

American Journal of Agricultural Science Engineering and Technology

ISSN: 2158-8104 (Online), 2164-0920 (Print)

Volume: 3, Issue: 2



Published by: e-Palli,
Florida, USA

The American Journal of Agricultural Science, Engineering and Technology (AJASET) is blind peer reviewed international journal publishing articles that emphasize research, development and application within the fields of agricultural engineering, science and technology. The AJASET covers all areas of Agricultural Science, Engineering and Technology publishing original research articles. The AJASET reviews article within approximately two weeks of submission and publishes accepted articles online immediately upon receiving the final versions.

Published Media: Online and Print ISSN: 2158-8104 (Online), 2164-0920 (Print)

Frequency: 4 issues per year (January, April, July, October)

Area of publication: Agricultural Science, Engineering and Technology. The subjects covered by the journal includes but not limited to:

Agriculture	Dental and Medical Science
Agricultural Economics and Agri-business	Experimental Agriculture
Agricultural Engineering	Food science, Engineering and Technology
Agricultural Statistics	Genetics Technology
Agricultural Extension and Development	Geophysics
Agro-forestry and Ecotourism	GIS, GPS, and Remote Sensing
Agronomy	Horticultural Science
Agro-tourism	ICT for Agricultural Development
Animal Science and Nutrition	Irrigation and Water Resource Engineering
Applied Agriculture	Land Use and Development
Applied Economics and Finance	Mathematics
Aquaculture	Modeling of Crop and Animal System
Bioinformatics	Pathology and Plant Protection
Biotechnology and Biochemistry	Fisheries
Climate Change and Green Technology	Plant Breeding and Crop Science
Collaborative Engineering	Post-harvesting Technique and Technology
Computer Science and Engineering	Precision Agriculture
Computational Biology	Production Engineering
Crop Science and Production	Social Science and Agricultural Development
Dairy Science & Poultry Science	Soil Science
Decision Support System	Tropical Agriculture
Entomology	Veterinary Science and Technology
Environmental Science and Extension	

Members of Editorial Board

Professor Dr. James J. Riley, United States
Dr. Shawn Wright, United States
Dr. Sumit Garg, United States
Professor Dr. Michael D. Whitt, United States
Dr. Goutam Palui, India
Dr. Satyaki Kar, India
Dr. Indranil Bhattacharya, United States
Dr. Dalia Abbas, United States
Professor Dr. Hilda M. Rodríguez, United States
Professor Dr. Rahmatullah Imon, United States
Dr. Ekkehard Kurschner, Germany
Dr. Md. Akhtaruzzaman, Malaysia
Professor Dr. Saied Pirasteh, Canada
Professor Dr. Ahmed Osumanu Haruna, Malaysia
Dr. Wael Alaghbari, Yemen
Professor Dr. Saroje Kumar Sarkar, Bangladesh
Dr. Provash Kumar Karmokar, Bangladesh
Dr. Muthunayagam Rufus Kitto, Saudi Arabia
Dr. KS Zakiuddin, India
Professor Dr. Nasrin Sultana Juyena, Bangladesh
Professor DR. Emdadul Haque, Malaysia

IMPACT OF CLIMATE CHANGE ON LIVESTOCK IN BANGLADESH: A REVIEW OF WHAT WE KNOW AND WHAT WE NEED TO KNOW

Q M Monzur Kader Chowdhury^{2*}, Maruf Hasan³, Juned Ahmed², Chamali Akter Shykat², Md Saiful Islam², Muhammed Hossain¹

ABSTRACT

Bangladesh is one of the over populated disaster prone country. The effect of climate change on livestock is a great deal to talk. This review study reveals that Bangladesh is one of the most vulnerable countries. However, the change of climate in this country momentarily continuing and which determines how difficult it is to design and implement future strategies. Being a developing country, Bangladesh is less likely to face the challenges caused by global warming and climate changes owing to financial crisis and budget allocation in preparedness of emergency and urgent. As a part of agriculture, livestock sector is considered as backbone of annual GDP in Bangladesh. Besides, the financial hardship, negligence of long term planning and dearth of implementation of the existing capacity are crucial draw back for livestock development. Therefore, this review provides some advantageous rules for policy makers on habituation and pacification of the climatic hazards for wellbeing of livestock sectors of Bangladesh.

Key words: Climate change, Livestock, Bangladesh, Hazards and strategies.

¹Department of Parasitology, Faculty of Veterinary and Animal Science, Sylhet Agricultural University, Sylhet-3100, Bangladesh

^{2*}Faculty of Veterinary and Animal Science, Sylhet Agricultural University, Sylhet-3100, Bangladesh

³Department of Pharmacology and Toxicology, Faculty of Veterinary and Animal Science, Sylhet Agricultural University, Sylhet-3100, Bangladesh

*Corresponding Author: bmhossain34sau@gmail.com

INTRODUCTION

Bangladesh is one of the smallest countries in the world but it had been experiencing deleterious vulnerability to the issues related to climate change (IPCC, 2007). Intergovernmental Panel on Climate Change (IPCC, 2007) further forecasted that adverse effect of climate patterns will be continued to worsen to socio-economic conditions of Bangladesh. Particularly, the economic losses will be occurred to the rural areas where people are more dependent on livestock, fisheries and agriculture related activities for their livelihood (IFAD, 2009). Livestock in Bangladesh comprised of cattle 23.99 million, buffalo 1.46 million, goat 25.44 million, sheep 3.29 million, chicken 304.17 million and duck 296.26 million (BBS, 2014). Livestock is thus an integral component of agricultural economy of Bangladesh performing multifarious functions such as provisions of food, nutrition, income, savings, and foreign currency earning (MoEF, 2009), draft power, manure, fuel, transport, social and cultural functions. The climate change and its impacts can result in the outbreak of new diseases and pests that will affect these agriculture, fisheries and livestock (IPCC, 2001; Gaughan et al., 2009). It has been reported by the global scientists that the global temperature increased from 1.0 to 1.5°C within the last 30-50 years and it is under foretell that the global average temperature may be raised up to 4.0°C by this century (IFAD, 2010). This prediction reflects 20-30% plant and animal species will be endangered and must face consequences for insecurity among the developing countries (FAO, 2007). Bangladesh is also not out of the realm and prediction (Ahmed et al., 2013). Bangladesh is a least developing country where about 70% people live in the rural areas and 40% people stay under poverty (MoEF, 2009). There is no doubt that most of the people live in the countryside engage themselves in livestock farming for their livelihoods, to meet the protein demand. Bangladesh livestock is the second largest sector after fisheries to meet the national protein demand (BARC, 2011). Although, Bangladesh is not responsible for the climate change globally but our people are under miserable position (Ahmed et al., 2012), which is not suitable for livestock feeds, fodders, forages and grazing fields. Moreover, the uneven flood is significantly in the some areas causing livestock diseases. If the livestock animal experiences heat stress it shrinks feed intake and that causes the reduction of gross production (Rowlinson, 2008). Climate change is also affecting livestock bio-diversities, genetics, breeding and livestock rearing (Ahmed et al., 2013). The study aims to provide concern to mitigate the climate change for promotion of livestock production.

MATERIALS AND METHODS

Secondary data resources like IPCC reports, international reports, books, scientific journals and government policy documents has been used in this study to come up with the approximation. Both the qualitative and quantitative data and information were used to portray the impact scenario of climate change on livestock of Bangladesh.

Resultant impacts and economic losses

Impact of climate change on quality and quantity of forage from grasslands

Bangladesh has one of the largest livestock populations in the world, and one of its notable characteristics is that almost its entire feed requirement is met from crop residues and by-products; grasses, weeds and tree leaves; and grazing on common lands and harvested fields (Dikshit & BIRTHAL, 2009). Climate change affects livestock production by altering the quantity and quality of feed available for animals. Climate change is expected to change the species composition (and hence biodiversity and genetic resources) of grasslands as well as affect the digestibility and nutritional quality of forage (Thornton et al., 2009). Droughts and extreme rainfall variability can trigger periods of severe feed scarcity, especially in dry land areas desertification leads to soil compaction and hardening, making the land unable to absorb rainwater (FAO, 2008), with devastating effects on livestock populations and increased level of salinity in cultural lands as sea level rises and finally consequences low forage production. Reductions in the quantity and quality of feed could make the impacts of climate change on livestock systems severe in certain places.

Impact of climate change on animal production

Climate changes create stress in livestock and poultry. A high temperature will increase body metabolism which will cause less growth in livestock. This leads to less meat, milk and egg production (MoEF, 2009). Conversely, increased ambient temperature lower feed intake consequences less production (Mack et al., 2013).

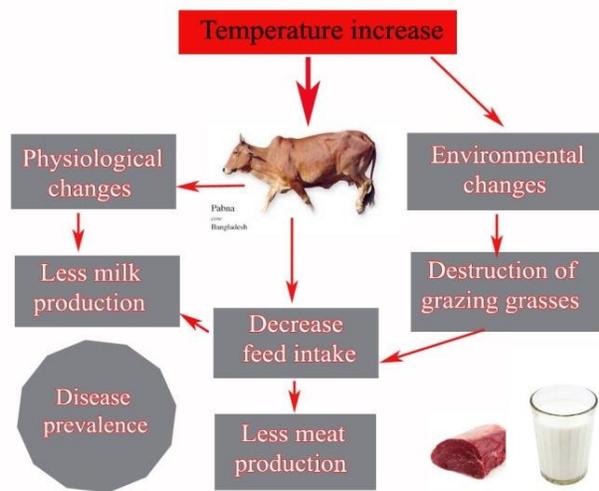


Figure 01: Effect of CC on Cattle. Increase in temperature can cause physiological changes in livestock. This will result in less milk and meat production. Besides disease prevalence may occur.

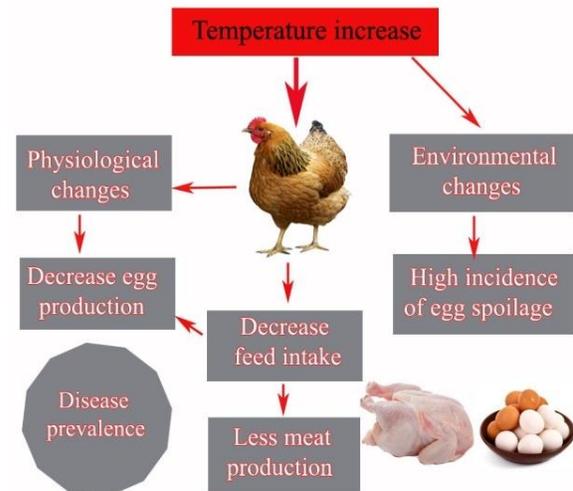


Figure 02: Effect of CC on Chicken. Increase in temperature can cause physiological changes in poultry. This will result in less egg and meat production. Besides disease prevalence may occur.

Effects of climate change on the spread and emergence of animal (and human) diseases

As global temperatures increase, the effects will be quite complex and vary from region to region. Though the extent of these effects is uncertain, it is known that those communities and regions with the least resources (IPCC, 2007), such as rural agricultural areas (Halweil, 2005) will be the most vulnerable to climate change. Warmer and wetter weather will increase the risk and occurrence of animal diseases. The direct effect of climate change such as temperature fluctuation and uneven rainfall can introduce vector-borne diseases and attack of parasites and transmissions of new diseases (Thornton and Herrero, 2008). Certain existing parasitic diseases may also become more prevalent or their geographical range may spread, if rainfall increases (Epstein & Mills, 2005) this may contribute to an increase in disease spread including zoonotic diseases. The viral infection Blue tongue Disease, for example, was once only a threat in Africa, now affects cattle and sheep in the whole of Europe (Clarke, 2007). Incidences of bovine respiratory diseases are known to be increasing (Duff & Gaylean, 2007) because of climate change. Outbreaks of diseases such as Foot & Mouth Disease or Avian Influenza affect very large numbers of animals and contribute to further degradation of the environment and surrounding communities' health and livelihood (Romarao, 1988).

Impact of climate change on breeding strategies

Breeding trends of livestock in the developing countries is always a sensitive issue to face the damage of climate change. The imported livestock species from Australia or Denmark are much more susceptible to the climate hazards compared to our locals and it is not cost effective in the scenario of Bangladesh. Therefore, we need to concentrate on our own hybrid livestock technology for enriching the breeding capacity providing high technology and institutional feedback. Although we should appreciate the national livestock breeders but still it requires some options to improve a rich gene bank where we can preserve the livestock's gene up to a certain period for the climate resistant livestock development.

Other effects of climate change

Sea level rise, natural disasters (floods, cyclones and droughts) and saline water intrusion which ultimately consequences economic loses, human casualty, loss of traditional lifestyles, biodiversity losses, disease spreads and famine (Ali, 2012).

Climate change impacts and economic losses

The role of livestock sub-sector is very crucial for the economic development of agriculture-based Bangladesh. Livestock provides daily protein and milk dietary requirements of the population, thus playing an important role in providing nutrition and health. Any reduction in production in this sector will result in a loss in rural household income, and an increase in unemployment in the rural areas. The salinity intrusion shall have impact on the meat and milk production in the coastal area. This will be due to the destruction of pasture lands in the area. Due to increased salinity, availability of water for livestock will be leading to decrease in livestock resources.

Strategies to maintain poverty and livestock

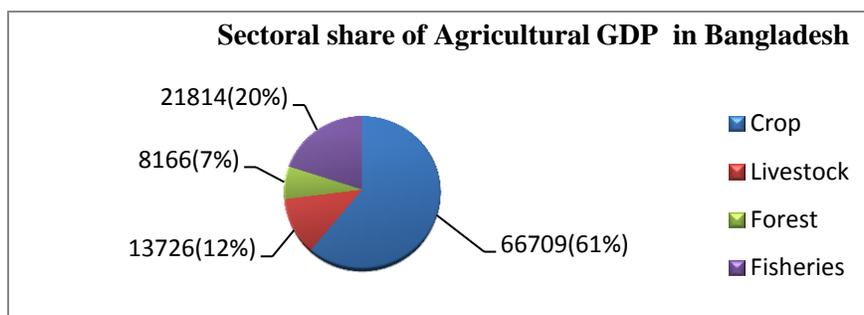


Figure 03: Sectoral share of agricultural GDP in Bangladesh (BBS, 2007).

More than 10 million people in Bangladesh are involved in livestock farming and 12% is contributing to the national economy. Unfortunately, still it could not achieve its targeted goals in the GDP (Figure 3). Moreover, the challenge of climate change acts as a barrier to receive its sustainability for smooth livestock management. Although there is existed the government policy and service into four steps which is usually called top-down approach but it failed to strengthen the policy and implementations due to financial and other limitations. Applicable sustainability option requires high technology and effective institutional framework to keep safe the livestock from the climate change vulnerability which is unfortunately costly. As climate change is a continued process so, we have to fix our goal first for a certain time frame and then implementation accordingly. Firstly, we need a stable policy as we are concerned that it is being changed due to change of government of the developing countries. Secondly, enhance subsidies is very essential in the national budget for livestock equipment and climate change matters. The government can sign some memorandum of understanding (MoU) with some developed countries for research exchange and transfer of technology. Although, the government is trying to tackle the climate change but still it is recognized that it requires the integrated participatory approach including respective ministries, civil society and different business sectors.

Role of youth to challenge climate change

Youth are the nation builders of tomorrow. They can contribute in this strategy of challenging climate change by raising voice against emission of greenhouse gases by organizing seminar, conference and summit to create pressure on policy makers for warranted action. Youth can take proper training to be skilled to face climate change effect and raise participation for rehabilitation of victims of climate change.

CONCLUSION

This study focuses the climate change challenge and its impacts to livestock sector in Bangladesh. This is very sensitive issue as about 15% of the total population are somehow involved for their livelihoods to livestock sector. The consequence of climate change is supposed to be more worsening in the future. Therefore, policymaker requires applying effective adaptation measures to reduce the vulnerability in the livestock sector. Although, there are some limitations but this research could be effective for the national climate strategies for the sustainable livestock management. Therefore, there are no alternatives except accessing high technology and advance knowledge for the sustainable development of the livestock sector. Our review is expected to act as the guidelines for potential approach for the policymakers toward the successful climate resilient livestock management in Bangladesh.

REFERENCES

- Ahmed, F., Alam, G. M., Al-Amin, A. Q., & Hassan, C. H. B. (2013). The Impact of Climate Changes on Livestock Sector: Challenging Experience from Bangladesh. *Asian Journal of Animal and Veterinary Advances*, 8:29-40.
- Ahmed, F., Alam, G. M., Al-amin, A. Q., & Hassan, C. H. B. (2013). The impact of climate changes on livestock sector: Challenging Experience from Bangladesh. *Asian Journal of Animal and Veterinary Advances*. 8: 647-658.
- Ahmed, F., Al-Amin, A. Q., Alam, G. M., and Hassan, C. H., (2012). Climate change concern to cattle feed in Bangladesh. *J. Anim. Vet. Adv*, 11:1946-1953.
- Ali, M. S. (2012). Effects of Climate Change on Floods of Bangladesh: Learning from the past. Retrieved from <http://ars.gcoe.kyoto-u.ac.jp/assets/files/flood-Climate%20Change-Ali-final1.pdf>
- BARC. (2011). Livestock and poultry research and development plan of BLRI-2021. Bangladesh Agricultural Research Council Newsletter, Volume 9, No. 1. January-March, 2011.
- BBS. (2014). Bangladesh Department of Finance, Bangladesh Economic Review.
- BBS. (2007). Bangladesh Department of Finance, Bangladesh Economic Review.
- Clarke, J. (2007, March 9). Climate change pushes diseases north: Expert. Retrieved from <http://www.reuters.com/article/us-africa-disease-idUSL0920787420070309>
- Dikshit, A., Dhakal, C. K., Regmi, P. P., Dhakal, I. P., Khanal, B., Bhatta, U. K., Barsila, S. R., Acharya, B. K., & Birtal, P.S., (2009, April 17). Grasslands: Enabling their potential to contribute to greenhouse gas mitigation. Retrieved from Inter-governmental Panel on Climate Change. <http://www.fao.org/fileadmin/templates/agphome/documents/climate/FinalUNFCCCgrassland.pdf>
- Duff, G. C., & Galyean, M. L., (2007). Board-invited review: recent advances in management of highly stressed, newly received feedlot cattle. *Journal of Animal Science*, 85: 823-840.
- Epstein, P. R., & Mills, E., (2005). Climate Change Futures: Health, ecological and economic Dimensions. The Center for Health and the Global Environment, Harvard Medical School. November.
- FAO. (2007). State of food and agriculture report: Paying farmers for environmental services.
- Food and Agriculture Organization of the United Nations, Rome, Italy. Food and Agriculture Organization of the United Nations. Desertification. Accessed April 23, 2008.
- Gaughan, J. B., Lacetera, N., Valtorta, S. E., Khalifa, H. H., Hahn, G. L. & Mader, T. L. (2009). 'Adaptive responses of domestic (farm animals) to climate challenges'. In: G.R. McGregor, R. de Dear, K.L. Ebi, D. Scott, S. Sheridan and M.D. Schwartz (eds.), *Biometeorology for Adaptation to Climate Variability and Change*, 1 ed., pp, 131-170.
- Halweil, B. (2005). The irony of climate. *World Watch Magazine*, 18, 18-23.

- IFAD. (2009). IFAD's response to climate change through support to adaptation and related actions. Comprehensive Report: Final Version.
- IFAD. (2010). IFAD's strategic framework 2007-2010.
- Inter-governmental Panel on Climate Change (IPCC), (2007). Climate change impacts, adaptation and vulnerability; summary for policymakers. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report.
- IPCC. (2001). Climate Change 2001:Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.
- Mack, L. A., Felver-Gant, J. N., Dennis, R. L., & Cheng, H. W. (2013). Genetic variation alter production and behavioral responses following heat stress in 2 strains of laying hens. *Poult. Sci.*, 92:285–294.
- MoEF. (2009). Climate change, adaptation plan of action, 2009. Ministry of Environment and Forest, Government of Bangladesh, Bangladesh.
- Romarao, D., (1988). Seasonal indices and meteorological correlates in the incidence of foot-and-mouth disease in Andhra Pradesh and Maharashtra. *Indian Journal of Animal Science*. 58(4): 432-434.
- Rowlinson, P., (2008). Adapting livestock production systems to climate change-temperate zones. Proceedings of the Livestock and Global Change Conference, May 25, 2008, Tunisia.
- Thornton, P. and Herrero, M. (2008). Climate change, vulnerability and livestock keepers: Challenges for poverty alleviation. Proceedings of the Conference on Livestock and Global Change, Hammamet, Tunisia, pp: 1-33.
- Thornton, P., van de Steeg, J., Notenbaert, M. H., & Herrero, M. (2009). The impacts of climate change on livestock and livestock systems in developing countries: A review of what we know and what we need to know. *Agri. Systems*, 101:113-127.