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Construction of Scale to Measure Women Farmers' Attitude towards Climate Resilient Dairy Farming Practices

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ABSTRACT

Understanding farmers' attitude is instrumental in initiating/formulating any strategy to promote the adoption of technology. A scale was developed to analyze the attitude of women farmers towards climate-resilient dairy farming practices. A list of 50 statements comprising both positive and negative statements were collated and refined based on Edward's 14 principles and 35 statements were retained for administering to women farmers from non-sampling area for further analysis. Finally, "t" value for each statement, and found that 17 statements were having "t" value greater than 1.75. The 17 statements were rained for the final scale and administered for reliability and validity testing. Cronbach alpha coefficient of 0.786 confirmed the internal consistency of the developed scale. The content validity of the scale was ascertained based on the judgment of the experts. The final developed scale can be used to measure the attitude of women farmers on climate-resilient dairy farming practices in the present context and beyond the study area with modifications.

INTRODUCTION

Inter-Governmental Panel on Climate Change (IPCC, 2014), in the year 2014, reported that agriculture sector has been severely impacted by climate change which in turn poses major threat to food security and livelihood of millions of people across the world. Major risks include an increase in diseases in crops, fishery and animal husbandry (Sarkar et al., 2010). Livestock play a major role in the agricultural sector in developing nations, and the livestock sector contributes 40 per cent to the agricultural GDP (Gross Domestic Product). Global demand for foods of animal origin is growing and it is apparent that the livestock sector will need to expand (FAO, 2009). Livestock are adversely affected by the detrimental effects of extreme weather. Climatic extremes and seasonal fluctuations in herbage quantity and quality will affect the well-being of livestock, and will lead to declines in production and reproduction efficiency (Sejian, 2013). Climate change is a major threat to the sustainability of livestock systems globally. Consequently, adaptation to, and mitigation of the detrimental effects of extreme climates has played a major role in combating the climatic impact on livestock (Sejian et al., 2015). The difficulty livestock facing is weather extremes, e.g., intense heat waves, floods and droughts. In addition to production losses, extreme events also result in livestock death (Gaughan & Smith, 2015). Dairy farming is vulnerable to climate change through increased temperatures and changes in rainfall patterns. These factors adversely affect feed and water availability, animal health, breeds and in turn milk production. Warmer and drier conditions increase the likelihood of heat stress in cattle. Heat stress adversely affects productive and reproductive performance in dairy animals (Van den Bossche & Coetzer, 2008).

Dairying is one of the important enterprises, which supports the rural households by providing gainful employment and steady income. Women in India play a predominant role in agricultural

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production (Bhati et al., 2023) and women's involvement in livestock management is a longstanding tradition. There is considerable evidence to show that livestock and management related activities continue to be predominately rural women's responsibility and domain. Women generally are responsible for the feeding, grazing, fodder collection, milking, processing, dung management, while men who manage the finances generally sale of milk and milk products (Sethi, 2010). They constitute 71 per cent of the labour force in livestock farming. In India, about 75 million women are engaged as against 15 million men in dairying (Thakur & Chander, 2006). Increasing demand for milk and milk products in recent years intensifies dairy farming as profitable enterprise for women (Mohapatra et al., 2012).

A multi-pronged strategy should be adopted by extension agencies to prepare farmers for fight against the adverse effects of climate change. Changing their attitudes towards adoption various practices available is one of the important strategies (Bharat et al., 2021). Understanding the attitude of farmers will provide an important information in developing policy planning (Saji et al., 2023). Keeping the vital role played by women in the dairy farming, it is imperative to understand the attitude of women dairy farmers towards climate resilient dairy farming practices

METHODOLOGY

An attempt was made to measure the attitude of women dairy farmers towards climate resilient dairy farming practices**.** Likert's Summated Rating method was used to construct a scale for the purpose. Likert scale is a subject-centered/individual differences among respondents with respect to their possession or standing on a particular attribute or aspect (Ramya et al., 2019). The methodology followed by Kumar et al., (2016); Gupta et al., (2022), Vijayan et al., (2022) were followed. Likert scales with a five or seven point continuum can generate adequate variance for examining the relationships among items and scales, and create adequate internal consistency (Lissitz, 1975) and in this paper we went ahead with five point continuum.

Item analysis was performed with the responses from 60 women dairy farmers (random selection) from Uchana and Budha Khera villages around Karnal city which were from non-sampling area. To proceed further with item analysis an exhaustive list of statements that would measure the attitude were collected from literature, self-experience and by consulting experts, researchers and other relevant professionals of extension education and climate resilient dairy farming. A total of 50 statements were collected for the construction of scale and the statements were refined on the 14-point criteria given by Edwards (1957) for construction of scale statements and accordingly 15 statements were eliminated after screening and 35 statements were retained for item analysis.

RESULTS AND DISCUSSION

Base on the opinion of experts, a total of 35 items which were relevant to the construct were retained. Finally, the 35 statements were administered to 60 women farmers from a non-sampling area and responses for each item were collected on a five-point continuum i.e., Strongly agree, Agree, Undecided, Disagree and Strongly disagree with scores 5, 4, 3, 2 and 1 respectively. Scoring was given in reverse order for the negative statements. Scores of all the respondents were summed up to get a total score and then respondents were arranged in descending order. For calculation of t – values the top 25 per cent and lowest 25 per cent of the respondents were selected as criterion groups. The t-value for each statement was calculated (Table 1) by using following formula to distinguish between respondents having high and less favorable attitude towards climate resilient dairy farming practices.

$$t = \frac{\bar{x}_H - \bar{x}_L}{\sqrt{\frac{\sum(x_H - \bar{x}_H)^2 + \Sigma(x_L - \bar{x}_L)^2}{n(n-1)}}}$$

Where,

$\bar{x}_H$ = Mean score of a given statement for the high group

$\bar{x}_L$ = Mean score of a given statement for the lower group

$$\Sigma(x_H - \bar{x}_H)^2 = \Sigma x_H^2 - \frac{(\sum x_H)^2}{n}$$

$$\Sigma(x_L - \bar{x}_L)^2 = \Sigma x_L^2 - \frac{(\sum x_L)^2}{n}$$

n = number of respondents

The 't' value indicates a measure of extent to which a given statement differentiates between high score and low score groups. As a crude and approximate rule of thumb, we may regard any 't' value equal to or greater than 1.75 as indicating that the average response of high and low groups to a statement differs significantly. Through item analysisIt was found that 17 statements were having "t" values greater than equal to 1.75 which indicated that these statements were having capacity to differentiate between favorable attitude and unfavorable attitude. Therefore, these 17 statements were included in the final developed scale (Table 1). Statements with negative value (statement number 18, 19, 30 and 35) were also dropped from the final scale as these statements expressed in opposite direction. Reliability and validity of the final scale was established through appropriate procedures.

Reliability refers to the consistency between multiple measurements of a variable. Cronbach alpha (Internal consistency) coefficient was used to determine the reliability of the measuring instrument. Cronbach alfa coefficient was calculated using SPSS tool and the coefficient was found to be 0.786 which was good enough to prove that the scale is a reliable one. The ideal value of Cronbach alpha value in research is more than or equal to 0.7 and in some cases a Cronbach coefficient of 0.6 and more is also considered good enough to prove the reliability of the measuring instrument (Nunnally& Bernstein,1994).Calculated Cronbach alpha coefficient of the developed scale was found to be 0.786 which was good enough to prove that the developed scale was a reliable one.

A scale is said to be valid, if it measures what it is supposed to measure. It is the extent to which a scale accurately represents the concept or construct of the interest. The content validity is the sampling adequacy or representative nature of the content in scale to the content of the universe. Content validity of the present scale was ensured by collecting statements from relevant literature and by consulting experts.

Table 1. Scale to measure the attitude of farmers towards climate resilient dairy farming practices with their respective 't' values

S.No.	Statement	t -value
1.	Climate resilient dairy farming practices can only be followed by resource rich farmers.	2.218
2.	Climate variation is a normal phenomenon and there is no need to be much concerned about the same.	3.207
3.	Animals have innate capacity to adapt to changing climate and there is no need to follow a specific climate resilient practice.	2.268
4.	Climate resilient practices increase cost of production while profits from increased milk production are minimal.	4.563
5.	Gender is a major concern for adoption climate resilient dairy farming practices.	4.000
6.	Climate resilient dairy farming practices put additional burden on women farmers.	5.330
7.	Though women spend much of the time in dairy farming, when it comes to decision making regarding management of animals men have upper hand.	2.88
8.	Lower socio-economic position of women is hindering adoption of climate resilient practices in dairy farming.	3.118
9.	More women centric trainings should be conducted for better adoption of the practices.	2.477
10.	Preparation of milk primary milk products like khoa, ghee, paneer etc is utmost necessary to enhance the shelf life of milk.	4.486
11.	Value addition of milk will be a potential source of income as climate change is posing a threat to the livelihoods of women.	3.928
12.	Indigenous breeds are comparatively more resistant to changing climate, but, their lower milk productivity may little influence in improving adaptive capacity.	1.870
13.	Dairy animals should have innate resistance to adverse impacts of climate change and adopting climate resilient practices will not help.	2.594
14.	Climate change is just a seasonal variation and no need to take extra care for animals as they themselves can adapt to it.	2.522
15.	One needs to have some expertise in identifying the symptoms of impact of climate change on dairy animals.	4.000
16.	Emphasis should be given to promote climate resilient dairy farming practices made of locally available low-cost resources.	3.162
17.	Frontline demonstration of the climate resilient dairy farming practices may improve its adoption.	3.162

CONCLUSION

In conclusion, it is crucial for extension organizations and policy makers to study the attitude of women dairy farmers towards climate-resilient dairy farming practices. The participation of women in the agricultural workforce is significant and necessary for achieving gender equality in the sector. Additionally, climate change poses a significant threat to dairy farming, and farmers need to adopt climate-resilient practices to adapt to changing conditions. By understanding the attitudes of women dairy farmers towards these practices, extension organizations and policy makers can design interventions that are more gender-sensitive and effective. This will not only benefit the farmers themselves but also contribute to the overall sustainability of the dairy farming industry.

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