A Diagnostic Study on Livestock Production System in Eastern Region of India

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ABSTRACT

A study was conducted in seven East Indian states, viz. Bihar, West Bengal, Odisha, Chhattisgarh, Jharkhand, Assam and eastern UP, to understand the livestock production and management systems for making strategies for the improving livestock production scenario in the region. The data were collected from two districts from each state and from each district twenty-five (25) farmers were selected. Information was collected farmer‘s socio-economic status like, family size, education, land holding, animal status (types of animals, strength, production), feeding system (feeds and fodder availability, sources of feed, feeding methods), health status (types of diseases, symptoms and vaccination mode), breeding methods, assistance needs (subsidy, loan, animals, training) and satisfaction with animal and production aspects through pretested survey instrument specially developed for the purpose. It was found that family size varied from 5.31 (West Bengal) to 9.48 (Eastern UP) and most head of families were educated having more than 0.5ha agriculture land. Majority (70.86%) of the farmers were not able to spare agriculture land for fodder production. A large number of farmers in Assam, Chhattisgarh and Jharkhand had non-descript (ND) cows. However, majority of farmers surveyed in Bihar and eastern UP had crossbred (CB) cow. Average milk production (kg/d), lactation length (m) and dry period (m) amongst animals of eastern region for ND cows 2.48, 7.71, and 6.66, for CB cows 7.20, 9.08, and 3.85 and for buffaloes 5.54, 8.56, and 6.93, respectively. The farmers followed their own feeding practices and offered self-produced feeds. Majority of the farmers of the region reported Foot & Mouth Disease (FMD) as a major concern and were not satisfied with their animals and production. On the basis of this study it can be concluded that livestock farmers of eastern region of India are in great need of improved breeds, they also require capacity building and training on balance feeding and general management practices for better and sustainable animal production.

Key words: Livestock; Population; Production; Feeds & feeding; Health care; Breeding

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Introduction

The eastern region of India has vast resources of livestock and poultry, mostly of indigenous type, which play a vital role in improving the socio-economic conditions of the rural masses. The region comprises of 176 districts spread over seven states (Eastern UP, Bihar, Jharkhand, Chhattisgarh, Odisha, West Bengal and Assam) and five agro-ecological zones (Eastern Himalaya, Lower & Middle Gangetic Plains, Eastern Plateau and Hills and East Coast Plains & Hills region) of the country. The region has high density of cattle population, 22.67 per 100 human against the national average of 19.25 (Anon, 2003). The region is also having large numbers of total bovine population comprising of cattle (81.10 million), buffalo (19.32 million) and small ruminants (57.10 million). The contribution to milk production from eastern region is 20.18% with per capita availability of around 158 g/ head/ day against the national average of 281g /head/ d (DAHD&F, 2012). Animal husbandry sector contributes as high as 33.7% of state Agricultural GDP in Bihar and as low as 10% in Odisha (Dey *et al*.2012; Singh *et al* 2009; Singh *et al* 2012b). Moreover, the region has interregional disparities in respect of livestock products, productivity and per capita availability as animal preferences and management practices vary in different parts of the region. Improvements in productivity, quality and value addition in livestock sector have to be achieved under conditions of diminishing per capita land and water resources, expanding biotic and abiotic stresses and fast changing consumer and market preferences for livestock products through integrated and systemic approach. At the same time scanty and scattered information is available on livestock management and productivity system in eastern region of India. Considering above, a study was conducted to collect the information on existing livestock production and management systems to enable policy maker to make strategies for further improvement of livestock sector in the region.

Materials and Methods

To collect desired information, a survey was conducted in seven East Indian states during the year 2011-12. From each state, two districts were selected (Assam: Barpeta, Hailakandi; Bihar: Buxar, Patna; Chhattisgarh: Durg, Rajnandgaon; Eastern UP: Azamgarh, Ballia; Jharkhand: Dumka, Ranchi; Odisha: Keonjhar, Sambalpur; West Bengal: Burdwan, Hooghly) based on strong crop-livestock linkages. From each district, five villages were selected and from each village five farmers were selected randomly (twenty five farmers from each district) comprising of different categories of farmers from landless to large (Table-1). The primary information was collected on pretested questionnaires through personal interview on socio-economic characteristics of livestock owners (family size, education, land holding), animal holding size (types of animals, strength), production status (milk production), feeding system (feeds and fodder availability, sources of feed, feeding

methods), health care practices (incidence of diseases and health care practices), breeding methods, input requirement (subsidy, loan, animals, training) and response of farmers towards animal husbandry. The data were analyzed statistically.

Results and Discussions

Socio-economic characteristics of livestock owner

The average family size of livestock owner varied from 5.31 to 9.48 with average value of 7.01 for the region. The largest family size was recorded in Eastern UP followed by Bihar and lowest in West Bengal. The larger family size may be linked with comparatively large land holding and lower educational level in Eastern UP and Bihar. Lahiri-Dutt (2012) reported the average family size of Madhuvani (6.2) and East Champaran (9.75) districts of Bihar and Malda (5.4) and Cooch Bihar (6.0) districts of West Bengal, which are in agreement with the present study. Similarly, family size in Jharkhand was reported by Singh *et al*. (2012a) varying from 4.7 to 5.9. The majority of head of family was educated (86%) with highest value in Jharkhand followed by Assam, West Bengal and lowest value in Eastern UP. However, in respect of level of education, the livestock owners belonging to Eastern UP had highest values (30%) at university level. In Assam, Jharkhand and West Bengal, the education level of farmers at university level was lower (6-8%) due to poor socio-economic conditions of .livestock owners (Table 2). The education level of farmers of Bihar (91.82%) was reported by Singh *et al*. (2011) and in Jharkhand (56.1%) by Singh *et al*. (2012a). So far as land holding is concerned, it is observed that 46% of livestock owners in West Bengal were landless followed by Jharkhand (18%) and Eastern UP (10%). Only 2, 4 and 4% of livestock owners in Assam, Odisha and Chhattisgarh, respectively, were landless. However, 78% farmers in Odisha, 74% farmers in Bihar and 70% farmers in Eastern UP owned more than 0.5 ha of land. Percentage of livestock owners having more than 0.5 ha land was observed low in West Bengal (45.5%) followed by Jharkhand (44.0%). Per household land holding in Bihar (0.49 ha) was reported by Singh *et al*. (2011) and per capita land availability in Jharkhand (0.325 ha) by Singh *et al*. (2012a). The average land holding of Assam, Bihar, Chhattisgarh, UP, Jharkhand, Odisha and West Bengal has been reported as 1.10, 0.39, 1.36, 0.75, 1.17, 1.04 and 0.77, respectively (Agriculture Statistics at a Glance, 2012)

Limited green fodder production is a major constraint for dairy development in eastern region. High population density and thereby priority on food crop production is the main reason for farmers for not allocating land for green fodder production. It is evident from the Table 2, that 70% livestock owners in the region were either landless or did not spare land for fodder production. However, in West Bengal and Chhattisgarh the condition is much alarming as 100 and 96% of the surveyed livestock owners did not cultivate any green fodder. Land allocation to cultivate green

fodder crops in India as a whole is limited and has hardly exceeded 5% of gross cropped area (GOI, 2009).

Livestock holding size

Livestock holding size depends on land availability, irrigation facilities available and crop production. From the Table 3, it is observed that more than 50% livestock owners had non- descript cattle. Only 30% households had crossbred cattle, 29% had buffalo and 32% had goat. About 18% households reared both cattle and buffalo. State wise findings depict that majority of farmers of Assam (64%), Chhattisgarh (63.9%) and Jharkhand (64%) had non-descript (ND) cattle. However, majority of farmers of Bihar (62%) and Eastern UP (46%) had crossbred (CB) cow. It is also reported that 3 and 55.9% households in Assam, 3.6 and 31.5% in Bihar, 2.0 and 55.70% in Chhattisgarh, 1.2 and 50.9% households in Jharkhand, 3.5 and 45.3% in Odisha, 3.7 and 33.7% in UP and 5.2 and 37.8% households in West Bengal possessed crossbred and indigenous cattle, respectively (NSSO, 2006), Buffalo is most preferred animal by the farmers of Eastern UP (60%) followed by Jharkhand (42%), Bihar (40%) and Chhattisgarh (30%). Buffalo holding size in Assam, Bihar, Chhattisgarh, Jharkhand, Odisha, UP and West Bengal was reported at 2.7, 20.6, 13.8, 7.1, 2.4, 44.3 and 2.3% of households, respectively (NSSO, 2006). Maximum population of goat per family was recorded with the farmers of Odisha (8.58 nos.) followed by West Bengal (3.77 nos.). Out of total livestock numbers, goat constitutes 30.93% of total livestock population in eastern region. However, goat constitutes 25.01, 33.6, 19.22, 36.4, 20.56, 40.27 and 30.92 % of total livestock population in Assam, Bihar, Chhattisgarh, Jharkhand, Odisha, Eastern UP and West Bengal, respectively (Bhatt *et al*, 2011). A good number of respondents of Eastern UP (48%) and Jharkhand (32%) had both cow and buffalo. The number of milking cow and buffalo of total stock was recorded 39.92 and 44.86%, respectively at farmer's house. A good numbers of respondent of West Bengal were having ND cow (45.5%) and CB cow (33.0%) and majority (46%) of them were landless, which was similar to the finding of De Jong (1996) who reported distribution of dairy animals and milk production among landless producer in India was 22 and 23%, respectively.

So far as holding size is concerned, average holding size of livestock (small and large ruminants only) per household was recorded at 6.89 in eastern region, out of which cattle holding size was larger 37.50 percent (Table 3). State wise analysis depicts that Odisha had highest livestock holding size per household (12.10) followed by Chhattisgarh (11.47). The lowest holding size was recorded in Bihar (2.60). So far as percent composition of livestock is concerned, cattle occupied the highest composition (37.44%) followed by goat (35.70%). State wise analysis of livestock composition reveals that cattle occupied the highest composition in all the states except Chhattisgarh (36.53%). With respect to livestock composition (%), buffalo was observed the most preferred dairy animal in Chhattisgarh (63.47%), Eastern UP (33.16%) and Bihar (30.77%). Goat

has occupied an important position in all states of the region as it is the preferred livestock by landless and marginal households. Among total large and small ruminants, goat occupied the highest composition in Odisha (70.91%) and West Bengal (57.21%). In all most all states, goat was observed a preferred animal except Chhattisgarh and Bihar.

Production status

Milk

From the Table 3, it is further revealed that in eastern region about 40% cow and 44% buffalo are in production. State wise data reveals that highest percentage of dairy animals in production was observed in Eastern UP (50% in cow and 59% in buffalo) followed by Jharkhand (55% for cow and 44% in buffalo) indicating the better management practices and nutritional status of animals adopted by the farmers. Lowest percentage of dairy animals in production was observed in Odisha (30% in cow and 27% in buffalo) followed by in Assam (32% in cow and 20% in buffalo). Halder (2000) reported that 65.2% of breedable cattle in West Bengal were in production.

Animal production performances in the eastern region varied amongst different states within the region. Average milk production (kg/d), lactation length (month) and dry period (month) amongst animals of eastern region were reported by farmers for Non-descript (ND) cow (2.48, 7.71, 6.66), crossbred (CB) cow (7.20, 9.08, 3.85) and buffalo (5.54, 8.56, 6.93), respectively (Table 4). Daily milk production of non-descript cow in the region varied from 1.56 to 4.12 l/ d with highest productivity in Eastern UP (4.12 l/ d) and Bihar (3.58 l/ d) which indicated the higher nutritional status of the animal. Productivity in remaining states varied between 1.63 to 2.49 l/ d. For crossbred cows, the highest productivity was recorded in Bihar (9.12 l/ d) followed by West Bengal (8.41 l/ d) and lowest in Chhattisgarh (3 l/ d), however, the general productivity in the region varied from 7.3 to 9.12 l/ d. The productivity of buffalo varied from 3.87 to 7.16 l/ d with highest value (7.16 l/ d) in Bihar. In West Bengal, buffalo is reared as working animal whereas in Easter UP, Bihar and Jharkhand buffalo milk is preferred due to higher fat content in milk. Almost similar type of observations was recorded for milk production in non-descript cow, crossbred cow and buffalo in eastern region by Singh *et al*. 2005; Roy and Saha, 2003.

Meat

The meat productivity of goat depends on the body weight at slaughter. From the table 3, it is observed that slaughtering age and body weight differed in different states. The goats were sold at average age of 11.73 months having body weight of 12.75 kg in the region and almost uniform values were observed in all the states in respect of slaughtering age and weight (8-10 months age and 10-13 kg body weight) with little variation in Jharkhand where both values were higher (16

months age and 17 kg body weight). Dey *et al*. (2007) reported the body weight of adult Bengal breed of male goat as 15 kg under field condition of Bihar.

Feeding practices

The feeding system of dairy animals varied in different states within the region. The composition of feed varied depending on the availability of crop residues and byproducts, socio-economic conditions of farmers and availability of common grazing land (Table 5). On an average, a dairy animal was offered 6 kg dry roughage, 5 kg green fodder and 1.6 kg concentrate feed in the region, though amount of feed differed in different states depending on production level and economic conditions of farmers. The dairy farmers of North Bihar were fed on average dry roughages 8.85 kg, green fodder 5.33kg and concentrate feed 0.77kg per head per day (Keshava and Mandape, 2001). Rice straw was found most common dry roughage in all states except Eastern UP and Bihar where wheat straw is preferred. Grazing is practiced in all most all states by the resource poor farmers. In Chhattisgarh 100% surveyed households practiced grazing of animals due to abundant availability of common property resources and nearby forest area. As a result, farmers did not cultivate green fodder. In other states more than 60% households practiced grazing except Bihar and Eastern UP where rice-wheat crop was prevalent with abundant availability of crop residues.

So far as method of feeding is concerned, separate feeding of dry & green roughage and concentrates was practiced by farmers of Odisha (94%), Assam (86%) and West Bengal (74%). In states like Chhattisgarh (100%), Eastern UP (90%), Bihar (94%) and Jharkhand (46%), mixed feeding system was followed where dry & green fodder was mixed with concentrates and water. Combination of dry and green fodder together was fed by the farmers of West Bengal (26%), Jharkhand (18%), Assam (14%) and Eastern UP (10%).

Majority of the farmers (56-90%) of eastern region used to feed self-produced dry roughages (rice and/ or wheat straw) and only 3-30% farmers procured dry roughages from other farmers in the same village or from markets in seven states studied. Similarly, 72-98% farmers cultivated green fodder sparing their own land seasonally. In Chhattisgarh, no household surveyed cultivated green fodder as it was collected from common property resources or the animals were kept on grazing. However, very few households (5%) in the region procured green fodder for the feeding of dairy animals. So far as feeding of concentrate feed is concerned, only 16-50% farmers purchased balanced feed in different states. But majority of households (53%) prepared concentrate mixture at home by using maize/ wheat/ rice in grain or powdered form , wheat and/or rice bran, mustard and linseed cake, pulses chunnies etc. resulting imbalances of nutrients as in most of the cases proper formulation was not followed. Almost similar trend of consumption in adult buffalo during milking and dry period in India for green fodder, dry-roughages and concentrate feed were

reported by Dikshit and Birthal, 2010. This is an indication of acute shortage of concentrates and green fodder, resulting in animals being underfed. Ramachandra *et al*. 2007 also reported supply of feed has always remained short of normative requirements which restricting realization of the true production potential of livestock under field conditions. Thorpe *et* al. 2007 also reported problem of insufficient fodder and its poor nutritive value in Indo-Gangetic plain region of India. Moreover, majority of farmers were not produced fodder due to small land holding, hence, most of them collected fodder from nearby community land. In India, 15 per cent land to geographical area is under common property resources (Annon, 1998). Apart from this, farmers were having less interest on fodder production and balance feeding due to lack of knowledge. Similar observations were also recorded among the farmers of Belgaum district of Karnataka (Pushpa, 2006).

Disease incidence, health care management, breeding method and input needs

Incidence of diseases is a major constraint in livestock production which not only reduces the productivity but also causes economic loss. Only 54% households in the region followed the vaccination schedule with some variations among the states (Table 6). While in Chhattisgarh all the households (100%) opted for vaccination;, West Bengal had the lowest (20%). Among the diseases, incidence of several bacterial (HS, BQ, Mastitis, Fever etc.), viral (FMD) and some non-specific diseases like fever, diarrhea, reproductive problems; respiratory problems (2-20%) were reported in different states with variable incidences. The infectious diseases were reported by 72% farmers of the region. Mitra *et* al. (1995) also reported a serious threat of infectious diseases like FMD, HS and BQ in animals of the region. Hence, proper support is required for vaccination against some epidemic viral and bacterial diseases for their prevention and control.

In respect of breeding methods, majority of the households (61%) followed natural breeding methods; however, few household followed both the methods for different types of livestock, e.g. in case of buffalo, mostly natural breeding method was followed. In states like Bihar (92% households) and Eastern UP (64% households) artificial insemination technique was followed. Low conception rate, distantly located A.I. centers, declining use of male calves in farming system and higher incidence of reproductive diseases are the main reasons for the farmers not to follow the A.I. technique.

So far as satisfaction of farmers on level of production of dairy animals is concerned, majority of the farmers (51%) in the region were not satisfied with their breed of animals and production level except Eastern UP and Bihar where mainly crossbred cattle or buffalo were maintained with comparatively higher productivity. In remaining states mainly low producing non-descript cattle and buffalo dominated (Table 6). To overcome the constraints of livestock production, input needs of the farmers were also recorded. Among the entire input requirements,

subsidy on procurement of feed, animals etc. occupied the highest position (45%) followed by loan for purchase of good quality animals (30%) in all the states except Chhattisgarh. Training and high producing crossbred cattle as input were also the requirement of 19 and 33% farmers, mostly big farmers, in the region, respectively.

Conclusion

It can be concluded from the study that livestock farmers of eastern region of India are in great need of improved breed matching their household resources and capacity building for balance feeding and general management practices for achieving higher productivity as well as economic returns. Keeping in view the substantial area in the region under rain-fed agro-ecosystem with occurrence of frequent natural disasters like floods and droughts, the focus and direction of agricultural development programmes must be oriented towards multidisciplinary approach in improving the farm productivity in general and livelihood improvement in particular.

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Table 1: Details of Sample states, districts and villages selected

S.N.	State	Selected districts	Number of farmers selected for detailed study
1	Assam	Barpeta	25
		Hailakandi	25
2	Bihar	Buxar,	25
		Patna	25
3	Chhattisgarh	Durg,	25
		Rajnandgaon	25
4	East Uttar Pradesh	Azamgarh	25
		Ballia	25
5	Jharkhand	Dumka	25
		Ranchi	25
6	Odisha	Keonjhar	25
		Sambalpur	25
7	West Bengal	Burdwan	25
		Hooghly	25

Table 2: Socio-economic characteristics of farmers

State	Av. family size (No.)	Education level of head of the family (%)		% Households having crop land			% Households having fodder land		
		Uneducated	Educated	Nil	>0.5 ha	<0.5 ha	Nil	>0.1 ha	<0.1 ha
Assam	6.64	6.00	94.00	2.00	36.00	62.00	76.00	2.00	22.00
Bihar	8.56	10.00	90.00	8.00	18.00	74.00	30.00	20.00	50.00
Chhattisgarh	5.93	14.00	86.00	4.00	28.00	68.00	96.00	0.00	4.00
Eastern UP	9.48	30.00	70.00	10.00	20.00	70.00	42.00	38.00	20.00
Jharkhand	6.34	6.00	94.00	18.00	44.00	38.00	86.00	10.00	4.00
Odisha	6.78	23.00	77.00	4.00	18.00	78.00	66.00	0.00	34.00
West Bengal	5.31	8.00	92.00	46.00	45.50	8.50	100.00	0.00	0.00
Av. Eastern region	7.01	14.00	86.00	13.14	29.92	56.93	70.86	10.00	19.14

Table 3: Livestock holding size

State	% Household having animal					Av. population per household (No)				
	ND Cow	CB Cow	Buffalo	Cow & Buffalo	Goat	Cow		Buffalo		Goat
						Total	In Milk	Total	In Milk	
Assam	64.0	22.0	20.0	16.0	46.0	3.54	1.12	0.60	0.12	2.64
Bihar	12.0	62.0	40.0	16.0	4.0	1.56	0.70	0.80	0.36	0.24
Chhattisgarh	63.9	4.1	30.0	4.1	0.0	4.19	1.72	7.28	3.32	0.00
Eastern UP	52.0	46.0	60.0	48.0	16.0	1.84	0.92	1.32	0.78	0.82
Jharkhand	64.0	34.0	42.0	32.0	34.0	2.34	1.28	1.22	0.54	1.16
Odisha	50.0	18.0	6.0	4.0	64.0	3.22	0.96	0.30	0.08	8.58
West Bengal	45.5	33.0	4.5	4.5	63.0	1.37	0.53	1.45	0.58	3.77
Av. Eastern region	50.2	31.3	28.9	17.8	32.4	2.58	1.03	1.85	0.83	2.46

Table 4: Animal production status

State	Production status										
	ND Cow			CB Cow			Buffalo			Goat	
	MP	LL	DP	MP	LL	DP	MP	LL	DP	SA	SW
Assam	1.95	8.02	6.50	7.86	8.05	3.36	3.87	9.31	5.69	8.42	9.63
Bihar	3.58	7.66	4.83	9.12	8.49	4.10	7.16	7.57	5.39	9.50	12.50
Chhattisgarh	1.63	6.77	14.28	3.00	10.50	7.50	4.80	9.16	14.23	--	--
Eastern UP	4.12	10.90	5.05	7.30	10.80	3.75	6.78	10.22	5.06	14.37	13.37
Jharkhand	2.06	7.64	6.18	7.66	9.43	2.56	6.16	9.12	5.25	16.23	17.13
Odisha	2.49	6.42	5.34	7.08	8.00	3.17	4.50	6.00	6.00	10.78	12.70
West Bengal	1.56	6.60	4.47	8.41	8.32	2.55	--	--	--	11.10	11.20
Av. Eastern region	2.48	7.71	6.66	7.20	9.08	3.85	5.54	8.56	6.93	11.73	12.75

MP: Milk production/d/head (kg); LL: Lactation length (month); DP: Dry period (month); SA: Slaughter age (month); SW: Slaughter weight (kg)

Table 5: Feeding system in dairy animal and sources of feed

State	Feed offered (kg/d/h)			Graz. (%)	Feeding method (%)			Source of feed (%)					
	Dry	Green	Conc		Ind	Dry + Green	Mix	Dry Roughage		Green Fodder		Concentrate	
								Self	Pur	Self	Pur	Self	Pur
Assam	6.69	10.25	1.66	80	86	14	0	70	20	72	22	54	36
Bihar	6.38	8.11	1.81	18	00	6	94	90	6	98	2	46	26
Chhattisgarh	5.12	--	1.71	100	0	0	100	56	26	0	0	50	50
Eastern UP	7.35	5.93	2.21	32	0	10	90	78	10	96	4	18	20
Jharkhand	7.69	3.86	1.25	63	36	18	46	56	30	98	0	50	48
Odisha	4.73	6.68	1.73	86	94	0	6	90	4	90	6	76	16
West Bengal	5.00	2.62	0.78	65	74	26	0	59	3	96	2	74	22
Av. Eastern region	6.14	5.35	1.59	63	41	11	48	71	14	93	5	53	31

Ind: Individual; Conc: Concentrate; Pur: Purchased

Table 6: Animal health care system, breeding methods and needs of inputs

State	Major diseases (%)			% Farmer follow-ed Vacc.	Breeding method followed (%)		Farmer Satisfac-tion with stock / Prod. %	% Farmer need assistance				
	Viral	Bact	Other		Nat.	AI		Sub.	Loan	AI	Tr	CB
Assam	82	12	14	40	84	30	28	42	38	26	18	52
Bihar	52	50	20	48	8	92	82	28	36	34	22	2
Chhattisgarh	100	100	0	100	100	0	34	0	10	0	35	32
Eastern UP	76	56	4	62	46	64	86	14	20	6	0	10
Jharkhand	96	58	0	64	52	54	35	68	16	32	16	62
Odisha	24	4	4	44	72	30	16	84	12	10	40	70
West Bengal	75	16	2	20	62	45	61	82	80	35	0	0
Av. Eastern region	72	42	6	54	61	45	49	45	30	20	19	33

AI: Artificial insemination; Bact: Bacterial; Sub: Subsidy; Tr: Training; CB: Crossbred