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The Impact of Climate Changes on Livestock Sector: Challenging Experience from Bangladesh

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ABSTRACT

To provide an acceptable adaptation measures for the resilience to climate change, this study explores the challenges developed through rapid climate changes to livestock that Bangladesh has been experiencing. International discourses on climate change testify that Bangladesh is one of the most vulnerable countries. Moreover, the damage of climate change in this country is significantly spontaneous and intensifying which is considered as one of the biggest challenges in designing the future strategies and their implementation. Being a developing nation, Bangladesh is less able to face the challenges caused through climate change and global warning due to the financial constraint in prioritizing budgetary allocation in a number of emergency and urgent preferences. Livestock sector in Bangladesh alongside agriculture is considered as the backbone of Bangladesh economy. Although, county encounters crucial financial hardship, denying the need of long-term planning and appropriate implementation procedure to the capacity building for the livestock sectors would cost more setbacks ultimately. Therefore, this study suggests some effective guideline for policy option on adaptation and mitigation the climate hazards for the wellbeing of livestock in Bangladesh.

Key words: Climate change, livestock, sustainability, policy issues, Bangladesh

INTRODUCTION

Intergovernmental Panel on Climate Change (IPCC, 2007) identifies Bangladesh as one of the smallest countries in the world that has been experiencing severe vulnerability to the issues related to climate change. The study further predicated that the adverse effect of climate patterns will be continued to worsen to Bangladesh socio-economic conditions IPCC (2007). The climate change would affect particularly the economics of the rural areas where people are more dependent on livestock, fisheries and agriculture related activities for their livelihoods (IFAD, 2009). It has been studied by the global scientists that already global temperature increased from 1.0 to 1.5°C within the last 30-50 years and it is under prediction that the global average temperature may be raised up to 4.0°C by this century (IFAD, 2010). This prediction reflects that the future 20-30% plant and animal species will be endangered and will turns into extreme consequences for insecurity among the developing countries (FAO, 2007b). The Bangladeshi economy is not out of this realm and prediction. The scientific evidence for climate change impacts is now real for Bangladesh and

scientifically, it is clear that changing climate patterns often adversely affected the soil, water, plants, health, animals, agriculture and the economy (Al-Amin *et al*., 2010; Al-Amin and Filho, 2011; Al-Amin and Alam, 2011; Lobell *et al*., 2011).

A good number such researchers, as Deshingkar *et al*. (2008), Ellis and Freeman (2004), Tarawali *et al*. (2011), Steinfeld and Gerber (2010), Hoffmann (2008), Hussein *et al*. (2008), Batima (2007), Brooks (2006), Cohen *et al*. (2002) and Dolberg (2001) have studied the poverty reduction and livestock production strategies. In addition, ample amount of studies show how to adapt the livestock instead of having the threat of climate change impacts and action measures with the issue on activities of species development, genetic factors, genetic parameters, genetic trends, disease context, disease outbreaks and focus the adaptation and mitigation options for the livestock sustainability of the developing countries (Wang *et al*., 2012; Demir and Bozukluhan, 2012; Mansoori *et al*., 2011; Bahmani *et al*., 2011; BCIP, 2010; Jabbar, 2010; Aksoy *et al*., 2009; GoAP, 2008; Thompson and Colavito, 2007; Linares *et al*., 2006; Tabidi *et al*., 2004; Nwanna, 2005; Karrar *et al*., 2003; DANIDA, 2002; Lund and Price, 1998). However, the evidence for the Bangladesh is dissimilar in nature and still lots need to be done in how to adapt the livestock instead of having the threat of climate change and similar activities to minimize in gaps (Ahmed *et al*., 2012).

Bangladesh is a least developing country where about 70% people live in the rural areas and it is about 40% people stay under poverty (MoEF, 2009). There is no doubt that most of the people live in the countryside somehow depend on agriculture either livestock or fisheries. Rural people are likely more engage themselves in livestock farming for their livelihoods. It is always a matter to meet the protein demand in the country where its population reaches to more than 160 million. Bangladesh livestock is the second largest sector after fisheries to meet the national protein demand (BARC, 2011). However, unfortunately the livestock is under threat due to the climatic patterns. Once there was a variation of six seasons but now it seems to be fixed into three for the global warming and that is a vital factor for causing livestock degradation. Although, Bangladesh is not responsible for the climate change globally but our people are under miserable position (Ahmed *et al*., 2012). In addition, cyclones and storms are being increased in the coastline which brings high tidal that raising the level of salt which is not suitable for livestock feeds, fodders, forages and grazing fields. Moreover, the uneven flood is incrassating significantly in the some areas which is causing livestock 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). Storm surges, draught and inadequate precipitation also affecting the livestock sector in Bangladesh. Unplanned deforestation and drought brings unavailability of livestock feeds and sustainable water resources for livestock use. If the livestock animal experiences heat strain it shrinks feed intake and that causes the reduction of gross production (Rowlinson, 2008). Climate change is also affecting livestock biodiversities, genetics, breeding and livestock rearing. About 12% agricultural GDP comes from the livestock sector and 10 million people are directly involved to this livestock sector for their livelihood (Karim *et al*., 2010). A wide gap still exists in the livestock sector such as veterinary services; drugs, operation, livestock services (DLS), feeds, quality control, vaccines and breeding materials, marketing system, breed development, inadequate supply system, coverage of animal health services, poor management and productivity of livestock. Lacking in training and capacity building and policy issues add to a number of these

disputes and challenges, as evidenced a recent study of CARE Bangladesh (Karim *et al.*, 2010). In addition, lacking in research and development push further one step ahead of challenges. Therefore, the technology received by the livestock institutes and farmers are considered as minimal.

With this background, it is clear that livestock should be considered as one of the first priorities of the policy makers of Bangladesh to make it sustainable against the climate change but still there are some gaps choosing the policy options in an account. Therefore, this study focuses how to choose the adaptation and mitigation option as a measure for sustainable livestock management against the climate change in Bangladesh. We need to find the stable solution for the policy makers of the country. Our initiatives to guide the policy maker and professional how to achieve the directions to cope their livestock sector instead of having the damage of climate change. This study aims to strengthen the respective ministries to successful for running and implementing relevant projects including both private sectors, mainstreaming people and stakeholders of livestock farmers or livestock keepers. It is expected that there should be a solution from this study to keep our livestock sector alive and make it both sustainable and financially viable in future.

This study aims to focus the climate resilience mitigation options for the sustainable livestock management in Bangladesh. The effect of climate change hits the poorest people first as they are more dependent on climate sensitive livelihoods such as livestock farming. Climate change locates them vulnerable to social and economically in a continuous fashion as the poor social protection. Therefore, the academia and policy maker needs to understand applicable option as a measure for sustainable livestock management against the climate change. Hence, it requires perceiving the issue of climate change and its impacts to livestock sector. Secondly, government requires the direct manifestation and course of action. Consequently, community based adaptation of livestock and participatory approach can be the greatest options for the policymakers to escape the livestock sector from extinction in Bangladesh.

CONSIDERATION OF CLIMATIC AND LIVESTOCK ISSUES

Emergency response and post flood rehabilitation program: Bangladesh is a country where more than two hundred river flows inside this country and scientists believe that due to the result of climate patterns flooding is to be continued to rise than its normal range. Recently, we notice that irregular flooding which is causing the demolition of livestock for livelihoods in the countryside. Irregular flooding causes obstacles for livestock's feed and lodging. Particularly, water lodging and mudflat causes infection like foot and mouth disease, bard flu which results in huge loss of livestock in the irregular flooding season for climate change matters. The scenario in the coastal region is more vulnerable as sometime cyclone added additional impacts. The present and future impacts of different climate events on livestock, poverty and economic growth are shown in Table 1. Therefore, livestock requires the quick response during the flood and post flood for the sustainable rehabilitation. The respective ministries of the government can take potential steps to rehabilitate the flood affected livestock by its local offices. To strengthen the local manpower ministries may include a large number of volunteers to work for livestock during the flooding season. The ministry of food and d isaster management also can work together with the ministry of livestock and fisheries in this regards. The participatory coordination of the different mainstreaming people and the stakeholders can make this adaptation measures option successful.

Table 1: Present and future impacts of different climate events on livestock, poverty and economic growth

	Level of impacts					
	Identified impacts		Poverty		Economic growth	
Key issues	Present	Future	Present	Future	Persent	Future
Flood and river bank erosion	Severe	-	Moderate	Severe	Moderate	Severe
Drought	Moderate	-	Moderate	Severe	Moderate	Severe
Cyclone and storm surge	Severe	-	Severe	Severe	Severe	Severe
Sea level rise	Severe	-	Severe	Severe	Severe	Severe
Salinlty intrusion	Moderate	-	Moderate	Severe	Moderate	Severe
Erratic Rainfall	Low	-	Low	Low	Low	Low
Temperature variation	Moderate	-	Moderate	-	Moderate	-
Heat wave	Moderate	-	Moderate	Low	Moderate	Low
Cold wave	Moderate	-	Moderate	Very low	Moderate	Very low
Fogginess	-	-	-	-	-	-
Incidence of pest and diseases	Moderate	-	Moderate	Moderate	-	-

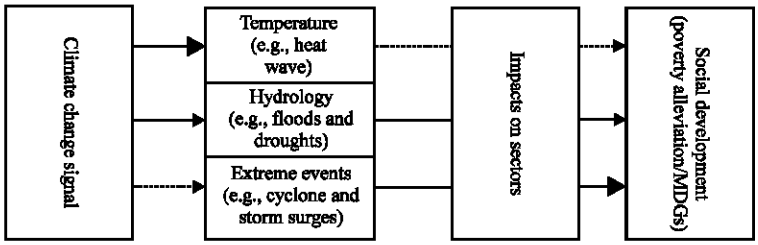

Fig. 1: Strength of climate change signal and their impacts of sectoral and social development

Relocate of small ruminant and poultry from affected areas: Generally the affected people first consider the household than the livestock or poultry once the flooding and cyclone is over and hence of the livestock affected by born diseases. This negative trend is increasing as a regular fashion in Bangladesh. Therefore, it is essential to draw a special consideration of the policy makers for the survival of the livestock management properly. As an instant measure the small ruminant and poultry could be transferred from the flood affected area to comparatively high lands and should consider building a good number of cyclone or disaster shelters for livestock. Although there is found some disaster shelters but this is insufficient and basically these are used for the cyclone or flood affected people. The number of secured shelter in the high land or cyclone shelter should be increased to accommodate the livestock during unfavorable natural disasters. As we know that the poultry faming is sensitive to the climate change related outbreaks and also there is a relationship of climate change signal and their impacts of sectoral and social development; therefore, it is required for extra care to their normal life span (Fig. 1). In addition, as we understand that there are some negative effects of climate change to the livestock, hence academia and national government should have the technical and institutional capacities to resolve the impacts of sectoral and societal development and any uneven calamities of the livestock sector.

Production adjustment: As there are some negative relationships between livestock sector and climate change, it is not wise to consider only specific livestock farming such as poultry farming for sectoral and social development. As the occurrence of bird flu in the poultry sector is very spontaneous and susceptible, hence we should consider the alternative options of the livestock farming and adjustment on the livestock farming system. The introduction of mixed farming system such as stall-feed pattern and pasture grazing which would be very effective measure to get rid from the damage of climate change. Unfortunately, most of the livestock farmers in Bangladesh are much curious to monopoly farming and interested to cattle farming for more financial interest. It is very critical issue of the diversification or intensification for the sustainable livestock management and concerns should concentrate on this point for the further development of this sector. If there is no suitable adjustment of the livestock sector then the species of the total biodiversity may face lack of sustainability against the climate change.

Breeding strategies: Breeding trends of livestock in the developing countries is always a sensitive issue to face the damage of climate change. Nowadays majority of the livestock keepers intend to have hybrid livestock for the quick livestock production either for dairy or meat likes Australia or Denmark. In addition, 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.

Institutional and policy change and development of science and technology: Instead of having the economic limitations Bangladeshi Government requires to subsidies, insurance or incentives for the livestock keepers so that the climate change approach to livestock would successful. It is also crucial for the policy toward sustainability in the livestock sector as climate change is a continuous process and academia should find the mechanism options to adapt with this change of environmental patterns. Hence, the development of science and technology is the pre-condition for the livestock management to cope with the damage of climate change. There is no doubt that we have resource constraints for breeding new species and we are far behind to have the access of high technology and advance knowledge than the developed countries. However, we must understand that without the research and technological access for genetics and breeding, biotechnology and molecular biology the adaptation measures of livestock to climate change is all time questionable. National government of Bangladesh should take action in some research exchange with the developed countries to discover the climate tolerance new breeds of livestock to skip the climate vulnerability. The biotechnological research is very effective in this case.

Sustainable management system: It is presumed that the socio-economic conditions of the livestock keeps are not stable. They are incapable to cope with the adaptations technologies as it is expensive. Therefore, they require the competent and reasonable practices so that they can be interested with that adaptation measures. Reducing the number of livestock but keeping productive will deduce competition for adaptation measure of the rural farmers (Batima, 2007). It means selection of large animal rather than small is more effective for climate change adaptations and

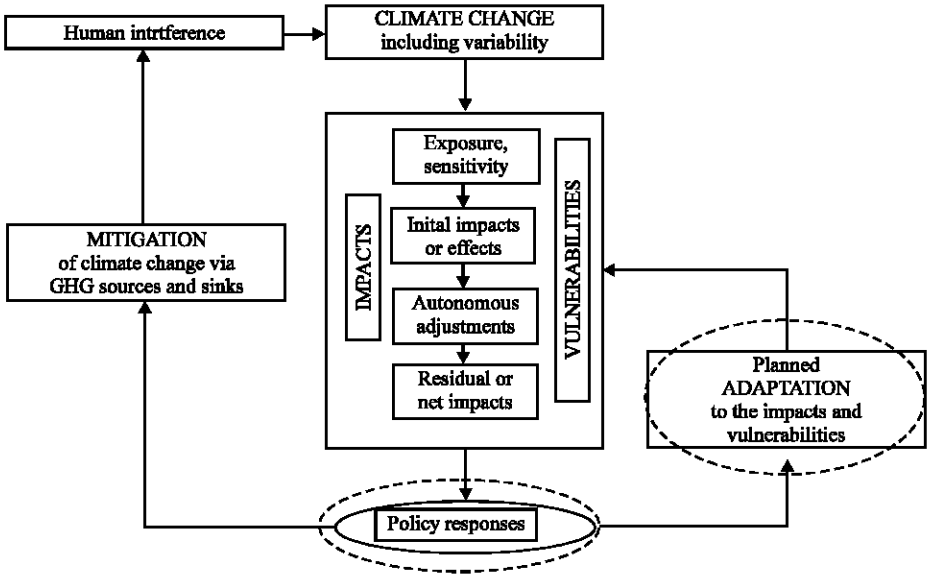

Fig. 2: Linkage and formulation of strategies for adaptation and mitigation (IPCC, 2007)

measures. Local communities and indigenous peoples have an in-depth understanding of their environment and a vast experience in adapting to climate variability (IFAD, 2010). This knowledge is a key to the development of effective adaptation and mitigation strategies. So, the policymakers should encourage them for their continuous efforts for the wellbeing of this sector. It is also essential to rehabilitate them by engaging in livestock farming so that we will have no chance to loose this endogenous knowledge. Sustainable adaptation measure is not possible without the participatory approach which requires the engagement of community people for the identification and intensification of new solutions (Fig. 2). To ensure the long term sustainability endogenous knowledge and participatory approach is significant to face the climate challenge for the livestock management in Bangladesh.

KEY FINDINGS AND ISSUES

Payment for environmental services (PES): The livestock farming is considered as the way to quit the poverty of the poor smallholders of livestock (Thornton *et al*., 2008). If livestock keepers live under poverty then the environmental sustainability program against the climate change would not be successful. The introduction of payment for environmental services (PES) needs to be increased as the instrument to alleviate the poverty of the livestock farmers for the sustainable livestock management. There are some success studies are available in this regard and the application of PES also represents the sustainable livestock management including agricultural production systems (FAO, 2007a; Herrero and Thornton, 2010). This incorporates PES for climate instruction, biodiversity conservation, hydrological services and watershed management (Fig. 3).

Environmental services provision with agricultural production systems (LiAPS): LiAPS scheme is new innovative approach particularly for the livestock keepers to the developing countries. There are lots of scopes for the livestock farmers to get advantage from this system for the biodiversity conservation, watershed and climate regulation (Herrero *et al*., 2009; Steinfeld and Gerber (2010). The effective interactions of agricultural systems with ecosystems and

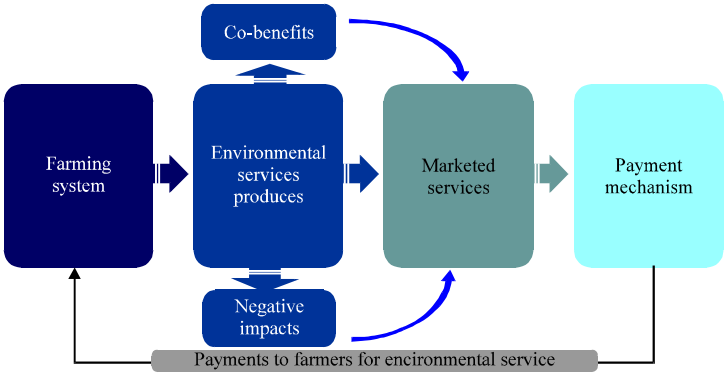

Fig. 3: Examples of flow chart for PES scheme design where the recipients of the payments are farmers (FAO, 2007a)

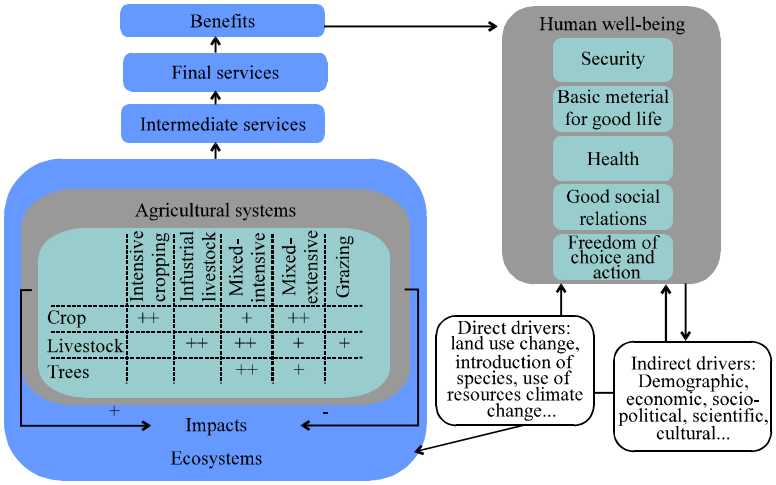

Fig. 4: Interactions of agricultural systems with ecosystems and their impact on human well-being (MEA, 2003)

their impact on human well-being are shown in Fig. 4. Bangladesh should consider the LiAPS scheme; even though there are some limitations still exists in material and methods for the capacity and substantiation of environmental services. Although, there is the acceptance of scheme in the private sector but unfortunately the experience of developed countries shows that the public funding is very crucial for community and quasi-community relationship of biodiversity preservation for the sustainable livestock farming generally at the national and international level (Bernues *et al*., 2011). As an alternative, different grazing or pastoral system can be managed by the restoration of degraded resources management to face the climate challenge of the livestock sector. The livestock farmers can be paid for the mixed crop-livestock strategy for the fodder and forage. As a result it should be kind of integrated livestock management against the threat of climate change.

Livelihood improvement opportunity: The LiAPS can improve the livelihood of the livestock keepers for reducing the poverty. It can focus the different advantages including income

diversification, resources storage and reduction of poverty. The LiAPS scheme can lead the livestock sector as green economy through green livestock farming. In addition, the livestock farmers can introduce the sustainable agricultural land management (SLUM) with LiAPS scheme to minimize the environmental impact by conserving the biodiversity ensuring sustainable use of natural resources. This can represent three potential relationships among livelihood enhancement, ecological services to climate change and biodiversity preservation.

STRATEGIES TO MAINTAIN POVERTY AND LIVESTOCK

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 (Fig. 5). 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. There is not doubt that the issues is a challenge to be become succeed against the damage of climate change for managing the livestock sector. Like many other natural resources livestock is also a vulnerable issue in Bangladesh. Effective policy never goes alone if there is no potential implementation which is lacking. Hence, policymaker should work together with NGO's, academic and professional expertise for finding potential adaptation strategies.

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 equipments 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. It is also required to build capacity both in government and private organizations to plan and implement development programs. Together with government NGO's need to strengthen their capacity by implementing different program effectively and enhance the adaptation measure to the challenge of climate change in Bangladesh. Bangladesh has the experience how to plan and

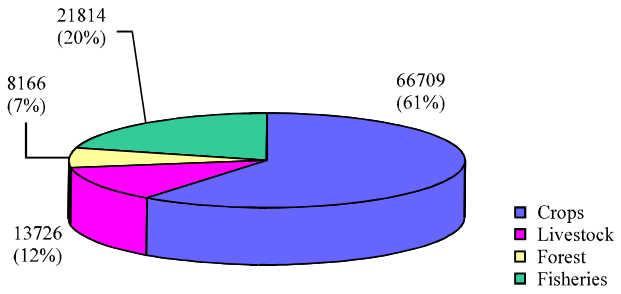

Fig. 5: Sectoral share of agricultural GDP in Bangladesh

implement climate change programs more sustainable for livestock management. However, now it requires involving the local communities who are called stakeholder for the planning, conservation and construction. We must assume that climate change funds are essential with stakeholders for sharing their indigenous knowledge and make sure that projected investments meet their requirements.

There is no baseline that when the effect of climate change will be more vulnerable for the livestock sector. But we presume that the situation will be more worsen gradually in the future as the literature suggest. Therefore, as a precaution we need to capacity building by strengthening the livestock keepers to escape from the attacks of rise of sea level, flood and drought including other environmental hazards. It is quiet difficult for our government to raise the fund in the national budget for climate change as it will be a massive burden due to the economic constraints. As a result we are bound to appeal to the international community for their continuous support to meet the climate change challenge in Bangladesh. Certainly, Bangladesh requires the strong opinionated assurance and support to help in executing the long-term climate resilient strategies. Although, the developed countries are committed to introduce climate fund for the climate affected countries from the COP 15 declaration but unfortunately Bangladesh still did not receive such fund for the climate change mitigation and adaptation in the livestock sector. Finally, national government needs to take potential steps internationally for collecting additional funds to exist in the globe minimizing the challenge of climate change in general and livestock sector in particular.

CONCLUSION

This study focuses the climate change challenge and its impacts to livestock sector in Bangladesh. It represents the factors that are lacking for the livestock sustainability in the perspective of developing country like Bangladesh. This is very sensitive issue as about 15% of the total population are somehow involved for their livelihoods to livestock sector. The damage 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. Our initiative in this study is a guideline to show the path for the sustainability issues. Although, there are some limitations but this research could be effective for the national climate strategies for the sustainable livestock management instead having the challenge of repeated cyclones, rising sea level, flood, drought, deforestation, rising temperature, low precipitation and other environmental degradations. Therefore, there are no alternatives except accessing high technology and advance knowledge for the sustainable development of the livestock sector. Our discussion and argument is expected to act as the guidelines for potential approach for the policymakers toward the successful climate resilient livestock management in Bangladesh.

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