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Operationalizing the pro-poor potential of livestock: Issues and strategies

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ABSTRACT

Livestock comprise an important source of income for the poor. The sector contributes about one-fourth to the agricultural gross domestic product and has been growing faster than the agricultural sector as a whole. Livestock resources are more equally distributed than land, and are increasingly becoming concentrated among small landholders. These trends imply that growth in livestock sector has a larger potential for poverty reduction. The fast-growing demand for animal food products is an opportunity to harness this pro-poor potential. The productivity of livestock, however, is low, and growth therein has decelerated in recent years. Reversing this would require a technological breakthrough in genetic enhancement, animal health, and feed and nutrition and strengthening of livestock infrastructure, institutions and service delivery system.

Key words: Livestock, Poverty, Growth strategies

In the past three decades the share of agricultural sector in gross domestic product (GDP) declined from 35% in 1980–81 to 15% in 2010–11. Yet the sector continues to attract considerable attention in policy and academic debates because of its strategic importance to food and nutrition security and potential for poverty reduction. Over 70% of India's population lives in rural areas and over 28% of them are poor (Kumar *et al*. 2011). Agriculture is the main source of livelihood for a majority of the rural population. Livelihood opportunities in agriculture, however, are limited and shrinking. The net cropped area has now stabilized around 140 million hectares, and there is little scope to increase it further. Average landholding size is small (1.2ha) and has been declining. Close to two-thirds of the farm households operate less than or equal to one hectare of land with an average size of 0.38 ha. If agriculture (crop production) were to be the sole source of income or livelihood, a majority of them would have remained poor (Chand *et al.* 2011).

Livestock comprise an important productive asset and source of income for about two-thirds of India's farm households (Birthal 2008a). They help improving livelihood of the poor farm households in several ways. They supply outputs on a continuous basis or with short gestation, hence make a regular source of income for them. During 2007–09, livestock produced outputs (milk, meat, eggs, fibres and dung) equivalent to one-fourth of the agricultural GDP. Animal food products are rich in protein and in many other nutrients, hence improve nutrition of the poor producers and consumers. Contribution of livestock, however, goes beyond income and food provisions. They are a source of draught power for agriculture and rural transportation, and of manure and domestic fuel. They can be raised with small initial investment, and by belonging to the class of natural capital can be reproduced or multiplied within a shorter period to accumulate wealth than can serve as a buffer to cope with income shocks of crop failure or otherwise.

The main aim of this paper is to identify and suggest strategies for leveraging the potential of livestock in sustaining agricultural growth and reducing rural poverty. The specific objectives are: (i) to explore opportunities for growth of livestock sector, (ii) to examine contribution of livestock to agricultural growth and poverty reduction, and (iii) suggest technology, institutional and policy options to harness the pro-poor potential of livestock.

OPPORTUNITIES FOR GROWTH

Livestock play a multi-functional role, depending on the changes in technology, physical and socio-economic environment, and food preferences. With increasing adoption of chemical and mechanical technologies in agriculture and sub-division of land holdings, the non-food functions of livestock (draught power and manure) are becoming less important. On the other hand, sustained income and economic growth, a fast-growing urban population, burgeoning middle-income class, changing lifestyles, improvements in

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transportation and storage practices and rise of supermarkets (in urban areas) are causing rapid changes in food basket in favour of animal food products. The share of animal food products (milk, meat, eggs and fish) in the total food expenditure has increased from 19.7% in 1983 to 24.4% in 2004, while the share of cereals declined from 42.7% to 24.4% (Joshi and Kumar 2011). This change in food basket is all-encompassing— across income classes and locations. During this period, the share of animal food products in rural food basket increased from 17.2% to 23.2% and in urban food basket from 23.8% to 25.4%. This is expected, as the income elasticity of demand for animal food products is comparatively larger for the poor and the rural population.

Per capita consumption of animal food products, however, is low. In 2004–05, the per capita consumption of milk equivalent of dairy products was 85 kg, and of meat, eggs and fish 11.8 kg (Joshi and Kumar 2011). In recent past, the factors underlying changes in food basket have been quite robust and are unlikely to subside in the near future. Between 1991 and 2008, India's per capita income grew at an annual rate of 4.8% and urban population at 2.5% a year, higher than the growth in overall population (1.7%). By 2020, per capita consumption of milk is expected to increase to 106 kg, of meat to 5.0 kg and of eggs to 2.9 kg. And with increasing population, the total demand for milk is expected to be 143 million tons, of meat 6.7 million tons and of eggs 4.4 million tons (Table 1).

In the past, the increasing demand was met through domestic production. Milk production increased from 34 million tons in 1981 to 112 million tons in 2009 (FAOSTAT) at an annual rate of 4.3% making country self-sufficient in dairy products. India rather turned out to be a net-exporter of dairy products from a net-importer until the mid-1990s. During this period, production of meat increased from 2.7 to 4.4 million tons at an annual rate of 1.8%, and of eggs from 0.6 to 3.2 million tons at a rate of 6.2%.

The world demand for animal food products is also increasing, more so in the developing countries. By 2020, demand for milk and meat in developing countries is expected to be 391 and 188 million tons, respectively (Delgado *et al*. 1999). India produces 16% of the global milk output, and its milk production has been increasing almost twice the rate of growth in the global milk production. Expanding global demand is an opportunity for India to enhance exports of dairy as well as other livestock products. During 2005–09, India exported livestock products worth US $ 950 million on average, almost 7 times more than that exported during 1991–95 (FAOSTAT). Buffalo meat accounts for three-fourths of the total exports of livestock products.

India is not an important player in the international market for animal food products. However, it has a positive trade balance in livestock products. There is a growing market for dairy products in India's neighbouring countries such as Bangladesh, Bhutan, Nepal and Sri Lanka which are deficit in milk production and import dairy products to meet their domestic demand.

Table 1. Demand for animal food products to 2020

	Per capita consumption (kg/annum)		Total consumption (million tons)	
	2004–05	2020	2004–05	2020
Milk	91.2	106.5	94.6	143.2
Meat	4.2	5.0	4.3	6.7
Eggs	2.8	3.3	2.9	4.4
Fish	5.2	6.1	5.4	8.2

Source: Joshi and Kumar (2011).

CONTRIBUTION TO AGRICULTURAL GROWTH

Growing demand for animal food products is a potential opportunity for millions of small-scale producers to increase returns from animal agriculture, and contribute to agricultural and economic growth. In the past, livestock sector grew faster than the agricultural sector as a whole. Its contribution to the total value of agricultural sector increased from 18.8% in 1981–83 to 25.5% in 2007–09 at an annual rate of 4.1% as compared to a growth rate of 3.0% for the agricultural sector (Table 2). In 2002–03, the monetary value of livestock products surpassed the combined value of cereals and pulses, and since then it has remained higher in the range of 5–13%.

Performance of livestock was better than that of crops throughout the last three decades (1980–81 to 2008–09). The sector grew at an annual rate of 5.3% during 1980s, almost twice the rate of growth (2.7%) in crop sector. In the subsequent decades, there was a deceleration in growth of all the components of agricultural sector. Livestock sector growth decelerated to 3.9% during 1990s and further to 3.6% during 2000s. Despite, it remained 1.5 times higher than that

Table 2. Annual growth in components of agricultural sector (1999–2000)

	Crops	Livestock	Fisheries	Forestry	Agriculture
% share in agricultural GDP					
1981–83	72.1	18.8	2.8	6.3	100
1991–93	69.2	22.4	3.8	4.6	100
2001–03	67.2	24.4	4.5	4.0	100
2007–09	66.1	25.5	4.7	3.8	100
% annual growth					
1980–81 to 1989–90	2.71	5.33	6.65	–0.05	3.20
1990–91 to 1999–00	2.76	3.86	5.08	1.27	3.04
2000–01 to 2008–09	2.45	3.62	3.37	1.90	2.71
1980–81 to 2008–09	2.66	4.12	5.10	1.10	2.99

Source: GoI (various years).

of the crop sector. This provided a cushion to agricultural growth. It may be noted that livestock are a stable and regular source of income, and thus help smoothen household consumption, particularly during the periods of crisis.

LIVESTOCK AND RURAL POVERTY

In 2004–05, close to 28% of India's population was poor (Table 3). The incidence of poverty was slightly higher among the rural population. As such more than 73% of the total poor were rural poor. Nonetheless, there has been a significant decline in the incidence of rural poverty from 53.1% in 1977–78 to 37.3% in 1993–94 and further to 28.3% in 2004–05. The absolute number of rural poor also declined. The decline in poverty can be attributed to a number of factors including poverty alleviation programmes and agricultural growth. Ravallion and Datt (1996) and Warr (2003) had shown that agricultural growth was a major driver of poverty reduction in India. Studies from many other developing countries have also identified agricultural growth critical to reducing poverty. Cervantes-Godoy and Dewbre (2010) examined nexus between agricultural growth and poverty for 25 developing countries and found that agricultural growth was a more important source of poverty reduction in half of these. In China, the rapid reduction in poverty in the last two decades of twentieth century was due to diversified growth in agricultural sector (Ravallion and Chen 2004).

Growth is necessary but not a sufficient condition for reducing poverty. It has to be looked into in conjunction with distribution of resources— land and livestock. Land is the main source of rural livelihood, and the incidence of poverty is higher among households at lower end of land distribution (Kumar *et al*. 2011) despite that land-scarce households earn their livelihood from multiple sources. Table 4. presents trends in the share of marginal farm households (defined as those operating less than or equal to 1.0 ha of land) in land and livestock resources. In 2002–03, marginal farm households controlled more than half of the country's cattle and buffaloes, two-thirds of small animals (goat, sheep and pigs) and poultry as against their share of 48% in rural households and 24% in land area. Further, they have also consolidated their position in livestock sector. Between 1981–82 and 2002–03, their share in livestock resources increased by 15–25% points and in land by 12% points as against a 7% points in their share of rural household. This indicates a more egalitarian distribution in the livestock sector and implies that even at a similar rate of growth livestock sector would have a larger effect on poverty reduction than the crop sector.

Table 3. Trends in rural poverty in India

	Number of poor (million)		(%) population	
	Total	Rural	Total	Rural
1997–78	329	264	51.3	53.1
1983	323	252	44.5	45.7
1993–94	320	244	36.0	37.3
2004–05	302	221	27.5	28.3

Source: Kumar *et al*. (2011).

Table 4. Share of marginal farm households (≤1.0ha) in livestock and land in India

	1981–82	1991–92	2002–03
Share in rural households (%)	41.2	48.3	48.4
Share in land (%)	11.7	15.5	24.1
Share in livestock (%)			
Cattle	30.0	47.3	53.4
Buffaloes	27.9	35.8	50.3
Small ruminants	38.6	46.2	62.4
Pigs	56.0	49.9	76.8
Poultry	48.8	54.9	63.8

Source: Birthal *et al*. (2006)

Another way to assess the importance of livestock in poverty reduction is to compare their contribution to household income by farm size, % share of livestock in the total household income by farm size (Table 5). More than 62% of the marginal farm households are directly associated with livestock, which of course is less than the corresponding shares among other categories of farm households. Nonetheless, the contribution of livestock to household income is negatively related to farm size. Marginal farm households receive 15% of their income from livestock as compared to 12% by the large farm households. Birthal *et al*. (2008) found that income from livestock is more equally distributed and has an equalizing effect on income distribution.

Compared to their share of agricultural income, livestock have a smaller share in agricultural employment. In 2004–05, livestock production engaged 8.8% of the agricultural workforce, higher than that in 1993–94, and there is hardly any difference in the employment shares of livestock on different farm categories. Nonetheless, livestock production is pro-women. Women comprise more than three-fourths of the total workforce engaged in animal husbandry (Table 6). Most of the animal farming activities, such as fodder collection, feeding, watering, health care, management,

Table 5. Share of livestock in the income of farm households

Landholding size	% households reporting income from livestock	% share of livestock in total income
Marginal (≤1.0ha)	62.4	14.9
Small (1.0–2.0ha)	65.8	15.7
Medium (2.0–4.0ha)	70.3	13.8
Large (>4.0ha)	78.1	12.2
All	64.9	14.4

Source: Birthal *et al*. (2008).

Table 6. Share of livestock in agricultural employment

Land holding size	Share of agricultural employment in rural employment (%)		Share of livestock in agricultural employment (%)		Share of women in livestock employment (%)	
	1993–94	2004–05	1993–94	2004–05	1993–94	2004–05
Marginal (<1.0ha)	73.0	65.2	7.1	9.2	69.4	73.4
Small (1.0–2.0ha)	89.4	88.2	6.1	7.4	72.1	82.1
Medium (2.0–4.0ha)	92.2	90.8	6.8	7.8	72.8	83.1
Large (>4.0ha)	93.1	91.4	7.7	8.6	76.7	82.0
All	78.4	72.7	6.8	8.8	70.5	76.6

Source: Birthal (2008a).

milking and household-level processing are performed by women.

These distribution patterns of livestock assets, income and employment clearly reveal that growth of livestock sector is more pro-poor than the growth of dominant crop sector. However, it may be mentioned that there could be number of reasons for a negative association between livestock and rural poverty, empirical evidence from India as well as some other developing countries suggest that livestock growth could be an important pathway for the poor to enhance their income and escape poverty traps (Ojha 2007, Kristjanson *et al*. 2004). Birthal and Taneja (2006) found rural poverty in India to be more responsive to the growth of livestock sector than the growth of crop sector.

Growth of livestock sector is demand-driven, and is likely to remain so, as the factors underlying demand growth in the recent past have been quite robust and are unlikely to subside in the near future. This is an opportunity for the poor households to diversify towards high-value animal agriculture.

STRATEGIES FOR PRO-POOR GROWTH

India has huge livestock wealth — 199 million cattle, 105 million buffaloes, 212 million small ruminants, 11 million pigs, 649 million poultry birds and 1.8 million animals of other species such as horses, ponies, donkeys, camels, yaks and mithuns (GoI 2010). Their productivity, however, is low compared to that in many developed countries. For example, average milk yield of a cow in India in 2009 was 1.2 tons per annum, which is much less than that in New Zealand (3.3 tons), Australia (5.6 tons), UK (7.1 tons), USA (9.3 tons) and Israel (10.2 tons). Buffaloes are largely concentrated in India and their average milk yield was 1.7 tons per annum in 2009. While the yield is low, growth therein too has decelerated in recent years — from 3% during 1990s to 1.7% during 2000s for indigenous cows, from 2.9% to 0.6% for crossbred cows and from 2.7% to 1.4% for buffaloes. Likewise, average carcass weight of pigs and small ruminants has remained almost stagnant at about 35 and 11 kg, respectively for the past several years.

However, there is a considerable scope for enhancing growth in livestock production through productivity improvements. In case of dairy animals, Birthal and Jha (2005) reported a gap of 25–75% between potential and realized milk yield in different parts of the country, and attributed it to the feed and fodder scarcity, breeding and reproduction problems and diseases. It may be noted that, past growth in livestock production was due to both increase in number of animals and their yield levels (Birthal and Taneja 2006). The deceleration of yield growth in recent years, however, is a matter of serious concern. Given the limited land and water resources, number-driven growth is unlikely to sustain for long. The future growth in livestock sector has to come from technological change duly supported by appropriate policies, institutions and investments.

Breed improvement: Crossbreeding of indigenous breeds, through artificial insemination (AI) using semen of exotic breeds, has been pursued as an important strategy to enhance their genetic potential. This strategy has been successful to some extent in some species such as cattle, pigs and sheep. Now about 17% cattle, 22% pigs and 5% sheep belong to crossbred species. However, the low conception rate (40–45%) is the main problem with artificial insemination particularly in dairy animals. This discourages farmers adopt AI technology. Lack of availability of quality semen straws and their poor storage infrastructure are the main factors for low adoption and conception rate of AI. There are 49 semen stations in the country supplying 50 million doses and 67000 centres for delivery of AI services (GoI 2010). As to enhance the acceptability and efficiency of AI, there is a need to identify quality bulls for semen production and improve semen collection and storage infrastructure, and enhance efficiency of delivery of AI services by making these available at farmers' doorstep. Wider dissemination of sexed semen technology, which at present is in the nascent stage in the country, will provide farmers a choice to produce required number of males or females, and help address problem of surplus animals.

Feed supplies: Livestock are raised in mixed farming systems and obtain their energy requirement from agricultural by-products and residues. Feed and fodder supplies in India, however, have always remained short of their required

quantities. The deficit is estimated 11% in dry fodder, 35% in green fodder and 28% in concentrate feed (Ramachandra *et al*. 2007). Area under green fodder crops has hardly ever exceeded 5% of the total cropped area. Common grazing lands are limited (10.4 million ha) and have been deteriorating quantitatively as well as qualitatively. It may be noted that fodder production and fodder preservation have not received adequate attention in livestock development programmes. Fodder development has rarely received more than 1% of the total expenditure on the livestock sector (Birthal and Taneja 2006).

The need is to enhance production of quality fodder seeds and their dissemination, and rejuvenate pastures and grazing lands. The feed and fodder scarcity, however, is not universal. There are regions such as Punjab and Haryana that are surplus in rice and wheat straws; and a considerable proportion of these is wasted due to mechanical harvesting and threshing. This wastage can be avoided if the surplus straws are compacted into feed blocks and transported to deficit regions. Another option is to promote technologies, such as urea treatment that enhance quality of straws.

Animal health infrastructure: There has been considerable improvement in animal health infrastructure in the past three decades. Yet, many diseases like Foot and Mouth Disease (FMD), Black Quarter (BQ), *Peste des petits* ruminant (PPR), Influenza, Brucellosis, etc. are still widely prevalent. In 2010, India had close to 55000 veterinary institutions (polyclinics, hospitals, veterinary aid centres) and 34500 field veterinarians, mostly in the public sector. Animal health and services account for over 25% of the total public expenditure on livestock; the delivery of services remains poor. Further, the emphasis in animal health remains on curative treatment rather on prevention. There is a need to aggressively pursue prophylactic measures to manage diseases and production losses, and to enhance efficiency of animal health services through public-private partnership.

Investment: Livestock sector did not receive as much attention in agricultural policy as it deserved. The sector has remained under-invested; it has hardly received 12% of the total public expenditure on agriculture and allied sectors (Birthal 2008a), which is disproportionately lower than its contribution to agricultural gross domestic product. Most of the investment comes from state governments. The central government contributes only around one-tenth of the total expenditure.

Between 1990–91 and 2004–05 total public spending on livestock sector more than doubled from ₹ 14009 million to ₹ 29435 million (at 1993–94 prices), and spending per standardized livestock unit from ₹ 45 to ₹ 96 (Birthal 2008a). Dairying had remained the main focus in livestock development programmes, receiving over 40% of the total livestock expenditure until 1999–2000 (Birthal and Taneja 2006). Its share, however, has come down to 27% in 2008–09. Animal health and veterinary services account for almost a similar share of expenditure. Small ruminants, pigs, fodder development, and veterinary education, research and training have received trivial investment, not even 2% each of the total investment. The corollary to this is that there is a need to target efforts and investments towards development of feed and fodder, pro-poor small animals, and education and training of the livestock producers.

Institutional credit: Credit plays an important role in asset accumulation, and adoption of improved technologies and quality inputs. Unfortunately, share of livestock in the total agricultural credit has hardly ever exceeded 5% (Birthal 2008a). This is an indication of the limited outreach or the neglect of the animal husbandry by the financial institutions. Animal husbandry credit is treated as investment credit, meant primarily for purchase of animals and equipments and construction of cattle shed. Investment credit often is advanced against collaterals and carries a higher rate of interest as compared to short-term crop loans (except the livestock advances in the government sponsored schemes). Poor households lack assets to offer as collateral, and capital to purchase feed, fodder, medicines and other inputs. Further, animal husbandry remains excluded from innovative credit delivery schemes, such as *Kisan Credit Cards*. Hence, there is a need to enhance credit flow to livestock sector as to harness its pro-poor potential.

Insurance: Institutional mechanisms to protect animals against risks are not well-developed. Currently, only 6% of the animal heads (excluding poultry) are provided with insurance cover (Birthal 2008a). The Government of India initiated a subsidized livestock insurance scheme in 2006, which is now operational in 300 districts. The scheme is applicable only to cows and buffaloes yielding at least 1500 litres of milk per lactation. The subsidy is restricted to two animals per beneficiary, and for a maximum period of three years. Its performance, however, is not encouraging. In 2010–11, the scheme could cover only 0.9 million dairy animals. The poor performance is because of its restrictions on numbers and quality of animals, and the period of insurance cover. Though insurance premium is subsidized, the poor cannot afford to pay it lump sum. In order to enable them to access insurance services, the existing schemes should be made flexible in terms of period of insurance cover, number and quality of animals insured and payment of premium. Besides, private insurance companies should be encouraged to provide livestock insurance.

Extension system: Efficient delivery of technologies, inputs, information and services can profoundly influence growth and distribution in livestock sector. Livestock extension services in India are very weak. These, to a limited extent, are provided by the public sector veterinarians, and the outreach is extremely limited. Only 5% of the farm households have access to information on livestock technology (Adhiguru *et al*. 2009). It may be mentioned that as livestock production systems become intensified and

commercialized, livestock services will be demand-driven and client-oriented. It is, therefore, necessary to create a cadre of qualified livestock extension workers in the public sector and promote public-private partnership for delivery of information and services.

Markets and value addition: Access to markets is critical to speeding up commercialization of livestock production. Lack of access to markets may act as a disincentive to farmers to adopt improved technologies and quality inputs. Except for poultry and to some extent for milk, markets for livestock and livestock products are thin, underdeveloped and dominated by informal intermediaries, who often exploit producers. There are about 2000 markets for live animals. Most of these are irregular and uncertain, and lack basic infrastructure and facilities. Likewise, slaughtering facilities are also inadequate. There are about 2600 registered slaughterhouses in the country. About half of the total meat production comes from un-registered slaughterhouses. Marketing and transaction costs of livestock products are high taking away 15–20% of the sale price (Birthal 2008b).

Dairy cooperatives have played an important role in improving farmers' access to markets. There has been a significant growth in milk procured by dairy cooperatives. Between 1980–81 and 2009–10 the number of dairy cooperatives increased from 1,32,84 to 1,40,227, number of farmer-members from 1.75 million to over 14 million and milk procured from less than one million tons to 9.4 million tons. Their success, however, is limited to a few regions (Birthal 2008a) especially Gujarat, Maharashtra, Karnataka and Tamilnadu. Private processors procure almost a similar quantity of milk as do the cooperatives. These secure milk supplies from producers through contracts. Contract farming has been reported to reduce price uncertainty, marketing and transaction costs, and provide farmers an easy access to inputs, technology, credit and services (Birthal and Joshi 2009). Contract farming has been quite successful in poultry as close to two-thirds of the total broiler production in India is now through contracts. Contract farming has also been accompanied by scaling-up of the production systems (Birthal 2008b).

Despite growth in production, the value addition to livestock products has remained low. Only about 6% of the poultry meat, 21% of the buffalo meat and 35% of the milk is transformed into value-added products (GoI 2005). Bulk of the poultry and buffalo meat is processed in the organized sector. The share of organized sector in total milk processed is 63%. By 2015, the level of organized processing is targeted 30% for milk, 45% for buffalo meat and 25% for poultry meat.

Livestock sector offers considerable opportunities for small-scale producers to enhance their income and escape poverty trap. The extent to which the pro-poor potential of livestock can be harnessed will depend on how technology, institutions and policies address the constraints that small-scale producers face. In the past, growth of livestock sector came largely from increase in livestock numbers. The productivity is low and growth therein has decelerated in recent years. And, given the limited land water resources, the number-driven growth may not sustain in the long run. The future growth would have to come from improvements in animal productivity. This will require enhancing feed and fodder supplies and improvements in delivery of animal health and breeding services. Technology will be a key driver of growth; and concerted efforts would be required to generate and disseminate yield-enhancing and yield-saving technologies.

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