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Evaluating dairy farmers perception pertaining to meteorological disaster management in Indian Sundarbans

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Abstract

Perception is influenced by factors such as knowledge, cultural practices, and access to information, and analyzing it helps understand human behavior and decision-making in disaster situations. In dairy farming, the perceptual level of farmers plays a crucial role in determining management strategies to minimize the impact of meteorological disasters on livestock. This study assessed the perception of 180 dairy farmers from the Kakdwip, Namkhana, and Sagar blocks of the Sundarbans region, an area highly prone to extreme weather events. The findings revealed that a majority (70%) of respondents believed that indigenous breeds are more resilient than crossbred animals during disasters, with 30% strongly agreeing and 40% agreeing. Conversely, nearly one-third (30%) of the farmers disagreed that inaccurate feeding management increases the risk of death due to starvation, indicating some gaps in knowledge. Overall, the analysis showed that most farmers possessed medium to high perceptual levels regarding meteorological disaster management, highlighting the need for targeted awareness programs and extension interventions to strengthen disaster preparedness and livestock resilience in the region.

Keywords: Perception, management strategies, meteorological disasters, sundarbans region, dairy farmers

Introduction

Dairy farming is a vital component of the Indian economy, providing employment and livelihood to millions of farmers while contributing significantly to national economic growth. India ranks first in the world in milk production, with 187 million tonnes in 2019, and milk production accounted for the largest share in the livestock sector, representing 67.2% in 2017. Furthermore, milk and milk products contributed more than 20.6% of the total output of paddy, wheat, and pulses in the same year. Approximately 8.4 million farmers depend on dairy farming for their livelihoods, of which 71% are women (Agriculture Skill Council of India) ^[1]. Dairy farming provides year-round employment to rural households, and the country has achieved self-sufficiency in milk production, with 73 million farmers, particularly women, actively involved in the sector (International Farm Comparison Network, Dairy Report, 2018) ^[3].

This sector plays a crucial role in ensuring food security, reducing poverty, generating employment opportunities for

women, and providing a regular source of income for rural households. In developing economies, landless and smallholder farmers often rely on dairy farming as an essential livelihood activity. However, the sector is highly vulnerable to meteorological disasters such as cyclones, floods, and droughts, which have severe economic impacts. Compared to developed countries, the effects of disasters are more pronounced in developing nations (Health *et al.*, 1999) ^[2].

Dairy animals are integral to many crop production systems, and disasters affect farmers by disrupting livestock supply, crop production, and fodder availability, often forcing farmers to sell animals. Meteorological disasters create multiple challenges, including meeting nutritional requirements of animals, ensuring livelihood security, preventing water- and vector-borne diseases, managing carcass disposal, vaccination, protection against snakebites, and coping with distress migration (Sen and Chander, 2003) ^[7]. Policymakers and researchers agree that effective disaster management strategies are critical for minimizing

the losses in the livestock sector, as animals are among the most vulnerable during extreme events (Unnikrishnan and Malavika, 1998) ^[9]. Understanding the perception of dairy farmers regarding meteorological disaster management is therefore essential, as it can inform the design of practical and context-specific policies and management strategies to enhance resilience at the grassroots level.

Methodology

In 2021, a study was conducted in the Sundarbans region of India to assess the perception of dairy farmers pertaining to meteorological disasters. The region was purposively selected due to its high vulnerability to extreme weather events. A sample of 180 dairy farmers was selected randomly for the study. To measure farmers' perceptions, a perception scale was developed using Thurstone's Technique of Equal-Appearing Interval Scale. Initially, all statements were sent to 120 judges comprising animal husbandry and extension experts with experience in the relevant field. Out of these, 52 judges responded, and their inputs were used for the final selection of statements for constructing the scale. Statements with a Q value of less than 1.5 were retained.

The final scale was administered to the respondents on a five-point continuum, i.e., *Strongly Agree (SA)*, *Agree (A)*, *Undecided (UD)*, *Disagree (D)*, and *Strongly Disagree (SD)*, with a scoring pattern of 5, 4, 3, 2, and 1, respectively. Based on the cumulative square root frequency method, respondents were classified into low, medium, and high perceptual level categories. The selected farmers were interviewed using a pre-tested interview schedule, and the desired information regarding their perceptions of meteorological disaster management was collected systematically.

Results and Discussion

The level of perception was operationalized as the degree to which dairy farmers recognized the impact of

meteorological disasters, which in turn determines the management strategies adopted to reduce their adverse effects on livestock. The perception of dairy farmers was measured using a five-point continuum scale, and the results are presented in Table 1. A majority (66.66%) of farmers expressed that disaster management reduces threats to livelihood, with 44.44% strongly agreeing and 22.22% agreeing. About 16.67% remained undecided, indicating some uncertainty among a few respondents. These findings align with Sarkar and Padaria (2010) ^[6].

Regarding health management, most respondents (61.11%) strongly agreed (26.11%) or agreed (35.00%) that proper measures, such as vaccination and disinfection of cattle sheds, reduce the transmission of water- and vector-borne diseases, while 23.33% were neutral. Feeding management was another critical concern; 50% agreed that inaccurate feeding increases the risk of death due to starvation during disasters, likely due to feed and fodder shortages. However, nearly one-third (30%) disagreed, and 20% remained undecided, suggesting variation in farmers' experiences or practices.

Farmers were also aware of the risk of injuries: 61.11% strongly agreed (22.22%) or agreed (38.89%) that cuts from disaster debris can make animals vulnerable to tetanus, highlighting recognition of the importance of proper health management. A vast majority (86.11%) perceived that translocating animals to cyclone shelters is the most effective way to protect livestock, with 47.22% strongly agreeing and 38.89% agreeing, while 13.89% disagreed, consistent with Mishra *et al.* (2016) ^[4].

Health interventions were well-recognized by farmers. 75.56% disagreed or strongly disagreed that mass vaccination may not reduce the fear of disease spread, reflecting trust in herd immunity and preventive practices, with only 6.67% undecided. Similarly, 75.56% disagreed or strongly disagreed that fumigation using local herbs is ineffective in controlling fly populations, indicating experience with successful pest control measures.

Table 1: Distribution of respondents according to their perception pertaining to meteorological disaster management

S. No.	Statements	Responses				
		SA (5)	A (4)	UD (3)	DA (2)	SDA (1)
1.	I feel proper meteorological disaster management can reduce the threat to the livelihood security of dairy farmers	80 (44.44)	40 (22.22)	30 (16.67)	25 (13.89)	5 (2.78)
2.	I think suitable health management can reduce the transmission of water-borne and vector-borne communicable diseases of livestock	47 (26.11)	63 (35.00)	42 (23.33)	16 (8.89)	12 (6.67)
3.	I feel that inaccurate feeding management will increase the risk of death due to starvation during a meteorological disaster.	31 (17.22)	59 (32.78)	36 (20.00)	29 (16.11)	25 (13.89)
4.	I agree that cuts acquired from disaster debris make animals vulnerable to tetanus by not taking proper health management care	40 (22.22)	70 (38.89)	30 (16.67)	30 (16.67)	10 (5.55)
5.	I am aware the best way to save the farm animals is to translocate them to cyclone shelters	85 (47.22)	70 (38.89)	0 (0.00)	25 (13.89)	0 (0.00)
6.	I don't think health management involving mass vaccination program may not reduce the fear of disease spread in the herd during a disaster	10 (5.55)	22 (12.22)	12 (6.67)	70 (38.89)	66 (36.67)
7.	I feel shelter management through fumigation of the shed using local herbs cannot control the fly population after the flood	17 (9.44)	27 (15.00)	0 (0.00)	81 (45.00)	55 (30.56)
8.	I think drinking water management with Increased salinity during floods is not required for dairy animals	18 (10.00)	22 (12.22)	0 (0.00)	78 (43.33)	62 (34.45)
9.	I believe that indigenous breed can survive more efficiently than crossbred animals after a meteorological disaster	54 (30.00)	72 (40.00)	30 (16.67)	20 (11.11)	4 (2.22)
10.	I feel that transportation management for selling product may not become a challenging task for marketing	16 (8.89)	54 (30.00)	0 (0.00)	79 (43.89)	31 (17.22)

Farmers also acknowledged water management as critical during floods: 34.45% strongly disagreed and 43.33% disagreed that managing drinking water with increased salinity is unnecessary, showing awareness of its impact on animal and human health. Regarding livestock breeds, 70% of respondents (30% strongly agreed and 40% agreed) believed that indigenous breeds survive better than crossbreds during disasters due to their adaptability, disease resistance, and resilience, while 16.67% were neutral. Finally, farmers recognized transportation challenges: 61.11% disagreed or strongly disagreed that transporting dairy products would not be difficult during disasters, reflecting their awareness of the importance of timely marketing for livelihood sustainability. Conversely, 30% agreed and 8.89% strongly agreed with the statement. Overall, the study revealed that farmers demonstrated medium to high perceptual levels concerning meteorological disaster management, reflecting awareness of strategies to mitigate disaster impacts on dairy animals.

Table 2: Perceptual level of dairy farmers pertaining to meteorological disaster management (n=180)

S. No.	Categories	f	%
1.	Low perceptual level (< 66.22)	40	22.22
2.	Medium perceptual level (66.22 to 82.69)	73	40.56
3.	High perceptual level (> 82.69)	67	37.22

Conclusion

The perceptual level of dairy farmers regarding meteorological disaster management is influenced by several factors, including their knowledge, cultural practices, and access to information. A higher level of perception enables farmers to better adapt to disaster situations, enhancing their awareness of how to efficiently utilize available resources during extreme events. Farmers acquire this knowledge both directly through personal experience and indirectly from fellow farmers, mass media, and extension services, which are further shaped by their observations, attitudes, and prior experiences.

As evident from Table 2, a majority (77.78%) of respondents belonged to the medium (40.56%) or high (37.22%) perceptual level categories. The study area, being a coastal region, is prone to frequent meteorological disasters, and farmers face continuous threats almost every year. Due to repeated exposure to disaster events, farmers develop practical knowledge and understanding, resulting in medium to high perception regarding disaster management. Only 22.22% of respondents were classified as having a low perceptual level.

The findings indicate that experience and awareness play a crucial role in shaping farmers' perceptions, as most respondents had adopted various disaster management practices to safeguard their livestock. Consequently, the study confirms that the majority of farmers in the Sundarbans region possess medium to high perceptual levels pertaining to meteorological disaster management, reflecting both their practical experience and proactive approach in mitigating the impacts of disasters.

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