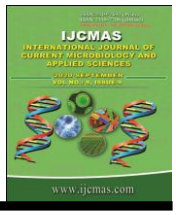
Int.J.Curr.Microbiol.App.Sci (2020) *9*(9): 896-904

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 9 Number 9 (2020)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2020.909.111

Knowledge Level of True-to-Type Salem Black Goat Farmers on Climate Change

C. Ramkumar[1*], N. Narmatha[1], V. Uma[1], K. Sivakumar[2] and S. Senthilkumar[3]

[1]Department of Veterinary and Animal Husbandry Extension Education, [2]Department of Livestock Production Management, [3]Department of Animal Nutrition, Veterinary College and Research Institute, Namakkal- 637 002, India

**Corresponding author*

Keywords

Climate change, Knowledge, Salem Black Goat

Article Info

Accepted:
10 August 2020
Available Online:
10 September 2020

A B S T R A C T

Climate change refers to any change in climate over time. Developing countries are more vulnerable to climate change than developed countries because their economies are dependent on climate sensitive sectors like agriculture and livestock. In India, livestock sector is considered as one of the important livelihood option for rural population. Within livestock sector, goat farming is one of the important livelihoods option for unprivileged section namely landless, small and marginal farmers and they rear the goats in low input traditional system. But the system of production has been under pressure from outside due to negative environmental implications. The present study was undertaken to understand the knowledge of goat farmers about climate change. For this study climate change knowledge test was constructed. With the help of pretested interview schedule data was collected from 340 True-to-type Salem Black traditional goat farmers. Half (50%) of the True-to-type Salem Black traditional goat farmers had medium level of knowledge, 96.18 per cent of the respondents had knowledge on species resistant to climate change and none of the respondents had knowledge on the institutions working on climate change in India. High significant difference exists between Salem Black True-to-type goat farmers and NICRA beneficiaries in the knowledge level on climate change. Salem Black goat farmers are in a position to understand climate variability and the management practices which help them to improve the production and productivity of goats in the climate change era.

Introduction

Climate change refers to any change in climate over time, whether due to natural variability or/and as a result of human activity (IPCC, 2007a). Globally unparalleled climate variability; low capacity of society and economical systems to cope; and drought, is frequently accompanied by ecological decline, decimation of livestock herds, widespread food scarcity, mass migration and great loss of human life (Tarhule and Lamb, 2003). Climate change with expected long term changes in rainfall patterns and shifting temperature zones are expected to have negative effects on agriculture (Charles and Rashid, 2007).

Climate variability and change are a major threat to food security in many regions of the developing world, which are largely dependent on rainfed and labor intensive agricultural production (IPCC, 2001; Downing, 2002; Ziervogel and Calder, 2003). Climate change will create new food insecurities in coming decades. Developing countries are more vulnerable to climate change than developed countries because their economies are dependent on climate sensitive sectors like agriculture and livestock and scarcity of capital for adaptation measures (Fischer *et al.,* 2005).

Climate change projections for India for the 2050s suggest an increase in temperature of 2–4^{0}C for the region south of 25^{0}N and by more than 4^{0}C for the northern region. While there is likely to be little change in the average amount of monsoon rainfall, climatologists expect the number of rainfall days to decrease over a major part of the country (NATCOM, 2008).

Adverse effects of climate change continue to be a major threat to rural livelihoods (IPCC, 2007a, 2007b; Nhemachena, 2009; Pouliotte *et al.,* 2009). This poses a challenge of developing innovative technologies to improve rural livelihoods and environmental conservation and ensuring adoption of such technologies. Climate change imposes constraints to development especially among smallholder farmers whose livelihoods mostly depend on rain-fed agriculture (IPCC, 2007b; Tanner & Mitchell, 2008). Negative impacts of extreme events such as floods and droughts are expected to be high in developing countries especially in rural areas (Adger *et al.,* 2003; IPCC, 2007a).

In general, it seems that intensively managed livestock systems will more easily adapt to climate change than crop systems. This may not be the case for pastoral systems, however, where livestock depend more fully on the productivity and quality of the rangelands, which is predicted to decline and become more erratic (IPCC, 2001).

In India, livestock sector is considered as one of the important livelihood option for rural population and has a substantial role in supplementing farm families' income. Within livestock sector, goat farming is one of the important livelihoods. Unprivileged section namely landless, small and marginal farmers mostly engaged in this activity. Goat population is more than 135 million and it accounts 26% of the total livestock population in India. Goat rearing in India is more of small holder in nature with low input traditional system. But the system of production has been under pressure from outside due to negative environmental implications.

Salem Black goat is one of the recognized goat breeds of Tamil Nadu and it is livelihood for many of the rural poor. Responding to the challenges of climate change, the farmers require basic knowledge about climate change to formulate appropriate coping strategies to sustain the goat farming. Hence, the present study was undertaken to understand the knowledge of goat farmers about climate change which would contribute to scientific and policy discussions to reorient the research and extension services to mitigate the effects of climate change.

Materials and Methods

Salem Black goat breeding tract is selected for the study since it is one of the recognized breeds of Tamil Nadu. Salem black goat breed is distributed in Salem, Dharmapuri, Krishnagiri and Erode districts of Tamil Nadu. Out of four districts, only Salem and Dharmapuri districts were selected since the True-to-type Salem Black goat is available

only in these districts. The study was conducted in Mettur and Omalur taluks of Salem district; Pennagaram, Palakodu and Harur taluks of Dharmapuri district where the true-to-type Salem Black goats are present. Five villages from each taluk having more number of households owning true-to-type Salem black goats were selected. An *ex-post-facto research design* was adopted for this study since the variables selected have already been occurred and the researcher may not be able to manipulate the variables. Sample size was estimated with the following formula

$$\text{Estimation of sample size} = \frac{\text{Sample size (SS)}}{1+(SS -1 / pop)}$$

$$\text{Sample size (SS)} = \frac{Z^2 (p) \times (1-p)}{C^2}$$

Z = 1.96 (for 95 per cent confidence interval)
p = 0.5 (probability)
C = 0.05 (confidence interval ± 5 which is expressed as decimal)
pop = True-to-type Salem Black goat farms in the selected Taluks (2787)

$$\text{Sample size (SS)} = \frac{1.96^2(0.5) \times (1-0.5)}{0.05^2} = 384$$

$$\text{Estimation of sample size} = \frac{384}{1+ (384 -1 /2787)} = 339.8 = 340$$

Estimated sample size = 340

Respondents from each taluk were selected based on proportionate random sampling method (Mettur - 104, Omalur - 59, Pennagaram - 45, Palakodu -66 and Harur – 66). Goat farmers with more than 15 years of goat rearing experience were selected as respondents. Totally 340 respondents were selected from 25 villages on proportionate random sampling method. Qualitative and quantitative data were collected using pre-tested interview schedule and analysed by appropriate statistical tools.

Collection and selection of knowledge statements

A list of knowledge statements on climate change was collected through various literatures and discussion with experts. Totally 50 knowledge statements were collected and send to subject matter specialist to understand the relevancy of the collected statements. They were requested to judge the knowledge statements in three point continuum as “Highly Relevant”, “Relevant” and “Not Relevant”. Statements which had more than average value were selected, which comprised 22 knowledge statements. By using split half method selected knowledge items were divided into two categories and were given to 30 farmers in non-sampling area for testing. The answers were evaluated and score of “1” and “0” was given to “correct” and “incorrect” answers respectively. The total score of the individual on knowledge was obtained by summing up the scores of the items. The knowledge scores of the individuals were arranged in descending order. Based on the score, the respondents were divided into six equal groups (each group had 5 respondents). These groups were named as G_1, G_2, G_3, G_4, G_5 and G_6. The middle two groups (G_3 and G_4) were eliminated. Two extreme groups with high and low scores were considered for difficulty and discrimination index (Ray and Mondal, 1999).

Difficulty index

It indicates the difficultness of the knowledge item. Difficulty index was calculated by using the following formula.

$$P_i = \frac{n_i}{N_i} \times 100$$

Where,
P_i – Difficulty index in percentage of the i^{th} item

n_i – Number of respondents giving correct answers to the i^{th} item
N_i – Total number of respondents

Discrimination index

Discrimination index is used to differentiate the well informed farmers from the poorly informed farmers. Discrimination index was calculated by using the formula given below.

$$E^{1/3} = \frac{(S_1 + S_2) - (S_5 + S_6)}{N/3}$$

Where,

S_1, S_2, S_5 and S_6 - Frequencies of correct answers in groups G_1, G_2, G_5 and G_6 respectively
N - Total number of respondents

Selection of final items for the study

Difficulty and discrimination index were considered for the selection of final items of knowledge test on climate change. As per the suggestions of Ray and Mondal (1999), those items with difficulty index of 30-80 and discrimination index of 0.30-0.55 were considered. Finally, 10 items were selected for the knowledge test on climate change.

Knowledge on climate change was estimated among the respondents. The score of "1" and "0" were given to the "correct" and "incorrect" answers. Further, based on the knowledge score, the respondents were classified into low, medium and high by equal appearing interval method.

Results and Discussion

The overall and item wise knowledge level of the goat farmers on climate change was assessed and presented below (Table 1).

Overall Knowledge level of goat farmers on climate change

The knowledge scores obtained by the respondents on climate change ranged from from 0 to 7. The overall average knowledge score of the respondents was 3.2. Half (50%) of the respondents had medium level of knowledge on climate change followed by low (47.94 %) and high (2.06 %) levels of knowledge. Climate change had negative impact on production, productivity, disease occurrence and prevalence of vector in livestock which affects the economic status of the farmers (Uma, 2017) which insist the farmers to gain knowledge on climate change. Understanding climate change is pivotal to sustain the livelihood of goat farmers pave way to seek information regarding climate advisory services. Preethi (2012) and Chouhan *et al.*, (2018) also reported that majority of the farmers had medium level of knowledge on climate change (Table 2).

Item-wise knowledge level of goat farmers on climate change

The knowledge on various aspects of climate change was assessed and it shows that 96.18 per cent of the respondents had knowledge on species resistant to climate change, 81.47 per cent understand the management practices needed to mitigate the effects of climate change, 80.88 per cent of the respondents understood the difference between climate and weather, 65.59 per cent felt that there exists relation between climate change and human activities (Table 3). Since goat rearing is the livelihood of the respondents which necessitate to understand the best species to withstand the effects of climate change and to avoid the economic loss, the farmers are in a position to learn about the managemental practices which help them to improve the production and productivity of goats.

Table.1 Selection of knowledge items to measure the knowledge level of Goat farmers on climate change

S.No	Knowledge statements	Difficulty Index	Discrimination Index
1	Meaning of climate change	**56.67**	**0.30**
2	Climate and weather	**50.00**	**0.30**
3	Climate variability is real	90.00	-0.10
4	Influence of human activities on climate change	**76.67**	**0.30**
5	Green house gas has emitted by livestock	**36.67**	**0.30**
6	Deforestation leads to climate change	40.00	0.10
7	Policies implemented by Indian government to mitigate the climate change	**40.00**	**0.30**
8	Livestock species resistant to climate change	**70.00**	**0.30**
9	Impact of climate change on human and animal health	80.00	0.20
10	Impact of climate change on rainfall over last 10 years	80.00	0.20
11	Impact of rainfall on grazing land	66.67	-0.20
12	Impact of temperature on livestock production	66.67	-0.20
13	Impact of temperature on incidence of disease in livestock	60.00	0.10
14	Impact of relative-humidity on pest and disease incidence	60.00	0.10
15	Emergence of new diseases	50.00	0.20
16	Change in feeding behaviour of goats due to climate change	50.00	0.20
17	Impact of climate change on oestrous cycle of goats	**76.67**	**0.32**
18	Impact of climate change on number of animals in the flock	53.33	0.20
19	Measures taken to mitigate the effects of climate change	**46.67**	**0.30**
20	Waste management to mitigate the climate change	53.33	0.10
21	Management practices to mitigate the effects of climate change	**43.33**	**0.40**
22	Institutions working on climate change in India	**50.00**	**0.40**

Table.2 Knowledge level of farmers on climate change n=340

Category	f (%)
Low (less than 3.3)	163 (47.94)
Medium (Between 3.3 to 6.6)	170 (50.00)
High (More than 6.6)	7 (2.06)

Table.3 Item-wise knowledge level of goat farmers on climate change n=340

S. No	Statement	Correct f (%)	Incorrect f (%)
1	Meaning of climate change	28 (8.24)	312 (91.76)
2	Climate and weather	275 (80.88)	65 (19.12)
3	Measures taken to mitigate the effects of climate change	177 (52.06)	163 (47.94)
4	Management practices to mitigate the effects climate change	277 (81.47)	63 (18.53)
5	Green house gas has emitted by livestock	10 (2.94)	330 (97.06)
6	Livestock species resistant to climate change	327 (96.18)	13 (3.82)
7	Influence of human activities on climate change	223 (65.59)	117 (34.41)
8	Impact of climate change on oestrous cycle of goats	7 (2.06)	333 (97.94)
9	Policies implemented by Indian government to mitigate the climate change	5 (1.47)	335 (98.53)
10	Institutions working on climate change in India	0 (0.00)	340 (100.00)

Table.4 Knowledge level of True-to-type Salem Black traditional goat farmers and NICRA beneficiaries on climate change

S. No	Item	Knowledge level	
		Salem Black True-to-type goat farmers*(%)	NICRA Beneficiaries# (%)
1	Meaning of climate change	8.24	45.45
2	Climate and weather	80.88	77.27
3	Measures taken to mitigate the effects of climate change	52.06	36.36
4	Management practices to mitigate the effects climate change	81.47	63.64
5	Green house gas has emitted by livestock	2.94	36.36
6	Livestock species resistant to climate change	96.18	22.73
7	Influence of human activities on climate change	65.59	81.82
8	Impact of climate change on oestrous cycle of goats	2.06	90.91
9	Policies implemented by Indian government to mitigate the climate change	1.47	77.27
10	Institutions working on climate change in India	0.00	36.36

*-n=340, #-n=22

Table.5 Knowledge level of traditional goat farmers and NICRA beneficiaries

S. No	Category	Salem Black True-to-type goat farmers*	NICRA beneficiaries#	Chi-square value
1	Low	163	2	53.48**
2	Medium	170	13	
3	High	7	7	

*-n=340, #-n=22

None of the respondents had knowledge on the institutions working on climate change in India and meagre knew about the policies on climate change (1.47%) and impact of climate change on oestrus cycle of goat (2.06%). The institution and policies aspects have no direct influence in the livelihood of small and marginal goat farmers. Expression of oestrus signs in goats were less noticed by the farmers hence the negative effect due to climate change goes unnoticed, but exposure of sheep and goats to elevated ambient temperature negatively affects the biological functions which are reflected in the impairment of their production and reproduction traits were also reported by Marai *et al.,* (2007).

Comparison of knowledge level on climate change between True-to-type Salem Black traditional goat farmers and NICRA beneficiaries

Knowledge level of True-to-type Salem Black traditional goat farmers on Institutions working on climate change in India was nil. Whereas institutions play a major role in imparting knowledge to the farmers. This initiated to identify whether knowledge level farmers has been influenced by the institution. So the Knowledge level of True-to-type Salem Black traditional goat farmers were compared with National Initiative on Climate Resilient Agriculture (NICRA) beneficiaries and presented in Table 4.

Table 4. shows that the knowledge level of the respondents was compared with the knowledge level of the beneficiaries of National Initiative on Climate Resilient Agriculture (NICRA). The knowledge of the NICRA beneficiaries on Institutions working on climate change in India, policies implemented by Indian government to mitigate the climate change, impact of climate change on oestrous cycle of goats, green house gas has emitted by livestock and meaning of climate change were very high when compared to the True-to-type Salem Black traditional goat farmers. The NICRA beneficiaries acquired more knowledge about the effect of climate change and the ways to mitigate the causes through the project. Even though the NICRA beneficiaries had less knowledge on measures taken to mitigate the effects of climate change, management practices to mitigate the effects climate change and livestock species resistant to climate change when compared to the True-to-type Salem Black traditional goat farmers. Due to scarcity of resources goat farmers preferred to rear the species which is resilient and adoptive to particular climatic conditions traditionally. Hence, Salem Black traditional goat farmers might be in a position to learn the management practices and measures to cope up with climate variability.

The result of Table 5 indicates that high significant difference exists between Salem Black True-to-type goat farmers and NICRA beneficiaries in the knowledge level on climate change. This might be due to experience of traditional farmers and exposure of NICRA beneficiaries to extension agencies. Thus knowledge on climate change has to be imparted to the traditional goat farmers to alleviate the effect of climate change.

In conclusion the salem black True-to-type goat farmers had medium and low level of knowledge on climate change. Since goat rearing is the livelihood of the respondents which necessitate to understand the best species to withstand the effects of climate change and to avoid the economic loss, the farmers are in a position to learn about the managemental practices which help them to improve the production and productivity of goats. Hence creating awareness on climate change policies and institutions working on

climate change would help them to improve their living standard in midst of changing climate.

References

Adger, W. N., Hug, S., Brown, K., Conway, D., and Hume, M. 2003. Adaptation to Climate Change in Developing World. *Progress in Development Studies, 3*(3), 179-195. doi:10.1191/1464993403ps060oa, http://dx.doi.org/10.1191/1464993403ps060oa

Charles, N. and Rashid, H. 2007. Micro-level analysis of farmers' adaptation to climate change in Southern Africa. IFPRI Discussion Paper 00714, Washington DC, USA.

Chouhan. G., D.D. Suradhkar and Anarase, M.S.2018. Farmers knowledge of climate change in relation to Crop Management. *International Journal of Current Microbiology and Applied Sciences* 6: 2445-2451

Downing, T. E. 2002. Linking sustainable livelihoods and global climate change in vulnerable food systems. Die Erde. 133 :363–378.

Fischer, G., Shah, M., Francesco, N., and Van Velhuizen, H. 2005. Socio-economic and climate change impacts on agriculture : An integrated assessment, 1990-2080. *Philosophical Transactions of the Royal Society*. 360: 2067 – 2083.

IPCC. 2001. Climate change 2001: Impacts, adaptation and vulnerability - IPCC Third Assessment Report. Cambridge University Press.

IPCC. 2007a. *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Cambridge: Cambridge University press.

IPCC. 2007b. *Climate Change: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: Intergovernmental Panel on Climate Change.

Marai, I.F.M., El-Darawany, A.A., Fadiel, A. and Abdel-Hafez, M.A.M. 2007. Physiological traits as affected by heat stress in sheep - A review. *Small Ruminant Research* 71: 1-12.

NATCOM, 2008. India's Second National Communication to the United Nations Framework Convention on Climate Change. Avaliable at http://www.undp.org/content/dam/india/docs/united_nations_framework_convention_on_climate_change.pdf

Nhemachena, C. 2009. *Agriculture and Future Climate Dynamics in Africa: Impacts and Adaptation Options*. Pretoria: University of Pretoria.

Pouliotte, J., Smit, B., and Westerhoff, L. 2009. Adaptation and development: Livelihoods and climate change in Subarnabad, Bangladesh. *Climate Change and Development, 1*, 31-46. doi:10.3763/cdev.2009.0001, http://dx.doi.org/10.3763/cdev.2009.0001

Preethi. 2012. A comparative study on knowledge and perception of agro-met advisory service (AAS) on climate change in Chickballapur district. M.Sc Thesis University of Agricultural Sciences, Bengaluru.

Ray, G.L. and S. Mondal. 1999. Research Methods in Social Sciences and Extension Education. Third edition.

Tanner, T and T. Mitchell. 2008. Entrenchment or enhancement: could climate change adaptation help to reduce chronic poverty? IDS Bull Inst of Dev Stud 39(4):6–15

Tarhule, A. and Lamb, P. 2003. Climate research and seasonal forecasting for West Africans: Perceptions, disseminations, and use? *Bulletin of the*

American Meteorological Society, 84, 1741-1759. doi:10.1175/BAMS-84-12-1741

Uma, V. 2017. Attitude of livestock farmers towards climate change and adaptation measures to mitigate its effects. Unpublished Ph.D. thesis, Tamil Nadu Veterinary and Animal Sciences University, Chennai.

Ziervogel, G. and Calder R. 2003. Climate variability and rural livelihoods: Assessing the impact of seasonal climate forecasts. *Area*, 35: 403–417.

How to cite this article:

Ramkumar, C., N. Narmatha, V. Uma, K. Sivakumar and Senthilkumar, S. 2020. Knowledge Level of True-to-Type Salem Black Goat Farmers on Climate Change. *Int.J.Curr.Microbiol.App.Sci*. 9(09): 896-904. doi: https://doi.org/10.20546/ijcmas.2020.909.111