TANUVAS TECHNICAL REPORTER

An official publication of research and developmental activities of Tamil Nadu Veterinary and Animal Sciences University

IN THIS ISSUE

EDITORIAL OFFICE

Directorate of Distance Education, TANUVAS, Anna Salai, Nandanam, Chennai - 600 035

Telefax: 91-44-2432 0411
Email: dde@tanuvas.org.in

MANAGEMENT OF ANIMALS IN DISASTER

The animal husbandry sector plays a crucial role in sustaining the livelihoods of the rural people of India. Augmenting livestock production and productivity is therefore very important in increasing the income of marginal, small farmers and landless labourers. However, natural and man-made disasters often affect the growth of the sector during one or other time in the course of its development. India has been vulnerable to varying degrees of natural disasters due to its unique geo-climatic conditions.

As per National Act on Disaster Management 2005, disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to and destruction of property, or damage to, or degradation of environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area.

CLASSIFICATION OF DISASTERS

Emergency Events Database – Centre for Research on the Epidemiology of Disasters (EM-DAT CRED) classified disaster as natural and technological disasters. It further classified natural disasters as biological (disease epidemic, insect / animal plagues), geophysical (earthquake, landslides, tsunami, volcanic activity), hydrological (avalanches, floods), meteorological (cyclone, storm, wave surges), climatological (extreme temperature, drought, wildfire) and extraterrestrial. The technological disasters are further classified as industrial, transport and miscellaneous accidents. Livestock Emergency Guidelines and Standards-LEGS classified disasters as rapid onset, slow onset and complex emergencies.

OCCURRENCE OF DISASTERS IN INDIA

India, due to its unique geo-climatic and socio-economic conditions, is vulnerable, in varying degrees, to floods, droughts, cyclones, tsunamis, earthquakes, urban flooding, landslides, avalanches and forest fire. Out of 36 States and Union Territories in the country, 27 are disaster prone. 58.6% land mass is prone to earthquakes of moderate to very high intensity; 12% land is prone to flood and river erosion; out of 7,516 km coastline, 5,700 km is prone to cyclones and tsunamis; 68% of the cultivable land is vulnerable to drought, hilly areas are at risk from landslides and avalanches, and 15% of landmass is prone to landslides. A total of 5,161 Urban Local Bodies are prone to urban flooding. Fire incidents, industrial accidents and other manmade disasters involving chemical, biological and radioactive materials are additional hazards, which have underscored the need for strengthening mitigation, preparedness and response measures (NDMA Annual Report, 2016-17).

IMPACT OF DISASTER ON ANIMALS

Studies on impact of various disasters on animals in India are very limited. As per the Central Water Commission's data, on an average 97,000 cattle were lost due to floods and heavy rains alone every year in India based on the statistics from 1953 to 2011.

When animals are affected by disaster, the main problems faced are as follows (Sen and Chander, 2003):

1. Death, injury or debilitation of animals
2. Destruction of animal shelters
3. Loss of livelihood assets for the farmers
4. Loss of market access
5. Inaccessible animal healthcare services
6. Outbreak of zoonosis
7. Animal/snake bites
8. The significant impact on public mental health due to the emotional involvement of the owners with the animals.
9. Reduced production due to the scarcity of feed and water, high livestock mortality rates, etc.
10. Damage to both domestic and wild animal species, due to lack of feed and water and the diseases which spread during and after a disaster.

THE DISASTER MANAGEMENT CYCLE (DMC)

The World Organisation for Animal Health in its "Guidelines on disaster management and risk reduction in relation to animal health and welfare and veterinary public health, 2016" stated that the objectives for veterinary services in disaster management are to protect animal health and welfare, safeguard human and environmental health and assist in restoring and enhancing economic and societal conditions. Among the various disaster management models available to provide a framework to develop disaster management plans, actions and activities, a simple, commonly used DMC model includes four phases namely; 1. Mitigation and prevention, 2. Preparedness, 3. Response, and 4. Recovery. Disaster management plans often focus on response, but effective disaster management includes activities in all four phases.

In emergency situations, specific livestock-targeted interventions are required to help households survive the immediate crisis and to support communities in rebuilding their livelihoods. Livestock interventions typically cover provision of animal health services, emergency feeding and water supplies, shelter provision, destocking (marketing, slaughtering) and restocking. The need for a particular intervention depends on the nature of the emergency, the local context and the phase of the emergency (Livestock related interventions during emergencies manual, FAO, 2016).

- Mitigation means 'the lessening or limitation of the adverse impacts of hazards and related disasters'. (UNISDR, 2015) and prevention means 'any action aimed at reducing risks or mitigating adverse consequences of a disaster for people, animals, the environment and property, including cultural heritage' (EU Civil Protection Mechanism, 2013). For example, rotational grazing and limiting the grazing of livestock in areas prone to drought to reduce risk, availing insurance for livestock/ poultry.
- Preparedness means 'a state of readiness and capability of human and material means, structures, communities and organisations enabling them to ensure an effective rapid response to a disaster, obtained as a result of action taken in advance' (EU Civil Protection Mechanism, 2013). This includes plans to safeguard animals and human beings, as well as the livelihoods of communities, early warning systems, safe animal shelters, methods to safe animal evacuation procedures, storage of sufficient feed and water and animal identification methods to reunite them in the event of an impending disaster.
- Response means 'the provision of emergency services and public assistance during or immediately after a disaster in order to save human and animal lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people or animals affected' (UNISDR, 2015). These are activities carried out after the impact of a disaster

in order to assess the needs, reduce the suffering, limit the spread and the consequences of the disaster, and open the way to rehabilitation. Mobile emergency veterinary clinics and search and rescue operations are often part of the early response phase, as is provision of emergency food, temporary shelters and reuniting of animal and owner wherever possible. Response activities often required to be approved and guided by the government.

- Recovery means 'the restoration, and improvement where appropriate, facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors'(UNISDR, 2015) are provided. It includes action taken to return the situation back to normal or furthermore, safer than before. Restoring veterinary care in the community is essential.

The four phases of the DMC are used as a framework to plan and organise the processes, policies and procedures involved in disaster management, including disaster risk reduction. The phases are not always distinct, but flow into one another in a continuous cycle. The Disaster Management Act, 2005 of India lays down institutional and coordination mechanism for effective disaster management at the national, state, district and local levels. As mandated by this Act, the Government of India created a multi-tiered institutional system consisting of the National Disaster Management Authority (NDMA) headed by the Prime Minister, the State Disaster Management Authorities (SDMAs) headed by the respective State Chief Ministers and the District Disaster Management Authorities (DDMAs) headed by the District Collectors and co-chaired by Chairpersons of the local bodies.

MITIGATION AND PREPAREDNESS

Mitigation and prevention activities occur prior to disaster events and they incorporate lessons learned from the response and recovery phases of previous disasters. According to NDMA Guidelines for Management of Biological Disasters (2008), the following preparations are essential for management of animals during disasters:

i) Development of flood, cyclone and other natural calamity warning systems for livestock. In principle, an Early Warning System (EWS) would make it possible to avoid many adverse economic and human costs that arise due to the destruction of livestock resources every year. Other tools that may provide early warning signals include field monitoring and remote sensing systems.

ii) Establishment of fodder banks at the village level for storage of fodder in the form of bales and blocks for feeding animals during drought and other natural calamities is an integral part of disaster mitigation.

iii) Supply of feed ingredients at nominal cost from the government / non governmental agencies: Most grain rations for cattle and sheep provide enough protein to maintain a satisfactory 10–12% level. But, when only the low-protein materials such as grain straws or grass straws are fed in emergencies a protein supplement is needed. Adequate reserves as per the availability of resources should be developed.

iv) Conservation of monsoon grasses in the form of hay and silage during the flush season greatly help in supplementing shortage of fodder during emergencies such as drought or flood. The objective is to preserve forage resources for the dry season (hot regions) or for winter (temperate regions) in order to ensure continuous, regular feed for livestock.

v) Development of existing degraded grazing lands with perennial grasses and legumes: As a majority of the population in drought prone areas depends on land-based activities like crop farming and animal husbandry, the core task for development will be to promote rational utilisation of land for supplementing fodder requirements during emergencies.

vi) Provision of free movement of animals for grazing from affected areas to the unaffected areas reduces pressure on pastures and also facilitates early rehabilitation of the affected livestock. In emergency situations, the presence of livestock can exacerbate conflict when "evacuated people with animals" compete for reduced forage and water resources. To prevent this, emergency destocking programme should be instituted. This programme provides for the intentional removal of animals from a region before they die.

viii) Treatment and vaccination of animals against contagious diseases in flood prone areas: Routine prophylactic vaccination of livestock in flood-prone area significantly reduces the severity of the post-disaster outbreak of any endemic diseases. Since animals affected by floods are prone to pick up infectious diseases, vaccination and veterinary camps should be set up to treat and immunise livestock against various diseases. The creation of a community based animal health care delivery system may significantly reduce livestock deaths in a region. Vaccination programmes and primary animal health care will prevent some of the drastic losses associated with the onset of rains.

ix) Initiation of Public Private Partnerships in livestock emergency management, especially in the field of vaccine production, will go a long way in combating animal health emergencies of infectious origin. Similar partnership in feed manufacturing as well as livestock production will minimise the losses due to other livestock emergencies.

x) Appointment of drafting teams for the preparation, monitoring and approval of contingency plans. Implementation of simulation exercises to test and modify animal disaster management plans and preparedness are also necessary.

xi) Assessment of resource needs and planning for their provision during animal disaster management is also crucial.

STRATEGY FOR EMERGENCY MANAGEMENT (RESPONSE AND RECOVERY)

- It is pertinent to develop plans regarding what to do, where to go, or whom to call for help before an event occurs. These actions will improve chances of successfully dealing with an emergency. These include preparedness measures such as posting emergency telephone numbers, holding disaster drills and installing warning systems.
- Efforts need to be made to respond safely to an emergency by converting preparedness plans into action. Seeking shelter from a cyclone or moving out of the buildings during an earthquake are both response activities.
- A comprehensive strategy for recovery actions to bring back normalcy, including assistance for repairs and other losses will be identified in disaster management plans. Safety is an important aspect of a response plan and every action plan will enumerate different responding activities to be undertaken for effective management of livestock disasters. The response plan will be rehearsed to remove the plausible anomalies in actions.
- Provision of compensation on account of distressed sale of animals and economic losses to farmers due to death or injury of livestock.
- The Disaster Management Plan released by the Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture and Farmers Welfare, Government of India indicates that for identification of resources for rescue and treatment of animals during disasters, the following measures are to be taken by the authorities concerned.
    - ★ Assess available manpower i.e. veterinarians, paraveterinary staff and ancillary staff.
    - ★ Review disaster management preparedness of veterinary medical facilities such as veterinary hospitals, mobile veterinary units, etc.
    - ★ Provision of adequate storage of medicine, vaccines, surgical and veterinary appliances, diagnostics, Personal Protective Equipment (PPEs), life saving equipment, etc.
    - ★ Ensure the logistical requirements such as fuels, lighting equipment, tents, sheds, bedding, trolleys and material for sanitation, storage of feed and fodder and water.
    - ★ Arrangements for ambulance and outreach facility for sick and injured animals.
    - ★ Identification of disease diagnostic and control measures for animal / poultry diseases.
    - ★ Assessment of existing animal handling search and rescue capacity, equipment and infrastructure facilities available at state and district levels.

DISPOSAL OF DEAD ANIMALS DURING DISASTERS

The NDMA guidelines also indicate that carcasses can be a hazard to the environment and other animals and require special handling. To minimise soil or water contamination and the risk of spreading diseases, guidelines for proper carcass disposal must be followed. Disposal options include burial in an approved animal disposal pit or incineration. Burial avoids air contamination associated with burning carcasses and is economical. Since the heat in the pile eliminates most pathogens, burial can also improve the biosecurity of farming operations. A plan for the disposal of dead livestock should address selection of the most appropriate site in each village or cluster of villages for burial or burning, disinfection process, provision of costs for burial or burning, material and equipment required for burial and burning, etc.

CONCLUSION

The role of veterinary services in disaster management and risk reduction in relation to animal health, animal welfare, veterinary public health and protection of livelihoods of animal owners needs no emphasis and the importance has been well understood by the planners and policy makers at all levels of the administration in India. Capacity building of veterinary professionals in animal disaster management will go a long way in serving the needs of the community at times of emergency in a more effective way.

References on request

email: manivannan.c@tanuvas.ac.in

C.Manivannan, A.Yasotha, M.Balagangatharathilagar and N.K.Sudeep Kumar

Veterinary Emergency Response Unit,
Madras Veterinary College,
Chennai – 600 007.

RESEARCH HIGHLIGHTS
(2016-17)

Molecular characterization and development of rapid diagnostic test using recombinant protein for cystic echinococcosis

- A study was undertaken to characterize the genotypes of *Echinococcus granulosus* of animals slaughtered at corporation slaughter house, Chennai and to develop a rapid recombinant antigen based serodiagnostic test for Cystic Echinococcosis (CE) in animal and human intermediate hosts. In the present study, 13 hydatid cysts were collected from 408 cattle and 134 buffaloes observed at slaughter, of which 12 (92.3 per cent) were fertile. Genotypic characterization was accomplished by amplification and sequencing of the mitochondrial COX I gene which revealed the presence of only *E. granulosus* G5 genotype in all the 12 fertile hydatid cysts.
- Recombinant proteins of antigen B (AgB) of hydatid cyst fluid and another calcium binding protein (CBP) were developed by amplifying, cloning and expressing respective genes in pET28a expression vector. The recombinant antigens (rAgB and rCBP) were validated using a standard latex agglutination test (LAT) which revealed that the sensitivity and specificity of rAgB was significantly higher than that of rCBP. Further, both recombinant antigens were used in Dot-Enzyme Immunoassay (Dot-EIA) and LAT for screening of sera samples collected randomly from various animal and human intermediate hosts. Chi square analysis of the rAgB based Dot-EIA and LAT revealed a highly significant difference between the tests ($P<0.01$).
- It was concluded that rAgB can be preferred over rCBP in screening of sera samples from intermediate hosts. Based on the current study, rAgB LAT can be preferred for serodiagnosis of cystic echinococcosis from all intermediate hosts except cattle for which rAgB Dot-EIA can be used. In addition, Dot-EIA and LAT are cost effective, rapid and easy to perform. The present study suggests the use of rAgB based Dot-EIA and LAT for serological screening of animal and human cystic echinococcosis.

Research Scholar: G. Jyothimol
Department of Veterinary Parasitology, Madras Veterinary College, Chennai – 600 007.
Chairman: Dr. A. Sangaran.

Genetic studies on semen production in Murrah buffalo bulls reared in Tamil Nadu

- South-west monsoon (June to August) and summer (March to May) were found to be the best season for semen production in Murrah buffalo bulls maintained under the Cauvery delta zone of Tamil Nadu.
- The mean age at first semen collection and semen freezing were 1149.71 days (~38 months) and 1160.67 days (~39 months) and the mean semen production and frozen semen production periods were 1313.97 days (~44 months) and 1292.23 days (~43 months).
- Murrah bulls aged above 42 months, with 540 kg and above body weight and with scrotal circumference >30 cm produced better quality semen and more number of frozen semen doses per ejaculate.
- Selection of bull calves with higher body weight and scrotal circumference at an early age could be used as a strategy for genetic improvement of Murrah buffalo bulls.

Research Scholar: M. Kousalya Devi
Department of Animal Genetics and Breeding, Madras Veterinary College, Chennai – 600 007.
Chairman: Dr. S.M.K. Karthickeyan

Registered with Registrar of Newspapers for India No.TN ENG/2016/73814
Posted at Pathrika Channel, Egmore RMS, Chennai - 8.

Printed and Published by Dr. K.N. Selvakumar, Director of Distance Education, Tamil Nadu Veterinary and Animal Sciences University, Old No. 327/New No. 485, Anna Salai, Nandanam, Chennai – 600035 on behalf of Tamil Nadu Veterinary and Animal Sciences University, Printed at University Printing Press, Mathur Road, Madhavaram Milk Colony, Chennai – 600051. Editor: Dr. K.N. Selvakumar, Ph.D.

Minimally invasive plate rod fixation technique for tibial fractures in dogs

- A clinical research was conducted with an objective to standardize the plate rod fixation by normograde pin fixation with Minimally Invasive Plate Osteosynthesis (MIPO) using Locking Compression Plate (LCP) for management of tibial fractures in dogs. The study was conducted in 12 dogs with diaphyseal tibial factures, which were randomly divided into two groups. In group I animals, fracture was treated with MIPO plate-rod technique and in group II, fracture was treated with open plate-rod technique.
- In both the groups, normograde pinning was applied. For plate rod technique 1-2 mm K-wire, 3.5 mm LCP and 12 mm to 30 mm cortical screws was found to be suitable in dogs weighing from 6.6 to 23.7 kg.
- The clinical evaluation in group I animals revealed early pain free ambulance, callus formation with excellent functional outcome as compared to group II.
- Secondary callus was observed in all the animals of group I and primary bone healing was observed mostly in group II animals.
- Complications like wound infection, osteomyelitis and wound dehiscence were observed in animals treated with open plate rod technique (Group II).
- Significant increased serum calcium on 60th postoperative day in group II and significantly increased phosphorus level on 60th postoperative day in both the groups were observed but values were within normal level.
- MIPO Plate rod technique was found to be suitable for management of tibial fractures in dogs owing to its relative stability and rapid healing.

Research scholar: R.Sarangabani
Department of Veterinary Surgery and Radiology, VC&RI, Namakkal.
Chairman: Dr.K.Jayakumar.

Analysis of commercial desi bird venture in Namakkal district

- In commercial desi bird venture, majority of the respondents had the flock size of 50 to 200 birds but cent percent of the backyard poultry farmers had up to 20 birds. Most of the commercial farmers and cent per cent of the backyard poultry farmers obtained chicks from their own flock and reared non-descriptive chicken.
- Majority of the commercial desi bird farmers followed semi intensive system of rearing and cent per cent of the backyard poultry farmers practiced backyard extensive system of rearing.
- Most of the respondents had better benefit cost ratio in commercial desi bird venture. The average net income per annum generated from commercial and backyard farming was Rs.2.2 lakh and Rs. 4000/- respectively. The contribution of poultry to total family income in commercial desi bird venture and backyard poultry farming was 30 per cent and 2.20 per cent respectively.
- Incidence of diseases and predator problem were the major constraints in commercial desi bird venture.

Research Scholar: R.Babyusha
Department of Veterinary and Animal Husbandry Extension Education, VC & RI, Namakkal
Chairman: Dr. K.M.Sakthivel.