

Intensification of Livestock production by smallholder and landless farmers in India

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INTENSIFICATION refers to the increased use of inputs and services to enhance the output quantity and/or value per unit input. Considering the increasing demand of animal products to meet out the requirements of huge population in our country, animal agriculture is now going to face a serious challenge in coming days. It is a fact that the livelihood of majority of population in India is dependent on agriculture. Further, out of total agricultural production, more than 70% is contributed by the smallholders and landless farmers. Improvements in livestock production are an important way to escape poverty. But, due to over exploitation of available resources, constant change in climate, shortage of feeds and fodders etc. decrease livestock production which ultimately result into low income and poor living standard, the livestock owners are forced to shift their livelihood security from rearing livestock to other non-agricultural enterprises where they feel comfortable. In addition, increasing urbanisation, availability of disposal incomes and changing food consumption pattern have enlarged the demand for various livestock origin foods including dairy products. Milk contributes a lion share among all other livestock

production followed by meat. The estimated demand for dairy products will be around 160 million tonnes per annum in 2020. There is an increasing importance of smallholder livestock production systems with milk as the major commodity in mixed farming systems. Also the grazing system contributes very small share, i.e. less than 10%. More than 90% of milk production is generated in mixed-farming systems and the largest share (53.9%) of total meat production is from mixed-farming systems, followed by landless systems (36.8%). Therefore, the importance of mixed systems for livestock production will continue to grow in the near future. New policies need to be formulated to explore the opportunities and to intensify smallholder's and landless farmers' livestock production.

Livestock production systems

Livestock systems worldwide can be categorized for the purpose of targeting research and development based on the integration with crops and relationship to land use into: (i) rangeland based systems; (ii) mixed farming systems, including rainfed or irrigated systems, and (iii) landless systems. These systems encompass livestock production in most of the developing world. Smallholder

producers tend to dominate mixed systems. In India, mixed farming systems are considered as most popular, effective and sustainable because of complementarities between crop and livestock production. Animals meet most of their feeds and fodders requirement from agricultural residues including by-products, and in turn, they provide draught power and dung manure for agricultural production. Livestock production is broadly classified as mixed rainfed, mixed irrigated, grassland and landless/industrial. Mixed rainfed system is practised in our country on 46% of land and mixed irrigated system on 37% land. Whereas, grassland and industrial systems are limited to 4 and 13% of land, respectively. Mixed farming system is facing continuous threat because of increased pressure on livestock for producing more to meet out the growing market demand. In addition, due to mechanization in agricultural operation and small landholdings, the balance between crop and livestock production is disturbed.

Opportunities of intensification for livestock production

To sustain agricultural growth and to fight against rural poverty with small land holding capacity, the

Considering the importance of nutritional security, employment generation for rural youth, contributions of livestock production in national economy and others, small holders and landless farmers must be provided due support / protection from the recent challenges / threats like huge demand of growing human population, over exploitation of available production resources, constant change of climate, shortage of feeds and fodders for livestock, unorganised production systems, lack of proper planning, implementation, lack of support by concerned authorities etc. Therefore, a holistic approach is must at different levels to fulfil the future demand of livestock products, to solve the challenges and to safeguard the poor livestock producers.

growth of livestock production should be faster. Because, under this situation, livestock plays very crucial role as a source of income for small holders and the landless farmers. Products like milk and eggs are steady source of cash income, and live animals are important natural assets for the poor, which can be easily liquidated for cash to meet out any household emergency. Smallholders and landless together control 75% of the country's livestock resources, and are capable of producing at a lower cost because of availability of sufficient labour with them. It is evident that smallholders obtain nearly half of their income from livestock. Growth in livestock sector is thus more pro-poor than growth in other subsectors of agricultural economy. The report of Delgado *et al* (1999) envisaged that by 2020 demand for milk, meat and egg will be 132-140 million tonnes, 8-9 million tonnes and 49700 million, respectively. Besides, increasing globalization of agricultural markets is too opening up significant opportunities to augment export of animal food products.

There are certain benefits of intensification of livestock production which are pointed out as under:

- Meet out the desired requirements.
- Engagement of rural and peri-urban labour throughout the year.
- Maximization in the resource utilization.
- Availability of nutritious and good quality food for households.
- Development of small scale cottage industries for by-products.
- Reduction of rural and urban population drift.
- Improvement in the productivity per unit of land.
- Upliftment in socio-economic condition of weaker sections of the society.
- Establishment of best model through integrated farming approach.

Livestock population and land holdings in India

As per 19th Livestock Census-2012, the number of milch animals (in-milk and dry) and the number of animals in milk in cows and buffaloes

were 118.59 and 80.52 million(m), respectively. The female cattle (cows) and female buffalo population showed increasing trend than previous 2007 census. The exotic/crossbred milch cattle increased upto 19.42 m and milch buffaloes upto 51.05 m, whereas, the indigenous milch cattle increased marginally. The total sheep, goat, pig, camel and donkey population were decreased in the country. On the other hand, the number of horse and ponies and mules were comparatively increased. In 19th Livestock Census, 37.28% were cattle, 21.23% buffaloes, 12.71% sheep, 26.40% goats and 2.01% pigs. Mithun, yaks and horses together contributed 0.37% of the total livestock. Data also indicated that livestock populations were increased substantially in Gujarat (15.36%), Uttar Pradesh (14.01%), Asom (10.77%), Punjab (9.57%) Bihar (8.56%), Sikkim (7.96%), Meghalaya (7.41%) and Chhattisgarh (4.34%).

The population of cattle was decreased by 3.14%, yaks by 8.15%, sheep by 8.37%, goat by 3.18%, donkeys by 28.09% and camels by 22.09% in rural areas. There were positive growths in buffalo with 4.18%, mithuns with 24.56%, horses and ponies with 1.31%, mules with 46.23% and poultry with 15.02% in rural areas. Negative growths in cattle with 18.34%, buffalo with 15.11%, mithuns with 78.10%, sheep with

Table 1. Livestock population (in thousands) in India

Category of Change	Year		Percent livestock
	2007	2012	
Cattle#	199075	190904	-4.10
Buffalo	105342	108702	3.19
Yak	83	77	-7.64
Mithun	264	298	12.88
Total bovine	304764	299981	-1.57
Sheep	71558	65069	-9.07
Goat	140537	135173	-3.82
Pig	11133	10294	-7.54
Horse and ponies	612	625	2.12
Mules	137	196	43.07
Donkeys	438	319	-27.17
Camels	517	400	-22.63
Total livestock	529696	512057	-3.33
Rabbit	424	592	39.55
Poultry	648829	729209	12.39

#Excluding stray cattle;
Source: 19th Livestock Census of India

Table 2. Crossbred/improved animal population in India (%)

Species	Rural		Urban		Total	
	1982	2003	1982	2003	1982	2003
Cattle	4.3	12.5	14.1	28.9	4.6	13.3
Sheep	3.0	9.6	8.1	4.9	3.1	9.3
Pig	8.8	15.5	15.7	19.6	9.2	16.1
Poultry	5.5	46.7	14.2	61.9	7.5	47.9

33.90%, goat with 15.66%, donkeys with 22.29%, camels with 1.80%, pigs with 9.06% and poultry with 25.60% population in urban areas were also the characteristic feature in the census. The positive growths were also noted in horses and ponies with 11.68% and mules with 13.26% in urban areas. Table 2 shows per cent crossbred/improved animal population in India since year 1982 to 2003 (DAHDE, 2012-13).

The ownership distribution of land and livestock (Table 3) suggests that the poor people in our country have a higher stake in livestock income. Livestock producers in India operate on a small scale. On an average, there were 46 in-milk bovines, 85 small ruminants, 167 poultry birds and 6 pigs per 100 households in 1991-92. Scale of production was positively associated with land holding.

Feeds and fodder availability for livestock in India

Good quality feed and fodder with sufficient quantity is necessary to livestock production. In our country, livestock is mainly maintained largely on crop residues, by products and grazing lands. In 2005 it was reported that the consumptions of green fodder, dry fodder and total concentrates were 491, 459 and 62, against the respective requirements of 648, 503 and 87 million tonnes during 2002-2003. India has remained chronically deficit in feed and fodders. The deficit is mainly due to huge livestock population in relation to available feed resources. The National Commission on Agriculture (1976) estimated deficit in dry fodder, green fodder and concentrates to the extent of 49, 53 and 43% respectively for the year 1972-73. Feed deficit, however, declined subsequently due to significant increases in production of

Table 3. Distribution of land and livestock holdings in India, 1981–82 and 1991–92 (%)

Item	Year	Landless (0 ha)	Marginal (<1 ha)	Small (1-2 ha)	Medium (2-4 ha)	Large (>4 ha)	All
Households	1981-82	26.1	41.2	14.5	10.6	7.8	100
	1991-92	21.8	48.3	14.2	9.7	6.0	100
Land	1981-82	0	11.7	16.7	23.5	48.1	100
	1991-92	0	15.5	18.6	24.2	41.7	100
In-milk	1981-82	8.5	37.5	17.0	15.6	21.0	100
	1991-92	3.5	43.5	21.8	17.3	14.3	100
bovines	1981-82	9.3	38.1	16.7	15.0	20.1	100
	1991-92	5.1	46.2	19.3	15.0	14.4	100
Small ruminants	1981-82	7.1	49.0	18.0	15.1	10.7	100
	1991-92	6.4	54.9	19	14.4	5.3	100
Poultry	1981-82	10.1	56.0	20.4	7.5	6.1	100
Pig	1991-92	7.7	49.9	20.4	13.9	8.1	100

Adopted from Birthal and Taneja (2006)

Table 4. Grazing resources in India ($\times 10^6$ ha)

Type of resource	1980-81	1990-91	2000-01
Geographical area	328.7	328.7	328.7
Forests	67.8	67.8	69.4
Permanent pastures and grazing lands	12.0	11.4	10.9
Culturable wastelands	16.7	15.0	13.6
Fallow other than current fallows	9.9	9.7	10.1
Barren and unculturable wastelands	20.0	19.4	19.3
Total CPRs (excluding forests)	58.6	55.5	53.9
CPR as % of geographical area	17.8	16.9	16.4
Permanent pastures and grazing land as % of geographical area	3.6	3.5	3.3
% of gross cropped area under fodder crops	4.6	4.6	4.4
Livestock units ($\times 10^6$)	295.0	327.0	328.0
Livestock units/ha of CPR	5.0	5.9	6.1

Adopted from Birthal and Taneja (2006)

food–feed crops. In 1991 the estimated deficit in dry fodder, concentrates and green fodder were 31, 47 and 23%, respectively. Table 4 represents the grazing resources (in million ha) in India.

Indian livestock production scenario

The livestock sector alone contributes nearly 25.6% of value of output at current prices of total value of output in Agriculture, Fishing and Forestry sector. The overall contribution of livestock sector in total GDP is nearly 4.11% at current prices during 2012-13 (DAHDF, 2012-13). India produces highest milk in the world, which has gone up from 53.9 million tonnes in 1990-1991 to 127.9 million tonnes in 2012-13. It is estimated that by 2020 milk production in our country will reach by 170 million tonnes. The per capita availability of milk has also increased from 176 grams per day in 1990's to 290 grams per day in 2012-13 against the world per capita availability of 289.31 grams per day. This represents sustained growth in the availability of milk and milk products for the growing population

of the country, apart from being an important secondary source of income for rural families. As per reports of Department of Animal Husbandry and Dairying, Government of India, milk has become India's largest agricultural commodity. Among different states, Uttar Pradesh contributes highest (18%) milk of total milk production in India followed by AP and Rajasthan (9% each), Punjab and Gujarat (8% each), Maharashtra (7%) and MP (6%). The average daily milk yield/animal was 4.4 ltrs / animal. The per cent of wet animals has been increased by 69.3% which is about 12% over the last decade. During the year 2009-10, the average daily milk yields per indigenous cow, crossbred cow and buffalo were 2.1, 6.9 and 4.6 litres, respectively. Over the last decade, Indian dairy market has grown by 6.8% and milk procurement price has grown by about 2.5 times.

As per meat production is concerned, about 40% of sheep, 46% of goats and 80% of pigs are slaughtered every year. Slaughter rate for cattle and buffalo is about 2%.

FAO (2013) indicates that India is the fifth largest producer of beef and buffalo meat in the world. At the end of Eleventh Five Year Plan (2011-2012) the meat production touched 5.5 million tonnes. The annual growth rate during 2011-12 was about 13%. The poultry meat production is estimated to be 2.47 million tonnes in 2011-12 (DAHDF, 2012-13). The egg production was around 66.45 billion in 2011-12 (MOFPI, 2012-13). Per capita availability of egg is around 55 eggs per day. India is the seventh largest producer of poultry meat and third largest producer of egg. Total quantity of export meat and meat products from India during 2012-13 is 1.703 million tonnes with the value of ₹ 18,349 crore.

Pre-requisites for intensification of livestock

Following are the basic needs for intensification of livestock enterprise in any particular area or region:

- Basic information regarding livestock, agriculture and allied sectors.
- Infrastructure availability for scientific livestock production.
- Credit availability for purchasing of livestock, feeds, fodders etc.
- Availability of suitable germplasm for the identified area.
- Possibilities of integration among different components.
- Availability of technical and scientific manpower for optimum output.
- Accessibility of reliable marketing of livestock/agricultural products or by-products.
- Economic feasibility of the enterprise.
- Assurance of livelihood security.
- Commitment of Government/non-government organizations and political willingness to implement area and need based policies.
- Recurrence of natural disasters in the area, if any.

Future challenges

Nutritional security and rural poverty are the major problems in the developing countries. As rural people have very little access to land and

thus, they have very limited opportunities for crop production. On the other hand, livestock wealth is more equitably distributed compared to land, and the expanding demand for animal food products generates significant opportunities for the poor to escape poverty through diversifying and intensifying livestock production. During production, these poor livestock producers also face the problems of availability of capitals, quality inputs, scientific and improved technological support, subsidy, local marketing etc. Competitions with commercial producers as well as import from global market are also the major threats to make their farming sustainable. The ability to take advantage of the opportunities resulting from the increased market demand of livestock related products will depend on how supportive the policy is to small holder livestock production and the extent to which smallholders improve their scale of operation and efficiency of production. Number of challenges have to be faced by the small holders and landless labourers during intensive livestock production to make their enterprise more sustainable. Some of the challenges are pointed out are:

- Availability of good quality germplasm for intense production.
- Judicious use of limited resources.
- Very small and fragmented pieces of land.
- Low productivity of animals.
- Non-availability of small scale mechanization.
- Labour crisis.
- Logistic infrastructure.
- Seasonality of production.
- Bridging the gap between supply and demand.
- Availability of manpower for technological guidance at farmers doorstep.
- Market failures in the form of credit, insurance, inputs, technology and information that prevent smallholders from participating in livestock production.
- Competition with world trade market.

- Lack of robust food safety standards.
- Heterogeneous consumer requirements.
- Unorganised market.
- Economic losses from animal diseases.
- Natural disasters etc.

Approach of intensification of livestock production

Resource-poor farming systems should target the improved management of the various livestock species in backyards and small farming systems using locally available resources. Proper management packages for scientific cattle, buffaloes, sheep, goats, rabbit and poultry production are the actual need of the day. Specialised commercial livestock farming systems can only be sustainable with supply of quality germplasm, quality and quantity feed, animal health services service, labour, management, production of hygienic products and adequate marketing. The following approaches may be considered to intensify the profitable livestock production-

- Resources are underutilized in our country due to improper planning and poor management. The approach, to improve the existing situation, should be to intensify small holder mixed farming production system. The improved scientific management technologies for rearing of various livestock species under backyard as well as small farming conditions should be encouraged to augment productivity of diversified livestock.
- Livestock based breeding policy to improve animal productivity in terms of milk, meat, draught power etc.
- Proper management and utilization of grazing land, common pastures, marshy land, unutilized/underutilized land for the production of livestock feeds and fodders.
- Mapping supply chains for marketed animals and their products/sub-products and strengthening those chains that benefit most to the small livestock producers through proper policies.

- Development of marketing facility at the nearest market place to save transport cost.
- Organization of proper animal health programme.
- Training of small producers to prepare homemade low cost concentrate feed using available household ingredients.
- Livestock production through integrated approach.
- Combine of efforts of technology, policy and institutional innovations are required to achieve sustainable and equitable livestock sector growth.
- Research and development for farmers' friendly small scale mechanization.
- Value addition to livestock products through improved processing and transportation facility especially amongst small-scale producers should be emphasized.
- Involvement of co-operatives, private sector, NGOs to strengthen livestock enterprise under PPP mode.
- Government should show long term commitment and political will to support small holders and landless farmers friendly development programmes as they represent a large labour force in developing countries.

SUMMARY

From the available facts and figures, it is evident that livestock sector is the backbone of Indian agrarian economy which is mainly dependant on small holders and landless farmers. The wide variety of livestock species has the capability to produce at their optimum level if they are managed properly. Therefore, a holistic approach is required at every different levels to meet out the future demand of animals products, to solve the challenges and to safeguard the poor livestock producers.

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