

Trans-boundary Diseases of Animals: Mounting Concerns

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With technological advances, livestock production has gained an integral position in the agrarian component of the national economy. Livestock farming is one of the important sources of livelihood to rural farmers in India, particularly landless farmers. Increasing contribution of livestock to socioeconomic development and poverty alleviation are well recognized. A healthy livestock is pride of any country. However, rapid trend of globalization has brought upon challenges in maintaining healthy herds of livestock. The emerging infections of foreign origin could spread across national geographical borders and cause havoc. Consequently, there will be an emergence and spread of new disease in the region which was once free from the disease. In this article, we summarize the major diseases of livestock that are trans-boundary in nature, and review the challenges and essential management strategies in controlling the trans-boundary diseases.

KEY WORDS

Livestock health, international trade, trans-boundary animal disease (TAD), management of TADs.

INTRODUCTION

Livestock constitutes an important component of our agricultural system. Livestock provides for livelihood, regular income and women empowerment in rural India. It is unimaginable to have a human society without a healthy population of livestock. Livestock not only provide food security but also improve the quality of human life and make a significant contribution to national economy. Several thousands of small and marginal farmers in the

country depend solely on agricultural farming and livestock husbandry. The existence of infectious diseases affecting farm animals has been historically recorded for over hundreds of years. However, factors associated with modernization of human societies such as changes in agro-ecological conditions and global marketing, have led to increased incidences of animal diseases. This is mainly due to spread of disease causing pathogens across borders. With increasing movement of human population, livestock and livestock products, fish and fish products, and plants and plant products within and across countries, together with climate changes, threat from trans-boundary diseases is intensifying. Trans-boundary diseases are highly contagious and have the potential for rapid spread, irrespective of national borders, causing serious socio-economic consequences (Otte et al., 2004). Traditionally, trade, traffic and travel have been instruments of disease spread. Now, changing climate across the globe is adding to the misery. Climate change is creating new ecological platform for the entry and establishment of pests and diseases from one geographical region to another (FAO, 2008). Several new trans-boundary diseases emerge, and old diseases re-emerge, exhibiting increased chances for unexpected spread to new regions, often over great distances.

Trans-boundary livestock diseases such as Foot-and-mouth disease (FMD) have a direct economic impact by reducing agricultural and animal production (FAO/OIE, 2004; Domenech et al., 2006). Apart from causing suffering and mortality in susceptible population, the diseases adversely affect food safety, rural livelihoods, human health and international trade. The effect on national economy is felt by way of reduced access to international markets for the agricultural products and higher costs involved

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with inspection, treatment and compliance with international regulatory issues. Therefore it is necessary to effectively manage the trans-boundary diseases. In developing countries, control of these diseases is a key pathway for poverty alleviation. It is advisable to have an effective quarantine system in place to prevent entry and establishment of trans-boundary diseases. As a second line of defense, a country must also have in place a suitable contingency plans to respond quickly to high threat diseases. This could be achieved by timely application of scientific technology for rapid response. A disease outbreak in the neighboring country should always be taken as an immediate threat. Affected countries remain a threat to disease-free nations and this is exemplified by recent incursions of FMD in FMD-free countries like Japan and Korea.

TRANS-BOUNDARY ANIMAL DISEASES (TADs)

The common ways of introduction of animal diseases to a new geographical location are through entry of live diseased animals and contaminated animal products. Other introductions result from the importation of contaminated biological products such as vaccines or germplasm or via entry of infected people (in case of zoonotic diseases). Even migration of animals and birds, or natural spreading by insect vectors or wind currents, could also spread diseases across geographical borders. The major animal diseases (Otte et al., 2004; FAO/OIE, 2004) under this category are provided in table 1.

CHALLENGES IN DEALING WITH TADs

Several challenges confront the strategies to combat TADs (FAO, 2008; Hitchcock et al., 2007). The major ones are presented below:

- i. Requirement of novel systems having capacity of real-time surveillance of emerging diseases. For this, need driven research and service oriented scientific technology are a necessary at regional levels. Research emphasis has to be on specific detection and identification of the infectious agents.

- ii. Need for epidemiological methods to assess the dynamics of infections in the self and neighboring countries/regions. These methods should be of real-time utility.
- iii. Need for research and development of disease diagnostic reagents those do not need refrigeration (cold chain). More importantly, they should be readily available as well as affordable, for use in pen-side test format.
- iv. There are many diseases for which there is inadequate supply of vaccines or there are no vaccines available. Insufficient or lack of vaccine hampers the disease control programmes. Need to build up vaccine banks for stockpiling the important vaccines to implement timely vaccination.
- v. Required availability of cost-effective intervention or disease control strategies. Even if a technology is available, it has to be cheaper to adopt at the point of use.
- vi. Need for ensuring public awareness of epidemic animal diseases. Many farmers are unaware of the emerging diseases. As such, unless reported to concerned regional authority, an emerging disease may go unnoticed.
- vii. Shortage of government and private funding for research on emerging animal disease problems. Government as well as industries dealing with animal health should take initiative and appropriate sponsorship in this regard.
- viii. Inadequate regulatory standards for safe international trade of livestock and livestock products. Otherwise, there would be a compromised situation in disease control strategies.

MANAGEMENT OF TADs

Various strategies need to be implemented to prevent and control trans-boundary diseases. These include:

- i. Preventing incidence of trans-boundary diseases and disease transmitting vectors. Minimizing the movement of animals across the borders is essential. Also, prompt practice of quarantine

protocol would reduce many trans-boundary diseases. Geographic information system (GIS) and remote sensing could be utilized as early warning systems and in the surveillance and control of infectious diseases (Martin et al., 2007).

- ii. Reducing man-made disasters that have adverse implications on climate. Global warming and climate change either due to natural or anthropogenic influences are likely to predispose the animal population to newer infections (FAO, 2008). Therefore collective efforts are needed to minimize adverse climatic changes.
- iii. Interrupting the human-livestock-wildlife transmission of infections. Diseases at the wildlife–livestock interface must become the focus for surveillance of emerging infectious diseases (Siembieda et al., 2011). Breaking the cycle of disease transmission would help control the spread of infections.
- iv. Establishing regional biosecurity arrangement with capacity for early disease warning system for surveillance, monitoring and diagnosis of emerging disease threats (Domenech et al., 2006).
- v. Undertaking animal breeding strategies to create disease resistant gene pools. Enhancing host genetic resistance to disease by selective breeding of resistant animals is a smart strategy to improve natural immunity of animals to counter invading infections (Gibson et al., 2005).
- vi. Strengthening government policies to enhance agricultural/animal research and training, and technology development (Rweyemamu et al., 2006). More funds need to be allocated for this purpose to build goal oriented research programs in combating TADs.
- vii. Ensuring appropriate preparedness and response capacity to any emerging disease. Keeping in view that emerging infectious diseases are a constant threat, it is necessary to have early disease

detection capacity and then implement a timely response (Hitchcock et al., 2007).

- viii. Intensification of international cooperation in preventing spread of TADs. As TADs are a concern globally, cumulative effort is needed at international level to minimize the spread of infectious diseases across the borders (Domenech et al., 2006; Hitchcock et al., 2007).

SUMMARY

With rapidly increasing globalization, an associated risk of movement of trans-boundary diseases is emerging. Trans-boundary animal diseases represent a serious threat. They reduce production and productivity, disrupt local and national economies, and also threaten human health. This imposes far-reaching challenges for agricultural scientists on the critically important need to improve technologies in animal production and health in order to ensure food security, poverty alleviation and to aid economic growth. Considering that livestock rearing constitutes a significant share in the national economy of a developing country like ours, it is imperative to take up disease control initiatives. Measures are required to safeguard the livestock industry from epidemics of infectious diseases and to uphold safe international trade of livestock and their products. In this regard, it is essential to develop scientific and risk-based standards that facilitate the international trade in animal commodities.

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TABLES

Table 1: Major Trans-boundary Animal Diseases.

Disease	Animals affected	Regions with major incidence
Foot-and-mouth disease (FMD)	Cattle, buffalo, sheep, goats and pigs	Parts of Africa, Middle East and Asia
Peste des petits ruminants (PPR)	Sheep and goats	Africa, Middle East and Asia
Classical swine fever (CSF)	Pigs	South and South-East Asia
African swine fever (ASF)	Pigs	Sub-Saharan Africa, West Africa, parts of Europe and Latin America
Blue tongue (BT)	Sheep, cattle	Australia, USA, Africa, Middle East, Asia and Europe
Rift Valley Fever (RVF)	Sheep, cattle and goats	Africa
Contagious bovine pleuropneumonia (CBPP)	Cattle	Eastern, Southern and West Africa, parts of Asia
Lumpy skin disease (LSD)	Cattle	Africa
Sheep and goat pox	Sheep and goats	South Asia, China, Middle East, Africa
Bovine spongiform encephalopathy (BSE)	Cattle	UK and other parts of Europe
Venezuelan Equine Encephalomyelitis	Equines	Central American and South American countries
Newcastle disease (ND)	Poultry	Asia and Africa
Highly pathogenic avian influenza (HPAI)	Poultry	Asia, Europe and Africa
Hendra virus (HeV) infection	Horses	Australia
Nipah virus (NiV) infection	Pigs	Malaysia and Singapore