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Current status of goat husbandry and scope for improving its productivity in Bihar, Odisha and Uttar Pradesh

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ABSTRACT

A study was undertaken in selected districts of Bihar, Odisha and Uttar Pradesh states, to understand the current status of goat husbandry and identify suitable interventions to enhance productivity and income of goat keepers. Approximately 87.2% families in the study area were living in poverty and 93% goat keeping families belonged to small, marginal or landless families. While 47.5% goat keepers owned less than 5 goats across the study area, over 73% goat keepers were small flock owners in Bihar and a majority of them were dependent on extensive grazing. This was predominant in Odisha where over 99% goat keepers were dependent on extensive grazing while in Bihar and Uttar Pradesh, less than 20% families were dependent on extensive grazing. PPR was the major disease, but FMD, enterotoxaemia, goat pox and HS were also reported with low intensity. Goat mortality was high at 33.5% in Bihar, 26.6% in Odisha and 20.6% in Uttar Pradesh. Goat husbandry was mainly looked after by women. Over 80% goat keepers sold their goats in their villages itself. The income from goats has been significantly low at ₹ 4,068 per family in Bihar, while it was slightly higher at ₹ 10,748 in Odisha. Assured breeding and health care services and financial support are needed to enhance the income of goat keepers. Hence, priority should be given to build their capacity for developing value chain and mobilise critical services for improving the production.

Key words: Goatery, Goat breeds, Goat diseases, Goat keepers, Small ruminant marketing

As over 85% farmers in India are small and marginal landholders, mostly deprived of irrigation, their dependence on livestock for supplementary income, has been significantly high since many decades. This is the reason for India owning 17% of the world's livestock population, ranking first in the world. In spite of this, 29.5% of 1.2 billion people are living in poverty (GoI 2015), which is reflecting on low productivity of a majority of the livestock in the country.

Out of 129.22 million landholders in India, 67% are marginal and 17.9% farmers are small holders, who together own 75% of the total livestock of 512 million, for supplementary income. Over 65.33 million families maintain cattle, 39.18 million households buffaloes, 33.014 million families goats and 4.552 million families sheep (GoI 2013). Farmers in general, having adequate feed resources, prefer cattle and buffaloes while marginal farmers and landless prefer to own sheep and goats. However, in the absence of genetic improvement, lack of support for healthcare, feeding and marketing, livestock productivity has been heavily eroded over the years, rendering most of them uneconomical.

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Goat has been very popular among marginal farmers and most of the weaker sections of the society because of low investment, easy management, short gestation and high return. Presently, India has a goat population of 135.173 million, with an average flock size of 4 goats per family, with 40% annual replacement. Over the past 60 years between 1951 and 2012, goat population has increased by 186.38% as compared to 150.46% in buffaloes, 72.92% in cattle and 66.42% in sheep, indicating prolific rate of growth (GoI 2013). It is estimated that by 2050, goat population in India will increase to 216 million, producing 1.36 million tonnes meat, 9.8 million tonnes milk and 0.25 million tonnes hide per annum (CIRG 2013).

Goats contributed ₹ 38.59 billion to the economy (8.4% livestock Gross Domestic Product), through production of meat (₹ 22.625 billion), milk (₹ 9.564 billion), hide (₹ 1.49 billion), fibre (₹ 3.360 billion) and manure (₹ 1.535 billion) (CIRG 2015). India stood second in world goat meat production, with 12% share, where the production increased from 0.5 million tonnes in 2008, to 0.94 million tonnes in 2012–13. The demand for goat meat is expected to rise to 1.275 million tonnes in 2030 and 2.13 million tonnes by 2050 (CIRG 2013). Goat milk with good nutritional and medicinal value is sold at a high premium. India had the largest contribution of 4.59 million tons of milk, sharing 29% of the world goat milk production (Aziz 2010) although

the average milk yield was 132.8 kg/doe/lactation.

In spite of several advantages, goat husbandry in India has been in a state of neglect, without any major development programmes during the last 2–3 decades to support goat keepers. It was therefore proposed to study the current status of goat husbandry in Bihar, Odisha and Uttar Pradesh states in particular, and identify the challenges and opportunities to improve the profitability of goat keepers in the country.

India has over 23 registered breeds of goats, which are adapted to different agro-climatic conditions, but only 26.97% goats are of pure breed, 11.77% of graded breed and 61.26% belong to non-descript goats. This reflects on poor breeding facilities. As most of the farmers considered goat husbandry as a family tradition, no serious attention was given to either improve the genetic status or to introduce good husbandry practices. Depending on fodder and grazing land availability, goats were let out for grazing while some goat keepers provided supplementary feed and fodder when adequate fodder was not available for grazing. There were very few farmers who stall fed, except in large commercial farms, which were being established in recent years.

Protection from various diseases was a serious challenge for the goat keepers. PPR was the most important disease. The mortality of goats during the period 2007 to 2013 was 34%. Out of this, death caused by PPR was 34%, followed by Blue tongue (24%), Sheep and Goat Pox (14%), Enterotoxaemia (12%) and CCPP (5%) (Balamurugan *et al.* 2015). The estimated loss due to PPR disease in India in 2014–15 was ₹ 12.04 billion (NIVEDI 2015). The intensity of PPR outbreak was high during June to September in most of the states (Singh and Prasad 2008). Fortunately, several states have taken the initiative to carry out mass vaccinations against PPR and this has helped to control the disease very significantly. However, the disease outbreaks were not reported in many parts of the country. The Government of India reported only 3,731 deaths caused by 12 different diseases, of which 2,419 deaths were due to PPR, 472 deaths due to Goat Pox and 303 deaths due to Enterotoxaemia (DAHDF 2015). This was why disease control was not taken up on priority. The growth and productivity of goats were also affected by internal and external parasites. Roundworm was the important internal parasite, while the problem of tapeworm was less serious. External parasites such as lice, mites, flies and ticks were generally infested through direct contact with other infected animals. By and large, goat keepers were ignorant about deworming.

Most of the goat keepers particularly those owning 3–4 goats, housed their animals in extended sheds adjoining their houses and those having larger flocks, housed their goats in thatched houses. Women took responsibility of taking goats for grazing, collecting supplementary fodder, providing drinking water, ensuring breeding facilities, cleaning of the shed and looking after the sick animals, while selling of animals was decided jointly by men and women. Goat marketing was unorganised, compelling 75% goat keepers to sell their goats in the village itself. Others sold to local butchers or in the local market. A majority of the goat keepers sold their male goats at a premature age due to financial pressure and ignorance about potential price (Kumar *et al.* 2016). Pricing of goats was done differently, like price per head, price per pair or group. Of late, selling was done on actual body weight and general health. Only 30% of the butchers/meat traders slaughtered the goats in slaughter houses maintained by Municipal Corporations. Better facility for meat processing was most critical for expansion of meat industry and better price realisation.

Although the Task Force of the Government of India (1996) recommended focussing on enhancing meat production, processing and marketing, no major scheme was implemented for goat development for over two decades and after a long gap during the 11th Five Year Plan, an Integrated Small Ruminants and Rabbits Development Scheme was implemented through NABARD, which provided venture capital with interest-free loan for establishing goat units of 40 females or 2 male goats or sheep. However, the response was poor and the scheme did not benefit a majority of the small goat keepers due to lack of technical support and market linkage (NABARD 2015). Control of PPR and other diseases was supported under the 11th and 12th Five Year Plans (DAHDF 2015). As most of the goat development schemes did not attract the poor goat keepers, it was proposed to study the status of the goat keepers, problems affecting goat productivity and to identify suitable interventions required to improve the income of small goat keepers. The objectives of the study were to: understand the profile of goat keepers in the backward regions; document the prevailing goat husbandry practices; identify the challenges and opportunities faced by small goat keepers; and to recommend suitable strategy for improving goat productivity.

MATERIALS AND METHODS

The districts selected for the study were Begusarai, Saran and Vaishali in Bihar, Sundergarh, Keonjhar and Mayurbhanj in Odisha and Kanpur Dehat, Sitapur and Unnao in Uttar Pradesh state. The selection of the above districts was based on high goat density, number of weaker sections of the society dependent on goat husbandry and reasonable communication and transport facilities with easy access to leading goat markets (GoI 2013). This information was collected during the discussions with the officials of the respective Animal Husbandry Husbandry Departments and the districtwise demographic data (GoI 2011). The villages and blocks having higher goat density were selected within the districts for the study.

The study was undertaken through interactions with officials and organisations concerned with goat development, collection of secondary data and interaction with goat keepers, traders and butchers, during March to May 2016. Discussions with goat keepers were carried out through 90 focus group discussions (FGDs), 10 in each district, of which 50% FGDs were attended by women goat keepers and 50% by men. Each FGD was attended by about

20–25 goat keepers. A set of questions related to their goat husbandry practices were posed during the discussions and the answers given by the group were recorded and analysed. Simultaneously, 10 goat keepers belonging to different socio-economic groups, were selected at random from each cluster and interviewed with a schedule, to explore various details pertaining to herd size, breeding services, feeding, health care, marketing and income. Other stakeholders such as goat traders, slaughter houses and farmers maintaining large flocks were also interviewed, but the sample size was small. The data was compiled and analysed.

RESULTS AND DISCUSSION

The analysis of the data collected during FGDs and individual interviews, is presented below.

Socio economic status of goat keepers: Among these goat keepers, 66.67% respondents were men and 33.33% were women. 66% goat keepers were illiterate and 27% had studied between 5th and 10th standard. 41.22% goat keepers belonged to Other Backward Communities (OBC) category, 32.39% to Scheduled Castes (SC) and 26.38% to Scheduled Tribes (ST). Both Bihar and UP had equal representation of SC and OBC categories while Odisha was dominated by ST at 72% (Table 1).

Over 93% of goat keepers belonged to marginal, small and landless categories. Among them, 73.8% goat keepers were marginal holders, 15.5% were small holders, 2.2% were medium, 4.9% were large and 5.6% were landless (Table 2). The marginal landholders were highest in Bihar and lowest in Uttar Pradesh. The number of landless families owning goats was also large in Uttar Pradesh. Similar trend was reported by Government of India (2013). Dey and others (2007) have also reported that most of the goat keepers were confined to backward classes, marginal holders and landless, who could neither maintain large animals nor ensure food security through agriculture.

87.2% goat keepers belonged to below poverty line (BPL). Goat keepers belonging to BPL families were highest at 94% in Odisha, followed by Bihar with 90.6% and Uttar Pradesh with 74.4% (Table 2). The prosperity of the participants could be easily measured by the mode of local transportation used by them. While 55.2% respondents had no means of transportation, 37.2% owned bicycles and 6.7% owned motorcycles. Only in Odisha, a few respondents owned four wheelers which were probably used for transportation of commodities to rural areas (Table 2). For 37.1% respondents, goat husbandry was the major source of livelihood, although most of them had a second source of income from non-agricultural labour (23.8%), agriculture (22.0%) and agricultural labour (10.6%).

47.5% goat keepers owned 5 or less goats, 35.7% had 5–10 goats and 16.8% had more than 10 goats (Table 2). The average flock size per family in Odisha was 5.12, 3.44 in UP and 2.95 in Bihar, while the national average was 4.09. It was observed that OBCs had maintained large flocks as compared to SC and ST families. The flock size was influenced by the availability of good quality breeding services, grazing area, space for housing, ability to provide supplementary feed, veterinary services and finance. Feed shortage was a major constraint in Bihar and Uttar Pradesh while space for housing was the constraint in Odisha.

Goat breeding services and breed status: The major constraint in goat breed improvement was lack of breeding service, through elite bucks or insemination service. As a result, most of the goat keepers owned nondescript goats. Presently, 79.4% goat keepers were dependent on stray

Table 1. Demographic profile of goat keepers in three states

Particular	Bihar (%)	Odisha (%)	UP (%)	Average (%)
Education				
No education	93.0	55.0	50.0	66.0
Up to 5th Standard	1.0	11.3	5.0	5.8
Between 5th and 10th Standard	6.0	33.67	41.3	27.0
Between 10th and 12th Standard	0	0	0	0
Graduate	0	0	0	0
Social status				
Scheduled castes (SC)	46	7	48	32.4
Scheduled tribes (ST)	0	72	2	26.4
Other backward communities (OBC)	54	21	50	41.2

Table 2. Economic status of goat keepersin Bihar, Odisha and UP

Particular	Bihar (%)	Odisha (%)	UP (%)	Average (%)
Land holding				
Marginal	90	73	60	73.8
Small	8	24	7	15.5
Medium	1	2	4	2.2
Large	0	1	13	4.9
Landless	1	0	16	5.6
Economic status				
BPL	90	94	74	87.2
APL	10	6	26	12.8
Vehicles owned				
Bicycle	35	34	43	37.2
Motorcycle	3	5	12	6.7
4 wheelers	0	3	0	0.9
None	62	58	45	55.2
Main occupation				
Agriculture	3	35	21	22
Agricultural labour	21	7	5	10.6
Non-agricultural labour	27	17	23	23.8
Goat rearing	35	39	30	37.1
Dairy husbandry	2	0	16	6.4
Goat flock size				
Less than 5	73	26	45	47.5
Between 5 and 10	26	40	41	35.7
Above 10	1	34	14	16.8

bucks for breeding services, 11.3% availed the services of elite bucks and 9.2% maintained their own bucks. In Bihar, over 97% of the farmers were dependent on stray bucks. In Odisha, 71% of goat keepers were dependent on stray bucks while 25% goat keepers particularly those having larger flocks, maintained their own bucks of Black Bengal breed. In Uttar Pradesh, services of private breeding bucks, but not any pure breed, were availed by 41.5% goat keepers. No AI service was available in the study area (Table 3).

Table 3. Goat breed status and preference

Particular	Bihar (%)	Odisha (%)	UP (%)
Breed status			
Nondescript	100	97	100
Upgraded Black Bengal	-	3	-
Source of breeding			
Stray Buck	97	71	72
Private Buck	3	-	14
Own Buck	-	25	14
Breed preference			
Jamunapari	30	-	25
Black Bengal	22	90	-
Barbari	18	-	47

The breed preference in Bihar was for Black Bengal, Jamunapari and Barbari while it was Barbari and Jamunapari in Uttar Pradesh and Black Bengal in Odisha. Ganjam district being the home tract of Ganjam breed, this breed was popular in Ganjam and adjoining districts.

Care of pregnant does: Good goat husbandry practice has to begin with better care of pregnant goats, which include deworming, vaccination and feeding. Goat keepers were aware of the need for supplementary feeding but most of them did not practice it. Only 17% of goat keepers in Bihar and 12% in Odisha vaccinated their pregnant does. The goat keepers were not aware of the need for deworming of pregnant does and hence, none of them practiced it (Table 4).

Table 4. Care of pregnant does and kids

Particular	Bihar (%)	Odisha (%)	UP (%)
Vaccination - pregnant does	17	12	-
Average no. of kids born			
Single	33	50	35
Twins	37	46	60
Triplets	25	4	5
Care of weak kids			
Milk / boiled grain	41	-	63
Pulse / Rice water	24	20	-
Deworming of kids	80	43	4
Vaccination of kids < 3 months	-	38	4
Suckling kids (months)	3-4	2-3	4
Feeding of kids			
Cooked grain / Leftover food	73	7	32

Kidding and aftercare: The data revealed that 47.7% does delivered twins, 39.3% had single kids, while 11.3% had triplets. The percentage of triplets was highest at 25% in Bihar, as compared to only 4% and 5% in Odisha and Uttar Pradesh respectively, which may be due to higher population of upgraded Black Bengal breed, which is known for kidding higher percentage of triplets. Farmers judged health status of the kid by mere general appearance and physical movement. For nurturing weak kids, milk, boiled grain, pulses/rice water, etc. were fed in Bihar (65%) and Uttar Pradesh (63%), while only 20% families practiced this in Odisha (Table 4).

Deworming of kids was carried out by 80% goat keepers in Bihar, 43% in Odisha and only 4% in Uttar Pradesh. Vaccination for kids below 3 months was carried out by 38% goat keepers in Odisha while only by 4% in Uttar Pradesh and none in Bihar. The kids were allowed to suckle milk for a period of 2–4 months depending on the availability of milk. 73% goat keepers in Bihar and 32% in Uttar Pradesh provided supplementary feed such as grain or cooked rice for kids. This was not the practice in Odisha, because of poor economic status and availability of tree fodder (Table 4). Castration of male kids was not carried out by most of the goat keepers due to lack of awareness and non-availability of castration services. Goat keepers in Uttar Pradesh mentioned that selected persons from the Valmik community do perform castration of goats using a sharp knife (BAIF 2016).

Feeding system: In Odisha 99% goat keepers were maintaining their goats exclusively on grazing (Extensive system). In Bihar, 19% goat keepers were dependent on complete (extensive) grazing, 73% on partial grazing (semi intensive) and 8% on stall feeding. Similarly, in Uttar Pradesh, 13% were dependent on extensive grazing, 9% on stall feeding, while 78% were following semi intensive

Table 5. Feeding systems of goats in Bihar, Odisha and UP

Feeding habits of goats	Bihar (%)	Odisha (%)	UP (%)
Dependency on grazing			
Field	55	25	32
Road / canal side	41	-	68
Forest	-	75	-
Grazing hours/day			
4-5 h	28	3	18
5-6 h	48	33	39
6-7 h	3	47	29
7-8 h	3	17	3
Supplementary feeding			
Dry fodder	80	-	75
Green fodder	90	40	79
Concentrate	87	-	14
Mineral mixture	27	-	-
Difficulties in feeding			
Shortage of grazing area	27	27	21
Non-availability of green fodder	17	36	21

grazing. Non-availability of grazing area and green fodder were the main concerns in all the three states. The goats were let out for grazing between 3 to 8 hours per day, which was influenced by availability of fodder in different seasons (Table 5). Due to acute shortage of village common properties, goat keepers in Bihar and Uttar Pradesh grazed their animals on road/canal sides and agricultural fields after the crop harvest and provided supplementary feed in the form of grain, green fodder and dry crop residues. In Odisha, a majority of the goat keepers let out their goats in village forests and common lands and provided tree foliage as supplementary feed wherever available. In Bihar, 87% goat keepers fed concentrate, while only 14% fed concentrate in Uttar Pradesh and none in Odisha. None of the goat keepers in any state purchased fodder for feeding their goats (Table 5).

There was no influence of landholding of the goat keepers on the time spent on grazing. However, with respect to socio-economic classes, there was significant difference in grazing. While SC families spent more time, the OBCs spent less time both in Bihar and Uttar Pradesh. Even in Odisha, the goat keepers belonging to OBC category spent less time on grazing than the STs.

Health problems of goats: PPR was the most significant disease in Bihar and Odisha, occurring during rainy and winter seasons. Foot and Mouth Disease (FMD) was the next important disease which affected goats in Bihar, Odisha and Uttar Pradesh throughout the year. Enterotoxaemia (ET) and Goat Pox were occurring only in Odisha throughout the year while Haemorrhagic Septicaemia (HS) was reported from Uttar Pradesh and Bihar to some extent. Apart from these diseases, National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) also reported the incidence of Brucellosis from Bihar, while the

Table 6. Disease problems of goats

State	Bihar			Odisha			Uttar Pradesh		
Season →	1	2	3	1	2	3	1	2	3
Diseases	%	%	%	%	%	%	%	%	%
PPR Ind*	3	4	4	54	18	2			
PPR FGD**	64	40	32	41	30	0	10	0	7
ET Ind	0	0	0	32	11	9			
ET. FGD	0	0	0	24	34	7	0	0	0
FMD Ind	2	1	2	5	16	2			
FMD FGD	26	60	18	22	21	0	6	29	7
Goat pox Ind	0	0	0	8	15	5			
G. pox FGD	0	0	0	30	15	13	0	0	0
HS Ind	21	9	0	0	0				
HS FGD	10	0	0	0	0	0	35	0	14

1, Rainy season; 2, winter; 3, summer.*Response from individual goat keepers; **Response from the group during FGDs.

Table 7. Response from FGDs about ailments affecting goats

States	Bihar			Odisha			Uttar Pradesh		
Season →	1	2	3	1	2	3	1	2	3
Ailments	%	%	%	%	%	%	%	%	%
Diarrhoea	61	20	62	61	24	62	0	0	0
Gastric Problems	20	57	57	0	0	0	0	0	4
Pneumonia	27	28	8	4	28	8	0	0	0
Fe/Cou/Cold*	40	32	15	22	32	15	0	0	0
Mouth/Skin	13	16	15	13	16	15	0	0	0
F & M Les*	0	0	0	0	0	0	10	3	0
Urinary Problem								*7*	*7*
Liverfluke	1	0							
Sunstroke	0	0	2			10			
Parasites:Ect/End	High	Low	Mod.	High	Low	Mod.	High	Low	Mod
EndoParas. Control	90	56	81	40	37	43	7	4	4
Ecto Parasite Control	83	14	9	37	40	33	18	14	14
Vaccinations	-	-	-	60	53	43	-	-	-
Mortality Individuals	16.51			20.64			18.97		
Mortality FGD	33.5			26.46			20.58		

1, Rainy season; 2, winter season; 3, Summer season. *Fe/Cou/ Co, fever, cough and cold; F&M Les., foot and mouth lesion.

status of this disease in other two states was not available. During the interviews with the individual goat keepers, the intensity of PPR disease was not highlighted significantly as can be seen in Table 6. Similar under reporting was observed with regard to Foot and Mouth Disease in Bihar and Goat Pox disease in Odisha. This was due to ignorance of the individual goat keepers about the outbreak of these diseases. Goat keepers often referred to PPR as diarrhoea as they were unable to correctly diagnose the disease. It was also likely that FMD was wrongly diagnosed as Mouth and Skin ailment by many farmers. Over 50% of the goat keepers in Odisha during the FGDs mentioned about vaccination being carried out by the State Animal Husbandry Department. However, no regular vaccination was reported from Bihar and Uttar Pradesh.

Among the ailments, diarrhoea was the most significant problem in all the three states. However, there was no mention about this problem from Uttar Pradesh during the FGD as this ailment is often neglected. Pneumonia, cough and cold and mouth and skin lesions were the other common ailments reported particularly from Bihar and Odisha. It was realised that diarrhoea and pneumonia were the major causes of kid mortality in the project area. Goats suffered maximum health problems during rainy season followed by winter and summer seasons (Table 7). Fever, cough and cold, skin, foot and mouth lesions, urinary infections and gastric problems were other ailments which affected the growth of the animals. Sunstroke was also reported during summer from Odisha and Bihar.

Goat keepers were aware of the adverse effects of Ecto-parasites and confirmed that control measures were undertaken periodically particularly during the rainy season. However, this was not highlighted during the individual interviews. The incidences of deworming were high in Bihar and moderate in Odisha and in very small number in Uttar Pradesh. There were stray cases of Liver fluke and Haemonchosis reported from Bihar. Farmers in some parts of Uttar Pradesh have been feeding neem foliage during winter and crushed fenugreek with jaggery and sesame oil in some other regions for control of endo-parasites.

Mortality: Goat mortality rate in Bihar was 33.5% followed by 26.4% in Odisha and 20.61% in Uttar Pradesh. However, during the individual interviews, the mortality rate indicated by the goat keepers was between 15–20%, as there was a tendency to ignore the mortality of kids. High mortality rate in Bihar was probably due to dominance of Black Bengal breed which is susceptible to diseases. However, in Odisha, the mortality was slightly lower due to vaccination (Table 7). Low mortality in Uttar Pradesh could be due to breed resistance and dry climate.

Housing: More than 95% of the goat keepers had mud (*kuchha*) houses, but 43% farmers in Uttar Pradesh kept their goats in open area. 53.2% of them had thatched roof, 37.3% had tiles or metal sheets for roofing. Almost 100% goat sheds had mud (*kuchha*) flooring (Table 8). Goat keepers having larger flock size, had a tendency to invest in housing. Among different socio-economic categories, OBC families invested more in housing than others.

Milking of goats: About 29% goat keepers in Uttar Pradesh milked the goats and most of them used it to feed kids, but very few goat keepers in Bihar and none in Odisha reported milking of goats. Generally, milking was practiced by the goat keepers who had high milk yielding does (Table 9).

Role of women in goat husbandry: Taking goats for grazing, feeding and other care demanded labour. These activities were mainly looked after by women in Bihar (97%) and Odisha (80%). In Uttar Pradesh, women looked after goats in 74% families and both men and women looked after it jointly in 24% families (Table 9).

The decision on sale of goats was taken jointly in 50.58% families, by males in 24.19% families and by females in 25.23% families across the study area (Table 9). However, in Bihar, 70% responded that women have a major say in the sale of goats, whereas in Uttar Pradesh in 52% families, men took the decision and the decision was taken jointly by 42% families. In Odisha, 84% of the families took joint decision. With regard to the use of the money earned from sale of animals, in Bihar, it was women who influenced the decision while in Uttar Pradesh, it was men. In Odisha, the decision was taken jointly (Table 9).

Table 8. Housing facilities provided for goats

	Bihar (%)	Odisha (%)	UP (%)
Housing for goats			
Open Area	3	10	43
Shelter	97	90	57
Type of roof			
Bamboo	12	-	-
Tile + Straw	46	73	43
Tile / Sheet	54	29	-
Type of flooring			
Kuchha	54	100	61
Pucca / Hard			
Type of walls			
Mud	50	100	64
Straw	50	-	-

Table 9. Goat husbandry and gender dynamics in three states

	Bihar (%)	Odisha (%)	UP (%)	Average (%)
Milking goats				
Yes	2	0	15	5.49
No	98	100	85	94.51
Who attend to goats				
Jointly	2	17	24	14.58
Men	1	3	2	2.26
Women	97	80	74	81.16
Decision on sale			42	
Jointly	23	84	52	50.58
Men	7	11	6	24.19
Women	70	5		25.23

Marketing of goats: The general practice was to sell male kids at the age of 12 to 14 months and to maintain females to replace the old does. However, distress sale was common to meet emergency cash requirements. 67% goat keepers in Bihar and 33% in Uttar Pradesh, selected goats with higher weight for selling, while other considerations were age and sex. However, in Odisha (59%) and Uttar Pradesh (23%), goat keepers were willing to sell goats of customers' choice. The price was fixed on the basis of weight, health and sex but there was lack of fairness and generally, the goat keepers were dominated by buyers. Hence, the goat keepers preferred to sell their goats either in the village or in the nearby market. On an average, 45% goats were sold at the doorsteps of farmers followed by village market (37%). While 80% of the goat keepers in Bihar sold in the local market, over 78% in Uttar Pradesh sold at farm gate. In Odisha, 47% sold at farm gate while 48% sold their goats in the nearby market. Most of the goat keepers accepted lesser price as exploitation was an unavoidable practice. Transportation to the market, particularly in Odisha (Table 10), was reported to be a major constraint.

Agencies involved in goat marketing: Major buyers of goats in the project area were local traders and butchers having meat shop in the neighbourhood. The local traders reported that they moved from house to house enquiring about goats for sale and purchased on cash payment. These traders sold these goats either to butchers or in nearby markets, who earned ₹ 8,000–10,000 per month with great difficulty. Lower volume and poor quality animals were the major bottlenecks for lower income. Many traders also suffered from lack of finance for expanding their business. The local butchers also visited villages for direct negotiations with the farmers, who were selective and prepared to pay higher price.

Income of goat keepers: The income from goats and other sources, is presented in Table 11. The net annual income, worked out after deducting the out of pocket expenses from the sale proceeds from goat per family was highest at ₹ 10748 in Odisha followed by ₹ 7,224 in Uttar Pradesh and ₹ 4068 in Bihar. In Odisha, income from goat was about 40% of the total income, while it was only 9% in Bihar and 15% in Uttar Pradesh. Higher income from goat in Odisha could be attributed to higher flock size. Overall family income in Odisha was less mainly due to hilly terrain and mono cropping dependent on rainfall. Many goat keepers felt that they were not making any profit from goats even to earn labour wages, but continued with goat husbandry as they did not have any other opportunity.

Challenges of goat keepers and support needed: The major challenges faced by goat keepers in improving the productivity were health care, lack of finance, shortage of feeding and grazing area and housing. Availability of breeding services was also a critical constraint but many of the goat keepers did not highlight this as a problem mainly due to lack of awareness. However, whenever they were asked to identify the support needed for improving the income from goats, the need for veterinary service was considered as the most important requirement (34.53% goat keepers) followed by breeding services (26.73% goat keepers), housing (18.68% goat keepers), training (17.40% goat keepers) and insurance (2.67% goat keepers) as presented in Table 12.

Scope for improving goat productivity: The outcome of the study highlighted that a majority of the goat keepers owned a small number of goats. This was because most of them being poor, they could not afford to feed and provide health care. There was no opportunity for genetic improvement. In the absence of necessary backward and

Table 10. Criteria for sale of goats as expressed during focus group discussions

	Bihar (%)	Odisha (%)	UP (%)	Average (%)
Selection of goats for sale				
Weight basis	67	3	33	34
Age	31	31	17	26
Sex	25	7	27	20
As per choice of customer	-	59	23	27
Market venue				
Farm gate	20	47	78	45
Village	80	1	4	37
Local traders	1	15	15	6
Market	0	48	3	12
Hurdles in marketing				
Not aware	80	55	75	71
Lower price	20	4	4	9
Transport	-	3	11	5
Distance	-	38	7	15

Table 11. Family income from goats and other sources in three states

Income	Bihar (₹)	Odisha (₹)	UP (₹)
Gross income - goats	5354	11106	10285
Net income - goats	4068	10748	7224
Total family income	43537	27112	49030
Major crops	Paddy, maize, wheat, potato	Paddy	Paddy, wheat, maize sesame, Black gram

Table 12. Challenges and opportunities in goat husbandry

	Bihar (%)	Odisha (%)	UP (%)	Average (%)
Challenges				
Capital	31	31	17	26.57
Lack of health care	7	48	34	26.89
Shortage of feed / grazing	36	7	23	24.15
Housing	26	14	26	22.38
Support needed				
Veterinary service	23	32	54	34.53
Breeding service	34	29	13	26.73
Housing	12	27	14	18.68
Training	26	11	17	17.4
Insurance	5	1	2	2.67

forward linkages and support from development organisations, these goat keepers were unable to improve the productivity of their goats and earn substantial income from goat husbandry.

It was further observed that most goat keepers were heavily dependent on free grazing on village common lands although the productivity of these common lands has been fast depleting. Hence, it is pointless to encourage them to increase the flock size, unless the goat keepers change their attitude to provide supplementary feed and gradually shift over to stall feeding. Stall feeding must be made mandatory for establishing commercial goat farms with large number of goats.

With regard to goat keepers owning small flocks, the present income from goats is substantially low, resulting in them shying away from any capital investment and adoption of good husbandry practices. The most significant factor affecting the profitability of goat keepers is the absence of value chain. It is therefore necessary to support them to improve goat productivity through improved breeding services, feeding and health care, which can enable them to gradually increase their flock size by 30 to 50%. Further awareness on sale of goats on weight basis, can help in higher price realisation and enhance their income significantly.

Recommendations

Major focus on goat development should be to empower small goat flock owners to improve the productivity of goats through value chain development and sustainable husbandry practices. To facilitate the establishment of an efficient value chain and to improve the income of goat keepers, the following recommendations have been made:

1. Organise goat keepers through promotion of self help groups of women goat keepers for backward and forward linkages; Train local youth as paravets for providing minor health care, extension and marketing services;
2. Genetic improvement and breed conservation through buck production for supplying to goat keepers and Artificial insemination using frozen semen service;
3. Disease control through establishment of call centres to report about disease outbreaks and for veterinary services;
4. Improve feeding practices through supplementary feeding of concentrate and mineral mixture, demonstration on fodder production on degraded lands, feeding of processed crop residues and development of community pasturelands;
5. Arrange finance at lower rate of interest by bringing Goat husbandry under the priority sector for development;
6. Promote decentralised goat markets and improved processing facilities for milk, meat and skin, for higher value realisation through public private partnership.

To finally conclude, goat husbandry is an important source of food security for small and marginal farmers as well as landless rural families in India. As a majority of them owned small flocks of 3–5 goats, with poor access to good goat husbandry practices, income from goat husbandry has been extremely low. There is scope to transform goat husbandry into a profitable rural family enterprise through introduction of good goat husbandry practices and promotion of goat keepers' organisations for goat value chain development. Suitable policy interventions and development support are required to improve the livelihood of goat keepers.

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REFERENCES

Aziz M A. 2010. Present status of the world goat populations and their productivity. *Lohmann Information* **45**(2): 42–52.

BAIF. 2016. *Socio-economic baseline assessment of goat keepers in Uttar Pradesh. Study Report*. BAIF Development Research Foundation, Pune: 35.

Balamurugan V, Gajendragad M R and Rahman H. 2015. Epideomology of PPR in India. *Control of PPR Disease: Challenges and Opportunities. Proc. – National Conference on PPR Disease*. BAIF, Pune, pp. 16–23.

CIRG. 2013. Vision 2030. *ICAR Central Research on Goats*. Makhdoom, Mathura.

CIRG. 2015. *Annual Report 2014–15*. *ICAR Central Research on Goats*, Makhdoom, Mathura.

DAHDF. 2015. *Annual Report 2014–15. Department of Animal Husbandry, Dairying and Fisheries, Government of India*, New Delhi.

Dey A, Barari S K and Yadav B P S. 2007. Goat production scenario in Bihar, India. *Livestock Research for Rural Development* **19**(9): 1–8.

Government of India. 1996. *Report of the Task Force on Sheep, Goat and Rabbit Production*. Government of India. Ministry of Agriculture. 164 pp.

Government of India. 2011. Census data. Registrar General and Census Commissioner. Ministry of Home Affairs, New Delhi.

Government of India. 2013. Department of Animal Husbandry, Dairying and Fisheries, 19th Livestock Census -2012.

Government of India. 2015. Ministry of Agriculture website.

Kumar S, Kareemulla K and Rao C.A.R. 2016. Goat marketing system in Rajasthan. *Indian Journal of Agricultural Marketing* **23**(3): 150–67.

NABARD. 2015. *NABARD Annual Report 2014–15*.

NIVEDI. 2015. *Annual Report 2014–15*. ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI), Bangalore.

Singh B and Prasad S. 2008. Modelling of economic losses due to some important diseases of goats in India. *Agricultural Economics Research Review* **21** (July-Dec.) : 297–302.