Micro Climate Affecting Livestock Production in Assam

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ABSTRACT

Livestock produce gaining popularity in recent years is helping in sustainable livelihood security and poverty alleviation. It has given rise to the need for a critical analysis on various aspects of climate, sustainability, preference and performance etc. With a stratified random sampling technique a study was conducted in Dibrugarh, Kamrup and Bongaigaon districts from Upper Assam, Middle Assam and Lower Assam respectively in flood affected blocks selected for data collection. At the village level, random sampling method on the basis of lottery was adopted to select the respondents. Precision investigations were ensured by the check lists and methods specially prepared for the purpose of this study. Information was collected personally by the researchers in a pre-tested, reliable and valid interview schedule containing the features of micro climate indicators. The data such collected were arranged, tabulated and analyzed so as to arrive at useful conclusion and interpretation. Flood was recognized as the most important factor affecting livestock in all the three districts. The micro-climate factors affecting livestock production had no significant mean difference among the districts in Assam. The major micro-climatic factors affecting livestock production in order of their impact were Flood (6.09%), Less availability of grass (5.82%), Parasitic infestation (5.72%), Education (5.66%) and Draught (5.56%). Flood had significant affect and the five critical indicators of micro-climate could express as high as 35.00 per cent of the variations in livestock production, although there was a significant difference as far as R value (1.75) was concerned.*

Key words: *Micro-climate; Indicators; Livestock production; Flood;*

Livestock systems in developing countries are changing rapidly in response to a variety of drivers including climate. Globally, human population is expected to increase to 9.2 billion by 2050. Rapid urbanization is expected to continue in developing countries, and the global demand for livestock products will continue to increase significantly in the coming decades (*Steinfeld et al., 2009*).Climate change is seen as a major threat to the survival of many species, ecosystems and the sustainability of livestock production in many parts of the world. Global climate change is expected to alter temperature, precipitation, atmospheric carbon dioxide levels, and water availability in ways that will affect the productivity of crop and livestock systems. For livestock systems, climate change could affect the costs and returns of production by altering the thermal environment of animals thereby affecting animal health, reproduction, and production efficiency by which livestock convert feed into final products (especially meat and milk). Also environmental stress reduces the productivity and health of livestock resulting in significant economic losses (*Rosenzweig et al., 2008*). The relationship between the livestock sector and climate change is likely to influence the overall nature of the approach to adaptation within the livestock sector. Consequently, adaptation and mitigation of detrimental effects of extreme climates like housing, feeding and breeding management have played a major role in combating the climatic impact in livestock production. Hence formulating mitigation strategies incorporating all requirements of livestock is the need of the hour to optimize productivity in livestock farms for sustainability, well being and progress (*Gura, 2008; Thrornton et al., 2015*). Therefore, a study was planned to find out the factors of micro-climate change and their influence in bringing change in the livestock production system in Assam

METHODOLOGY

In order to obtain an idea of affect of floods in the entire stress of Brahmaputra valley in Assam, three districts, namely Dibrugarh district in Upper Assam, Kamrup district in Middle Assam and Bongaigaon district in Lower Assam were selected for the purpose of the study. From each district again one development block was selected depending upon the regularity of supply of livestock produce and products to the markets. From each of the blocks again, 100 progressive farmers each were randomly selected by enlisting their names first and then having them selected through a lottery system to make the total sample size 300 from the registered villages only.

The variable micro climate change and influence on livestock production were measured on the basis of a check list containing 24 items especially designed for this purpose. A test-retest method was used to measure the reliability coefficient for the check list. The correlation coefficient obtained was 0.91, which was found to be highly significant, thereby indicating that the instrument was stable and consistent.

Content validation process was employed to ascertain the validity of the schedule on the grounds of sensitive collection of the listed items and their judicious placement in the check list. The respondents were asked to put a check mark against the statements corresponding to the agreement in the very much, much and somewhat degrees with their corresponding values of 3, 2 and 1 only. Therefore, the minimum and maximum obtainable scores for each of the respondents were 0 and 72 respectively.

RESULTS AND DISCUSSION

It could be seen from Table 1 that the average degrees of micro-climate affecting animal husbandry development were 30.75, 30.27, 30.51 and 30.62 with their respective standard deviation as 4.24, 4.38, 4.69 and 4.52 and ranges from 14-60, 16-55, 14-58 and 14-60 in the districts of Kamrup, Dibrugarh, Bongaigoa and the pooled sample respectively. From this table it was found that most of the farmers realizing factors that affected livestock production belonged to medium group level, but in a degree which fell below the natural average. They were also of the opinion that these factors were responsible for affecting the quality and quantity of livestock products and produces. These might have been an outcome of slow changes taking place in the micro climate of the selected districts and for some those might have still remained below their perceptible levels. Similar kind of findings was also reported by *Allaby (2001)* and *IPCC (2007)* however, based on the mean and standard deviation their distribution as low, medium and high groups were 18.33 per cent, 66.00 per cent and 15.67 per cent of the districts respectively. The mean difference of the respondents in different districts affecting livestock production was non significant. Similar views were also reported by *Pearson (2006), Thronton (2010)* when the realization was in slow nature.

A Table 2 represented the scores of the respondents on different indicators affecting livestock production out of the total 100 per cent. The five very important items identified by the respondents were Flood (6.09%), Less availability of grass (5.82%), Parasitic infestation (5.72%), Education (5.66%) and Draught (5.56%). Flood affecting livestock production in all the three districts, Kamrup (5.78%), Dibrugarh (6.13%), and Bongaigaon (6.37%) with highest proportion was justified as it was the recurring problems in the state. Further it implied the fact that Bongaigaon was the most flood affected district under the study. This might have been due to the gio climatic situation of lower MSL of the area. Less availability of grass was regarded as second most important indicator by the districts of Kamrup (5.72%) and Dibrugarh (5.92%) but in Bongaigaon district Parasitic infestation (6.04%) was the second most important indicator to influence livestock production signalling a geo-climatic root to the affect. All the

Table 1. Distribution of respondents on realization of important factors of micro climate affecting livestock production in different districts of Assam

Variable	District	Low	Medium	High	Mean	SD	Range	F-Value
Factors	Kamrup (n=100)	17(17.00)	64(64.00)	19(19.00)	30.75	4.24	14-60	
Affecting	Dibrugarh (n=100)	21(21.00)	58(58.00)	21(21.00)	30.27	4.38	16-55	0.46^{NS}
Livestock	Bongaigaon (n=100)	14(14.00)	66(66.00)	20(20.00)	30.51	4.69	14-58	
production	Overall pooled (n=300)	55(18.33)	198(66.00)	47(15.67)	30.62	4.52	14-60	

Table 2. Respondents' agreement on relative importance of climate indicators affecting animal husbandry

	Kamrup		Dibrugarh		Bongaigaon		Overall
Indicators	No.	%	No.	%	No.	%	%
High temperature	239	5.21	242	5.49	231	5.42	5.37
Low rainfall	235	5.13	203	4.61	220	5.15	4.96
Less availability of grass	262	5.72	261	5.92	250	5.86	5.82
Parasitic infestation	260	5.67	247	5.60	258	6.04	5.72
Flood	265	5.78	270	6.13	272	6.37	6.09
Soil erosion	137	2.99	170	3.86	145	3.40	3.41
More dust in air	113	2.47	103	2.34	94	2.20	2.34
Pollution in water	185	4.04	160	3.63	135	3.16	3.62
Land used for infrastructure	238	5.19	213	4.83	190	4.45	4.83
Job in polluting public/private sector	145	3.16	140	3.18	142	3.33	3.22
More vehicular traffic	113	2.47	92	2.09	75	1.76	2.11
Conflicting neighbours	224	4.89	223	5.06	220	5.15	5.03
Competitive general atmosphere	139	3.03	130	2.95	122	2.86	2.95
Change in traditional rituals and festivals	123	2.68	125	2.84	120	2.81	2.78
Concern over visiting dignitaries	152	3.32	140	3.18	125	2.93	3.15
Doubtful social standings	212	4.63	211	4.79	202	4.73	4.71
Difficult education	245	5.35	250	5.67	255	5.97	5.66
Draught	253	5.52	230	5.22	245	5.74	5.56
Development works	133	2.90	130	2.95	119	2.79	2.88
Stringent rules and regulations	105	2.29	60	1.36	70	1.64	1.77
Less per capita availability of land	242	5.28	232	5.26	210	4.92	5.16
Increasing cost of Animal Husbandry	238	5.19	240	5.45	237	5.52	5.39
Lack of technical people in field	170	3.71	175	3.97	162	3.80	3.82
No departmental support	155	3.38	160	3.63	170	3.98	3.66
Total	4583	100.00	4407	100.00	4268	100.00	100.00

Table 3. Régression analysis of live stock production on critical indicators of micro-climate

Independent Variables	Regression coefficient (b value)	"t" value for b
Flood	0.15*	2.59
Less availability of green grass	0.08	1.39
Parasitic infestation	-0.05	-0.87
Education of family members	-0.06	-1.01
Draught condition	0.02	0.32
	R^2=0.35,	F' value for R= 1.75*

important indicators directly and indirectly could be treated as the fall out of the floods in the districts under study. What might be received as a proper signal supporting the results were the findings of *Rahman (2014)* and *Hansen (2004)* where it was mentioned that flood was found to be a recurrent phenomenon in the study areas giving rise of spiral other problems.

Once the critical indicators were identified, an attempt was made to go for assessing the impact of the climate indicators on livestock production. It could be seen from the Table 3 that flood was the only indicator having significant impact on livestock production. In fact, affect of floods every year in the state has remained a perennial problem, people have learnt to live with it and also they make their own contingency plan for get their difficulties lessened as far as practicable. As such they also take care of their livestock which is one of their movable assets. But even after that to get rescue from the impact of floods is not possible and with much degree of certainly the livestock production suffer to a large

extent having permanent affect. The findings of *Rahman (2014)* and *Hansen (2004)* could be drawn to this context also in order to justify the significant impact having some permanency. The R^2 value was found to be 35.00 per cent. Only the five critical indicators expressing as high as 35.00 per cent of the total variation in livestock production looked like impressive and R=1.75* was also justifiable as all these indicators worked in altogether in different lines.

CONCLUSION

The micro-climate indicators affecting livestock production realized a lower to natural average with no significant mean difference among the districts in Lower, middle and upper Assam although the flood scenario looked different and expected to impact differently in different stresses of the state. Flood was recognized as the most important factor affecting livestock. The major micro-climatic indicators affecting livestock production in order of their impact were Flood (6.09%), Less availability of grass (5.82%), Parasitic infestation (5.72%), Education (5.66%) and Draught (5.56%). In regression analysis flood was found to have significant affect on livestock production and the five critical indicators of micro-climate could express as high as 35.00 per cent of the variations in livestock production, although there was a significant difference as far as R value (1.75*) was concerned.

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