The Pharma Innovation Journal 2021; SP-10(6): 01-04

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(6): 01-04

www.thepharmajournal.com
Received: 18-03-2021
Accepted: 02-05-2021

KP Saravanan
Assistant Professor, Department of Veterinary and Animal Husbandry Extension Education, Veterinary College and Research Institute, Orathanadu, Thanjavur, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

A Manivannan
Professor and Head, Department of Veterinary and Animal Husbandry Extension Education, Veterinary College and Research Institute, Orathanadu, Thanjavur, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

T Sivakumar
Dean, Veterinary College and Research Institute, Orathanadu, Thanjavur, Tamil Nadu, India

KM Sakthivel
Associate Professor, Department of Veterinary and Animal Husbandry Extension Education, Veterinary College and Research Institute, Namakkal, Tamil Nadu, India

M Ramachandran
Professor and Head, Department of Animal Nutrition, Veterinary College and Research Institute, Orathanadu, Thanjavur, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Corresponding Author:
KP Saravanan
Assistant Professor, Department of Veterinary and Animal Husbandry Extension Education, Veterinary College and Research Institute, Orathanadu, Thanjavur, Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Perception of goat farmers towards climate change in southern region of Tamil Nadu, India

KP Saravanan, A Manivannan, T Sivakumar, KM Sakthivel and M Ramachandran

Abstract
Exploitation of natural resources has disturbed the ecological balance and climate as a result, patterns and climate have shifted. Among the livestock species, goat is better adaptable to changing environment. A warmer world means that goats will thrive in the future. Due to changing conditions, goat farmers' opinion could help and ensure their farming. Under these circumstances, goat farmers' impression about climate change could support and safeguard their business under changing climate. Based on the above background the objective of the study was formulated to ascertain about the Kanni Adu goat farmer's perception towards climate change. The research was carried out in the Southern districts of Tamil Nadu namely Virudhunagar, Thoothukudi, and Tirunelveli. The sample size was calculated using sample size estimation and distributed to the study region using proportionate sampling. Data were collected from 381 respondents from twenty-five villages using a pre-tested interview schedule. The Weighted Mean Score (WMS), the mean and standard deviation used for ranking and classification. The results revealed that in the study area, farmers perceived high temperatures with increased intensity occur during the summer. Climate change had a moderate effect on goat farmers' perceptions. Government needs to conduct training and awareness programme to the key farmers regarding access of climate information would help and safeguard Kanni Adu goats and farmers from climate stress.

Keywords: Goat farmers, changing environment, Tamil Nadu

Introduction
Overexploitation of natural resources by man has put the ecology and climate system into disarray as a result, the environment and weather patterns have changed and now the world is experiencing climate change. Recently, there have been several climate impacts, such as the Texas cyclone, Uttrakhand flash flood, and unusual strong downpour in Tamil Nadu. Developed countries are innovating quickly and helping farmers in the face of severe weather. In contrast, developing countries pose a high risk of occurrence in the future (IPPC -The Intergovernmental Panel on Climate Change Report, 2019, which will be amplified by freshwater scarcity. Agriculture and livestock farming in India are heavily reliant on the weather. Farmers will suffer from both ends as a result of severe weather farming: they have to spend more money on supplies, feeds, and drugs, and they have a higher chance of production loss. In particular, farmers in dryland areas, who are experiencing droughts caused by climate change, have few opportunities for livelihood.
In comparison to agriculture, livestock farming is the right alternative source of livelihood for farmers because it needs less water. Goats have a lower water requirement than other livestock animals (Naqvi *et al.* 2015) [12]. Researchers opined that goats will become a key species in future climate change (Darcan and Silanikove, 2018) [5]. In addition, the goat population has been steadily increasing in India (Livestock Census, 2019) [9]. In these conditions, goat farmers' perceptions on climate change will be helpful to face the effects of climate change. With these backgrounds in mind, the study was formulated with of the objective of ascertaining the perceptions of Kanni Adu goat farmers towards climate change.

Materials and Methods
Study area and data collection
The study was conducted in the southern region of Tamil Nadu, India since it is the native breeding tract of Kanni Adu goat breed. The true type of Kanni Adu goats have been found in the Sattur, Sivakasi, Kovilpatti, Vilathikulam taluks and Sangarankovil taluk of the southern region (Thiruvenkadan *et al.* 2011) [16].

The major livelihood activities of farmers in the region are agriculture, livestock rearing, fire office work and migration to urban for work. The average annual rainfall of the region is 655mm (Thoothukudi), 829 mm (Virudhunagar) and 736 mm (Tirunelveli). The research area is in the dryland regions and hit harder by climate change. Proportionate sampling technique was used to selected samples from the taluks *viz*., Sattur – 110, Sivakasi – 88, Kovilpatty – 61, Vilathikulam – 48 and Sangarankovil – 74. Five villages were selected from each taluk. A proportionate random sampling technique was used to randomly choose 381 people from 25 villages. Data were collected through pretested interview schedule by direct contact from 2019 to 2021 January.

Statistical analysis

Perception was operationalised as 'the ability of farmers to understand/feel the variability in weather between past and present periods" (Wolf and Moser, 2011) [19]. Based on an exhaustive analysis of the literature as well as consultation with experts and extension functionaries, a collection (29) of items/statements on three dimensions such as summer season, monsoon season and winter season were compiled and arranged for this research to ascertain about the perception of Kanni Adu goat farmers' toward climate change.

To identify the degree of perception level towards climate change by the farmers a three-point continuum scale was used and scores were given 2, 1 and 0 for agree, undecided and disagree respectively. Additionally, the perception level was determined by comparing their weighted mean scores and ranking was also performed using their weighted mean scores (Meena *et al.* 2018) [10].

$$\text{Weighted Mean Score (WMS)} = \frac{\text{Total score obtained of all members in each item of perception}}{\text{Total maximum possible score for each item of perception}} \times 100$$

Overall perception of farmers towards climate change

The total number of statement is 29 and the total score of the farmers' perceptions was arrived at by adding up the individual item of each respondent. The highest score was 58, and the minimum score was 0. The respondents were categorized into three classes namely low, medium and high based on mean and standard deviation.

Results and Discussion

The findings were presented and discussed in three dimensions, beginning with farmer perceptions on climate change during summer, monsoon and finally winter seasons. Individual statement results were interpreted on each dimension in the first segment, followed by ranking and group results.

I. Individual statement wise perception of Kanni Adu goat farmers towards climate change in summer season

A close examination of the table 1 revealed that 183 respondents agreed that high temperatures with increased intensity occur during the summer, and that they were ranked first (MWS 51.05). In the study area, generally, farmers link agricultural activities with the weather for demarcating, remembering and rising temperature is creating an uncomfortable situation. Further, they are using traditional weather forecast proverbs to recall the weather and most farmers rely on their traditional experience, conventional thought, and traditional knowledge to make climate judgments. Similar findings were also reported by Choudhry *et al.* 2012 [4]; Mohanraj and Karthikeyan (2014) [11]; Tolemariam *et al.* (2015) [17]; Nguyen *et al.* 2016 [13]; Uma 2017 [18].

According to Table 1, the statement, a prolonged drought would occur (39.63 MWS) came in second position, followed by decreased drinking water supply (III), recurrence of drought for the past 15 years (III), and an increase in the number of hot days (IV). Farmers may be aware of climate change; the information may be obtained by repeated personal experience and via a family member, peer group contact, contact with veterinary or para veterinary personnel, medical shop dealers. They also perceived the change through less rain, or no rain leads to water scarcity, especially giving drinking water to livestock and fodder cultivation. Gurung and Bhandari (2008) [6]; Mohanraj and Karthikeyan (2014) [11]; Uma (2017) [18] also drew a similar kind of inference.

Further, farmers reported that summer winds are getting warmer (V) with a rise in wind speed in recent years (VI), and both day and night temperatures are increasing (VII), according to the Table 1. Following this, the perception such as long dry spell periods (VIII), there are more number of rainy days in the summer season (IX), early onset of summer (X) and variation between day and night temperatures is reducing in gradually (XI) were perceived to some extent as the effect of climate change by the respondents.

Table 1: Perception of Kanni adu goat farmers towards climate change in summer season, N = 381

S. No.	Statements	Agree	Undecided	Disagree	MWS	Rank
1	High temperature with increased intensity are experienced during summer	183	21	177	51.05	I
2	Occurrence of prolonged drought	136	20	225	39.63	II
3	Decreased availability of drinking water	128	12	241	36.88	III
4	Recurrence of drought in the past 15 years is more	126	18	237	36.88	III
5	Increase in number of high temperature days	133	13	235	36.75	IV
6	Winds are getting more warmer during summer	75	25	281	24.15	V
7	There is increase in the wind speed in the recent years	69	24	288	22.83	VI
8	Both day and night temperature are getting increased	55	20	306	17.45	VII
9	Long dry spell periods	39	24	318	14.17	VIII
10	There are more number of rainy days in summer season	24	31	326	11.28	IX
11	Early onset of summer	10	34	337	7.742	X
12	Variation between day and night temperature is reducing gradually	6	34	341	6.56	XI

II. Farmers perceptions on climate change in the monsoon season based on individual statements

For farmer perception on monsoon aspects, 13 statements were interpreted. The statement on less rainy day, with a weighted mean score of 39.11 ranked first among these statements. Farmers in the study region remember climate events focused on the effects of climate change on agriculture and livestock farming, such as crop stunting, decreased yield,

and the introduction of new diseases in plants and livestock, changes in animal behaviour, economic loss and cropping period. Various researchers also agreed with the above statement. (Mohanraj and Karthikeyan 2014, Ayal *et al.* 2018, Chingala *et al.* 2017 and Joshi *et al.* 2018) [2, 3, 8, 11]

Table 2: Perception of Kanni adu goat farmers towards climate change in monsoon season, N = 381

S. No.	Statements	Agree	Undecided	Disagree	MWS	Rank
1	Less number of rainy days	134	25	222	39.11	I
2	Low rainfall during monsoon	130	25	226	38.32	II
3	Rainfall is unreliable for the last 15 years	107	21	253	31.23	III
4	Arrival of monsoon is usually delayed	55	32	294	18.90	IV
5	Date of onset of monsoon is unpredictable	45	35	201	16.54	V
6	Variation in intensity and pattern of rainfall	40	34	307	15.49	VI
7	Occurrence of heavy down pours in short duration	36	28	317	13.91	VII
8	Drastic changes in annual rainfall	30	25	326	12.20	VIII
9	Short period of northeast monsoon	29	20	332	11.94	IX
10	Early ending of monsoons	12	19	350	6.96	X
11	Period of southwest monsoon is extended	09	20	352	6.56	XI
12	Increase in occasion of unexpected rainfall	03	26	352	5.38	XII
13	Occurrence of more number of cyclones in the last 15 years	01	16	364	3.81	XIII

It was found from the table 2 that statement "low monsoon rainfall" (II) followed by rain was unreliable for the last 15 years (III), and that monsoon arrival is delayed (IV). Based on variation in grazing pastures and input availability for livestock farmers, perceiving changes in the monsoon rainfall. Furthermore, most farmers have switched from multi-millet to cash mono-cropping. They also switched from buffalo to crossbred cow to goat rearing as a livestock keeping pattern. In addition to above, owing to lack of technical knowledge, most farmers do not use the government service weather forecast; however, during unseasonal rainfall, heavy downpours, and cyclones, they gather information from television, newspapers, and peer groups. Researchers from different countries also found similar kind of perception from farmers. (Apata *et al.* 2009, Okezie *et al.* 2011, Silvestri *et al.* 2012, Mohanraj and Karthikeyan 2014, Ayal *et al.* 2018, Chingala *et al.* 2017 and Joshi *et al.* 2018) [1-3, 8, 11, 14, 15].

Statements *viz.*, the date of the monsoon's onset is uncertain (V), accompanied by variations in rainfall intensity and pattern (VI), and the frequency of heavy downpours for short periods of time (VII) were perceived as shown in the Table (2). Farmers were deciding and relating rainfall differences due to increased feed costs, limited availability of feed at pastures, variations in behaviour, production loss in agricultures and goat farming. Different researchers also agreed with above perception (Apata *et al.* 2009; Silvestri *et al.* 2012; Mohanraj and Karthikeyan 2014; Nguyen *et al.* 2016; Ayal *et al.* 2017) [1, 2, 11, 13, 15].

Farmers perceived changes in the monsoon, such as drastic changes in annual rainfall (VIII), accompanied by a short northeast monsoon period (IX) and an early monsoon ending (X). Chingala *et al.* 2017 [3] and Joshi *et al.* (2018) [8] also reported similar results. Other statements, such as the southwest monsoon's period being prolonged, an increase in the frequency of unexpected rainfall, and the occurrence of more cyclones in the last 15 years, were met with scepticism by farmers.

III. Perceptions of Kanni adu goat farmers towards climate change in winter season

In terms of farmers' perceptions of towards climate change in winter season, one-fifth of the respondents (MWS 15.74) accepted that the length of the season has decreased. Mohanraj and Karthikeyan (2014) [11] also reported similar inference.

Table 3: Perception of Kanni adu goat farmers towards climate change in winter season, N = 381

S. No.	Statements	Agree	Undecided	Disagree	MWS	Rank
1	Duration of winter has decreased	45	29	307	15.74	I
2	High day temperature and low night temperature	13	19	349	6.43	II
3	Low temperatures are experienced in winter season	08	28	345	6.04	III
4	Increase in relative humidity in the recent years	04	27	350	4.99	IV

The statements *viz.*, high day and low night temperatures (MWS 6.43), low temperatures during the winter season (MWS 6.04), and a recent increase in relative humidity (MWS 4.99) have not been agreed by the respondents which might be due to their experience in winter season.

Table 4: Categorization of the respondents according to their overall perception of climate change, N = 381

S. No.	Level of perception	Frequency (n)	Percentage (%)
1	Low (Below 1.04)	112	29.00
2	Medium (1.04 - 20.34)	214	56.00
3	Higher (Above 20.34)	55	15.00
	Mean 10.69 SD ± 9.64		

It could be inferred from Table 4 on the whole; more than half of the respondents (56%) thought climate change was at a medium stage. Following that, nearly one-third (29%) of goat farmers were perceived low, while 15% of respondents were

rated as having a high level of perception. Uma (2017) [18] and Joshi *et al.* (2018) [8] also agreed results.

Conclusions

From above study it could be concluded that Kanni Adu goat farmers perceived high temperature during summer season. Kanni Adu goat farming is a viable livelihood enterprise in the study area which has to be sustained in future. Under these circumstances, when the goats are exposed to heat stress during summer season that could be alleviated by adopting suitable management practices in goat rearing *viz*., avoiding grazing during hot sunlight hours, increasing drinking water facilities, supplementation of nutritious feed and fodder etc. Hence it is recommended that one or two days training programme on heat stress management of goats can be planned by government institute and non-governmental organization operating in the study area for creating awareness about heat stress and its prevention and control.

Acknowledgement

The research was carried out as part of a Ph.D. thesis of the first author. The researchers are grateful to Tamil Nadu Veterinary and Animal Sciences University in Chennai for allowing them to conduct the above research study.

Reference

1. Apata TG, Samuel KD, Adeola AO. Analysis of climatic change perception and adaptation among arable food crop farmers in South Western Nigeria. International association of agriculture economist's conference. Beijing, China 2009, 16-22.
2. Ayal DY, Radeny M, Desta S, Gebru G. Climate variability, perceptions of pastoralists and their adaptation strategies. International Journal of Climate Change Strategies and Management 2018;10(4):596-615.
3. Chingala G, Mapiye C, Raffrenato E, Hoffman L, Dzama K. Determinants of smallholder farmers' perceptions of impact of climate change on beef production in Malawi. Climatic Change 2017;142:129–141. DOI 10.1007/s10584-017-1924-1.
4. Choudhry JS, Shukla G, Prabhakar CS, Maurya S, Das B, Kumar S. Assessment of local perception on climate change and coping strategies in Chotanagpur Plateau of Eastern India. Journal of Progressive Agriculture 2012;3(1):8-15.
5. Darcana NK, Silanikove N. The advantages of goats for future adaptation to Climate Change: A conceptual overview. Small Ruminant Research 2018.
6. Gurung GB, Bhandari D. An Integrated approach to climate change adaptation Leisa India, AME foundation 2008;10(4):10-12.
7. IPCC Fourth Assessment Report 2019. https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr.pdf
8. Joshi S, Joshi MA, Raghuvanshi R. Farmers' Perception about Climate Change and their Knowledge of Adaptation Strategies. International Journal of Basic and Applied Agricultural Research 2018;16(1):1-7.
9. Livestock Census. Department of Animal Husbandry, Dairying and Fisheries. Ministry of Agriculture. Government of India New Delhi, India 2019.
10. Meena OP, Sharma NK, Jeph NK, Meena DS. Constraints perceived by dairy members in adoption of new technologies in dairy farming in Rajasthan. Veterinary Practitioner 2018;19(2):317-319.
11. Mohanraj K, Karthikeyan C. Perception of tank irrigated farmers towards climate change. Journal of Extension Education 2014;26(3):5311-5314.
12. Naqvi SMK, Kumar D, De K, Sejian V. Climate Change and Water Availability for Livestock: Impact on Both Quality and Quantity. Climate Change Impact on Livestock: Adaptation and Mitigation 2015, 81-95. doi:10.1007/978-81-322-2265-1_6.
13. Nguyen TPL, Seddaiu G, Gonario S, Virdis P, Tidore C, Pasqui M, Roggero PP. Perceiving to learn or learning to perceive? Understanding farmers' perceptions and adaptation to climate uncertainties. Agricultural Systems 2016;143:205-216.
14. Okezie CA, Chidinma UU, Okezia R, Sulaiman J. Climate Variability and change: Perceptions and Adaptations in Subsistence Agriculture. Indian Journal of Agriculture Research 2011;45(4):275-282.
15. Silvestri S, Bryan E, Ringler C, Herrero M, Okoba B. Climate change perception and adaptation of agro-pastoral communities in Kenya. Regional Environmental Change 2012;12:791-802. DOI: 10.1007/s10113-012-0293-6.
16. Thiruvenkadan AK, Panneerselvam S, Saravanan R. Kanni adu goat A Monograph. TANUVAS. Chennai 2011.
17. Tolemariam T, Eneyew A, Mitiku F. Development agents perception about the effect of climate risk on livestock production. Livestock Research for Rural Development 2015;27(5):1-9.
18. Uma V. Attitude of Livestock farmers towards climate change and adaptation measures to mitigate its effects. Unpublished PhD thesis. Tamil Nadu Veterinary and Animal Sciences University. Chennai 2017.
19. Wolf J, Moser SC. Individual understandings, perceptions, and engagement with climate change: insights from in-depth studies across the world. Wiley Interdiscip. Rev. Clim. Change 2011;2(4):547-569. http://dx.doi.org/10.1002/wcc.120.