

## IMPACTS OF CLIMATIC CHANGE IN ANIMAL HUSBANDRY- ARE WE PREPARED?

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### ABSTRACT

*Climatic change and food security are two important emerging global problems. The increasing animal population to meet the food security is also considered as a major catalyst for climatic change and emerging zoonoses. Developing countries are likely to be worse affected by climatic change and difficult to cope with the adaptation or mitigation measures for want of economical and technological support. Species and region specific research are essential to formulate ideal but affordable mitigation measures to meet the climatic stresses. Sensitization of farmers about its importance and capacity building are the immediate needs. Collaboration of multidisciplinary experts and agencies is also important for desired results.*

### CLIMATIC CHANGE AND GLOBAL WARMING

Extreme weather events and its damaging effects are already experienced all over the world. Climatic change is now a reality and the most obvious manifestation is the rising average atmospheric temperature otherwise known as global warming. The mean global annual temperature increased between 0.4 to 0.7° C. The impacts could be multifarious like rainfall, melting

glaciers, rising sea level, recurrent droughts and floods, threat to biodiversity, increased plant and animal diseases and infinite number of challenges on public health (Sarkar, S. and Padaria, R. N. 2010). The Intergovernmental Panel on Climatic Change (IPCC) predicts the increase in global average surface temperature between 1.8°C and 4.0° C by 2100 and extinction of approximately 20 to 30 percent of plant and animal species with severe consequences for food security in developing countries (FAO).

Effect of Green House Gases (GHG) like Carbon dioxide, Methane and Nitrous Oxide towards global climatic change is already established. At smaller levels these gases have a protective role of life on earth. Carbon dioxide is widely considered the most important human-induced GHG. Estimated GHG emission from animals is 18 percent, mainly Methane, which got 25 times the Global Warming Potential (GWP) of Carbon dioxide (FAO). Climate-changing gases are released into the atmosphere at every step of meat, egg, and milk production and potentially disrupting weather, temperature, and ecosystem health. Globally emissions from pig manure alone account for almost half of all GHG emissions from farm animal manure. (Koneswaran, G and Nierenberg, D, 2008).

## **DIRECT IMPACTS ON ANIMAL HEALTH**

India is an agrarian country with the largest cattle population in the world. Livestock population have a crucial role in developing countries by its contribution to food security and poverty alleviation. It is also noted that the global livestock sector is growing faster than any other agricultural subsector. But Methane emission from cattle population through enteric fermentation and manure management is a matter for concern in climatic change.

Impact of climatic changes could be in four ways: heat-related diseases and stress, extreme weather events, feed grain forage availability and price and adaptation of animal production systems to new environments and emergence or re-emergence of infectious diseases, especially vector-borne diseases critically dependent on environmental and climatic conditions.

Most important direct effect could be heat stress and reduced nutrient intake affecting production performance (Mariara, J.K., 2008). The results of impact assessment study in Africa indicate that large livestock farms are more vulnerable to climate change and are likely to lose net revenue while small farms are much less vulnerable and will probably get advantage, atleast against the risk of dryness, livestock offer a good substitute for crops. (Seo, S.N. and Mendelsohn. R.2007). It is a requisite to mitigate the climatic stresses, if a high producing and less tolerant animal to be reared in harsh environmental situation. (Naqvi, S.M.K and Sejian, V. 2011). Mitigation to overcome heat stress could be

- Physical modification of environment
- Genetic development of less sensitive breeds
- Improved nutritional management schemes

Some current economic practices such as shades, sprinklers and ventilation will be suitable for adapting to reduce heat stress in dairy cows. Shades are the simplest method to reduce the impact of high solar radiation. Open sided construction for sheds will increase natural ventilation and if not, providing specially designed fans will be ideal. An effective way of cooling cattle is evaporative spray-mist, fog and sprinkling systems.

Climate change will have a substantial effect on global water availability in the future. Not only will this affect livestock drinking water sources, but it will also have a bearing on livestock feed production systems. Reduction of livestock numbers to more productive animals leads to more efficient milk/ meat production and lower GHG emissions. Different animal feeding and manure management (collection, storage, spreading, biogas production), management of feed crop production are other mitigation measures. (IFAD, 2007).

### **Emergence/ Re-emergence of diseases:**

Predictions on all the impacts are difficult but a change in climate can result in changes in species composition of vectors, pathogens and augmenting its spread and even the emergence of new pests and diseases. New transmission modalities and host ranges complicate the epidemiology of some diseases. (FAO, 2008). Temperate countries will be more prone to such diseases. Changes in the spatial distribution of vectors/pathogens, animal populations with little or no immunity would be exposed and suffer major disease impacts (FAO, 2008). Diseases such as Bluetongue have expanded their range due to

global warming. Extreme weather events such as heavy rainfall or droughts often trigger disease outbreaks.

## **PUBLIC HEALTH IMPACTS**

Climate change is having far-reaching consequences on human health, perhaps most starting signals could be growing conflicts, hunger and then to diseases. (Koneswaran, G and Nierenberg, D, 2008). Climate change may result in food-borne zoonoses. Additional /inappropriate use of pesticides and veterinary drugs could be another concern. Mycotoxins in food is going to be a growing problem in the coming era.

Vulnerability of the impact could be more on developing countries where animals and human are exposed directly to natural resources for food and less capacity for adapting mitigation measures. Rural poor communities rely greatly on agriculture and livestock for their survival, at the same time these are amongst the most climate-sensitive economic sectors. So climatic change can aggravate poverty.

## **NEED FOR A 'ONE HEALTH' APPROACH**

It is estimated that up to 75 percent of newly recognised infectious diseases of humans are from zoonotic pathogens- Bovine Spongiform Encephalitis, Nipah virus, Monkey Pox, H5N1, West Nile Virus, Rift Valley Fever and many more to add. It is a clear realisation that infective agents circulate between wildlife, domestic animals and humans. It is also proved that no one discipline or sector of society has enough knowledge and resources to prevent the emergence or resurgence of diseases in today's globalized world. The 'One Health' approach needs contributions from

multidisciplinary experts like agricultural scientists, veterinarians, anthropologists, economists, educators, engineers, entomologists, epidemiologists, microbiologists, nutritionists, physicians, public health professionals, sociologists and local communities (Black, P.F. *et.al.* 2008)

Responses to Climatic changes and future strategies

1. Adaptation to reduce the vulnerability of people and ecosystems
2. Mitigation to reduce the magnitude of impact in the long term.

The Conference of the signatories under the United Nations Framework Convention on Climate Change (UNFCCC) have been unsuccessful till date in negotiating consensus on emission reductions. The chances for global agreement in preventing or mitigating climate change are increasingly decreasing. Therefore we need to prepare people for adjusting to the impacts of climate change.

Across the globe, governments are increasingly adopting national programmes to deal with the threat of climate change. According to the national action plan on climatic change by the Prime Minister's council, possible risks were analysed with observed impacts and eight National Missions were formulated in strategic areas including a National Mission for sustainable agriculture. Under the aegis of these missions implementation of various activities are in progress. Some of them are conservation of water through practices like rain water harvesting, risk financing like crop/animal insurances, disaster management and proactive programmes on capacity building, surveillance and control of vector borne diseases like Japanese Encephalitis,

Dengue fever, Malaria, Filariasis, energy audits in large energy consuming units, promotion of biofuels. (GOI., 2009)

Government of Karnataka invited related departments to prepare their action plans, strategies or vision documents for evaluation but only half the agencies could prepare the requisite documents in time. Government of Kerala have the department of Environment and Climatic Change to co-ordinate reduction, adaptation or mitigation measures.

### **METHANE EMISSION REDUCTION STRATEGIES**

This is very important in India with huge livestock population. Also Methane is the GHG with the shortest life span, 10-12 years when compared to CO<sub>2</sub> with 120 years. So any effort to reduce methane emission will be beneficial to slow global warming. It could be managerial, nutritional or advanced biotechnological strategies. (Naqvi, S.M.K and Sejian, V. 2011). Methane emission from exotic/crossbred cows with high productivity is proved to be less. Amount of feed consumed and its digestibility are two important factors that determine total Methane production.

### **WHAT NEXT?**

Identifying task force to formulate policies in relevant sectors, research to develop vulnerability indices on various parameters in the sector and to formulate adaptation strategies that best suited for the farming situation of our state are crucial to meet the hardships of climatic change. Capacity building of staff at various levels to cope

up with the mitigation measures and sensitisation of farming community about this phenomenon are other immediate interventions required.

### **CONCLUSION**

Climate change is an ongoing process. Starving in both animals and human can be worse in the developing world. There is a two-way relationship between livestock production and environmental health. On the one hand, livestock contribute to climate change and other environmental problems, and at the same time livestock health and productivity can be adversely affected by these same environmental upsets. (Sherman, D.M. 2010).

Research should be initiated by responsible forum to formulate policy for sustainable livestock at one end. Developing farmer friendly technologies are important especially in the quality of feed to improve milk production and decrease emission of GHG. Control of emerging diseases need concerted efforts in research, control measures for vector and pathogen including their transboundary movement in the era of enhanced global trade, travel and tourism. Climate determines ecosystem health over time, but weather drives immediate outbreaks and disasters. Hence implications of climatic change on different fields connected with plant, animal and human life need to be studied in depth at different levels for early mitigation. The environmental impacts of animal production require more focussed attention from international organizations, governments, producers, and consumers on meat and dairy production.

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