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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 to understand the livestock production and management systems for making strategies for the improving livestock production. The data were collected from 2 districts from each state and from each district 25 farmers, on socio-economic status of farmers, animal status, feeding system, health status, breeding methods, assistance needs etc. Family size varied from 5.31 (West Bengal) to 9.48 (eastern Uttar Pradesh) and mostly heads of families were educated having more than 0.5 ha of agriculture land. The majority (70.86%) of the farmers were not able to spare agriculture land for fodder production. A large number of farmers in Asom, Chhattisgarh and Jharkhand had non-descript cows. However, the majority of farmers surveyed in Bihar and eastern Uttar Pradesh had crossbred cow. Average milk production (kg/d), lactation length (m) and dry period (m) amongst animals of eastern region for non-descripts cows 2.48, 7.71, and 6.66, for crossbred cows 7.20, 9.08, and 3.85 and for buffaloes 5.54, 8.56, and 6.93, respectively. The majority of the farmers of the region reported foot-and-mouth disease (FMD) as a major concern and were not satisfied with their animals and production. It can be concluded that livestock farmers of the region are in great need of improved breeds, capacity building on balance feeding and general management practices for better and sustainable animal production.

The eastern region of India comprises 176 districts spread over eastern Uttar Pradeh, Bihar, Jharkhand, Chhattisgarh, Odisha, West Bengal and Asom, and five agro-ecological zones (Eastern Himalayas, Lower and Middle Gangetic Plains, Eastern Plateau and Hills, and East Coast Plains and 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); and having large numbers of total bovine population comprising 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 caput 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). 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.

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MATERIALS AND METHODS

A survey was conducted in 7 East Indian states during 2011–12 to collect desired information. From each state, 2 districts were selected (Asom: Barpeta, Hailakandi; Bihar: Buxar, Patna; Chhattisgarh: Durg, Rajnandgaon; Eastern UP: Azamgarh, Balia; Jharkhand: Dumka, Ranchi; Odisha: Keonjhar, Sambalpur; West Bengal: Burdwan, Hooghly) based on strong crop-livestock linkages. From each district, 5 villages were selected and from each village 5 farmers were selected randomly (25 farmers from each district) comprising different categories of farmers from landless to large. The primary information was collected on pre-tested 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 DISCUSSION

Socio-economic characteristics of livestock owner

The average family size of livestock owner is 7.01 for the region. The largest family size was recorded in eastern Uttar Pradesh 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 Uttar Pradesh and Bihar. The average family size reported by Lahiri-Dutt (2012) is 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 with highest value in Jharkhand followed by Asom, West Bengal and lowest value in eastern UP. However, in respect of level of education, the livestock owners belonging to eastern Uttar Pradesh had highest values, at university level. In Asom, Jharkhand and West Bengal, the education level of farmers at university level was lower due to poor socio-economic conditions of livestock owners (Table 1). The education level of farmers of Bihar and Jharkhand was reported at 91.82% and 56.1% respectively by Singh *et al*. (2011), Singh *et al*. (2012a). As far as land holding is concerned, 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 Asom, 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 caput land availability in Jharkhand (0.325 ha) by Singh *et al*. (2012a). The average land holding of Asom, Bihar, Chhattisgarh, Uttar Pradesh, 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 (Anon 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 1 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. More than 50% livestock owners had non- descript cattle (Table 2). Only 30% households had crossbred cattle, 29% buffalo and 32% goat. About 18% households reared both cattle and buffalo. State wise findings depict that majority of farmers of Asom (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 cow. It is also reported that 3 and 55.9% households in Asom, 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 followed by Jharkhand, Bihar and Chhattisgarh. Buffalo holding size in Asom, Bihar, Chhattisgarh, Jharkhand, Odisha, Uttar Pradesh 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 followed by West Bengal. 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 Asom, Bihar, Chhattisgarh, Jharkhand, Odisha,

Table 1. 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
Asom	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 Uttar Pradesh	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 2. Livestock holding size

States	% Household having animal					Av. population per household (No)				
	ND Cow	CB Cow	Buffalo	Cow and Buffalo	Goat	Cow		Buffalo		Goat
						Total	In Milk	Total	In Milk	
Asom	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 Uttar Pradesh	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

ND, Non-descript; CB, crossbred.

Table 3. Animal production status

States	Production status										
	ND Cow			CB Cow			Buffalo			Goat	
	MP	LL	DP	MP	LL	DP	MP	LL	DP	SA	SW
Asom	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 Uttar Pradesh	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)

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 farmers house. A good numbers of respondent of West Bengal were having non-descript cow (45.5%) and crossbred 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% (Table 2). State-wise analysis depicts that Odisha had highest livestock holding size per household followed by Chhattisgarh. The lowest holding size was recorded in Bihar. So far as per cent composition of livestock is concerned, cattle occupied the highest composition followed by goat. State-wise analysis of livestock composition reveals that cattle occupied the highest composition in all the states except Chhattisgarh. With respect to livestock composition (%), buffalo was observed the most preferred dairy animal in Chhattisgarh, followed by eastern Uttar Pradesh and Bihar. 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 and West Bengal. In almost all states, goat was observed a preferred animal except Chhattisgarh and Bihar.

Production status

Milk: In eastern region about 40% cow and 44% buffalo are in production (Table 2). 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 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 Asom. 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 as reported by farmers for non-descript (ND) cow, crossbred (CB) cow and buffalo, are given in Table 3. Daily milk production of non-descript cow in the region varied from 1.56 to 4.12 l/ d with highest productivity in eastern Uttar Pradesh and Bihar which indicated the higher nutritional status of the animal. Productivity in remaining states varied between 1.63 and 2.49 l/d. For crossbred cows, the highest productivity was recorded in Bihar (9.12 l/d) followed by West Bengal and lowest in Chhattisgarh, 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 a working animal, whereas in eastern 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 Roy and Saha (2003) and Singh *et al*. (2005).

Meat: Slaughtering age and body weight of animals differed in different states (Table 3). 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 4). The dairy farmers of north Bihar were fed on average dry roughages 8.85 kg, green fodder 5.33kg and concentrate feed 0.77kg / head/day (Keshava and Mandape 2001). Rice-straw was the most common dry roughage in all states except eastern Uttar Pradesh and Bihar where wheat-straw is preferred. Grazing is practised in all most all states by the resource poor farmers. In Chhattisgarh 100% surveyed households practised 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 Uttar Pradesh where rice-wheat crop was prevalent with abundant availability of crop residues.

So far as method of feeding is concerned, separate feeding of dry and green roughage and concentrates was practised by farmers of Odisha (94%), Asom (86%) and West Bengal (74%). In Chhattisgarh (100%), eastern Uttar Pradesh (90%), Bihar (94%) and Jharkhand (46%), mixed feeding system was followed where dry and 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%), Asom (14%) and eastern Uttar Pradesh (10%).

Majority of the farmers (56–90%) of eastern region used to feed self farm-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 to 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

Table 4. Feeding system in dairy animal and sources of feed

States	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
Asom	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 Uttar Pradesh	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.

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% land to geographical area is under common property resources (Annonymous1998). 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

Only 54% households in the region followed the vaccination schedule with some variations among the states (Table 5). 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, diarrhoea, 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 buffalo, mostly natural breeding method was followed. In Bihar (92% households) and eastern Uttar Pradesh (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 Uttar Pradesh 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 5). 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.

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.

Table 5. Animal health care system, breeding methods and needs of inputs

States	Major diseases (%)			% Farmer followed Vacc.	Breeding method followed (%)		Farmer Satisfaction with stock/ Prod.%	% Farmer need assistance				
	Viral	Bact	Other		Nat.	AI		Sub.	Loan	AI	Tr	CB
Asom	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 Uttar Pradesh	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.

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