

## DAIRY FARMERS' VIEWS ON OVERCOMING BARRIERS TO ADOPTING CLIMATE CHANGE ADAPTATION STRATEGIES

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### ABSTRACT

*This study investigates the challenges inhibiting dairy farmers in South Gujarat from adopting climate change adaptation strategies and presents their perspectives on overcoming these constraints. Data were collected from 280 dairy farmers who were selected through multistage random sampling method in seven districts of South Gujarat. Survey findings revealed predominant issues: Communication participation, social engagement, and key farm-related factors significantly correlated with dairy farmers' adaptation strategies, while certain demographic and economic factors showed significant relationships at different probability levels. Non-significant correlations were found for age, gender, education, and other variables, suggesting nuanced influences that may require further exploration. 86.77% cited inadequate technical guidance for livestock practices as the primary barrier, followed by 75.00% experiencing the unavailability of critical adaptation inputs. Financial constraints (67.85%) and limited access to timely weather forecasts (63.57%) were also significant hurdles. Reasons for non-adoption varied with 79.28% attributing it to insufficient resources and 72.50% believing climate change was exaggerated. Conversely, 51.78% sought innovative dairy farming to engage rural youth. The suggestions provided by farmers highlighted urgent needs: establishing low-cost weather forecasting systems (87.85%) and regular technical guidance visits (82.14%). Financial aid (72.50%) and awareness about livestock insurance schemes (60.71%) were stressed, alongside training in climate mitigation practices (59.28%). These findings underscore the multifaceted challenges faced by dairy farmers and offer a clear direction for policymakers and stakeholders. Implementing the suggested solutions could empower the farming community in adopting resilient climate adaptation strategies in South Gujarat region.*

**Keywords :** adaptation strategies, climate change, constraints, dairy farmers

### INTRODUCTION

Livestock sector is prominent sector among agriculture and allied activities in India .The livestock sector alone contributes nearly 25.6 % of value of output at current prices of total value of output in agriculture, fishing & forestry sector. The overall contribution of livestock sector in total GDP is nearly 4.11 % at current prices during 2018-19 (Anon., 2019). The livestock sector is being deemed as one of the promising sectors for boosting farmers' incomes. Global climate change is primarily caused by Green House Gases (GHGs) emissions that result in warming of the atmosphere (IPCC, 2014).The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm and exploit beneficial opportunities. Adaptation to climate change has the potential to substantially reduce many of the adverse impacts of climate change and enhance beneficial impacts decline size though neither without cost nor without leaving residual damage. The impacts of climate change on agriculture assume significantly important

mainly to developing countries like India for the reason that Indian people are heavily dependent on agriculture for their livelihood despite limited arable land and poor technological and financial capacities for mitigation and adaptation to climate change (Stern, 2006;Nelson *et al.*,2010).

### OBJECTIVES

- (1) Association between profile of dairy farmers and adaptation strategies adopted by the dairy farmers to cope up with climate change
- (2) Reasons behind non adoption and /or discontinuance of climate change adaptation strategies among the dairy farmers and their suggestions

### METHODOLOGY

This research addresses the impediments faced by dairy owners in the adoption of climate-smart livestock practices to mitigate the impact of climate change. Dairy farmers having minimum five years experience in livestock

rearing and owing at least one species among cattle and buffalo having minimum three lactating animals at the time of study and obtaining major part of their income from livestock enterprises were considered as respondents for this study. Data were collected from 280 dairy farmers who were selected through multistage random sampling. The gathered

data were meticulously organized and the frequencies of each constraint were determined presenting a rank-ordered list. The findings shed light on the complex challenges faced by dairy owners providing a delicate understanding of the factors restricting the uptake and sustainability of climate-resilient practices in the region.

**RESULTS AND DISCUSSION**

**Association between profile of dairy farmers and adaptation strategies adopted by them to cope up with climate change**

**Table 1 : Association between profile of dairy farmers with adaptation strategies adopted by them (n=280)**

Sr. No.	Variable No.	Characteristics	Correlation of coefficient ('r' value)
01	X <sub>1</sub>	Age	0.111 <sup>NS</sup>
02	X <sub>2</sub>	Gender	-0.112 <sup>NS</sup>
03	X <sub>3</sub>	Education	-0.031 <sup>NS</sup>
04	X <sub>4</sub>	Family education status	0.146*
05	X <sub>5</sub>	Subsistence ratio	-0.147*
06	X <sub>6</sub>	Communication participation	0.346**
07	X <sub>7</sub>	Communication cohesiveness	0.305**
08	X <sub>8</sub>	Social migration	-0.026 <sup>NS</sup>
09	X <sub>9</sub>	Social participation	0.446**
10	X <sub>10</sub>	Assistance by family members residing outside the village or community	0.121*
11	X <sub>11</sub>	Assistance from external agency	0.036 <sup>NS</sup>
12	X <sub>12</sub>	Number of relative in the village or community	0.262**
13	X <sub>13</sub>	Extension contact	0.121*
14	X <sub>14</sub>	Farmer to farmer extension	0.214**
15	X <sub>15</sub>	Herd size	0.345**
16	X <sub>16</sub>	Modern farm equipments	0.321**
17	X <sub>17</sub>	Fodder sources	0.135*
18	X <sub>18</sub>	Distance to purchase critical inputs	0.158**
19	X <sub>19</sub>	Distance of the household from road	0.154**
20	X <sub>20</sub>	Distance to sell farm output	0.095 <sup>NS</sup>
21	X <sub>21</sub>	Extreme event experienced	0.402**
22	X <sub>22</sub>	Availability of climate related information	0.312**
23	X <sub>23</sub>	Proportion of household expenditure to livestock	-0.101 <sup>NS</sup>
24	X <sub>24</sub>	Availability of credit	0.124*
25	X <sub>25</sub>	Productive animal in the herd	0.138*
26	X <sub>26</sub>	Habit of saving	-0.253**
27	X <sub>27</sub>	Annual income	0.138*
28	X <sub>28</sub> (DV)	Awareness of the dairy farmers regarding climate change and its variability	0.146*
29	X <sub>29</sub> (DV)	Adaptation strategies adopted by the dairy farmers.	1.00

\* Significant at 0.05 per cent level of probability DV- Dependent Variable

\*\* Significant at 0.01 per cent level of probability

The data manifested in table 1 reveals that communication participation (0.346\*\*), communication cohesiveness (0.305\*\*), social participation (0.446\*\*), number of relative in the village or community (0.262\*\*), farmer to farmer extension (0.214\*\*), herd size (0.345\*\*), modern farm equipments (0.321\*\*), distance to purchase critical inputs (0.158\*\*), distance of the household from road (0.154\*\*), extreme event experienced (0.402\*\*), availability of climate related information (0.312\*\*) and habit of saving (-0.253\*\*) were significantly correlated with the adaptation strategies adopted by the dairy farmers 0.01% level of probability.

While, family education status (0.146\*), subsistence ratio (-0.147\*), assistance by family members residing outside the village or community (0.121\*), extension contact (0.121\*), fodder sources (0.135\*), availability of credit (0.124\*), productive animal in the herd (0.138\*), annual income (0.138\*) and awareness of the dairy farmers regarding climate change and its variability (0.146\*) were significantly related with the adaptation strategies adopted by the dairy farmers

**Reasons for discontinuance of climate change adaptation strategies among the dairy farmers who are aware regarding climate change and its consequences**

**Table 2 : Reasons for discontinuance of climate change adaptation strategies among the dairy farmers who are aware regarding climate change & its consequences. (n=280)**

Sr. No	Constraints / Reasons	Frequency	Percentage	Rank
01	Insufficient technical guidance to adopt livestock practices	243	86.77	I
02	Non-availability of critical inputs of adaptation strategies	210	75.00	II
03	Paucity of money	190	67.85	III
04	Unable to access timely weather forecast	178	63.57	IV
05	Too little availability of livestock insurance policies for milch animals	156	55.71	V
06	Lack of proper training or knowledge to use adaptation strategies	137	48.92	VI
07	Lack of local body to create climate awareness	98	35.00	VII
08	Insufficient field veterinary extension services	90	32.14	VIII
09	Insufficient animal healthcare services at grass root level	77	27.50	IX
10	Lack of organised milk marketing facilities at village level	70	25.00	X

Table 2 provides a comprehensive profile of respondents in the study area detailing reasons for discontinuing climate change adaptation strategies among dairy farmers who were knowledgeable about climate change issues. The primary reason for discontinuance as reported by 86.77% of respondents, revolves around the lack of adequate technical guidance for adopting livestock practices. This

0.05% level of probability.

However, age (0.111), gender (-0.112), education (-0.031), social migration (-0.026), assistance from external agency (0.036), distance to sell farm output (0.095) and proportion of household expenditure to livestock (-0.101) were non significantly related with the adaptation strategies adopted by the dairy farmers. Understanding these correlations is crucial for policymakers and stakeholders aiming to support and enhance farmers' adaptive capacities. Strategies focusing on improving communication networks, ensuring resource accessibility, providing targeted support during extreme events, and promoting financial stability could significantly bolster farmers' ability to adapt to changing conditions. Further qualitative investigations or in-depth studies may be required to comprehensively grasp the nuanced influences of non-significant factors, ensuring a holistic understanding of the complex dynamics governing farmers' adaptation strategies in the dairy farming sector.

critical shortfall indicates the pressing need for specialized expertise and support systems to effectively implement climate-smart strategies within the dairy farming sector. Nearly 75.00 % of respondents highlighted the absence of critical inputs necessary for successful adaptation strategies. Financial limitations reported by 67.85% of respondents present a substantial barrier. Insufficient funds hinder the

implementation and continuation of climate change mitigation practices, suggesting a critical need for financial support mechanisms. A notable 63.57% faced challenges in accessing timely weather forecasts, vital for informed decision-making in executing climate adaptation strategies. This limitation impedes proactive planning, hindering effective adaptation efforts. Around 55.71% expressed concerns regarding the limited availability of livestock insurance policies for milch animals. This shortage of risk mitigation measures poses challenges in managing potential risks due to climate variability. Almost half of the respondents (48.92%) indicated a lack of proper training or knowledge in utilizing adaptation strategies. This highlights the necessity for educational initiatives to equip dairy farmers with the requisite skills and know-how. A significant proportion (35.00%) identified the absence of local bodies focused on climate awareness. This gap indicates the need for entities disseminating crucial information and fostering awareness regarding climate change impacts and mitigation strategies. Over 32.14% faced challenges due to inadequate field veterinary extension services. Such insufficiencies hinder the effective

implementation and continuation of climate-smart practices in the dairy farming landscape. Around 27.50% struggled with insufficient animal healthcare services at grassroots levels, indicating challenges in ensuring the health and well-being of livestock a critical aspect of climate-resilient farming practices. Lastly, 25.00% cited the absence of organized milk marketing facilities at the village level as a difficulty. This limitation impacts the marketing and distribution aspects of dairy products, adding to the challenges faced by dairy farm owners.

These varied reasons collectively highlight the multifaceted challenges that dairy farm owners in South Gujarat encounter, emphasizing the necessity for comprehensive support systems addressing technical, financial, educational, and infrastructural aspects to facilitate sustained adoption and continuation of climate change mitigation practices. Previous studies conducted by Sofoluwe *et al.* (2011), Maiti *et al.* (2014) and Chinchmalatpure (2022) have also identified and reported similar reasons contributing to the discontinuance of adaptation strategies aligning with the findings presented in this study.

**Reasons for non-adoption of adaptation strategies to cope up with climate change among the dairy farmers who are aware of climate change and its consequences**

**Table 3: Reasons for non-adoption of adaptation strategies to cope up with climate change among the dairy farmers who are aware of climate change & its consequences (n=280)**

Sr. No.	Constraints / Reasons	Frequency	Percentage	Rank
01	Lack of essential resources to follow livestock adaptation strategies	222	79.28	I
02	Feels that climate change is not at all a problem and is blown out of proportion by environmentalist and media.	203	72.50	II
03	Lack of awareness regarding the negative consequences of the climate change on livestock.	175	62.50	III
04	Perceived that climate is changing from time immemorial, ecosystems adjust themselves with this change and no extra efforts are needed.	123	43.92	IV
05	Thought that the term ‘climate change’ is merely a hoax or propaganda.	98	35.00	V

Table 3 presents a comprehensive breakdown of reasons outlining the non-adoption of climate change adaptation strategies among dairy farmers who possess awareness of climate change and its consequences. The foremost challenge identified by a substantial majority (79.28%) of dairy owners was the lack of essential resources required to implement climate-smart livestock management practices. This constraint underscores the practical barriers faced by dairy farmers, emphasizing the need for accessible support mechanisms to facilitate the adoption of adaptive measures. Interestingly, a considerable percentage of respondents expressed varying perceptions that influenced their decision not to adopt adaptation strategies. The belief

held by 72.50% of farmers, considering climate change as a non-issue, reflects a significant disconnect between awareness and acknowledgment of the problem’s severity. Additionally, a lack of awareness (62.50%) regarding the adverse effects of climate change on livestock emerged as a significant factor contributing to non-adoption. This highlights the importance of targeted education and information dissemination to bridge knowledge gaps within the farming community. Furthermore, a notable proportion of farmers (43.92%) held the perception that ecosystems naturally adjust to climate changes over time, minimizing the necessity for additional efforts. This belief, coupled with the notion (35.00%) that “climate change” is a mere hoax

or propaganda, showcases the prevalence of skepticism or denial within the community. Understanding these reasons offers crucial insights for designing interventions aimed at promoting the uptake of climate adaptation strategies among dairy farmers. Initiatives addressing resource accessibility, targeted awareness campaigns emphasizing the tangible impacts of climate change on livestock, and efforts to dispel misconceptions are pivotal. The present result is in line with the partial findings of Rajput (2022).

### Suggestions of dairy farmers to overcome the constraints

Suggestion is an idea or plan put forward for consideration. Efforts were made to obtain suggestions from the dairy farmers to overcome the constraints. These suggestions might be implemented and utilised by them to overcome their constraints in adoption of climate smart livestock adaptation strategies.

**Table 4 : Suggestions of dairy farmers to overcome the constraints**

(n=280)

Sr. No.	Suggestions	Frequency	Percentage	Rank
01	Need to establish low cost weather forecasting system at taluka or village level	246	87.85	I
02	Regular visit by field extension personnel to provide timely technical guidance to the farmers on various aspects of dairy farming at village level.	230	82.14	II
03	Dairy farm beneficiaries should be provided with adequate financing and subsidies.	203	72.50	III
04	Create awareness among dairy farmers regarding necessity of availing insurance scheme.	170	60.71	IV
05	Provide regular training on different climate mitigation practices.	166	59.28	V
06	Create awareness about innovative dairy farming enterprises to promote and retain rural youth in dairy farming.	145	51.78	VI
07	Need to ensure that government schemes are benefitted by every eligible farmer.	120	42.85	VII
08	Feed storage structures should be established at taluka level.	102	36.42	VIII
09	State agricultural universities need to develop new scientific low-cost practices and technologies to encourage farming.	94	33.57	IX
10	Rotation wise responsibility must be made mandatory to provide information.	75	26.78	X

The result in table 4 revealed the major suggestions given by the dairy farmers in descending order of rank were; need to establish low cost weather forecasting system at taluka or village level (87.85 per cent), regular visit by field extension personnel to provide timely technical guidance to the farmers on various aspects of dairy farming at village level (82.14 per cent), dairy farm beneficiaries should be provided with adequate financing and subsidies (72.50 per cent), create awareness among dairy farmers regarding necessity of availing insurance scheme (60.71 per cent), provide regular training on different climate mitigation practices (59.28 per cent), create awareness about innovative dairy farming enterprises to promote and retain rural youth in dairy farming (51.78 per cent), need to ensure that government schemes are benefitted by every eligible farmer (42.85 per cent), feed storage structure should be established at taluka level (36.42 per cent), state agricultural universities need to develop new scientific low-cost practices and technologies to encourage farming (33.57 per cent) and rotation wise responsibility must be made mandatory to provide information (26.78 per cent). In summary the suggestions gleaned from the findings advocate for a multi-pronged approach, integrating practical, financial, educational, infrastructural and collaborative

efforts to effectively navigate and implement climate-smart strategies within the dairy farming community.

### CONCLUSION

The research findings underscore the multifaceted challenges faced by dairy farmers in South Gujarat when it comes to adopting climate-smart livestock practices. Lack of technical guidance, essential resources, and financial support emerged as primary barriers, hampering the effective implementation of adaptation strategies. Moreover, perceptions ranging from skepticism about climate change to a lack of awareness regarding its impact on livestock pose significant hurdles. However, amidst these challenges, the suggestions provided by farmers highlight practical solutions and critical needs. Establishing low-cost weather forecasting systems, facilitating regular field guidance, and ensuring financial aid were among the top recommendations. These suggestions emphasize the need for a comprehensive approach involving practical, financial, educational, and infrastructural support systems to promote the sustained adoption of climate-smart practices in dairy farming.

Therefore, to bridge these gaps and enable effective adaptation, interventions should focus on enhancing resource accessibility, targeted education, dispelling misconceptions, and facilitating collaboration. The culmination of these efforts will be crucial in empowering dairy farmers, fostering resilience, and ensuring sustainable livestock management in the face of climate challenges. Ultimately, a holistic and collaborative approach is imperative to enable the successful implementation of climate-smart strategies within the dairy farming community in South Gujarat.

#### RECOMMENDATIONS/POLICY IMPLICATIONS

To enhance dairy farmers' resilience to climate change in South Gujarat, it is essential to establish low-cost weather forecasting systems, increase technical guidance through regular extension services, and provide financial support, including subsidies and livestock insurance. Additionally, promoting awareness and training programs, innovative dairy enterprises, and improved infrastructure for feed storage and marketing, along with integrating climate adaptation into agricultural policies and fostering public-private partnerships, will drive sustainable and climate-smart dairy farming practices.

#### CONFLICT OF INTEREST

The authors of the paper declare no conflict of interest

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