Assessment of Breeding, Feeding, Health care and Shelter management strategies followed by dairy farmers regarding meteorological disaster in Sundarbans region of India

Abstract

Breeding, Feeding, Heath care and Shelter play a very significant role during meteorological disasters in utilizing the real potential of dairy animalsas all the aspects are prerequisite factors for milk production and saving them from disastrous condition. The study was conducted in Sundarbans region of India to explore existing breeding, feeding, health care and shelter management strategies followed by dairy farmers. A total sample size of 180 dairy farmers was taken using multistage random sampling for the present study.The result revealed that majority of the respondents (74.45%) were rearing indigenous breeds because of their easy availability and good adaption to the local environment. It is noticed that majority (70.00%) of the farmers in the study area was in touch with local para vets for any immediate veterinary assistance. It was observed that the majority of dairy farmers (71.67%) followed Crop residues + tree leaves + grazing the animals in open fields/bunds as alternatives used to cope up fodder shortage due to disaster and 20.56 percent of dairy farmers were feeding less concentrate and less green fodder as a feed during disaster conditions. The study revealed that the majority (68.89%) of dairy farmers have no knowledge of feed additives to cope up extreme hot/cold weather followed by 31.11 percent of dairy farmers were providing mineral mixture. Preventive measures like vaccination of animals for various diseases in consultation with a veterinarian was adopted by 61.11 percent of the respondents, as it would reduce the chances of infection during outbreaks of disaster conditions and 38.89 percent of the respondents were not following any kind of practices to maintain the health of animals.The majority (81.11%) of the dairy farmers were following Loose/Open housing system.Among flooring the animal sheds a vast majority (66.11%) were using Brick's/Earthen materials in flooringthe animal shed and the minimum 31.11 percent were using cement concrete floor. Height of the animal shed at the ground level was used by 93.89% of dairy farmers. The management strategies of breeding, feeding, health care and shelter among dairy farmers of Sundarbans region need improvement, including

increased awareness on breeding services,fodder cultivation,health care and better shed construction.

Keywords:*Breeding,Feeding, Health care,Shelter, Management strategies, Meteorological disasters, Sundarbansregion, Dairy farmers*

1. Introduction:

The dairy farming is one of the vital part in the Indian economy that not only offers employment and livelihood to millions of farmers but also contributes to the nation's economy. India stands first in milk production in the globe with 187 million tonnes in 2019. Milk production contributed the largest share in the livestock sector, accounting for 67.2 percent in 2017. Moreover, milk and milk products provided more than 20.60 percent of the total output of paddy, wheat, and pulses in 2017. Annually, 8.4 million farmers depend on the dairy farming for their livelihoods, out of which 71 percent are women (Agriculture Skill Council of India). Dairy provides employment opportunities throughout the year to rural households. The country has reached self-sufficiency in milk production as 73 million farmers are involved in the dairy sector, especially women (International Farm Comparison Network, Dairy Report, 2018). This sector plays significant role in accomplishing food security, reducing poverty, creating employment opportunities for women and providing a regular source of income for rural households. Moreover, in developing economies, landless and poor farmers are actively involved in dairy farming as an essential means of livelihood. However, the disasters have affected different sectors of the economy and so does the dairy sector in some parts of the country. Considering the contribution of livestock sector to the GDP of the country and reliance of dairy farmers on livestock for their livelihood indicates that there is a need of proper management strategies to save the animals during these disasters. Disaster Management strategies are especially crucial for the livestock because animals will suffer more during disaster situations.

Livestock sector is severely suffering every year because of repeated occurrence and intensity of meteorological disaster like cyclones, floods, drought. Compare to the developed countries the impact of meteorological disasters is greater in developing countries (Health *et al*., 1999). Dairy animals play a key role in crop production system in a number of farming

situations. Disasters affect farmers through changes in the supply and prices of stock. Disasters destroy the crops and may lead to a decline in fodder supplies. The period of disasters induced feed and fodder shortage and hence farmers were forced to sell animals. Meteorological disasters pose major problems such as nutritional requirement of animal, livelihood security of farmers, transmission of water borne and vector borne diseases, disposal of carcass, snake bite to animals, vaccination, distress migration of farmers (Sen and Chander, 2003). Climate change is the key cause of meteorological disasters that unpleasantly affect livestock production system especially in developing countries. Policy makers and researchers agree at this point those disasters significantly impact the livestock sector. Weather related natural hazards like floods and cyclones are frequently witnessed at a head of Bay of Bengal. The four states namely West Bengal, Odisha, Andhra Pradesh, Tamilnadu are affected every year and also impair the livelihood security of population in these states.

Sundarbans is famous biodiversity hotspot and a UNESCO heritage site. Sundarbans region lies near to the Bay of Bengal. The region of Sundarbans is not static due to depression of lands, earthquake, tidal waves and cyclones. The region has now started to witness the climate change. The fluctuation of water levels, temperatures and wind flow are altering the entire topology. The course of rivers, sizes of sand dunes among other things, also changes with it. Forests also suffer in all this and forests are also disappearing due to the calamities. The Sundarbans' history is a record of the region's terrible natural disasters. The life has become miserable in this area due to repeated cyclones, tidal waves, floods, earth quakes, heavy rainfall. These disasters leave a deep impression upon the economy of local people. As the coastal plain of Bengal is located in the tropical belt, cyclones are more regular in the region. The agriculture and livestock economy of this area were totally destroyed by the calamities. Cyclone destroyed the crops, water supply system and communication. These disasters have negative effect on farmers who depend on dairy farming in the region. The cyclones and the devastation they bring can disturb the production, distribution and consumption processes in dairy farmers. In the recent past unprecedented damage has been unleashed by Amphan cyclone in 2020. It is considered to be the strongest cyclone to hit the region in 50 years.

So, it is crucial to know the unexplored existing management strategies to identify the strengths and weaknesses of strategies of dairy farmers of Sundarbans regionand devise appropriate Govt. intervention. The present study was undertaken to gather information regarding existing breeding, feeding, healthcare and sheltermanagement strategies followed by the dairy farmers of Sundarbans region.

2. Methodology:

The study was conducted in Sundarbans region of India in the year 2021. A field survey was conducted to collect information related tobreeding, feeding, healthcareand shelter management strategies followed by dairy farmers regarding meteorological disaster in Sundarbans region.The Sundarbans region was selected purposively.The Sundarbans region of India is covered by five subdivisions. From these five subdivisions, one subdivision (Kakdwip) was selected randomly which is having four blocks. From Kakdwip subdivision three blocks namely Kakdwip, Namkhana and Sagar blocks were selected randomly.From each selected block, six villages were randomly selected.A sample of 10 dairy farmers from each village were selected randomly andthe total respondents of the study were 180 dairy farmers, thus the current study covered 18 villages.The selected farmers were interviewed, and the desired information was collected with the help of a pre-tested interview schedule.

3. Results and Discussion:

Breeding management

Table 1: Distribution of respondents according to management strategies followed for breeding (n=180)

S.no	Management strategies	Frequency	Percentage
1.	**Suitable breeds in disaster vulnerable areas**		
	Crossbreds	33	18.33

	Indigenous breeds	134	74.45
	Both	13	7.22
2.	**Breeding methods followed during disastrous conditions**		
	Natural	134	74.45
	AI	33	18.33
	Both	13	7.22
3.	**During disaster breeding, related information gathered from**		
	Qualified veterinary doctors	30	16.67
	Para vets	126	70.00
	Local quacks	24	13.33

Breeding management strategies played a key role in increasing the productivity of animalsin the disaster-prone areas. The factors like selection of breeds suitable to the location, breeding methods and enhancement of genetic pool of livestock in the concerned area were taken into consideration in breeding management.From the data furnished in table 1, it can be seen that under the various breeding management strategies followed by the dairy farmers in disasters hit area, majority of the respondents (74.45%)were rearing indigenous breeds because of their easy availability, ability to strive well on low-cost management systems as well as they were more immune to diseases and they had good adaption to the local environment.The finding was supported by the study of **Maiti et al**,**Sultana**and **Tyagi**.Crossbreds were reared by only 18.33 percent of respondents. Similar findings were observed by **wangdi**.

Table 1,further indicated that 74.45 percent of dairy farmers followed natural breeding for their cattle as compared to the artificial insemination, which was followed by 18.33 percent of the respondents. This is due to inefficient cross-breeding program as well as limited number of crossbred animals available in the study area. The findings were in line with the work of**Odend'hal andDas et al.**On the other hand, 7.22 percent respondents had followed both natural breeding and artificial insemination for their dairy animals. It can also be noticed that majority (70.00%) of the farmers in the study area was in touch with local para vets for any immediate veterinary assistance, as the service of the para vets were easily available to famers via phone call. Similar findings were observed by **Kumar et al and Das et al**.Only 16.67

percent of the respondents had contact with veterinary doctors for breeding related information. For example, in villages like Bhuban nagar in Kakdwip block the veterinary officers could be reached easily for the assistance.Similar results were reported by **Sameer Kumar Dasand Hema Tripathi**. On the other hand, 13.33 percent of the farmers in the region contacted local quacks. Sometimes distant locations and hardship in movements due to lack of transport facility, farmers of the area were forced to contact the local quacks. Similar findings were reported by **Patnaik et al** and **Das et al**.

Feeding management

Table 2: Distribution of respondents according to management strategies followed for feeding (n=180)

S.no	Management strategies	Frequency	Percentage
1.	**Feed provided for dairy animals during disaster conditions**		
	Less concentrate and less green fodder	37	20.56
	Less green fodder & more dry fodder	31	17.22
	Any available feed	112	62.22
2.	**Alternatives used to cope up fodder shortage due to disaster**		
	Use of crop residues	51	28.33
	Crop residues + tree leaves + grazing the animals in open fields/bunds	129	71.67
3.	**Feed additives to cope up extreme hot/cold weather**		
	Mineral mixture	56	31.11
	No knowledge	124	68.89
4.	**Source of water during an extreme weather event**		
	Tube well	40	22.22
	Pond	140	77.78
5.	**Fodders used during meteorological disasters conditions**		
	Use of crop residues/sugarcane bagasse	87	48.33

	Use of tree leaves/vegetables	93	51.67
6.	**Manger used to feed animals**		
	Cement	116	64.44
	Plastic	64	35.56

Feed management strategies were the key to reduce the negative impact of disasters on animal health. From the table 2, it can be observed that 62.22 percent of the dairy farmers feed any materials whichever was available during disaster situation.Further, due to scarcity of feed and fodder during floods, 20.56 percent of dairy farmers were providing concentrate and green fodder in a less amount to their animals. Apart from this, 17.22 percent of farmers were feeding low quantity of green fodderduring cyclonic conditions, it was very difficult to get the green fodder, so usually farmers provided more dry fodder especially leguminous crops (e.g., Lathyrus) to dairy animals as a main source of feed.Similar findings were reported by the **Bakshi et al.** It can also be seen that majority (71.67%) of the farmers were feeding crop residues such as paddy straw, tree leaves of mangrove especially,*Avicennia* sp. to the animals and they are letting the animals to graze in the open fields/ bunds as an alternative to cope up with fodder shortage.The findings were in line with the work of**Ghosh et al. and Mishra et al.**Around 48.33 percent of farmers were providingcrop residues only during disaster conditions.It is because the paddy straw is available throughout the year, so the farmers preferred to feed straw to livestock.**Rasool et al, Kabir et al and Anitha et al**in their study found similar results.Furthermore,77.78 percent of respondents reported thatsource of water during an extreme weather event was pond. Majority of the households in Sundarbans possessed a pond in whichwater remains available throughout the year and through which the need of water for dairy farming activities were being met by the farmers.

Health care management

Table 3: Distribution of respondents according to management strategies followed for health care (n=180)

S.no	Management strategies	Frequency	percentage

1.	**Health management under adverse meteorological disaster conditions**		
	Preventive measures like vaccination	110	61. 11
	No practices followed	70	38.89
2.	**Management of reproductive problem**		
	Consult veterinarian/para vet/local quacks	60	33.33
	No knowledge	120	66.67

Availability of veterinary service and related infrastructure in meteorological disaster-prone areas like Sundarbans should be of utmost importance to provide emergency health care to the animals in the area during such disasters. The dairy farmers should possess basic kit for the treatment of animals which should consist of medicines for common diseases as well as a first aid kit for wound treatment. It can be observed from the table 3, preventive measures like vaccination of animals for various diseases in consultation with a veterinarian was adopted by 61.11 percent of the respondents, as it would reduce the chances of infectionduring outbreaks of disaster conditions.These observations are in consonance with **Anitha et al and Pankaj et al**. Whereas, 38.89 percent of the respondents were not following any kind of practices to maintain the health of animals. It was evident that consulting the veterinarian/para vet/local quacks during reproductive problem was followed by 33.33 percent of the farmers during disaster events.This was in accordance with the finding of **Sanjay Kumar**.Still majority of farmers (66.67%) had no knowledge about the reproductive problems faced by animals during disaster condition.

Shelter management

Table 4: Distribution of respondents according to management strategies followed for shelter management (n=180)

S.no	Management strategies	Frequency	percentage

1.	**Type of Housing**		
	Loose/open housing system	146	81.11
	Conventional housing system	34	18.89
2.	**Height of the animal shed**		
	Raised from the ground	11	6.11
	At the ground level	169	93.89
3.	**Materials used in flooring the animal shed**		
	Cement concrete floor	56	31.11
	Brick's/Earthen flooring	119	66.11
	Stones	5	2.78

Shelter management is an important aspect regarding the safety of animals during disaster management in disaster-prone areas like Sundarbans. The animal shed should be located at a good altitude in flood-affected areas while the animal shed should be built with strong materials in cyclone-prone areas to avoid injury or death by the destruction of the shed due to extreme wind waves.These observations are in consonance with**Mondal**.It is evident from table 4, that the loose/open house system was used by 81.11 percent of the farmers, as free and open space was safer during a disaster.Similar findings were observed by**Pankaj et al**. Further, 18.89 percent were using the conventional housing system. It can also be observed that, the animal shed was built at ground level by 93.89 percent of farmers. This may be due to more cost involvement in building raised sheds from ground level. Raised animal shed from the ground was built by only 6.11 percent of farmers.The finding was supported by the study of **Mishra et al, Pyne et aland Mondal**.Earthen flooring for animal shed was used by 66.11 percent of farmers as it was easy to construct and involved less cost.It was consistent with the findings of**Das et al.**Cement flooring was used by 31.11 percent of farmers.The findings were in line with the work of**Veldandi et al**and**Ambazamkandiet al.** On the other hand, very few farmers that is, 2.78 percent farmers used stone as flooring material in their animal sheds. It was also noticed, most of the animal sheds in the study area were having no proper ventilation.**Mandal et al.**reported in tropical cyclone prone coastal areas that the shape and dimensions of animal houses, roofing materials, roof design and slope of the roof are very important concerns to

withstand high wind speed. Foundation of buildings of animal house, walls, ventilation and other different structural elements need special attention to reduce the risk of structural damages.

4. Conclusion:

The study explored breeding, feeding, health care and shelter management strategies followed by the dairy farmers of Sundarbans region identified their strengths and weaknesses.Popularization of cross breeding programme /breed upgradation programme should be implemented by local veterinary officials and state livestock department in the study area to increase the production and productivity of milk in the study area. Respondents in the study area were still depending on the local quacks for veterinary services. State government should equip the veterinarians in the study area for delivering the veterinary services at farmers door step which will help in upliftment of the condition of dairy farmers. Farmers were using Crop residues + tree leaves + grazing the animals in open fields/bunds to cope up fodder shortage due to disaster. There is a need to explore options for improved fodder cultivation to supplement the existing resources and ensure consistent quality feed availability during disasters.From the study, cost of concentrates and feed additives, non-availability of seeds of high yielding varieties of fodder crops was the major factors affecting in the feeding aspect. So, dairy cooperatives should provide these inputs for encouraging small and medium herd size farmers in dairy farming. Promoting the construction of pucca or semi-pucca sheds and the use of concrete flooring materials can facilitate better sanitation, protection, and comfort for the dairy animals during disasters, leading to improved health and productivity. It was found that financial help in the construction of pucca cattle shed and construction of coastal embankments for enhancing the capability to deal with severe cyclonic storms were the major needs of all the respondents.However, it is essential to ensure proper ventilation.The provision of cement mangers in most sheds indicates an understanding of the importance of feed management. Specialized training and first-hand knowledge of scientific dairy farming practices can help the dairy farmers from saving their animals during meteorological disasters, which is only possible through the intervention of extension services and government.

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