A SCALE TO MEASURE DAIRY FARMERS AWARENESS ABOUT CLIMATE CHANGE ISSUES AND ITS VARIABILITY

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ABSTRACT

Dairy sector plays a significant role for uplifting rural community in India. The study was conducted to develop and standardize a reliable and valid scale to measure dairy farmers awareness about climate change issues and its variability. A summated (likert) rating scale has been developed. The process started with identifying the dimension, collection of items followed by relevancy and item analysis and checking the reliability and validity for precision and consistency of the results. A total of 40 statements were framed from which finally 27 statements were retained which have practical applicability in measuring the climate change awareness and its variability among dairy farmers .The responses were collected on a five point continuum viz. strongly agree, agree, undecided, disagree and strongly disagree with respective weightage score of 5, 4, 3, 2, and 1 for the favourable statements and with the respective weightage score of 1, 2, 3, 4 and 5 for the unfavorable statements. The reliability co-efficient (0.75) and content validity also were worked out, indicating higher reliability and validity of the scale. The standardized awareness scale would have theoretical and practical applicability in discovering the intensity of awareness of dairy farmers regarding climate change issues, climate variability and facilitates to take right decisions by livestock policy makers.

Keywords: *awareness, climate change issues, 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 and Tajpara *et al.* 2020). Livestock systems operate under a wide range of environmental conditions, causing production to be increasingly affected by climate change (Vinaya and Babu, 2021). A quarter of the global economic impact caused by climate-related extremes was absorbed by the agriculture sector, where in livestock, next to the crop subsector, faces most of the total damage and loss (FAO,2015).

The debates and dialogues on global development have constantly focused on the issues of climate change and its adverse impact on human lives and their livelihood profiles (Raghuvanshi and Ansari, 2020).Researchers need to know how the dairy farmers are likely to respond to climate change and climate variability issues, because those responses can attenuate or amplify the impact. As such the paper explains the development and standardization of awareness scale to measure the awareness of the respondents towards climate change issues and its variability.

OBJECTIVE

To development a scale to measure dairy farmers awareness about climate change issues and its variability

METHODOLOGY

Item Selection

The item making up for perception scale are known as statement. According to Edwards (1957) statement may be defined as anything that is said about a psychological object. Initially, 40 items were prepared by using relevant literatures and experts opinions. On basis of the criteria suggested by Edward and Kilpatrick (1948) the ambiguity were eliminated by editing and finally 27 statements were selected as they were found to be non-ambiguous.

Item Analysis

A schedule with 27 statements was sent online through 'monkeysurvey.com' as well as through post for judging the relevancy to the personnel working in various agricultural universities of India. It was also sent through post to retired eminent personalities of our fraternity to judge. Total 110 judges had responded. The investigator found that 10 judges have responded very carelessly, had misunderstood the directions and the concept of the study hence, those

schedules were eliminated. Finally, 100 schedules were included for construction of the scale.

Selection of item

Five point rating method was followed. The responses of 100 judges on 27 items were transferred into the master sheet. Item analysis under the method of summated rating was used to reject statements. The frequency distributions of scores were done based upon the responses to all statements. Whole schedule was kept in descending order and 25 per cent of the responses *i.e.*21 subjects with highest total scores and 25 per cent of the responses *i.e.*21 subjects with lowest total scores were considered. These two groups provide criterion groups in terms of which to evaluate the individual statements. Paired '*t*' test was applied to measure the extent to which a given statement differentiates between the high and low groups.

$$t = \frac{X_H - X_L}{\sqrt{\frac{\sum (X_H - X_H)^2 + (X_L - X_L)^2}{n(n-1)}}}$$

Where,		
XH	=	The mean score on given statement of the high group
XL	=	The mean score on given statement of the low group
ΣXH^2	=	Sum of squares of the individual score on a given statement for high group
ΣXL^2	=	Sum of squares of the individual score on a given statement for low group
ΣXH	=	Summation of scores on given statement for high group
ΣXL	=	Summation of scores on given statement for low group
N	=	Number of respondents in each group
t	=	Extent to which a given statement differentiate between high & low groups

After computing the *t'* value for all the items the statements having '*t*' value equal to or greater than table *'t'* value (*i.e.* 2.02) were selected. Out of them the 27 statements with the largest value of'*t*' were selected for perception scale. The final statements are shown in table 1.

Table 1: Final selected statements to determine the 'awareness of the dairy farmers regarding climate change and its variability'

Sr. No.	Statements	*t* Value
01	Climate Change' happens due to excessive burning of fossil fuels such as oil, coal and natural gas etc	3.40
02	Changes in land use pattern, deforestation, land clearing, agriculture and other activities have led to a rise in the emission of carbon dioxide, which finally leads to 'Climate Change'	3.45
03	Increasing temperature during summers	2.45
04	Prolonged summer	2.95
05	Delayed onset of winter	3.40
06	Short winter periods	2.69
07	Occurrence of heavy fog during winter season	2.68
08	Unpredictable rainfalls	3.55
09	Decline in precipitations	3.75
10	Long dry spells and increased rate of drought	3.55
11	Change in the season cycle during the last 10 - 15 years	2.02
12	Increased rate of heat and cold waves	2.65
13	The type, frequency and intensity of extreme climatic events are expected to rise even with a slight change in the climate.	2.45
14	Changes in rainfall pattern are likely to lead to severe water shortages and/or flooding.	2.94
15	Reduced soil moisture and evapotranspiration may increase land degradation and desertification.	2.37
16	'Water stress' for the human-beings and or livestock due to decrease of freshwater availability in river basins during summer months due to glaciers retreat	2.95
17	The key 'climate- related risks' in the coastal zone include tropical cyclones, sea level rise and changes in temperature and precipitation	2.75

Sr. No.	Statements	*t* Value
18	Coastal zones will be more sensitive to erosion, flooding, submergence and deterioration of Coastal ecosystems such as salinization	3.55
19	Increase in endemic morbidity and mortality due to vector borne diseases like malaria, cholera diarrhoea, CCHF and Swine flu etc.	2.43
20	Agriculture is extremely vulnerable to 'Climate Change'	3.83
21	Higher temperatures eventually reduce yields of desirable crops, while encouraging weed and pest proliferation	2.94
22	Changes in precipitation patterns increase the likelihood of short-run crop failures and long-run production declines	2.66
23	Rising temperatures is the cause of shifts in crop growing seasons	2.02
24	Productivity of rain-fed crops will be adversely affected due to increased rate of drought	3.40
25	Heat stress may reduce the fertility of livestock	2.68
26	Heat stress may cause reduced feed intake in livestock	3.88
27	Increase in temperature and humidity is the cause behind decaling milk production of dairy bovine	4.03

Reliability of the scale

Reliability is referred as the probability that a product, system or service will perform its intended function adequately for a specified period of time or will operate in a defined environment without failure .The constructed scale on 'Awareness of the Dairy Farmers regarding Climate Change and its Variability for measurement was tested for its reliability by using the split half method. It was conducted on 20 dairy farm owners of non-sample area. This was done by comparing the result of one half *i.e.* even statements with the result from the other half *i.e.* odd statements of final scale. The coefficient of reliability between these two sets of scores was calculated by Rulon's formula suggested by Guilford (1954).

$$rtt = 1 - \frac{ó^2 d}{ó^2 t}$$

Where,

rtt = Coefficient of reliability

s^2d = Variance of these differences

s^2t = Variance of the total scores

The value 0.75 was found to be significant at 1 per cent level. Thereby, testifying the reliability of the scale. According to Singh (2015);Kumar *et al.* (2015)and Kumar *et al.* (2016) when the purpose of the test is to compare the means of the two groups of narrow range, a reliability coefficient of 0.50 or 0.60 would suffice. Hence, the constructed scale is reliable as the rtt was > 0.60.

Content Validity of the scale

Validity of scale is the property that ensures the obtained test score as valid, if it measures what is actually valid as per theoretical and practical aspects. A scale is said to be valid if it stands logical reasoning .Content validity is referred to the representativeness or sampling adequacy of the content of a measuring instrument (Kerlinger, 2010).Content validation was carried out by subjecting the selected 27 items to judge's opinion. Experts in the selected field of study formed the judges. It was assumed the present scale satisfied the content validity as the scale value seemed reasonable to accept the scale as valid measure of the dimension. The final format of the scale is presented in Table 1.

Administering the scale

For application of the scale, the researcher can collect information against each 27 statements (Table 1) in five point continuum viz. 'Strongly agree', 'Agree', 'Undecided', Disagree and 'strongly disagree' with weightage score of 5,4,3,2 and 1 for positive and reverse scoring is advised to quantify negative statements . For this dependent variable, the maximum score possible was 110 and minimum was 22. An arbitrary method was used for categorisation. For that the higher score is subtracted from the lower score and divided by the number of categories. The obtained score is added into the lower score until you get the highest score.

RESULTS AND DISCUSSION

The final scale was called to be the standardized one which consisted of 27 statements (Table 1). The scale was developed to measure the awareness of the dairy farmers regarding climate change and its variability. Where responses had to be recorded on a five point continuum representing

strongly agree, agree, undecided, disagree and strongly disagree with scores of 5, 4, 3, 2, and 1, respectively.

CONCLUSION

The standardized scale would have practical applicability in discovering the intensity of attitude of dairy farmers and thus it facilitates to take right decisions by policy makers. The reliability and validity analysis revealed that selected items were highly reliable, valid and statistically significant. The scale was able to differentiate the dairy farmer's categories by the response of the farmers during reliability test. The awareness scale constructed in the present study can be used by social scientists with suitable and reliable modifications to measure the dairy farmer's awareness about climate change issues and its variability.

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