

Doubling rural farmers' income through goat farming in India: prospects and potential

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Nearly 72.2% population of India is living in 6.38 lakh villages, mostly dependent upon agriculture and livestock for their livelihood. Crops productivity is largely restricted by uncertain and erratic rainfall, scarcity of water for irrigation and deterioration of soil-health. Out of the 138 million Indian rural households, 33.01 million (24%) are maintaining goats. Households cultivating less than 2.0 ha of land (marginal and small) are the custodian of more than 76% of the total goats in the country. Goat has been playing multiple role in livelihood of the rural people by providing income, employment, nutrition, supporting crop production and risk aversion in case of crop failure. Landless men and women are increasingly relying on goat keeping for their socio-economic upliftment.

Key words: Farming, Goat, Income, Rural population



Presently commercial goat farming has emerged as important drivers of agricultural growth in India. Goat farming has huge opportunity in rural development as goat has potential for export of products, capital storage, house-hold income, employment and nutrition. It is suitable for women and could be used for rural women empowerment. India is endowed with huge biodiversity of goats (28 breeds) distributed in different agro-ecosystems throughout the country, which were developed by our wise ancestors as per the climatic conditions and then requirement of people of those particular regions. All

these 28 Indian goat breeds are great performer in their habitat under adequate feeding and bear great degree of resistance for disease and climatic fluctuations. Chegu and Changthangi are reared in northern upper Himalayan region (Laddakh and Kashmir) above 3,500 msl, known to produce finest quality of under coat hair called 'Cashmere' or 'Pashmina' beside quality meat. Important goat breeds found in north-western region are Beetal, Jamunapari, Barbari, Sirohi, Marwari, Jakhrana, Surti, Gohilwadi, Kutchi, Zalawadi, and Mehsana. These goats are medium to large in body size, dual purpose with special

attribute of higher milk yield (150 to 350 litre/lactation). Body weight at 12 month (20-40 kg), litter size 1.3 to 1.7 and kidding rate is 1.3 to 1.6. The goats of north-western region have potential to be developed as dairy goat and may play great role in sustainable nutritional security of poor people.

Many breeds (Beetal, Jamunapari, Sirohi, Zakhrana, Barbari etc.) are candidate breed for grading up of non-descript goat of arid and semi-arid regions of India. Large-sized breeds have potential to attain 19 to 23 kg body weight at 6 months of age, and 40 to 50 kg weight at one year of age. Barbari is one of the most demanding breed due to its suitability and performance under intensive/stall feeding. Sirohi has become National breed among traditional goat farmers. Osmanawadi, Sangamneri, Malabari, and Kannai-adu are the main goat breeds of the southern region. These goats possess are good in prolificacy (40-65%) and attain 20 to 24 kg body weight at 12 months of age under optimum feeding and 25 to 34 kg under intensive feeding (Table 1).



Table 1. Production and economic characteristics of major goat breeds of India

Production characteristics	Barbari	Jamunapari	Sirohi	Black Bengal
Suitable climate	Semi-arid	Semi-arid	Semi-arid	Hot-humid
Cost of adult female (₹)	5,000	8,000	7,000	3,500
Age at first kidding (months)	12-16	18-22	18-20	10-12
Kidding interval (months)	9	10	10	8
Multiple birth (number)	1.6	1.3	1.3	2.2
Kids produced in 3 years	6.4	4.7	4.7	10
Survival of kids up to 12 months (%)	92.5	92.5	92.5	80
Survived kids available in 3 years	6.4	4	4	8
Body weight at 12 months (kg)	22	27	27	16
Weight delivered/goat/year	42	38	38	42
Milk yield /goat/year	80	135	100	30
Surplus milk /year (liter)	25	78	60	0
Income surplus milk	625	1,950	1,500	-
Maintenance cost of adult female and its kid /year	4,250	4,550	4,150	3,840
Sale Price of kids/year (₹)	8,400	7,300	7,300	8,440
Net profit/goat/year	4,775	4,700	4,650	4,600

Note: Productivity and economics are obtained of those goats which are maintained under semi-intensive feeding system where they will be provided about 50% feed-fodder requirement through supplementation and remaining 50% from grazing area.

Black Bengal is main breed of eastern region of India. It is a dwarf size meat goat breed and has great recognition for prolificacy (>80% females produces multiple birth), skin and carcass qualities however, low in milk yield. Body weight at 12 month varies from 16 to 22 kg.

Short-term measures

Promoting semi-intensive or strategic feeding management system through field demonstrations: Goat keepers (>95%) rear their goat on zero input and earn average profit of ₹ 12,500/year from a unit of five adult females. The profit from five goats becomes double or more than that i.e. ₹ 25,000 by shifting goat management from extensive to semi-intensive or intensive management. Farmers may be charged cost of inputs and many farmers (>50%) are ready to pay, once profit message spread horizontally remaining farmers also become ready to pay cost that incurred on vaccination, deworming, feed-mineral mixture and service from high potential buck.

Profit per goat under extensive management from one adult Barbari goat is ₹ 3,280 whereas with strategic feeding support it was ₹ 6,493. The profit increased with strategic inputs support on account of increased body weight (>40%), increased milk yield (80%), increased survivability (50%), increased multiple birth

(50%), increase in premium value/breed purity (20%) etc. The 100% timely vaccination of goats against infectious diseases to achieve quantum jump in 30 to 45% profit from goat farming; Well-structured grading up programme; capacity building of goat farmers; and credit access for promoting scientific goat production and value addition of goat products.

Long-term measures and programmes

Some programmes to be implemented with the involvement of government agencies and farmers support are discussed here.

Development of genetic stock by supply of high potential pure-bred bucks: Selection of breeds adaptable to the existing agro-climatic conditions that can thrive well on un-conventional feed and fodder resources should be given top priority in goat-based rural

development-cum breeding programme. There is need to encourage the farmers to breed local non-descript goat with improver breed suitable for that particular agro-climatic conditions. Upgrading of goats through elite purebred bucks should be seriously implemented along with prophylactic support. Establishment of kids nursery farm of improver breeds in home tract of all important and high potential breed for regular supply of breeding bucks to goat keepers for improvement in genetic potential of goats. Progenies born out from superior bucks yielded 40-75% more production and also fetched 25-40% higher price in market as breed premium.

Promotion of prophylactic measures (goat health calendar): Goat keepers (>75%) were neither aware and nor adopted vaccination against infectious diseases such as *Peste des petits ruminants* (PPR), goat pox, enterotoxaemia and Foot-and-Mouth Disease (FMD) which are responsible for high economic losses (30 to 60% goat mortality). It was observed that vaccination and deworming of goats have reduced the mortality (< 10%) thus; increase in the survival of goat and net income of ₹ 3,500 to ₹ 4,500/year with a unit of five goats. It requires expenditure of only ₹ 300/year on five unit of goats.

Development of feeding resources at village level by improving wasteland and community pastures and its judicious utilization: Fodder supplies in villages can be enhanced substantially by increasing the productivity of traditional food and forage crops. Intercropping with twin objective, using seed for human and leaves for animals, short duration and quick

Table 2. Critical gaps in goat farming

Item(s)	Gap (%)	Normal value	Base value
Goat stoking rate (goat/ha)	>400%	10	>50
Bucks availability (No.)	150	1:40	1:100
Pure-bred pedigreed bucks availability	450	1:40	1:300
Kids(< 3 month) mortality (%)	250	10	35
Adult mortality (%)	166	7.5	20
Fodder (lopped, cultivated etc.) availability (g/goat/day)	233	1000	300
Concentrate availability (g/goat/day)	400-500	200-300	25-50
Body weight at 12 month (kg)	25-55	-	-
Reproductive efficiency	40-65%	-	-
Profit/adult female goat per year with (zero-input) and strategic input	100	5,000	2,500

growing leguminous forage crops should be promoted. Farmers are made skillful for processing and storage of fodder resources available during monsoon for meeting the forage demand during the lean period and their nutritive/value addition. The degraded grazing lands and CPRs should be converted in to productive system like silvi-pastoral. Drought tolerant grasses, shrubs and fodder trees need to be promoted on field bunds. Improvement in the natural rangelands by reseeded with perennial grasses (grass yield increase from 1.0 tonne to 4.0 tonne/ ha/ year), intercropping of legumes, plantation of fodder trees and most importantly judicious utilization of natural resources. Agroforestry should be popularized among farmers.

Strengthening support services and extension network: Credit is an important asset for goat keepers to access technological interventions such as improved housing, purchase of concentrate, quality animals, value-added products etc. It will encourage goat keepers to switch their goat from extensive (zero-input)

to semi-intensive management system and up-scaling the introduced innovations.

Motivation and popularization of package of improved management practices: Goat keepers should be made aware for improved management practices such as breeding calendar (optimum age and weight of breeding at first time, seasons/months of breeding to obtain maximum survival, production and profit from goats, health calendar, strategic feeding (timely colostrum feeding, supplementary concentrate feeding at advance pregnancy, first 60 to 90 days of lactation, 3-9 months of age during kids growth, efficient use of feed and fodder as per age, sex, productivity) and smart marketing and value addition of products. Avoid overcrowding of goats especially in growing kids. Floor should be cleaned regularly and kept dry by proper cleaning of waste materials and adequate sun light exposure. Replace old-and caked-soil once in a year in April-May with new soil mixed with lime @10 kg/m³ of soil. Goat sheds should have a provision of open as well as covered space.

The area of open space is normally double of the covered area. The covered area is utilized mainly to provide the shelter to the animals to protect them from inclement weather. The floor space requirement (closed area, m²) for 0- 3, 3-6, 6-12 months age kids, adult goats and breeding bucks and pregnant/ lactating goats are 0.20-0.25, 0.30-0.50, 0.75-1.00, 1.50 and 1.5-2.0, respectively. Proper care of newly born kids (up to 30 days), timely colostrum and milk feeding, synchronising kidding in conducive seasons, cleanliness of shade, balance feeding and timely vaccination of kids minimizes kids mortality up to 2-4%.

A study in drought prone area showed that a farmers earned an additional income of ₹ 18,348/year with a 5 unit of goat by proper adoption of improved management practices (Table 4). Goat-based interventions also provided employment to the tune average of 182 man-day/year from a unit of 5 goats.

Formulation of farmer's groups, SHGs cooperative, societies for transfer of technology: Such groups should be

Table 3. Productivity and profit enhancement in Barbari goats under extensive and strategic management system

Characters	Performance of goats in extensive management	Performance of goat with strategic interventions
Kids mortality	25%	<8%
Adult goat mortality	15%	<5%
Lactation period	65 days	110 days
Lactation milk yield	40 liter	65 litre
Body weight at one year	16 kg	22 kg
Kidding interval (KI)	12 month	8 month
Age at first kidding (AFC)	18 month	14 months
Multiple birth (%)	40%	65%
Increase in number of kids/year/goat due to decrease in AFC and KI and increased multiple birth with 5 female	6 kids	9 kids
Number of surplus kids/year (assuming average adult flock size of 5 and 25% kids mortality in Extensive management and 7% with strategic management)	07	11
Net income/goat/year due to increased productivity (body weight, milk yield, kidding rate, Saving due to reduction in age at first kidding, kidding interval) and survivability. (1) Kids for sale increased from 7 to 11. (2) Weight increased from 16 kg to 22 kg/goat. (3) Surplus milk 25 kg @ ₹ 25.4. (4) Survival of adult goat. (5) Declined feed, labour cost due to decrease in AFC, KI	₹ 3,000	₹ 5,000
Income from surplus milk/adult goat/year	Nil	625
Manure @ ₹ 1/goat/day	4,300	5,840
Income from sale of male @ ₹ 4,500 under EMS Income from sale of male @ ₹ 6,000 under SIM on account of higher weight (6 kg)	35,000	66,000
Survival of adult goat (0.6)	-	3,000
Saving of feed and labour on account of reduction in AFC, Kidding Interval	-	5,000
Book value of 5 adult goats	25,000	30,000
Cost/goat/year @rs1550 goat/year (5 adult+7 kid) in EMS (labour, health etc)		
Additional cost @ rs 3000/goat(feed, health, housing) in strategic management	18,600	48,000
Net profit with flock of 05 adult female/year	₹ 16,400	₹ 32,465



Table 4. Impact of improved management practices on income of goat keepers

Parameters	Before	After
Adult goat flock size	5	5
Multiple births (%)	20	45
Survivability (%)	74.5	90
Kids available up to one year	4.2	6.5
Body weight at 12 month (kg)	16.6	24.0
Income (₹) from sale of kids @ ₹ 160/kg liveweight	10,458	25,056
Total milk yield/goat/year	49	83.5
Surplus milk yield(l)(sold/ consumed)	3	37.5
Income from milk@₹20/liter	Fed to kids	3750
Total gross income (₹)	10,458	28,806
Operational cost (₹)/year	2,092/goat	5,761/goat
Net gross income (₹)/year	6,758	23,706
Additional income (₹)	-	18,348
Additional income/goat (₹)	-	3,670
Net income (₹)	1,352	4,741

periodically empowered (credit access, knowledge and incentives).

Development of technologies and models for low cost goat houses: Due to scarcity of space and high of inputs/items cost for goat houses, there is urgent need to conduct research to build multi-layered and low cost outhouses as most of goat keepers are poor.

Manure management: Manure produced from goat is rich source of NPK and has long lasting effect on soil fertility and minimizing soil erosion. Technology pertaining to value addition, storage and utilization of manure should be made available to farmers.

Value addition of goat products increases income and nutrition

Sustained livestock production to provide livelihood and ensure food and nutritional security is dependent on efficient utilization of animal products. Value-added products have great opportunity. Processing of goat products to value-added products can contribute to sustained demand for meat and milk and efficient marketing of these products to earn reasonable returns by farmers. Such added value can be obtained in shelf-stability, improved technological functions, better sensory quality or even more convenience. Today's consumers are no longer fully satisfied with the traditional products, rather they look for variety, nutrients and convenient ready-to-eat products. These convenient items are economical and cost-effective and provide options for changes of menu,

having better shelf-life and acceptability than traditional products. Value addition of goat products may help farmers to increase their products sale and to get more net return.

Mitigation strategies for climate change

Occurrences of natural calamities at regular interval are outcome of erratic climate changes. It decreases productivity, profit and economic stability of goat like other livestock species. Therefore, it is imperative to modify livestock production system such as selection of hardy/resistance breeds (genetic make-up), healthy housing and feeding practices.

Popularization of goat-based business (livelihood) models with different breeds

Recently many educated youth have set-up goat farms on semi-intensive or intensive management. They have handsome earning on regular income with little-bit



problems at initial stage. Goat farmers of eastern region (Bihar, west Bengal, Jharkhand) are switching for northern breeds like Barbari, Jamunapari and Sirohi. Many feedbacks indicated that performance of these northern breed declined up to 35% in hot-humid eastern region climate, therefore farmers are advised to keep good stock of Black Bengal on improved diet. The net profit from different breed in their respective home tract is presented in Table 4 from data provided by commercial goat keepers.

Goat-based integrated livelihood models for rain-fed/disadvantageous regions

Model revealed that a landless / marginal household having 15 adult

Table 5. Goat-based Integrated livelihood models

Models	Unit	Net income (₹)	Suitability for household category	Number of HH covered under trial
Goat+Poultry	15 adult F+ 25 chicks	₹ 82,727 (71,115+11612)	Landless Marginal	64
Goat+ Cow+ Poultry+Crops (Rainfed)	10 adult F+ 2 cows +50 chicks +1 ha.	₹ 100,634 (47,410+22,000+ 23,224+8,000)	Landless Marginal Small	142
Goat+Buffaloes+ Cows+Crop (semi-irri)	5 adult F+ 2 buffaloes+ 2 cows+2 ha.	₹ 109,705 (23,705+34,000+ 22,000+30,000)	Marginal Small Medium large	80
Goat Buffaloes Cows Crop (semi-irri)	10 adult F 2 buffaloes 2 cows 2 ha	₹ 119,000 (47,410+32,000+ 22,000+30,000)	Semi-medium Medium Large	56

female goats and 25 poultry birds may yield ₹ 82,727/year (Table 5). Similarly, a landless/ marginal- and small-household with 10 adult goats, 2 cows and 50 chicks and 1 ha rainfed land may earn ₹ 100,634/year. Marginal-, small- and medium-farmers with 5 adult female goats, 2 buffalo, 2 cows and 2 ha of rainfed land may earn ₹ 119,000/year. Whereas, a semi-medium, medium and large farmer may earn ₹ 119,000/year with keeping 10 goats, 2 buffaloes, 2 cows and crop production on 2 ha semi-irrigated land. These recommended models were highly adopted by farmers of draught prone Bundelkhand region.

MAJOR CONSTRAINTS AND CHALLENGES

Major constraints and challenges responsible for low productivity of goats are discussed here.

Constraints of goat production

Now-a-days goat production is having several constraints like inefficient and inappropriate production system (extensive/zero-input); prevalence of non-descript or poor genetic-make-up of animals and lack of organized breeding programmes; scarcities of feed-fodder which deteriorate the production and immunity of goats and made them vulnerable for diseases; large knowledge gap on improved/strategic management practices and technologies; inadequate space and improper housing of goats. goats were housed predominately in human dwelling and in open under enclosures made up of bushes, shrubs etc. (50-55%); less availability of veterinary services, breeding buck and institutional credit.; high mortality (15 to 40%) due to inadequate prophylactic measures.; inadequate goat-based specialized and integrated livelihood and business models suitable for different agro-climatic conditions and diversified farming systems; and unorganized marketing, distress sale of goat and lack of efforts and infrastructure for

value addition of goat products (meat, milk, skin, fibre, manure etc.).

Challenges of goat farmers under prevailing production system

Under prevailing production system challenges of goat farmers are: acceleration and enhancement of goat productivity and profit; goat keepers are unwilling to keep bucks due to fear of high rearing cost and difficulty in handling/ management of a buck; potential evaluation of about 70% non-descript goat population; perfection in artificial insemination with frozen semen technology; check on uncontrolled slaughter and sale of high potential male; establishment of buck mother farms of different breeds in their respective home-tracts; reduction in feed and fodder cost through technological innovations as expenditure on feed and fodder in goat farming account for more than 60% of recurring cost; checking depletion of grazing resources, uncontrolled grazing and high stocking rate capacity building of uneducated traditional 30 million goat keepers; lack of well trained and experienced trainers; development of low-cost goat shelter and house models suitable for different agro-climatic regions, farming systems under traditional and commercial farming; Monitoring and surveillance of important goat disease and effective health services; Development of dairy goat (3.0 litre milk/ day) for ensuring nutritional security of poor rural people and for marketable products; institutional credit to goat keepers with simple process; and linking production, products and by-products to market. Therefore, existing goat production system needs to be improved substantially by using strategic inputs, value-addition of goat products and careful marketing to harness goat potential, productivity and profitability. The extent to which goat keepers will be benefited will mainly depends at what rate and magnitude semi-intensive and intensive system replace largely



followed extensive management system. Technologies to improve productivity of goats do exist, however, the awareness and rate of adoption is consistently low.

SUMMARY

Productivity of goats is low (75-100% of their potential) and mortality is high (35-50%) because goats in India (>85%) are kept under sub-optimal production conditions (zero inputs). The net income of majority of goat farmers (with zero-input) ranges from ₹ 2,000 to 3,000/adult female goat/year with an average of ₹ 2,500. The ratio of profit: cost mostly ranged from 1.5 to 2:1. However, by providing critical inputs, rearing good potential goats, following improved management practices and smart marketing the productivity of goats could be increased by 90 to 160%. The gross income and net income goat/year will increase from ₹ 7,500 to ₹ 10,000 and 5,000 to ₹ 7,500/goat /year, respectively. The expenditure incurred on necessary strategic inputsetc. on one adult female goat and their kids is ₹ 2,500-3,500/year. Thus goat keepers of India may double their income with in one year by adopting improved management practices, low cost innovative technologies and smartly marketing of goat and their products.

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