Livestock Value Chains: Prospects, Challenges and Policy Implications for Eastern India

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Livestock Value Chains: Prospects, Challenges and Policy Implications for Eastern India

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Introduction

India has one of the largest livestock sectors in the world and the largest livestock population with 520.6 million head. Of the world's livestock population, cattle contribute 12.7%, Buffalo 56.7%, goats, 14.5% and sheep 5.9 % (FAOSTAT, 2008). Livestock constitutes a natural asset for the poor that can be liquidated when required. Hence, it is a store of wealth and an insurance substitute during times of crisis. India's economy has not only grown but transformed. In the agriculture-based economy, the agriculture sector's share in total gross domestic product (GDP) declined. In 1980, the share of agriculture sector in total GDP was at 34 percent. It came down to only 16 percent in 2007-08 (GOI, 2008). Between 1991 and 2008, the country's total population increased by 1.6 percent annually, but the urban population grew at a faster rate of 2.4 percent. Real per capita income also rose by 4.8 percent annually. Throughout India's economic transformation, the livestock sector consistently contributed to about five percent of total economic output (Figure-1). Between 1981 and 2006, the livestock sector grew at the rate of 3.9 percent annually much faster than crop sector growth of 2.8 percent. Both contributed to a growth rate of about three percent annually for agricultural value added during the same period (national accounts statistics). In 2007-08, the livestock sector contributed to 26.5 percent of agriculture GDP increasing from 14 percent in 1980-81 (GOI, 2008). During 2009-10 the contribution of livestock sector in agricultural GDP was 29.64% (GoI, 2010).

There has been uneven growth in the livestock sector in India, leading to an unequal distribution of benefits and the need to differentiate approaches to further development. For example Operation Flood-revolutionized smallholder dairy development in the country, and overtime laid the ground for private sector participation in the dairy industry. However, most of the investments, and consequently the impacts, occurred in only few states. As a result, at least two situation of livestock development are found in India today.

(i) Leading livestock producing states, such as Punjab, Haryana, Gujarat, and Tamil Nadu, where livestock activity is increasingly a more commercialized and market-driven enterprise.

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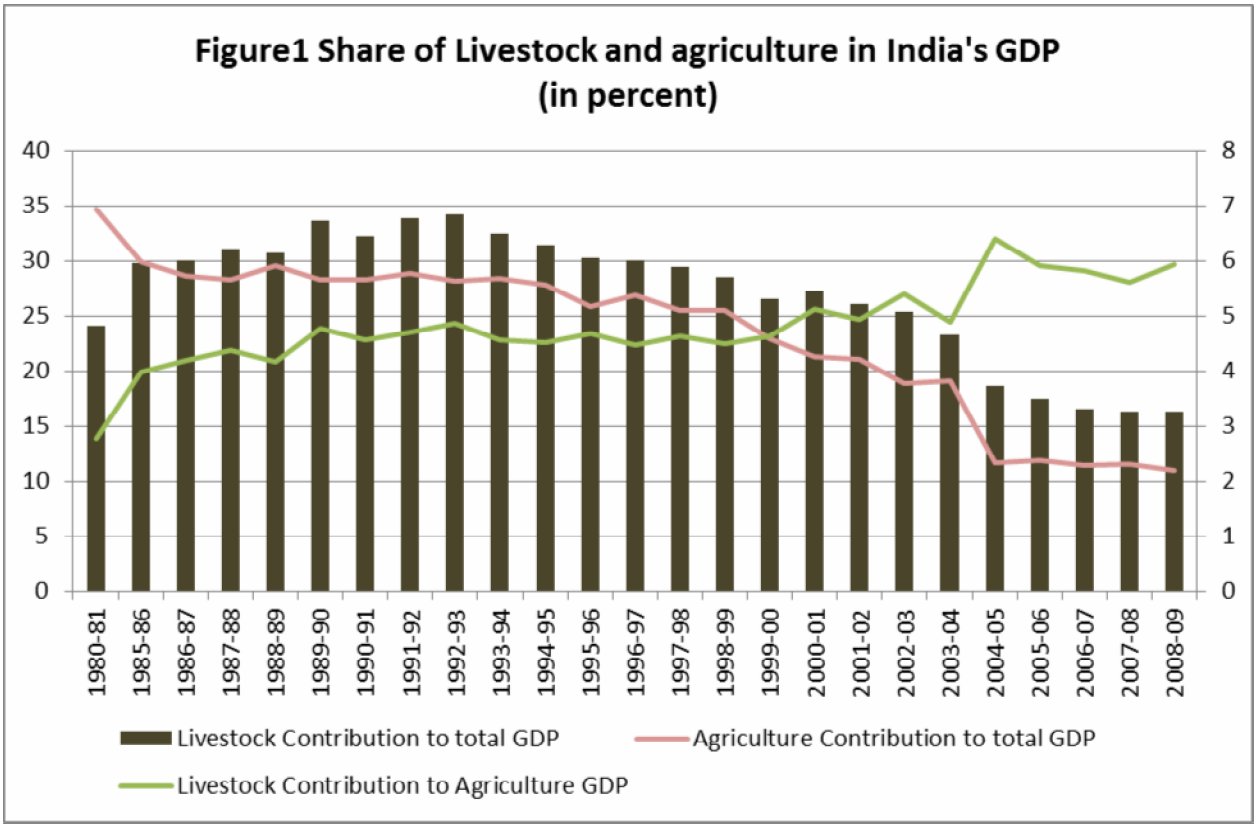
(ii) Lagging livestock producing states-Such as Bihar, Orissa, Assam etc. where livestock activity continues to be mainly subsistence driven and livelihood-based, characterized by low levels of animal productivity and low contribution to overall agricultural output.

Livestock contributes less and the level of rural poverty is significantly higher in the lagging states. Hence, promotion of livestock activities in the lagging regions that have potential but have hitherto been neglected is necessary to ensure more equitable and inclusive approach to livestock sector development across the country.



Source: Basic Animal husbandry Statistics, GoI, 2010.

2. Livestock Marketing and Value Chains

Livestock systems represent a potential pathway out of poverty for many smallholders in the developing world. The majority of the world's rural poor, and a significant proportion of the urban poor, keep livestock and use them in a variety of ways that extend far beyond income generation (Randolph et al., 2007). In many cases, livestock are a central component of smallholder risk management strategies (Bailey et al., 1999). Livestock products have highly distributed production systems located far from consumer markets and they are, highly perishable. Thus, they require highly efficient marketing and processing along their entire value chain—from production to consumption—to realize their best value. Marketing and processing activities are even more critical in India since most livestock producers are small, resource poor,

and often unable to establish their own linkages with markets, processors, and consumers; . Even after decades of economic development in India, the marketing of livestock and livestock products remains largely unorganized, traditional, and fragmented, with a few exceptions.

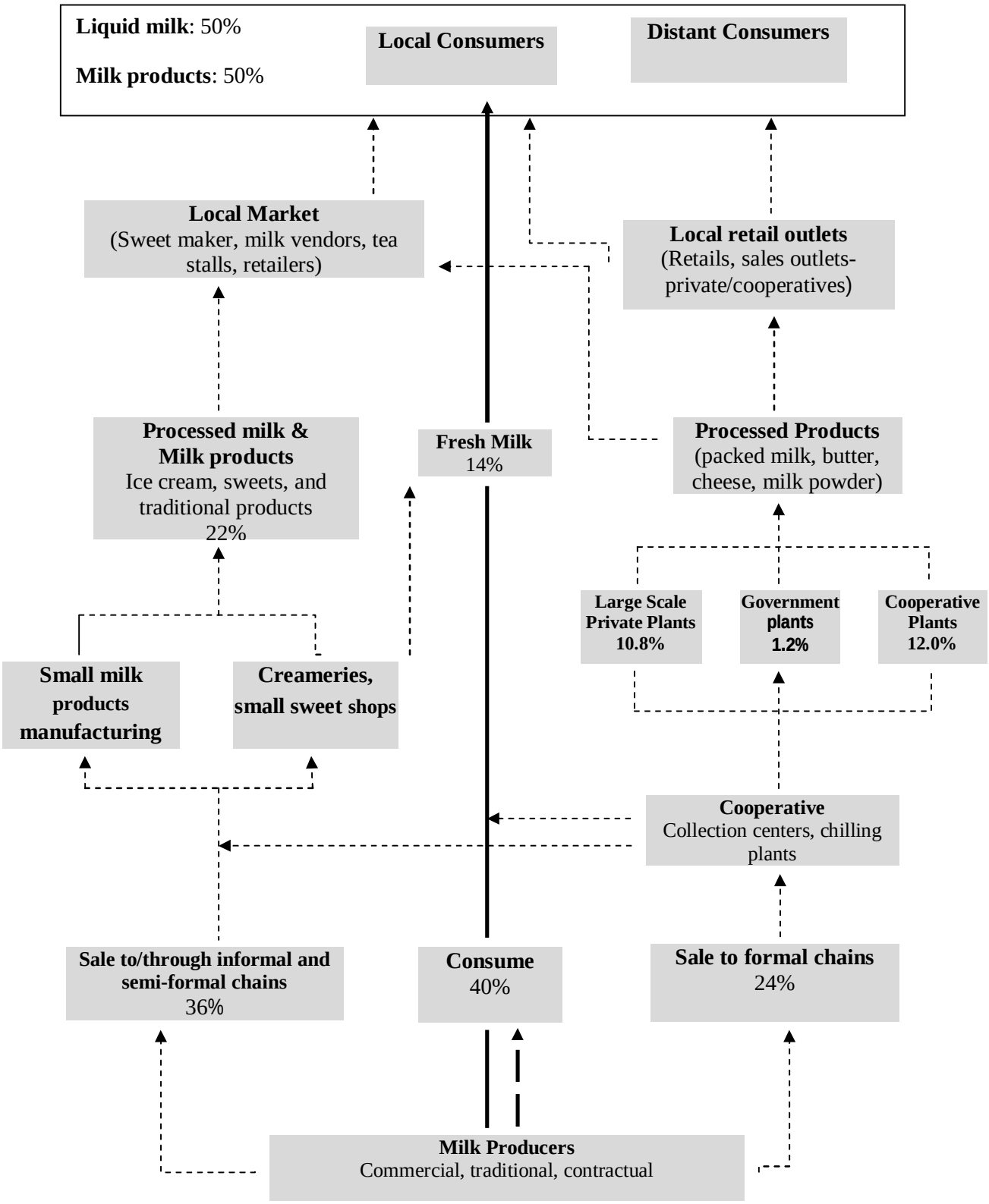
2.1 Dairy Value Chains

The milk and dairy products are, by far, the largest constituent of the livestock sector in India. India has now become the world's largest milk producing nation, and its dairy market today is worth Rs. 2500 billion (Gandhi and Zhou 2008). Total milk production in 2007-08 was estimated to be 104.8 million tons. In 2004-05, liquid milk comprised about 92 percent of consumer expenditures on dairy products. It is broadly estimated that over 50 percent of milk production is consumed as fluid milk, about 25 percent is converted into butter or *ghee* (clarified melted butter), ten percent into milk powder, seven percent into *paneer* (cottage cheese) and other cheeses. The rest goes to other dairy based products such as *dahi* (yogurt), sweet meats, and in recent years, ice cream (Gandhi and Zhou 2008). Milk moves from producers to consumers through various value chains that vary depending on the state and the production system. **Figure-2** gives a general map of the main value chains through which milk flows from producers through processing and value addition to consumers. Informal and semi-formal chains are generally short and primarily serve local markets, while formal chains are longer and link producers with local and distant consumers. It is estimated that nationally about 40 percent of milk output is consumed by producers themselves and 60 percent is marketed—36 percent through informal chains and 24 percent through formal chains managed by cooperatives, the private sector, and government parastatals.

Value chain approaches can play a significant role in characterizing the complex networks, relationships and incentives that exist in the livestock system. Kumar et al., (2011) has synthesizes the experiences of various authors on the value chains of livestock products presented during the 18th, Agricultural Economics Research Association, Annual Conference on *"Value Chains of Agricultural Commodities and their Role in Food Security and Poverty Alleviation"* held at National Academy of Agricultural Research Management (NAARM), Hyderabad. The study highlights the broader perspectives of value addition in the Indian dairy sector and the potential of value addition in milk through manufacturing of different types of dairy products. The salient findings presented by the various researchers are as:

A comparative analysis of costs on milk procurement, processing, manufacturing and marketing of dairy products in the co-operative and private dairy plants in Tamil Nadu revealed that procurement cost of the co-operative dairy societies was higher than of the private milk collection centres. However, the cooperative dairy plant was more efficient in the manufacturing of toned milk, standardized milk, full cream milk and ghee, whereas the private dairy plant had an edge in manufacturing of butter and skimmed milk powder. The success of dairy value chain through self-help group is evident from Madhya Pradesh state. Farmers could get better returns on developing value chain through a self-help group.

Figure 2: General map of main dairy value chain in India



Source: World Bank, 2010

The economic analysis of dairy marketing in Kanpur, Uttar Pradesh reported the producer's share in consumer's rupee under different channels in different seasons. The producer's share in consumers' rupee has been reported to be 80–98 per cent in these milk marketing channels. The entrepreneurial behavior of dairy farmer in Uttar Pradesh revealed that most important factors such as management orientation, farm decision making, leadership ability, achievement motivation and self-confidence had higher factor loading. The technical efficiency of dairy farming of members of a co-operative and non-members in Haryana shows that technical efficiency level of dairy co-operative farmers has been found considerably higher (79%) than of non-member dairy farmers (66%). The scene in the eastern state of India shows that the milk marketing chains and their implications for farmers and traders in Bihar shown that despite growing presence of modern milk supply chain, the traditional milk supply chain is still in dominance in Bihar. The traditional milk marketing seemed to offer good opportunities for the small and resource-poor milk producers and traders.

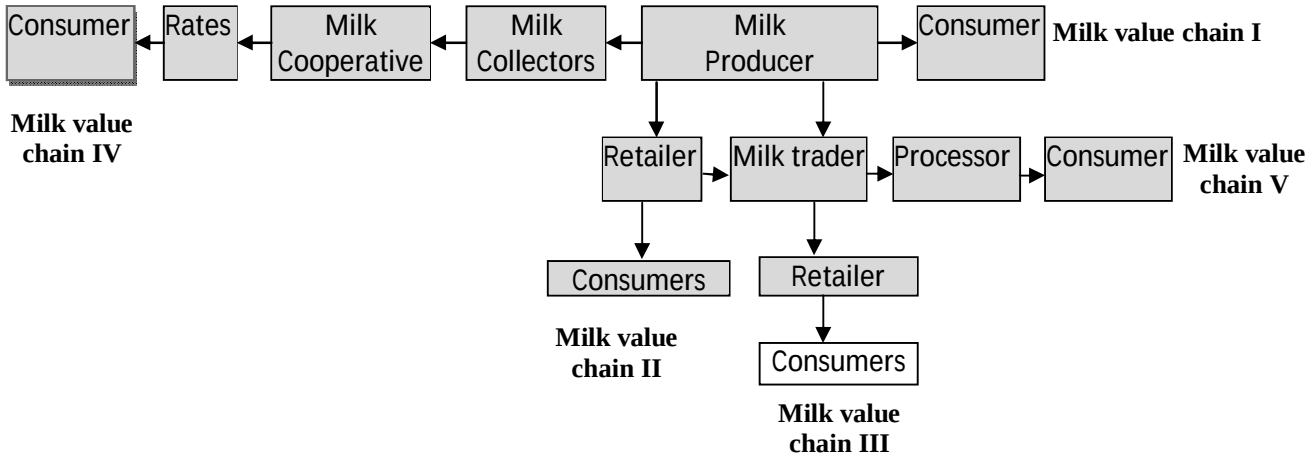
2.2 Dairy Value Chains in Eastern India: Case of Bihar and Orissa

In terms of milk yield, productivity per animal as of 2003 in Bihar was 417 kg/year and 218 kg/year in Orissa—among the lowest rates in the country and considerably below the national average. In recent years, milk productivity has reportedly gone up. In terms of *per capita* milk availability, at the national level it is 246 gm/day. In Bihar and Orissa, the figures are 163 gm/day and 104 gm/day, respectively, whereas Punjab has the highest per capita availability at 961 gm/day. The Bihar State Cooperative Milk Producers' Federation Ltd. (COMFED) implemented Operation Flood in Bihar following the Anand model, and it is now the apex organization for dairy cooperative societies and unions. COMPFED is the largest player in dairy business in the state and has developed a fairly integrated supply chain for liquid milk and other dairy products. COMPFED's achievements include outreach, increasing milk procurement, product and market leadership, provision of support services, and the resulting higher incomes for producers. COMFED is currently working in 21 of the 38 districts in Bihar, and covers about 7 percent of the marketable surplus, collecting 477,000 litters of milk per day. By comparison, Gujarat's milk producers' federation, which ranks first in the country, procured 7592 TKPD in 2007/08. Nearly 6,544 dairy cooperative societies (DCS) have been organized in Bihar and their membership topped 322,000 in 2007/08. However, because of low animal productivity and other problems such as floods in some of the milk-producing areas, Bihar's average daily milk procured per society is approximately 96 kg/day, which is only slightly higher than low-producing Orissa at 86 kg/day. Around 15 percent of members of co-operative societies are women, 9 percent belong to scheduled castes and tribes, and 48 percent are from underprivileged groups. The social and gender composition of the DCSs suggests that COMFED has been able to reach some the poorest sections of the population. The Orissa State Cooperative Milk Producers' Federation Limited (OMFED) works in all 30 districts of the state (table 36). It has 8 milk unions and some 2932 functional village DCSs with more than 166,000 members. OMFED has a high percentage of women members, a little less than half of total member and the highest percentage in the country. Currently, milk procurement is approximately 8- 9 percent of the total state production.

2.3 Milk Marketing and Value Chain: Case of Eastern State-Bihar.

Kumar et al. (2010) conducted a study in Bihar and surveyed a sample of 225 households rearing cattle and or buffaloes. Results reveal that, only 145 households (64.44%) reported producing milk during the survey period. The rearing of cattle and or buffalo is not necessarily a market-oriented activity, given the strong household demand for consumption of milk and milk products, which are protein staple in a largely vegetarian society. Out of these 145 milk producing households, only 75 households reported selling milk through one or more of the marketing chains, namely individual consumers, private traders/milk vendors and dairy co-operatives/formal private milk processor. Different milk marketing chains in Bihar are depicted in Figure-3. In India, milk production is dominated by small holder producers having only a few buffaloes or cattle, in systems closely integrated with crop production through use of crop residues such as rice and wheat straw. The marginal and small landholders account for about69 per cent of the total milk production in the country (Birthal, 2008). Similar to the structure of milk production at the national level, the milk production in Bihar is also predominated by small landholders. Landless, marginal and small landholders accounted for 64 per cent of total milk production and 69 per cent of marketed milk in Bihar. Based on herd size, a similar pattern was discernible. In Bihar 78 percent of milk production and 67 per cent of marketed milk was contributed by the households having one or two milch animals.

Figure 3: Different value chains in Bihar

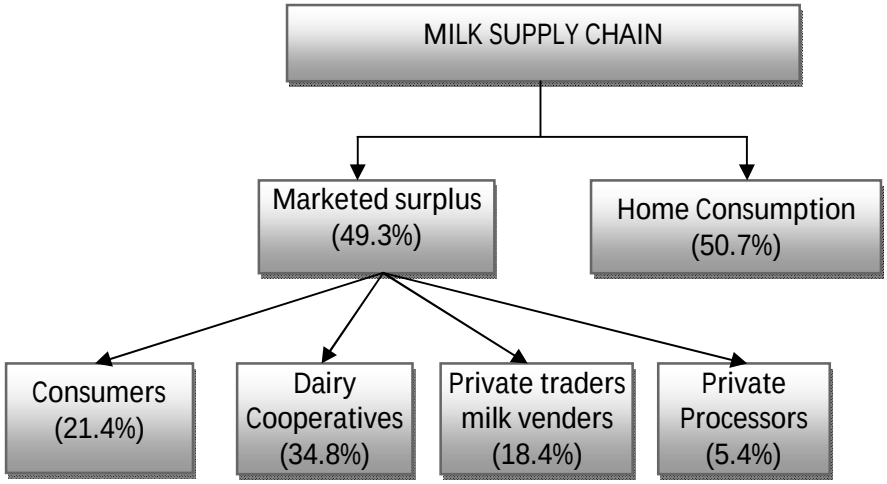


Source: Kumar et al. 2010

The extent of marketed surplus gives an indication about commercialization of the activity. About 49.3 percent of the milk was being marketed while 50.7 percent was being retained for domestic consumption. The milk supply chain (Figure-4) presents a mixed picture in Bihar. Private informal traders turned out to be the biggest buyer of marketed milk (38.4%) in Bihar, closely followed by dairy co-operative societies (34.8%) and consumers (21.4%). Formal private

processors accounted for 5.4 per cent of marketed milk in Bihar. Direct marketing to consumers was a significant component of milk marketing chain in Bihar. About 21 per cent of marketed milk was sold directly to consumers. The higher proportion of direct sale of milk to consumer can be attributed to the fact that in Bihar only 40 per cent of the rural households are engaged in milk production activities (Kumar, 2008).

Figure 4: Milk supply chain in Bihar



Source: Kumar et al. 2010

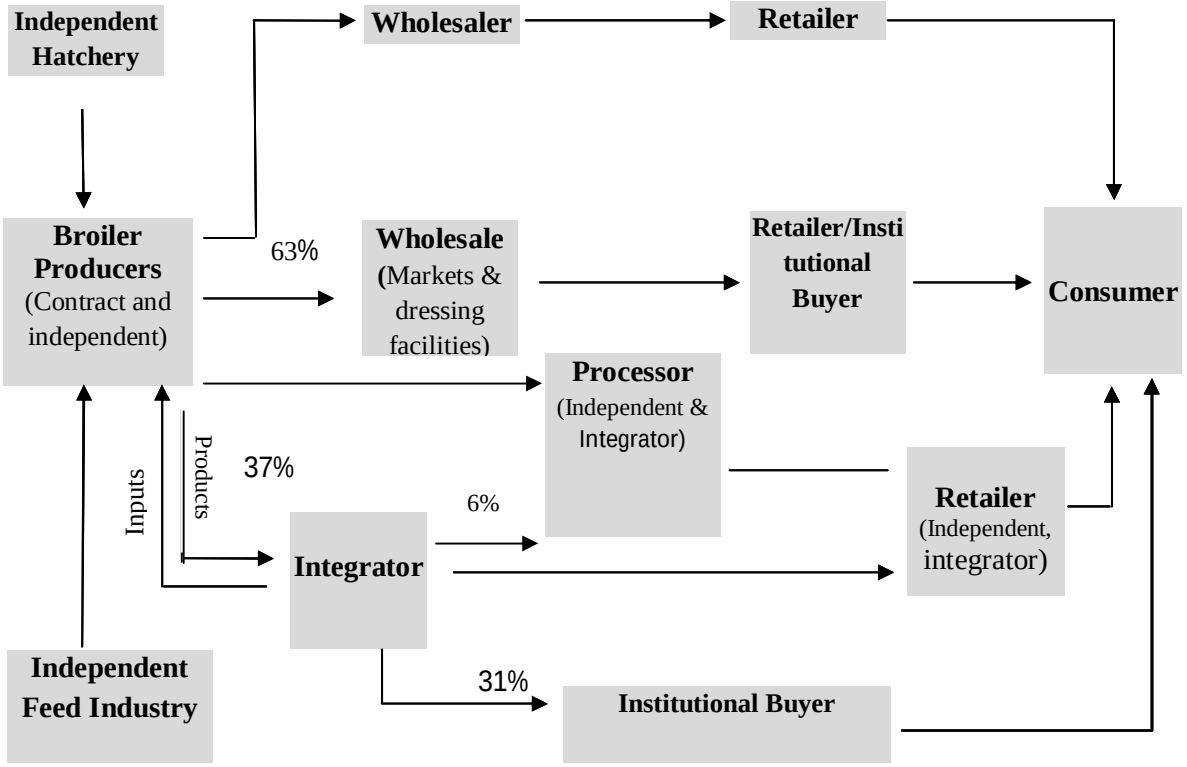
Study reveals that the dairying appeared to be a profitable venture. On an average, milk producers selling milk through traditional milk marketing chain make a profit of Rs 2.98 per litre of milk production. The profit from milk production turned out to be considerably higher in case of farmers linked with modern milk supply chain (Rs. 4.71/litre). There is not much difference in the prices paid for milk by traditional and modern milk marketing chains. However, the farmers linked with modern milk supply chain could reduce cost of milk production (per unit) and thus were able to raise their profitability. This may be attributed to the reduction in transaction cost in acquision of inputs and services, adoption of better breeds and improved management practices by linking with modern milk supply chain. However, the household income generated from dairying in the study area is meager (Rs.43/day to Rs.94/day). This is attributed to the lower herd-size and consequently, the lower scale of production. This holds true for farmers irrespective of their linkage with the milk marketing chains. Since this activity is profitable and the demand for milk and milk products is growing rapidly, there is enough scope to upscale milk production activities. The up-scaling would substantially help to enhance the household income of the milk-producing households. Further, the constraints which have been preventing the expansion and intensification of dairying in spite of its profitability need to be identified and ameliorated. Lack of knowledge on the marketing partly leads to the inherent poor agricultural commodity marketing in India and other developing countries. One of the major problems is the lack of storage and processing facilities for the perishable and seasonal agricultural commodities (Bani, 1995).

2.4 Poultry Value Chains

The poultry development in India has taken quantum leaps in the past three decades. Much of the success of the poultry sector is attributed to greater vertical integration among the Stakeholders of poultry value chain. The broiler supply chain in the national capital region of Delhi has been found that the producers received a larger share of consumer rupee in the unorganized sector as compared to that in the organized sector. The study has also assessed the pros and cons of manual dressing vis-à-vis mechanical processing of broilers and has also estimated the cost of processing in the two systems. In Maharashtra, the evidences of the gains of value chain through poultry contract farming through contract companies show that per unit return has been testified to be higher in the case of contract farmers than non-contract farmers. Institutional innovation in the form of contract poultry farming in Andhra Pradesh-the case study of Sugna food evident that gains to the contract growers in comparison to non-growers were much higher. The contract farmers were reported to shift their risks to the contractor and were also able to have better access to latest technologies and know-how. The role of poultry value chain in food security and poverty reduction in India is evident. The prospect of import, export and price competitiveness for eggs in India show that India has comparative advantage in exporting eggs to many countries including Germany, Indonesia, Denmark, Korea, South Arabian, Japan, etc.

Rapid transformation occurred in poultry value chains led by the private sector. The introduction of contract farming in broiler production has been the most important organizational change. Until the mid-1980s, backyard scavenging poultry kept by smallholders on mixed farms used to supply the majority of poultry meat and eggs. Live birds and eggs were marketed through traditional value chains involving a few intermediaries—like collectors, wholesalers and retailers—but without processing or value addition. Rapid transformation occurred since then with increased commercial production of poultry using improved technology (breeds, feeds and management), which also led to the development of new types of value chains led by the private sector. **Figure-5** gives a general map of major value chains for broilers currently operating in the country. Only 6 percent of total poultry meat goes through value-added processing, mainly in the form of dressed broilers. The modern poultry processing sector includes 10-12 firms that together process about 12,000 tons of poultry meat annually, or 1-2 percent of consumption, and they mainly serve various fast food, hotel, and restaurant chains (Landes et. al., 2004). The rest of the poultry is sold as live birds through different retail outlets mainly in wet markets (traditional, open markets).

Figure 5 General value chains for broilers and poultry meat in India



Source: Adapted from Gandhi and Zhou (2008); Consultant report (2008b, 2008d)

The introduction of contract farming, especially in commercial broiler production, has been the most important organizational change in the poultry value chains. It is believed that contract farming takes market downside risks and bird disease risks away from the producers. In 2004-05, 37 percent of total broiler production in the country took place under contract arrangements. Contract arrangements may be of different types. Under fixed fee contract the contractor or the integrator provides all the inputs and services except labor and land, and has full ownership of the output while producers provide land and labor for which they receive a predetermined fixed fee or income. Special provisions for sharing disease risk may be included in the terms. In other arrangements, the contractor provides all inputs and services, often on credit, and buys back the output but there may be different ways of sharing price and disease risks with or without insurance cover. Tamil Nadu, Karnataka, Maharashtra, and Andhra Pradesh produce 41 percent of total broiler output in the country, and 78 percent of it is under contracts.

2.5 Goat Marketing and Value Chains in Eastern States

Goat meat is the most heavily consumed in the rural areas because poultry development is still limited to the urban and peri-urban areas. There are two types of markets for goats: rural *haats* close to villages and large markets close to the city area. According to World Bank (2010) in Bihar, 75 percent of the retail shops are on the roadside, with hardly any amenities of water supply or electricity and no basic norms of health and hygiene. The scale of operations was low, with the average retailer selling around 25 animals per week. In Orissa, an average retailer sells about 150 animals per week with better amenities: *pucca* shops with basic amenities of water and electricity. Because of the high demand, shopkeepers are interested in upgrading the hygiene and cold storage facilities to enhance their business. Middlemen often bring goats from the farmers' households to rural and urban markets. There are four types of middlemen involved in the goat chain: (a) collector/primary trader; (b) secondary trader; (c) commission agents (who bring buyers and sellers together in large markets); and (d) big traders. Again, survey data suggests that in Bihar, 75 percent of farmers sold their goats to traders/primary collectors at their doorstep for cash at what they regarded to be a low price. The main reasons for undertaking doorstep sales was uneconomic scale (with an average holding of 2-4 goats it was not worthwhile going to distant markets), lack of market information, perceived lack of transparency in price setting in weekly markets, sense of weak bargaining power in the market, and the fear of bringing animal back unsold. The goat skin from Bengal goats is of high quality and attracts a premium price in the leather industry. Some industrial houses have, therefore, shown interest in the promotion of Bengal goats with the objective of improving the quality of their skin. This can help to increase the returns from the goat farming.

2.6 Marketing and Processing of Hides and Skins

Indian leather industry is concentrated in a few states but raw materials collected from around the country are of poor quality. The leather industry has 125 medium and large-scale firms, and about 1,200 small-scale firms. Also thousands of tiny tanneries in rural areas process raw hides and skins before selling them to larger tanneries for proper processing. Three states—Tamil Nadu, Uttar Pradesh, and West Bengal—account for more than 80 percent of the country's leather output. Tamil Nadu alone accounts for about 50 percent of production, largely because it allows the slaughter of cattle. Hides and skins are traditionally collected from villages and towns and transported to major terminal markets. In recent years, tanneries have also started collecting skins from the district-level markets and urban areas. The quality of hides and skins retrieved from slaughterhouses is usually poor due to improper slaughtering and skinning. In addition to absorbing domestic supplies, the tanning industry imports skins to increase capacity utilization (Chawla et. al. 2004).

3. Challenges for Livestock Value Chains in Eastern India

3.1 Challenges for dairy sector

National production levels of milk and other livestock products have increased exponentially over the last two to three decades and per capita availability of these products more than doubled over the same period. A key driver of increased supply was the increase in demand. As the economy grew and incomes rose, the share of livestock products in households' expenditures increased. The livestock sector is an integral part of the farming system in the economy, driving agricultural growth, and providing employment to more than 20 million people, particularly women. Livestock sector development is not only important for overall economic growth, but essential for lifting a large number of rural households, who depend on the sector for living, out of poverty. Notwithstanding the past success achieved, the Indian livestock sector is facing renewed development challenges which need to be squarely addressed for the sector to achieve its full potential. According to the World Bank (2010), the challenges before the Indian livestock value change are as;

1. ***Low margins for dairy producers:*** Data gathered during this study suggests that the average net income per day from dairy enterprise is very low. This is the result of three distinct factors: (a) low milk productivity from animals with low genetic potential; (b) poor health, feeding and husbandry practices; and (c) low prices offered by largely inefficient milk cooperatives. This analysis also shows considerable scope to enhance producer incomes from dairy by enhancing animal productivity, improving management practices, and ensuring more remunerative prices.

2. ***Marketing channels remain traditional.*** More than 85 percent of marketable surplus in milk is sold through informal channels, especially private traders in the unorganized sector and direct sale to other farmers. This is especially in the case in Bihar (table 37). This is in sharp contrast to the leading dairy states where there has also been a marked shift from cooperative to corporate sector. Regarding prices, data from a value chain analysis (VCA) survey shows that farmers received the lowest prices from milk cooperatives and the best from sales to other farmers.

3. ***Dairy cooperatives' marketing shows weakness.*** The performance of dairy cooperatives in Orissa and especially in Bihar is weak with respect to various indicators of effectiveness such as:
    - share of marketable surplus going to cooperatives;
    - prices received by farmers;
    - transparency in pricing;
    - share of consumer price going to farmers;
    - availability of services to farmers; and
    - Professional management of the state federation.

Only 15 percent of the villages in Bihar are covered by dairy cooperatives. Survey evidence suggests that the prices paid (Rs. 9-11 for cow milk and Rs. 13-14 for buffalo) are very low, especially given high demand for milk and rising feed prices. Prices set by cooperatives become the benchmark for other market operations, and hence have a pervasive effect on depressing dairy incomes. Pricing is sometimes based on one composite sample per society, which sets the price for that society. This is different from other collection systems in India, where a sample is taken from every producer's milk can, tested for fat content, and priced accordingly (e.g., Gujarat). This practice is seen by some farmers as less remunerative for higher fat contents and has prompted some of them to remove some of the fat from the milk and sell it separately to brokers and/or directly to consumers.

4. ***Volumes and margins at the collector level****.* Both in Bihar and Orissa the scale of milk collection operations is small—e.g., cooperative societies collecting between 45-50 liters per day in Bihar and80 liters per day in Orissa. The margins realized by different types of collectors (collector for private diaries, collector for cooperative societies, and local private traders) vary between 20-30 percent of price received by producers (Rs. 2-3). Given the low volumes involved, milk collection is done essentially through family enterprises with little external capital or labor inputs, either in the form of hired labor in milk collection or equipment/facilities to process or transport over long distances. Consequently, value-addition opportunities, which are considerable given the prevalence of milk based products in popular diet, are not exploited. Given the very small marketable surplus with individual households it is necessary to build institutions that can vertically integrate small and scattered producers with livestock product processors.

3.2 Challenges for goat sector

Goat value chains produce low returns, but improvements are possible. The challenges are mentioned by World Bank (2010) are as;

1. ***Health Services***. In Bihar, only 25 percent of goat-rearing households surveyed reported having access to vaccinations; these were mostly in areas around Patna city where veterinary clinics were providing vaccinations free of cost. Also, about 50 percent of farmers reported access to primary health care and first aid, through veterinary centers in areas around the city and community health workers in the interior areas. Nevertheless, there is much more scope to enhance these services in the interior parts of the state.

2. ***Credit.*** Access to institutional credit is very poor. Credit is typically available from informal sources— money lenders, relatives, friends and traders—and mostly for agricultural purposes and social needs. Hardly any credit was availed for livestock purchase, and it was almost impossible to get credit for small ruminants. Thus, strengthening alternate approaches to credit through women self-help groups, etc. could be very helpful for the development of this sector.

3. ***Marketing – early sale by small farmers***. In the case of Bihar, the average age of goats coming to the market is between 6-12 months (approx 9 kg body weight/6kg dressed meat),

where a majority of the goats coming to the market are below 10 months of age. Average price received per goat is around Rs. 500. In Orissa, most of the goats sold were between the ages of 12-14 months, with an average selling price of about 1040. In both the states, the sale of animals is mostly in the nature of distress sale to overcome some immediate crisis. However, selling goats at a very young age does not allow the farmers to capitalize on the optimum returns.

4. ***Small Scale of Production***. In the case of Bihar, the average animals sold per farmer is only about two. There is scope to introduce semi-intensive scale of operations, up to 10 animals per household. Also, if the goats are reared for up to 18 months instead of the usual practice of selling goats at below 10 months, the farmer returns can be much higher, up to Rs. 10,000 per year from goat rearing.

5. ***Small Scale Trading and Marketing***. In Bihar, the collector who goes door to door to collect animals, have to travel large distances and is able to collect and sell about 15 goats per week. In the case of the trader and retailer, the average number of animals sold are about 25/week. *Low Returns*. Returns to goat rearing for small farmer are low: approximately Rs 1.50 per day per goat in Bihar and Rs 3 in Orissa. The goats are reared on grazing and mostly children and women are involved in goat rearing. Goats are usually used to get immediate income in times of immediate need for money. There is need and scope to transform this into more income generating opportunity

4. Policy Issues and Way Forward

Problem area, policy recommendations, needed supportive measures, expected outcomes and risks are summarized in table-1 for the development strategy. Strategies for exploiting the potential for livestock sector growth need to be based on recognition of the existing uneven development among states. The development challenge in the lagging states is to capitalize on the potential for growth in livestock which entails elaborating a strategic framework for livestock sector development that would encourage movement towards a broad-based and market-oriented production system in the lagging states. In eastern states, appropriate policy and incentive structures need to be created to attract private sector and other sources of investment. In making policy and investment strategy, the comparative advantage of each lagging state in different commodities—dairy, poultry, ruminant meat, pork and hides and skins—should be objectively assessed and fed into prioritization, rather than trying to develop everything in each state. Public expenditures on the livestock sector should increase in real terms to be more in line with the contribution of the sector to GDP.

Policies on public expenditure should vary between leading and lagging states depending on the degree of development of the livestock sector and the degree of market orientation for livestock inputs, services and outputs. In the leading areas, private sector firms may be able and willing to provide services for a profit that only the public sector can and will provide in the lagging areas. Expenditures on research, education, and training are essential public goods for

generation of new technologies, inputs and institutions to commercialize production systems. Yet they are meager and have increased only marginally over time. There is need to strengthen research-policy-extension linkages and provide incentives for multidisciplinary systems research. Better coordination among various central and state government agencies collecting macro statistics should be increased to increase complementarities and compatibility of data, thus make better use of scarce resources. Access to credit and insurance services should be enhanced significantly as finance is a major constraint for investment in improved technologies. The absence of an integrated approach to provision of credit and insurance services works to the disadvantage of not only smallholders but also for potential entrepreneurs interested in setting up livestock farms on a commercial scale. However Constant policy support and infrastructure development will be required in the leading states for further intensification and specialization of production systems to increase productivity, produce better quality, and safer products to respond to changing domestic and long-distance markets.

Traditional milk processing seems to offer good opportunities for the small and resource-poor milk producers and traders to enhance their income. The traditional milk sector should be addressed in a constructive manner and the policies should be evolved which would allow informal players improve their performance including quality control and their integration with the emerging modern milk supply chains (Kumar et al. 2010). Since the concepts of value chains and value chain analysis have been evolving in India, the need of clarity on various issues was felt unanimously. Therefore, there is great need for developing the conceptual framework for value chain analysis and addressing the issues and concerns related to value chains for different agricultural commodities. The issues to be addressed in due course of time are:

- The institutional requirements to ensure inclusiveness of resource-poor farmers in agricultural value chains should be examined.
- The pathways for scaling up of successful value chains should be identified.
- The contribution of technology, policy, institutional and infrastructural facilities to the development of value chains in agriculture should be assessed.
- The role of information in value chain development should be studied and modes to enhance farmers' access to information should be evolved.
- There is a need to assess the roles of various externalities (social, economic and environmental) in commodity-specific value chains.
- There is a strong need to undertake different capacity building programmes like organization of trainings, demonstrations, awareness generation, exposure visits and farmer-scientist interactions on different aspects of agricultural value chains.
- Capacity building in the participatory risk assessment for improving quality and safety along the value chain should be encouraged.
- Farmer-friendly communication networks should be established to transform Indian farmers from being information-poor to information-rich.
- Strengthening of farmers' linkage with markets should be accorded high priority.

Table 1: Development strategy for markets, institutions and value chains

Problem area	Recommendation	Supportive Measure	Expected outcome	Risks
• Cooperative dairy value chains in lagging states perform poorly. • Private sector dairy and poultry industries are concentrated in a few leading states. • Poor quality and safety standards of products is a problem for export as well as for higher end domestic market. • Information on characteristics and constraints of emerging value chains highly inadequate. • Development projects on cattle, small ruminants and pigs are production oriented without attention given to market and demand to assure remunerative price and income.	**Govt. of India** • Create incentive structures for investment in lagging states to reduce gaps in development. • Harmonize rules, regulations and regulatory authorities, in collaboration with state governments, to strengthen public monitoring of hygiene standards. • Make more investment for improving hygiene standards. • Undertake more research on input and output markets including export. **State governments** ⍰ Give considered support to cooperatives and other forms of collective action in lagging states but take measures to improve efficiency. ⍰ Make proactive measures to encourage private sector investment in lagging states. ⍰ Try to link new investment with both local demand, which may be small in the beginning, and supply shortages in some leading and high growth states. ⍰ Expand investment for expanding export of ruminant meat both for export earnings and as a mechanism to increase off take rates, which will indirectly resolve problems of inadequate feed supply and inefficient feed utilization.	**State Governments** ⍰ Facilitate research and assessment of market and investment potentials to guide public and private sector investment in the sector. ⍰ Give attention to market regulatory authorities, in collaboration with state governments, to strengthen public monitoring of hygiene standards. ⍰ Make more investment for improving hygiene standards ⍰ Undertake more research on input and output markets including export. **State governments** ⍰ Give considered support to cooperatives and other forms of collective action in lagging states but take measures to improve efficiency. ⍰ Make proactive measures to encourage private sector investment in lagging states. ⍰ Try to link new investment with both local demand, which may be small in the beginning, and supply	⍰ Greater efficiency in market performance and benefits for all actors in value chains ⍰ More functional market links between leading and lagging states ⍰ Reduction of regional and inter-sate inequality in livestock development	⍰ Limited size of markets in smaller lagging states may be a constraint in attracting private sector investment

		shortages in some leading and high growth states. Expand investment for expanding export of ruminant meat both for export earnings and as a mechanism to increase.		

Source: Adapted from World Bank (2010).

Conclusions

In XIth Five Year Plan (2007-12), Govt. of India emphasized that large quantities of animal products now being produced, research on process technologies, value addition, packaging, storage, transportation, and marketing should receive high priority. Indian markets for livestock products are by and large unorganized, traditional and fragmented, except for components of organized milk, meat and by-products sectors. About 60 percent of the milk produced is marketed with only one-fourth of the marketed milk handled by the organized sector. The rest is sold through unorganized informal chains where the compliance with safety standards is usually limited, and risks of contamination may be higher. As livestock products are highly perishable and require immediate processing, storage and preservation, to move them from production areas to demand centers. Processing and market linkages are therefore prerequisites for value creation and addition. Dairy development has followed a well-established organizational model producing a product for which local demand continues to grow. Successful adoption of the Anand model and the support from the National Dairy Development Board (NDDB), in training and capacity building have led to increased milk production and procurement. It has also contributed to increase outreach to the poorest sections of the population. In general dairy cooperatives have developed an integrated supply chain for liquid milk and other dairy products, provided support services, and increased income for their members. However the success was not widespread. Milk marketing through liberalizing, provide the opportunities for increased private sector participation in milk procurement and processing. This has led to improved competition which helped coops to accept challenges and address some problems that had previously contributed to their inefficiency.

The private sector has not however shown the same interest in the lagging states (with the exception of few individual initiatives) for various reasons, including poor infrastructure, weak producers' organizations, law and order issues, and other governance concerns. Contract farming has become the dominant mode of production in the broiler industry, while independent enterprises remain dominant in the layer industry. There has been significant scaling up of production units in both broiler and layer industries, including contract production units. However, the higher degree of specialization and the increased economies of scale and size in poultry production, in addition to the concentration of both the dairy and poultry industries in few states have seriously limited the opportunities for creating wider geographical

impact through participation of a larger number of smallholders, especially from the lagging states in the newly developed value chains. Regional inequality in development can stifle the overall development potential of the sector. The dairy value chains can be popularizes though the SHG approaches. Improving supply chains and operations will enable stakeholders in India to enhance competitiveness and successfully deploy growth initiatives. The need is especially acute for small and resource-poor farmers as well as entrepreneurs because of their small operational bases and greater vulnerability to unforeseen shocks. Since this dairying activity is profitable and the demand for milk and milk products is growing rapidly, there is enough scope to upscale milk production activities. The up-scaling would substantially help to enhance the household income of the milk-producing households. Further, the constraints which have been preventing the expansion and intensification of dairying in spite of its profitability need to be identified and ameliorated.

Meat processing in India is confined to slaughter and dressing of carcasses for fresh meat output, used for direct consumption, and slaughter and dressing are often carried out in the open air under highly unhygienic conditions. There are many slaughter houses throughout the country, owned by the local self-governments, most of them dirty and dilapidated, just for rendering fresh meat. Value addition in meat is limited and includes small quantities of meat meant for export, poultry products and to a much lesser extent, pork products. Export is still a minor activity but has good potential. Export can be an alternative route to increase off-take rates to improve productivity and solve feed problems, but achievement of that will require investment to improve quality of output. The hides and skin industry benefited from low wage and lax environmental regulations and enforcement in the country. There are opportunities for expansion in this industry subject to addressing the environmental impacts. There is a perceived increase in the demand for quality, safety, variety and convenience along with increases in quantity demanded. But overall, quality and safety standards in all value chains – dairy, poultry, ruminant meat, hides and skins- are in need of improvement, though these issues have been receiving more attention in leading states and within private sector operations. The marketing of livestock products through unorganized channels tends to increase the products' safety risks and reduces its quality. Quality and safety standards in domestic and export value chains are managed through a number regulations and implementing authorities with little coordination amongst themselves.

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