Research Article

CHANGING TREND IN LIVESTOCK HOLDING PATTERN IN CLIMATE CHANGE SCENARIO

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KEYWORDS:
Irrigated area, rainfed area, livestock, climate change, fodder scarcity

ARTICLE INFO
Received on:
16.08.2019
Revised on:
18.09.2019
Accepted on:
20.09.2019

ABSTRACT

The study was conducted in irrigated and rainfed systems of Namakkal district of Tamil Nadu. Totally 32 village panchayats were selected from irrigated and rainfed systems based on livestock intensity and 10 livestock farmers were selected randomly from each panchayat to constitute a sample size of 320 respondents. Ex-post-facto research design was adopted to find the trend in livestock holding as perceived by the respondents. The respondents had agriculture as their primary occupation and livestock farming as their secondary occupation in irrigated (86.87%) and rainfed (85.62%) areas which indicates that the traditional way of maintaining livestock as subsidiary occupation along with agriculture is still prevailing in the study area. There was high significant difference between different categories of farmers in the livestock holding in irrigated area, whereas significance at 10% level was noticed in rainfed area. Most of the livestock farmers had decreased their livestock holding over 30 years and high significant difference noticed in irrigated area and no significant difference in rainfed area. In irrigated system, 53.75% of the respondents perceived forage scarcity as the main reason to reduce the number of livestock followed by labour shortage (51.25%) and water scarcity (40.00%). In rainfed system, 62.50% of the respondents perceived water scarcity as the major reason and 59.38% of the respondents reported forage scarcity was the second most reason. Equal per cent of the respondents in both systems perceived that there was no change in livestock disease occurrences over thirty years. Next to this, they perceived the frequency of disease incidence was increased. Due to deficit rainfall, the water and forage scarcity occurs resulting in reduction of livestock holding. Apart from the direct effect of climate change on animal and animal production, there were profound indirect effects as well as climatic influences on quantity and quality of feed and fodder resources such as pastures, forages, grain and crop residues which affects the availability of fodder to livestock. This resulted in change in livestock rearing pattern from extensive (82.81%) to semi-intensive (92.5%) or intensive (4.19%) system. Developing common grazing land, fodder banks and seed banks by the local bodies would help the livestock farmers to adapt for the climate change effects and retain the livestock.

INTRODUCTION

Climate change and food security are two emerging issues being faced by the people all over the world, particularly those in the developing countries. The Intergovernmental Panel on Climate Change (IPCC) reported that many of the developing countries tend to be especially vulnerable to extreme climatic events as they largely depend on climate sensitive sectors like agriculture and allied activities. Agriculture is the livelihood for 800 million people globally and the effect of climate change in agricultural sector is multifaceted. About 12% of the world population depends solely on livestock for their livelihood (FAO, 2006). Livestock is an asset of poor and it is highly vulnerable to climatic variabilities and extreme (Calvosa *et al.*, 2009). South Asia will be hard hit since agriculture provides employment for 60% of the population. India is one among the most vulnerable countries (Pandit *et al.*, 2014) with a geographic disadvantage as it is already in the warmer part of the world. The pace and extent of warming across India is wide spread and undisputed.

In India, livestock plays an important role in providing employment, livelihood and food security to the rural poor. Climate affects animal husbandry in four ways viz. decrease feed grain availability; decrease in pasture and forage crop production and quality; direct effects of weather and extreme events on animal health, growth and reproduction; and changes in distribution of livestock diseases and pests (Rotter and Van de Geijn, 1999).

Tamil Nadu is one of the water starved state in India. It experiences widespread, consecutive droughts (over two or three years) every two decades and in every second year there could be a drought in some part of the state. Climate change is further expected to decrease the number of rainy days and increase the temperature, leading to severe drought which will have more intense impacts on agriculture and allied sector (United Nations Development Programme, 2013). Rural poor in Tamil Nadu rely greatly on agriculture and livestock for their survival which are the most climate sensitive economic sectors. Livestock is an integral part of agriculture and providing employment to more than two-third of the rural population and improve their economic status (Government of Tamil Nadu, 2013).

Depletion of natural resources coupled with degradation of land, alteration in water resources, poor productivity, low level of technology adoption, fodder scarcity and inadequate credit availability are posing serious challenges to socio-economic development and food security of Tamil Nadu. Rainfall is the ultimate source for water in rivers, lakes, ponds, reservoirs and underground water and it is affected by vagaries of monsoon and unpredictable natural disasters like flood and drought (Tamil Nadu State Perspective and Strategic Plan, 2012). With this background the present study was formulated with an objective to assess the trend in livestock rearing.

MATERIALS AND METHODS

Namakkal district of Tamil Nadu was selected for study and categorised into irrigated and rainfed blocks. Based on the 19th livestock census, four blocks each from irrigated (Rasipuram, Kabilarmalai, Pallipalayam and Sendamangalam) and rainfed areas (Mallasamudram, Puduchatram, Paramathi and Namakkal) with highest livestock intensity were selected for the study. Village panchayats in each selected block were classified into high and low categories based on standard livestock units. From each category, two village panchayats were randomly selected. From the 32 selected villages, 10 livestock farmers from each village were randomly selected. Thus, 320 livestock farmers constitute a sample size for this study. Ex-post-facto research design was adopted in this study.

RESULTS AND DISCUSSION

The primary and secondary occupation of the livestock farmers were studied and presented in Table 1. It could be inferred that 86.87% and 85.62% of the respondents had agriculture as their primary occupation and livestock farming as their secondary occupation in irrigated and rainfed areas respectively.

Table 1. Occupational status of farmers in irrigated and rainfed areas

Sl. No.	Category	Irrigated No (%)	Rainfed No (%)	Chi-square value
Occupational status				
1	Livestock farming + Agriculture	3 (1.88)	6 (3.75)	5.140^{NS}
2	Livestock farming + Non-farm occupation	0 (0.00)	3 (1.88)	
3	Agriculture + Livestock farming	139 (86.87)	137 (85.62)	
4	Non-farm occupation + Livestock farming	2 (1.25)	3 (1.88)	
5	Non-farm occupation + Agriculture with livestock	16 (10.00)	11(6.87)	

Meager respondents in both irrigated (1.88%) and rainfed (3.75%) areas had livestock as primary occupation with agriculture as secondary occupation. The above result clearly indicates that the traditional way of maintaining livestock as subsidiary occupation along with agriculture is still prevailing in the study area. The old age respondents depend mainly on agriculture and livestock for their livelihood.

Table 2. Landholding pattern of farmers in irrigated and rainfed areas

Sl. No.	Category	Irrigated No (%)	Rainfed No (%)	Chi-square value
1	Landless	4 (2.50)	6 (3.75)	3.120^{NS}
2	Marginal farmers	43 (26.87)	45 (28.13)	
3	Small farmers	51 (31.88)	61 (38.12)	
4	Large farmers	62 (38.75)	48 (30.00)	

In irrigated and rainfed areas, the small farmers were 31.87% and 38.12%; large farmers were 38.75% and 30%; and marginal farmers were 26.87% and 28.13% in irrigated and rainfed areas respectively. Meager respondents were landless in irrigated (2.50 per cent) and rainfed (3.75 per cent) areas. It could be concluded that majority of the farmers were small and marginal, which reflects the national trend of land and livestock holding pattern. Hence these farmers depend on livestock for their livelihood due to vagaries of monsoon.

Table 3. Livestock holding pattern in irrigated area

Livestock holding					
Sl. No.	**Category**	**Low (up to 2.77 SLU) No (%)**	**Medium (2.78 to 6.95 SLU) No (%)**	**High (above 6.95 SLU) No (%)**	**Chi-square value**
1	Landless	3 (75)	1(25)	0	17.156*** (p=0.009)
2	Marginal	14 (32.56)	23 (53.48)	6 (13.95)	
3	Small	13 (25.49)	28 (54.90)	10 (19.60)	
4	Large	5 (8.06)	43 (69.35)	14 (22.58)	
Change in livestock holding					
	Category	**Decrease**	**No change**	**Increase**	
1	Landless	0	4 (100)	0	26.841** (p=0.000)
2	Marginal	26 (60.46)	6 (13.95)	11(25.58)	
3	Small	31 (60.78)	9 (17.65)	11 (21.57)	
4	Large	46 (74.19)	5 (8.06)	11 (17.74)	

Medium level of livestock possession was noticed among majority of farmers in large (69.35%), small (54.90%) and marginal (53.48%) category of farmers. While studying the change in livestock holding pattern over 30 years, the large (74.19%), small (60.78%) and marginal (60.46%) livestock farmers decreased the livestock holding in irrigated area. High significant difference was noticed in livestock holding and change in livestock holding. Further, the above results indicated that for landless labourers, the livestock contribution was similar for the past 30 years.

Table 4. Livestock holding pattern in rainfed area

Livestock holding					
Sl. No.	**Category**	**Low (up to 2.77 SLU) No (%)**	**Medium (2.78 to 6.95 SLU) No (%)**	**High (above 6.95 SLU) No (%)**	**Chi-square value**
1	Landless	1 (16.67%)	3 (50%)	2 (33.33%)	$11.752^{\#}$ (p=0.068)
2	Marginal	14 (31.11%)	25 (55.55%)	6 (13.33%)	
3	Small	8 (13.11%)	42 (68.85%)	11 (18.03%)	
4	Large	4 (8.33%)	31 (64.58%)	13 (27.08%)	
Change in livestock holding					
	Category	**Decrease**	**No change**	**Increase**	
1	Landless	3 (50%)	2 (33.33%)	1 (16.67%)	4.059^{NS} (p=0.669)
2	Marginal	32 (71.11%)	5 (11.11%)	8 (17.78%)	
3	Small	36 (59.01%)	8 (13.11%)	17 (27.87%)	
4	Large	32 (66.67%)	6 (12.50%)	10 (20.83%)	

Medium level of livestock possession was noticed among majority of farmers in small (68.85%) large (64.58%), and marginal (55.55%) category and similar trend in decreasing the livestock holding over 30 years was noticed in marginal (71.11%), large (66.67%) and small (59.01%) farmers in rainfed area. Significant difference was noticed in livestock holding. Though agriculture is the primary occupation, medium to high livestock possession indicates that livestock acts as buffer for farmers in rainfed areas.

Table 5. Livestock rearing pattern

Category	Irrigated No (%)		Irrigated No (%)	
	Earlier	Recent	Earlier	Recent
Extensive	131(81.87)	6 (3.75)	134 (83.75)	3 (1.87)
Semi intensive	29 (18.12)	146 (91.25)	26 (16.25)	150 (93.75)
Intensive	-	8 (5)	-	7 (4.38)

The livestock rearing pattern had changed from extensive to semi-intensive or intensive over years (Table 5) due to non-availability of grazing land and scarcity of fodder.

Table 6. Perception of incidence of disease occurrence

Perception	Irrigated No (%)	Rainfed No (%)	Chi-square value
Not aware	30 (18.76)	23 (14.38)	2.5301^{NS}
No change	59 (36.88)	59 (36.88)	
Decreased	31 (19.36)	27 (16.87)	
Increased	40 (25.00)	51 (31.87)	

Equal proportion of the respondents (36.88%) perceived that there was no change in incidence of disease occurrence. In irrigated areas 25% and in rainfed 31.87% in rainfed areas perceived that incidence of diseases was increased over years. Farmers opined that the timely interventions of veterinarians might have contributed for not increasing the frequency of disease occurrence.

Table 7. Reasons for reduction in livestock holding

(n = 160 + 160)

Sl. No.	Category	Irrigated# No (%)	Rainfed# No (%)
1	Water scarcity	64 (40.00)	100 (62.50)
2	Forage scarcity	86 (53.75)	95 (59.38)
3	Labour shortage	82 (51.25)	49 (30.63)
4	Lack of technical guidance	1 (0.63)	5 (3.13)
5	Land scarcity	7 (4.38)	4 (2.50)
6	Not economical	31 (19.38)	29 (18.13)
7	Social rejection	16 (10.00)	9 (5.63)

- Multiple responses

Table 7 indicates that in irrigated area, 53.75% of the respondents perceived forage scarcity as the main reason to reduce the number of livestock followed by labour shortage (51.25%) and water scarcity (40%). In rainfed area, 62.50% of the respondents perceived water scarcity as the foremost reason and 59.38% of the respondents reported forage scarcity was the second most reason. Due to deficit rainfall, the water and forage scarcity occurs resulting in reduction of livestock holding and change in livestock rearing pattern.

Besides the direct effect of climate change on animal and animal production, there were profound indirect effects as well as climatic influences on quantity and quality of feed and fodder resources such as pastures, forages, grain and crop residues. Sirohi and Michaelowa (2007) also reported that the indirect effect of climate change influenced the livestock resources.

It could be concluded that shrinking grazing lands, diversification of crops and indirect effect of climate change might have contributed for decrease in livestock holding and change in rearing pattern. Developing common property resources, fodder banks and fodder preservation techniques would help the farmers to maintain livestock as livelihood option and improve their economic status.

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How to cite this article?
Uma, V., N. Narmatha and K.M. Sakthivel. 2019. Changing trend in livestock holding pattern in climate change scenario. *Innovative Farming*, **4**(3): 162-166.