for containment and control of HPAI.
- Initiation of an Epidemiological Survey to trace the source of infection for the first HPAI Outbreak in Maharashtra as it has a bearing on the Avian Flu Containment of the GOI in future.

India's proposed monitoring and surveillance related investments are consistent with the principles defined in OIE guidelines for Surveillance of Avian Influenza: *Terrestrial Animal Health Code 2005*, Appendix 3.8.9: Article 3.8.9.1, 3.8.9.2 and 3.8.9.3. They also follow guidelines and directions as formulated under the World Bank supported Global Program on Avian Influenza, which emphasizes the need for: (i) improving animal health information flow among relevant agencies; (ii) detection, reporting and follow-up of reported cases; (iii) public and community-based surveillance

networks; (iv) routine serological surveys and epidemic-surveillance; and (v) improving diagnostic laboratory capacity.

Although India has rigorously followed global standards set out by the WHO, FAO and OIE to meet its international obligation to mitigate pandemic human infection, the country's long and porous international borders with infected neighbouring countries require that GOI and the entire international border attached states should address this issue on utmost priority. Intensified surveillance along international borders should be put in place with involvement of border security forces and special bird flu check posts in vulnerable points all along the borders. It is beyond one's comprehension that Bangladesh will ever be able to eradicate let alone contain endemic bird flu situation in the near future. In view of this, India draw up immediate and long-term pragmatic and result oriented intensive transboundary surveillance strategies to prevent incursions.

Restricted 50 kilometre or more '**immune belt created through international border vaccination campaigns**' should be created over conventional waiting for the disease outbreak to occur and then initiate 'fire-fighting' approach of massive culling of infected and in-contact poultry that results in the loss of valuable indigenous genetic pool and compensation which does not commensurate with the living resources of poor and marginal famers. Confronted with the threat of continuous transboundary ingress of bird flu from across the borders, disease prevention approach through 'limited area vaccinations' coupled with intensive disease monitoring and surveillance is to be preferred over disease control through culling, at least with Bangladesh borders. The Chinese and Vietnam experiences in extensive use of prophylactic bird flu vaccinations has few lessons for India in preventing north-eastern states becoming permanently endemic.

Another inadequately investigated area is the role of visiting migratory birds, indigenous water birds, ducks and geese in precipitating

bird flu outbreaks across the country. A long-term master plan including satellite remote sensing of bird sanctuaries and large water bodies is suggested and periodic PCR testing of cloacal swabs from trapped birds in these locations may help to identify incursion of H5N1 virus and initiate preventive measures.

A separate laboratory facility should be established for exclusive epidemiological screening of cloacal and other samples from non-poultry birds. Human/poultry clinical samples from outbreaks should not be laboratory examined where routine surveillance migratory and other bird populations are routinely screened. National Institute of Virology, Pune is ideally the designated for handling human samples and High Security Animal Disease Laboratory, Bhopal for poultry samples.

There is a need for a close collaboration among south-Asian and south-eastern Asian countries and China to draw regional baseline disease prevention and control strategies and exchange of disease information, although WHO, FAO and OIE are exceptionally involved as a part of their global initiative support systems.

Backyard poultry and Bird Flu

India has some 270 million fowl and duck in the back yards of rural households. They are constantly exposed to infection risk from migratory birds, particularly in the large land corridors along the flyways. Large scale mortality among the back yard poultry annually due to Raniket Disease (New castle Disease) is common in India. It is therefore quite possible that outbreak of Avian Influenza are taken for granted in Indian villages and go unreported. Human disease outbreaks running concurrently with large scale bird mortality are also likely to be ignored in this scenario.

Dealing with such situation requires extensive community participation and awareness, particularly participation of village women in the disease information campaign against HPAI.

This can best be attained by creating a constituency of village representatives, including lady livestock link workers. Village women should be trained to detect symptoms of Avian Influenza and other diseases. The training can be imparted in the village itself and, according the cost of the training is expected will be Rs. 500 per person, including the IEC kit received at the end of training, as a one time grant.

Village representatives, estimated at about 120,000, should become be the government's village intelligence force, transmitting information on diseases to the nearest Animal Husbandry institution on a day to day basis: the Participatory Disease Intelligence Constituency. If it is decided to launch vaccination of backyard poultry at some point, these Village Representatives could play an important role in carrying out this program.

MAIN DISEASES OF ZONOTIC IMPORTANCE

Bovine brucellosis

One of the most endemic and insidious bacterial diseases of livestock is caused by the four brucella species which have specific reservoir hosts: *B. abortus* in bovines, *B. melitensis* in sheep and goats, *B. suis* in pigs, *B. canis* in dogs. Transmission occurs through contact with infected and carrier animals, their tissues contaminated with the organisms, or through ingestion of contaminated products. This endemic disease has zoonotic importance especially for rural women and children who mostly attend to animal husbandry practices under poor rural sanitary conditions.

PD_ADMAS (Project Directorate on Animal Disease Monitoring and Surveillance), Bangalore carried out one of the largest serological study during 1994-2003 involving 53,518 bovine serum samples from 24 states and a Union Territory and estimated incidence rate of 7.2 and 5.2 percent in cattle and buffaloes respectively. These were non-purposive

samples and the incidence could be much higher if targeted samples from abortion and reproductive failures are thoroughly investigated. Dairy intensive states like Gujarat, Punjab, Haryana and Maharashtra have much higher incidence. Brucellosis in sheep and goats is also widespread and play an important in human brucellosis in states which have large population of small ruminants.

Prevention of human infection essentially involves removal of its primary source of infection in domestic animals. Developed countries have eradicated brucellosis through rigorous test and slaughter policy. Other countries have contained the disease through calf hood vaccination using Srtain-19 vaccine (now much improvised RB51 vaccine) and slaughter of positive animals. The long-term field based research carried out at PD_ADMAS has suggested a **Bovine Brucellosis Progressive Control Programme (BBPCP)**. The basic considerations of this approach are:

1. Brucellosis in bovines is rather a self-limiting disease (in terms of abortion and reproductive failure) despite permanent infection discharge of infective bacteria reduces in subsequent pregnancies.
2. In rural India, herd strength is generally not more than ten animals and original stock gets replaced by turnover process of three successive generations which, if calthood vaccinated, remain protected yet prevent /

limit spread of brucellosis. The number of young stock that requires vaccination in different states is appended below and by any standard achievable compared to routine ongoing vaccinations against other diseases.

The milk co-operative sector in India is fairly well developed and operative across the country and the rural milk co-operatives provide most ideal opportunity for initiating BBPCP. Periodic testing of pooled milk sample from each Co-op (representing several villages) confirms presence or absence brucellosis among its bovine population. Brucellosis milk ELISA kit developed by PD_ADMAS, Bangalore is specific and sensitive to detect brucellosis in a sample drawn from 700 litres of pooled milk. It is very economical costing around Rs. 25 per test and is affordable to milk co-operatives. In Karnataka, this kit performed optimally when used on pooled milk from 7000 co-ops and large farms (see Box 1).

Under this approach, Brucella positive milk co-ops / village(s) are targeted to one-time calf hood vaccination over the age of 6 months in cattle and above one year in buffaloe heifers for at least 5 years. There is a definite need for ear punching or ear tags to identify the vaccinated heifers. The negative Co-ops are retested twice annually by milk ELISA and vaccination initiated if found positive. Adult females, bulls and bull calves are not vaccinated with S-19 vaccine and RB-51 vaccine can be used in adult

Box 1: BBPCP—Karnataka Experience (1998-2002)

The Karnataka state which has 13 milk producers' unions, representing 17093 villages and involving 1.48 million farmers was taken as a model for initiation of BBPCP. In all, pooled milk samples from 6767 village level milk co-operative societies from 13 milk unions with a turnover of 18 lakh litre of milk per day were used in this study. The first round of milk ELISA results indicated that 5 out of 27 districts are free from brucellosis and in the remaining infected districts, 284 villages were positive for brucellosis (3.8%) by pooled milk survey. The maximum number of calves that required annual calthood vaccination in these 284 villages was about 30,000 for 3-5 years. The estimated cost of vaccine was Rs. 3 lakhs per year and operational costs of another Rs 2 lakhs per year.

This survey showed low or marginal infection in these five infected districts. This low prevalence is perhaps due to small herd structure (5-7 animals per herd) and natural self-limiting tendency of the disease under such conditions. These findings gave strong credence for the use of calthood vaccination in the infected villages and that the disease can be controlled at low cost. This Karnataka experience is an excellent example to initiate brucellosis control strategies at village level in India, through the concept of BBPCP.

females and, any case bulls and bull calves are not to be vaccinated with either vaccine. The cost of one-time S-19 vaccine is around Rs 10-15 compared to immediate economic loss of Rs 5000 or more due to abortion and loss of milk / calf production. RB-51 vaccine is not made in India, although Indian Immunologicals Ltd, Hyderabad (a NDDDB concern) has manufacturing licence from USA.

BBPCP aims to achieve sustainable 'herd-immunity' against a progressively 'self-limiting' and declining infection levels with further lactations. Segregation of infected adult animals is not mandatory in BBPCP and, S-19 vaccinated and tagged heifers sero-converting after 10 months post vaccination; advantageously serve as 'Indicators' of lurking infection on the premises and this re-exposure to infection boosts protective immunity against brucellosis and are believed to be 'non-infectious'. This situation is often misunderstood and projected as a 'disadvantage' of S19 vaccination.

Rabies

Rabies is common in most parts of India with the exception of Andaman and Nicobar, and Lakshadweep islands. The dog population of India is around 25 to 30 million animals. Most of stray dogs play a major role in the spread of rabies. Each year, approximately 17 million animal bites are reported and seven million people undergo post exposure rabies treatment after a dog bite. In its survey report, the Association for the Prevention and Control of Rabies in India (APCRI) reported 20,565 human deaths in 2004 (of which, 50 percent were children below the age of 15 years) and 89 per cent had not taken post exposure vaccination. Another estimated placed the number of rabies deaths at 2.49 per 100,000 population in rural and 0.37 deaths per 100,000 population in urban India (Knobel *et al*, 2005). Some of the media reports, quoting WHO sources, however placed the number of rabies deaths at about 35,000 per year (The Hindu, May 6, 2002). Because Rabies is not a notifiable disease in India and there is no organized

surveillance of rabies, the actual numbers could be much higher. Majority of human rabies deaths occurred within six months of dog bite and it is estimated that a person dies every 30 minutes in India. (Menezes, 2008). Annual number of person days lost due to animal bites in India is about 38 million and the cost of post bite treatment about \$25 million (Menezes, 2008).

The actual number of rabies deaths is believed to be higher due to wrong diagnosis and under-reporting, especially from rural areas. Interestingly, introduction of sustained Animal Birth Control (ABC) programme in cities like Chennai has reduced stray dog population by 70 percent and the incidence of rabies deaths from 120 in 1996 to five in 2004. Also, Jaipur which reported ten deaths in 1996 has not reported any rabies cases since 2001 consequent to introduction of ABC programme.

In India, nearly 96% of cases are due to bites from stray dogs which are mainly responsible for the maintenance of the epizootic situation and the transmission of rabies to humans. Involvement of wildlife and bats in rabies is insignificant or absent in India although laboratory evidence of rabies infection in mongoose and jackals is recorded. Effective vaccines against Rabies are available in the country, but prophylactic vaccinations are not in vogue. A comprehensive Rabies Control Programme, is yet to be attempted in this country. While susceptible species of pet animals receive prophylactic vaccinations, except for people expose to Rabies hazard, human beings invariably use vaccine for post bite therapy. The full course of vaccination can cost anywhere between Rs.1500 to Rs.5000 depending on the severity of the bite. Several reasons are cited by CPCRI in its national rabies survey report for high incidence of rabies in the country includes:

1. The incidence of animal bite is high and is due to a high dog: man ratio.
2. The use of anti-rabies vaccines is very low and majority of animal bite victims belonged to lower economic class.

3. The incidence of animal bite is higher where dog: man ratio is high. The presence and menace of stray dogs is high in urban areas and municipal licensing of pet dogs is inadequate.
4. Public awareness about this dreaded disease is inadequate, so is ignorance of critical first-aid of dog bite wounds to restrict virus spread.
5. Strategies and action plans to bring down canine rabies and eventually eliminate stray dog population through ABC programme.
6. Prevent dog rabies through dog vaccination and promotion of responsible dog ownership.
7. Increase post exposure access to rabies immunoglobulin and modern cell culture vaccines in vulnerable populations living in regions where canine rabies is highly endemic.
8. Compartment approach of medical and veterinary professions at large.
9. Lack of a national rabies control programme for eventual rabies eradication.

Realizing the severity of rabies incidence in India some of the medical professional bodies have been trying to raise awareness about animal bites and rabies and popularize the use of intradermal vaccination to reduce high cost of treatment. These efforts however make marginal impact and a number of other measures are required including a massive program to control the population of stray dogs (along the lines of Chennai's program on Animal Birth Control), elimination of suspected infected animals, addition of pre-exposure vaccination in the schedule of immunization for children, public health educational programs about rabies and designation of rabies as a notifiable disease (Menezes, 2008).

DISEASE INCIDENCE— SPATIAL DISTRIBUTION

Statewise data on disease incidence are difficult to get. For the purpose of this paper we attempted to put together basic disease outbreak reports from the annual Reports of the Dept of

Animal Husbandry and Dairying (DAH&D), Indian Veterinary Research Institute, Izatnagar, National Dairy Development Board (NDDB), Project Directorate on Animal Disease Monitoring and Surveillance (PD_ADMAS), and Project Directorate on Foot and Mouth Disease (PDFMD). Most these reports contained very brief information on outbreaks and did not contain critical epidemiological information most needed for a comprehensive view of disease incidence across states. Data on outbreaks, attacks and deaths due to various diseases is given in Table 3. State-wise incidence of FMD, HS, Anthrax, and BQ during 1991-2005 is also plotted in Figure 5.

Going by this data, it appears that Andhra Pradesh is the hot bed for all diseases as more than 65 percent of all livestock deaths are reported from Andhra Pradesh. This is obviously an erroneous conclusion. The fact of the matter is that Andhra Pradesh is perhaps one of the few states where veterinarians are encouraged to report diseases and the same is compiled and shared with regional laboratories and national institutions. The reporting system in a large number of states has become dysfunctional and that seriously undermines the reliability and veracity of data on spatial distribution. Therefore this paper refrains from making any definitive statements based on Table 3. Instead, the paper summarizes lessons from a proposed a control strategy and action plan for animal disease control for Andhra Pradesh where more reliable district level data is available. These lessons are presented in Annex 3.

INSTITUTIONAL STRUCTURE AND ANIMAL HEALTH INFRASTRUCTURE

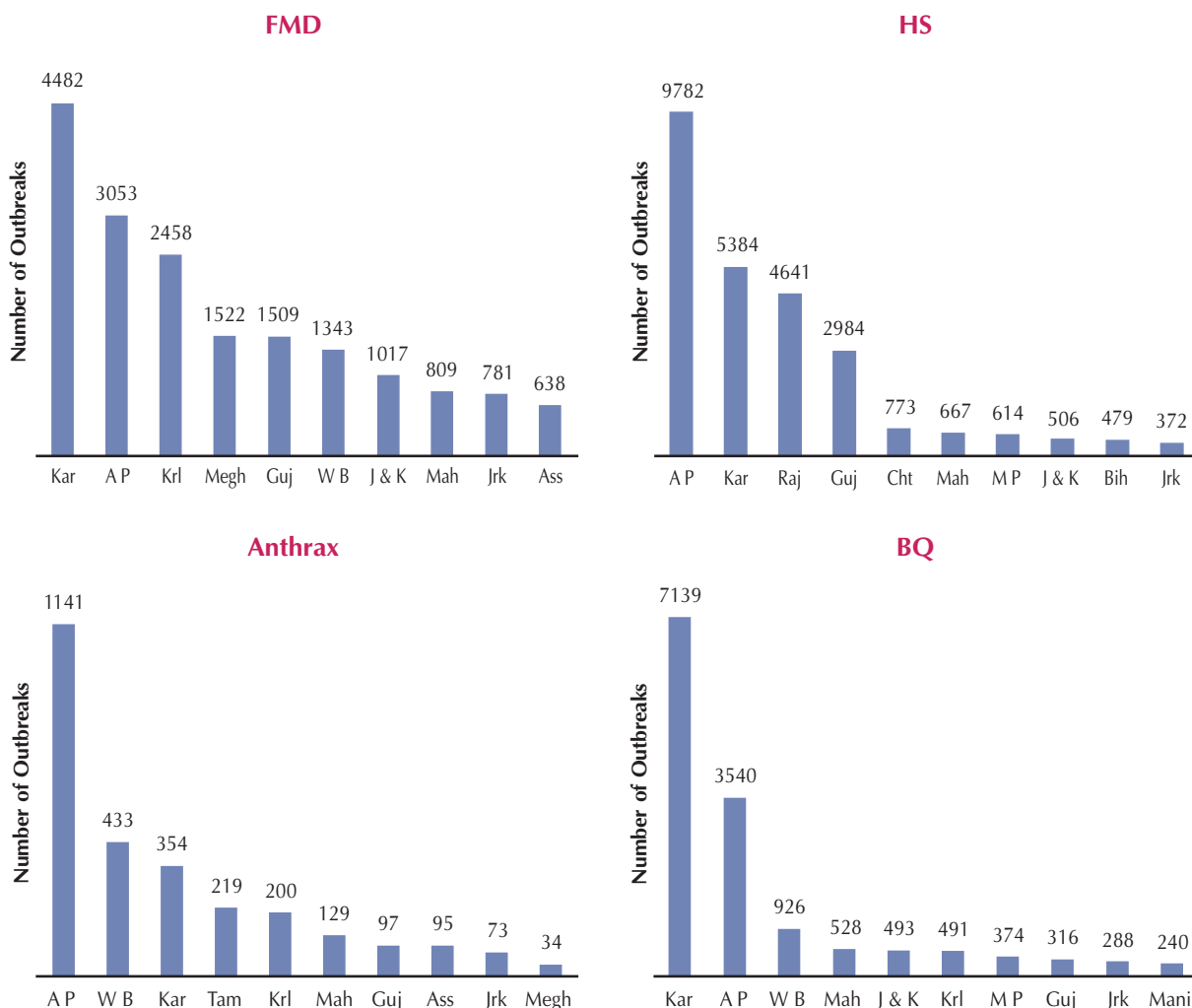
Agriculture, including livestock being a state subject, most issues related to livestock in general are handled by the state governments. The central government intervenes in the issues of national interest such as disease control, eradication, research and development, etc. At the central government level, Ministry of Agriculture through its Department of Animal

Table 3: Major Infectious Livestock Diseases During 1998-2002

State	FMD		HS		BT		BQ		PPR		ET		Anthrax		SP-GP										
	Obs	Deaths	Obs	Deaths	Obs	Deaths	Obs	Deaths	Obs	Deaths	Obs	Deaths	Obs	Deaths	Obs	Deaths									
Andhra Pradesh	1088	26024	577	3843	19609	26896	2246	162184	30381	983	3767	2179	1474	39951	12569	1330	13715	6798	638	2276	2050	616	27567	3660	
Assam	440	22255	198	266	2651	174	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bihar	467	7611	191	334	3364	1583	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chhattisgarh	21	21	—	507	507	183	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Goa	27	955	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gujarat	537	16518	47	468	6449	2513	3	149	21	130	845	533	21	1658	811	—	—	—	—	—	—	—	—	—	—
Haryana	123	5382	142	38	1400	378	1	100	36	2	11	4	—	—	—	—	—	—	—	—	—	—	—	—	—
Himachal	69	16575	199	2	67	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Jharkhand	373	5545	70	211	1795	1035	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Karnataka	2632	52849	830	2145	11328	4695	3613	12514	2026	3328	9671	4469	7	1492	167	425	4836	1204	77	226	192	93	2014	602	
Kerala	1358	25297	2990	19	64	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Maharashtra	203	4362	113	331	2370	936	6	162	12	164	454	278	18	2041	119	48	725	250	62	1183	359	62	814	162	
Manipur	32	1366	78	1	67	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Meghalaya	312	5335	—	30	961	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Madhya Pradesh	80	436	—	197	716	716	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Orissa	38	7503	1	29	322	87	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Punjab	6	51	2	4	37	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tamil Nadu	318	5410	278	19	171	147	19	391	241	70	382	284	27	4585	376	—	—	—	—	—	—	—	—	—	—
Uttaranchal	53	1514	10	34	203	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
West Bengal	518	28291	806	154	542	290	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	8699	233698	6560	8633	52625	39711	5888	175500	32717	5775	39207	10318	2235	111031	24740	1819	19388	8303	1276	6490	53185	934	36702	6024	

Source: Animal Husbandry Statistics, Various years.
Data source: DAH&D, GOI

Figure 5: State-wise Incidence of FMD, HS, Anthrax, and BQ Outbreaks during 1991-2005



Husbandry looks at issues in animal health. The responsibility of livestock research and education lies with the Department of Agricultural Research and Education and the Indian Council of Agricultural Research headed by the Deputy Director General (DDG). The DDG is assisted by Additional Director General, Animal Sciences to take care of research on Veterinary Biologicals, Disease Diagnosis, and Research on Vaccine Production. This work is carried out with the help of a High security Animal Disease Laboratory at Bhopal, a Virology Laboratory at Mukteshwar and three Regional Research Laboratories one each at Srinagar, Kolkata and Bangalore.

For providing referral diagnostic services one Central and five Regional Disease Diagnostic

Laboratories have been set up by the Central Government. The Centre for Animal Disease Research and Diagnosis (CADRAD) of IVRI, Izatnagar is designated as the Central Laboratory. The Regional Laboratories are located at Kolkata (Eastern), Pune (Western), Jalandhar (Northern), Bangalore (Southern) and Guwahati (North-eastern). The networking of these laboratories with other laboratories of the State Governments, ICAR and Universities have been initiated for better coordination and efficient disease diagnosis, monitoring and reporting. The objectives of these laboratories are to

- Provide referral services for diagnosing various animal diseases.

- Networking of these referral laboratories with the ICAR, University and State laboratories to support their programmes on disease diagnosis.
- Study the problems of emerging diseases of animals, and
- Undertake surveillance against emerging and exotic infections threatening the country.

At the State level Directors of Animal Husbandry are assisted by Additional Directors, Joint Directors, Deputy Directors, Assistant Directors, professional veterinarians and para-veterinary staff. The role of state Departments of Animal Husbandry is provide services related to animal breeding, veterinary service delivery, disease control, feed and fodder development, and to liaise with other state governments and central departments and institutions in the matters related to livestock development. The Deputy Director, Epidemiology collects the disease incidence in the state from animal health centers, veterinary institutions, and VBRI, consolidated information is sent to ADMAS, Bangalore and Animal Husbandry Commissioner, GOI. The Departments provide health, breeding and other livestock development services through large network of various types of Veterinary institutions. A detailed chart outlining various components of animal health service delivery in India is given in Figure 6.

Overall, the public infrastructure for animal health has grown significantly. The First Five Year Plan document mentions some 2000 veterinary dispensaries countrywide as the infrastructure available in 1951 to provide health cover to livestock. By 2006, the number of veterinary institutions had grown to more than 52000 units comprising some 8700 veterinary polyclinics, 18830 dispensaries, and more than 25000 veterinary aid centres (Figure 7). All these institutions belong to the State/Union Territory governments and the staff manning them are all employees of the government – some 27000 veterinarians (approx. 90 percent of them veterinary graduates) and 61000 para veterinary staff (Stock Assistants and technicians).

Table 3 presents state-wise distribution of dispensaries, hospitals, and veterinary aid centres. Following observations can be made based on this table and distribution of livestock population across states

1. While there is significant correlation between proportion of veterinary institutions and proportion of livestock population, there is substantial variation between states in the density of veterinary institutions. What is even more striking is that in some of the poorest states, number of livestock per veterinary institution is among the highest. As shown in Figure 8, states such as Jharkhand, Bihar, MP Chhattisgarh, Rajasthan have very high number of livestock units per veterinary institution. High income states such as Punjab and Haryana on the other hand are on the other extreme.
2. There is a continuing bias in the service delivery system towards large animals. Some of this is also reflected in availability of animal health infrastructure. Andhra Pradesh, Rajasthan, West Bengal, UP and Maharashtra account for over 55 percent of India's small ruminant population but have less than 40 percent veterinary institutions. Even the institutions that exist in these states cater primarily to large animals.

It can also be observed that Gujarat, one of the High Income States, has one of the lowest number of government veterinary institutions on a per animal basis. That is simply because of strong veterinary service delivery support provided by the dairy cooperative network. In Gujarat, most services are delivered animal side (instead of delivering services through stationary institutions network) and nearly all services are paid for.

Despite such vast institutional network, the animal health scenario in the country remains grim. Most State Governments are finding it increasingly difficult to manage and sustain this system financially as well as managerially. Financial constraints have reduced the State

Figure 6: Animal Health Service Delivery System in India

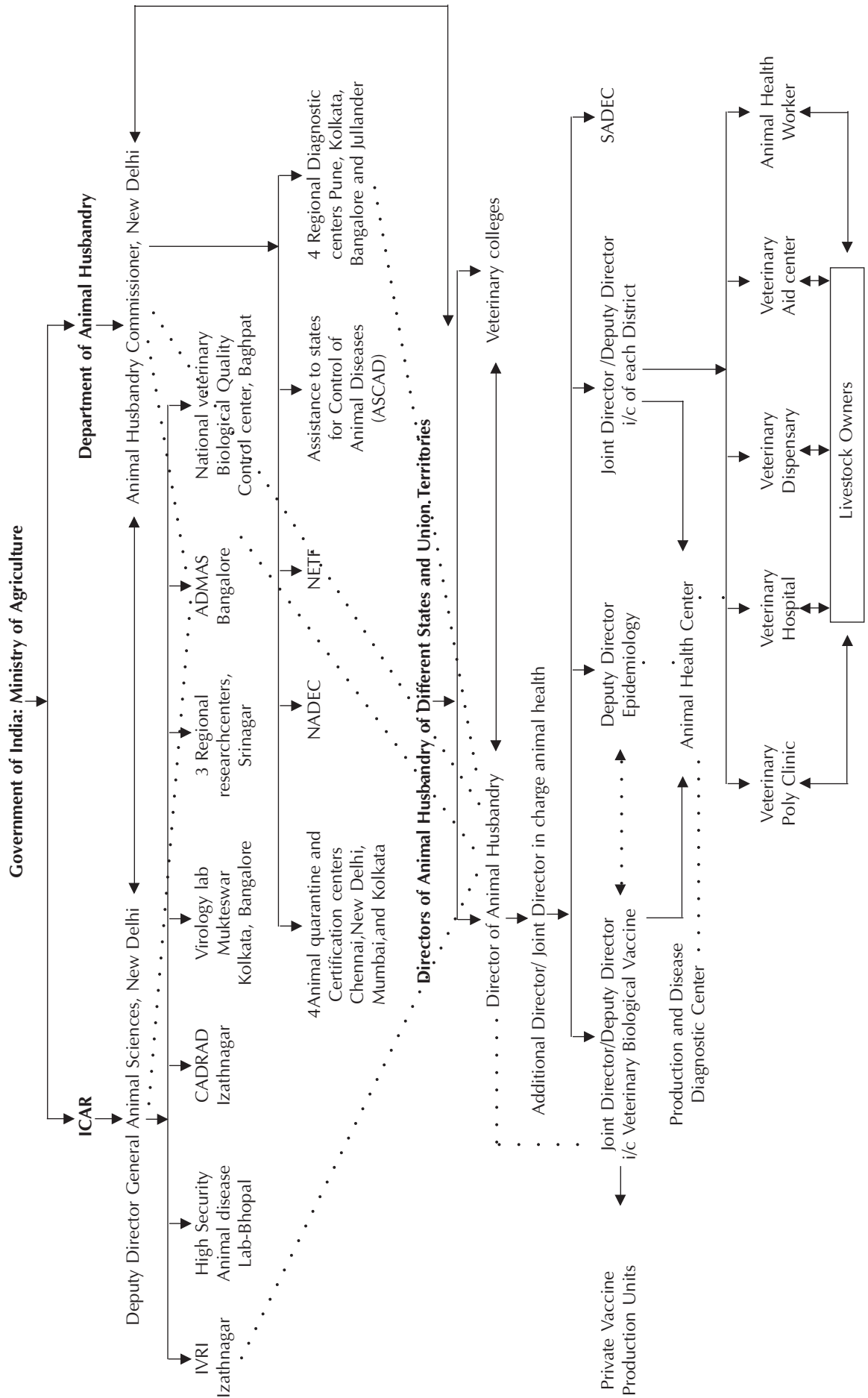


Table 4: State-wise veterinary infrastructure

States	2000			2004			2006		
	Veterinary Hospitals & Polyclinics	Veterinary Dispensaries	Veterinary Aid Centres (Stockmen Centres/Mobile Dispensaries)	Veterinary Hospitals & Polyclinics	Veterinary Dispensaries	Veterinary Aid Centres (Stockmen Centres/Mobile Dispensaries)	Veterinary Hospitals & Polyclinics	Veterinary Dispensaries	Veterinary Aid Centres (Stockmen Centres/Mobile Dispensaries)
Andhra Pradesh	280	1642	2610	304	1793	2879	303	1794	2879
Arunachal Pradesh	1	93	169	1	93	189	1	93	189
Assam	26	434	1213	26	434	1213	29	428	1213
Bihar	62	1154	3852	29	428	1213	39	785	1435
Chhattisgarh				208	703	34	208	708	290
Goa	4	23	54	5	21	52	5	21	52
Gujarat	14	453	590	14	478	589	14	487	587
Haryana	607	859	759	620	864	776	673	999	745
Himachal Pradesh	309	1259	14	334	1520	14	335	1721	14
Jammu & Kashmir	195	146	460	303	1585	14	303	1585	14
Jharkhand				405	3	-	405	3	-
Karnataka	244	803	2191	294	1451	2029	294	1451	2029
Kerala	266	829	22	260	833	26	213	880	26
Madhya Pradesh	772	2344	90	565	1742	72	565	1742	72
Maharashtra	31	1156	2134	43	1390	2113	43	1382	2056
Manipur	54	101	29	55	101	29	55	109	34
Meghalaya	4	58	79	4	65	153	4	70	151
Mizoram	5	40	101	5	35	103	5	35	103
Nagaland	4	27	133	4	27	127	4	27	127
Orissa	58	482	2924	13	527	2939	-	540	2939
Punjab	1261	1535	45	1375	1478	45	1362	1486	12
Rajasthan	1180	285	1080	1437	285	1727	1439	285	1733
Sikkim	12	25	58	12	25	58	12	25	58
Tamil Nadu	124	807	2533	167	922	2407	167	1156	1854
Tripura	9	44	371	15	56	375	15	56	396
Uttaranchal				284	11	599	295	11	588
Uttar Pradesh	2047	280	2720	1758	268	2289	1763	268	2313
West Bengal	110	612	3245	110	612	3325	111	612	3248
Chandigarh	6	8	1	5	9	1	5	10	1
Delhi	48	24	1	49	27	1	49	27	1
Pondicherry	3	14	4	2	15	8	2	15	8
India	7749	15554	27543	8720	17820	25433	8732	18830	25195

Source: Animal Husbandry Statistics, Various years.

Figure 7: Growth in Veterinary Institutions and Veterinarians in India

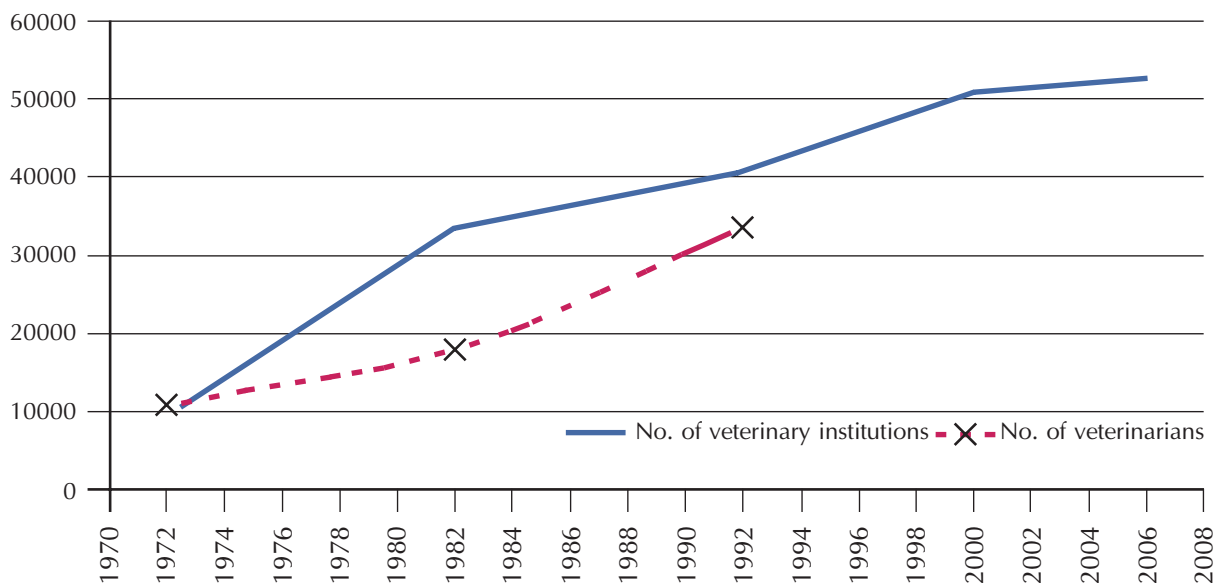
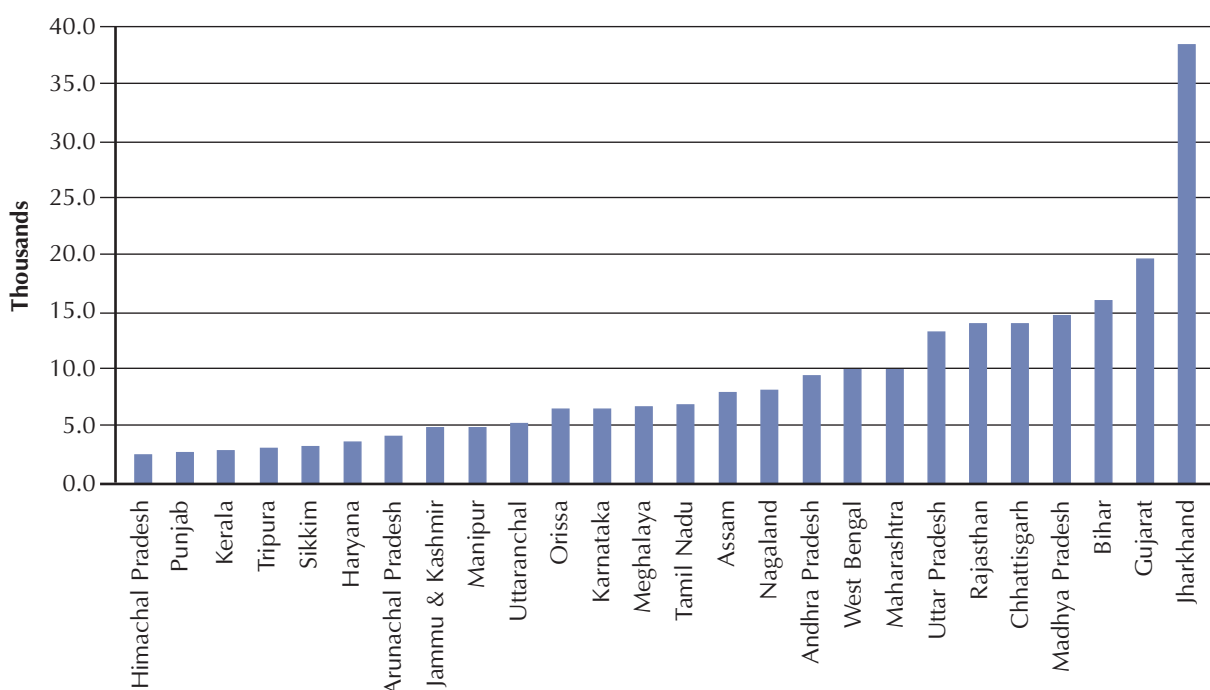


Figure 8: Livestock Units per Veterinary Institution - 2004



Source: Animal Husbandry Statistics, Government of India

funding for these services to barely cover the salaries of the employees (85% of the State non-plan budget in most states) leaving lesser and lesser funds for veterinary medicines, vaccines, reagents, instruments and equipment. But any suggestions to involve private sector players in livestock service delivery to mobilize financial and managerial resources are met with great

resistance and suspicion on the ground that this will restrict the access to these services by the poor.

A series of studies undertaken to assess the distributional outcomes of the above policy have emphasized the need to fine tune service delivery systems including creating space for other non-government service providers

(Ahuja,). These studies make a reasonably strong case for reducing the subsidies in the form of free services and putting this money into services such as disease prevention, reporting, control, awareness education and so on, for these are the services that are currently neglected due to fiscal pressures and are likely to generate a larger social good than simple treatment services. The studies highlighted a number of shortcomings of animal health service delivery system in India. Some of these are summarized below

1. Livestock services are biased towards delivering curative veterinary services and AI. Preventive veterinary care receives scanty attention and vaccination coverage of animals is unsystematic, below the level of effective protection. As a vast majority of cattle and buffalo are owned by small and marginal farmers and landless households, this lack of adequate prevention in particular affects the poor.
2. The government has traditionally been, and continues to be, the primary provider of these services. Government services are delivered through a vast network of veterinary dispensaries, hospitals, first aid centres and AI centres, which employ a large number of veterinary professionals and para-veterinary staff.
3. The number of private providers is quite small and they generally operate in areas where there is unmet residual demand. Some cooperative unions and NGOs also provide these services, but their area of operation is limited to the cooperative milk procurement zone or the base of operations of the NGOs. Notably, however, a large number of government veterinarians do operate as 'private veterinarians' in terms of charging market based fees, instead of the government set fees.
4. In the public sector, current budgetary resources cover mainly the salaries and benefits of veterinarians and veterinary technicians employed by the government on a full-time basis, leaving very little funds for

other recurrent needs such as drugs and veterinary supplies. As a result, farmers using government services generally have to purchase the prescribed drugs and supplies from the market. Limited financial resources also limit investments in diagnostic equipment and a large number of government veterinary institutions are without any diagnostic facilities.

5. Government services are intended to be delivered with significant subsidies or for free. A large proportion of this subsidy, however, does not reach the service users. Further, whatever little is actually reaching the users is not necessarily benefiting the poor. The profile of those who received subsidized services shows that not all of them belonged to the 'poor' category.
6. There is significant positive willingness to pay for curative veterinary and AI services. Even though the prices paid by the users to government providers are not substantially different from those charged by the private veterinarians, the users are not dissatisfied with prices they are currently paying.
7. The elasticity of demand for curative veterinary services is very low. The services are valued very highly and price is not the foremost consideration in deciding on the use of these services. The poor are not necessarily more price sensitive than other groups. No effect of income is found on price elasticities.

Based on these findings, the studies suggest that the governments should share the responsibility of delivering livestock services with private providers and creating an enabling environment for private practitioners. At the same time, the studies do caution that complete privatization of service delivery in the immediate future is neither feasible nor desirable. For a long time to come, therefore, presence of the government in livestock service delivery is inevitable. The issue, therefore, is how to manage the transition from pure public to more market oriented service delivery style. Again, these studies suggest several options that can facilitate managing this transition. These are outlined below:

Option 1: Improving Effectiveness and Sustainability of Government Services

Balancing the role of government and encouraging private providers are the objectives under this option. This, in the short term, would require:

1. improving the effectiveness and financial sustainability of government services through operational and financial autonomy of veterinary centres and cost recovery;
2. creating the enabling environment for greater private sector participation in the delivery of livestock services; and
3. establishing the regulatory framework to ensure quality of service delivery.

Fostering greater financial autonomy of veterinary institutions

Restructuring the veterinary services delivery network, enabling each of the veterinary hospitals, dispensaries to develop into financially autonomous entities would ensure their sustainability. This would require full cost recovery for all curative veterinary and other private good services delivered at the centre as well as at home. The full costs recovered will include:

1. cost of materials and supplies such as drugs and consumables for veterinary care,
2. transport cost in the case of home delivery; and
3. an appropriate share of salaries and establishment costs.

Under this option, the service unit should be allowed to retain the revenues from recovering the cost of the (i) materials and supplies (drugs, consumables, frozen semen, liquid nitrogen, etc.), and (ii) an appropriate share of the establishment costs. These revenues would be used to build up a revolving fund to help ensure financial sustainability over the longer term. To minimize the current establishment costs, re-evaluation of the government staffing structure and the adoption of mechanisms (e.g., early retirement and reassignment to neglected

localities) will be needed in parallel to improve the cost effectiveness of the existing system while promoting broader coverage in neglected areas. This would lead to a reduction in the fiscal subsidy requirement of government services and improvement in the quality of service that government centres could provide to farmers, particularly in ensuring the availability of essential drugs and other supplies as well as expansion of areas covered.

Creating an enabling environment for private practitioners

Introduction of full cost recovery is the first step towards creating a level playing field for private practitioners. However, the next essential step would be to restrain government veterinarians from engaging in private practice while also earning salaries and perks as full-time government employees. Together, these two measures will ensure a level playing field for the intending private practitioners and will encourage the growth of private providers in the services sector.

The two measures recommended above would make the government delivery system progressively viable and of better quality and will enable balanced growth of the government system along side private providers.

Regulatory framework to ensure service quality

Meaningful commercialization and privatization requires good regulation which, while protecting the consumers, does not impose disproportionate regulatory costs and risks on the producer. Veterinary councils, both at the national and state level, already exist. Under the Indian Veterinary Council Act, these councils are mandated to regulate the ethics and quality of the professional services in the sector. However, the councils have yet to put regulations and the statutory framework in place. Since regulating the quality and ethics of the services is an essential requisite under all options, it is important that guidelines for private veterinary services delivery are

formulated. This should be done in consultation with all the stakeholders such as Indian Veterinary Association and other agencies like National Dairy Development Board, BAIF, farmer groups, veterinary pharmaceutical companies, and representatives of private service providers.

Option 2: Restructuring the Government Services Delivery System

This option seeks to make use of the existing government infrastructure and manpower for services delivery while distancing the governments from direct delivery of services. It makes the existing professionals and para-professionals a part of the change and enables them to actually bring about the change—moving services delivery away from governments towards self-generating, sustainable mechanisms. The specific recommendations in the context of this option are:

1. converting all government veterinary hospitals, dispensaries and AI centres into independent practice centres delivering veterinary and AI services at the farmers' doorstep;
2. manning the mobile services with the serving veterinarians and inseminators;
3. enabling the practitioners to make the service delivery a private arrangement;
4. allowing them to charge for service delivery at market determined prices;
5. encouraging them to build up their practice in their place of posting, without further transfers and continuing to pay them salaries, allowances and retirement benefits (on superannuation);
6. promoting private practitioners to succeed serving veterinarians and inseminators when they retire or superannuate; and

Under this option, the practitioners will be required to arrange at their own cost all supplies for their practices. In addition, they will also be

required to arrange the transport for their practice with credit from commercial banks/ lease companies. The State Animal Husbandry Departments will no longer be required to supervise services delivery on a day-to-day basis or provide practitioners the supplies for their practices.

This change in the delivery system will enable the practitioners to reach out to farmers, enormously expand the coverage of service, improve service quality and reduce the users' cost in terms of time and money spent on transporting the animals to the centres. Above all, it will enable a smooth and gradual changeover from government employees to private practitioners for service delivery.

The major advantages of the option are that it enables serving veterinarians and inseminators to develop to their full potential, expands the service coverage, encourages transparency, avoids the need for subterfuge and minimizes the disruptions and social upheavals associated with change. The major disadvantage of this option are that the government continues to bear the cost of the services establishment⁵ and salaries, while the veterinarians and inseminators are officially allowed to engage in private practice, and that it creates a potential disincentive to the entry of purely private livestock service providers.

Option 3: Leasing Government Veterinary Service Facilities to Private Veterinary Professionals

This is a limited option that can be applied in combination with other options. Private veterinary practice basically needs no such established facilities, as services are invariably rendered at farmers' homesteads (animal side). Speciality veterinary hospitals and polyclinics exist in all states and these institutions invariably accommodate a group of specialist veterinarians.

⁵ This, however, is on a diminishing scale, as retirements will progressively reduce the cost burden on the government. Discontinuation of supplies for veterinary and AI services, as also discontinuing day-to-day supervision and monitoring of the vast services delivery network, will result in immediate cost saving.

All such institutions will have the potential for leasing as part of a voluntary retirement package for professionals, as a base of operations and for specialist consultation. However, the application of such treatments under Indian conditions will be limited and location specific.

Incentives for Managing the Change

All three options discussed above would need incentive packages to make them attractive to the serving veterinarians and inseminators and to persuade them to go along with the changes. Several complementary measures are also needed to hasten the change and to ensure that the change is permanent. Some recommendations in this context are:

1. offer all serving veterinarians and inseminators, who have put in more than five years of government service and those who have more than 10 years to superannuate, an attractive Voluntary Retirement Scheme (VRS);
2. keep the VRS offer open for a reasonable length of time to enable waves of practitioners to make up their mind initially, and then reopen the offer three years later to give the undecided ones a second chance;
3. allow those accepting the VRS to choose their area of practice;
4. ensure for them a level playing field in their chosen area, that is, start no service delivery institution in their practice area and or relocate any that already exist;
5. offer a start up grant and/or loan for professional equipment needed for their practice; and
6. give them positive discrimination: government contracts for animal/ animal products inspection, enforcement of zoo-sanitary measures, preventive vaccinations/ campaigns and disease surveillance and reporting;
7. make no new recruitment for services delivery nor start new delivery institutions in the state, as a matter of policy; and
8. promote private veterinary and AI practices to fill up gaps in service delivery and in

retirement vacancies (offer them training, and licenses as incentives).

In this context, it must be emphasized that the above studies focused only on curative treatment and AI services for dairy farmers. Thus, the scope of substantial involvement of private sector in providing livestock services may still be limited to high potential areas. Poor and marginal areas would still require approaches that can overcome the structural constraints of high transactions costs and low demand for services resulting from poor awareness and subsistence oriented production system. A number of alternative models have emerged to effectively address the issue of service delivery in such areas. These include community based animal health workers (CAHWs), para-professionals, membership organizations, self-help groups and so on.

Many states have rich experience with delivery of services with the help of Animal Health Workers—either private (with appropriate technical and input supply support from the state) or those employed and supported by NGOs. In general, farmers appreciate the services rendered by these service providers as they are able to reach much closer to the farmers than the AHD. But, there remain concerns about service quality, specially the impact of some undesirable practices in the long run. Paravets and AHWs often go beyond their brief and perform services that they are not equipped or trained for. It is, therefore, important to have in place a strong monitoring, regulating and support system **to strengthen and mainstream the service delivery by paraveterinarians and AHWs**. In an exercise carried out in the state of AP in the year 2005, the Government of AP, set-up an Expert Group to debate and suggest ways of 'Mainstreaming Minor Veterinary Services in Andhra Pradesh'. Based on an extended debate and wider consultations, the expert committee identified seven broad areas encompassing different services that can be rendered by Animal Health Workers. These include

1. Extension and advisory services
2. Fodder development
3. Preventive health and disease reporting
4. Minor procedures in first aid
5. General dispensations
6. Doorstep inseminations
7. Castration

The services were then categorized as schedules I, II and III services. The spirit underlying the scheduling was to visualize the extent of training, handholding and supervision, which in turn will provide clues in formulating meaningful curricula. The essence of each schedule is given below:

Schedule I	All general extension and fodder development services (which require basic orientation training).
Schedule II	All services that require systematic skill development and guidance of a registered veterinary practitioners
Schedule III	The services that require advanced training and supervisory guidance of the registered Veterinary Practitioner

States need to recognize that Animal health workers are a critical link in the overall animal health system and provide an effective model for extending the outreach of animal health service delivery to poor and marginalized areas. However, the realization of their full potential requires a strong linkage and referral system for the purpose of ethical and professional supervision and technical support. It is therefore essential that they become an integral part of the animal health system with the help of necessary legislation. Recently a fairly exhaustive exercise was carried out in the state of Andhra Pradesh to provide role clarity for different kinds of service providers within a clear legal framework. *Detailed recommendations based on that experience are given in Annex 2.*

Similarly, certain identifiable groups (such as small ruminant rearers, tribal households, dalits

families, etc) who are extremely poor will continue to need special support packages for helping them to outgrow their subsistence livelihood systems and become productive livestock farmers. In this context, a village based livestock service delivery mechanism, community driven but initially paid for by public funds, would be the first step in any development effort: timely availability of vaccinations, minor veterinary services will reduce production losses, drastically cut down mortality of livestock, increase output, protect farmer investments and will help to appreciably increase household incomes.

Some awareness already exists at the policy level on these issues. For example, the Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India, appointed a Steering Group in 1993, to review the livestock sector in India and to recommend to the Government a unified policy framework for the livestock sector. The report of the steering group, arrived at through a process of review, analysis and extensive consultation with a cross section of the stakeholders was presented to the GOI in 1996. Among other things, the report recommended the need for a review in the government's role in livestock sector in general and in livestock services delivery in particular. Similarly, the recent livestock sector policy of Orissa suggests major reforms in livestock service delivery (see Annex 4 for a brief overview of the provisions relating to animal health services in the new livestock sector policy of Orissa).

The progress on the ground on these issues has however been slow. Many states are not willing to confront the political economy of change while others may not be fully convinced about the viability/feasibility and equity/efficiency impact of alternative models. This requires dialogue with a wide set of stakeholders so as to discover models of service delivery that would suit local production and market conditions. Recently, A consultative process was carried out in Andhra Pradesh under the

auspices of PPLPI (Pro-Poor Livestock Policy Initiative) of FAO,⁶ CALPI (Capitalization of Livestock Program Experiences India) and Government of Andhra Pradesh. Lessons from that exercise can be of immense learning value for managing change (see Ahuja, Gustafson and Otte, 2008, for lessons from AP exercise).

PUBLIC SPENDING

Both the central and the state governments fund livestock development. Table 5 below shows public spending on livestock by the central and state governments. Expenditure on animal husbandry and dairy development nearly doubled from Rs 12.8 billion in 1981–83 to Rs. 21.9 billion in 2001–03. This comprised 8 percent of total expenditure on agricultural and allied activities in 2001–03, down from 14 percent in 1981–83.

Most expenses towards animal husbandry and dairy development come from the state governments. Contribution of the central government in total expenditure was only 5 percent in 2001–03, down from 15 percent in 1991–93. Activity-wise allocation of livestock sector expenditure is shown in Table 6. Although dairy development continues to be the preferred public spending activity, the share of Veterinary services, animal health and veterinary education in the total expenditure on animal husbandry has increased from about 15 percent to 26 percent. Overall, however, public spending on livestock remains meager compared to the growth and livelihood support potential of the sector.

Table 5: Expenditure on Animal Husbandry and Dairy Development in India (at 1993-94 prices)

	1982-83	1992-93	2002-03
Agricultural sector (Rs. Billion)	93.2	171.3	276.6
Percent share of central government		43.9	57.0
Livestock (Rs. Billion)	12.8	19.5	21.9
Percent share of central government		14.8	5.0
Percent of livestock in total agricultural expenditure	13.6	11.4	7.9
Livestock expenditure/cattle equivalent unit (INR)	41.3	62.7	71.1

Source: GOI: Reports of the Auditor General and Comptroller of India

Table 6: Distribution of Livestock Sector Expenditure by Activity (%)

	1982-83	1992-93	2002-03
Cattle and buffalo	11.9	13.0	11.7
Sheep and goat	2.3	2.4	2.5
Poultry	3.0	2.9	2.1
Veterinary services and animal health	13.3	21.1	23.3
Feed and fodder	1.0	0.9	1.1
Veterinary education and research	1.9	2.0	2.7
Dairy development	57.8	44.8	41.2
Direction and administration	2.5	3.9	7.2
Other expenditures	6.3	9.0	8.2
Total	100	100	100

Source: GOI: Reports of the Auditor General and Comptroller of India

⁶ PPLPI is an initiative of the Food and Agriculture Organization of the United Nations to facilitate and support the formulation and implementation of policies and institutional changes that promote the participation of poor in livestock product markets and sustain and support poor people's livestock dependent livelihoods. The initiative is supported by the Pro-Poor Livestock Policy Facility based at FAO headquarters in Rome, and is being operationalized through strategic country engagement in South Asia, South-East Asia, the Horn of Africa, West Africa and the Andean region. More details on the initiative are made available in Annex 5.

Table 7: Public spending on animal disease control (Rs. Lakhs)

States	Assistance to State for Control of Animal Diseases			National Project for Rinderpest Eradication			Foot & Mouth Diseases Control Program					
	2003-4	2004-5	2005-6	2006-7	2003-4	2004-5	2005-6	2006-7	2003-4	2004-5	2005-6	2006-7
Andhra Pradesh	184	216	0	500	10	40	35	0	98	150	130	0
Arunachal Pradesh	45	50.4	101	101	15	25	35	5	0	0	0	0
Assam	247	0	0	0	25	20	20	5	0	0	0	0
Bihar	253	0	193	0	0	0	0	0	0	0	0	0
Jharkhand	142	6	50	50	15	15	0	0	0	0	0	0
Goa	8	24	15	30	10	10	25	0	0	0	0	0
Gujarat	247	439	293	455	25	20	30	0	88	150	80	0
Haryana	211	328	256	150	20	35	30	5	116	200	55	0
Himachal Pradesh	67	76	82	104	20	15	22	0	0	0	0	0
Jammu & Kashmir	75	203	200	200	20	32	23	0	0	0	0	0
Karnataka	74	451	400	865	25	40	38	10	0	0	0	0
Kerala	80	0	150	150	20	15	10	5	41	58	60	0
Madhya Pradesh	6	234	275	197	25	35	10	5	0	0	0	0
Chattisgarh	46	174	54	450	10	10	10	0	0	0	0	0
Maharashtra	91	666	705	1035	25	35	35	10	122	180	0	0
Manipur	65	104	58	97	15	10	10	0	0	0	0	0
Mizoram	101	169	244	251	15	10	20	5	0	0	0	0
Meghalaya	42	23	81	97	25	10	0	5	0	0	0	0
Nagaland	176	315	346	310	15	10	15	10	0	0	0	0
Orissa	210	330	229	270	20	15	15	5	0	0	0	0
Punjab	32	156	0	370	15	15	15	0	126	200	70	0
Rajasthan	88	204	267	257	25	20	30	0	0	0	0	0
Sikkim	32	0	51	57	20	10	20	0	0	0	0	0
Tamil Nadu	64	300	999	200	10	15	30	5	14	20	40	12
Tripura	154	43	220	142	20	10	0	0	0	0	0	0
Uttar Pradesh	414	263	1222	0	20	20	25	0	282	524	260	0
Uttaranchal	11	125	103	158	10	10	0	0	0	0	0	0
West Bengal	105	465	492	547	45	35	45	10	0	0	0	0
India	3271	5367	7086	7153	520	537.5	548	85	887	1482	695	12

Source: Animal Husbandry Statistics, Various years.

3. Disease Reporting, Surveillance, Diagnosis and Emergency Response

Normally disease incidence in livestock is reported by the villagers or village sarpanch or local village assistant to nearest veterinarian. Initially the disease is diagnosed based on the disease symptoms reported by the villagers as in most cases by the time veterinarian reaches the village the animals are dead. Due to this reason collecting samples and confirming the disease does not happen. Second, in many cases diseases are not reported and affected animals are sold at throw away prices. Even in cases when veterinarian can reach the animal before disposal, they are not able to collect samples due to lack of equipment for collection, preservation and transportation to nearest laboratory for confirmation.

As on date only dung samples are examined at most of the veterinary hospitals to identify parasitic infestation. Animal health centers are located at district head quarters who are responsible for confirmation of disease and supply of required vaccines for conducting preventive vaccinations. At district level diseases are confirmed based on the symptoms and examination of dung, urine, blood samples and by conducting postmortem of dead animals. For further confirmation, samples are sent to the state laboratory, the reason being non availability of diagnostic kits at field level or at district level. Even at the state level final

confirmatory diagnosis is not done for many viral diseases and samples are sent to central or regional laboratories established by Government of India.⁷ Currently, cultural and biological tests are conducted at state level laboratories. If facilities and trained manpower are provided at district level most of the diseases can be diagnosed at district level and effective control measures can be taken up immediately. In most of the cases by the time disease is confirmed, the affected livestock is not available to take up remedial measures. Overall, the livestock disease reporting system in India has become a low profile administrative ritual which has outlived its relevance except that it remains as the only official record of disease outbreak with morbidity and mortality statistics although with no details of population at risk. It has built in hierarchical complacency resulting in the loss of epidemiologically sensitive information. In sum

- The existing reporting system is passive and lacks direction.
- The disease reports are based on clinical symptoms and subjective assessment and lack laboratory confirmation
- Under reporting and not-reporting are the norm rather than exception
- Since the disease outbreak reports are consolidated manually at block, district and

⁷ These include one central laboratory “Center for Animal Disease Research and Diagnosis” at IVRI Izzatnagar (CADRAD) and four Regional Diagnostic Centers—Pune for Western region, Kolkata for East and North East regions, Bangalore for South, and Jullundher for the North.

state levels, the information collected is diluted at every stage of consolidation and transmission to the higher authority. Vital information of the details of outbreak are lost permanently

- The information flowing into the system is incomplete and inadequate, as it lacks the disease information from non government agencies, private practitioners, universities, etc.
- There is no cohesiveness in handling livestock diseases as a national phenomenon and each state acts as a compartment without any interaction with its neighbour
- There are no organised national surveys of endemic diseases to assess incidence and prevalence
- There is severe dearth of laboratory infrastructure, quality diagnostics and trained manpower
- Veterinary extension education is very poor

The state governments claim that preventive vaccinations are being carried out against many livestock diseases. However, given poor data availability, it is difficult to assess the veracity of such claims. The situation is further complicated due to (i) no control on the movement of diseased animals within the state or outside the state, (ii) poor disposal of dead animals (In most of the cases dead animals meat is consumed and skins are sold in the market and dead animal carcasses are discarded either in tank beds or in common grazing lands), and (iii) complete absence of coordinated efforts between the states in controlling viral diseases.

The State and Central Plan budgets annually include provision for vaccinating animals against all major diseases. However, the vaccinations are distributed all over the country, as a share of the plan budget due for each district and do not result in any advantage in terms of containment of diseases. Application of the same amount of money perhaps on a planned approach to disease control – based on an area specific control plan and supported by a sound

epidemiological surveillance system can result in high cost-benefit ratios. Recently, an attempt was made under the PPLPI of FAO to develop an action plan for control of animal diseases of economic importance for the poor. A total of five diseases — Haemorrhagic septicaemia (HS), Peste des Petits Ruminants (PPR), Black quarter (BQ), Enterotoxaemia (ET) and Ranikhet disease (RD) — were identified for the purpose. A focused epidemiological analysis of the retrospective seven-year (1998 to 2004) disease outbreak data of AP was attempted to delineate the long-term trends of these diseases. In addition, need-based collateral information on number of outbreaks, attacks and deaths and villages affected, weather parameters, migration profiles, population (livestock) density per sq. km., infectivity and habitat aspects of the associated pathogens were reviewed to substantiate their impact on the long term disease trends. This was done with a view to understand specific temporal and spatial parameters associated with the long-term disease trends in the population and their usefulness in evolving control strategies and action plans.

Based on the analysis and general epidemiological considerations, a two-pronged approach to disease control was suggested. This includes massive vaccinations in high disease incidence districts to substantially bring down or freeze disease outbreaks in high-risk districts while allowing identification of 'infection foci' should outbreaks surface in low-risk districts. More details are available in Rajsekhar (2006) and in Annex 3. It is recommended that an integrated exercise of this kind is carried out for all states. This can be financed under the project "*Assistance to States for Control of Animal Diseases (ASCAD)*" which provides assistance to States/ Union Territories for control of economically important diseases of livestock and poultry. The programme is being implemented on 75:25 sharing basis between the centre and the states; however, 100 % assistance is provided for training and seminar/workshops.

A RECOMMENDED DISEASE MONITORING AND SURVEILLANCE SYSTEM

An organised nation-wide disease monitoring and surveillance system is a basic requirement for a sustainable livestock health and production system. One of the most important activities in veterinary epidemiology is the continuous observation of the behaviour of disease in livestock population. Continuous observation of endemic diseases in general, in different livestock population is referred to as “disease monitoring”, while intensive observation through investigation of a specific hitherto unknown exotic disease in a particular population (including risk analysis of importing livestock and products in the country) is referred to as “disease surveillance.”⁸ In recent times, the usage of ‘disease surveillance’ has found greater global acceptance over ‘disease monitoring’ which primarily dealt with analysis of endemic disease estimates and their trends with or without preventive interventions. The goal of surveillance is a directed specific action in the prevention and control of disease condition. The reliable information generated by the monitoring and surveillance evaluation reports can be useful for

- geographic and seasonal estimates of diseases,
- establish indices for projection of future disease patterns and trends,
- develop time and location specific epidemiological profiles,
- forewarn the endemic, new or emerging diseases,
- evolve strategies for national disease control and eradication,
- design economically feasible livestock health delivery system
- promote production and exports,
- conduct risk analysis for import regulation of animals / products.

The success of any monitoring and surveillance system largely depends on the simplicity of data generation, the speed and efficiency of data collection, retrieval and analysis. Lack of timely and reliable data is the inherent problem of the existing system.

The active monitoring of diseases is essentially early recognition of the disease outbreak, its laboratory validation, tracking of its source and movement coupled with identification of precipitating factors which will provide clues for the critical control measures. The final outcome depends on the effectiveness of the control and the a variety of epidemiological situations that may or may not lead to the establishment of temporary or permanent disease foci with variable endemicity.

This demands all the inputs in position for an effective fire-fighting approach which is not easily available in the country. The failure on this front is perhaps responsible for a large number of diseases becoming endemic. There is an urgent need for massive inputs for strengthening of infrastructure, veterinary services, manpower and resources.

Surveillance is disease intelligence. Here, a never ending vigil is kept on new diseases which hitherto did not exist or were not recognized. A close watch is also maintained on the the international disease scenario and in particular the risk analysis of importing livestock and products. This is the weakest link in India as the country has the reputation of importing livestock without due regard for the disease situation in the exporting country. Also, equally lacking are effective quarantine and exotic disease diagnosis facilities. Disease surveillance could be done through abattoirs by active ante and post slaughter examination.

Rapid growth of information technology is making the task of monitoring and surveillance

⁸ In recent years, GOI has notified and enforced import restrictions on livestock, products and biologicals from several countries with respect to Bovine Spongiform Encephalopathy (BSE) and Avian Influenza (H5N1) among the others. ICAR High Security Animal Disease Laboratory for exotic disease confirmation at Bhopal has strengthened surveillance of new incursion across the borders.

easier and faster with built-in checks resulting in high degree of reliability. The need of the hour is to strengthen the disease monitoring and surveillance based on Geographic Information System (GIS). With fairly well developed telecommunication in India, following options are recommended for the consideration of GOI for enhancing the effectiveness and efficiency of disease monitoring and surveillance.

- Interactive Voice Response System
- SMS through mobile/cell phones
- Toll free land line phones - voice mail

Interactive Voice Response System

The IVRS is an automated interface with telephone callers (disease informers / reporters), which can enable instant delivery of time-critical information. Interactive Voice Response System has proven to be the most effective automated interaction and can be tailor made to suit the requirements of any Industry. It can also be routed through operators (preferably by retired vets on shift basis) to provide person to person direct interaction which helps to elucidate disease related information from farmers, or from the Epidemiology Units or from any Business Service Providers.

IVRS can provide an almost fool proof voice/speech-to-data-to-voice conversions and all the details of the caller ID phone / Mobile number, time and duration of call to trace back and information storage for any length of time. It can also receive emails or SMS and convert to voice mails to data for delivering to the pre-designated phone /mobile/ SMS /e-mail/ Fax. It can receive voice mails in any language and respond in the same or alternate voice messages-very useful to illiterate villagers. The disease outbreak message can then be distributed or conveyed through voice/SMS/Email/Fax instantaneously to vet service providers at all levels. Pre-recorded messages through IVRS can also be helpful extension education activity of Animal Husbandry Departments. If linked to GPS, it can also display disease outbreaks

reports on maps and the data can be stored for epidemiological analysis.

The details of costing and maintenance need to be worked out if IVRS is to be put in use for national disease reporting system. It is recommended that GOI takes a very serious look at IVRS given its versatility and multi functionality.

SMS through mobile/cell phones

This is useful in its own way for disease reporting for people with mobile phones and literate enough to write a SMS. It is not automated for redistribution of messages and requires manual intervention for this purpose. It is difficult to organise a national network for the simple reason that no one knows when and where the disease is going to strike and access to cell phone for sending SMS and in particular to find person willing to SMS for a poor villager. Voluntary networks in endemic areas can be attempted as good public relations effort by local vets. On the other hand, in most places public land line telephony is feasible and its use for disease reporting is seen as more pragmatic than SMS.

Toll free land line phones

This can perhaps provide the most easily accessible, simple, user friendly system even in most remote places for disease reporting. If Toll-Free numbers are provided by the Government, the system can encourage farmers to report disease and interact with vets at various levels of Admin. These toll-free numbers can be directly linked to various animal health functionaries with a separate response cell at epidemiology unit for follow up action. It is recommended that Toll-free land line phones is considered on top priority by AHD.

In addition to the above measures, there is also a need for a simplified disease reporting format. Lengthy and complicated formats dissuade field functionaries from active disease reporting. It is recommended that a simple 'Disease

Outbreak Report' format be developed and deployed nationwide. The required epidemiological data collection should be the responsibility of the Epidemiologist investigating specific outbreaks, through detailed formats.

Use of hand held computers with pre loaded formats can greatly facilitate quick and effortless data collection and subsequent transfer to desktops on return to office / laboratory.

4. Inputs and Supplies

Veterinary Pharmaceuticals and biologicals: A wide range of veterinary pharmaceuticals and biologicals are produced in the country. The pharmaceuticals industry is mainly in the private sector, while the production of biologicals (vaccines) is shared by the Public and Private Sector. The total number of manufacturing units for pharmaceuticals are many—a large number of them in the small scale sector. There are 26 biological production units – 19 in the Government and 7 in the Private Sector. Modernization is urgently needed, both for equipment and skills. Some of the production units however have excellent, state of the art, facilities, and can serve as models for others.

Veterinary vaccines and biologicals products are manufactured in India primarily by the Government institutions, both central and state. There are now 29 biological production units – 22 in the government sector, 7 in the private sector. 21 viral vaccines 14 bacterial vaccines and 13 diagnostic reagents are now produced in the country. Most of the government units are owned and operated by state governments. Each state institute is trying to produce all the requirements of the state for all the diseases. Among them there is no product specific specialization or a common product policy.

Most of the state owned units barring a few are ill equipped and do not have adequately trained staff. In most of the units the technologies used and skills available are out dated. In the private

sector most of the units are owned by larger companies and have modern and up to date facilities and skills. Those in the small scale sector are often ill equipped and ill conceived. But, quality assurance and quality control both in the public and private sector leaves much to be desired. Most of the public sector units do not follow good manufacturing practices and the private sector, barring a few units, often cuts short the procedures to avoid expensive quality control procedures.

Continued presence of public sector units in vaccine manufacture results in wasteful utilization of resources while raising costs of vaccine production due to poor economies of scale and unnecessary public sector overheads. Given the private sector capacity in vaccine production, there does not appear to be any logic for the state governments to continue to engage in the manufacturing of vaccines and biologicals. The government should therefore *gradually* move out of vaccine production and shift its own demand to private sources. Even in case of niche vaccines where aggregate demand may not be large enough to attract private sector investment, the government should evaluate the possibility of providing tax breaks and lump sum subsidies to encourage private sector vaccine manufacturing instead of continuing to engage in producing them.

Regulation of production of veterinary vaccine and biologicals is under the drugs and cosmetic act-1940 administered by the drug controller of

India, assisted by state drug control department. Standards for veterinary vaccines followed in India are out dated which need revision. Indian Veterinary Research Institute is responsible for monitoring the quality of vaccines and biologicals produced in the country. In addition, a separate National Veterinary Biological Quality Control Centre has been established at Baghpat, Uttar Pradesh with the following objectives

- recommending licensing of manufacturers of veterinary vaccines, biologicals, drugs, diagnostics and other animal health preparations in the country.
- establishing standard preparations to be used as reference materials in biological assays.
- ensuring quality assurance of the veterinary biologicals both produced in the country and obtained through imports.

The major player in the industry – Glaxo (now virbacc) accounts for approximately 10 percent of the market due to its strong presence in the poultry and cattle segments. This is followed by Zydus Sarabhai, Intervet and Pfizer. The top ten companies account for more than 60 percent of the market. Competition is intense not by the number of companies in the market, but more due to the fact that most of these companies have competing “me-too” products. The two major FMD vaccine manufacturing companies- M/s. Indian Immunologicals Limited and M/s. Intervet are ranked among the first five companies in the Industry.

Biologicals contributed more than 15 percent of the total revenue of the AH Industry during the year 2003-04. In fact the biological segment has witnessed the fastest growth during the last one decade with more than 50 percent contribution coming from the commercial poultry sector. In cattle segment the FMD vaccine continues to be the biggest revenue earner with a contribution of more than 30 percent. The introduction and implementation of FMD- Disease Free Zones concept in the country and continued support to States under ASCAD programme by the Central Govt. has helped expanding this market.

Anti-infectives: These constitute the biggest therapeutic segment—28 percent, of the Indian Animal Health Industry. Poor level of farm hygiene and sanitary conditions coupled with traditional husbandry practices amongst the farmers across the country usually results in a number of diseases amongst their livestock due to high bacterial count. The therapeutic use of anti-infectives therefore, is widespread in all the sectors - Cattle, Poultry, Sheep and Goats amongst farmers.

The anti-infectives’ market in Cattle & Sheep/Goat segment is dominated by the use of Streptopencillins and Tetracycline’s. Pfizer’s Terramycin (Oxytetracycline) and Zydus Sarabhai’s DCR (Dicrystacin) are the leading brands in this segment followed by Moxel (Amoxicillin+Clavulanic acid) from Alembic. The use of 3rd and 4th generation cephalosporins is not yet widespread and is limited to treating specific infections like mastitis etc.

Quinolones: Enrofloxacin and P-Floxacin are the most popular antibiotics being used in Poultry sector. Enrocin- a brand from M/s.Ranbaxy continues to be the brand leader in Poultry segment. Indiscriminate and continued usage of tetracyclines & Streptopencillins at the farmer level for the last two decades however, has led to resistance development to most of these antibiotics. The existing scenario offers a good opportunity and scientific rationale for one to come out with a new generation broad-spectrum injectable antibiotic for use in Cattle. Marbofloxacin (a quinolone) and cefquinome (a 4th generation cephalosporins) can be the best alternatives fitting in to the current market requirements. Similarly for fast growing canine segment, a combination of (Amoxicillin + Clavulanic acid) can be an antibiotic of choice.

The Indian Animal Health Market is essentially a dairy oriented market. The main focus in cattle rearing continues to be getting the more productivity from animals in form of milk. Mastitis in milch animals continues to be one of the major diseases of livestock. There is a good market and scope for introduction of a

combination of anti mastitis infusions for the treatment of mastitis in dairy cattle. A combination of (Cefaperazone Sod.+ Procaine Pencillin G+Prednisolone) can be a good alternative. As per our information the anti-infective market will continue to grow at an average annual compounded growth rate of 5%.

Anti-parasitics: The anti -parasitics constitutes the second biggest therapeutic segment with nearly 20 percent contribution to the total turnover of Indian Animal Health Industry. The growth in market for anti-parasitics is estimated at more than 10 percent per annum.

Regular use of anthelmintics for deworming their flocks is quite popular amongst the nomadic population of shepherds across the country. The small ruminant segment accounts for around 28 percent of the anthelmintic market where as cattle segment contributes about 70 percent. Benzimidazoles/Fenbendazole/Mebendazole/Triclabendazole), Imidothiazoles Tetramisole/Levamisole) and Pyrantel Pamoate are the most popular anthelmintic salts being marketed by many companies. For controlling fasciolosis the salicylanides are the most preferred formulations. Nilzan by Glaxo, Tolzan by Intervet and Fascinex by Novartis are the most popular brands.

Ectoparasiticides: The Indian ecto -parasiticides market has grown phenomenally during the last one decade. The market has evolved from the

use of chlorinated hydrocarbons to Organ phosphorus compound to pyrethroids and formamidines. At present the market is dominated by the synthetic parathyroid formulations –like Deltamethrin ,Cypermethrin and flumethrin etc.

Given the temperate climate of the country, uncontrolled grazing, poor farm hygiene and sanitary conditions will continue to pose a big challenge and a menacing threat of ecto and endoparasites to the livestock. Moreover it has been observed that due to indiscriminate and excessive use of ectoparasiticides at farmers level has lead to resistance development to these molecules.

Anti-protozoals: With increasing crossbred population of cattle across the country has always been under constant threat from the protozoal diseases like Babesiosis, Theileriosis and Trypanosomiasis. Berenil (diminazene diacetate) from Intervet is the drug of choice and a brand leader for treating babesiosis in cattle. However for treating theileriosis cases there are not much alternatives and the drug of choice continues to be limited. The Camel population in the country is expected to be around 1.1 million. However for treating the most frequently occurring Surra (Trypanosome evansi) infections in camels, hardly there are alternative drugs available which can be rated very effective.

5. Conclusions and Recommendations

The foregoing analysis underlines the need for re-examining government's current strategy for delivery of animal health services. As noted in the introduction, domestic as well as global demand for livestock products is growing rapidly and can be a source of poverty alleviating growth. But poor fiscal condition of the state government, poor infrastructure for market access, and low awareness are likely to be the main constraints in capitalizing on this opportunity.

In absence of good access to markets, demand for livestock services is likely to remain low necessitating the government presence in service delivery in many areas. That has the effect of locking up the resources required for providing much needed disease control and surveillance and market access infrastructure for this sector. A recommended disease monitoring and surveillance system has been proposed in section 4 and the government will be well advised to operationalize the system in all states. This would require setting up a central command and control system along the lines of Rinderpest eradication project. Similarly, elements of disease control strategy are given in Annex 4 and the government should seriously consider the feasibility of operationalizing such an approach.

Coming back to the discussion on service delivery, there are a number of progressive areas with relatively good access to markets that can profitably support the private veterinary sector.

However, what is needed is a level playing field for private practitioners. Subsidized delivery of these services by the government provides unfair advantage to the government veterinarians, which, in turn, drives out the private entrepreneurs from the market. First step towards creating a conducive environment will, therefore, be to institute measures such as full cost recovery, gradual withdrawal of government from high potential areas and putting in place regulatory framework for private veterinary practice.

In the relatively remote and marginal areas, government will have a more direct role. Even in these areas, however, the government need not and should not be the only, or even the dominant, player. It will be desirable to work with non-government organizations and other stakeholders for sensitizing the poor communities towards creating the demand for these services, training community based health workers for minor treatments, providing drugs and supplies on cost in areas where private distribution network is weak, providing extension advice related to animal husbandry including feeding practices and shelter innovations, etc. Given the current concentration of government veterinary centers in relatively better-off areas, reducing government presence in curative service delivery in these areas can release significant resources for focusing on the marginal areas.

High Potential Areas

Such areas can be identified based on high density of large ruminants, concentration of crossbred animals, relatively progressive agriculture, lower poverty incidence, better general infrastructure, and easier access to markets due to their proximity to the main urban centers. Given these characteristics, these areas can support private delivery of curative veterinary services. The governments should therefore

1. Introduce full cost recovery for curative veterinary services delivered at the centre as well as at home. Full cost should include the cost of materials, transportation in case of home service, and an appropriate service charge to cover the salary and establishment cost.
2. Provide operational and financial autonomy to the veterinary centers. This would mean that the units be allowed to retain the recovered costs to finance expenditures on drugs and supplies and improving the facilities at the centers. Overseeing of these funds should be done by a committee consisting of veterinary staff, representatives from the villages served by the centers, and the representatives of credible NGOs operating in the area.
3. Provide incentives to serving veterinarians and para-veterinarians to start their own private practice by offering voluntary retirement and start-up grants and loans. Those who chose this option should also be provided positive discrimination by not starting any new service delivery centre in their practice area and relocating any that already exist to marginalized areas.
4. Create a level playing field by restraining the serving government veterinarians, para-veterinarians and inseminators in engaging in private practice while continuing to receive salaries and benefits as government
5. Establish and implement an effective regulatory framework to ensure service quality. This would require participation of government, professional veterinary bodies,

non-government organizations, national level bodies such as NDDB, Veterinary Council of India and so on. The aim of the regulatory framework should be to protect the service users without imposing disproportionate cost on the service providers. It has repeatedly been shown that very high quality standards and extra stringent regulatory controls tend to be unproductive for both consumers and producers and create rent-seeking opportunities.

Average Potential Areas

In addition to creating conducive environment for emergence of private sector in livestock services, the government strategy in these areas will need to focus on strengthening and creating access to urban markets. This would require active participation from marketing federations and associations in terms of professional management of cold supply chains, revitalization of primary cooperative societies where they exist and setting up of these societies where they don't. This will also require financial and operational autonomy and reduced government intervention in the functioning of these institutions. In addition, the government should

1. Strengthen livestock extension system to create awareness about proper livestock health care and management, and to impart skills for providing veterinary first aid, poultry vaccination, heat detection, shelter innovations, and so on. These initiatives should be implemented with active participation of women and credible NGOs working in the area.
2. Introduce some cost recovery measures for curative veterinary services with targeted subsidies if necessary.
3. Provide operational and financial autonomy to veterinary centers.
4. Provide incentives to serving veterinarians and para-veterinarians to start their own private practice by offering voluntary retirement, start-up grants and loans and

assurance from the government that no government veterinary centers will be operated in their area of practice.

5. Create a level playing field by restraining the serving government veterinarians, para-veterinarians in engaging in private practice while continuing to receive salaries and benefits as government employees.
6. Sub-contract part of government jobs such as animal disease reporting, surveillance, education and training, and preventive vaccinations to private veterinarians and para-veterinarians.

Low Potential Areas

These are the areas with high poverty incidence, low educational status, poor access to markets, backward agriculture, and low density of livestock. In these areas, the government

strategy will need to combine awareness creation, improved market access, and gradual commercialization of service delivery. Following are some specific recommendations

1. Strengthen livestock extension system to create awareness about proper livestock health care and management. This should be done with active participation of women and local NGOs.
2. With the help of credible local NGOs, train community health workers who, besides providing veterinary first aid and minor treatments, will also serve as the link between government and poor communities.
3. Sub-contract public good tasks and preventive vaccination jobs to relocated veterinarians and para-veterinarians.
4. Provide drugs and supplies on cost in areas where private distribution network is weak.

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Annex 1: Livestock Service Delivery—A Conceptual Framework⁹

Rational delivery of livestock services must be based on basic principles of rationality. The first principles of economics provide useful point of departure in thinking about the most efficient way of organising livestock service delivery. The first fundamental theorem of welfare economics states that in absence of externalities, public goods, and informational failures, every competitive equilibrium is efficient. In other words, for ‘pure private goods’ that do not involve any *information asymmetries*, or *economies of scale*, private markets are most efficient way of organizing service delivery. This theorem has been an important force in shaping the thinking on public-private roles in service delivery in general. Applied to animal health services, it implies that the effectiveness of service delivery can be significantly enhanced by divesting those services that can be commercialized and are of private good type. The government’s role, on the other hand, should be limited to correcting various forms of ‘market failures’. Based on this logic, Umali, Feder and de Haan (1992), were the first to prescribe the sectoral delivery channels for various livestock services. These are presented in Table A1.1. As can be seen, clinical veterinary services and the distribution and production of drugs and vaccines are classified as pure private goods because the user captures all benefits. Theoretically, therefore, these services are best provided by the private sector. On the other hand, due to associated externalities, the private free market will not provide services such as disease diagnosis, vaccination against contagious diseases, vector control, etc at the optimal level. The state, therefore, has an important role in putting measures in place to ensure their optimum supply. Finally, services such as disease surveillance, prevention, food hygiene and inspection, and overall market regulation fall into the category of ‘pure public goods’ and private markets are unlikely to deliver them due to their non-excludability characteristic. Hence it becomes the responsibility of the state to find a collective mechanism to undertake the delivery of these services.

Public good nature of some of the services however does not necessarily imply that the government must take the direct responsibility of their delivery. There are many examples where public authorities can contract with private agents to deliver selected

services. Private agents, competent NGOs and other agencies can be contracted and paid by the government to deliver selected services. This also helps create further space for private sector to enhance profitability of their operations. But, it must be understood that ensuring public accountability in delivery of these services must remain the public sector responsibility. It also needs to be kept in mind that sub-contracting may not always lead to reduction of the costs of government as it will entail additional (transactions) costs of public rule making and monitoring the contractors.

Public contracting differs from private contracting in the sense that the need for transparent accountability necessitated by the expenditure of public money means that bidding and monitoring rules are more stringent and complex. Also, contractors and other interested parties have the incentive to go around and influence the rules of the game in their favor. It is therefore important to understand the social, political and legal institutions in which these public-private contractual relationships are to be embedded. Whether the government chooses to supply the public good service itself or to sub-contract certain functions would therefore depend on the strengths of these institutions in designing and enforcing public contracts and their independence from overall politics in the country.

In this context it is important to understand the sources of ‘market failure’ and examine the context in which livestock service markets function. The key sources of ‘market failure’ relate to (i) information asymmetry, (ii) economies of scale, and (iii) competition. Informational failures, economies of scale, and lack of adequate competition are likely to impair market efficiency which, in turn, has important implications for private-public roles. These roles are further shaped by the context of livestock production and economic and institutional development of the country. The remainder of this Annex takes a closer look at these issues and draws some further implications for private-public roles in service delivery.

Information asymmetry: One aspect of information related market failure that has been widely

⁹ This Annex borrows heavily and liberally from Ahuja, V. 2004. .

Table A1.1: Suggested Sectoral Delivery Channels for Livestock Service Delivery

Animal Health Function	Appropriate delivery channel		Economic characteristic
	Public	Private	
Disease surveillance, prevention, control & eradication of			
• Highly contagious diseases with serious socio-economic, trade and public health consequences	√		Public good Private goods with externalities
• Diseases of low contagion	√	√	
Quarantine and movement control	√		Measures to correct for externalities
Emergency response	√		Public good
Veterinary inspection	√		Measures to correct for 'moral hazard
Wildlife disease monitoring	√		Public good
Zoonosis control	√		Measures to correct for externalities
Disease investigation and diagnosis	√	√	Private good with externalities
Drug/vaccine quality control	√		Require measures to correct for 'moral hazard
Production and distribution of drugs and vaccines		√	Private good
Vaccination and vector control	√	√	Private good with externalities
Research, extension and training	√	√	Public and private
Clinical diagnosis and treatment		√	Private good
Food hygiene and inspection	√		Measures to correct for 'moral hazard
Residue testing	√		
Food safety tasks	√		Public good
Compliance monitoring	√		Public good

Source: Adapted from Umali, Feder and de Haan, 1992 and Holden, Ashley and Bazeley, 1996.

recognized in the literature on livestock service delivery relates to *moral hazard*. For example, Umali, Feder and de Haan (1992) point out that such problem could arise in functions such as food inspection and drug quality control where it is difficult to observe the quality. But, it appears that the possibilities of such failures in case of livestock service markets are more significant than recognized by the core literature. Indeed, given the specialized nature of livestock services, information related market failures are possible even in the case of clinical diagnosis and treatment. Since the service provider usually has more information and the service user has no mechanism to monitor whether the provider is acting in the best interest of the user, a moral hazard problem can arise if the service provider exploits the informational advantage for his own benefit. Given generally low education and awareness levels of poor livestock producers in developing countries, the public veterinary

authorities often make the point that private veterinarians are likely to resort to exploitative practices. Although this does not justify public provision of clinical veterinary services, it does signify the importance of strong institutions for regulating behavior, enforcement of ethics, and information dissemination and an effective regulatory and legal framework.

Similar implications emerge when we examine the case of *adverse selection*. The inability of service users to distinguish low and high quality providers can significantly impair market efficiency. Some evidence in this respect has recently become available. For example, Ly (2000) has observed that, "If left alone, the market for veterinary services in Senegal would evolve toward a typical lemons market where only low quality services would be demanded.¹⁰ This would create a sub-optimal situation for herders, providers and society (p.229)." He further notes, "the challenge

¹⁰ The term 'lemons market' was introduced by Akerlof in the context of used car market. He made the point that since the sellers of used cars have significantly more information and since average buyer cannot readily distinguish between good and bad cars (or the lemons), poor quality cars are likely to drive good cars out of the market.

faced by the privatization of veterinary services delivery systems in Senegal is in the urgency of strengthening the transformation process in the sub-sector so that livestock production and productivity is higher and veterinary inputs marketing systems are more efficient. Among the prerequisites are the creation of more suitable and workable organizational arrangements, leading to a new shape of veterinary input and service delivery with respect to structure, form, quality, and prices (p.259)". This once again takes us to importance of organizational and institutional structures and procedures.

Competition and profitability: Market efficiency result is also contingent on there being adequate competition in the market which, in turn, derives from the assumption of multiple service providers and users in the market. In the case of livestock service markets in developing countries where livestock farming is a subsistence activity, it is not clear whether aggregate demand for these services can support multiple service providers to generate adequate competition. Private services have been shown to generally work well in high potential high-density areas where farmers are relatively wealthier and more educated. But, in a large number of poor marginal areas, aggregate demand often falls short of the level required to sustain profitable private veterinary practice both due to the subsistence nature of production system resulting in poor willingness of the farmers to pay for the services and due to the high transactions costs of service delivery in these areas. This implies that conventional model of private service delivery may not be a feasible option in such areas.

Economies of scale: Some of the animal health services such as veterinary research and extension, diagnostic services and the delivery of clinical services in remote areas require high fixed costs. This can act as a deterrent for the private sector to undertake the delivery of these services until they can achieve significant scale to make the delivery of these services profitable.

One implication of the preceding discussion is that while the conceptual framework to delineate public-private roles is appealing, it is perhaps not very useful to simply suggest to the governments to privatize the services that are of private good nature. It is critical to focus thinking on promoting market-supporting institutions that facilitate information flow and healthy competition. But, the rules of the game must be compatible with country conditions. Whether a particular institution is appropriate in a country often depends on supporting institutions, available technology and skills, and the politico-economic context including

the level of corruption and transparency in organizational procedures. It is therefore necessary that service privatization process is approached not from a narrow ideological perspective but from a more pragmatic approach. Further, the reform process must be guided by hard field based evidence on the distributional impacts of policy and institutional changes. As noted by Holden, Ashely and Bazeley (1996), in absence of such evidence policy makers are often left with conflicting ideologies and poorly understood economic theories. Given the diversity of contexts, there will inevitably be a plurality of methods, models and institutional structures but the real challenge is to manage the reform process in a way that empowers poor communities.

Another important consideration in this context pertains to the pace of commercialization and private sector involvement. There is often the tendency to push for rapid privatization while relegating the issue of competition and regulation to later stages. This can be dangerous. Successful policy reform generally requires a relatively long process of stakeholder consultation and consensus building. Stakeholder participation has been shown to be one of the most effective strategies for rallying people behind public policy. Privatization of clinical veterinary services in a number of countries has been driven almost exclusively by international development and donor agencies, sometimes with adverse and unintended consequences. Gros (1994), for example, notes that privatization of veterinary services in Cameroon was driven and pushed by the World Bank and not Cameroon policy-makers. Many of them did not even fully understand the logic behind privatization and the structural constraints in its implementation. In the process even some of the public sector functions were delegated to the private sector which had an adverse consequence on delivery of these services. In Indonesia, on the other hand, privatization of Animal health posts in Java followed a stepwise approach that minimized disruptions during the transition phase and generated local support for the process. Further, given the political economy in many developing countries, there is much scope of the privatization processes being mismanaged if pursued rapidly and once a vested interest is created, it will have all the incentives and the resources to bend rules in their favor. It is therefore important to integrate the debate on livestock service delivery with the larger debate on political economy and institutional development which, in turn, depends on available technology and skills, and the politico-economic context including the level of corruption and transparency in

organizational procedures. This means there cannot be a blueprint for reform and each country will have to discover its own path depending upon the economic, social and political context. Nonetheless, a large body of experiences is now available to guide the decision makers; and the international development institutions and donor agencies will be well advised to help facilitate the dissemination of these experiences to various stakeholder groups in developing countries.

Finally, given the livelihood intensive nature of livestock production in developing countries, special focus is required in ensuring the necessary

services reach poor marginal areas. While in some cases it may be necessary for the public sector to undertake such delivery, there are numerous options of working through membership organizations, self-help groups, civil society organizations, and promoting community based animal health delivery systems and para-professionals to more efficiently achieve the equity objectives. The services delivered by these organizations and groups tend to be far more client oriented and responsive to local needs and need to be supported with appropriate legislative and policy frameworks.

Annex 2: Some recommendations on the organization of Minor Veterinary Services

Currently, livestock keepers in India are served by several service delivery mechanisms sponsored by and operated through different government and non-government agencies and bilateral projects. A number of these mechanisms are supported by trained para-veterinarians known by different names. However, accountability for the services they render remains a concern. One of the other critical constraints in regulating and monitoring the services provided by these para-veterinarians is that in most states there does not exist a clear definition of 'Minor Veterinary Services' that can be provided by trained personnel other than registered veterinarians. From the national perspective, the Veterinary Council of India (VCI) Act 1984 created a provision for certain personnel holding a diploma or certificate of veterinary supervisors, stockmen or stock assistant, etc to render 'MINOR VETERINARY SERVICES' under the supervision of a Registered Veterinary Practitioner (RVP). The above provision is subject to the condition that respective state governments have by order permitted such persons.

The direct implication of the Clause 30b of the Veterinary Council of India Act 1984 (No.52 of 1984) is that it makes it mandatory for all State Governments to identify 'Minor Veterinary Services' over and above the few examples indicated in the act and notify the same in the respective state government gazettes. **The indirect implication is that the standards of the jobs and tasks involved in performing the notified 'Minor Veterinary Services' have to be described, which forms the basis for appropriate skill development.** However, to date, only few states in India have undertaken this exercise.

In the light of the emerging importance of para-veterinarians in livestock service delivery, and the issues regarding quality, an exercise was carried out recently in Andhra Pradesh (GoAP) to put in place a strong regulatory framework. Accordingly, Government of AP issued an order to constitute an expert committee to propose a definition of the 'Minor Veterinary Services' in the context of its specific needs, and to prepare a list of services that can be rendered by para-veterinarians. The purpose of this exercise was to provide a better basis for the planning, monitoring, and evaluation, and the continuous up-scaling of service delivery mechanisms through a well-considered regulatory

framework. The process involved organizing focal group discussions and meetings with stakeholders and intense discussions within the expert group in order to achieve the above objective.

A systematic approach was adopted to guide the process of defining 'Minor Veterinary Services'. An Expert Committee was constituted to deliberate on various aspects of 'Minor Veterinary Services' and to come up with a list of services to be notified the state gazette. The process was initiated with a desk study to provide the necessary background. The study involved reviewing the existing information from the department, earlier study reports from the National Bank for Agriculture and Rural Development (NABARD), Institute of Public Enterprise (IPE), the Boston group and the NGO Anthra. Circulars issued by the Uttar Pradesh Government were also reviewed. With this background, a consultative process was initiated involving focal group discussions, brainstorming exercises, expert group discussions, and one-on-one meetings with organizations involved in service delivery. Workshops were also conducted with veterinary assistants and junior veterinary officers to get their inputs.

Definition of minor veterinary services and dispensations

As described in Clause 30b of Indian veterinary Council Act 1984. No52 of 1984 the term 'MINOR VETERINARY SERVICES' means the recurring of primary veterinary aid like vaccination, castration, dressing of wounds and such other types of preliminary aid or the treatment of such ailments as the state governments may by notification in the official gazette specify in this behalf.

The lists of services delivered by the para-workers in general were presented to members of the expert committee on May 2005. Based on these, the expert committee identified seven broad areas encompassing different services that can be rendered by para-workers:

1. Extension and advisory services
2. Fodder development
3. Preventive health care and disease reporting
4. Minor procedures in first aid
5. General dispensations
6. Doorstep inseminations
7. Castration

Based on an extended debate the services were categorized as Schedule I, II, and III services. The spirit underlying the scheduling was to visualize the extent of training, handholding and supervision, which in turn will provide clues in formulating meaningful curricula. The essence of each schedule is given below:

- Schedule I** All general extension and fodder development services (which require basic orientation training).
- Schedule II** All services that require systematic skill development and guidance of a registered Veterinary Practitioner
- Schedule III** All services that require advanced training and supervisory guidance of a registered Veterinary Practitioner

The Expert Committee recommended following definition of 'Minor Veterinary Services' for the state of Andhra Pradesh.

"Basic veterinary interventions, dispensations and livestock extension services (as specified in Schedules I, II & III) provided by trained and certified personnel, other than the registered veterinary practitioners, to support livestock health and production."

Training duration and qualifications: Para-veterinarians

The committee reviewed the existing curriculum (12 months) that is used to impart entry-level training to direct recruits of Veterinary Assistants (10+2) employed with the AHD. It was recommended that those who go through that curriculum may be made eligible to practice all services described under Schedules I, II and III. Further they shall perform additional tasks entrusted to them by their employers from time to time. Basic entry-level qualification for para-veterinarians will be:

- For a two year university diploma: a pass in the 10th class and
- For the one year certificate offered by AHD of Andhra Pradesh, 10+2 years of education was prescribed.

Training duration and qualifications: Animal Health Workers

Given the variety of tasks and the diversity of market, production and socio-cultural contexts, it is neither feasible nor desirable to prescribe entry-level qualifications and specific training duration of curricula for all types of AHWs. While a formal education of 10th standard and above may be

desirable for selecting an Animal Health Worker, the committee did not consider this to be a mandatory condition. The committee was of the view that nature and duration of training and the basic qualifications to undergo the training will depend on the range and purpose of the task they are expected to perform, and the overall production and market context under which they function. The expert committee debated on a minimum training duration for different types of AHWs and attempted to outline the essential elements of some of the training required for these. It was recommended that

- All AHWs should undergo a minimum of 12 day foundation training
- Those wishing to provide all the services listed under Schedule I should undergo a minimum of 41 day training and certification in addition to the 12 day foundation training.
- Those wishing to provide all services in Schedule II should undergo a minimum of an additional 48 day training. Thus an individual AHW intending to practice 'Minor Veterinary Services' as stated in Schedule I and II, has to undergo and successfully complete a minimum of 101 day comprehensive training course inclusive of both classroom learning and apprenticeship.
- A minimum of an additional 13 day training and apprenticeship was prescribed at an advanced learning module to practice the 'Minor Veterinary Services' as stated in Schedule III. Only the AHWs who have been certified to deliver Schedule II services will be eligible for this course.

Registration and training certification

It was recommended that all organizations imparting training pertaining to Schedule I, II and III services shall register with the state AHD and inform the latter of the nature of the training provided, the tasks being performed by the trainees in the field and the name of the registered veterinary practitioner (RVP) under whose supervision the AHW is delivering the services.

The principal / head of the registered training centre evaluates the performance of the trainees and certifies to that effect. The competent authority identified by the State Director of Animal Husbandry may further countersign such certificates. Certificates must be issued to the successful trainees at the training centre itself within 15 days of the completion of training.

The lists of certified trainees must be communicated to the respective district Joint Directors of

the AHD for its records. The training centre principals/government/NGO sector are responsible for such notifications.

Linkages with registered veterinary practitioners

Systematic linkage between AHWs and the state veterinary department is more or less non-existent. Wherever it exists, the scope of such linkage is limited to input supply and minimal monitoring and supervision.

The Expert Committee recommended strengthening the linkage between professional veterinarians, para-veterinarians and AHWs, and extending it beyond input supply support. The system must provide for technical back-up and formal referral support, professional and ethical supervision, and the enforcement of regulatory measures. Most state governments are already responsible for ethical/professional supervision, technical back-up and referral support of the para-veterinarians they employ. But there is need to extend this function to private and non-government organizations seeking such support. Indeed, the system must strive towards recognizing and mainstreaming service delivery by para-veterinarians and AHWs as the third tier in the livestock services delivery chain. The VCI Act under Article 30 (b) provides for the dispensation of minor veterinary services by suitably trained para professionals *under the supervision of registered graduate veterinary practitioners*. The standardization of the training of these animal health workers/para professionals and linking them to registered veterinary practitioners for regulation and ethical/professional supervision thus became mandatory.

The linkage of the para-veterinarians and the AHWs with the registered veterinary practitioners

should be multi-dimensional, going well beyond the mere legal requirements, in order to evolve and render the para-veterinarians and AHWs into multi-skilled service providers satisfying both the needs of the farmers and the regulatory requirements under the VCI Act. As private registered veterinary practitioners are few and far between in India and the Veterinary Assistant Surgeon (VAS) of the AHD is the most accessible registered veterinary practitioner state-wide, the VAS will naturally be the key nodal point in the regulatory/supervisory support set up.

The AHWs should thus function as the non-governmental extension of the AHD service delivery chain. While they remain independent private practitioners, delivering minor veterinary and AI services at farm level as paid inputs, with add-on skills from time to time when necessary, they should also be obliged to complement the government's efforts in extension efforts, fodder development, disease surveillance, outbreak reporting and disease control campaigns *as paid associates*. These are public good services for which farmers may not be willing to pay. Yet, however, the AHWs can become an important and effective channel for delivering these services if their participation in delivery of these tasks is appropriately incentivized. This will have the dual effect of strengthening the implementation of public good tasks while at the same time enhancing the revenue earning potential of AHWs so as to make their practice more sustainable. In case of calamities, where mass preventive vaccinations have to be conducted in a campaign approach, it may be made *mandatory* for all para-veterinarians and AHWs to participate. *Those who are not directly employed by the government should be appropriately compensated for these mandatory duties.*

Annex 3: Control Strategy and Action Plan for Animal Diseases of Economic Importance for the Poor: Some lessons from a recent exercise in Andhra Pradesh

Effective control of animal diseases is a critical element of any strategy that aims at supporting and enhancing livestock dependent livelihoods of rural poor. Over the years, the literature on delivery of livestock services has increasingly emphasized that the governments in developing countries have a public responsibility in ensuring that the incidence of animal diseases, specially those diseases that cause substantial economic losses for the poor, is reduced significantly so that the production and trade losses are minimized and private costs of treatment substantially reduced.

An exercise was recently carried out in Andhra Pradesh under the auspices of a PPLPI-CALPI-AHD joint initiative to identify the livestock diseases that cause significant economic loss to the poor livestock keepers and to review their temporal and spatial occurrence so as to help the state administration fine tune its initiatives to prevent disease outbreaks. A total of five diseases- Haemorrhagic Septicaemia (HS), Peste des Petits Ruminants (PPR), Black Quarter (BQ), Enterotoxaemia (ET) and Newcastle Disease (ND) - were identified as those probably having the highest impact on poor livestock keepers.

A retrospective analysis of seven-year (1998 to 2004) disease outbreak data of AP was carried out to delineate the spatial and temporal trends in the occurrence of these diseases. In addition, collateral information on number of outbreaks, attacks and deaths and villages affected, weather parameters, migration profiles, livestock density, and epidemiological aspects of the associated pathogens were reviewed. This was done with a view to understand specific temporal and spatial observations associated with individual diseases and their usefulness in developing control strategies and action plans.

Special importance was given to disease outbreaks as a temporal and spatial event, and relatively less credence to their actual numbers, attacks, deaths or villages affected. The long term influence of monthly and seasonal incidence of disease outbreaks e.g. monsoon periods, also formed basis for data analysis, interpretation, and identification of critical periods for vaccine interventions. The disease situation in the 22 districts of the state was analyzed in totality to prioritize disease burden in each district and this in turn, paved way to identify districts that sustained the majority of the disease burden. This was done for all the five 'selected

diseases' with specific intention of introducing targeted long term action plans to reduce disease incidence and spread of infection to other locations. The results of the analyses were then discussed with a large number of stakeholders in a series of consultative meetings so as to get a reality check on the analysis and to understand the field level difficulties in implementing the suggested control measures. Key recommendations from that exercise are given below.

Haemorrhagic septicaemia

HS is endemic in most parts of India and seasonal outbreaks are an annual feature. Andhra Pradesh ranks first in the total number of HS attacks reported in India in the past five years followed by Gujarat and Karnataka. In fact, Prakasam, Nellore, Guntur and Kadapa districts of AP are among the top ten districts reporting HS outbreaks in the country.

Peste des Petits Ruminants

During the last few years, AP has been at the centre of major epidemics of PPR and their scale has been considerably greater compared to other Indian states, possibly because of the large small ruminant population and the nomadic husbandry system. Better disease reporting practice among field veterinarians, actively supported by the state veterinary administration, is likely to have contributed to record significantly higher incidences of PPR than was previously the case.

There is a slow and gradual build up of infection in the population starting from October to January when massive and explosive outbreaks start forthcoming. After reaching a steep peak in March, outbreaks gradually decline with the progression of ensuing summer months until June. The peak corresponds to the lambing seasons and field investigations in recent times indicate that lambs between one and six months of age are affected most severely. In addition, PPR often occurred in sheep flocks without affecting goats living in close proximity indicating sheep appeared to be more susceptible than goats.

PPR is a virus infection that primarily affects sheep and goats and other than these natural hosts, it has no 'alternate' hosts for its survival. Also, recovered as well as the vaccinated and subsequently sero-converted animals are immune for life. Population-wide PPR vaccination in high-

risk districts (which account for 80 per cent of annual outbreaks) would 'freeze' virus transmission within two to three weeks of vaccination, leaving hardly any virus to spread to other districts. Ideal timing of vaccination against PPR in high-risk districts would be October and November (extendable up to December), which ensures temporary protection of young stock through maternal antibodies during the peak disease period and should reduce high mortality currently encountered in this vulnerable group. In addition, young stock will be free of maternal antibodies (which last six to eight months), and are ready for vaccination. Ensuing vaccination in low outbreak locations will further reduce virus circulation in the state. Annual follow-up by vaccination of young stock should pave way for ultimate PPR eradication.

Black quarter

BQ, a soil-borne clostridial infection of bovines, is ranked fourth in terms of economic importance as disease of livestock in India. It is most frequent in the states of AP and Karnataka. The survival of clostridial spores in different soil types is not well understood and there seems to be some relationship between the soil type and number of rainy days for BQ to precipitate in a given location. Frequent soil contamination with infective spores due to poor carcass disposal adds to build-up of soil infection.

BQ occurs over the entire year with increasing intensity between June to October possibly due to surfacing of spores following monsoon rains and subsequent infection through ingestion. The epidemiology of BQ provides a unique opportunity to pre-empt disease outbreaks, which can only occur in locations that have a pre-deposit of infectious spores in the soil due to improper disposal of infected carcasses. This requires identification of the infected villages and introducing zoo-sanitary measures for long term control.

'Chronically infected villages' which have recorded highest incidence of BQ in the past seven years, should be mapped and rigorously introduce annual vaccinations. This focused approach will save precious vaccine and increase efficiency of efforts to decrease disease outbreaks. In addition, post-outbreak vaccination should be introduced in fresh outbreak areas and BQ incidence followed up in the subsequent 3-5 years.

Enterotoxaemia

Analysis in Andhra Pradesh did not throw up any specific period in the year that is most conducive

for the occurrence of ET outbreaks, but the lowest number of outbreaks was reported in the months of October and November respectively with most outbreaks occurring from April to July. This could be due to fact that the causative organism is present in the soil and intestines of healthy animals and extraneous factors such as changes in feed and feeding habits precipitate toxin production resulting in acute disease and sudden death.

ET is an insidious disease and factors that precipitate sudden outbreaks may vary from place to place. In addition, migratory shepherd traditions that are determined predominantly by the prevailing drought / non-drought conditions make organised vaccination programmes rather difficult. Generally, shepherds are very receptive and actively co-operate in vaccinating their animals. In this context, a flexible vaccination campaign to suit the shepherd's migratory habits is required and a road map needs to be developed for this purpose. The shepherd 'green card', which records all details of vaccinations etc. during their migration is a big success in Karnataka state and deserves a similar attempt in other states.

New Castle Disease

Newcastle disease, a virus infection of domestic poultry and wild free-living birds, is widespread in India. There is limited 'carrier status' in recovered and apparently healthy birds, especially in free-living wild birds, which are the source of infection to rural, domestic birds. The disease produces moderate morbidity and mortality in rural poultry, which are somewhat resistant to the virus infection. But, the extent of ND incidence is not well recorded field veterinarians often admit to more ND outbreaks than reported.

Virus from wild birds and spillover from organised poultry farms initiate infection in backyard poultry – which represent around 70 percent of poultry in India. The organised poultry sector, despite rigorous vaccination, often report mild, moderate or severe outbreaks due to a variety of complex virus and host-stress related factors. The rural scavenging backyard poultry (in smallholdings) which are more exposed to wild free-living birds, suffer the disease due to lack of owner interest in vaccination, although most state governments claim to supply free vaccine.

The authorities must address under or not reporting of ND in all states. Extension education and involvement of local Panchayat agencies to promote vaccination awareness among villagers, especially the women, is suggested.

Recommendations

Broadly, a three-pronged approach is suggested for disease control, which involves,

1. Massive annual vaccination in 'high-risk' districts in one-go at the epidemiologically best time for 3 to 5 years (or longer). This is ideal for PPR, HS, BQ and ET but not for ND.
2. Restricted vaccination in previous outbreak locations and post outbreak 'ring vaccination' in villages reporting fresh outbreaks in 'low-risk' districts. Areas without previous history of 'selected diseases' outbreaks to remain unvaccinated.

3. No-vaccination strategy in districts which have either very low incidence or not reported disease outbreaks at all in the past to allow 'lurking' disease if any, to reappear. Limited vaccination can be initiated as and when outbreaks occur.

These approaches stand in contrast to the present ritual of annual vaccination, whether or not a village / district has a history of disease outbreaks. This approach to deploy vaccine where it is most required, cuts costs and conserves veterinary human resources. However, as disease outbreaks are unforeseen and non-predictable, ring vaccination is to be resorted to, supported by other containment procedures.

Annex 4: Provisions pertaining to animal health service delivery in the new livestock sector policy of orissa

The Government of Orissa appointed a high powered Steering Committee in 1998 to carry out a comprehensive review of the state livestock sector and to recommend new policy directions, to enable the State Government to formulate a new Livestock Sector Policy Framework. On the basis of the livestock sector review, a new livestock sector policy was formulated and approved in 2002. Aspects of the new policy that relate to provision of animal health services are reproduced below

Provision of animal health and breeding services

Animal health care and breeding services are the two most important services that the state now provides free to the livestock producers. Improving the quality of these services and their usefulness to the producer is the prime consideration under the new policy. There is increasing evidence that farmers prefer good quality paid services to poor quality free service.

In order to make these services improve their quality, reach out to the farmers whom it seeks to serve and become accountable, the government will progressively make veterinary and artificial insemination services, mobile practices operating within their existing jurisdictions and delivering the service at the farmers door-step, as paid inputs. Under the new policy the government will permit the government employed Veterinarians, Livestock Inspectors and Inseminators to practice their profession /trade and to charge for the services delivered at the farmers' door-step at market rates. These reforms will be implemented in a phased manner; first in well developed areas, which can absorb the change and work it to their advantage. Extension of the policy and introduction of the new delivery systems in other areas will follow an economic change scale.

There are many services and inputs needed by livestock owners in the day to day management of their livestock enterprise and most of these do not need the services of a qualified Veterinarian or Livestock Inspector. The magnitude of the task is so large that the only solution is to create such skills among the users themselves in the villages. The tasks are veterinary first aid, vaccination of birds and animals, ecto and endo parasite control, innovative feed supplementing techniques, shelter innovations and candling of desi eggs for hatching. These are all simple skills needed in villages

constantly. Young men and women from the small holder households can be trained to practise these skills, provide service to the smallholders and even earn a small income for their services.

The mandate of the Department of Animal Husbandry under the new policy would be: (i) control containment and eradication of animal diseases; and (ii) livestock sector development. Department will progressively move away from delivery of veterinary care and AI services, first converting them into mobile practices; gradually retreating towards the privatization of the services. The department will have a bipolar structure, reflecting the mandate—one group engaged in disease control and the other in livestock development. Disease control will be direct action by the department; but for livestock development the department will work in a participatory format. The department's training capacity will be geared up to cater to the needs of intensified participatory extension service and empowerment of Non-Governmental Organisations active in livestock development.

This change over in veterinary service delivery however will be gradual, over a 25 year period. As a first step the veterinary hospitals, dispensaries and livestock aid centres in selected districts will be converted into mobile practices delivering the services at the farmers door step. The veterinary and the para-veterinary officers involved in the mobile practice will be allowed to treat door-step delivery of services as a private arrangement between the practitioner and the farmer. The practitioners will continue to be employees of the Government of Orissa in the Department of Animal Husbandry and will receive all their emoluments, allowances and perks till they superannuate.

The programmes for animal health care comprise the conversion of the veterinary hospitals, dispensaries and livestock aid centres into mobile practice veterinary and AI services delivery, the capital grants required to equip the veterinarians and the inseminators and reequipping these institutions to handle the changed system.

User charges will be collected for vaccination/AI/ diagnostic services and feed analytical services etc. as prescribed by the State Govt. from time to time. The development tasks under the new policy will necessitate the promotion of a new autonomous

body “the Orissa Livestock Resource Development Society” a registered society under the Societies Act, which will take over all the AI infrastructure, except the field AI centers. It will generate all the genetic outputs for breeding of cattle and buffalo and will establish a state-wide infrastructure for the distributed bulk movement and bulk storage of liquid nitrogen. Frozen semen and liquid nitrogen will be delivered to all AI practitioners at their doorstep by the OLRDS, against payment.

Disease control

The state government in consultation with the central government and the governments of the neighbouring states will draw up a State Foot and Mouth Prevention, Control and Containment Project, as a part of a Larger National Project for the Control and Containment of FMD. The project will cover the entire state, but will create a disease containment zone covering the 9 coastal districts in category ‘A’ with the exception of Baragarh District, as it is not a coastal district, and as it also happens to be a border district along the boundary of Madhya Pradesh.

Containment of FMD along the coast will be comparatively easy as the sea prevents ingress of the disease all along the coast and border vaccinations along the open boundaries will effectively keep the most productive coastal districts under category ‘A’, disease free. The strategy for control will be the tested methodology of the erstwhile FMD Control project in Southern Peninsula, suitably modified to conform to the geographical formation of Orissa.

Vaccinations and control programme for other disease like HS and BQ will continue on “need basis”, preventive vaccinations in the endemic areas annually based on the state endemic chart and ring vaccinations and stamping out procedures during outbreaks. Vaccines against diseases of sheep, goat and poultry will be stocked in distributed storage points in the districts and delivered to Breeders’ Associations and Self Help Groups for timely vaccinations by the village technicians.

Diagnostic Laboratories

The existing diagnostic laboratories will be suitably strengthened to take up challenges of emerging diseases with bio-technological methods. Each district will have a district diagnostic laboratory and related laboratories of the Orissa Veterinary College and the Animal Disease Research Institute will act as referral laboratories. Institute of life science will also be involved in the exercise.

Bio-security measures will be adopted against hazards likely to emanate at all levels of production of biologicals and livestock. An excellent but simple disease reporting and monitoring system with NCI network link at district and state level including OUAT, a credible cold chain, systematic vaccination and well orchestrated coordination with border states and center will be the key components.

Annex 5: The Pro-Poor Livestock Policy Initiative

Background and Rationale

With the adoption of the Millennium Development Goals, the international community made the eradication of extreme poverty and hunger one of its primary targets. Livestock contribute to the livelihoods of an estimated 70% of the world's rural poor by providing a small but steady stream of food and income, raising whole farm productivity, increasing assets and diversifying risks. Livestock also have an important role in improving the nutritional status of low-income households, confer status, are of cultural importance, and create employment opportunities within and beyond the immediate household.

The increasing demand for animal protein in low- and middle-income countries provides an opportunity for the rural poor to improve their livelihoods. However, the nature of livestock farming is determined by policy and institutional frameworks that rarely favour of the poor. Therefore, in 2001, the Food and Agricultural Organisation (FAO) of the United Nations launched the Pro-Poor Livestock Policy Initiative (PPLPI) to facilitate and support the formulation and implementation of livestock-related policies and institutional changes that have a positive impact on the world's poor. To achieve this goal, the Initiative combines stakeholder engagement with research and analysis, information dissemination, and capacity strengthening.

A central facility of the PPLPI, funded by the UK Department for International Development, has been established at FAO headquarters in Rome with the responsibility of guiding and co-ordinating the Initiative's activities, and with the ambition to become a point of reference for livestock-related pro-poor policy development.

In order to cover the different levels of policy-making, extending from international, through regional and national to sub-national levels, and to engage directly with relevant stakeholders, the Initiative complements the work of the central facility with active participation in selected policy processes in a number of strategically chosen 'focus countries'.

The Role of the Central Facility

Livestock sector development has far-reaching externalities that give rise to conflict at many levels. Global concerns are increasingly influencing

national agendas, while national concerns may become the subject of international debate. Informed public policy-making is therefore becoming increasingly complex, and the processes of negotiation around livestock and public goods issues need to be adapted such that they combine stakeholder engagement and negotiation with research and analysis.

To assist policy makers in tackling poverty through evidence-based policy and institutional reforms the PPLPI compiles information on livestock-poverty relationships and conducts and commissions research in four interrelated thematic areas.

The first thematic area encompasses the role of livestock in the household, community, and in national economies. A clear understanding of the role of livestock at various levels is essential to appreciate the choices made by the various actors at these levels, and to identify development pathways that are most likely to offer pro-poor benefits.

Second, the PPLPI conducts research into the political economy of livestock sector-related policy making. A detailed appreciation of actual *vs.* stated policies, their impacts, and the interests and influence of various players is a prerequisite for the project's engagement in policy and institutional reform processes.

The third thematic area relates to markets and standards, which are key determinants of the balance between subsistence and market-oriented production. Markets provide the crucial link between sectors and sub-sectors and between rural and urban populations. Linking poor livestock keepers to expanding urban markets is likely to be one of the most promising avenues for rural poverty reduction.

The fourth major thematic area covers livestock services. These constitute a wide variety of basic inputs to livestock production, such as feeds, drugs, health services, credit and insurance, which are often not accessible to poor livestock keepers.

The PPLPI compiles information and conducts research and analysis relevant to these themes both in support of specific policy processes in selected countries, and generically, to enhance decision-making by the livestock development community as a whole. Results of these studies are published

as PPLPI working papers and widely distributed in the form of policy briefs.

In-Country Engagement

The PPLPI has engaged in policy processes in 'focus' countries from five strategically chosen regions: the Andean Region, the Horn of Africa, West Africa, South Asia and the Mekong Region, representing a range of socio-economic, agro-ecological and cultural settings. Selected focus countries in each of these regions are: Peru, Uganda, Senegal, the State of Andhra Pradesh in India, and VietNam.

The objectives of the Initiative's country engagement are threefold. First, it provides the opportunity for closer contact with policy makers and livestock-dependent poor, allowing the Initiative to get a grounded understanding of their concerns and constraints. This country-based interaction helps identify recurrent national and

regional issues affecting poor livestock keepers that need to be dealt with at higher levels of policy-making. The experiences obtained at national level thus also constitute an important input into the thematic work carried out by the Initiative.

The second objective is to learn, by engaging in national policy processes, how the Initiative can most effectively inform and influence national, regional and international policy making to achieve pro-poor outcomes. As most policies that affect livestock keepers are made at national level, a sound understanding of the processes involved, based on partnerships and experience, is essential.

By engaging successfully at national and regional levels, i.e. actually effecting pro-poor policy change, the third objective is achieved, which is to gain the credibility needed for the PPLPI to be recognised widely as point of reference for livestock-related pro-poor policy development.