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India

Livestock Sector Review: Enhancing Growth and Development

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South Asia Region



Currency Equivalents

Currency Unit = Rupees (Rs)

Average Exchange Rates

(Rs/US \$)

	1990	1991	1992	1993	1994	1995	3/1996
Rs/US \$	17.50	22.74	25.92	30.49	31.37	31.42	34.45

Weights and Measures

li	-	liter
ha	-	hectare
kg	-	kilogram
mt	-	metric ton
pc	-	pieces

Abbreviations and Acronyms

APMA	-	Agricultural Product Markets Acts
APEDA	-	Agricultural and Processed Food Products Export Development Authority
CPR	-	Common Property Resource
CBPP	-	Contagious bovine pleuro-pneumonia
DCP	-	Digestible Crude Protein
DGFT	-	Directorate General for Foreign Trade
DM	-	Dry matter
EOU	-	Export oriented unit
GOI	-	Government of India
ICAR	-	Indian Council of Agricultural Research
IRDP	-	Integrated Rural Development Program
MEF	-	Ministry of Environment and Forests
MMPO	-	Milk and Milk Products Order
NABARD	-	National Bank for Agriculture and Rural Development
NAFED	-	National Agriculture Cooperative Marketing Federation
NCDC	-	National Cooperative Development Corporation
NDDB	-	National Dairy Development Board
NECC	-	National Egg Coordination Committee
NWDB	-	National Wasteland Development Board
OF	-	Operation Flood
SMP	-	Skim milk powder
WMP	-	Whole milk powder

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INDIA
LIVESTOCK SECTOR REVIEW:
ENHANCING GROWTH AND DEVELOPMENT

EXECUTIVE SUMMARY

1. **Sustained Economic Growth Opens Demand-Led Opportunities for Livestock Sector.** India's program of reform and economic liberalization opens significant market-led opportunities for the livestock sector. Sustained economic growth and rising domestic incomes are driving the rapid growth in livestock product demand. This has fostered the rapid expansion of livestock output in recent years. Between 1985 and 1992 the value of livestock output grew by 6 percent a year in real terms, from Rs 196 billion to Rs 302 billion (1985 rupees). The dairy and poultry industries contributed the major share of this growth. By 1990, livestock accounted for about 32 percent of the total value of agricultural output. Revenue from exports of live animals and livestock products¹ grew even faster, at 13 percent a year in real terms, from \$1.1 billion in 1987 to \$1.8 billion in 1991.

2. **Livestock Sector Growth is Poverty Alleviating.** Sustained growth in the livestock sector has a significant beneficial impact in generating employment and reducing rural poverty. More than 630 million people (74 % of the population) live in rural areas.² Of the total households in the rural areas, about 73 percent own livestock. Income from livestock production accounts for 15-40 percent of total farm household incomes. More importantly, small and marginal farmers account for three-quarters of these households, raising 56 percent of the bovine (cattle and buffalo) and 62 percent of the sheep populations.³ Thus, increasing livestock product demand will be a major factor raising incomes in the rural areas in general, and of the rural poor in particular, provided that India's productivity is internationally competitive.

3. **Sustained Growth of Livestock Sector Requires Policy Reforms to Promote Increased Productivity.** The ability of the livestock sector to meet future consumption growth and to contribute to poverty reduction will require the elimination of policies and regulations that hinder productivity growth at the farm and processing sectors. Increasing the productivity of the processing sector will benefit both producers and consumers by raising farm prices and lowering consumer prices. It will also enable the livestock sector to remain internationally competitive. The recent liberalization of external trade in livestock products heightens the importance of improving the efficiency of the domestic processing industry in order to remain competitive with imports. This is particularly important to the dairy sector, because of the recent liberalization of skim milk powder and butter oil imports (para 14). In view of the potential for imports to depress producer prices, and adversely affect the 30 million--mostly poor-- dairy farmers, it is critical that all available opportunities for increasing marketing efficiency be explored in order to reduce the

¹ Livestock products include live animals, meat and meat preparations, dairy products, eggs, and leather and woolen products.

² G. Datt, "Poverty in India: 1951-91," World Bank Policy Research Working Paper, forthcoming.

³ Small farmers own less than 2 hectares, marginal farmers own less than 1 hectare.

currently high marketing margins. The beneficial impact of such measures to farmer's welfare would be further strengthened by improved incentives for the uptake of technologies which enhance productivity and further improve farm profitability.

4. **Singular Focus of Public Expenditures on Dairy Sector is not Sustainable.** Since the 1960s public spending on livestock has been concentrated in the dairy sector. Between 1974 and 1991, the sector received about \$1 billion from the government under the five-year plans, \$1.13 billion under five World Bank project loans, \$480 million in government grants to the National Dairy Development Board (NDDB), and \$1.15 billion in food aid to the NDDB (in 1990 dollars). During this period dairy accounted for nearly 5 percent of total central government spending in agriculture. State government expenditures on dairy over the same period likely totaled an additional \$5 billion (1990 dollars). While these expenditures helped to more than double milk output (from 23.9 million mt in 1977 to 56.4 million mt in 1991), such outlays for a single sector are not sustainable over the long term. More important, structural and policy constraints inhibit the more effective use of these funds and discourage private investments in the dairy sector.

5. **Livestock Development Needs to be Balanced with Environmental Conservation.** Livestock has been one of the causes of environmental degradation in India. The growth in livestock populations, coupled with shrinking grazing areas, has put intense pressure on existing pastures, encouraged encroachment into forest lands, and contributed to the degradation of land resources. Moreover, livestock processing, particularly leather processing, also has been a major cause of industrial pollution. While livestock development activities generate significant benefits, it must be balanced with environmental conservation measures.

6. **Agenda for Promoting Growth.** Livestock could play a strategic role in promoting rural growth and reducing rural poverty. This study, the first World Bank livestock sector review since 1975, was undertaken at the government's request to identify key issues and recommend policy directions and investments to promote the livestock sector's growth and development (see the matrix at the end of this summary). Promoting growth and increasing marketing efficiency in the livestock sector will require reforms at both the central and state government levels. The most pressing issues include:

- ◆ Creating a level playing field for all market participants in both output (dairy and meat) and input markets (feed and veterinary services). This will require liberalizing dairy and feed marketing and promoting private participation in the delivery of animal health and breeding services.
- ◆ Phasing out remaining trade restrictions on feeds and livestock products, while paying close attention to progress made in the restructuring of the domestic processing industry;
- ◆ Integrating livestock development within a framework of environmental conservation. This goal will be best achieved by increasing the participation of local institutions in addressing degradation problems in common property resource areas.

A. The Livestock Sector and the Economy

7. **Livestock Fulfills Many Roles in the Rural Economy.** The livestock sector plays a significant role in the welfare of India's rural population. The sector employs eight percent of the country's labor force, including many small and marginal farmers, women, and landless

agricultural workers. Milk production alone involves more than 30 million small producers, each raising one or two cows or buffaloes. Livestock provides a large share of draft power, with about half the cattle population and 25 percent of the buffalo population being used to cultivate 60 million ha of crop land (or about 30 percent of the total cultivated area). The organic fertilizer produced by the sector is an important input to crop production, and dung from livestock is widely used as fuel in rural areas. Livestock also serves as an insurance substitute, especially for poor rural households; it can easily be sold during times of distress.

8. **Livestock Product Consumption in India Still Low by International Standards.** Per capita consumption of livestock products in India remains low. For example, per capita milk consumption is about half the level in the US and Australia, while per capita poultry meat consumption is about 12 percent of per capita consumption in China. Beef consumption is extremely low compared with other countries, but this is mainly due to sociocultural factors; for religious reasons, a large portion of the population does not consume beef. These sociocultural factors also affect the consumption of buffalo meat. Livestock products, however, are an important component of consumer budgets. Poor rural consumers spend up to 15 percent of their budgets on animal products (dairy, meat, eggs and fish). Poor urban consumers spend up to 19 percent.

9. **Increasing Per Capita Incomes Expected to Boost Livestock Product Demand.** Sustained economic growth and attendant increases in per capita incomes are expected to boost livestock product demand substantially. Recent estimates of livestock product demand in the year 2020, assuming that the economy consistently grows at 5.5 percent per year, and population growth, price and income elasticities of the past ten years remain stable, indicate that demand for milk will increase by a factor of 10 to about 497 million mt by 2020. Demand for eggs and poultry meat will increase by a factor of 7 to 7.21 million mt and 1.35 million mt respectively, while demand for mutton will increase by a factor of 8, reaching 2.5 million mt. If output growth rates between 1980-92 are maintained, poultry, beef and mutton demand growth will be adequately met by domestic supplies.⁴ If the dairy output growth rate is maintained, a domestic milk deficit of almost 200 million mt is expected. Meeting domestic consumption growth, therefore, poses a particular challenge for the dairy sector. If Indian dairy farmers are to capture the demand-led growth opportunities, policy changes are necessary to foster efficiency and productivity growth at the farm and processor levels.

B. Increasing Livestock Marketing Efficiency Critical To Meeting Future Growth in Demand

10. **Operation Flood (OF) has been Successful in Jump-Starting Dairy Sector Development.** Operation Flood was launched in 1970 to promote the integrated development of the dairy sector. Its primary objective is the creation of farmer-owned and farmer-controlled organizations based on the Anand pattern of cooperative development. In setting up dairy cooperatives, the OF sought to capitalize on the beneficial features of cooperatives. The cooperatives would (i) provide farmer members an assured market for their output which is critical for a perishable commodity like milk, (ii) enable farmers to directly share the benefits

⁴ During the 1980-92 period the average annual growth rate 5.6 percent for milk; 6.6 percent for eggs; 6.5 percent for poultry meat; 3.5 percent for mutton.

from the returns generated by the cooperative, and (iii) offer a farmer-controlled mechanism for delivering essential support services such as technology transfer. The National Dairy Development Board (NDDDB) was established to oversee the planning and implementation of the program.

11. OF has been successful in spreading the dairy cooperative concept and providing an important demonstration effect on the potential for dairy development in India. In its 25 years, Operation Flood replicated the cooperative model in more than 200 districts. In 1993, 8.4 million member farmers (estimated to be about one-third of the total dairy farmers) were supplying 5 million mt of milk to 65,000 milk cooperative societies, who in turn deliver the milk to 170 milk unions for processing and marketing.⁵ The successful demonstration effect of the dairy cooperative movement has encouraged private sector participation in the dairy industry. The non-cooperative private dairy processing sector currently handles about 80 percent of marketed milk. The cooperative movement has also served as a check and balance for private dairy marketing activities.

12. **Many Cooperatives Perform Poorly.** In the 1990s, a large number of cooperatives were found to be performing poorly. A 1994 World Bank review of 117 cooperatives receiving assistance under the World Bank National Dairy Project II found that 52 percent incurred losses. During the two year period 1993-94, the 117 cooperatives incurred combined losses of Rs 1.1 billion (\$37 million), which had to be covered by budgetary transfers from the center and state budgets. In view of the problems of fiscal imbalances in the central and state governments, continued subsidization of the dairy cooperatives is not sustainable.

13. **Continued Protection of the Dairy Sector Maintains Inefficiencies in Processing Industry.** Three key measures were undertaken by the GOI to promote the development of the nascent dairy cooperative sector. Protected as an "infant industry," dairy product imports were canalized through the NDDDB until 1994 to shield the sector from competition from cheaper imports. Only imports in the form of food aid were allowed to enter the country and proceeds from the sale of the food aid were appropriated exclusively by NDDDB to finance its cooperative development efforts. In addition, domestic competition from the non-cooperative private sector was limited by the Industries Development and Regulation Act, 1951, which restricted entry into the dairy industry through licensing. In the context of liberalization, the licensing requirement was abandoned in 1991, only to be re-introduced in 1992 under the Milk and Milk Products Order (MMPO), in response to political pressure.

14. Although the MMPO was amended in 1993, several key regulations were retained which will inhibit incentives for increased competition and efficiency in the dairy industry. These include: (i) licensing of all enterprises processing more than 75,000 liters of milk per day or greater than 3,750 kg a day of milk solids, with the license renewable every five years; (ii) new processors must develop their own milkshed or milk collection area and cannot encroach on cooperative milksheds; and (iii) processing of milk into higher-value products could be banned during the lean summer months. The licensing requirement restricts entry and thus limits competition and production growth. It discriminates against achieving economies of scale and technology modernization to improve quality, which would help the industry to become more domestically and internationally competitive. Restricting growth, the adoption of cost reducing

⁵ National Dairy Development Board, 1993.

innovations, and competition between processors would raise market prices for dairy products. The delineation of milksheds for cooperatives and new private entrants limits competition by creating “de facto” monopolies and discourages production at least cost. They eliminate farmer options for obtaining the best price for his/her milk output. Although the milkshed or “zoning” regulation helps ensure the viability of the processing enterprise, they also increase the cost of processing because it acts to limit the processor’s ability to expand to optimum size and source from the most efficient dairy producers. Arbitrary restrictions on the processing of milk to higher-value added products hurt farmers, because they depress processor demand for farmer’s milk. It also increases processing risks, contributing to higher operating costs.

15. The continued protection of the dairy processing industry, especially the cooperative sector, has fostered inefficiencies in the processing and marketing of milk products. Although producer milk prices in India are significantly lower than in the United States and Western Europe, dairy product prices (butter and whole and skim milk powder) were substantially higher (20 to 50%) than international market prices. Only during the mid-90s, the rupee devaluation and a sharp rise in world dairy prices--as a consequence of a production shortfall in major dairy producing countries, narrowed the gap between Indian dairy prices and world market prices. Fluid milk marketing margins are high in India — for example, it is about 67 percent higher than in the United Kingdom.

16. **Dairy Cooperatives As a Vehicle for Protecting the Welfare of Poor Milk Producers and Consumers.** Many state governments used the cooperatives as a vehicle to promote social objectives, in particular to ensure a remunerative price for milk producers and the availability of milk for consumers at affordable prices. To achieve these objectives, states exercised considerable control over cooperative operations, including controls over input and output pricing and the appointment of state officials to cooperative management positions to ensure the achievement of the milk-related social objectives.

17. **State Interventions Contribute to Weak Performance of Cooperatives, Inhibiting Their Ability to Be Competitive with Private Sector.** State interventions, and thus the diversion from the original farmer-controlled cooperative concept, contributed to the poor performance of many cooperative unions. For example, social pricing policies implemented in some states resulted in negligible or zero processing margins. For example, government pricing of milk supplied to the cooperative federation in Tamil Nadu prevented profitable operations and the move to reduce the producer price in Karnataka in order to maintain profitable operations was blocked by the state government. In Maharashtra and Punjab, the state governments set the minimum producer price. In Maharashtra, the selling price is fixed if the union delivers supplies to the government dairy. In Andhra Pradesh and Karnataka, selling prices of the cooperative federations require government consultation.

18. **Weak Management and Inadequate Market Orientation of Some Cooperatives Contribute to Their Poor Performance.** Outside of state interventions, weak management and poor market orientation resulted in the poor economic performance of some cooperatives. A lack of flexibility in adapting to changing market conditions, poor quality control, over-staffing, underutilization of capacity due to the limited milk market, processing inefficiencies and weak marketing and commercial orientation further contributed to the poor financial performance of these cooperatives and resulted in their continued dependence on state financial transfers/subsidies. In some federations and unions, the frequent turnover of state appointed

officials in cooperative Boards and top management contributed to poor incentive structures and weak management commitment.

19. Improving the Efficiency of the Dairy Processing Industry Will Generate Significant Gains for the Poor, the Dairy Sector and Society in General. Increased efficiency of the dairy processing industry is critical in many respects. First, increased competition and improved operating efficiency could raise producer milk prices and directly benefit the large majority of small and marginal dairy farmers. Second, it will enable the industry to better respond to opportunities created by increasing domestic demand. Third, it will improve the industry's ability to compete with imports, especially in the current more open trade environment. The relaxation of import restrictions on skim milk powder and butter oil, which can be reconstituted into fluid milk, will increase competition from imports. Although the inflow of imports will benefit consumers, it would depress prices for farmers if current marketing margins are to be maintained. Increased efficiency and competition in the processing industry could mitigate this effect.

20. Cooperatives Have Considerable Potential to Improve Their Performance. Continued protection of cooperatives will only sustain the inefficient operations of the poorly performing cooperatives, which in the long run will hurt both farmers and consumers. Introducing incentives that improve cooperative management and performance would help ensure the sustainability of cooperative operations and the continuous stream of benefits for farmers. Elimination of state interventions and closer adherence to the Anand Model, with greater farmer control of operations (rather than government control), and upgrading of skills in production, marketing, and financial management would help cooperatives meet the new marketing challenges. Improved cooperative performance will generate increased profits for the cooperative and permit greater returns to the member's investments. It will ensure sustainable operations and generate earnings for further productivity improving investments which will enable cooperatives to compete on an equal basis with private entrepreneurs. It will strengthen the cooperative's capacity to continue providing production-related and associated social services demanded by members.

21. Creating a More Level Playing Field. The achievements and contributions of cooperatives to the development of the dairy sector and in providing new income generating opportunities for small farmers and the poor in rural areas are remarkable and laudable. Indeed, it has served as a model for cooperative development in other countries. However, having been in operation for nearly 25 years, the dairy cooperative sector should no longer be treated as an "infant industry". As in any sector that has reached maturity, promoting market competition is needed to ensure the development of a sustainable and efficient industry. This implies ensuring a level playing field for all participants and the elimination of any barriers to entry for any firm. In many countries (for example, Germany, The Netherlands, the United States), cooperatives compete in the same market as other private enterprises when it comes to economic activities such as dairy processing, marketing, and export. Indian dairy cooperatives, therefore, would have the potential to compete in such activities as well.

22. The creation of a level playing field for all market participants will require a package of reforms revolving around four key actions.

- ◆ **Eliminating All State Interventions In Cooperatives.** The states should discontinue interventions in cooperative operations and transfer full control

of cooperatives to farmer members in line with the proposed Model Cooperative Act . With farmers assuming full control, the cooperatives can take the necessary measures to improve their financial and management efficiency and competitiveness. The NDDDB, in continuation of its program to improve cooperative efficiency, should focus greater priority in its development efforts in the next five years to facilitating the immediate restructuring of the poor performing cooperatives.

- ◆ **Lifting Of MMPO.** In particular, it will involve the elimination of the licensing requirement, restrictions on the sourcing of milk or the milkshed requirement, restrictions on the production of higher value milk products and storage activities. Instead, each state should establish an objective set of criteria for the registration of firms, which relate solely to public health and safety, environmental protection and general prudential requirements.
- ◆ **Establishing Mechanism To Monitor Milk Market To Ensure Fair Competition.** The government's proper role in the new more open market will be to establish an appropriate mechanism to ensure that fair competition persists, that is to guard against predatory pricing and dumping by any market participant (see Box 4.3).
- ◆ **Strengthening of Public Monitoring and Enforcement of Hygiene Standards.** Public sector enforcement of hygiene and sanitation standards will become more critical as the number of market participants increases. Monitoring and enforcement mechanisms will need to be strengthened.

23. **The GOI Presently Opposes the Elimination of the MMPO.** The GOI opposes the elimination of the MMPO on two major grounds. First, the impact of increased competition on cooperatives, and the possible closure of some of them could disrupt milk supply to the urban and metropolitan areas. Second, the shift to commercial operations of cooperatives could have an adverse impact on poor cooperative farmer members. There are concerns that particular milk routes/suppliers could be dropped, due to the unprofitability of servicing these areas. This will result in the loss of markets and income for affected milk producers.

24. **Promoting Competitiveness of Cooperatives.** The ability of cooperatives to compete with other enterprises has been undermined by extensive state interventions in their operations and poor commercial orientation due to weak management. These constraints will be addressed by the first measure described above. Phasing out of state interventions complemented by technical assistance from NDDDB to restructure and improve cooperative operations will put the cooperatives in a level playing field with other private enterprises.

25. **Introducing Targeted Compensatory Measures Where Absolutely Necessary.** The potential adverse effects on very poor farmer members of cooperatives are important and could be addressed if found to be critical through targeted compensatory measures. These measures could take the form of a temporary and declining per unit transport subsidy or a flat subsidy to poor cooperative milk producers in remote areas. This will serve as a transition mechanism, while alternative economic opportunities are examined and promoted for these areas. If the purpose of the state price controls on cooperatives are to ensure access to milk by poor

consumers, then there will be a need for more targeted assistance programs, which may take the form of food vouchers and primary school nutrition programs.

26. **Phasing in By Starting in At Least Three States.** Some states have expressed interest in liberalizing their dairy processing sector to promote growth in their dairy industries. Thus, the reform program could be initiated first in these selected states and subsequently be broadened to the rest of the states in India after the pilot phase of 3 years. The experience and lessons from the initial pilot phase would serve as an important basis for improving implementation of the reform program in the rest of the country.

27. **Cooperative Provision of Support Services Should Not Undermine its Economic Viability.** Cooperatives play an important role in delivering key production and social services to members. But these supplementary services should be kept within the bounds of the profits generated by the cooperative, so as not to undermine its economic viability. Moreover, these supplementary services need to be kept separate from other operational activities to ensure transparency and accountability.

28. **Sustained Growth in Poultry Sector Will Continue to be Driven by Private Sector .** Poultry meat and egg output displayed exceptional growth over the past two decades—with minimal government intervention and investment. Egg and poultry meat production grew by an average of 7 and 6 percent a year respectively, between 1971 and 1993, with production concentrated in private noncooperative enterprises. The Eighth Five-Year Plan's (1992-97) proposal to relaunch the poultry cooperative development program should be dropped. Past experiences with poultry cooperatives involved in production and marketing in many states were poor, and further public sector subsidies to develop the poultry cooperatives would only crowd out the relatively efficient private poultry industry.

C. Ensuring an Adequate Supply of Livestock Inputs

29. **Balancing Feed Supply and Demand is a Major Challenge for the Indian Livestock Sector.** National feed balances are 20-30 percent short of what is needed. This deficit is equivalent to about 250 million mt of dry feed per year. Estimates of concentrate (cereals, brans, and oilcake) shortfalls place the deficit at 35 million mt, but more conservative estimates indicate supply and demand are near equilibrium. Future projections, however, show a widening gap.

30. Several factors contribute to the feed deficit. The continued growth of the livestock population has been fostered by increasing demand, sociocultural factors which inhibit the killing of cows, low output prices which slows down the uptake of more productive stock and increase the incentive to maintain larger herds to compensate for low productivity, and a shift to small ruminants in the more degraded areas. As a result of population growth, the pressure on the traditional grazing areas (pastures and forests) increased. Moreover, the total grazing area in the country also declined as a result of the government's land distribution policies, which in some cases included the distribution of common property areas. The increased use of concentrate feeds could reduce the demand for fodder, but it is discouraged by government dairy policies and other market interventions. Addressing the feed sector's problems will require a four-pronged strategy that:

- ◆ Improves incentives for adopting improved stock, both to increase productivity and feed efficiency and to remove the incentives to keep large herds of low-productivity animals;
- ◆ Improves the management of the environmentally fragile grazing areas to restore and increase their productivity;
- ◆ Eliminates economic barriers to the increased availability of concentrate feed; and
- ◆ Increases integration of crop and livestock production systems, and promotes more efficient use of crop by-products.

31. Addressing the Resource Degradation Problem will Require GOI and State Action.

To restore the productivity of the degraded common grazing areas and common fodder supply sources, efforts should be made to establish or strengthen grassroots community and user groups who would be responsible for managing the common property areas. A comprehensive approach would involve:

- ◆ *At the central government level:* Establishing national guidelines for allowing user groups to manage the common property grazing areas.
- ◆ *At the state level:* Pursuing legislative reforms to allow user groups to manage common property grazing areas. Adopting mechanisms (such as a microplanning approach and collaboration with nongovernmental organizations) to identify common property areas and, in cooperation with users and user groups, develop area management plans. Alternative management approaches could include cut-and-carry and stall feeding systems in the rural areas, the introduction of grazing fees, and rotational grazing; and
- ◆ Formulating supportive mechanisms (such as initial matching grants and loans) to compensate user groups for the temporary closure of degraded grazing areas until productivity is restored.

32. Liberalizing the Domestic Concentrate Feed Sector Important for Increased Concentrate Feed Use. The domestic marketing of feeds and feed ingredients needs to be further liberalized to promote market efficiency. Liberalization would involve eliminating laws that impose storage and movement restrictions on feed ingredients and limit poultry feed (except feed in pellet form) and oilseed manufacturing to small-scale enterprises.

33. Animal Health and Breeding Services Delivery Need to be Improved. In addition to proper feed and production management, livestock health and breeding services are crucial in achieving the productive potential of livestock. The delivery of animal health services is primarily a state activity. The supply and quality of these services, outside of the cooperatives and the externally funded campaigns, have been poor. To increase the availability of and access to animal health services, the state's focus should shift toward delivering purely public services such as sanitary control, border controls, quarantine operations, and extension services. The private sector should take over activities such as clinical treatment and noncompulsory vaccinations. Key steps to promote private participation in animal services include:

- ◆ Creating a level playing field by instituting full cost recovery for state delivered “private good” services (clinical services, noncompulsory vaccinations, artificial inseminations) and,
- ◆ Establishing appropriate incentives, such as leasing of central and state government veterinary facilities, opening private subcontracting opportunities for key government tasks (such as compulsory vaccinations and food inspection), and flexible civil service arrangements.

34. Genetic upgrading to increase livestock productivity and feed efficiency will require promoting farmer adoption of improved breeds. Livestock breed improvement activities in India are still concentrated in the public sector. About 700 central and state livestock breeding centers cover cattle, buffalo, poultry and sheep. The impact of these centers has been limited. In cattle breeding, the National Dairy Development Board and private breeders, using semen from imported and local bulls, are more effective than bull production in state farms. In buffalo breeding, government involvement has been rather limited, but a number of private breeders and artificial insemination companies are emerging. These efforts should be encouraged. The quality of the state artificial insemination service has been poor, as reflected by the low conception rates. Private operators would likely obtain better results. In small ruminant breeding, the central government’s program of importing and distributing fine wool breeds have been rather unsuccessful. Such breeds are not well adapted to most Indian climatic and management conditions. Village-based selection schemes using local breeds would have more impact and should be encouraged. In poultry breeding, the private industry has all but taken over, and government involvement should be phased out.

35. **Livestock Research Priorities Need to be Reoriented.** Livestock research is concentrated on cattle, whereas the attention paid to buffalo (which supply half the national milk output) and small ruminants (which supply most of the national ruminant meat production) does not correspond to the importance of these sectors. Poultry, for which suitable production technology is readily available and a vibrant private sector exists, continues to receive seven percent of the total research resources. The key weaknesses of the livestock research sector include a shortage of trained personnel, poor staff/operating costs ratios and lack of client orientation especially for smallholder production. An exception in dairy is the National Dairy Development Board (NDDB) research program, which has been more successful due to its better client orientation. Research efforts should be reoriented to focus on smallholder farming systems management, feed and fodder production, breeding schemes, and the testing of “on-the-shelf” technologies.

36. **Livestock Extension Needs to be Strengthened.** Livestock extension services have been sadly neglected. Livestock technology within the integrated public sector agricultural extension service is not disseminated. NDDB has effectively incorporated livestock extension in its cooperative support activities. Several nongovernmental organizations (NGOs) are also conducting livestock research and providing extension services. One NGO, the Bhartiya Agro-Industries Foundation (BAIF), is active in five states with annual research and extension expenditures of about Rs 140 million. An animal husbandry extension scheme to support the animal husbandry activities in the states is proposed under the Eighth Plan and will cover all livestock. An increased focus on livestock extension at the state level would be justified in view of the need to intensify livestock production. This would only be feasible if it is accompanied by increased privatization of veterinary services, so that state veterinary staff can be shifted to extension work. The shift to extension work needs to be accompanied by appropriate training in extension techniques.

Adequate and innovative incentive programs need to be developed to make the services more client- and result-oriented. The creation of another unresponsive bureaucracy should be avoided.

D. Preparing for the Future

37. During the past 15 years, World Bank assistance to India's livestock sector has concentrated on dairy development. These projects contributed significantly to the development, expansion, and strengthening of the dairy cooperative sector, which served as the primary mechanism for dairy development. Several other World Bank-supported state-level agricultural development projects in areas such as social forestry, watershed development, and area development have also included livestock development and fodder production components.

38. The GOI has recognized that a comprehensive development strategy is needed for the livestock sector to take advantage of the synergism that could be achieved in coordinating government development activities, many of which have been undertaken with World Bank assistance. The assessment of the current status of the livestock sector, undertaken by this study, indicates sustained growth of the sector will require policy reform to promote increased efficiency, complemented by an investment program to facilitate the supply response by livestock farmers and entrepreneurs to the emerging opportunities. The government's policy reforms, in particular, should focus on the:

- ◆ Elimination of remaining commercial trade restrictions, including barriers to private sector entry (such as the revision of the MMPO) and the small-scale reservation of poultry feed and oilseed manufacturing;
- ◆ Formulating national guidelines to improve the management of common property areas.

At the state level, policy reform should focus on the:

- ◆ Discontinuing interventions in the operations of dairy cooperatives;
- ◆ Promoting competition in livestock markets by removing state restrictions on private trade;
- ◆ Rationalizing state intervention in the delivery of agricultural support services (agricultural research and extension, animal health services, breeding) to focus on the delivery of public goods;
- ◆ Establishing the legal and regulatory framework to improve the management of common property areas;
- ◆ Implementing cost recovery programs for all non-public good support services provided by the state; and

39. State-level investment programs with national institutional components, focusing on a number of innovative interventions, would improve the capacity of farmers, private traders, and private providers of support services to respond to emerging opportunities. At the national level the investment programs should focus on:

- ◆ Institutional reform, including clearer definitions of public and private, and union vs. the state responsibilities;

- ◆ Improving data collection and dissemination of livestock market information, strengthening the Department of Animal Husbandry and Dairy in policy analysis and formulation, and developing efficient private-public sector quality control institutions;
 - ◆ Technical support for key private organizations, such as the Veterinary Order and the Compound Livestock Manufacturers Association; and
 - ◆ Livestock research and extension support in priority areas.
40. At the state level, the investment programs should be directed toward:
- ◆ Improving common property resource tenure and management regimes, with an emphasis on grassroots involvement;
 - ◆ Developing innovative techniques for sustainable resource use; and
 - ◆ Promoting alternative service delivery systems for animal health and breeding and livestock extension and credit, with an emphasis on private sector and user group involvement.

LIVESTOCK SECTOR REVIEW

KEY PROBLEMS AND RECOMMENDATIONS

Problem Area	Recommendation	Supportive Measure	Expected Outcome	Risks
I. Increasing Livestock Marketing Efficiency				
Dairy marketing The Milk and Milk Products Order (MMPO) limits competition in the dairy products market and maintains inefficient operations of existing firms.	GOI Introduce amendments to the MMPO in at least three states. After three years, expand to other states. Specifically: <ul style="list-style-type: none"> • Remove restrictions on milk sourcing (milksheds) to encourage greater competition. • Eliminate restrictions on processing milk into high-value-added dairy products • Eliminate restrictions on storage volumes and provisions that allow the government to inspect and seize private stocks, except under state of emergency. State government <ul style="list-style-type: none"> • Discontinue state intervention in dairy cooperative operations and assist in restructuring of cooperatives. • Eliminate state price controls on liquid milk 	GOI <ul style="list-style-type: none"> • Strengthen public monitoring and enforcement of hygiene standards State government <ul style="list-style-type: none"> • Develop where critical targeted compensatory measures for poorest dairy farmers in remote areas (mostly supplying milk to cooperatives) who are adversely affected by liberalization of the milk market. These could include a temporary per unit transport subsidy or flat subsidy per household. • Establish objective criteria for registration of firms, relating exclusively to public health and safety, environmental protection and general prudential requirements. 	⇒ Increase competition and promote efficiency in the dairy processing industry ⇒ Improve import competitiveness ⇒ Raise milk farmgate prices ⇒ Encourage technology up-take	Inadequate assistance for cooperative restructuring could lead to bankruptcy of some cooperatives, the disruption of the milk collection and the reduction of income of small farmers supplying milk to cooperatives.
Livestock market information Data on production, prices, supply and demand for policy formulation and trader use are poor and often not available.	State government Improve production and market information (especially prices and supply) collection and dissemination systems, including use of mass media.		⇒ Reduce marketing costs	
Trade Restrictions. Most exports remain subject to quantitative restrictions.	GOI Quantitative export restrictions (such as licensing, canalization) should be eliminated.	GOI <ul style="list-style-type: none"> • Eliminate domestic marketing restrictions on feed ingredients. • Promote cooperative restructuring 	⇒ Provide a price ceiling for consumers ⇒ Provide a price floor for producers	Trade reform without accompanying reform of the marketing and processing sectors will adversely affect producer welfare, especially in the dairy sector.

Problem Areas	Recommendations	Supportive Measures	Expected Outcome	Risks
II. Ensuring an Adequate Supply and Efficient Delivery of Inputs				
<p>Degradation of common property grazing and forest areas. Land policy reform in 1950s contributed to the shrinkage of CPR areas and the disintegration of the traditional institutions that managed these areas. Coupled with an increasing population, these two factors resulted in the conversion of the CPR into open access areas, causing degradation and grazing areas.</p>	<p>GOI Introduce national guidelines for allowing user groups to independently manage the common property grazing areas.</p> <p>State government Establish regulatory framework and promote the establishment of community and user groups to manage the degraded common property areas</p> <ul style="list-style-type: none"> • Identifying common property areas and relevant users and, in cooperation with user groups, developing an area management plan. New management approaches that could be explored by user groups include cut-and-carry and stall feeding, the introduction of grazing fees, and rotational grazing. • Determining safety net mechanisms (for example, initial grants or loans) that may be needed to provide safety nets to user groups until the productivity of the degraded areas is restored. 	<p>GOI Review current legislation affecting the management of common property grazing areas.</p> <p>State government Explore possibilities for cooperation with NGOs and other development institutions</p>	<p>⇒ Reduce land and forest degradation</p> <p>⇒ Promote sustainable livestock production systems</p> <p>⇒ Increase productivity of existing grazing areas</p>	<p>Social unrest may result, if reforms are not based on extensive consultations with the affected stakeholders</p>
<p>Domestic market interventions. Interventions such as market controls and restrictions on enterprise size reduce the efficiency of domestic feed ingredient marketing.</p>	<p>GOI Liberalize the marketing of feed ingredients</p> <ul style="list-style-type: none"> • Eliminating storage and movement restrictions on feed ingredients. • Eliminating licensing requirements for feed ingredient imports (especially amino acids, and feed quality wheat and maize). • Abolishing immediately limits on enterprise size of poultry feed and oilseed manufacturing. 		<p>⇒ Increase incentive for feed industry to modernize and increase efficiency</p> <p>⇒ Increase the competitiveness and profitability of the livestock industry, especially the poultry industry</p> <p>⇒ Reduce pressure in grazing areas.</p>	<p>Increased imports may lower incomes of feed and cereal producers. A reduction in vegetable oil prices with the rationalization of oilseeds market may lower demand for ghee in particular and milk in general.</p>

Problem Area	Recommendations	Supportive Measures	Expected Outcome	Risks
II. Ensuring an Adequate Supply and Efficient Delivery of Inputs cont'd				
Veterinary services Public sector animal health services are characterized by poor delivery and lack of accessibility. Subsidization of public sector services acts as a barrier to private entry.	State government Provide only pure public good services such as sanitary control, border controls, quarantine operations, and progressively withdraw from private sector responsibilities such as clinical treatment and animal breeding. Key steps to be undertaken include: <ul style="list-style-type: none"> • Creating a level playing field by instituting full cost recovery for services where private participation should be promoted (clinical services, noncompulsory vaccination) • Creating appropriate incentives, such as leasing of government facilities, opening private subcontracting opportunities, and flexible civil service arrangement (such as leave of absences, and so on.). 	GOI Government should withdraw from pharmaceutical production, which could be franchised out to the private sector and to concentrate on research in areas not covered by private sector. State government To complement increased private participation in veterinary services, some Department of Animal Husbandry and Dairying veterinary staff should be shifted to extension work after appropriate training in extension techniques.	⇒ Increase availability and quality of veterinary services ⇒ Reduce farm losses due to diseases ⇒ Enhance farmer adoption of improve breeds ⇒ Increase public sector effectiveness in providing public services, such as disease surveillance, disease control ⇒ Reduce fiscal costs	Payment of full costs could affect access by the poor. Continuous monitoring will be required
Breeding services State breeding services are inadequate and service quality is poor. The public sector continues to maintain poultry breeding stations, which only crowd out private sector involvement.	State government <ul style="list-style-type: none"> • Introduce full cost recovery of artificial insemination services to create a level playing field with private sector. • Retain selected state breeding farms to maintain the genetic pool of indigenous stock. Review alternative uses for remaining loss-making farms (for example leasing to private sector, public-private joint ventures). • Close poultry breeding farms. 		⇒ Increase availability and quality of animal breeding services ⇒ Enhance farmer adoption of improve breeds ⇒ Reduce fiscal costs	Artificial insemination adoption rate may drop.
Agricultural research Public research activities suffer from a lack of client orientation (especially for smallholder production), a shortage of trained personnel, and poor staff and operating ratios.	GOI and State governments <ul style="list-style-type: none"> • Livestock research activities should focus on the problems of smallholder production systems. • Support for research in the commercial poultry sector should be reduced significantly because such research is already being conducted by the private sector. Poultry research should focus on smallholder free-range poultry production. 		⇒ Increase availability of improved technologies suitable for smallholder production systems	

Problem Area	Recommendations	Supportive Measures	Expected Outcome	Risks
II. Ensuring an Adequate Supply and Efficient Delivery of Inputs cont'd				
Agricultural extension Limited attention is being paid to transmitting appropriate technologies to farmers	GOI New and alternative extension delivery methods (including NGO and private sector involvement) to improve extension delivery should be explored and tested under the proposed animal husbandry extension scheme	GOI and State governments Promote vertical integration between feed mills and processors and farmers, through innovative technical assistance arrangements (such as temporary extension cost sharing mechanisms between government and processors).	Improve uptake of productivity enhancing technologies Improve competitiveness of domestic production relative to imports	

CHAPTER 1

INTRODUCTION

1.1 India's agricultural sector will have a significant impact on the future growth of the country's economy. Agriculture accounts for about 30 percent of gross domestic product (GDP) and about 16 percent of the value of total exports. It employs 65 percent of the labor force and 84 percent of all active women. Moreover, of the country's 310 million poor (36 percent of the total population), 76 percent live in rural areas and depend on agriculture as their main source of livelihood. Agricultural growth is therefore important for overall economic growth and poverty reduction.

1.2 In the past forty years agriculture has made significant strides in meeting the growing demand for food. The production of foodgrains more than tripled from 51 million tons in 1950/51 to 176 million in 1990/91. As a result, India is now nearly self-sufficient in food grains.¹

1.3 The agricultural sector, however, has been discriminated against relative to manufacturing for most of the last 25 years.² The average level of protection for agriculture between 1970/71 and 1987/88 was about half that for manufacturing. Two recent developments, however, suggest that this bias will be reduced. In July 1991 the Indian government introduced a program of economic stabilization and liberalization. Although the reforms are directed almost entirely at the manufacturing sector, the devaluation of the rupee and its expected shift to full convertibility has indirect effects on the entire economy—including agriculture—by making it more export competitive. In addition, the opening up of Indian agriculture under the General Agreement on Tariffs and Trade (GATT) and the expected changes in world agriculture under the GATT will most likely accelerate the improvement in terms of trade. These developments are also expected to change the economy's incentive structure, with agriculture attracting an increasing share of resources from the private sector over the next few years.

1.4 India's program of reform and economic liberalization opens significant market-led opportunities for the livestock sector. Sustained economic growth and rising incomes are driving the rapid growth in livestock product demand. This has fostered the rapid expansion of the livestock output in recent years. Between 1985 and 1992 the value of livestock output grew by 6 percent a year in real terms from Rs 196 billion to Rs 302 billion (1985 rupees) (Figure 1.1). By 1990 livestock accounted for 32 percent of the value of agricultural output. Revenues from exports of live animals and livestock products (about 8 percent the total value of Indian exports in 1992) have grown even faster, increasing by 13 percent a year in real terms from \$1.1 billion in 1987 to \$1.8 billion in 1991.³ This growth was driven by exports of leather goods, meat, and meat products. With improved domestic production and marketing efficiency and a world market reshaped by the GATT, the Indian livestock sector could become even more competitive.

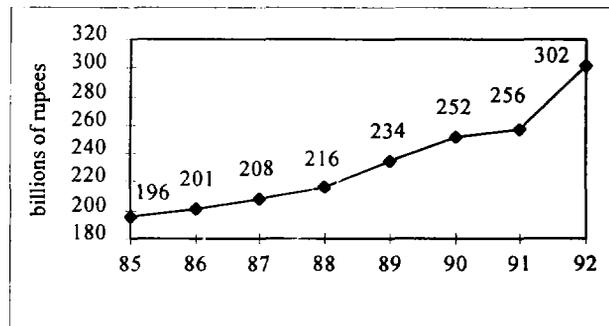
¹ Government of India (GOI), 1992, Eighth Five-Year Plan 1992-97.

² G. Pursell and A. Gulati, 1993, "Liberalizing Indian Agriculture: An Agenda for Reform" Policy Research Working Paper 1172, World Bank, Washington, D.C. and C.H. Rao and A. Gulati, "Indian Agriculture: Emerging Perspectives and Major Policy Issues," International Food Policy Research Institute, Washington, D.C.

³ Such exports include live animals, meat and meat preparations, dairy products, eggs, and leather and woolen products.

1.5 Livestock sector development has a significant beneficial impact in generating employment and reducing poverty in rural areas. More than 630 million people (74 % of the population) live in rural areas, and 237 million (38 percent) of them are poor.⁴ In 1986/87, 73 percent of rural households owned livestock. Small and marginal farmers account for three-quarters of these households owning livestock, raising 56 percent of the bovine (cattle and buffalo) and 62 percent of the sheep population (Table 1.1).⁵ Rural households depend on livestock for nutrition and income—

Figure 1.1: Real Livestock Output Value (1985 Rupees)



Source: Ministry of Agriculture.

income from livestock accounts for 15-40 percent of total farm household incomes. The sector employs 8 percent of India's total labor force, including many small and marginal farmers, women, and landless agricultural workers. Thus improving the productivity of, and increasing incomes from, livestock enterprises would benefit the rural poor both directly and indirectly, through the associated multiplier effects in the nonlivestock rural economy.

1.6 Livestock provides other benefits to the rural sector. Livestock supplies a large portion of draft power for agriculture, with about half the cattle population and 25 percent of the buffalo population being used to cultivate an estimated 60 million ha of crop land (about 30 percent of the total cultivated area). The organic fertilizer produced by the sector is an important input into crop production, and dung from livestock is used as fuel in rural areas. Livestock also serves as an insurance substitute, especially for poor rural households, since it is an asset that can easily be sold during times of distress.

1.7 Livestock sector development, however, must be balanced with measures to conserve the environment, because excessive livestock population causes overgrazing and land degradation, especially in the semi-arid North. The continuing growth in livestock numbers, coupled with shrinking traditional grazing areas, has put intense pressure on existing grazing areas, encouraged encroachment into forest lands, and ultimately

Table 1.1: Ownership of Landholdings and Livestock by Size of Farm (percent)

Farm Size (hectares)	Distribution of Holdings	Distribution of Livestock Ownership	
		Bovines ^a	Sheep
less than 1 ha	57.2	37.3	40.2
1-1.99 ha	18.4	19.1	22.0
2-3.99 ha	13.9	21.3	18.0
4-9.99 ha	8.3	17.0	13.0
more than 10 ha	2.1	5.0	7.0

a. Cows and buffaloes.

Source: Department of Agriculture and Cooperation, based on Input Survey.

⁴ The total number of the poor in India is estimated at 310 million, 76 percent (236.7 million) are in the rural areas, the remainder (73.3 million) are in the urban areas (G. Datt, "Poverty in India: 1951-1991," World Bank Policy Research Department Working Paper, forthcoming).

⁵ Small farmers are farmers with area holdings of less than 1.99 ha. Marginal farmers own less than 1 ha.

contributed to the degradation of land resources. Livestock processing, particularly the leather processing industry, also has contributed to industrial pollution. Thus, any development strategy for the livestock sector, must attempt not only to achieve growth and reduce poverty, but also to maintain agricultural and environmental sustainability.

1.8 The promising developments emerging from economic liberalization efforts and the GATT, as well as livestock's key role in alleviating poverty, have refocused attention on livestock's considerable potential and on the need for a coherent, long-term strategy to capitalize on the sector's emerging economic opportunities. World Bank lending to India's livestock sector during the past 15 years has mainly concentrated on dairy development including support for three state and two national dairy development projects totaling \$584 million (current dollars).⁶ These projects helped develop, expand, and strengthen the dairy cooperatives, which were the primary mechanism for dairy development. Other donors, such as the European Union, have supported dairy development through food aid donations channeled through the National Dairy Development Board. In recent years the World Bank has supported state-level agricultural development projects in such areas as social forestry, watershed development, and area development. These projects also included livestock development and fodder production components.

1.9. The World Bank's last livestock sector review was in 1975. The current review was undertaken at the Indian government's request to identify key issues and future policy directions and investments to promote the growth and development of the livestock sector. Specifically, this study:

- ◆ Assesses the technical and economic situation in the sector, focusing on feed and fodder and on cattle, buffalo, poultry, and small ruminants,
- ◆ Identifies the main constraints to the development of these sectors,
- ◆ Identifies opportunities for future investments and policy reforms that would promote environmentally sustainable production and efficient marketing and trade, paying particular attention to the changing roles of the public and private sectors and the more efficient use of scarce financial and human resources,
- ◆ Proposes a plan for action.

⁶ These projects were the Karnataka Dairy Development Project (fiscal 1974), the Madhya Pradesh Dairy Development Project (fiscal 1974), the Rajasthan Dairy Development Project (fiscal 1974), the National Dairy Project (fiscal 1978); and the Second National Dairy Project (fiscal 1987).

CHAPTER 2

LIVESTOCK PRODUCTION AND PERFORMANCE TRENDS

A. Recent Population And Output Trends

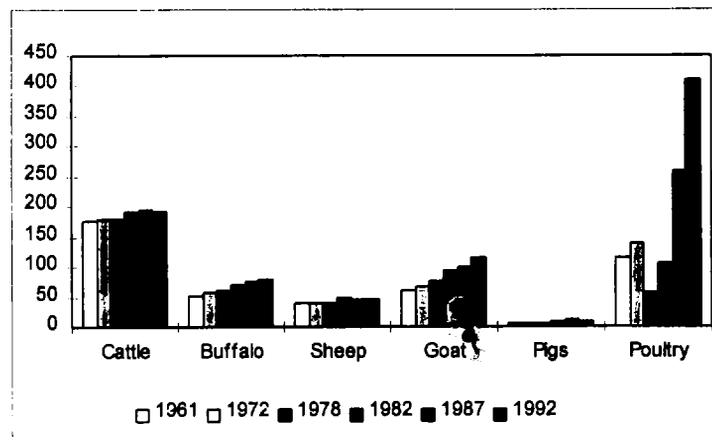
2.1 **Livestock Population.** India accounts for a significant share of the world's livestock population. In 1993, the country contained 53 percent of the world's buffaloes, 20 percent of the goats, 15 percent of the cattle, 4 percent of the chickens, 4 percent of the sheep, and one percent of the pigs. India's livestock population continues to grow steadily, especially among goats and poultry (Figure 2.1). The near doubling of the goat population over the past 30 years reflects to some degree the increasing degradation of grazing areas, as declining feed availability increases the incentives for raising hardier animals. The near quadrupling of the poultry population can be attributed largely to increased demand, as a result of the rising per capita income and the increased availability of Western technology, which generated considerable private investments in the sector (para 2.7).

2.2 The cattle population increased to 195 million in 1987, but declined by 2 percent to 193 million in 1992 (Annex Table 2.1a). This decline can be attributed to the increasing yield per animal (para 2.3), the shift to small ruminant production in the more degraded areas, and the reduced dependence on cattle for draft power as mechanized alternatives became more widespread, especially in the irrigated areas. In contrast, the buffalo population grew by about 10 percent over the same period, except during the 1987-92 period when the growth rate dropped to 2.3 percent.

2.3 **Livestock yield and output trends.** As livestock populations expanded, output from most livestock categories also grew (Table 2.1). Goat and cows milk and broiler production displayed the highest annual growth rates, with poultry output growing by nearly 15 percent during 1988-92. Despite the two percent drop in cattle numbers, total cow milk output increased by 7.5 percent between 1988-92, partly a result of the increasing number of crossbred cows.

2.4 By 1992 milk from cows accounted for about 48 percent of milk supply, buffalo milk accounted for another 48 percent, and the rest was supplied by goats (Annex Table 2.2).

Figure 2.1: Livestock Population, 1961-93 (millions).



Source: India Directorate of Economics and Statistics.

2.5 Meat output increased by an average of five percent during 1988-92, driven largely by the outstanding increase in poultry meat output (see Table 2.1). Goat meat output increased by about 5 percent a year during the same period, while other meats (buffalo, beef, and mutton) increased by three or four percent.

2.6 Milk products continue to account for about two-thirds of the total value of livestock output. In 1991, meat and meat products accounted for 14.7 percent of total output; eggs (3.6%), wool (0.3%), dung (10.9%), and other products accounted for the remainder (Annex Table 2.3).

2.7 Poultry Industry Growth.

Poultry meat and egg output displayed impressive growth over the past two decades. Poultry and egg output increased by more than 50 percent in real terms (1990 dollars) from Rs 18.7 billion in 1980 to Rs 46.8 billion in 1993 (Figure 2.2). In 1991-92 the two products accounted for nine percent of the agricultural share of the gross domestic product. Egg production grew an average of seven percent a year between 1971 and 1993, reaching 24.8 billion pieces by 1993 (Table 2.2). Andhra Pradesh, Maharashtra, Punjab, Tamil Nadu, and Haryana are the top five egg-producing states, accounting for about 60 percent of total egg production (Annex Table 2.4). Egg production increased as the share of imported hybrid layers, first introduced in the 1960s, grew to account for 56 percent of the estimated total layer population of 150 million by 1993.⁷

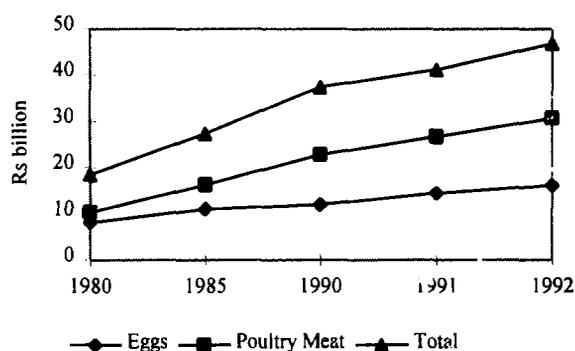
2.8 Poultry meat output grew by an average of six percent a year during the same period, reaching 454,000 mt in 1993. About 60 percent of poultry meat is produced in Andhra Pradesh, Maharashtra, Punjab, West Bengal, and

Table 2.1: Average Annual Animal Yields (kilograms per animal)

Commodity	Yield per animal, 1990 India	Average annual increase in output (percent)	
		1980-88	1988-92
Milk		5.6	5.7
Cows			
Indigenous	170-1,299	6.5	7.5
Crossbred	661-2,934		
Buffalo	529-2,254	4.8	3.8
Goat	44-358	5.6	10.8
Meat			5.3
Beef	101	2.5	3.9
Buffalo	138	3	3.2
Mutton & lamb	12	0.0	3.1
Goat	10	2.8	4.8
Pig	35		1.0
Poultry	na	2.9	14.1
Eggs (pieces)	159-281	7.5	4.9
Wool	na	3.1	0.0

Source: FAO Production Yearbook, various years; Animal Husbandry and Dairying, 1993, Report of the Technical Committee of Directors for Improvement of Animal Husbandry and Dairying Statistics.

Figure 2.2: Value of Poultry Product Output, 1990 rupees.



Source: Annex Table 2.5

⁷ Indian Poultry Industry Yearbook, 1994.

Karnataka.⁸ Unlike the layer industry, broiler raising is mostly concentrated around major cities like Hyderabad, Bombay, Bangalore, Calcutta, Ludhiana, and Madras, where better infrastructure and marketing facilities exist. A large portion of the growth in poultry meat output derives from the immense population growth of the broiler sector, which grew by an average of 20 percent a year during 1971-93 (see Table 2.2). Some estimates place broiler meat production at about two-thirds of total poultry meat production.⁹ The growth in the layer industry also indirectly contributed to the increased supply in poultry meat, through the increased supply of culled hens.

Table 2.2: Egg and Poultry Production

Year	Eggs (billions)	Broilers Population (millions)	Non-broiler (millions)	Total Poultry (millions)	Poultry Meat (thousands of metric tons)
1971	5.3	4	110	114	121
1980	12.5	30	116	146	179
1985	16.1	75	90	165	274
1990	23.3	190	160	350	412
1991	23.7	215	165	380	440
1992	22.7	210	200	410	427
1993	24.8	235	200	435	454
Average Annual Growth Rate (percent)					
1971-85	8.3	23.3	-1.4	2.7	6.0
1985-93	5.5	15.3	10.5	12.9	6.5
1971-93	7.3	20.3	2.8	6.3	6.2

Note: 1993 figures are estimates

Source: Indian Poultry Industry Yearbook, 1994; FAO Production Yearbook, various issues.

2.9 Several factors contributed to the rapid growth of the poultry sector. Rising incomes, a growing popularity of chicken-based fast food restaurants, declining prices of poultry meat and eggs (para 4.67), and lower prices of broiler meat relative to milk and mutton (para 2.11) increased the attractiveness of broiler meat for consumers. On the supply side, quick returns to producers, the availability of western technology, vertically integrated operations, and declining feed prices increased the economic attractiveness of broiler production.

B. Consumption of Livestock Products

2.10 Despite the continuing increase in supply, per capita consumption of livestock products in India is still considerably lower than in industrial countries and in other developing countries. For example, per capita consumption of milk is about half the level in Australia and the United States, while per capita poultry meat consumption is about 12 percent of the level in China. Consumption of beef and veal is extremely low relative to other countries, but this is primarily due to sociocultural factors. For religious reasons, a large portion of the population does not consume them. Moreover, the impact of these sociocultural factors spills over to the consumption of buffalo meat.

⁸ USDA/FAS, 1994, "Agricultural Situation, Annual Report," AGR No. IN 4084.

⁹ USDA/FAS, 1990. "Agricultural Situation and Outlook Report." AGR No. IN 0046.

2.11 Annual per capita consumption of eggs (30) and poultry meat (0.43 kg) is still significantly lower in India than other countries, and thus offers opportunities for growth (Table 2.3). Moreover, 75- 80 percent of the eggs and poultry meat are consumed in urban and semi-urban areas, which account for only about a quarter of the country's population.

Egg consumption in urban areas is about 90 eggs per capita, while rural consumption is about 13 eggs per capita. Factors contributing to the higher consumption in urban areas include the higher purchasing power of consumers and the transport costs from peri-urban to rural areas, which contribute to higher rural prices. Consumer preference is also implied by the fact that egg consumption increased even though the ratio of the price of eggs relative to the price of other livestock products (milk and meat) declined (Table 2.4).

2.12 Poultry meat is becoming a popular source of affordable protein for the (largely urban) Indian population. In addition, broiler meat consumption is increasing faster than other types of poultry (duck, quail) meat (Table 2.2). In 1993, broiler production accounted for 56 percent of total poultry production. By the year 2000, it is expected to account for about 70 percent.

2.13 **High Income Elasticity of Demand for Livestock Products.** The demand for livestock products in India is highly income elastic. Recent estimates of the expenditure elasticity for milk and milk products range from 1.14 to 1.47 for rural households and 0.61 to 1.09 for urban households.¹⁰ The demand for meat, fish and eggs is more elastic in rural households (0.92-1.18) than urban households (0.54-0.88). Presently, animal products (dairy, meat, eggs and fish) are already an important component of consumer budgets. Dairy products account for a large share of rural (4-22 percent) and urban (7-21 percent) consumer spending, with the percentage share increasing

Table 2.3: Per Capita Consumption of Livestock Products in India and Selected Countries, 1992 (kilograms per year).

Product	India	Other Countries
Milk (fluid milk)	65.0 ^a	China-3; Australia-104; U.S.-104
Eggs (pieces)	26.0	China-163; Japan-276; Australia-170; U.S.-181; Turkey-122
Beef and veal	1.1	China- 2; Philippines-2.4; Australia-36; U.S.-43;
Buffalo meat	1.4 ^b	
Lamb and mutton and goat meat	0.7	New Zealand-20; Turkey-6; Saudi Arabia-19; China-1.1
Poultry meat	0.5	Hong Kong- 43; China-4; U.S.- 40; Thailand-9

Note: a. Milk equivalent; b. Per capita availability.

Source: US Department of Commerce, 1994, *Statistical Abstract of the United States Situation*; USDA, 1995, *Livestock and Poultry: World Markets and Trade*.

Table 2.4: Ratio of wholesale egg and broiler prices to selected livestock product prices, 1980-1990.

Year	Egg Prices Over			Broiler Prices Over		
	Beef Price	Mutton Price	Milk Price	Beef Price	Mutton Price	Milk Price
1980	0.057	0.025	0.115	1.62	0.70	3.25
1985	0.073	0.020	0.099	2.06	0.56	2.80
1990	0.056	0.017	0.083	1.66	0.50	2.47

Source: Prices are from Annex Table 4.3.

¹⁰ P. Hazel and G. Bhalla, 1996, "Prospects for Balancing Food Needs with Sustainable Resources Management in India to 2020", International Food Policy Research Institute; R. Radhakrishna and C. Ravi, 1004, "Food Demand in India" Emerging Trends and Perspectives", mimeo; D.K. Jain, T. Kesavan, and H. Jensen, 1992, "Food Demand Analysis in India: An Application of the Almost Ideal Demand System", National Dairy Research Institute.

significantly with expenditure budget levels. Meats, eggs, and fish account for five to six percent of rural and two to seven percent of urban consumer expenditures. Even poor consumers¹¹ spend a large share of per capita budgets on livestock products (5-15 percent rural areas and 11-19 percent in urban areas) (Figure 2.3 a&b). Sustained economic growth and attendant increases in income will therefore continue to boost livestock demand in the future.

2.14 Two trends will shape future livestock demand:

- ◆ An increasing shift from vegetarianism to diets that include meat (poultry-mutton-goat) meat.
- ◆ The high income and price elasticities of demand for livestock products. Experience from other countries indicates that consumption will increase with increasing per capita gross domestic product (GDP). Decreasing product prices due to increased supply and improved market efficiency would have the same effect.

C. Demand And Supply Projections

2.15 Sustained economic growth and attendant increases in per capita incomes are expected to boost livestock product demand substantially. Recent estimates of livestock product demand in the year 2020, assuming that the economy consistently grows at 5.5 percent per year, and population growth, price and income elasticities of the past ten years remain stable, indicate that demand for milk will increase by a factor of 10 to about 497 million mt by 2020. Demand for

Figure 2.3a: Percentage share of Dairy and Meat Product Expenditures in Total Rural Per Capita Monthly Expenditures, by Expenditure Class, 1991-92.

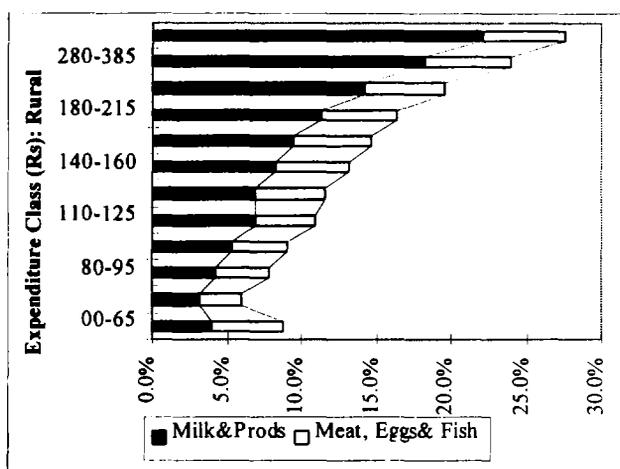
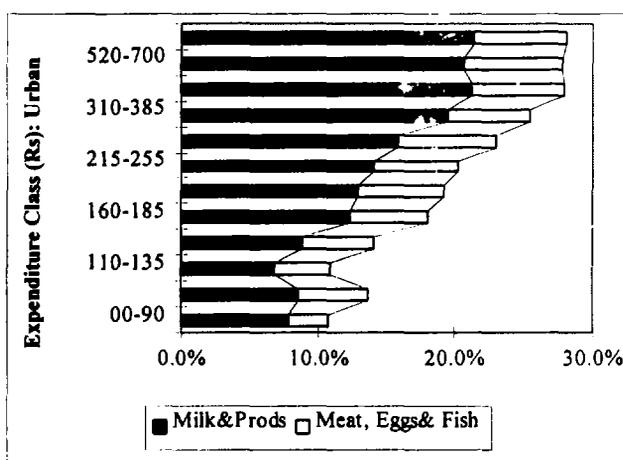


Figure 2.3b: Percentage share of Dairy and Meat Product Expenditures in Total Urban Per Capita Monthly Expenditures, by Expenditure Class, 1991-92



Source: National Sample Survey Organization, India, *Tables with Notes on Fifth Annual Survey on Consumer Expenditure and Employment-Unemployment, 1992.*

¹¹ The poverty line used here is Rs 148 per capita per month in rural areas and Rs 204 per capita per month in urban areas (1991 rupees). See G. Datt, "Poverty in India: 1951-1991," World Bank Policy Research Working Paper, forthcoming.

eggs and poultry meat will increase by a factor of 7 to 7.21 million mt and 1.35 million mt respectively, while demand for mutton will increase by a factor of 8, reaching 2.5 million mt. 89.4 million mt. If output growth rates between 1980-92 are maintained, poultry, beef and mutton demand growth will be adequately met by domestic supplies.¹² If the dairy output growth rate is maintained, a domestic milk deficit of almost 200 million mt is expected.

Table 2.5: Demand and Supply Projections for Selected Livestock Products to 2020 (millions of metric tons)

Commodity	Demand in	Demand in 2020 with GDP Annual Growth of		Supply in 2020
	1990	3%	5.5%	
	million mt	million mt	million mt	million mt
Milk	42.51	193.76	497.01	281.51
Eggs	1.13	3.78	7.21	7.69
Beef	0.59	1.96	3.74	6.93
Sheepmeat	0.4	1.35	2.57	3.09
Poultrymeat	0.21	0.71	1.35	2.18

Assumptions: Population increases from 846 million to 1.3 billion between 1991 and 2020. Expenditure elasticity of 1.47 and 1.01 for milk in rural and urban areas, 1.04 and 0.75 for meat and eggs. Average annual percentage growth rate of 5.6 percent for milk, 6.6 percent for eggs, 6.5 percent for poultry meat, and 3.5 for mutton and goat meat.

Source: Demand figures from P. Hazell and G. Bhalla, 1996, "Prospects for Balancing Food Need with Sustainable Resources Management in India to 2020", IFPRI. Supply figures: computed.

D. Bovine Production Systems

2.16 India's diverse livestock production systems are changing rapidly. Generally, livestock is integrated into the cropping system: several species are kept on the same farm, and livestock is used for multiple purposes. Most production systems, however, are still characterized by low input use and low productivity. Intensification has only occurred on a wide scale in the poultry industry and on a more limited scale, in the dairy industry.

2.17 Most bovines (cattle and buffalo) are raised on small farms. According to a 1987 livestock census, the average herd size per farm is 3.7 heads of cattle and buffalo. Of the approximately 300 million cattle and buffalo, 56 percent are raised on holdings of less than one hectare, and only five percent are raised on farms larger than 10 ha (Table 2.6).

2.18 Milk production and traction are the main production activities of most bovine systems. The 1987 census showed a total population of about 60 million oxen, mostly cattle, which annually cultivate about 30 percent of the total arable area in India. The increased use of motorized traction, however, has lowered animal draft requirements. Since 1961 the number of tractors has increased from 30,000 to 1.14 million, while the oxen population fell from 85 million to its current level of 60 million.

2.19 In milk production, the emphasis is changing from indigenous cattle to buffalo and crossbred cattle. During 1961-87, the female buffalo population increased by about 60 percent and the crossbred cow population increased from almost none to 5.3 million. The population of indigenous animals remained relatively stable during the same period. Precise data on average milk yields of different cattle breeds are not available. A conservative estimate is about 500 liters a year for indigenous cattle and 1,500-2,000 liters a year for buffalo. The average milk yield of buffalo in 1987 was 1,041 liters a year. The rapid increase in the buffalo population is the result of:

¹² During the 1980-92 period the average annual growth rate 5.6 percent for milk; 6.6 percent for eggs; 6.5 percent for poultry meat; 3.5 percent for mutton.

Table 2.6: Distribution of Bovine and Sheep Ownership by Size of Holding, 1986-87

Category	<1 ha	1-1.99 ha	2-3.99 ha	4-9.99 ha	>10 ha	All Holdings
Number of Holdings	50,921	16,407	1,2373	7,427	1,830	88,958
Distribution of Holdings (percent)	57.2	18.4	13.9	8.3	2.1	100.0
Average Holding Size (hectare)	0.4	1.45	2.76	5.9	14.3	1.66
Livestock per holding						
Bovine	2.33	3.7	5.47	7.29	9.16	3.7
Sheep	1.05	1.77	1.94	2.36	4.85	1.49
Total Population						
Bovine	118,646	60,706	67,680	54,143	16,763	317,938
Sheep	53,467	29,040	24,004	17,528	8,876	132,914
Distribution of population (percent)						
Bovine	37	19	21	17	5	100
Sheep	40	22	18	13	7	100

Note: Bovine includes cows and buffaloes.

Source: Department of Agriculture and Cooperation, based on 1986-87 Input Survey.

- ◆ The higher price of buffalo milk. Under India's fat-based milk pricing system, buffalo milk (6.9 percent fat) commands a price premium of about 50 percent relative to cow's milk (4.2 percent fat),
- ◆ The buffalo's more efficient digestive capacity for fibrous materials,
- ◆ The higher salvage (meat) value of the buffalo since, unlike cattle, they are not subject to the ban on slaughter,
- ◆ Competing use for family labor and the higher productivity of buffaloes have made it economically feasible to undertake labor intensive stall feeding, which is not economically feasible for indigenous cattle. Stall feeding becomes feasible at yields of 1,200-1,500 liters per animal per year.

2.20 Regional Differences. Cattle and buffalo are raised throughout India, although production is generally concentrated in higher rainfall areas (the west coast and eastern regions, the lower and middle Gangetic Plain and Plateau areas). These areas are characterized by high population densities and large (80-90 percent) areas of land under rainfed conditions, with rice as the main crop. The Eastern regions are also characterized by large (30-40%) poor populations. Buffaloes are mostly kept in the drier areas of the upper and middle Gangetic and Gujarat Plains, which are characterized by a large (35-60%) share of irrigated arable land, mostly wheat-based farming systems, and a much smaller share of the population (less than 20%) living below the poverty line.

2.21 Constraints to Bovine Production. Two major constraints to cattle and buffalo production are:

- ◆ Feed quantity and quality. The feed deficit is quite significant in the semi-arid areas in the northwest and in the densely populated areas of the Central Plateau. The feed shortage is exacerbated by the large number of unproductive cattle,
- ◆ Low buffalo meat prices result in the slaughter of a large proportion of male buffaloes at birth and the loss of productive potential,

E. Small Ruminant Production Systems

2.22 Small ruminant (sheep and goats) production is concentrated in the arid areas of western and central India, the subhumid areas of the Southern Plateau, and the temperate foothills of the Western and Eastern Himalayas. In these areas, the share of irrigated agricultural land is small (5-15%) and, with the exception of western Rajasthan, a significant portion (10-60%) is under forest cover. The main crops grown in these areas are millet and pulses. A large share (20-60%) of the population in these areas is poor.

2.23 **The Nomadic system.** The nomadic system, under which about 30 percent of the small ruminant population is raised, is based on seasonal movements between the dry western zone and the Himalayan Central Plateau, and on crop residues of the irrigated areas. The nomadic system has grown in importance over the past decade. For example, in Rajasthan cattle in the area declined by 10 percent during 1977 and 1992, while nomadic sheep and goat populations increased 22 percent. The increases are the result of the excessive grazing pressure in sedentary systems, the opening of stubble areas in the irrigated crop areas of Haryana, and improved transport which facilitates seasonal migration. In arid areas, there has been a shift away from bovines toward goats, reflecting the increased pressure on grazing resources. Sheep and goat herds under nomadic systems are generally larger than those under sedentary systems, with normal herd sizes exceeding 40 sheep or 20 goats. Sheep are kept for wool and meat and goats for meat and milk, but demand for meat has been the driving force for the population increases. Production coefficients (birth rate, mortality) are generally better under nomadic systems than under the sedentary systems, especially for herds that have access to crop stubble.

2.24 **The sedentary system.** Sedentary systems predominate in the Plateau areas. Herd sizes in these areas average 1.5 sheep per household, with herd size increasing with landholding size (40% of the sheep are kept on farms of less than 1 ha). Intensive feedlots for sheep fattening have not yet developed.

2.25 **Constraints to small ruminant production.** Three important constraints to small ruminant production are:

- ◆ The poor genetic quality of most local sheep and goat breeds, both for meat and for wool. India, however, has a large genetic pool of productive breeds.
- ◆ Weak support services (extension, breeding, animal health) to small ruminant farmers because of central and state government emphasis on cattle.
- ◆ Feed and fodder availability, given that most sheep and goats depend on degraded common areas for their feed supply (para 3.18).

F. Poultry Production Systems

2.26 Both intensive and traditional poultry production systems are maintained in India, although the intensive system is rapidly gaining greater importance. About 60 percent of poultry meat and 56 percent of eggs are produced under intensive production systems.¹³ About 60,000

¹³ Indian Poultry Industry Yearbook, 1994.

poultry farms are under intensive production systems, using technology and inputs developed locally or imported, with some farms raising more than 100,000 birds. Production coefficients on these farms approach Western standards. About 100,000 farms scattered throughout rural areas practice more extensive production systems, with backyard flocks ranging from 25 to 250 birds. Free-roaming indigenous chicken in backyard rural flocks have low productivity levels—about 40-80 eggs a year. Hatching is done by the broody hen and no investments are made in rearing and maintenance.¹⁴ Under intensive production systems profits are about Rs 3 per bird or Rs 2 per kg liveweight and Rs 2 per month per layer, although such results can vary considerably over time and across localities.¹⁵

2.27 Poultry farming cooperative societies have been established in several states, generally with government assistance. By 1991 there were 3,000 poultry cooperatives, with 190,000 members and total sales of Rs 757.7 million.¹⁶ The highest concentration of these cooperatives is in Maharashtra, which contained 43 percent of the country's poultry cooperatives in 1992. A large number of cooperatives have also been established in Bihar (227), Gujarat (228), Punjab (248), Tamil Nadu (167), and Uttar Pradesh (215). The GOI's eighth Five-Year Plan (1992/93 to 1996/97) gives priority to developing the poultry cooperative sector (para 4.48).

2.28 **Constraints to Poultry Production.** The poultry production subsector faces three major problems:

- ◆ **Feed supply.** Seasonal fluctuations in the supply of major feed ingredients such as corn, fishmeal, soybean meal, and other oilseed cakes and meals are a major problem. Moreover, trade restrictions that prevented imports during production shortfalls also have hurt the industry. For example, the industry faced an acute maize shortage in April 1992, resulting in a sharp increase in feed prices. High feed prices, coupled with the seasonal decline in egg prices during the summer, resulted in the early culling of layers, the postponement of regular placements, and a consequent sharp drop in the layer population. While large farms survived, small farmers (2,000-5,000 layers) were forced to shut down. In Andhra Pradesh more than 30 percent of the local egg producers ceased operations. The feed shortfall increased egg prices by 20 percent. Sustained growth in the poultry industry will be significantly influenced by the consistent availability of feeds. The government's recent move to reduce the tariffs on feed ingredient imports will help ease domestic supply problems (although most imports remain canalized or restricted by licensing).
- ◆ **Feed quality.** In some cases commercial feeds are adulterated, for example fish meal with urea, sand, and salt. Poor feed production management and restrictions on enterprise size (para 3.35) have also contributed to inconsistent feed quality. In some cases, for example, inadvertent heating of feed mixtures has damaged the protein quality of feeds. Thus, standardization and greater quality control are needed in the feed sector.

¹⁴ National Cooperative Development Corporation, 1993.

¹⁵ Alpha Agritech Consultants (PVY.) Ltd, 1994, "Poultry Development," Consultant's Report.

¹⁶ Nripendra Mishra, 1994, "An Operational Framework for the Future of Cooperatives in India," Paper presented at the "Agricultural Service and Credit Cooperatives Workshop," April 21-22, 1994, World Bank, Washington, D.C.

- ◆ **Diseases.** The prevalence of infectious Bursal disease (Gumboro disease) and other diseases also have been a major problem. In March 1993 a Gumboro disease outbreak devastated the poultry industry; about 4.5 million commercial layer and broiler birds died in Andhra Pradesh alone. Epidemics were also recorded in Bangalore, Jind, and Pune. Newcastle disease is also prevalent in backyard poultry. These problems could be alleviated through improved production management. In addition, limited awareness of proper immunization techniques may require strengthening of the delivery channels for technical advice (para 6.46).

G. Conclusion

2.29 The livestock sector's future performance will be significantly influenced by its international competitiveness. As trade protection is cut back, the sector needs to improve efficiency and lower costs. The underlying current trends in livestock production systems present tremendous challenges—but they also offer opportunities. While some intensification is occurring in livestock production, especially among dairy and poultry producers, the sector is still dominated by low-input production systems operating at significantly lower levels of intensification than in the crop sector. Intensification of production is further constrained by sociocultural factors which prohibit the slaughtering of cows. Large cow populations are one of the main factors contributing to overgrazing. Rising incomes and the associated increase in consumption, however, offer promising opportunities for greater intensification in the livestock sector.

2.30 Output increases in the dairy sector will have to come from improvements in the quality of the animals and not, as in the past, from increases in the animal population. Emphasis should thus be placed on the use of improved buffalo and higher-producing crossbred cows, while maintaining enough local genes to be able to function under prevailing smallholder conditions. Given the existing price incentives for higher-fat milk, the buffalo population can be expected to grow strongly. More intensive production and use of genetically superior animals will increase the use of stall feeding and farm-produced fodder and improved crop residues. This ultimately will lead to a closer integration of cattle and buffaloes in the farming system. The use of cattle for traction can be expected to decrease further, as the quality of small-farm machinery continues to improve and prices decline. More and more farmers, especially the younger ones, will switch to tractors for cultivation.

2.31 In the small ruminant sector, increased meat production initially will have to come in the short term from an increase in herd numbers, as no infrastructure exists to genetically improve meat production. Long term opportunities exist in genetic improvement of local breeds. The development of intensive feed lots for sheep fattening will also offer an important means of increasing total meat production.

2.32 Provided that its competitiveness improves, the poultry sector will be able to maintain its spectacular growth, especially for broilers. Growth will come from the expansion of intensive production systems, mainly operated by the private sector.

2.33 The most critical factors governing these trends will be the availability of high-quality and low-priced feed, since this will determine the feasibility of stallfeeding, the opportunities for

intensive feedlots, and the efficiency and international competitiveness of the poultry industry. These factors are further analyzed in the Chapter Three.

CHAPTER 3

BALANCING LIVESTOCK SECTOR GROWTH AND FEED AND FODDER SUPPLY

3.1 Ensuring an adequate supply of reasonable quality feed and fodder is one of the major challenges facing the Indian livestock sector. While there is some debate on the exact size of the current deficit, there is general agreement that the volume and quality of future feed supply will be of vital importance in sustaining the growth of the livestock sector. This chapter reviews the current status of the feed and fodder system and identifies constraints that hamper its development. Structural problems and public sector policies influencing the performance of the sector are examined. The challenge of improving the genetic base in India, which could also increase the efficiency of feed use is discussed in Chapter 6.

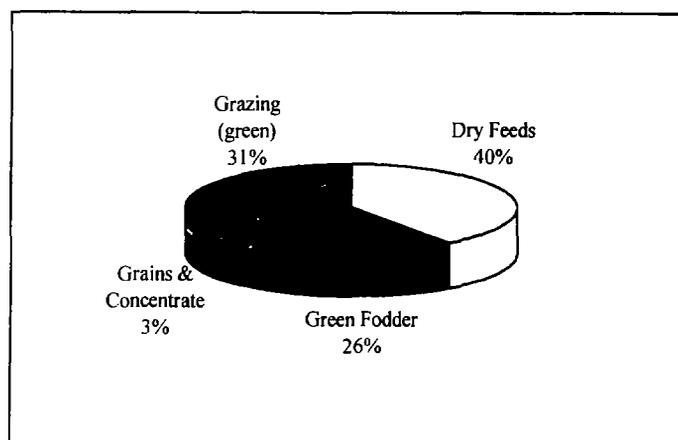
A. Feed Consumption in India

3.2 Green and dry fodder account for most feed consumption in India (Figure 3.1). Dry feeds, composed mainly of agricultural residues, cultivated green fodder and green fodder from grazing in forests and pastures together account for over 90 percent of livestock feed consumption. Grains and feed concentrates are only important in the intensive production systems.

3.3 **Agricultural Residues.** Agricultural residues consumed by livestock consist of two-thirds straw from wheat, rice, barley, maize, sorghum, and millet and one-third hay from pulses and oil seeds. It is customary to collect residues immediately after harvest and pile them into heaps, either near the threshing yard or in backyards, for stall or supplemental feeding during the lean season. In some states (for example, Punjab and Rajasthan) the complementarity between intensive cropping systems and livestock production is exploited through the migration of animals (mostly goats and sheep) to the wheat and rice growing areas after harvest to feed on the agricultural residues. Over the past decade, the quality and quantity of wheat and rice straw, the main ingredient in residues, have deteriorated because of the shift toward the production of "green revolution" varieties, which produce less and poorer quality straw. A number of technologies for on-farm treatment can improve the feeding quality of these straws (para. 3.11).

3.4 **Grazing and Cultivated Green Fodder.** Grazing is the most important source of fodder for cattle and other ruminants. Most grazing takes place in forest areas, non-arable lands, permanent pastures and grazing areas, and land under miscellaneous tree crops and groves. The total area covered by these land categories shrank by about 30 percent (23 million ha) between 1950-51 and 1988-89 (Table 3.1). The area under green fodder totals about 8.3 million ha, or 5 percent of the total cultivated area, and is increasing in significance with the diversification of Indian agriculture. For example, fodder cultivation for dairy production is increasingly being introduced in the irrigated Punjab area.

Figure 3.1: Composition of Feed Consumption in India.



3.5 Most grasslands are severely degraded and overgrazed as a result of continuous grazing or harvesting of the grass. Consequently, the soils are shallow, low in nutrients, and severely compacted. Moreover, the levels of palatable and nutritious grasses have fallen. In addition, extensive areas have been invaded by noxious weeds and bushes.

3.6 **Fodder from Forests.**¹⁷ Tree leaves and grass undergrowth from forests constitute an

important source of fodder, particularly in hilly and arid areas. Leaf fodder available from forest areas depends on several factors, including the proportion of fodder trees to the total growing stock, the density of the forests, the practice and intensity of harvesting of leaf fodder, and the distance of the forest areas from the villages. In some parts of the country more animals feed on shrubs and trees in forest areas than on

Table 3.1: Land Use Classification in India, 1950/51 to 1988/89 (millions of ha)

Geographic Area	1950/51	1960/61	1970/71	1980/81	1988/89
Forests	40.48	54.05	63.92	67.47	67.08
Permanent Pastures and Grazing Land	6.88	13.97	13.26	11.97	11.8
Wastelands	22.94	19.21	17.5	16.74	15.23
Fallow Lands (excluding Current Fallow)	17.44	11.18	9.76	9.92	10.46
Current Fallow	10.68	11.64	11.12	14.83	13.84
Misc. Tree Crops and Groves	19.83	4.46	4.3	3.6	3.45
Gross Cropped Area	131.89	152.77	165.79	172.63	180.11

Source: Directorate of Economics and Statistics, 1992, *India Agriculture in Brief*, 24th edition.

open grass and pasture land. Forests cover about 700,000 square kilometers or about 21 percent of India's land area (Annex Table 3.1). About 90 percent of all forests are publicly owned and managed. The Ministry of Environment and Forests in 1993 estimated that about 90 million cattle and buffaloes graze in forest areas.

3.7 Forests areas are not equally distributed throughout the country, more than half of forest land is located in five states: Madhya Pradesh, Arunachal Pradesh, Andhra Pradesh, Orissa, and Maharashtra. The area covered by forests in these states ranges from 15 and 30 percent, with the

¹⁷ This section is mainly drawn from World Bank, 1993, "Forest Sector Review", Report 10965-IN, India Agriculture and Water Operations Division, Country Department II, South Asia Region.

exception of Arunachal Pradesh with 82 percent. In contrast, in the mainly semi-arid and arid states such as Gujarat and Rajasthan, only 4 percent of the area is covered by forest. Most forests are not large contiguous blocks, but rather small patches interspersed by habitations.

3.8 The pressure from grazing has contributed to degradation in many forest areas. Heavy grazing in the forest damages trees, compacts soil and inhibits regeneration. Livestock pressure on forests has built up over time as the population has grown and traditional grazing lands have been turned over to crop cultivation. In some areas, forests have become the primary grazing site and the main source of fodder. Both sedentary village livestock (mainly cattle and small ruminants) and migratory animals raised by nomadic livestock producers use forest lands.

3.9 Forests that are situated near habitations and villages have the heaviest incidence of grazing. Grazing and other activities, such as repeated annual ground fires and the removal of dry fuel wood and non-timber forest produce, have reduced vegetative cover, exposing the forest floor to erosion and thus further reducing its carrying capacity for grazing. The magnitude of livestock pressure is illustrated by a survey of 174 protected areas which found that 67 percent of national parks and 83 percent of sanctuaries reported grazing incidence, despite laws prohibiting grazing in these areas. It has been estimated that in 1984 more than half (about 36 million ha) of forest areas were degraded. A key challenge therefore is to find a more sustainable strategy for using these forest areas.

3.10 **Fodder Marketing.** The market for green and dry fodder is not yet well developed. In areas with surplus dry fodder from agricultural residues, the fodder is primarily marketed in nearby deficit areas. Sometimes, they are baled and sent to distant locations by rail. The sale of dry fodder in the weekly markets is quite common. Green fodder is also cut and transported short distances for marketing, particularly to nearby urban areas. Large-scale organized markets for fodder are few, they only operate in Bombay, Ahmedabad, Delhi and Calcutta.

3.11 **Technologies for More Efficient Use of Fodder Resources.** New technologies are being developed in India to improve the utilization of crop residues. Fodder production and cut-and-carry systems offer an alternative to communal grazing. The quality of crop residue (i.e. straw) may be improved by urea treatment to improve its nutritive value. Similarly, urea-molasses blocks have been improved through research conducted by ICAR, agricultural universities and the NDDB. Increased milk yields of 20 percent as a result of using urea-molasses blocks have been reported. The application of by-pass protein technology in combination with straw¹⁸ has been found to quadruple the efficiency of supply of amino-acids from feed to milk production. Bypass protein technology, under experimental conditions, has reportedly allowed the reduction of concentrate requirement by 40 percent, the increase in the conversion of protein in dry matter by over 30 percent, and the reduction of dry matter requirement by 24 percent.¹⁹ Important constraints to the utilization and dissemination of these technologies remain. These include the applicability of these technologies to high yielding cross-bred cows only, their commercial production and utilization

¹⁸ Bypass protein technology refers to the use of special protein sources (e.g. brewer's grain, corn gluten meal, cotton seed cake, soybean meal) and processes (e.g. heating) to reduce the digestive losses in the rumen and improve the efficiency of protein utilization.

¹⁹ A.K. Chatterjee and R.M. Acharya, 1992, "Heading for 21st Century," in Dairy India: 1992.

potential, and weaknesses in the existing technology transfer system which could introduce such technologies to farmers.

3.12 The current GOI program for increasing the production of fodder crops and pasture grasses/legumes primarily consists of the dissemination of high yielding foundation/certified seeds of these crops. For this purpose, several regional stations and a Central Fodder Seed Production Farm have been established to undertake their production and propagation.²⁰ In addition, a scheme for fodder mini-kit demonstrations aims to educate farmers on new high yielding fodder varieties and improved agronomic practices through field demonstrations. This is also being implemented in the regional stations and the Central Fodder Seed Production Farm. Fodder seed supply is also an important constraint. To increase the availability of improved fodder seeds, the provision of incentives to registered private seed growers in different states to take up the production of the seeds needs to be more vigorously pursued.

Table 3.2: Production of Mixed Animal Feeds by the Organized Sector, 1964-90 (thousands of mt)

Year	Cattle Feed	Poultry Feed	Total
1964	25	14.4	39.4
1970	125.4	84.3	209.7
1975	275.3	143.9	419.2
1980	549.9	350.2	900.1
1985	867.3	502.8	1370.1
1987	1119.3	609.4	1728.7
1990	1324.5	833.7	2158.2

Feed Production by Region, 1990, 000 mt

Region	Cattle Feed	Poultry Feed	Total
North	46.4	169.5	215.9
South	488.6	422.6	911.2
West	781.8	217.7	999.5
East	10.8	23.9	34.7

Source: The Compound Livestock Feed Manufacturers Association of India (CLMFA), Bombay.

3.13 **Concentrate Feed.** Concentrate feed in India is supplied by the “organized” and “unorganized” sectors. The organized feed compounding industry (plants with capacity greater than 100 mt/day) in the cooperative and private sector currently produces nearly 3 million mt of feed annually.²¹ The bulk of the feeds is produced in the Western and Southern regions of the country (Table 3.2). Another two million mt of feed are produced by the unorganized sector (10-30 mt/day plant capacity). Concentrate feeds largely utilize domestically produced feed ingredients.

3.14 Only a small proportion of poultry feed is supplied by the commercial feed sector. Compared with over 700,000 mt of poultry feed produced by feed millers in the organized sector, total production and consumption of feed by commercial poultry operations, including broilers and breeding stock in 1990, was estimated at 5.4 million mt. The majority is actually accounted for by on-farm and custom mixing by poultry farmers.

B. The Feed Deficit

3.15 National feed balance calculations, such as those estimated by the Wasteland Development Board and the Ministry of Agriculture consistently project feed deficiencies of about 20-30 percent of requirements, equivalent to 250 million mt dry feed per year (Annex Table 3.2 a&b). More conservative estimates (Annex Table 3.2c) show a total dry matter (DM) availability of about 480 million mt and a requirement of about 735 million mt. Natural grazing is the most difficult to

²⁰ Regional stations have been established in Mamidipally, Hyderabad (Andhra Pradesh), Gandhi Nagar (Gujarat), Hissar (Haryana), Suratharh (Rajasthan), Sahema (Jammu and Kashmir), Alamadhi (Tamil Nadu), and Kalyani (West Bengal) (Ministry of Agriculture, Department of Animal Husbandry and Dairying Annual Report 1992-93).

²¹ These firms also make up the Compound Livestock Feed Manufacturer's Association (CLFMA).

estimate,²² and slight changes in the assumptions regarding natural grazing yields have considerable impact on the size of the deficit. For example, an increase of forest grazing yields of only one ton DM per ha per year would decrease the deficit by one third. For concentrate feeds, supply estimates can be more precise. Most estimates show an annual production of about 33 million mt. In the case of concentrates, the debate focuses on the requirements, and especially those of the traditional sector. Most national feed calculations show a deficit of about 50 - 60 million mt (150 percent of the requirements), mainly the result of the assumption of 0.5 - one kg per animal consumption per day by the traditional sector. If, as is likely, farmers would not find this economically justified, the estimated deficit would be only 3 million mt (Table 3.3).

Table 3.3: Requirements and Availability of Feed
(millions of mt DM)

	Type	Roughage	Concentrate feed
Supply	Grazing	213	
	Crops and crop residues	271	33.1
Total		484	33.1
Requirements	Cattle and buffaloes	606	24.3
	Small ruminants	122	1.9
	Poultry	0	4.5
	Pigs	0.7	4.4
Total		735	35.7
Balance		-251	-2.6

Source: World Bank estimates.

3.16 Regional deficits are more important than the national deficit, especially for roughage which is not economical to transport over long distances. The most recent estimate (1991) from the National Wasteland Development Board²³ found that 43 of the 55 micro-regions exhibited deficits; only 12 micro-regions exhibited surpluses (Annex Table 3.2 b).²⁴ In the surplus regions, improved livestock are mostly stall-fed. In the hills and dry western regions of Rajasthan and Gujarat, the surplus is attributable to the large quantity of pasture grasses produced from the vast range and pasture lands. In most deficit states, the deficiency is due to the large livestock population, little or no area under fodder, and very low biomass from degraded/marginal lands (0.5-one mt DM/ha).

3.17 The deficit can be expected to grow in the future. National feed balances predict a further widening gap in concentrate supply of about 42 million mt in the year 2001 and about 60 million mt

²² This is also illustrated by the fact that feed deficits of magnitudes similar to present estimates have already been made as far back as 1941 and then again in 1974, while in the meantime the cattle and buffalo population has increased by 8 and 30 percent respectively, and livestock production has even doubled over the past two decades. Such an increase in population and production would not have been likely if these deficits of the magnitudes estimated existed.

²³ Based on a study by P. Singh and A.B. Majubar, 1992, Current Status of Feed and Forage in Management of Livestock, in Agricultural Situation in India, August: 375-382.

²⁴ The surplus micro-regions include: Northwestern UP Plain, Southwestern UP Plain, Delhi, Punjab-Haryana, Rajasthan, MP Central Plateau and Hills, East Rajasthan Plains and Hills, Maharashtra-Deccan Plateau, MP-Malwa Plateau, Maharashtra Konkan, Western Dry, and the Rajasthan Dry Division.

in the year 2016.²⁵ The rate of growth of the poultry industry will be an important factor influencing the feed demand pressure. A continuation of the growth of the commercial broiler industry at the same rate of about 15 percent per year would increase the requirement of that sector by about 3.5 million mt per year. A doubling of the number of improved dairy cows over the same period would increase demand by another 10 million mt.

C. Addressing the Feed Deficit

Managing the Common Grazing Areas

3.18 Most natural grazing areas (community pastures and grazing lands, community forests, and wastelands) are common property resources (CPRs). CPRs are resources over which members of a group have co-equal use rights. Traditionally, it was in essence private property for the group with an established management and authority system enforcing norms of behavior among the members with respect to the resource. These CPRs are now subject to serious problems of erosion and land degradation. The Bank's Wasteland Development Review (1989) estimated that about 130 million ha (40 percent of India's potentially productive land area) are either not productive or are producing well below their productive capacity. The annual loss of topsoil due to erosion is estimated at 6 billion mt every year. Depletion of the quality of the grazing areas is clearly shown by the change in the vegetative composition and the shift towards grazing by sheep and goats instead of cattle. A study of 75 villages in 7 states by Jodha (1992) found that CPR areas declined by as much as 30 to 55 percent between 1950-51 and 1982-85; the number of watering points (ponds), an important component of grazing lands, has also declined by 55 to 92 percent; and as much as 20 percent of the original cattle grazing areas is now being grazed by small ruminants (Table 3.4 and 3.5).²⁶

3.19 Two important factors have contributed to the decline and subsequent degradation of the common property grazing areas: (i) the change in land policy of the GOI, initiated in the early 1950s and (ii) population growth.

3.20 Land Policy

Reform. A major factor contributing to the degradation of common property grazing areas is their conversion into open access areas, which to a large extent was spurred by changes in government land policy beginning in the 1950s. Land reform in the 1950s, designed to

Table 3.4: Changes in Common Property Resources, 1951-1981

State	Number of Districts & Study Villages	Average Area of CPR/village 1981/82, (hectares)	Decline since 1951 (percent)	Persons Per Ha	
				1951	1981
Andhra Pradesh	3,10	827	42	4.8	13.4
Gujarat	3,15	589	44	8.2	23.8
Karnataka	4,12	1165	40	4.6	11.7
Madhya Pradesh	3,14	1435	41	1.4	4.7
Maharashtra	3,13	918	31	4	8.8
Rajasthan	3,11	1849	55	1.3	5
Tamil Nadu	2,7	412	50	10.1	28.6

Source: N.S. Jodha, 1991, "Rural Common Property Resources, A Growing Crisis," *Gatekeeper Series 24*, International Institute for Environment and Development.

²⁵ Alpha Agritech Consultants, Ltd., 1994, "Feed and Fodder Production," Consultant's report prepared for the World Bank.

²⁶ N.S. Jodha, 1992, *Common Property Resources: A Missing Dimension of Development Strategies* World Bank Discussion Paper 169, Washington, D.C.: World Bank.

Table 3.5: Selected Indicators of Common Property Resource Degradation, 1980s

Indicators of Changed Status & Context of Comparison	States (Number of Villages)						
	Andhra Pradesh (3)	Gujarat (4)	Karnataka (19)	Madhya Pradesh (40)	Maharashtra (3)	Rajasthan (4)	Tamil Nadu (2)
Number of Trees and Shrubs per hectare in :							
•Protected CPRs ^a	476	684	662	882	454	517	398
•Unprotected CPRs	195	103	202	215	77	96	83
Number of Watering Points in Grazing CPRs:							
•1950s	17	29	20	16	9	48	14
•1980s	4	13	4	3	4	11	3
CPR Area shifted from Cattle to Small Ruminant Grazing	48	112	95	--	52	175	64

a. Areas where for religious reasons living trees and shrubs are not cut.

Source: N.S. Jodha, 1992, "Common Property Resources, A Missing Dimension of Development Strategies," *World Bank Discussion Paper* 169, Washington, D.C.: World Bank.

provide land to specific beneficiaries (mainly the landless), encouraged the privatization of these areas. Because the government was unable to acquire adequate land for redistribution through land ceiling laws or voluntary donation, it decided to distribute some of the common lands instead. Privatization was carried out either through the formal distribution of common lands to the landless and other groups or through the legalization of illegal grabbing of such lands by more powerful groups. Both actions increased the pressure on the remaining common areas.

3.21 The traditional management systems for CPRs (including usage regulation, enforcement of user obligations, and investments in conservation and development) were also seriously weakened in many areas when the traditional institutions were replaced by the administrative structures such as the village *panchayat* system or elected village councils.²⁷ Land reform also eliminated a number of revenue sources, such as levies and taxes, for the maintenance of common property areas (Table 3.6). While the *panchayat* eliminated the formal authority of the feudal landlords, it also weakened the authority of the village elders in many areas or was unable to fill the management vacuum that it created. Although they had legal powers, the village panchayats were generally unable to enforce regulations pertaining to the CPRs. The panchayat's dependence on community vote compelled them to avoid unpopular measures like user obligations. Moreover, their domination by village leaders with little personal interest in the CPRs reduced the effectiveness of many of the panchayats. The weakened management played a decisive role in the conversion of the CPRs into open access areas. The exceptions were in cases where village elders still exercised informal authority over the CPRs.²⁸

²⁷ Village panchayats are local self-government units that are responsible for civic services. In some states, the units are responsible for primary education, rural industries, inputs for agriculture, and so on. On average, the gram panchayat covers 2-3 villages and a population of 2,400 people. At the block level there are panchayat samitis, which cover 48 gram panchayats and implement local schemes and some works taken up with their own resources. The zila parishad, which cover 13-14 panchayat samitis, are generally advisory, fund-distributing bodies.

²⁸ R. Brara, 1987, "Shifting Sands: A Study of Rights in Common Pastures," Institute of Development Studies, Jaipur, India.

Table 3.6: Selected Indicators on CPR Management, 1950s to 1982-85.

State (Number of Villages)	Number of Villages with					
	Formal or Informal Regulations on CPR Use ^a		Formal or Informal Taxes or Levies on CPR Use ^b		User's Formal or Informal Obligation for CPR Maintenance ^c	
	1950s	1982-85	1950s	1982-85	1950s	1982-85
Andhra Pradesh (10)	10	--	7	--	8	--
Gujarat (15)	15	2	8	--	11	2
Karnataka (12)	12	2	9	--	12	3
Madhya Pradesh (14)	14	2	10	--	14	3
Maharashtra (13)	11	1	6	--	10	1
Rajasthan (11)	11	1	11	--	11	2
Tamil Nadu (7)	7	--	4	--	7	1

a. Measures such as regulated or rotational grazing, seasonal restrictions on CPR, provision of CPR watchmen, etc.;

b. Measures such as grazing taxes and penalties for violating of regulations on CPR

c. Measures such as contributing towards desilting of watering points, fencing, trenching, protection of CPRs, etc.

Source: N.S. Jodha, 1992, *Common Property Resources, A Missing Dimension of Development Strategies*, World Bank Discussion Paper 169, Washington, D.C.: World Bank.

3.22 The traditional community arrangements and informal systems of social sanctions relating to the use and maintenance of CPRs have been replaced by frequently unenforceable legal and administrative measures. These measures marginalized the people's initiative and alienated them from the CPRs. They also encouraged dependence on government grants or relief and discouraged the mobilization of local resources for the upkeep of the CPRs.

3.23 **Productivity Decline.** The policies and programs adopted to raise the productivity of CPRs have performed poorly, primarily because of the lack of emphasis on the strengthening of the local social organizations. For example, a number of programs made rehabilitation of community pastures and community forests a community responsibility—yet were often treated as state-run activities. Moreover, many programs emphasized technology for raising productivity without consulting with or involving the communities. Because these programs were conceived as top-down measures, implemented with administrative and legal procedures and sustained by state subsidies with limited community involvement, many of them failed.

3.24 **Reversing the Degradation Spiral.** CPRs need to be reconverted from open access regimes to true common property areas (communal privatization). This will require re-establishing and enforcing usage regulations and user obligations.²⁹ At the aggregate level, this could be facilitated by provisions that would not only regulate usage, but would also empower local communities to implement such provisions. Strategies to rehabilitate CPRs should focus on organizing user groups. There are no unique models to pattern such groupings in dry areas.³⁰

²⁹ N.S. Jodha, 1985, "Population Growth and the Decline of Common Property Resources in Rajasthan, India," *Population and Development Review*, Vol. 11 (2): 247-264; N.S. Jodha, 1985, "Market Forces and Erosion of Common Property Resources", in *Agricultural Markets in the Semi-Arid Tropics*, Proceedings of an International Workshop, October 24-28, 1983, ICRISAT, Patancheru, India.

³⁰ See S.M. Ashish, 1993, "Decentralized Management of Natural Resources in the UP Hills," *Economic and Political Weekly*, August 28, 1993, pp. 1793-96; P.N. Wilson and G.D. Thompson, 1993, "Common Property and Uncertainty: Compensating Coalitions by Mexico's Pastoral Ejiditarios," *Economic Development and Cultural Change*, Vol. 41 (2):299-318; N. Shanumgaratnam, T. Bedeld, A. Mossige, and M. Bovin, *Resource Management and Pastoral Institution Building in the West African Sahel*, World Bank Discussion Paper 175, Washington, D.C.: World Bank.

Whatever the approach, the importance of participatory planning and location-specific solutions cannot be overemphasized. Given the enormous variations in topography, soil types, customs, traditions, and beliefs among Indian villages, it is impractical to think in terms of uniform programs and administrative processes. User groups must be given the freedom to set resource management rules to suit local conditions and needs (Box. 3.1).

3.25 Key features of CPR user-groups. Based on local and international experience in traditional forms of rural cooperation and management of community resources,³¹ the following are desirable features of prospective CPR groups:

- ◆ ***The users and boundaries of these CPRs must be clearly identified. In addition, access to benefits from the area should be equal for all members.*** CPRs have been encroached upon by both rich and poor households, some of whom have obtained legal titles or established de facto rights to them. A land survey may be needed to determine which areas are still open access and which have become private property. The formation of the users groups for these areas must start at the grassroots level, where membership could be based on geographic proximity to the CPR or based on traditional use patterns. Members must see these groups as their own organization, thus they must be consulted and involved in the formation of these groups. The services of local community organizers, such as village elders, would be useful for this task. Technical assistance and logistical support might be needed in the formation of these groups; such support could probably come from the National Wasteland Development Board.
- ◆ ***Users groups should have legal status; in some cases this may require establishing groups separately from the formally elected village bodies.*** Managerial authority should be ceded to the leaders of groups who depend on the CPRs. These groups must be given the authority to adjudicate conflicts and disputes among members. The government might need to pass enabling legislation for this purpose. Government support will also be needed to enforce the groups' exclusionary rights against nonmembers and in providing managerial training for the group leaders.
- ◆ ***Preconditions for membership in the group should include a binding commitment to user obligations and usage regulations.*** People are more willing to commit to obligations and regulations if they are involved in the design of their own operational rules. Violators of these rules can be made to pay fines.³²

³¹ These studies include: M.J. Odell, 1982, "Local Institutions and Management of Communal Resources: Lessons from Africa and Asia," ODI Pastoral Network Paper 14e, Overseas Development Institute, London; P.R. Mishra and M. Sarin, 1987, "Sukhomajri-Nada: A New Model of Eco-development," Business India, Bombay, November 16-29; T. Shah, 1987, "Profile of Collective Action on Common Property: Community Fodder Farm in Kheda District," Institute of Rural Management, Anand, Gujarat; K. Chopra, G.K. Kadekodi, and M.N. Murty, 1990, *Participatory Development: People and Common Property Resources*. New Delhi: Sage Publications; A. Agarwal and S. Narain, 1990, "Towards Green Villages," Center for Science and the Environment, New Delhi; M. Proffenberger, 1990, "Joint Management of Forest Lands: Experience from South Asia," The Ford Foundation, Delhi.

³² Ostrom, E., 1990, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge, UK: Cambridge University Press.

Box 3.1: Design Principles of CPR Institutions

Clearly defined boundaries

Individuals or households who have rights to withdraw resources from the CPR must be clearly defined, as must the boundaries of the area itself.

Congruence between appropriation and provision rules and local conditions

Appropriation rules restricting the time, place, technology, or quantity of resource units must be related to local conditions and to provision rules requiring labor, material, or money.

Collective choice arrangements

Individuals affected by the operational rules should be able to participate in modifying the operational rules.

Monitoring

Monitors, who audit area conditions and appropriator behavior, must be held accountable to the appropriators or be the appropriators.

Graduated sanctions

Appropriators who violate operational rules should be assessed graduated sanctions (depending on the seriousness of the offense) by other appropriators, by officials accountable to the appropriators, or by both.

Conflict resolution mechanisms

Appropriators and their officials should have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.

Minimal recognition of rights to organize

The rights of appropriators to devise their own institutions must not be challenged by government authorities.

Source: Ostrom, E., 1990, *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge, U.K.: Cambridge University Press.

3.26 Joint Management of Forest Lands.³³ The increasing problem of forest degradation has led to various GOI programs to encourage users to protect the forests. One of these programs is the joint (government and user) management of forest lands. Several states have passed orders supporting joint planning and management of degraded government forests. In West Bengal almost 237,000 ha are managed by more than 1,700 forest protection committees. In Haryana more than 40 communities have started to protect catchment areas through forest protection committees and village leasing of grass harvesting rights. Similar efforts are being undertaken in Orissa, Uttar Pradesh, Kashmir, and Gujarat.

3.27 Although the performance of the forest protection committees varies considerably, several important lessons have emerged. These include:

- ◆ Establishment of appropriate incentives is essential to encourage local people to take up and sustain forest protection efforts,
- ◆ A cooperative attitude among forestry officers is important,

³³ World Bank, 1993, "Forest Sector Review," op. cit.

- ◆ Regular annual income flows and clear, equitable benefit-sharing arrangements between the identified user groups and the Forest Departments ensure participation,³⁴
- ◆ Program effectiveness improves with greater homogeneity of groups, participation in the forest protection committee of a large share of households within a village, and direct linkage to the protection of the resources by small user groups.

3.28 Issues remaining to be resolved include the increased participation of women in forest protection committee decision making and the rights of secondary users (those living in more distant hamlets from the forests who traditionally have harvested forest products).

3.29 Recent World Bank experience with social forestry projects in India attests to the importance of community participation and appropriate incentives for proper resource management. Microplanning is one approach that has been effective in enhancing community participation. This approach involves the preparation of a village profile which identifies the relevant users, collects information on demographics, property rights, and other socioeconomic statistics, followed by interviews with representative households to determine their needs and perceptions of the common property resource. From this information a plan for the management and use of the resource is formulated with the help of the community.³⁵

3.30 The National Dairy Development Board (NDDB), in collaboration with the National Wasteland Development Board (NWDB), has implemented a silvipasture scheme through the network of milk federations and unions and village cooperatives. The program involved the establishment of *kisan vans* (farmer groups) on privately owned wastelands and *gram vans* (village groups) on community wastelands, which plant fuelwood and timber, fodder trees, and grasses (see Box 3.2).

Box 3.2: The Silvipasture Scheme: Recent Experience and Emerging Lessons

By 1993, the scheme had been implemented in 132 milksheds in 15 states. The progress of the *Kisan Vans* (farmer groups) on farmer-owned land has been encouraging, covering 12,842 of the targeted 13,000 ha. The progress of *Gram Vans* (village groups) on community wastelands had been poor. Only 1,358 of the targeted 5,000 ha had been incorporated in the program, mostly on land that belonged to the dairy cooperative. The main constraint to further development was the unavailability of unencroached common grazing land or wasteland suitable for fodder and fuelwood tree and perennial grasses and legume production. In areas where the land was available, the milk unions encountered difficulties in getting lease rights to the land, either due to protracted and complicated procedures or restrictions imposed by state governments and forestry departments.

Source: NDDB, 1993, "Technology Mission on Dairy Development, Progress Report."

³⁴ Eleven states (Orissa, West Bengal, Bihar, Gujarat, Rajasthan, Madhya Pradesh, Tripura, Maharashtra, Jammu and Kashmir, Haryana, and Andhra Pradesh) have passed laws allowing benefit sharing between the government and local populations.

³⁵ See A.K. Banerjee, 1987, Microplanning, A Tool for Social Forestry Implementation, National Wasteland Development Board (India) for a detailed description of the microplanning procedure and case studies.

Removing Disincentives to Concentrate Feed Use

3.31 Domestic demand for concentrate cattle feed remains limited in India. This is in spite of the fact that the price of feed relative to milk prices is more favorable in India compared to other major milk

Table 3.7: Nominal Protection Coefficients for Selected Feed Ingredients, 1988-93.

Commodity	1989	1990	1991	1992	1993	1994	1995
Maize	0.92	0.83	0.99	1.05	0.81	0.68	0.97
Sorghum	1.17	1.13	0.99	1.07	1.08	0.77	0.99
Barley	1.00	1.04	1.01	0.92			
Soybean Meal	1.09	0.80	0.84	0.95	0.92	1.04	
Rapeseed Meal	0.47	0.41	0.32	0.32	0.47	0.55	
Peanut Meal		0.80	0.78	0.81	0.78	0.89	
Sunflower Meal	0.58	0.53	0.43	0.47	0.52	0.63	

Source: G. Pursell and A. Gupta, 1996, "Trade Policies and Incentives in Indian Agriculture," World Bank; James Fry, 1996, LMC International.

producing countries, like the US (Table 3.7). The price of oil meals/cakes, a major ingredient in concentrate cattle feed, have historically been below world market prices (Table 3.8).³⁶ For cattle, a major factor contributing to the low demand is the predominance of low productivity animals, which makes the use of concentrate feeds less profitable. The adoption of improved and higher yielding animals, which would demand higher quality feeds, however, is slowed by low milk prices and poor availability of veterinary services in many areas. Inefficiencies in the dairy processing sector further contribute to low milk prices.

3.32 A number of regulations also inhibit the efficient distribution of feed ingredients (Table 3.9). Movement controls on coarse grains and cereals under the Essential Commodities Act hinder arbitrage between surplus and deficit areas, while storage controls limit private interseasonal storage. The commodities act was enacted in 1955 to control and regulate the production, supply, and distribution of essential commodities so that they could be made available to consumers at reasonable prices. Under the Act interstate movement of commodities requires a general or special transport permit. Similarly, enforcement of the act subjects wholesalers to maximum stockholding limits. In Maharashtra the maximum storage period is 15 days for wholesale dealers. Continual changes in these regulations contribute to market uncertainty. Special officers have been appointed by state governments to enforce these regulations, giving rise to rent-seeking problems. A trader in the

Table 3.8: Relative Values of Feed and Livestock Product Output in India and the United States, 1980-93.

Ratio of	1980	1985	1990	1993
Milk/Feed^a				
India	2.44	3.91	3.80	
U.S.	3.08	3.32	2.97	
Beef/Corn^b				
India	2.45	2.92	3.42	
U.S.	20.71	25.82	33.81	
Egg/Feed^c				
India	2.54	2.55	2.54	2.79
U.S.	2.62	3.17	3.19	2.61
Broiler/Feed^d				
India	4.71	5.13	4.75	4.88
U.S.	5.65	7.66	6.45	7.15

a. kg of mixed feed of equal value to one kg of milk.

b. kg of mixed feed of equal value to one kg of beef.

c. kg of layer mash of equal value to one dozen eggs.

d. kg of broiler mash of equal value to one kg of broiler meat.

Source: USDA, 1994, *Feed Situation and Outlook Yearbook*, FDS-330; Annex Tables 4.3 & 4.5.

³⁶ This is also in part due to the lower quality of Indian oil meals and cakes. See World Bank, 1996, "The Indian Oilseeds Complex: Capturing Market Opportunities".

surplus states of Uttar Pradesh and Punjab faces an average of nine inspections a year from various departments and has to pay, on average, Rs 200-300 per visit. Inspections in other states occur every three to six months at an annual cost of Rs 300-1,200.

3.33 Multiple central and state taxation mechanisms also increase marketing costs. The sale of feed ingredients is often subject to multiple market fees under the state-level Agricultural Produce Markets Act (para 4.2). In addition, states levy a sales tax (5-15%), a turnover tax (10-15%), and an entry tax. Unofficial taxation is also pervasive. Road transport requires payment of “fees” ranging from Rs 200- 300 per checkpoint to avoid harassment. An interstate trip involves 6 to 7 checkpoints.

Table 3.9: Government Interventions in Feed and Feed Ingredient Marketing

Regulation	Government Level	Examples
Coarse Cereals		
Trade Licensing	Central and State	Foodgrains Licensing and Procurement Order, Uttar Pradesh Foodgrains and other Essential Articles, Haryana Food Articles Licensing and Price Control, Punjab Trade Articles (Punjab: if amount >2.5t)
Price Control	Central and State	Support Price, Uttar Pradesh Food Grains Act
Transport	Central	Motor Vehicles Act (Maximum quantity = 16.2 mt)
Inter-State Trade	State	Punjab Maize Movement Order
Dealer Trade	State	Punjab Trade Articles (dealer trade not to exceed 2.5t)
Storage Quantity	Central and State	Foodgrains Licensing and Procurement Order, Uttar Pradesh Scheduled Commodities Dealers Licensing Order, Punjab Trade Articles (Maximum quantity set by different orders) (Maximum quantity = 2.5t)
Storage Licensing	State	Uttar Pradesh Scheduled Commodities Dealers Licensing Order, Punjab Trade Articles
Oilseeds		
Trade Licensing	Central/State	Essential Commodities Act; Punjab Trade Articles (if quantity >2.5 mt)
Transport	State	Essential Commodities Act, Essential Commodities Act, Haryana Food Articles, Punjab Trade Articles
Storage Quantity	Central/State	(Class A: city-wholesalers 150 mt, retailers 10t; Class B: city-wholesalers 100 mt, retailers 7.5t; Other areas: wholesalers 50t, retailers 5t) (maximum quantity 2.5t)
Storage Licensing	State	Haryana Food Articles
Marketing	Central/State	Essential Commodities Act, Agricultural Produce Marketing Act (Oilseed Manufacturing restricted to small-scale enterprises)

Source: Tata Consultancy Services, 1994, “Report on Legislative Impediments in Agricultural and Agro-processing,” Phase II. Report prepared for the World Bank.

3.34 The weak domestic demand for concentrate feeds and heavy reliance on fodder has had a serious negative spill-over effect on the environment. Overgrazing in many areas is causing serious degradation problems in many common grazing areas and forests. For example, assuming that concentrates have 2.5 times the feed value of fodder, moving from grazing to stall feeding would increase the efficiency of feed utilization by 100 percent.

3.35 Another major constraint to the expansion of the feed concentrate sector is the small and highly volatile supply of quality feed ingredients. Feed manufacturers often face problems of adulteration of feed ingredients, such as when urea and sawdust are added to fish meal. Poor post-harvest handling and storage of feed ingredients result in low-quality inputs. Quality standards are available from the Bureau of Indian Standards, but no mechanism ensures that these standards are met by the industry for both ingredients and finished products.

D. Addressing Constraints in the Poultry Feed Sector

3.36 The development and competitiveness of the poultry industry will be significantly influenced by the adequate and reliable supply of good quality poultry feed. Presently, the price of poultry feed relative to output prices is considerably higher in India relative to other countries, such as the US (Table 3.8). For example, the value of one kg broiler meat in the US is equivalent to 7.2 kg of broiler feed, compared with India's 4.9 kg of feed. Eggs have price ratios that are more comparable to the U.S.

3.37 Increasing domestic production of maize, a major ingredient in poultry feed, will likely contribute the reduction of poultry feed prices. The liberalization of feed maize imports will also increase domestic supplies and provide a cushion for domestic production shortfalls (Table 3.10). This will help avoid possible feed crises, like in 1992, which severely hurt the poultry industry.

3.38 An important factor contributing to the high cost of poultry concentrate feed is a 1977 regulation restricting poultry feed manufacture, with the exception of poultry feed in pellet form, to small-scale enterprises. Only new units are subject to the regulation, however; medium-size and large units manufacturing poultry feed prior to the enactment of the regulation are exempt.³⁷ The

Table 3.10: Tariff Schedule for Selected Feed Ingredients, 1995 (percent)

Commodity	Tariff Level	GATT Tariff		Quantitative Restriction	
		Binding		Exports	Imports
Feed Maize	0	0		Restricted	Free
Barley	0	100		Restricted	Canalized
Rye	0	100		Restricted	Canalized
Sorghum	0	0		Restricted	Canalized
Millet	0	0		Restricted	Canalized
Soybean	40-50	100		Restricted	Canalized ^a
Groundnuts	40-50	100		Restricted	Canalized
Linseed	40-50	100		Restricted	Canalized
Rapeseed	40-50	100		Free	Canalized
Sunflower	40-50	100		Free	Canalized
Oats	0	0		Restricted	Canalized
Oilcakes, meals	35	150		Free	Restricted

a. Due to production shortfall, during the period of February to September 1995, imports of soybeans by private crushers were allowed, subject to meal re-export conditions.

Source: A. Goyal, 1995, *Customs Tariffs, 11th Budget Edition*, New Delhi: Academy of Business Studies; G. Pursell and A. Sharma, 1995, "Indian Trade Policies Since the 1991 Reforms," Draft mimeo., USDA, 1995, "Oilseeds and Products Annual," AGR No. IN5042.

³⁷ NDDDB, 1993, "Technology Mission on Dairy Development, Progress Report, July 1992-June 1993."

regulation does not apply to cattle feed manufacture, although the same processing facilities are often used to manufacture both feeds.

3.39 This restrictive policy inhibits the development of both the feed and poultry industry. At present, the large capacity modern feed mills in both the private and cooperative sector have underutilized capacity.³⁸ Moreover, firms cannot take advantage of economies of scale, thus increasing the cost of production. Since poultry feed preparation requires sophisticated technology and small enterprises do not have the capacity to make such investments, limiting poultry feed production to small-scale enterprises also hampers the production of standardized, high-quality feed products.

E. Conclusion and Recommendations

3.40 The low productivity and poor nutrition of most domestic livestock contribute to low yields per animal. To compensate for low productivity, farmers tend to maintain large herds and flocks. Large livestock populations, combined with the changes in government land policy, have contributed to the reduction in size of the common grazing areas and the breakdown of the traditional institutions managing these areas.

3.41 At the same time, increased use of concentrate feeds—which could lower the demand for fodder and thus ease the pressure on grazing areas—is limited by the low productivity of the animals, making concentrate use uneconomical. Even for productive animals the use of concentrate feeds is limited by government dairy policy and government restrictions on enterprise size in oilseed and poultry (non-pelletized) feed manufacturing.

3.42 Addressing India's feed problems requires a four-pronged strategy involving:

- ◆ Intensification and improvement of the genetic pool,
- ◆ Increased integration of crop and livestock production systems and improved management of the common grazing areas,
- ◆ More proactive dissemination of strategies for improved fodder production methods,
- ◆ Elimination of unnecessary regulations and movement restrictions and promotion of increased competition in the concentrate feed manufacturing sector.

3.43 Improving the genetic pool would increase productivity and improve feed efficiency, which would ease the incentives to keep large herds and help avert the continuing resource degradation. Improving the management of the common grazing areas would not only increase the productivity of these areas but also minimize degradation. Increasing the use of concentrate feeds also could help ease the pressure on grazing areas. Increasing the integration of crop and livestock production systems would allow farmers to exploit the complementarity between these system, since intensive cropping systems are important sources of crop residues.

³⁸ Ibid.

3.44 There is a need for a comprehensive government strategy for developing of the feed sector. Efforts also have to be made to address the problems of the CPRs. At present there is no clear division of labor among the concerned government agencies.

3.45 **Addressing the Resource Degradation Problem.** Alleviating the degradation problem in the common grazing areas and common fodder supply could be addressed by establishing grassroots community and user groups to manage the degraded common property areas. A comprehensive approach would involve:

At the union level:

- ◆ Identifying and evaluating needed legislative reforms to allow user groups to manage the common property grazing areas,

At the state level:

- ◆ Adopting mechanisms (such as microplanning and collaborating NGOs) to identify the common property areas and, in cooperation with users and user groups, develop an area management plan. New management approaches could include cut-and-carry and stall feeding, introduction of grazing fees, and rotational grazing. Cut-and-carry systems also would lower the number of unproductive animals because owners would not be willing to incur the labor costs of feeding unproductive animals.
- ◆ In addition, states should formulate alternative mechanisms (for example, initial matching grants or loans) to compensate users groups for the temporary loss of grazing areas until the productivity of the degraded areas is restored.

3.46 At present there is limited understanding of the socio-economics of utilizing grazing fees, of raising fodder in dry areas, and of the merits of stall feeding compared with rotational grazing. More research will be required in these areas. Experience from other countries indicates that the use of grazing fees to finance the management and maintenance of CPRs has a positive impact on use of the areas, provided the community is able to capture the benefits. Fee structures could be made progressive that is, depending on the size of the flock or herd.

3.47 **Introducing fodder production and crop-residue improvement.** Improving the feed supply will require better integration of fodder production into the farming system. Although input and output price ratios and returns to labor largely define farmer adoption of fodder cultivation technologies, new approaches that could be explored include:

- ◆ Testing large numbers of fodder species at the farm level and involving smallholders in seed production, as is being done in Turkey and East Africa. Such approaches would alleviate the shortage of seeds, which currently constrains on-farm fodder production; and
- ◆ Technologies that improve feed quality (para 3.11).

3.48 **Liberalizing the Concentrate Feed Sector.** The marketing of feeds and feed ingredients must be further liberalized to reduce their costs, increase their availability, and help ease the pressure on fodder sources. This would involve eliminating the following at the union and state government levels:

- ◆ Laws imposing storage and movement restrictions on feed ingredients.
- ◆ The restriction of poultry feed and oilseed manufacturing to small-scale enterprises,

3.49 The Compound Livestock Feed Manufacturer's Association, with government cooperation, also should review the marketing and feed quality problems and examine ways to improve the distribution and feed quality standards and control.

CHAPTER 4

LIVESTOCK AND LIVESTOCK PRODUCT MARKETING

A. Livestock Marketing

4.1 India has more than 2,000 markets where livestock and livestock products are traded.³⁹ All livestock markets are under the jurisdiction of state governments and union territories, although direct operation and supervision generally fall to local bodies, such as the *village panchayats* and municipal corporations. There are a few privately owned markets. A more detailed description of the marketing channels for live animals is presented in Annex A.

4.2 **Agricultural Product Markets Act and Market Development.** The Agricultural Product Markets Act (APMA) was enacted by the states to regulate the marketing of agricultural produce, including livestock, to improve their efficiency and in the process ensure a more equitable distribution of gains from agricultural trade among consumers, traders, and producers. The Uttar Pradesh *Krishi Utpadan Mandi Samitis Adhiniyam* (1972) and the Punjab Agricultural Produce Markets Act (1961) are examples of this legislation. The act governs the establishment of markets for agricultural produce and of marketing committees in each market area. The marketing committees are responsible for implementing and enforcing the provisions of the act and are empowered to regulate access to the markets, charge market and license fees, and issue, renew, suspend, or cancel licenses. The one-time marketing fees range from 1.0-1.5 percent of the value of the commodities. In many states, however, the marketing fee is applied to both raw and processed products, which increases transaction costs for traders and prices for consumers.

4.3 Revenues generated under the act are supposed to be allocated to the markets, particularly for the operation and maintenance of the market yards and the development and improvement of market facilities and related development works and activities. The marketing committees are supervised by the State Agricultural Produce Market Board, which is responsible for statewide market development.

4.4 Structural and management problems, however, contribute not only to a lack of consistency in fee collection, but also to the inefficient allocation of the revenues collected. A large portion of the revenue is often diverted to other uses (for example, rural roads outside the market area, agricultural scholarships) or transferred to the district magistrate as general tax revenue, instead of being reinvested to improve the market facilities or services (such as, sanitation, cold storage, grading, and weighing facilities, and market information). Limited financial authority of the respective marketing committees constrains access to the necessary capital to properly operate or upgrade the agricultural market facilities. Inadequate accounting standards have further contributed to rent-seeking activities.

4.5 There is a need to rationalize the revenue-generating and capital allocation responsibilities of the institutions involved in agricultural market development. The frequency at which fees are

³⁹ This section draws on Alpha Agritech Consultants, 1994, "Small Ruminant Development," Report prepared for the World Bank.

collected needs to be clarified and made more transparent. To increase the efficiency and promote the development of individual agricultural markets, financial rules need to be reformulated to allow the marketing committees to retain a greater share of the revenue collected and have greater authority in fund allocation. To improve the effectiveness and transparency of fund allocation, the marketing committees should be modified to include trader, farmer, and consumer representatives. The state marketing board should retain financial control over statewide market development initiatives.

4.6 Grading Standards for Live Animals. Grading standards are currently only applied to livestock product exports, to meet international requirements. The Agricultural and Processed Food Products Export Development Authority (APEDA) established the standards, including sanitary and hygiene standards, for exported raw and processed meat. No specific central government standard has been established, and while it is generally left to state governments to prescribe the standards, this task has been left to municipal corporations. In 1991, the Ministry of Agriculture initiated a program to establish national standards. This program is not yet complete. The implementation of any domestic standards, however, should take into account the tradeoff between stricter grading and higher costs to consumers.

4.7 In practice animal grading is performed by buyers with the assistance of brokers and commission agents. Prices are based on such factors as breed, age, body structure and appearance, milk yield, lactation number, estimated meat yield, etc. Prices are arrived at through negotiations, directly or indirectly through brokers and commission agents or, in a few cases, through auction.

B. Meat Processing

4.8 Most slaughterhouses, with the exception of a few private facilities catering to the export market, are operated by state governments. In 1992, there were 3,643 slaughterhouses; the four states with the largest number are Karnataka (860), Kerala (715), Tripura (397), and Maharashtra (387). Annex Table 4.1 lists the number of slaughterhouses by state.⁴⁰

4.9 India's majority Hindu population considers the cow to be sacred, so the slaughter of cattle is prohibited in all but a few states (Kerala, West Bengal, and several northeastern states). Buffaloes are not subject to the same religious sensitivities, and are slaughtered at a variety of weights (averaging about 300 kg liveweight) and ages. Only about five percent of cattle and ten percent of buffaloes are slaughtered each year, which is equivalent to about one-third the potential cattle offtake and about two-thirds the potential buffalo offtake. During fiscal year 1993 (April to March), about 3.1 million cattle and 3.9 million buffalo were slaughtered, yielding about 1 million mt of beef. With increasing mechanization, the demand for draft animals in states such as Punjab, Haryana, and Uttar Pradesh is declining, resulting in a surplus of male buffaloes, which often are slaughtered at birth. The slaughter of these young male calves is a waste of productive capital.

4.10 Goats are usually slaughtered at nine to twelve months of age, with an average carcass weight of 10-12 kg (45% dressing rate). About 40 percent of sheep and goats are slaughtered for meat production each year, which is about the total offtake to be expected for small ruminant production under low input conditions. Goat meat accounts for about three-quarters of the total small ruminant meat supply. Total goat and sheep slaughtered for fiscal year 1993 was 61.3 million,

⁴⁰ There are also a large number of unrecognized slaughterhouses in the country (USDA, 1994, Annual Livestock and Products Report, AGR No. IN4056.

consisting of 47.0 million goats and 14.3 million sheep and yielding about 615,000 mt of mutton and goat meat.

4.11 Except for the few operated by private, export-oriented enterprises, most slaughterhouses are old, unhygienic, overcrowded, and lack essential services like water, light, ventilation, drainage, waste disposal, and effluent treatment. Unsophisticated slaughtering practices contribute to poor meat quality and low recovery of various by-products such as hides and skins, tallow, blood, viscera, and organs. A large share of the blood from the unorganized slaughter of sheep and goats, for example, is wasted. One estimate placed the value of unutilized by-products of goats and sheep at about Rs 538 million in 1990-91.⁴¹

4.12 Most meats are sold without the benefit of sanitary inspection. Butcher shops often lack chilling equipment, further contributing to product deterioration and increased marketing losses. Further processing of meat (for sausages, prepared foods) is limited. High taxes on packaging materials (cans, closures, cartons) further constrain the profitability of processed meat production. The absence of laws restricting slaughtering to licensed slaughterhouses also contributes to the poor quality of domestically consumed meat and may pose a health hazard to the public. Poor enforcement of hygienic standards constrain India's export competitiveness, while poor enforcement of environmental standards will increase pollution problems in the future.

4.13 An important issue at this stage of market development is the tradeoff between the cost of stricter regulations for domestic meat production and the benefits from consumer health protection. While regulations are essential for livestock product exports, enforcing similarly strict standards in domestic markets may not be economically feasible.

4.14 Capital investments in existing slaughterhouses would contribute significantly to the collection of by-products. For example, blood and other offal's could be used as animal feed supplements. The Department of Animal Husbandry and Dairying has consistently allocated funds for the improvement of slaughterhouses and carcass utilization centers. In 1992-93, for example, these funds amounted to Rs 75 million or five percent of the department's total budget (para 6.10).⁴² Political and social pressures, however, continue to impede efforts to modernize the slaughtering sector.

4.15 To improve India's potential to export meat, the establishment of disease-free zones has frequently been advocated. The current prevalence of contagious diseases is a major constraint to exports. Detailed socio-economic studies—including an assessment of the domestic acceptability of culling animals to eradicate diseases—need to be conducted to determine the feasibility of such an undertaking.

C. Marketing of Wool

4.16 The marketing channels for wool are quite similar to those for meat, although the government and the Wool Marketing Federation intervene more extensively in the wool market. The government buys 10-15 percent of marketed wool. A more detailed discussion of marketing channels for wool is presented in Annex A.

⁴¹ Alpha Agritech Consultants, Ltd, 1994, "Small Ruminants Development." Report prepared for the World Bank.

⁴² Ministry of Agriculture, 1994, Department of Animal Husbandry and Dairying Annual Report 1993-94.

4.17 The wool and hair produced in India (most with a diameter greater than 30 microns) is best suited for furnishings, carpets, and industrial fabrics. Only 3,000-5,000 mt (8-12%) of domestic wool has a diameter of less than 25 microns, the width best suited for apparel. Wool produced in the temperate north and northwestern regions is superior to that of the eastern and southern regions.

4.18 During 1993-94 domestic wool production was estimated at 42,200 mt, while the wool processing industry demand was estimated at 79,000 mt.⁴³ To meet the deficit, 30,000 mt of wool, 25,000 mt of rags and waste, and 2,000 mt of wool and hair tops, valued at more than Rs 3 billion, are imported.⁴⁴ Wool imports are driven to a large degree by the limited domestic supply of fine wool (diameter less than 25 microns). To reduce the import burden, the government has launched a breeding program to crossbreed indigenous sheep with Rambouillet and Merino varieties. Over the past 8 years, about 10,000 fine wool sheep have been imported. The crossbreeding program has had limited success, however (para 6.29).

D. Marketing and Processing of Hides and Skins

4.19 Hides and skins are traditionally collected from villages, towns, and cities and transported to major terminal markets. In recent years, tanneries have also obtained skins at the district-level markets and urban units. The quality of the hides and skins retrieved from slaughterhouses is very poor. Annex A provides a more detailed discussion on the structure of hide and skin marketing.

4.20 The Indian leather industry has 125 medium- and large-scale units, 1,200 small-scale units, and thousands of tiny tanneries in rural areas. 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, largely because it allows cattle slaughter. In addition to absorbing domestic supplies, the tanning industry imports skins to increase capacity utilization. In 1990-91 leather raw material imports (including skins) amounted to Rs1.9 billion. The end uses of leather are estimated at 60 percent for footwear, 12 percent for garments, 10 percent for bags.

4.21 The leather industry exhibited tremendous growth as a result of the simplification of export procedures, the government's decision to encourage exports of value-added leathers, and the liberalization of capital good and component imports (specifically the reduction in duties). Increasing costs of production (especially wages) and growing concerns about the negative environmental impact of tanneries in industrial countries helped improve the competitiveness of Indian leather products. India has a competitive edge due to low wage rates. Environmental regulations are also weakly enforced.

4.22 The tanning industry faces serious problems, including sizable losses due to the defective curing, preservation, storage, and handling of skins and environmental pollution resulting from the improper disposal of waste products from the tanning process. To address the pollution problem, the government is restricting the establishment of new units and the expansion of existing tanneries.

E. Marketing and Processing of Dairy Products

4.23 About 60 percent of India's milk production, is sold in the market; the rest is consumed at the producer (urban and rural) household level. In 1993/94, 36 million mt of milk were marketed,

⁴³ Ministry of Agriculture, 1994, Department of Animal Husbandry and Dairying Annual Report 1993-94.

⁴⁴ Alpha Agritech Consultants Ltd, 1994, 'Small Ruminants, Development,' op. cit.

of which 13 million mt (36 %) went through the organized sector (Operation Flood (OF) cooperatives, government milk schemes, and large private processors) and 23 million mt (64%) were channeled through the unorganized sector (small private dealers and processors). OF cooperatives and government schemes account for 17 percent of milk marketing; private processors account for 19 percent (Figure 4.1). Milk in the organized sector is processed in 275 dairy plants and 83 milk product factories operated by cooperatives, private dairy processors, and government milk schemes. Milk channeled through Operation Flood cooperatives is generally processed in rural dairy plants and transported into cities and towns.

4.24 The unorganized sector includes private milk vendors and milk dealers. Milk dealers supply milk either to bigger milk dealers or to private dairy factories. Small dealers generally collect milk from a small number of villages that serve as part of a larger procurement scheme operated by a bigger milk dealer or processor. The large processors set a fixed price according to fat content and non-fat solids, leaving it to the supplier to set prices for farmers. These processors usually integrate forward by establishing or leasing ice factories to chill the milk, enabling them to seek the best price for their milk from private dairy factories within or outside the state. Box 4.1

Box 4.1: Milk Marketing in Punjab

Punjab contains four main types of milk vendors outside of the cooperatives:

- ◆ Those who keep cattle sheds in urban peripheries to supply milk to the cities. These vendors are supported by fodder and feed supplies from an outlying village, where dry animals (cows and buffaloes) are returned. These owners typically market 50-600 liters of milk a day.
- ◆ Those who procure milk from village milk producers, get it standardized in local creameries by adding water and skim milk to it, and marketing it to their city customers.
- ◆ Those who purchase milk from creameries, dilute it, and sell the low-fat milk to low-income consumers, tea stalls, and restaurants. This type of vendor, fewer in number than the first two categories, is more prominent in the southern states of Tamil Nadu, Karnataka, and Kerala.
- ◆ Those who work as agents of milk contractors and purchase milk from producers.

Source: J. Singh, 1992, "Let Us Know Our Competitors," Report, Ludhiana District Cooperative Milk Producers' Union Ltd, Ludhiana.

describes the different types of milk traders in Punjab.

4.25 Total milk production in fiscal year 1993 was estimated at 60.8 million mt. About 45 percent of milk production is consumed as fluid milk. About 35 percent is processed into butter or *ghee* (clarified melted butter), 7 percent is processed into *paneer* (cottage cheese) and other cheeses, 4 percent is converted into milk powder, and the rest is used for other dairy-based products such as *dahi* (yogurt) and sweet meats. In recent years, ice cream production has been increasing, although foreign and domestic investments in the ice cream industry have been constrained by the restriction of ice cream production to small-scale industries. Annual production of milk powder and infant food is estimated at 160,000 mt, malted milk food at 45,000 mt, cheese at 3,000 mt, and condensed milk at 8,500 mt. Annual butter and butter oil production totals about 1.2 million mt, most of which is produced by small businesses and households.⁴⁵

⁴⁵ USDA, 1994, "India Agricultural Situation," AGR No. IN4084.

4.26 Indian consumers typically prefer high-fat milk, so milk quality is judged by its fat content. Thus buffalo milk, which usually has 7 percent fat, commands a premium over cow's milk. In retail channels, milk is classified as full-fat milk (6% fat), standard milk (4.5% fat), toned milk (3% fat), double-toned milk (1.5% fat), and skim milk (0.5% fat).

4.27 Government Interventions in Dairy Product Marketing.

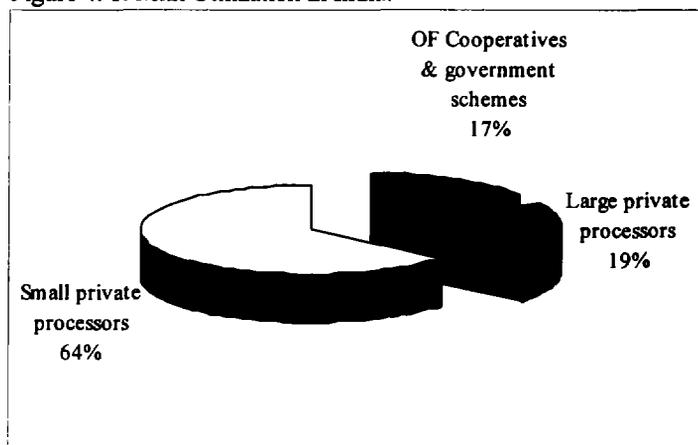
In order to ensure adequate supply of milk to consumers at affordable prices and ensure reasonable prices for dairy producers, the GOI implemented two major programs. The first was the setting up of City Milk Schemes in the 1950s and second was the launching of the Operation Flood Program in 1970.

4.28 **City Milk Schemes to Address Urban Milk Needs.** City milk schemes were introduced in the 1950s to ensure a cheap and stable supply of milk to urban populations. The first program was established in Delhi in 1955 with a large dairy plant supported by a network of rural milk and chilling centers. This program was subsequently replicated in about 100 towns and cities throughout the country. By the 1960s, however, the sourcing of milk from the urban peripheries became more difficult because of increasing competition from the *dudhias*, milk traders who collected milk from farmers and delivered it directly to customers. In many cases the city milk schemes started handling milk supplied by the *dudhias*. The inflexibility's and inefficiencies associated with the government operation of the milk schemes prevented the milk schemes from adjusting to changing market prices and conditions. Consequently, as market prices increased, producers started supplying milk directly to consumers or to vendors instead of selling it to the milk schemes. To cope with the short milk supply, the schemes began importing and reconstituting milk powder. At the same time, milk rationing programs, intended to control the heavy demand for cheap, subsidized milk, gave rise to milk cards (vouchers) and milk queues.

4.29 **Declining Share of Milk Schemes.** The market share of city milk schemes is gradually declining (Bombay and Calcutta) or posting slower growth (Delhi and Madras), with the advent of the regional and National Milk Grids operated under Operation Flood (OF). In large cities the milk schemes coexist with the Mother Dairies established under OF,⁴⁶ but the schemes mainly supply subsidized milk of variable quality to cardholders. The milk schemes, however, continue to suffer from poor management and are incurring significant losses.

4.30 **Operation Flood and the Cooperative Sector.** Operation Flood was launched in 1970 to promote the integrated development of the dairy sector. Its main objective is the creation of farmer-owned and farmer-controlled organizations based on the Anand pattern of cooperative development. In setting up dairy cooperatives, the OF sought to capitalize on the beneficial

Figure 4. 1: Milk Utilization in India.



Source: India Dairy Yearbook 1992.

⁴⁶ The Mother Dairy is a marketing mechanism developed under Operation Flood involving the installation of milk vending machines in major cities.

features of cooperatives. The cooperatives would (i) provide farmer members an assured market for their output which is critical for a perishable commodity like milk, (ii) a farmer controlled mechanism for delivering essential support services, and (iii) enable farmers to directly share the benefits from the returns generated by the cooperative. The National Dairy Development Board (NDDB) was established to oversee the planning and implementation of the program.

4.31 OF has been successful in spreading the dairy cooperative concept and providing an important demonstration effect on the potential for dairy development in India. In its 25 years, Operation Flood has replicated the cooperative model in more than 200 districts. In 1993, 8.4 million member farmers (estimated to be about one-third of the total dairy farmers) were supplying 5 million mt of milk to 65,000 milk cooperative societies, who in turn deliver the milk to 170 milk unions for processing and marketing.⁴⁷ In addition, the program provides training, extension, animal health, and artificial insemination services to its members and the NDDB, through its research institutes, conducts livestock research (para 6.42).

4.32 Financial support for Operation Flood was generated largely through the sale of recombined milk (processed from skim milk powder and butter oil) provided by the Food and Agriculture Organization and the European Union, five World Bank project loans, and government expenditures. During 1971-92 the food aid received by the NDDB included 411,170 mt of skim milk powder, 15,380 mt of whole milk powder, 110,940 mt of butter oil,

Table 4.1: Food Aid Received by the NDDB (millions of 1990 dollars)

Year	Skim Milk Powder	Whole Milk Powder	Butter Oil	Butter	Total
1971	18.27	0.00	na	0.00	18.27
1972	26.75	0.00	na	0.00	26.75
1973	31.05	0.00	na	0.00	31.05
1974	27.72	0.00	na	0.00	27.72
1975	42.58	0.00	na	0.00	42.58
1976	90.36	0.00	na	0.00	90.36
1977	75.43	0.00	na	0.00	75.43
1978	15.89	0.00	na	0.00	15.89
1979	21.56	0.00	na	0.00	21.56
1980	67.67	0.00	51.36	4.26	123.39
1981	39.36	0.00	45.47	3.65	88.49
1982	136.65	0.00	62.15	16.03	214.82
1983	48.55	0.00	31.96	10.62	91.13
1984	8.23	0.00	1.53	1.32	11.08
1985	49.00	0.00	30.55	9.76	89.32
1986	0.00	12.48	4.76	4.92	22.17
1987	0.00	7.33	0.54	1.04	8.90
1988	42.00	0.00	5.40	9.11	56.51
1989	34.85	0.00	3.69	14.37	52.90
1990	21.36	0.00	0.00	0.00	21.36
1991	0.00	0.00	1.47	0.00	1.47
1992	16.09	0.00	0.00	0.00	16.09
Total	813.37	19.81	238.88	75.18	1147.23

na = Not available.

Source: Annex Table 4.3

Table 4.2: Government Spending and World Bank Loans for Dairy Sector Development

Government of India Dairy Expenditures:	Millions of U.S. Dollars	Millions of Real U.S. Dollars (1990)
5th Plan 1974-78	60	184
6th Plan 1980-85	432	749
7th Plan 1985-90	434	521
Total	926	1,455
World Bank Projects	Millions of U.S. Dollars	Millions of Real U.S. Dollars (1990)
Rajasthan Dairy	27.7	88
Madhya Pradesh Dairy	16.4	52
Karnataka Dairy	30	95
National Dairy I	150	431
National Dairy II	360	468
Total	584.1	1,134

Source: K. Singh and R. Saxena, "Some Macro Economic Aspects of India's Livestock Sector: A Situation Analysis," Institute of Rural Management, Anand, India; World Bank data.

⁴⁷ National Dairy Development Board, 1993.

and 34,000 mt of butter (Annex Table 4.3). Valued at world market prices, these contributions total at least \$1.15 billion in 1990 dollars (Table 4.1).⁴⁸ The program also received World Bank loans for dairy projects, which in real terms (1990 dollars) amount to \$1.13 billion (Table 4.2). Since the loans cover only 70 percent of program costs, the NDDDB received an additional grant from the government of about \$480 million (1990 dollars). During 1974-90, government dairy expenditures (under the 5th through 7th Five-Year Plans) amounted to \$1.5 billion (1990 dollars). NDDDB projects also have privileged access to preferential loan terms and interest rates and other grants from the GOI. Not counting the interest rate subsidies, Operation Flood has received at least \$3 billion in real, direct subsidies (\$1.15 billion in food aid, \$480 million in grants and \$1.5 billion in government spending).

4.33 Domestic Protection of the Nascent Dairy Cooperative Sector. Three key measures were undertaken by the GOI to promote the development of the nascent dairy cooperative sector. Protected as an "infant industry," dairy product imports were canalized through the NDDDB until 1994 to shield the sector from competition from cheaper imports. Only imports in the form of food aid were allowed to enter the country and proceeds from the sale of the food aid were appropriated exclusively by NDDDB to finance its cooperative development efforts. In addition, domestic competition from the non-cooperative private sector was limited by the Industries Development and Regulation Act, 1951, which restricted entry into the dairy industry through licensing. In the context of liberalization, the licensing requirement was abandoned in 1991, only to be re-introduced in 1992 under the Milk and Milk Products Order (MMPO), in response to political pressure.

4.34 Weak Performance of Many Dairy Cooperatives. By the 1990s, however, many cooperatives were performing poorly. A 1994 review conducted by the World Bank of 117 cooperatives receiving assistance under the World Bank National Dairy Project II found that 52 percent incurred losses (Table 4.3). Rajasthan exhibited the worst performance, where all 17 cooperatives incurred losses. Cooperatives losses amounted to Rs 553 million in 1993 and Rs 583 million in 1994 (Table 4.4). A major factor which exacerbated the poor performance during 1993 and 1994 was the milk production surplus and the resulting crash in prices. Inventory and interest costs and sales below production costs contributed to substantial losses in Punjab, Haryana, Uttar Pradesh, Rajasthan, Andhra Pradesh, and Karnataka. Dairies with good liquid markets were less affected, and some capitalized on the low prices of skim milk powder to produce reconstituted milk, while others sold higher-fat milk (Orissa, Mother Dairies, Calcutta, and Delhi).

Table 4.3: Findings of World Bank Review of Cooperative Performance in Selected States

State	Total Number of Cooperatives	Number Incurring Losses	Percent Incurring Losses
Andhra Pradesh	11	9	81.8
Gujarat	20	2	10.0
Karnataka	14	7	50.0
Punjab	13	6	46.2
Rajasthan	17	17	100.0
Tamil Nadu	11	4	36.4
Uttar Pradesh	31	16	51.6
Total	117	61	52.1

Source: World Bank data.

4.35 Government Policies Contributed to Weak Performance of Cooperatives. In order to protect both producer and consumer welfare, many states exercised considerable control over cooperative operations, including controls over input and output pricing and the appointment of state officials to cooperative management positions. These interventions, and thus the diversion

⁴⁸ This is a lower bound estimate of the value of food aid received by NDDDB because this excludes the value of butter oil received during 1971-1979 (international market prices were not available).

from the original farmer-controlled cooperative concept, contributed to the poor performance of many cooperative unions. For example, social pricing policies implemented in some states resulted in negligible or zero processing margins. For example, government pricing of milk supplied to the cooperative federation in Tamil Nadu prevented profitable operations and the move to reduce the producer

Table 4.4: Financial Performance of Sample Cooperative Unions, 1993-94

Region	Number of Unions		Losses (millions of rupees)	
	with Losses	Total	1993	1994
Northern	16	61	-151	-302
Southern	19	37	-336	-232
Western	24	35	-53	-45
Eastern	3	14	-13	-4
Total	62	147	-553	-583

Source: World Bank data.

price in Karnataka in order to maintain profitable operations was blocked by the state government. In Maharashtra and Punjab, the state governments set the minimum producer price. In Maharashtra, the selling price is fixed if the union delivers supplies to the government dairy. In Andhra Pradesh and Karnataka, selling prices of the cooperative federations require government consultation.

4.36 Poor Management Of The Cooperatives Contributed To Poor Performance. Outside of state interventions, weak management and poor market orientation resulted in the poor economic performance of some cooperatives. A lack of flexibility in adapting to changing market conditions, poor quality control, over-staffing, underutilization of capacity due to the limited milk market, processing inefficiencies and weak marketing and commercial orientation further contributed to the poor financial performance of these cooperatives and resulted in their continued dependence on state financial transfers/subsidies. In some federations and unions, the frequent turnover of state appointed officials in cooperative Boards and top management contributed to poor incentive structures and weak management commitment.

4.37 Cooperatives Have Considerable Potential to Improve Their Performance. Continued protection of cooperatives will only sustain the inefficient operations of the poorly performing cooperatives, which in the long run will hurt both farmers and consumers. Introducing incentives that improve cooperative management and performance would help ensure the sustainability of cooperative operations and the continuous stream of benefits for farmers. Elimination of state interventions and closer adherence to the Anand Model, with greater farmer control of operations (rather than government control), and upgrading of skills in production, marketing, and financial management would help cooperatives meet the new marketing challenges. Improved cooperative performance will generate increased profits for the cooperative and permit greater returns to the member's investments. It will ensure sustainable operations and generate earnings for further productivity improving investments which will enable cooperatives to compete on an equal basis with private entrepreneurs. It will strengthen the cooperative's capacity to continue providing production-related and associated social services demanded by members.

4.38 The NDDDB has tried to improve the management of cooperatives under the Cooperative Development Program. By 1994, 90 unions had participated in the program, which includes problem-solving workshops, field-level training and orientation, and leadership training programs. The NDDDB has also created a marketing group to help unions develop in-house expertise and is planning to undertake market surveys to assess consumer preference and demand as it formulates a marketing strategy. The Board will also provide financial and technical assistance to dairies for consumer education campaigns and is increasing efforts to market higher-value-added products. In view of the large number of poorly performing cooperatives, upgrading their management will be a major task requiring significant resources.

4.39 Delicensing of the Dairy Processing Sector.

In recent years, however, OF and the NDDDB have come under increasing scrutiny as the private sector has lobbied for freer entry into the dairy processing industry and reduced protection for the dairy cooperatives. In July 1991 the GOI exempted the dairy processing industry from the 1951 Industries Development and Regulation Act, which had blocked the entry of private noncooperative dairy processors into the industry. In conjunction with other changes in the economy, delicensing opened the industry to private entrepreneurs and multinationals. The parent companies of multinational corporations (for example, Glaxo and Nestle) whose stake had been restricted to 40 percent were now allowed to raise their equity holdings to 51 percent. The basic goal of delicensing was to promote competition in the procurement and marketing of milk, thus increasing its value for both producers and consumers. Delicensing also was expected to increase the inflow of capital and new technologies.

Table 4.5: Applications for Dairy Processing Licenses, May 1994.

State	Total Applications	Transferred to State	License Approved	License Not Required
Northern Region				
Delhi	22	16	5	
Haryana	71	19	11	
Himachal Pradesh	5		3	
Jammu and Kashmir	3	2		
Punjab	57	2	16	2
Rajasthan	41	11	16	
Uttar Pradesh	174	64	12	
Total	373	114	63	2
Western Region				
Daman and Diu	2	2		
Goa	1		1	
Gujarat	54	26	19	
Maharashtra	108	59	16	
Total	165	87	36	0
Eastern & Central Region				
Andaman and Nicobar	1	1		
Assam	2	2		
Bihar	10	3	6	1
Madhya Pradesh	19	6	6	
Orissa	10	9	7	1
Sikkim	1		1	
Tripura	1		1	
West Bengal	10	7	2	
Total	54	28	23	2
Southern Region				
Andhra Pradesh	42	17		
Karnataka	23	8	13	
Kerala	8	5		
Pondicherry	1		1	
Tamil Nadu	28	17	5	
Total	102	47	44	2
All India	694	276	166	6

Source: Department of Animal Husbandry and Dairying, 1994.

4.40 Delicensing attracted

considerable private investment into the dairy sector. Within a year more than 100 dairy processing plants had been established in different parts of the country, most of which were designed for higher value-added product manufacture. By May 1994, 694 applications for investment had been received and 141 approvals had been issued. The highest number of applications originated from Uttar Pradesh, Maharashtra, and Haryana (Table 4.5). Some state governments have tried to attract private investments by offering concessions (sales tax breaks) and subsidies. In Haryana, for example, some 40 new plants were proposed to raise processing capacity to 4 million liters a day from the existing capacity of one million liters a day. As new private enterprises began operating, some of the new entrants were accused of poaching into cooperative territory. Moreover, concerns about excessive capacity and charges of private trader misconduct (mainly the sale of adulterated or contaminated milk) prompted calls for the reintroduction of market controls. Consequently, the GOI promulgated the Milk and Milk Products Order (MMPO).

4.41 Milk and Milk Products Order. In June 1992 the government promulgated the MMPO, which reintroduced controls on the entry and operations of participants in the dairy industry. Several key features of the order have important economic implications (Box 4.2).

Box 4.2: Important Features of the 1992 Milk and Milk Products Order

- ◆ All plants handling more than 10,000 liters or producing milk products containing more than 500 kg of milk solids a day are required to obtain a license from the MMPO controller. Those processing between 10,000 liters and 75,000 liters/day or greater than 500 kg but less than 3,750 kg of milk solids a day require state permission, while enterprises processing more than 75,000 liters/day or greater than 3,750 kg a day of milk solids require central government approval, with the license renewable every three years.
- ◆ New processors must develop their own milkshed or milk collection area and cannot encroach on cooperative milk sheds. If a shortage of milk occurs in one area and milk needs to be procured from other areas, it can only be sourced through cooperative unions or the cooperative federation at prices set by the union or federation.
- ◆ The processing of milk into higher-value products is banned during the lean summer months.
- ◆ Licensed processors must submit information on stock, procurement, production, and marketing to the government and allow it to enter and inspect private premises, with the power to seize stocks if necessary.
- ◆ A Milk and Milk Products Advisory Board was created to “assist, aid, and advise the central government on any matter concerning the production, manufacture, sale, purchase, and distribution of milk and milk products.” Members of the board include representatives from the Ministry of Agriculture, Ministry of Industry, Ministry of Food Processing Industries, Ministry of Health and Family Welfare, National Dairy Development Board (NDDDB), and National Cooperative Dairy Federation (NCDF). The board’s powers range from managing supplies across regions and establishing standards to approving license applications for new dairy processing plants.

Source: Ministry of Agriculture 1992.

4.42 The enactment of the MMPO was contested by the private sector as a form of back-door licensing and of compromising the GOI’s policy of liberalization. On the other hand, the cooperative sector’s counter arguments largely centered on the problem of new private dairies “poaching” and free-riding on the cooperative sectors’ investments and the lack of incentive by the private sector to make investments in productivity enhancements and develop its own supply base.

4.43 In May 1993 the GOI took measures to reduce the impact of the MMPO. The registration requirement was abolished for all units handling less than 75,000 liter a day or 3,750 kg a day of milk solids. The amendment also increased the license renewal term from three to five years and allowed for greater representation of the state governments and consumer bodies in the implementation of the MMPO, since the MMPO’s original Advisory Board was widely perceived as having an over-representation of farmer cooperatives.

4.44 **MMPO Maintains Barriers to Increased Competition and Market Efficiency.** Although the increase in capacity threshold and other modifications have changed some groups’ perceptions of the MMPO to that of a “toothless tiger,” such observations fail to take into account other critical components of the order. The four critical components of the Order are discussed below.

4.45 First, on the part of the processors, the delineation of milksheds, or areas from which milk is collected, creates local monopolies (for cooperatives or for any new private enterprise) and reduces the incentives for increasing operational efficiency. For farmers, the local monopoly prevents access to higher prices that come with greater competition. Competition would increase producer prices and encourage processing firms to increase their operational efficiency. The resulting lower processing margins would lower prices for consumers. Moreover, higher milk producer prices would improve the incentives for farmers to undertake investments to increase productivity and product quality, such as genetic upgrading and improved feeding. The resulting increase in milk supply and quality in the long run will enable processing firms to diversify their product lines and process more higher-value-added products to meet increasing consumer demand for such products.

4.46 Problems with the implementation of the MMPO have already appeared. In Uttar Pradesh, for example, despite the fact that cooperative processing capacity in some areas was far below the milk supply capacity of its milkshed, other private processors were not allowed to buy the excess milk.

4.47 Second, the condition that new entrants set up and develop their own milksheds imposes a higher investment cost on new firms, thus limiting the number of potential entrants to those with access to large amounts of capital. This provides an unfair advantage to cooperatives, who in the past have received considerable resources from the public sector (para 4.30) in developing their own milksheds. It is interesting to note that cooperatives criticize the concessions that new private enterprises are being offered by states, failing to recognize the subsidies they themselves have received and continue to receive.

4.48 Third, the provision allowing governments to dictate stock levels and to seize stocks during emergencies reduces the capacity of entrepreneurs for interseasonal arbitrage and increases market uncertainty. Given that trade liberalization has increased domestic access to world markets and supplies, this rule is no longer legitimate.

4.49 Fourth, imposing barriers to private entry is not an efficient way of addressing problems regarding the sale of contaminated or adulterated products by private producers. Rather, more stringent enforcement of hygiene and sanitation standards will better address product quality problems directly. Such standards will require strengthening the regulatory and enforcement agencies for hygiene and sanitation.

4.50 The achievements and contributions of cooperatives to the development of the dairy sector and in providing new income generating opportunities for small farmers and the poor in rural areas are remarkable and laudable. Indeed, it has served as a model for cooperative development in other countries. However, having been in operation for nearly 25 years, the dairy cooperative sector should no longer be treated as an “infant industry”. The successful demonstration effect of the dairy cooperative movement has encouraged private sector participation in the dairy industry. The non-cooperative private dairy processing sector currently handles about 80 percent of marketed milk. The cooperative movement has also served as a check and balance for private dairy marketing activities.

4.51 As in any sector that has reached maturity, promoting market competition is needed to ensure the development of a sustainable and efficient industry. This implies ensuring a level playing field for all participants and the elimination of any barriers to entry for any firm. In many countries (for example, Germany, The Netherlands, the United States), cooperatives compete in the same market as other private enterprises when it comes to economic activities such as dairy processing, marketing, and export. Indian dairy cooperatives, therefore, have the potential to compete in such activities as well.

4.52 The creation of a level playing field for all market participants will require a package of reforms revolving around four key actions.

- ◆ **Eliminating All State Interventions In Cooperatives.** The states should discontinue interventions in cooperative operations and transfer full control of cooperatives to farmer members in line with the proposed Model Cooperative Act . With farmers assuming full control, the cooperatives can take the necessary measures to improve their financial and management efficiency and competitiveness. The NDDB, in continuation of its program to improve

cooperative efficiency, should focus greater priority in its development efforts in the next five years to facilitating the immediate restructuring of the poor performing cooperatives.

- ◆ **Lifting Of MMPO.** In particular, it will involve the elimination of the licensing requirement, restrictions on the sourcing of milk or the milkshed requirement, restrictions on the production of higher value milk products and storage activities. Instead, each state should establish an objective set of criteria for the registration of firms, which relate solely to public health and safety, environmental protection and general prudential requirements.
- ◆ **Establishing Mechanism To Monitor Milk Market To Ensure Fair Competition.** The government's proper role in the new more open market will be to establish an appropriate mechanism to ensure that fair competition persists, that is to guard against predatory pricing and dumping by any market participant (see Box 4.3).
- ◆ **Strengthening of Public Monitoring and Enforcement of Hygiene Standards.** Public sector enforcement of hygiene and sanitation standards will become more critical as the number of market participants increases. Monitoring and enforcement mechanisms will need to be strengthened.

4.53 **The GOI Presently Opposes the Elimination of the MMPO.** The GOI opposes the elimination of the MMPO on two major grounds. First, the impact of increased competition on cooperatives, and the possible closure of some of them could disrupt milk supply to the urban and metropolitan areas. Second, the shift to commercial operations of cooperatives could have an adverse impact on poor cooperative farmer members. There are concerns that particular milk routes/suppliers could be dropped, due to the unprofitability of servicing these areas. This will result in the loss of markets and income for affected milk producers.

Box 4.3: Features of an Effective Competition Policy Agency

- Independent, insulated from political interference.
- Transparent, well-designed administrative mechanisms, regulations and procedures.
- Separate investigation, prosecution, and adjudication functions.
- Subject to checks and balances, including rights of appeal, review of decisions, and access to information on legal and economic interpretation.
- Expeditious and transparent proceedings that safeguard sensitive business information.
- Provisions for imposing significant penalties.

Source: Shyam Khemani, 1994, "Competition Law", *Viewpoint*, Note. No. 14, World Bank.

4.54 **Promoting Competitiveness of Cooperatives.** The ability of cooperatives to compete with other enterprises has been undermined by extensive state interventions in their operations and poor commercial orientation due to weak management. These constraints will be addressed by the first measure described above. Phasing out of state interventions complemented by technical assistance from NDDDB to restructure and improve cooperative operations will put the cooperatives in a level playing field with other private enterprises.

4.55 **Introducing Targeted Compensatory Measures Where Absolutely Necessary.** The potential adverse effects on very poor farmer members of cooperatives are important and could be addressed if found to be critical through targeted compensatory measures. These measures could take the form of a temporary and declining per unit transport subsidy or a flat subsidy to poor cooperative milk producers in remote areas. This will serve as a transition mechanism, while alternative economic opportunities are examined and promoted for these areas. If the purpose of the state price controls on cooperatives are to ensure access to milk by poor consumers, then there

will be a need for more targeted assistance programs, which may take the form of food vouchers and primary school nutrition programs.

4.56 Phasing in By Starting in At Least Three States. Some states have expressed interest in liberalizing their dairy processing sector to promote growth in their dairy industries. Thus, the reform program could be initiated first in these selected states and subsequently be broadened to the rest of the states in India after the pilot phase of 3 years. The experience and lessons from the initial pilot phase would serve as an important basis for improving implementation of the reform program in the rest of the country.

4.57 Cooperative Management Reform with Respect to Service Delivery. Cooperatives play an important role in delivering key production and social services desired by members. These supplementary services should be kept within the bounds of the profits generated by the cooperative and kept separate from other operational activities to ensure transparency and accountability. Similarly if the cooperatives would like to become providers of other social (public good) services which cannot be financed by own-generated profits, then an independent subcontracting arrangement should be negotiated with the government (GOI or state).

4.58 Operation Flood cooperatives argue that they may not be able to compete with the private sector because their procurement prices are lower in order to cover the services (education, animal health, research and extension) they provide to their members (paras 6.22, 6.27, 6.42, 6.44). Members continue to sell milk to the cooperatives despite the lower prices they received because of the low-cost animal health services. Thus, farmers have already factored the cost of animal health services into their market transactions with the cooperatives. What is needed is a promotional campaign explaining the shift in pricing structure, emphasizing the full cost recovery for animal health services and allowing producer prices to rise to market-determined levels. Such a campaign could also help promote other private veterinary services, which cannot compete with the subsidized cooperatives services.

F. Poultry Marketing

4.59 Broilers are sold live, fresh dressed, dressed chilled, or frozen. Live and fresh-dressed broilers account for the bulk of sales. Broiler farms are usually located within 100 km of big cities. In certain markets auctions are held daily, while in others farmers sell the birds to traders or processors. Egg marketing, on the other hand, is mainly handled by traders and commission agents. Annex A provides a more detailed discussion of the poultry marketing channels.

4.60 Persistent mistrust of private trader behavior and the strong commitment by the central and state governments to control prices have led to a variety of interventions in the poultry market. Several government parastatals are involved in poultry marketing.

4.61 The National Agriculture Cooperative Marketing Federation stabilizes egg prices. Prices fluctuate considerably in some states due to the seasonality of supply and demand. In some states (Andhra Pradesh, Punjab, Tamil Nadu, Madhya Pradesh, Rajasthan and Haryana), the federation buys and stores eggs when market prices drop below set levels; these are sold when prices rise in the lean months. These activities are performed subject to recommendations from the National Egg Coordination Committee. Losses are shared by the Committee and the government on a three to one basis. These price stabilization activities discourage private investment in storage facilities and activities and will likely give rise to unsustainable subsidies as the poultry sector grows.

4.62 The National Cooperative Development Corporation has been promoting poultry cooperatives since 1979. Its beneficiaries include landless laborers, small and marginal farmers, members of scheduled castes and tribes, women, and unemployed youth. The corporation establishes integrated poultry projects through cooperatives; strengthens cooperative structure for providing inputs, feeds, and veterinary services; sets up production, processing, and marketing facilities; creates marketing infrastructure; provides cash subsidies; and establishes technical and promotional units for state-level federations. By 1993 the corporation had assisted 49 projects with financial assistance totaling to Rs 240 million.

Box 4.4: The Failure of a Poultry Cooperative

The Sutlej Poultry Cooperative Society in Ludhiana was organized in the late 1970s and began with 100 farmer units. Poor production (overcrowding of cages, poor disease control, poor feed) and financial management (no provisions for working capital needs) resulted in the closure of about 80 farmer units within five years. Despite efforts by the society (additional credit) to bail out poorly performing farmers, by 1990 there were only 16 operating units, of which ten had expanded layer operations and six were converted into medium-sized (6,000-10,000) broiler units.

Source: Alpha Agritech Consultant, Ltd., 1994, "Poultry Development." Consultant's report prepared for the World Bank.

4.63 In the past, the corporation introduced a model scheme for integrated poultry cooperative development. Under this program NCDE financed 25 projects of 30,000 birds each, to be reared in central sheds in the state of

Maharashtra. This model was revised in 1990-91 to increase beneficiary participation. The revised model involved projects with facilities to rear 60,000 birds; half are reared in central sheds by 30 members and half are raised in backyard farms by another 30 members. Since the program is targeted at the vulnerable segments of society, loans are provided at concessional interest rates of 13.75 percent a year for cooperatives in underdeveloped states and 14.24 percent a year for cooperatives in other states (market rates are over 15 percent). An additional 90 poultry projects are being planned under the Eighth Five-Year Plan at a cost of Rs 1 billion.

4.64 **Economic Performance of Poultry Cooperatives.** The performance of the poultry cooperatives varies considerably. Several cooperatives operate successfully in Maharashtra. Their success can be attributed to good management, effective leadership, and a strong cooperative spirit among the members. These cooperatives have expanded the operations of the "central unit" to 50,000 to 60,000 commercial pullets, which are distributed among members, whose average flock size is about 1,000 birds. Loans and subsidies from the government are arranged by the central unit for the production infrastructure. The society centrally procures and sells inputs (feed, equipment), provides technical advice, and markets the eggs and culled hens. The poultry-raising activities in the "daughter units" are mainly handled by women; the average profit from egg production is about Rs 2 per bird per month. In view of the commercial successes of these farmer cooperatives, continued public sector subsidies are no longer economically justified. Cooperatives in other states have been unsuccessful mainly because of management problems (Box 4.3).

4.65 **National Poultry Development Board.** The creation of a National Poultry Development Board is under consideration to assist in the establishment of poultry complexes for layers and broilers.⁴⁹ These complexes would initially be set up in the eastern and northeastern regions, in the states of Uttar Pradesh, Bihar, West Bengal, Orissa, Madhya Pradesh, and Sikkim. Each complex would have 10,000 birds in the central unit, with units of 500 birds to be set up in individual farmers' backyards. The schemes will be implemented through the central poultry breeding farms. Layer chicks would be supplied by the central poultry breeding farms in Bombay, Bhubaneswar,

⁴⁹ Department of Animal Husbandry and Dairying, 1994, "Annual Report 1993-94" and Government of India, 1992, Eighth Five Year Plan 1992-97.

and Hessarghatta; broiler chicks would come from the central farm at Chandigarh. A revolving fund would be established to meet the initial costs of the feed, chicks, medicines, and the like, with the funds allocated by the management committee of the complex. This amount would come from the budget of the proposed National Poultry Development Board.

4.66 State-Level Poultry Corporations. Poultry corporations have also been established in several states. These corporations were designed to help farmers by supplying good quality feed at reasonable prices, assisting in the marketing of eggs, and so on. Because they were established as autonomous bodies, the corporations were viewed as being better able to perform these functions than government departments. The corporations, however, have performed poorly and are incurring heavy losses. The Punjab Poultry Development Corporation, for example, saw feed production decline from 18,600 mt in 1976/77 to 8,600 mt in 1992/93. Its remaining production is designated primarily for government poultry, dairy, and piggery farms. The corporation's egg sales fell from 72.6 million pieces in 1982/83 to 13.9 million in 1992/-93, while its dressing plant and egg-tray manufacturing plants have been closed.

4.67 Additional marketing controls in the broiler market are being proposed. New broiler associations and producer councils, whose main objective is to fix broilers prices on a live and carcass weight basis, are being established in major cities. A National Cooperative Broiler Marketing Federation has been proposed. The federation would be involved in price monitoring and the development of market infrastructure to increase broiler consumption. Although these measures are being undertaken to address perceived problems of market inefficiency (particularly trader market power), centralized price setting would not correct these problems and most likely would make them worse. Measures to increase competition, improve market information, and attract investments in market infrastructure would contribute more directly to increased efficiency and therefore should be pursued.

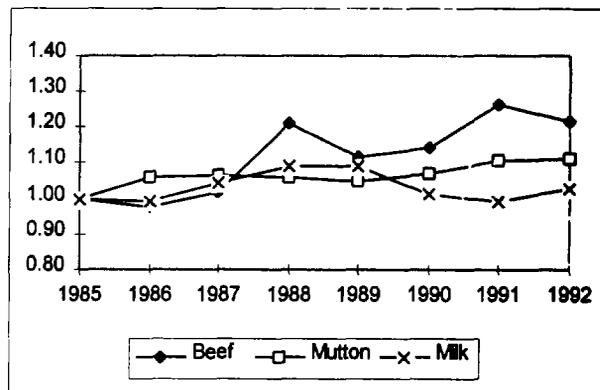
G. Market Price Behavior

4.68 Milk and Meat Price Behavior.

Although wholesale fluid milk, beef, and mutton prices exhibited an increasing nominal trend from 1980-92 (Annex Table 4.3), their behavior varied considerably, in real terms (Figure 4.2). Mutton prices have been stable, although they increased slightly during the mid-1980s. Real milk prices have fallen slightly since the late 1980s, which may be attributed to the doubling of supply and to direct and indirect price fixing (by the government and cooperatives). Real beef prices have risen since the late 1980s.

4.69 There have been no significant long-term relative price changes between dairy and mutton or beef products to encourage cross-commodity shifts in consumption and resources (Table 4.6). The ratio of milk prices to beef and mutton prices has remained essentially unchanged, although the price of mutton relative to beef has improved slightly. The declining costs of broiler meat relative to beef, mutton, and milk during 1980-92 (see Table 2.4) have also favored increased broiler meat consumption.

Figure 4.2: Real Wholesale Price Indexes of Selected Livestock, 1980-92, 1985=100



Source: Annex Tables 4.5

4.70 Poultry Price Seasonality.

Egg prices exhibit distinct seasonality. As illustrated by wholesale prices in the Madras, Delhi, and Bombay markets, egg prices generally reach their lowest point in April and remain low throughout the summer, after which they rise, peaking in November-December (Figure 4.3). Several factors, including seasonal changes in consumption and feed supply, contribute to the seasonality of egg prices. In addition, egg consumption typically drops during festival and summer months, contributing to lower egg prices. To insulate producers from such seasonality, the states, with central government support, finance price stabilization activities.

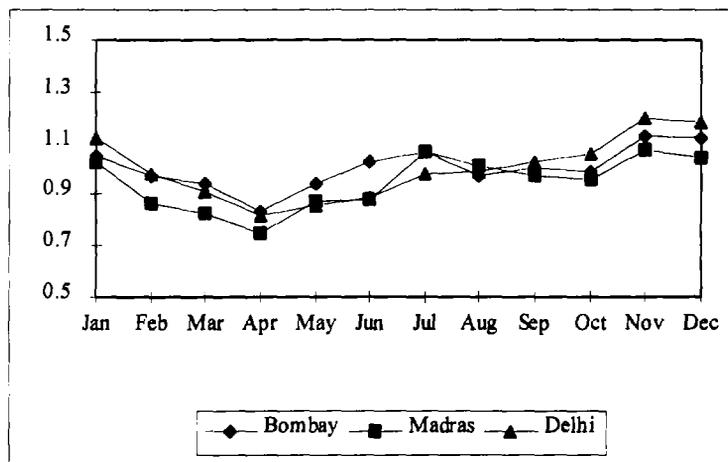
Table 4.6: Price Ratios of Selected Livestock Products, 1980-92

Year	Milk (Rs per thousand liters)		Mutton (Rs per mt)
	Beef	Mutton	Beef
	(Rs per mt)	(Rs per mt)	(Rs per mt)
1980	0.497	0.214	2.320
1985	0.736	0.199	3.694
1986	0.749	0.187	4.003
1987	0.756	0.196	3.867
1988	0.665	0.205	3.240
1989	0.720	0.207	3.478
1990	0.655	0.189	3.465
1991	0.578	0.178	3.238
1992	0.622	0.184	3.380

Source: Annex Table 4.4.

4.71 Egg and broiler prices have declined in real terms as the industry has become more established (Table 4.7). The real price of eggs declined 5 percent between 1985 and 1993, while the real price of broilers declined by 8 percent. The rapid production growth during the late 80s and early 90s (14% per year) explain the greater decline in broiler prices. In contrast, the price of day-old layer chicks increased 23 percent and day-old broiler chicks increased 10 percent during the same period. Trade protection afforded by high tariffs and import restrictions contribute to the high domestic prices of day-old chicks.

Figure 4.3: Seasonal Egg Price Indexes, 1990-93



Source: Ministry of Agriculture, *Agricultural Prices in India, 1988-90.*

4.72 Poultry and egg prices in the rural areas tend to be higher than in urban areas. This could be attributed to transportation costs, since production is undertaken in peri-urban areas, and differences in consumer preferences for different breeds of poultry. In particular, the price of the traditional free-range desi breeds is generally higher than the hybrid broilers.

H. Livestock Output-Feed Price Relations

4.73 **Meat and Milk.** Trends in the price ratios of meat and milk to feed ingredients have varied considerably, but have not shown any sharp changes. The ratio of mutton to feed ingredient prices exhibits some distinct improvement overall (Table 4.8). The ratio of beef to concentrate feed prices declined in the mid-1980s, but has since recovered somewhat. In contrast, the ratio of milk to concentrate feed improved slightly during the mid-1980s, but has since declined.

Table 4.7: Real Eggs, Broiler, Layer Chick and Broiler Chick Prices (1990 Rupees)

Year	Eggs (Rs per thousand)	Layers (Rs per chick)	Broiler ^a (Rs per mt)	Broilers (Rs per chick)
1985	709	7.55	20146	6.33
1990	624	8.50	18500	7.25
1991	657	9.16	19119	7.49
1992	673	9.06	18685	7.48
1993	676	9.27	18556	6.96

a. Liveweight.

Source: *India Poultry Yearbook*, 1994; *IMF International Financial Yearbook*, various issues

4.74 **Broilers and Eggs.** The price ratios of broilers and eggs to feeds have not changed significantly (Table 4.9). The sharp deterioration in the price ratios of broilers and eggs to concentrate feed in 1992 was largely due to the shortfall in maize production.

I. Marketing Intermediaries

4.75 Mistrust of marketing representatives remains pervasive in India, and has served as justification for extensive government intervention. The alleged market power wielded by marketing middlemen often has been blamed for the high farmer-consumer margins. Even the seasonal drop in egg prices—which is largely due to declines in consumer demand—has been blamed on trader market power. Some studies have shown, however, that margins for small ruminant marketing, for example, are reasonable. One factor contributing to the contrasting views of the performance of the livestock and livestock product markets is the limited resources and effort that have been allocated to collecting and analyzing livestock marketing data. Studies have often been limited in scope (in terms of location and subject matter) and thus cannot be generalized to all of India. Experience from many countries indicates that returns to marketing activities by traders

Table 4.8: Ratio of Prices of Selected Livestock Products to Feed Concentrate and Feed Ingredients 1980-92 (Rs per mt)

Year	1980	1985	1986	1987	1988	1989	1990	1991	1992
Beef									
Bal. Cattle Feed	6.37	5.30	5.38	5.58	6.21	5.43	5.66		
Maize	4.28	4.12	3.35	3.49	3.87	3.99	4.78	4.76	3.26
Groundnut Oilcake	4.68	3.13	2.89	2.50	3.42	3.86	3.29	3.76	3.60
Rice Bran	16.25	14.76	12.73	13.14	16.13	15.63	14.68	15.91	11.72
Milk (rupees per 1000 liters)									
Bal. Cattle Feed	3.17	3.91	4.03	4.22	4.13	3.91	3.80		
Maize	2.12	3.03	2.51	2.64	2.58	2.87	3.21	2.75	2.03
Groundnut Oilcake	2.32	2.30	2.17	1.89	2.28	2.78	2.21	2.17	2.24
Rice Bran	8.08	10.87	9.53	9.93	10.73	11.25	9.84	9.19	7.29
Mutton									
Maize	9.92	15.21	13.43	13.50	12.55	13.86	15.72	15.40	11.02
Groundnut Oilcake	10.85	11.56	11.58	9.67	11.10	13.43	10.82	12.18	12.18
Rice Bran	37.70	54.52	50.95	50.80	52.26	54.34	48.25	51.51	39.61

Source: Annex Table 4.4.

are generally reasonable and that the high margins can be traced to high transaction costs (transportation, storage, spoilage, unofficial taxation and poor communication of market information). Public investments in infrastructure (such as, roads, markets and telecommunications) and improving the marketing information system would lower transaction costs to marketing activities. A more comprehensive livestock information system, covering both production and marketing, would be a key input to the formulation of a clear strategy for the development of livestock markets and the livestock sector.

J. Vertical Integration

4.76 Promoting small-farmer integration into the marketing system is important for both livestock development and equity. One mechanism for achieving this objective is through vertical integration or, more specifically, through backward integration of processors into production by means of supply contracts or "contract growing". This approach is particularly relevant to the dairy and poultry industries and potentially to the small ruminant sector, where international experience attests to the feasibility of such arrangements. For the producer, supply contracts and contract growing arrangements provide an assured market at assured prices and access to information on new production techniques. For integrators and processors, such arrangements improve quality, reliability of supply, and timeliness of delivery, which in turn improve cost-efficiency, planning, and utilization capacity.

4.77 The government can facilitate the development of contract arrangements by helping small farmers in forming voluntary associations. These associations are important not only in the channeling of new information and technologies, but also in enhancing the farmer's bargaining position. The government could also assist farmers in contract preparation by providing legal and advisory services (which can be channeled through the association) and by establishing arbitration mechanisms for contract resolution. Processors could be offered temporary special incentives (such as, a tax credit or rebate per farmer contracted) for initiating contracts with the small farmers. For example, in the dairy sector, instead of giving new private companies special concessions merely for entering the industry, concessions could be tied to contract arrangements established with small dairy producers. Moreover, if extension services are needed to support the supply contract arrangements, a partial extension grant per farmer could also be temporarily provided.

K. Improving the Market Information System

4.78 Agricultural market information is vital, because such data is not only a key input for informed planning and decision-making by agricultural market participants, but also for

Table 4.9 Ratio of Poultry Product Prices to Selected Input Prices, 1980-93

Ratio of	1980	1985	1990	1991	1992	1993
Broilers (1 kg)						
Broiler Day-old Chick	3.2	3.2	2.6	2.6	2.5	2.7
Broiler Mash (kg)	4.7	5.1	4.8	4.9	4.4	4.9
Maize (kg)	6.9	8.5	7.9	7.4	5.2	7.0
Groundnut Extract (kg)			6.5	7.1	6.3	5.9
Rice Bran (kg)			13.6	13.9	11.4	15.7
Soybean Meal (kg)			6.1	7.2	9.0	4.0
Eggs (1 pc)						
Layer Day-old Chick	0.087	0.094	0.073	0.072	0.074	0.073
Layer Mash (kg)	0.212	0.212	0.212	0.239	0.204	0.233
Maize (kg)	0.243	0.300	0.267	0.253	0.186	0.253
Groundnut Extract (kg)			0.217	0.245	0.227	0.216
Rice Bran (kg)			0.459	0.479	0.412	0.571
Soybean Meal (kg)			0.207	0.247	0.323	0.146

Source: Annex Table 4.6.

effective government policy making and administrative decision-making. Although considerable resources have been directed toward collecting and disseminating information on basic crops (cereals, groundnuts, and so on), less attention has been given to collecting, disseminating, and analyzing livestock and livestock product data. Timely information on prices, volumes produced, quantities traded, locational availability, and stocks is largely unavailable.

4.79 The non-subtractability (use by one individual does not reduce its supply to others) and non-exclusivity (access is not limited to those who have paid for it) of agricultural marketing information distinguishes it as a public good. Moreover, given the large number of potential users (farmers, processors, traders, and governments), it is vital that the information be reliable and unbiased. Consequently, collecting, processing, and disseminating agricultural market information will have to remain a government responsibility. This does not, however, necessarily imply exclusive public ownership or government implementation. Tasks can be subcontracted to nonpublic institutions (nonprofit organizations like farmer's federations). Where tasks are contracted out, effective government monitoring and regulation are extremely important to prevent the misuse of the information (that is, for speculative activities).

L. Conclusion and Recommendations

4.80 Two key areas in the livestock marketing system which need to be addressed in order for the livestock sector to grow are marketing efficiency and the environmental problems associated with livestock processing. The government's role in the new, more open market would be to ensure that fair competition in the market persists, i.e. to guard against predatory pricing and dumping by any market participant. Public sector enforcement of hygiene and sanitary standards would also become more critical and require more resources as the number of participants in the market increases. Identification of real marketing bottlenecks through an improved livestock information system would facilitate government policy formulation and more efficient public sector resource allocation. Improved market information would be critical in promoting market competition.

4.81 **Poor Operation of and Inadequate Facilities in Local Agricultural Markets.** The poor operation and inadequate facilities of the regulated markets, which handle among others livestock and livestock products, are partly attributable to weaknesses in the existing institutional structures charged with the management of these markets under the State Agricultural Product Markets Acts (APMA). There is a need to rationalize the revenue generating and capital allocation responsibilities of the Marketing Committees and Boards. The frequency at which fees are to be collected needs to be clarified and made more transparent. In order to increase the efficiency and promote the development of individual agricultural markets, the financial rules need to be modified to allow the marketing committees to retain a greater proportion of the revenue collected and greater authority in fund allocation. To improve the effectiveness and transparency of fund allocation, the composition of the marketing committees should be reformed to include trader, farmer, and consumer representatives. The Marketing Board should retain financial control over statewide market development initiatives.

4.82 **Increasing Efficiency in the Dairy Processing Sector.** In the dairy sector, increased efficiency of the sector is critical, especially as dairy trade is increasingly liberalized. Effective competition would not be achieved if barriers to entry and protection as embodied in the (amended) MMPO are maintained. The key measures to achieve improved efficiency in the industry are:

- ◆ Revising of the MMPO by eliminating: (i) the dairy processing licensing requirement; (ii) the milk shed reservation provision; (iii) requirement to channel milk purchases

through cooperatives; (iv) government regulation of private sector inventory management activities except in emergency situations; and (v) restriction on processing to high value products. Instead, each state should establish an objective set of criteria for the registration of firms, which relate solely to public health and safety, environmental protection and general prudential requirements.

- ◆ Discontinuing government interventions in the dairy cooperative operations and designing targeted compensatory measures where absolutely necessary to protect poor cooperative farmer members from adverse impact of commercialization of cooperatives.
- ◆ Establishing mechanism to monitor milk market to ensure fair competition and strengthening of public monitoring and enforcement of hygiene standards.
- ◆ Elimination of small-scale reservation of ice-cream manufacturing to small-scale enterprises.

4.83 Promoting Continued Growth in the Poultry Sector. In poultry, the private sector has developed efficient production systems, especially for egg production, therefore further intervention (e.g. the promotion of poultry cooperatives and the introduction of price supports) should not be undertaken.

4.84 Addressing the Pollution Problem. Extensive pollution in the slaughtering and leather tanning industry poses as a major threat. For the tanning industry, escalating pollution will not be effectively solved by restrictions on the establishment of new or expansion of existing enterprises. To appropriately address these pollution problems, the following measures should be undertaken:

- ◆ For the private leather processing enterprises, the government should enforce established pollution standards. In view of the commercial profitability of the leather industry, these enterprises would have the capacity to undertake pollution control investments.
- ◆ For slaughterhouse sector, it should be made mandatory that programs for the modernization of state operated slaughterhouses should include investments in effluent treatment facilities. Subsidies for the modernization of privately owned slaughterhouses should be eliminated.
- ◆ GOI and state governments should explore the feasibility of establishing designated livestock processing (slaughterhouses and meat processing and leather processing) areas at the state level, to facilitate common effluent treatment facilities and benefit from the economies of scale associated with pollution control.

CHAPTER 5

RECENT TRADE REFORMS AND THE LIVESTOCK SECTOR

5.1 Until July 1991 India maintained a highly restrictive trade regime, characterized by pervasive quantity restrictions and nontariff barriers and among the world's highest tariffs. Since then, significant progress in liberalization has been achieved. Maximum tariffs have been reduced to 65 percent, with even larger reductions for a number of commodities.⁵⁰ The complicated import licensing system which regulated all imports has been replaced by a single and smaller negative list, and the number of commodities subject to export restrictions has been reduced. A floating exchange rate has replaced the managed crawling peg system, and the currency is nearing full convertibility.⁵¹

5.2 Although agriculture was largely left out of the 1991 reform program, significant trade reforms were introduced by April 1995. Tariffs and quantitative restrictions were removed or reduced for many agricultural commodities, including livestock products. Many policymakers, however, are concerned about the possible impact of agricultural trade liberalization on the incomes of the rural poor, and this concern has slowed the implementation of more extensive reforms.

A. Recent Trends in Livestock and Poultry Exports

5.3 The value of agricultural exports increased by almost 40 percent (in current dollars) between 1987 and 1992, to about \$3.2 billion. Still, agricultural exports accounted for only about 16 percent of the value of total exports during the period (Annex Table 5.1). Major livestock products—including live animals, meat, meat and dairy products, eggs, and hides and skins—account for only about four percent of agricultural exports (Table 5.1). The most significant agricultural export is leather products, equivalent to almost half the value of total agricultural exports. Wool products account for about three percent of agricultural exports.

5.4 **Buffalo Meat.** Buffalo meat exports exhibited tremendous growth. Exports almost doubled between 1988 and 1992, going from 51,205 mt to 94,000 mt and reaching a value of \$95 million (Annex Table 5.2). Still, total buffalo meat exports only account for eight percent of domestic output. Some private slaughterhouses and processing plants have established footholds in foreign markets for buffalo meat; major markets include Malaysia and Middle Eastern countries (Bahrain, Jordan, Kuwait, Oman, United Arab Emirates).⁵² The removal of the minimum export price for frozen and chilled buffalo meat (formerly set at \$750 per mt) should help increase exports.⁵³ There is considerable potential for buffalo meat exports due to the meat's price competitiveness.

⁵⁰ Until July 1991 two-thirds of India's commodity tariffs were above 110 percent.

⁵¹ World Bank, 1994, "India, Issues in Trade Reform," Industry and Finance Division, India Department.

⁵² Agricultural and Processed Food Products Export Development Authority, 1994.

⁵³ USDA Annual Livestock and Products Report, 1994, AGR No IN4056.

5.5 Taking advantage of recently introduced export incentives, several modern, export-oriented meat processing plants are being set up with technical assistance from foreign firms. Export-oriented units that export up to 50 percent of their agricultural production are eligible for tax breaks and for licenses to import processing equipment and machinery and some raw materials (para 5.17). Unlike most slaughterhouses in India, the export-oriented slaughterhouses are modern, hygienic, and have proper storage and processing facilities to meet export quality standards.

Table 5.1: Share of Selected Livestock Products in Total of Agricultural Trade, 1987-92 (percent)

Item	1987	1988	1989	1990	1991	1992
Live Animals						
Exports	0.57	0.51	0.41	0.33	0.34	0.34
Imports	0.47	0.38	0.56	0.27	0.39	0.20
Meat and Meat Prep^a						
Exports	2.95	3.00	2.71	2.56	3.41	3.53
Imports	0.00	0.00	0.03	0.00	0.00	0.00
Dairy Products and Eggs						
Exports	0.13	0.10	0.10	0.08	0.30	0.24
Imports	6.87	3.96	4.59	0.19	1.44	3.75
Hides and Skins						
Exports	0.00	0.00	0.00	0.01	0.02	0.02
Imports	0.29	1.07	1.62	3.40	2.56	1.24
Leather Products						
Exports	41.13	53.02	47.12	47.40	46.38	44.54
Wool Products						
Exports	2.68	2.83	3.18	3.24	2.79	na
Imports ^b	0.46	0.49	0.41	0.29	0.27	0.44

a. Includes poultry meat; b. greasy wool.

Source: Annex Table 5.1.

5.6 **Mutton.** Mutton (sheep and goat meat) exports were quite stable during 1988-92 at 7,000-8,000 mt (Annex Table 5.2). Again, primary export markets are the Middle Eastern countries (Bahrain, Oman, Saudi Arabia, United Arab Emirates,). Unlike beef, high domestic demand and prices limit larger exports of mutton, which accounts for 4-5 percent of domestic production.⁵⁴ The minimum export price, earlier set at \$1,950 per mt, was removed in April 1993, which should encourage exports.⁵⁵ Exports quotas were also recently removed.

5.7 **Dairy Products.** Dairy product exports have been minimal in the past, amounting to \$3 million, or 0.1 percent of total agricultural exports in 1992 (see Table 5.1). In September 1993, the government began to allow private exports of dairy products. Until that time, exports had been a National Dairy Development Board monopoly. An export quota of 25,000 mt of milk powder and 7,500 mt of butter and ghee has been introduced with the Agricultural and Processed Food Products Export Development Authority (APEDA) as the designated monitoring authority.

5.8 **Poultry.** Poultry meat and egg exports have been limited, largely due to a lack of price competitiveness (para 5.20). Eggs were recently exported to Bangladesh, where the combination of export incentives and high prices made such exports feasible.

5.9 **Leather Products.** Indian leather product exports were encouraged through an export ban on raw hides and skins, export incentives on leather products, and low production (especially labor) costs. To further encourage the domestic availability of raw materials for the leather industry, exports of semiprocessed leather were banned in April 1990. These policies have been

⁵⁴ USDA, 1993, "India Agricultural Situation and Outlook," AGR IN3065; USDA, 1994, "Annual Livestock and Products Report," AGR IN4056.

⁵⁵ USDA, 1993, "India Agricultural Situation and Outlook," AGR IN3065.

quite successful in promoting finished leather exports. The value of semifinished and finished leather product exports increased by almost 50 percent between 1987 and 1992, from \$960 million to \$1.4 billion (Annex Table 5.2). Leather garments and goods account for nearly half the value of leather exports; the rest is accounted for by footwear (14%), footwear components (18%), and finished leather (22%) (Annex Table 5.3).

5.10 Wool Product Exports. Wool product exports are not very significant, though they continue to increase. The value of wool exports increased by 36 percent between 1987 and 1991, from \$63 million to \$85 million (Annex Table 5.2). Woolen knitwear accounts for more than half of woolen exports, followed by hand-loom textiles (21%) and shawls, scarves, and mufflers (12%); (see Annex Table 5.4). The volume of wool imports (greasy wool) declined slightly during the late 1980s, but increased to 28,000 mt in 1992. As noted in Chapter 4, imports consist primarily of finer grade wool to meet the demand of the apparel industry. Increasing the volume of exports will require a greater supply of fine wool, which is currently in short supply in India. Domestically produced wool is poorly suited to garment production, and finer wool is generally imported, mostly from Australia. Continued imports will be necessary because India's agroclimatic conditions do not favor fine wool production, except in the Himalayan foothills.

B. Trends in Livestock and Poultry Imports

5.11 Because of extensive restrictions on imports and extremely high tariffs, India's agricultural imports are minimal. During 1987-92, the value of agricultural imports accounted for only 4-9 percent of total imports (see Table 5.1). Egg and poultry imports were negligible despite high domestic prices (Annex Table 5.2). Dairy products and raw hides and skins were two important commodity imports, accounting for 3-6 percent of total agricultural imports. Dairy product imports were largely food aid (skim milk powder and butter oil) "canalized" or exclusively channeled through the NDDDB (para 4.30) to support cooperatives; hide and skin imports increased to meet the growing demands of the leather industry.

C. Livestock Trade Policy Reform

5.12 Import Policy Reform. The GOI uses a variety of import restrictions to protect domestic agricultural (including livestock) producers. These include tariffs, import licensing, and "canalization" (government monopoly purchasing). Imported items are placed on negative, restricted, and canalized lists.

5.13 Consumer goods of agricultural and animal origin are included in the negative list and are only allowed to be imported under special licenses issued by the government. For example, butter oil and milk powder imports (both aid and commercial) were canalized in the past through the NDDDB. Domestic shortages of butter and ghee in 1994, however, necessitated imports. Thus, the government allowed the NDDDB to import commercially 3,300 mt of butter oil at a concessional import duty of 20 percent. The private sector was also permitted to import butter oil, at an import duty of 40 percent. The entire dairy industry was also subject to an import quota of 20,000 mt.

5.14 In April 1995, the GOI introduced major trade policy reforms that encompassed livestock products. Current policies on livestock products are listed in Table 5.2. Import tariffs for most livestock products were significantly reduced. Tariffs for skim milk powder (SMP) and pureline poultry stocks were completely eliminated. With few exceptions, however, (SMP, eggs and fresh

Table 5.2: Trade Policy Status: Major Livestock and Feed Products

Commodity	Tariff April 1995 (percent)	GATT Tariff Binding (percent)	Quantitative Restriction	
			Exports	Imports
Dairy Products				
Milk & Cream	40	100	Quota	Restricted
Yogurt	40	150	Free	Restricted
Powdered Milk, <1.5% fat	0	0	Quota	Free
Powdered Milk, > 1.5% fat	0	40	Free	Restricted
Powdered Milk, >1.5%fat sweetened	40	40	Free	Restricted
Butter	40	40	Quota	Restricted
Butter Oil	40	40	Free	Free
Cheese	40	40	Free	Canalized
Ice cream	80	—	—	—
Meat Products				
Fresh, Chilled, Frozen				
Buffalo	10	150	free	Restricted
Mutton	10	150	free	Restricted
Pork	10	150	free	Restricted
Poultry meat	10	na	free	Restricted
Edible offal's	10	—	—	—
Processed	50	150	Mostly Free	Restricted
Processed-homogenized, meats,hams	50	55	Mostly Free	Restricted
Eggs	40	—	free	Restricted
Animals				
Poultry Grand Parent Stock	20	100	Free	Free
Pureline Poultry Stock	0	100	Restricted	Banned ¹
Breeding Animals (bulls, cows)	10	100	Mostly Restricted ²	Banned
Live Animals	50	100	Mostly Restricted	Restricted
Bovine semen	10	—	Restricted	Restricted
Veterinary Pharmaceuticals	15	—	—	Free

Notes: 1 - Import is allowed on license for infusion of genetic quality. 2 - Exports of thoroughbred horses, donkeys, mules, goat and sheep are freely allowed. Exports of breeding cows, bulls, and indigenous breeds of horses are subject to licensing.

Source: A. Goyal, 1995, *Customs Tariffs 1995-1996, 11th Budget Edition*, Delhi: Academy of Business Studies; Ministry of Commerce, 1995, *Export and Import Policy, 1 April 1992 - 31 March 1997* (Incorporating amendments made up to 31st March 1995); G. Pursell and A. Sharma, 1995, "Indian Trade Policies Since the 1991 Reforms," draft mimeo.

chilled, and frozen meat), most products remain subject to quantitative restrictions (licensing, quotas, and canalization). Although tariffs have been reduced for most commodities, licensing requirements act as an effective ban or at the very least serve to ration imports. Licenses are required to import breeding stock, pulses, and all consumer goods of animal origin (Table 5.3).

5.15 Export Policy Reform. Trade reforms have relaxed many of the restrictions on the export of agricultural and livestock products, but GOI concerns about the welfare impacts of increased exports on consumers, especially the poor, have limited the magnitude of liberalization. For example, the NDDB monopoly on dairy product exports has been eliminated, but dairy products remain subject to export licenses and export ceilings set by the Directorate General for Foreign Trade (Table 5.4).

5.16 Export Incentives. Although some export incentives, such as the Cash Compensatory Support Scheme, have been eliminated, several others are available. Firms classified as export-oriented units (EOUs) and those within export processing zones (EPZs) may import, duty free, any goods—including capital goods—that they require for their manufacturing, production, or

Table 5.3: Licensing Policy, 1994

Policy	Remarks
<p>The number restricted items on the negative list was reduced.</p> <p>Items requiring a license include:</p> <ul style="list-style-type: none"> - Consumer goods of agricultural animal origin. - Dried fishmeal. - Livestock (excluding equine), pureline stocks, bird eggs, frozen semen/embryo, pureline poultry stock, commercial chicks. <p>Import ban on tallow, fats, and oils, (rendered or unrendered) of any animal origin and animal rennet.</p>	<ul style="list-style-type: none"> - Consumer goods import not permitted except with license or in accordance with public notices on this issue. - Import of animals permitted with license on recommendation of the Dept of Agriculture and Cooperation

Source: Ministry of Commerce, *Export and Import Policy, 1 April 1992-31 March 1997* (incorporating amendments made up to 31 March 1995).

processing activities, provided that the goods are not prohibited under the negative lists of imports. In special cases, such as animal husbandry and poultry, the EPZ unit or EOU may sell up to 50 percent of production (in value terms) domestically (see Annex B).⁵⁶ EPZs have been established in Delhi, Bombay, Calcutta, Madras, Vizagpatan, Kandla, and Cochin. These firms also enjoy tax breaks and other benefits, such as concessional rents (for firms in EPZs); domestic sales that are eligible for a refund of the central government sales tax, exemption from the central excise duty on capital goods, components, and raw materials; corporate income tax exemption for a block of five years in the first eight years of operation; refund of terminal excise duty; and participation in the duty drawback scheme. To encourage investments in the agricultural and livestock processing sector, foreign equity is allowed up to 100 percent for EOUs and EPZ units (Foreign equity is limited to 51 percent for firms outside the EOU and EPZ program).

5.17 While the establishment of the EOUs and EPZs could significantly stimulate exports, the privilege given to participating agribased exporting firms to sell as much as half their production in domestic markets provides them with an unfair advantage relative to domestic nonexport-oriented firms. Given that domestic raw material input prices are higher than world market prices, the EOUs and EPZs have preferential access to lower-cost imported inputs. To create a more level playing field, the import privileges should be extended to all firms.

5.18 There are also several financial incentive schemes sponsored by the Agricultural and Processed Food Products Export Development Authority (APEDA). The APEDA was established in 1986 to promote the export of agricultural commodities and processed foods. The authority provides subsidies to exporters, growers, trade associations, and government agencies to pursue export promotion and market development activities, strengthen market intelligence and information channels, improve export quality, develop infrastructure and human resource capacity, modernize meat processing facilities, and perform research and development. The subsidies range from 25-60 percent of the cost of the activities up to ceilings of Rs 10,000 - Rs 500,000 (\$300-\$16,000) per beneficiary (Annex Table 5.5).

⁵⁶ The special privilege also extends to EOUs and EPZs engaged in agriculture, aquaculture, floriculture, horticulture, pisciculture, and sericulture.

Table 5.4: Export Policy Reforms

Export Policy	1990	1993
1. Quotas		
Milk Powder		25,000 mt
Butter and Ghee		7,500 mt
Buffalo Meat		No restriction
Poultry Meat		No restriction
Sheep Meat		20,000 mt.
Goat Meat		20,000 mt
2. Minimum Export Price Condition	Buffalo meat, sheep and goat including heart, lungs, liver, grain, tongue, kidneys, offal's and other organs.	Eliminated in 1993.
3. Canalization	Dairy product exports canalized through NDDB	Dairy exports demonopolized subject to quota.
4. Licenses		
		Exports on negative list reduced. Exports perm subject to licensing: - Cattle, camels, - Hides and Skins ^a - Milk, baby milk, sterilized liquid milk - Fodder including wheat and rice straw - Pulses, processed pulses ^b - Paddy and rice bran (raw or boiled) - Deoiled groundnut cakes containing more than oil and groundnut expeller cakes Export ban on beef, tallow, fats or oils of animal o excluding fish oil
5. Export Cess		0.5% Levied by APEDA
6. Cash Compensatory Support	Poultry - 5% of FOB price Frozen or Canned Meat - 10% of FOB price	Eliminated in June 1990.

a. Includes (i) cuttings and fleshing of hides and skins used as raw materials for manufacture of animal glue gelatin; (ii) raw hides and skins, all types including lamb fur skin; (iii) all categories of semiprocessed hides and skins including E.I. tanned and wet blue hides and shins and crust leather; (iv) clothing leather fur suede/hair, hair-on suede/shearing suede leathers; (v) fur leather; (vi) industrial leather; (vii) lining leather; (viii) luggage leather; (ix) sole and shoe upper leathers; (x) miscellaneous leather (book bindings, skiver, etc.).

b. Except those made out of imported pulses under the duty exemption scheme or under an export operating unit or a unit in the export processing zone.

Source: Ministry of Commerce, *Export and Import Policy, 1 April 1992-31 March 1997* (incorporating amendments made up to 31 March 1995); USDA, 1991, *Agricultural and Situation Outlook Report*.

D. International Competitiveness

5.19 An examination of Indian dairy product prices relative to other countries indicates that the sector has not been competitive internationally. Although producer milk prices in India are significantly lower than in the United States and Western Europe, dairy product prices (butter and whole and skim milk powder) are substantially higher than international market prices, a result of domestic processing inefficiencies (Table 5.5). Only during mid 90's, with the devaluation of the Rupee and the sharp rise in world dairy product prices, did the gap between Indian dairy prices and world market prices narrow. In addition, fluid milk marketing margins are high in India — for example, it is about 67 percent higher than in the United Kingdom.

5.20 India also lacks international competitiveness in poultry products. Domestic poultry meat, in particular, are over 50 percent higher than world prices. Indian egg and broiler and day-old chick prices are only slightly above world market prices (Table 5.6). Despite considerably lower labor and energy costs, pent-up demand and high feed costs, and marketing constraints limit competitiveness. Only in buffalo meat and mutton does India exhibit an international price advantage.

Table 5.5: Comparison of Indian and World Market Prices for Selected Dairy and Meat Products, 1991-95 (dollars per metric ton)

Item	1991	1992	1993	1994	1995
Milk: Producer Price					
India: Cows (4% fat)	154			153	191
Buffalo (7% fat)	242			223	255
Germany	360	393			
United Kingdom	329	344			
United States	270	289		285	275
Milk: Wholesale Price					
India	336	360			
United Kingdom	438	435			
Butter Wholesale Price					
India:	1832	3788			2868
World	1413	1363	1350	1294	2215
Whole Milk Powder Wholesale Price					
India:	3089				2186
World	1388	1638	1488	1520	2075
Skim Milk Powder					
India					
World	1425	1681	1569	1563	2075
Beef					
India	616	579			
Argentina (FOB)	1780	1967			
Mutton					
India	1993	1956			
New Zealand (CIF London)	2330	2650			

a. January to May 1995 average.

Source: National Dairy Development Board; Ministry of Agriculture, *Agricultural Prices in India 1988-90, & 1990-1992*; *Economic Times of India*; GATT, 1995, *The World Market for Dairy Products 1994, International Dairy Arrangement*; Statistical Office of the European Community, 1995, *Eurostat Agriculture Statistical Yearbook*; USDA, 1995, *Dairy Yearbook*. *FAO Production Yearbook* (various issues).

E. GATT and Its Implications

5.21 As a signatory of the General Agreement on Tariffs and Trade (GATT), India was required to:

- ◆ Convert all nontariff barriers to tariffs;
- ◆ Reduce resulting tariffs by 24 percent over ten years;
- ◆ Reduce export subsidies by 24 percent over ten years from a base period of 1986-90;⁵⁷
- ◆ Reduce aggregate producer subsidies by 13.3 percent over six years; and
- ◆ Allow minimum access of imports equivalent to three percent of domestic consumption from the 1986-88 base period, rising to 5 percent over six years. Access greater than five percent must be maintained.⁵⁸

⁵⁷ C. Stevens, 1994, "After the GATT Uruguay Round: Implications for Developing Countries," Institute of Development Studies Policy Briefing Paper; World Bank, 1994, "The Uruguay Round: A Preliminary Assessment."

Table 5.6: Domestic and World Prices of Selected Poultry Items, 1991-92 (dollars)

Commodity	Unit	India Wholesale Price	India CIF Price
Eggs			
Table Eggs	360 pieces	18.1	17.0
Hatching Eggs	360 pieces	89.5	83.0
Live Poultry			
Day-old Chicks			
Layer	100 chicks	44.3	43.0
Broiler	100 chicks	40.2	39.0
Poultry Meat	mt	1,900	1,250

Source: *India Poultry Industry Yearbook, 1994*.

5.22 Domestic support of less than 10 percent and "green box" policies are exempt from the reduction commitments. Green box policies include general service policies (research, extension, training; direct payments to producers (income support, social

safety net programs, structural adjustment assistance, environmental programs, regional assistance programs, and so on), and development policies (investment subsidies and agricultural input subsidies to low-income or resource-poor producers). Any other form of domestic support that favors agricultural producers or "amber box" policies is subject to reduction. In addition, under GATT India can ask the Committee on Balance of Payments to impose restrictive price-based import measures on livestock and other agricultural products. Only one type of restriction can be applied to a product, and only if the government can show that increased imports will be detrimental to its balance of payments situation. In addition, the government is allowed to impose quantitative restrictions if price-based instruments do not arrest the sharp deterioration in the external payments position. India, however, must announce a timetable for the removal of such restrictions.

5.23 Because of its balance of payments situation, India is currently exempt from GATT market access commitments on agriculture. GATT balance of payment provisions enable countries to maintain restrictive import policies for the purpose of maintaining hard currency supplies. India therefore is exempt from reducing tariffs and from making other access commitments for agricultural products.

5.24 The GATT also provides exemptions from reductions in subsidies for developing countries with an aggregate support level of less than 10 percent on agricultural products. With a support level of less than 6 percent, India qualifies for this exemption.⁵⁹ Thus the new trade rules will have no impact on the income support and export subsidy measures that currently prevail in India's agricultural sector. But, India may benefit from the increase in world agricultural prices resulting from the subsidy reductions if such increases make Indian products more internationally competitive.

5.25 India's GATT tariff ceiling commitments for livestock and feed ingredients are set at extremely high levels ranging from 40-150 percent (see Table 5.2). However, current tariffs for these products have been set at levels considerably lower than the GATT tariff ceilings. In the

⁵⁸ Export subsidies include direct subsidies contingent on export performance or on the sale, disposal or export of stocks at prices lower than in the domestic market; payments on exports financed by producers by virtue of government action; subsidies to reduce the costs of marketing exports, including handling, upgrading, other processing costs, and the costs of international transport (but excluding widely available export promotion and advisory services); internal transport subsidies on export shipment; and subsidies on agricultural products contingent on their incorporation in exported products.

⁵⁹ World Bank, 1994, "India, Issues in Trade Reform," Industry and Finance Division, India Department.

future, the government must resist pressures from domestic interest groups to once again raise these tariff levels. Several studies which assessed the impact of the GATT on dairy and meat products, estimate that world dairy products prices will increase by about 5 to 12 percent from mid-80 levels, while world meat product 1 to 6 percent.⁶⁰ But, despite the devaluation and the expected increase in world market prices, it is expected that domestic product prices would remain higher than world market prices. Thus, increasing production and processing efficiency in the livestock sector will be critical, if the sector is to remain competitive with imports.

F. Policy Implications and Recommendations

5.26 India is reasonably competitive in the production of eggs and mutton and very competitive in buffalo meat. But the potential for exports of India's main products, particularly processed dairy and poultry meat products, is limited by their lack of international competitiveness. Dairy products could become internationally competitive if domestic processing efficiency were improved substantially. Given the recent liberalization of butter oil and skim milk powder imports (which can be reconstituted into fluid milk), pressures to increase domestic efficiency to keep up with imports will increase. Improving domestic efficiency will also require reforms of the public distribution schemes (for example, the milk schemes; para 4.26), which need to be targeted more effectively. Prices in the bovine meat sector are quite competitive, but sociocultural factors preclude a strong showing in the export market. Mutton exports may be constrained by domestic demand.

5.27 The recent lifting of most import restrictions on dairy and poultry meat products will adversely affect producers if it is not coupled with structural changes in the processing and marketing sectors to reduce marketing costs and margins. The inflow of cheap imports will sharply lower domestic prices and will produce substantial benefits for (mainly urban) consumers. But lower consumer prices will lower producer prices and negatively impact the incomes of the mostly rural producers. Lower processing costs and narrower margins would allow consumer prices to decline while minimizing the downward pressure on producer milk prices. In the case of poultry production, the number of small producers is relatively low and the overall benefits to consumers would probably outweigh the increased competition for the producers. The opposite would be true for dairy production, where 40-60 million small and marginal rural producers would be directly affected.

5.28 Trade liberalization should therefore be coupled with government action that induces the needed structural changes in the processing and marketing sectors. Such changes will require reevaluating existing financial and technical assistance mechanisms to the rural poor in order to achieve a less distortionary and more efficient use of rural resources. Temporary social safety nets may be needed for the poorest farmers.

5.29 Trade liberalization of imported inputs should continue. This will reduce production costs, improve the profitability of livestock production, and reduce soil degradation due to overgrazing.

⁶⁰ R. Sharma, P. Konandreas, and J. Greenfield, 1996, "A Synthesis of Assessments of the Impact of the Uruguay Round on the Global and South Asian Agriculture," Paper presented at the World Bank seminar on the "Uruguay Round Agreement: Implications for the South Asia Region's Agriculture," Kathmandu, Nepal, April 22-24, 1996.

CHAPTER 6

LIVESTOCK SUPPORT SERVICES

6.1 The profitability of investments in the livestock sector is strongly influenced by the availability and quality of animal health and breeding services and access to improved technologies and credit. Animal health services substantially reduce livestock losses caused by sickness and premature death. Animal breeding services increase the productivity and efficiency of feed resource use. To achieve their full benefits, health and breeding services must be supported by a strong technology generation and dissemination service. Access to credit facilitates these investments.

6.2 This chapter reviews the current status of agricultural support services for India's livestock sector, particularly veterinary services, animal breeding, research and extension, and livestock credit programs. The nature and level of government spending on research in the sector are also discussed.

A. Central and State Governments and the Livestock Sector

6.3 **Central Government.** Agricultural issues, including animal husbandry, are largely the responsibility of state governments, although state and central governments responsibilities overlap in some areas.⁶¹ Within the central government, animal husbandry issues are handled by the Ministry of Agriculture's Department of Animal Husbandry and Dairying (DAHD), the Department of Agricultural Research and Education (DARE), and the Department of Agriculture and Cooperation (DAC). A Directorate of Extension, which also will deal with livestock extension, is currently being set up.

6.4 The DAHD created in 1991, is responsible for all national-level livestock issues, including livestock production and health, animal development programs, slaughterhouses, carcass utilization, feed and fodder development, dairy development (including Operation Flood), the Delhi milk scheme, and the dissemination of livestock statistics. The department also promotes various livestock sectors through special schemes. These schemes are implemented by the animal husbandry departments in each state, usually with cofinancing from the DAHD. The secretary of DAHD is assisted by an Animal Husbandry Commissioner, two joint secretaries (Animal Husbandry, Dairying), and an additional secretary responsible for the Technology Mission on Dairy Development (Annex Figure 1).

6.5 Several institutions under the DAHD undertake production support activities. These include seven central cattle breeding farms, seven regional stations for forage production, four central poultry feeding farms, a central duck breeding farm, a central sheep breeding farm, the Central Frozen Semen Production and Training Institute, and a fodder seed production farm. The

⁶¹ JPS Associates, 1994, "A Study on Institutional Aspects of Livestock and Animal Husbandry Sector in India," Consultant's report prepared for the World Bank.

DAHD promotes dairy development through the NDDB and the Technology Mission on Dairy Development.

6.6 DARE, is responsible for education, research, technology development and extension work on livestock-related activities. These activities are undertaken through a number of institutions, national research centers, and the Indian Council for Agricultural Research Coordinated Projects. DAC, particularly its Seed Division, handles feed and fodder issues.

6.7 **State Government.** The state animal husbandry departments provide general support services to the livestock sector, including animal breeding, feed and fodder development, veterinary services, disease control and prevention, and extension. These departments are generally organized according to functional responsibility. In addition to animal husbandry departments, some states have commissions for milk (Uttar Pradesh and West Bengal) and departments for dairy development (Kerala). These additional departments are generally smaller than the animal husbandry departments and are mainly involved in extension activities and milk marketing (Annex Figure 2).

6.8 Production support is mainly handled by the state and union territory governments, with assistance channeled through the various state farms, wool extension and grading centers, artificial insemination centers, and semen banks. The statewide distribution of these centers is presented in Annex Table 4.1.

B. Public Spending in the Livestock Sector

6.9 **Central Government.** Public spending in the livestock sector (not including directed credit programs) comes from the central and state governments. The share of total agriculture spending going to animal husbandry and dairying activities ranged from 6-16 percent from the Fourth (1969-74) to the Eighth (1992-97) Five-Year Plan (Table 6.1). Until 1992, animal husbandry accounted for about 65 percent of total spending on animal husbandry and dairying. Under the Eighth Plan, however, the share of animal husbandry fell to 31 percent.

Table 6.1: GOI Planned Expenditures on Animal Husbandry and Dairying, 1969-97 (millions of rupees)

Five Year Plan	Agriculture and Related Activities.	Animal Husbandry	Dairying		Total Animal Husbandry and Dairying	
	Total	Total	Share (Percent)	Total	Share (Percent)	Total
Fourth Plan, 1969-74	23,204	1,543	7	788	3	2,330
Fifth Plan, 1974-78	48,665	2,325	5	540	1	2,865
Annual Plan, 1978-80	19,997	2,088	10	1,158	6	3,246
Sixth Plan, 1980-85	136,203	8,025	6	4,363	3	12,388
Seventh Plan, 1985-90	276,611	12,805	5	6,034	2	18,839
Eighth Plan, 1992-97	111,050	4,000	4	9,000	8	13,000

Source: K. Singh and R. Saxena, 1995, "Some Macro Economic Aspects of India's Livestock Sector: A Situation Analysis," Institute of Rural Management, Anand; Planning Commission, 1992, Eighth Five Year Plan.

6.10 Actual government spending (direct or through centrally sponsored schemes) on animal husbandry and dairying totaled Rs 1.5 billion (\$49 million) in 1992-93 (Table 6.2).⁶² An analysis of the 1992-93 expenditures indicates that:

- ◆ Activities that could be taken over by the private sector, such as poultry development, cattle breeding, and dairying (especially Operation Flood), receive about 60 percent of total agriculture funds. Funding of such activities should be phased out.
- ◆ Feed and fodder development activities receive very limited funding- Rs 57 million, or 3.5 percent of total spending on animal husbandry and dairying, although this does not include the support coming from other departments (such as the National Wasteland Development Board and the Departments of Crops and Seeds).⁶³ Given the magnitude and significance of the feed and fodder problem (para 3.15), more resources should be channeled into this area.
- ◆ Spending on disease control is modest, at about 20 percent of total expenditure, but is balanced by a high level of state spending (para 6.15).

6.11 GOI expenditures on animal husbandry and dairying (including the central and centrally sponsored schemes) fell by almost two-thirds in real terms between 1979 and 1993, from Rs 1.2 billion (in 1979 rupees) to Rs 466 million. This decline, is partly compensated for by an increase in directed credit programs for livestock production, funding for other central organizations that deal with livestock issues (such as the National Wasteland Development Board, and the National Forestation and Eco-Development Board), and state expenditures. For

Table 6.2: Actual GOI Expenditures on Animal Husbandry and Dairying, 1992-93 (millions of rupees)

Sector	Budgeted		Actual	
	Total	Share	Total	Share
Animal Husbandry				
•Disease Control and Rinderpest Eradication	260.0	16.5	263.0	17.4
•Cattle Development	96.5	6.1	96.4	6.4
•Slaughterhouse Improvement & Establishment of Carcass Utilization Centers	75.0	4.8	16.0	1.1
•Feed and Fodder Development	47.5	3.0	57.0	3.8
•Poultry Development	22.0	1.4	22.9	1.5
•Others	79.0	5.0	74.8	5.0
Subtotal	580.0	36.8	530.1	35.1
Dairying				
•Operation Flood	805.0	51.0	849.5	56.3
•Assistance to Cooperatives	50.0	3.2	20.0	1.3
•Integrated Dairying Development Program in Non-OF, Hilly & Backward Areas	27.0	1.7	10.0	0.7
•Others	115.6	7.3	100.5	6.7
Subtotal	997.6	63.2	980.0	64.9
Total	1577.6	100.0	1,510.1	100.0

Source: Ministry of Agriculture, *Department of Animal Husbandry and Dairying Annual Report 1993-94*.

⁶² See Annex Table 6.2 for further breakdown of GOI animal husbandry expenditures.

⁶³ In 1992-93, the budget allocation of the National Wasteland Development Board was Rs. 264 million. The budget for the National Forestation and Eco-Development Board was Rs 885.7 million.

example, state spending on animal husbandry and dairying in Maharashtra in 1992/93 was Rs 44.3 million. In Karnataka state expenditures totaled Rs 115 million for the same period.⁶⁴ At both the central and state levels, however, actual expenditures are frequently less than the budgeted allocation (Table 6.2).

6.12 Upgrading of Slaughterhouses and Carcass Utilization Centers. In an effort to address environmental problems and to improve the sanitation and hygiene of meat handling, the central government provides subsidies to states to upgrade existing slaughterhouses and carcass utilization centers. This subsidy covers half the capital costs of upgrading or constructing modern slaughterhouses.⁶⁵ The other half comes from state government departments, municipal corporations, and private entrepreneurs as grants or loans. While the government's subsidy might be justified for public slaughterhouses, there is no economic justification for subsidizing privately operated ones.

6.13 The government provides 100 percent grants for the improvement of carcass utilization centers. Under the scheme, states receive financial aid to establish carcass utilization centers and primary flaying units for the production of meat and bone meal, tallow, hides and skins, tail hair, horns and hooves. An important constraint to setting up modern carcass utilization centers in most rural areas is the limited capacity utilization potential relative to the large fixed costs associated with their establishment.

6.14 During 1991-93 central government spending on slaughterhouse and carcass utilization center improvements totaled just Rs 36 million (Rs 92 million was budgeted). Sociocultural factors remain an important impediment to these investments. Modern slaughterhouses have been built in four localities, and plans for another five are being reviewed. Upgrading is under way in ten localities. Carcass utilization centers have been improved in seventeen localities.

6.15 State Expenditures. State governments are responsible for financing most animal husbandry and dairying activities. For example, in fiscal 1993, the state share of total spending on these activities in Maharashtra, Tamil Nadu, Uttar Pradesh and Himachal Pradesh ranged from 89-98 percent (Table 6.3). In several states (Maharashtra, Punjab, Tamil Nadu) animal health spending accounts for more than half of total state expenditures on livestock (Table 6.4). Other major expenditures include administration and cattle and buffalo development.

C. Animal Health

6.16 Endemic diseases, such as Rinderpest and contagious bovine pleuro-pneumonia, are still present in India. In addition, the intensification of production and the introduction of exotic breeds have increased the incidence of other diseases, including foot and mouth disease, sheep pox, and Newcastle and infectious bursal disease (Gumboro) in poultry.

⁶⁴ JPS Associates, 1994, "A Study on Institutional Aspects of Livestock and Animal Husbandry Sector in India," Consultant's report prepared for the World Bank.

⁶⁵ Ministry of Agriculture, 1994, Department of Animal Husbandry and Dairying Annual Report 1993-94.

Table 6.3: State Expenditures on Animal Husbandry and Dairying, 1993-94
(Millions of rupees)

Source of Financing	Maharashtra		Tamil Nadu		Uttar Pradesh		Himachal Pradesh	
	Total	Share (Percent)	Total	Share (Percent)	Total	Share (Percent)	Total	Share (Percent)
State Government	605.1	98	678.5	89	1084	98	83.2	93
Centrally Sponsored Schemes	11.4	2	79.7	11	26.3	2	6.5	7
Total	616.5	100	758.2	100	1110.3	100	89.7	100

Source: JPS Associates Management Consultants, 1994, "A Study on Institutional Aspects of Livestock and Animal Husbandry Sector in India."

6.17 While indigenous stocks have some natural immunity to these diseases, the imported animals and the crossbreds that have been introduced to increase domestic productivity are more vulnerable to them. For example, foot and mouth disease occurs only in mild form in indigenous animals, but affects exotic and crossbred animals more severely. In 1987, estimates put the incidence of foot and mouth disease at about 200,000 animals a year,⁶⁶ resulting in economic losses (due to mortality, morbidity, and lost milk production, reproduction, and draft power) amounting to Rs 51 million a year.⁶⁷ In 1993 an outbreak of Gumboro disease killed 5 million birds in Andhra Pradesh alone (para 2.28).⁶⁸ Achieving sustainable output growth and maximizing the production potential of the livestock sector will require more effective disease control and better access to productive-enhancing technologies.

6.18 Veterinary services are handled by both the central and state governments and the NDDB. The central government develops the programs and defines the policies through the Department of Animal Husbandry and Dairying's Animal Health Division and the Department of Agricultural Research and Education, which operates mainly through the Indian Council for

Table 6.4: Livestock Sector Expenditures in Selected States, 1993-94.
(percent)

Program	Maharashtra	Bangalore	Kerala ¹	Tamil Nadu	Punjab	Himachal Pradesh	Dad. & N. Haveli
Administration	20.6	72.8	23.1	9.5	6.1	20.6	20.0
Animal Health	58.6	12.9	28.5	49.9	65.0	44.2	14.0
Cattle and Buffalo Development	33.8	8.4	19.3	29.9	28.6	28.0	32.0
Poultry Development	3.3	1.9	5.1	1.5	0.3	3.0	20.0
Sheep and Wool Development	1.5	2.7	0.3	8.6	0.0	2.9	12.0
Extension and Training	1.3	0.5	20.7	0.0	0.0	0.2	0.0
Piggery Development	0.0	0.3	0.0	0.2	0.0	0.0	2.0
Feed and Fodder Development	0.0	0.6	2.9	0.3	0.0	1.1	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a. Administration expenditures are integrated into other components

Source: JPS Associates Management Consultants, 1994, "A Study on Institutional Aspects of Livestock and Animal Husbandry Sector in India."

⁶⁶ The All India Coordinated Research Project (AICRP) reports that the number of FMD outbreaks in India between 1976 and 1986 ranged from 350 to 1,000 annually both in the vaccinated and unvaccinated population. The occurrence of the disease is spread from one region to another as a result of the unhindered movement of migratory cattle.

⁶⁷ AICRP, 1987.

⁶⁸ Wiebe van der Sluis, 1994, "India: Unforeseeable Growth in Poultry Industry," World Poultry, Vol. 10 (5): 10-15.

Agricultural Research (ICAR) institutes, such as the Indian Veterinary Research Institute, the species-oriented national research centers, and the ICAR Coordinated Projects (Surveillance of Animal Diseases, Foot and Mouth Disease and Haemoprotozoa Diseases).

6.19 The state animal husbandry and veterinary services departments provide animal health services down to the village level. They also work with the state agricultural universities on technology and extension services and oversee the Biological Products Division and research stations.

Table 6.5: Number of Veterinarians and Animal Health Auxiliary Personnel in India, 1993.

Type of Veterinarians	Number
•Government (Central/State)	28900
•Universities, Training Institutes	2800
•Private Practitioners	900
•Other Veterinarians	1000
Total	33600
Type of Animal Health Auxiliaries	Number
•Animal Health Assistants	62500
•Field Asst/Vaccinators	2900
•Involved in Food Hygiene	0
Total	64500

Source: FAO-OIE-WHO, *Animal Health Yearbook*, 1993.

6.20 In 1993, veterinary services were provided through about 22,000 polyclinics, veterinary hospitals, and dispensaries staffed by veterinarians. These facilities were complemented by 20,364 first aid centers and mobile dispensaries staffed by para-professionals.⁶⁹ The field network is supported by 250 central and state disease diagnostic laboratories and 26 vaccine production units, of which 19 are public sector and 9 are private sector.

6.21 The supply of livestock services is dominated by the public sector. Of the country's 33,600 veterinarians, only about 900 are private practitioners, most of whom are located in urban areas and deal with companion animals (Table 6.5). The veterinarians are complemented by about 64,500 animal health auxiliary personnel. These totals imply about 10,000 veterinary livestock units⁷⁰ per veterinarian and 5,000 veterinary livestock units per animal health auxiliary,⁷¹ which is below the norm of 20,000 units per veterinarian for these types of production systems. Access to these services, however, are highly skewed. The delivery of veterinary services to the smallholder population is weak, which hampers the adoption of more productive but disease-prone exotic and crossbred animals. Cooperatives and other private enterprises, through their own veterinary service units, have compensated for the inadequate availability of public veterinary services by providing these services to their members or growers.

6.22 Dairy cooperatives partially recover the cost of veterinary service directly through fees and indirectly through milk price discounts. For example, the fee for a routine visit is Rs 5 and for an emergency visit Rs 35. Actual costs run Rs 70 a visit. Part of the deficit is recovered through a milk price discount of about Rs 0.05 per liter. With an average milk delivery of 1-5

⁶⁹ Ministry of Agriculture, 1994, Department of Animal Husbandry and Dairying Annual Report 1993-94.

⁷⁰ A veterinary livestock unit (VLU) is a device for statistically standardizing the work requirements for animal health care of different livestock species. A VLU is equivalent to 1 cow or camel; or two horses, pigs, or donkeys; or 10 small ruminants; or 100 fowl (C. de Haan and S. Bekure, 1991, "Animal Health Services in Sub-Saharan Africa," World Bank Technical Paper No. 44, Washington, D.C.: The World Bank). The values used to calculate this ratio are national averages of livestock population and the number of veterinarians and auxiliary personnel, thus differences in availability within the country are not accounted for.

⁷¹ D. Umali, C. de Haan, and G. Feder, 1994, "Animal Health Services: Finding the Balance Between Public and Private Delivery," World Bank Research Observer, Vol. 9, No. 1:71-96.

liter per household per day, the indirect charge amounts to Rs 1.5-7.5 per month per farmer. Veterinary subsidies contribute to the poor financial performance of the cooperatives.

6.23 Although there is growing awareness of the important role the private sector can play in the delivery of veterinary services, several barriers to entry remain. These include free or subsidized public provision of services, veterinary pharmaceutical import licensing requirements, and high tariffs on private imports of veterinary pharmaceuticals. Animal vaccines and other veterinary pharmaceuticals are subject to a 40-50 percent import duty.⁷²

6.24 **Disease Control Programs.** Major livestock diseases constrain the productivity of the livestock sector (Table 6.6). To address animal health problems, disease control programs are undertaken by both the central and the state governments. The central government's programs focus on nationally important diseases, such as Rinderpest, foot and mouth disease, tuberculosis, Brucellosis, and contagious bovine pleura-pneumonia. In addition, the establishment of disease-free zones has been proposed (Box 6.1). Centrally planned schemes are usually implemented by the state governments, with the costs of the programs split evenly between the two levels of government. The state-level disease control programs cover diseases of more local importance, such as haemorrhagic septicemia, black quarter, anthrax, surra, and liver fluke infestation. These programs have been supported by the European Union (Box 6.2). In addition, a Directorate of Veterinary Health Services within the Department of Animal Husbandry and Dairy has been proposed. The directorate's main function will be to coordinate disease control activities at the national and international levels. At present, there is no central reference laboratory to backstop the state-level agencies.

6.25 **Veterinary Pharmaceuticals.** The domestic pharmaceutical industry has exhibited tremendous growth. Products listed in the 1989 Veterinary Pharmacopoeia included 419 drug formulations, 31 vaccines, and 9 diagnostic reagents (antigens and serums). The network of 24 public and private biological units produce 800 million doses of vaccines and serum to combat major livestock diseases. The pharmaceutical industry consists of more than eighty firms and industry turnover has increased from Rs 50 million in 1965 to Rs 3 billion in 1993 (current Rupees).⁷³ India is also one of the leading bulk exporters of veterinary drugs. In 1988-89 exports of veterinary medicines and vaccines totaled Rs 145 million and vaccines Rs 5.6 million. Vaccine production increased from 190

Table 6.6: Major Livestock Diseases in India

Animal Species	Prevalent Diseases
Cattle/ Buffalo	Rinderpest, foot and mouth disease, tuberculosis, Brucellosis, haemorrhagic septicemia, anthrax, black quarter, contagious bovine pleuropneumonia, blue tongue, chlamydia, buffalo pox
Sheep	Sheep pox, enterotoxemia, anthrax, pasterurellosis, Rinderpest, foot and mouth disease, immature amphistomiasis, acute fascioliasis, black disease, Brucellosis, Johne's disease, gastrointestinal helminthiasis
Goats	Coli Bacillosis, Coccidiosis, pneumonia, Johne's disease
Poultry	Newcastle disease, fowl pox, Marek's disease, duck plague, infectious Bursal disease, encephalomyelitis, egg drop syndrome, reovirus infections, viral arthritis, latent adenovirus infections.

Source: FAO-OIE-WHO, 1993, *Animal Health Yearbook*.

⁷² A. Goyal (Eds), 1995, Customs Tariff 1995-1996, 11th Budget Edition.

⁷³ J.N. Diwivedi and A.B. Reddy, 1992, "Veterinary Pharmaceuticals Strides Ahead," in Dairy India 1992, and Indian Poultry Industry 1994, "Poultry Industry Survey."

Box 6.1: Centrally Sponsored Disease Control Programs

Foot and Mouth Disease. Control is undertaken in two ways: a national subsidy program covering half the cost of the vaccine for small and marginal farmers and agricultural laborers for exotic, crossbred, and indigenous cattle and buffalo (provides 6 million vaccinations a year) and, mass vaccinations provided as part of a disease-free-zone scheme in the four southernmost districts and in some other districts (provides 10 million vaccinations a year).

Rinderpest. The nationwide mass vaccination program has been in operation for forty years, covering about 60-80 percent of the bovine population. Immune zones are currently being developed along interstate and international borders, and migratory populations are protected on important cattle movement routes. Animals are vaccinated in cattle fairs and markets and before transportation by rail. Vaccinated animals are branded.

Contagious bovine pleuro-pneumonia. Six units have been established to test cattle for the pleuro-pneumonia. Cattle testing positive are withdrawn from the main herd and sent to isolated areas.

Tuberculosis and Brucellosis. Pilot programs are under way for controlling bovine tuberculosis and Brucellosis through 30 units specially established in the country's bovine breeding tracts. Bovines are tested in these operational areas by tuberculin and agglutination tests respectively and positive reactors are withdrawn from the main herd against payment of compensation and sent to isolated areas.

Disease-free zones. DFZs are designated areas free from Rinderpest, FMD and CBPP. It includes a buffer zone along its periphery and only duly protected animals are allowed to enter this area. These DFZ are designed to enable exports of livestock and their products and are being implemented in the four Southern-most districts of the country.

Source: Department of Animal Health and Husbandry Annual Report 1993-94.

million doses in the mid 1970's to 1.25 billion doses in 1992/93. Vaccine imports by the public and private sectors are allowed, subject to the approval of various government committees.

6.26 Both the public and private sectors are extensively involved in poultry biologicals development and production. Poultry biological products are manufactured by 18 central and state biological product institutions and by 10 private institutions. Public and private research has contributed to the domestic development and production of vaccines, antisera, chemotherapeutic agents, diagnostics, and diagnostic methodologies against Ranikhet disease, fowl pox, Marek's disease, and so on. By 1991, vaccines for nine viral diseases, three bacterial diseases, and four diagnostics have been produced locally (Annex Table 6.1). Specific pathogen-free eggs for the production of vaccines are being used by some large poultry companies. The pharmaceutical needs of the local poultry industry are also met by Indian manufacturers. Given the private sector's success in the production and marketing of vaccines, state agencies should phase out their production activities, and strengthen activities that are less attractive to the private sector, such as basic research.

D. Animal Breeding

6.27 **Public Breeding Institutions.** Seven central and numerous state cattle breeding farms produce breeding bulls, rams, and improved poultry stock for distribution to the various agencies involved in livestock development (Annex Table 4.1). These farms also supply bulls and elite donor females to the Central Frozen Semen Production and Training Institute. There are about 20,000 artificial insemination centers about half of them are under the management of the NDDB.

6.28 The impact of the government breeding programs has been limited. Artificial insemination programs only cover about 10 million cattle and buffaloes, or about 10 percent of the breedable population. One exception is in Kerala State where coverage is more than 50 percent. Low conception rates (20-40 percent) and socioeconomic factors (including lack of access to and the high cost of quality feeds, and lack of access to animal health services) are major factors contributing to the low adoption rate. The low conception rate is partly due to the ineffective management of the public artificial insemination institutions.

Box 6.2: The European Commission Project - Strengthening Veterinary Services for Livestock Disease Control

Vaccination against Rinderpest: For 1992-1994 the project strategy places the various states into 3 categories according to the statements given to the OIE in March 1992 regarding the last recorded outbreak of Rinderpest. States in group "A" do not have Rinderpest and will declare themselves provisionally free of the disease; states in group "B" do not have Rinderpest but will, for the time being, provide a buffer zone against the spread of infection from the endemic area; and the five south Indian states in group "C" that constitute the endemic area.

Research and training components: including Vaccine Research and Training Unit, ELISA training unit, epidemiology of Rinderpest and Rinderpest like diseases in small ruminants, development of rapid RP Antigen detection tests, and located at IVRI Izatnagar and Mukteshwar and the Institute of Animal Health at Bangalore.

Tissue Culture Rinderpest Vaccine Production: the ten State Biological Production Units identified for production and supply of the vaccine will be strengthened to enhance the capacity and update the technology of production.

CBPP Eradication: Based on the removal of the reactor animals from 3 districts of Assam to identified isolated premises in the Lakhimpur College of Veterinary Science

Disease Investigation and Diagnosis: development of a network of state disease investigation laboratories at the state level and a referral laboratory at the central level. The sero-monitoring laboratories will be part of the state diagnostic unit.

Source: "Project ALA/89/04, Government of India, European Commission."

6.29 In the last eight years, about 10,000 fine-wool Rambouillet sheep have been imported to increase the domestic production of fine wool for the apparel industry. These sheep have been distributed to the states of Gujarat, Himachal Pradesh, Haryana, Jammu and Kashmir, Punjab, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh. The impact of the sheep breeding program has been limited, largely because of poor agroclimatic conditions for fine-wool production outside the Himalayan region. The breeding program should be reoriented to improve local breeds for meat, with strong farmer participation.

6.30 **Poultry Breeding.** Poultry breeding programs are being undertaken in both the public and private sectors. The Department of Animal Husbandry and Dairying and the Indian Council for Agricultural Research have developed commercial eggs and meat chickens at their various centers. Several private companies have also established pureline layer and breeding programs by importing strains from Australia, Canada, Israel, the Netherlands, the United Kingdom, and the United States.

6.31 Given the substantial private participation in poultry breeding, public sector research efforts should be redirected toward areas that are less financially attractive to the private sector but are of significant social importance. These activities include: improving backyard poultry production and feed formulation (including the use of crop by-products), strengthening management of small farm production; and developing disease control methods suitable for free-range chicken production and diagnostic technologies that can be used under less than clinical conditions at the village level. In addition, DAHD poultry breeding stock production activities should be phased out because these activities could be undertaken by the private sector. Existing DAHD breeding farms could be leased or sold to private investors.

6.32 **Private Breeding Services.** Some private breeding farms are competing successfully with public breeding services in semen production. These farms charge Rs 10-15 per dose of semen (Holstein Friesian and Jersey cow and buffaloes). One private breeding operation in Haryana supplies semen to Uttar Pradesh (150,000 doses a year), Rajasthan, and Punjab and exports semen and breeding animals to Nepal. The government breeding services in Uttar Pradesh and Rajasthan do not have the capacity to meet local demand for semen and thus must turn to private suppliers. In addition to providing AI services, the private firms also engage in milk recording.

6.33 Artificial insemination services in India are still subsidized, including those provided by cooperatives and nongovernmental organizations. In addition to milk collection and feed sales, the village cooperatives provide veterinary and AI services. Nongovernmental organizations such as the Bhratiya Agro-Industries Foundation (BAIF) also operate centers that provide AI and animal health services. Some states (such as Uttar Pradesh) contract BAIF to provide AI services in the state. Because of their limited profitability, privatization of AI services by themselves might not be feasible; a combination of private insemination and veterinary services would be more likely to provide an adequate income.

6.34 **Private Commercial Stock Supply.** Most of the needs for day-old chicks are met by private hatcheries with either pureline operations (limited to a few big breeders) or franchise arrangements with U.S. or European poultry companies. Public breeding farms also produce hybrid chicks, although output is limited by resource constraints.⁷⁴ There are 115 layer and 280 broiler hatcheries in the private sector and 200 hatcheries in the public sector producing about 1.3 million layer and 2.6 million broiler parents stock. In total, about 95 million hybrid layer and 275 million broiler day-old chicks are being reared.⁷⁵ Almost all major commercial breeds are from the U.S., Europe and Canada.

6.35 The domestic poultry breeding industry has been very successful in developing locally adapted breeds. During the 1970s, the Indian poultry industry relied on grand parent stock imports to raise commercial poultry stock. To promote self-reliance and save on the foreign exchange requirements of such imports, the government restricted grand parent imports in 1980-81 to those companies who had been engaged in pureline breeding prior to 1981. As a result, many entrepreneurs imported broiler and layer lines and developed the facilities for the proper maintenance and genetic improvement of stocks. Import restrictions promoted private investment in poultry research and development and led to breeds adapted to India's climatic conditions (such as, heat resistance). For example, intensive selection in the private sector has caused egg production to increase from 260-270 eggs a year to 300-310 eggs a year. In 1981 it took broilers 47-48 days to achieve a body weight of 1.5 kg; now it takes 38-40 days. These production figures compare favorably with North American and European standards. Feed efficiency, however, has remained slightly behind the levels achieved in other countries. While the feed required to produce an egg in India dropped in India from 146 g in 1981 to 135 g in the 1990s, the European standard is 120 g. Broiler feed efficiency improved from 2.5 to 1.85 over the same period, 1.75 kg is the standard in industrial countries.⁷⁶ Part of the lower feed conversion can be attributed to the fragmented and technologically backward feed industry, but it is also caused by the lack of access to superior genetic material. The recent trade liberalization offers opportunities to bridge this genetic gap (para 6.37).

6.36 In 1994, 12 private companies were operating 16 pureline projects. About half of the parent market for broilers is served by one company. Each year this company sells 1.4 million

⁷⁴ Four Central poultry breeding farms (in Hessarghatta, Bombay, Bhubaneswar, and Chandigarh) produced 82,000 egg type and 45,000 meat type parent chicks in 1992-93 (DAHD, Annual Report 1993-94).

⁷⁵ India Poultry Industry Yearbook, 1994.

⁷⁶ Wiebe van der Sluis, 1994, "India: Unforeseeable Growth in Poultry Industry," World Poultry, Vol 10, No. 5, pp. 10-15.

broiler parents—more than ten times the output of all government breeding farms combined—to subsidiaries, private integrators, and franchises.⁷⁷ Domestic protection also lowered supply and raised commercial poultry stock prices, to the extent that real broiler and layer chick prices increased during the 1980s, but real broiler and egg prices declined (see Table 4.7).

6.37 The central government lifted the restrictions on grand parent stock imports in April 1993. Imports are now allowed under open general license. In April 1995 the import duty on grand parent stock was reduced to 20 percent (see Table 5.2). The devaluation of the rupee, however, has slowed imports. Until the recent liberalization, grand parent broiler stocks were imported by several breeding companies. With liberalization, the increased competition in supply of commercial poultry meat and egg stock could cause their prices to fall—subject to changes in tariff levels.

E. Livestock Research

6.38 Livestock research is undertaken by a multitudes of institutions, often creating problems of duplication. At the central level, the Indian Council of Agricultural Research conducts livestock research through its six specialized national institutes, six research centers, and six coordinated livestock projects (Annex Figure 1). The council serves as the apex organization for sponsoring, coordinating, and promoting research, education, and extension services in agriculture and related fields. The council oversees 43 central institutes, 4 national bureaus, 20 national research centers, 9 project directorates, 70 All India Coordinated Research/Improvement Projects, and 109 farm science centers.

6.39 Research is also carried out by the 28 state universities. The state agricultural university system supports 30 veterinary and animal science colleges. Most of the funding for the agricultural universities comes from state governments, some additional support comes from the ICAR. Private spending research is still negligible.

6.40 Expenditures on livestock research is in line with livestock sector's relative contribution to agricultural GDP, but the distribution of spending across livestock subsectors are not consistent with their relative importance. Under the Seventh Five-Year Plan (1985-90), ICAR spending on livestock research totaled Rs 500 million a year, or 29 percent of ICAR's total expenditure.⁷⁸ The breakdown of the research budget allocation by species is presented in Table 6.7 and a comparison of livestock research spending and total agricultural research spending appears in Table 6.8. This is in line with the sector's 30-33 percent contribution to agricultural GDP (Annex Table 2.3).

6.41 Livestock research, however, is skewed towards bovines and mainly focuses on cattle. The attention paid to buffalo (which supply half the national milk output) and small ruminants (which supply most of the national ruminant meat production) does not correspond to the importance of these sectors. Poultry, for which advanced technology is readily available and a vibrant private sector exists, still receives seven percent of research resources. Spending

⁷⁷ Ibid.

⁷⁸ Data on the Eighth Plan are not available, but can be expected to be similar.

breakdowns (breeding, health, nutrition and management and production system) are not available, but the ICAR livestock research institutes tend to focus their efforts on genetic improvement, with considerable emphasis on the import of exotic breeds and biotechnology.

6.42 Key weaknesses of the livestock research sector include a shortage of trained personnel, poor staff and operating cost ratios and the lack of client orientation especially for smallholder production. An exception in dairy is the NDDB research program, whose success can be attributed to its client orientation. The program covers the animal breeding, nutrition, and health problems of its mostly smallholder members.

6.43 Given the sector's technical and socioeconomic constraints and institutional weaknesses, research efforts should be reoriented to focus on:

- ◆ Farming systems research, to identify key constraints at the smallholder level;
- ◆ Feeds and fodder production, including:
 - Basic research, using modern biotechnology techniques, to improve the nutritive value of low-quality, high-fibrous forages and crop residues. Research could include work on rumen ecology and manipulation, better *in vitro* and *in vivo* fermentation techniques, and improved utilization of scarce protein and carbohydrate resources using bypass techniques.
 - Applied research on feeds and fodder production, especially in the more arid zones, the use of multipurpose trees, the integration of the different feeds with the farming system, optimal supplementation of poor-quality crop residues, and considerably more emphasis on the economics of production. Priority should be given to buffalo and small ruminants and feeding systems. These systems could be financed by reallocating the budget for research in cattle and poultry production. Research on

Table 6.7: ICAR Research Spending, 1987-91

Subsector	Ave Annual Research Expenditure	Share (percent)
Bovines & Large Animals	216	65.1
--Buffalo Research Share	44	13.3
Small Stock	43	13.0
Poultry	22	6.6
Other	7	2.0
Total	332	100

Source: World Bank, 1990, "Agricultural Research in India: Prologue, Performance and Prospects," Agricultural Operations, India Department.

Table 6.8: The Share of Livestock Research in Total Pubic Agricultural Research Spending, 1992 (percent)

State	Share (percent)
Andhra Pradesh	35.6
Assam	41.3
Bihar	40.6
Gujarat	36.5
Haryana	54.7
Himachal Pradesh	22.5
Jammu and Kashmir	31.1
Karnataka	27.5
Kerala	20.7
Madhya Pradesh	32.4
Maharashtra	22.9
Orissa	25.7
Rajasthan	29.3
Punjab	36.6
Tamil Nadu	27.6
Uttar Pradesh	40.4
West Bengal	23.2
Average	32.5
North and West	31.2
East and South	31.5
Uttar Pradesh	40.4

Source: M. Rathyunjaya, P. Ranjitha, and S. Selvarajan, 1995, "Congruency Analysis of Resource Allocation in Indian Agricultural Research System," Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi.

intensive poultry production should be dramatically reduced.

- Applied and multidisciplinary research, with a strong emphasis on the socioeconomic aspects of rehabilitating of the common property resource areas;
- ◆ Genetic improvement, with a strategic shift from the current emphasis on introducing exotic breeds to one that identifies simple breeding schemes eventually using modern biotechnology techniques, to improve local breeds. More emphasis should be given to the evaluation, conservation, and use of local genetic resources in small ruminants and buffaloes;
- ◆ Epidemiological research, with an emphasis on gauging the relative importance of various diseases and developing cost-effective control strategies;
- ◆ Free-range chicken production, with an emphasis on backyard poultry production systems. Special Attention should be given to specific free-range disease problems (of which Newcastle disease is the most important) and genetic improvement; and
- ◆ Socioeconomic evaluation of new and “on the shelf” (such as urea-molasses blocks) technologies.

F. Livestock Extension

6.44 The governments integrated agricultural extension service has not given enough emphasis to the dissemination of livestock technology. The World Bank, working with the central government, has provided financial assistance for the strengthening of extension services in the states of Madhya Pradesh, Rajasthan, and Orissa under the National Agricultural Extension Project (NAEP) I; in Haryana, Karnataka, Jammu and Kashmir, and Gujarat under NAEP II; and in Uttar Pradesh, Assam, Himachal Pradesh, and Bihar under NAEP III. Still, the extension system continues to be heavily crop-oriented. The NDDDB, however, has effectively incorporated livestock extension to its cooperative support activities.

6.45 In addition, nongovernmental organizations are conducting research and providing extension services. The Bhartiya Agro-Industries Foundation (BAIF) is one of the most efficient organizations. The BAIF operates in five states and has been active in developing artificial insemination services and in organizing livestock shows and training programs. BAIF's spending on livestock research and extension totaled Rs 140 million in 1994.

6.46 The Eighth Five-Year Plan (1992-97) foresees more livestock-oriented extension activities. An Animal Husbandry Extension Scheme has been proposed which will support animal husbandry activities in the states, implement countrywide milk yield competitions, and provide financial assistance to states to organize seminars, workshops, training, demonstrations, and field visits on animal husbandry extension for field officers, breeders, and farmers. But while increased attention to livestock extension is needed and certainly justified, this should not lead to the creation of another bureaucracy. A flexible system involving nongovernmental organizations and private veterinarians and companies (such as private agro-processors) through subcontracting or cost-sharing arrangements would improve the delivery of extension services. International experience has shown that cost-sharing arrangements between the public sector and agro-processors (integrated into contract growing or supply schemes) can be an effective means of delivering extension services to small farmers (para 4.72). Furthermore, better incentives should be introduced for the extension agents, rewarding them on the basis of performance and impact in the field.

G. Livestock Credit Programs

6.47 **Integrated Rural Development Program.** Poverty alleviation programs, such as the Integrated Rural Development Program (IRDP), have been used to channel financial assistance to the poor to undertake productive activities such as livestock raising.⁷⁹ For families earning less than Rs 6,000 a year, the IRDP provides a subsidy of up to Rs 3,000 for projects with total cost of less than 10,000.⁸⁰ The funds, which are channeled through commercial banks, cooperative banks and regional rural banks serve as margin money for getting loans (at subsidized interest rates) from commercial banks. Subsidized insurance coverage and training are also provided.

6.48 Livestock loans continue to account for a significant though declining portion of IRDP loans. In 1994, livestock accounted for 58 percent of the IRDP-backed loans of commercial banks, 17 percent of the IRDP loans of cooperative banks, and 25 percent of the IRDP loans of regional rural banks.⁸¹ When the program started (under the Sixth Five-Year Plan, 1981-86), dairy cattle loans accounted for 70 percent of total loans. This share had fallen to 22 percent by 1994.⁸² As noted in the Eighth Plan (1992-97) (p. 28, para. 2.2.4),

...the IRDP program was quite successful in terms of providing incremental income to poor families. However, the number of households able to cross the poverty line has been small. It may be partly due to the low levels of initial investment. On the other hand, it is also difficult to expect banks to raise the per capita loan assistance to beneficiaries, given the excessive overdues pending. In order to enhance the economic returns from an asset, it is necessary to integrate this scheme with the development plans of an area.

6.49 Some factors contributing to the poor performance of IRDP beneficiaries include poor decision making by local government officials, the diversion of funds for consumption purposes, and the poor viability of the projects. For example, the unavailability and low quality of dairy cattle and fodder, the high cost of concentrate feed, poor veterinary services, and poor linkages to the market critically affected the viability of dairy activities. High maintenance costs during the dry season and cash constraints caused by delays in payments by cooperatives resulted in the disposal of the animals. Moreover, the government's 1990-91 debt relief scheme further affected loan recovery.

⁷⁹ The IRDP funds have also been channeled to the dairy cooperative sector, amount to about Rs 900 million in 1993 (N.K. Chawla, personal communication).

⁸⁰ A.K. Chatterjee and R.M. Acharya, 1992, "Heading for 21st Century," in Dairy India 1992.

⁸¹ As of March 1994, small and medium size farmers accounted for 46 percent of the total financial assistance while agricultural laborers accounted for another 36 percent (C. Kesavan, 1994, "Credit, Insurance, & Finance to Livestock Sector," Paper prepared for the DAHD and Swiss Development Cooperation joint study on the Livestock Sector).

⁸² The IRDP subsidy allocation under the Eighth Plan is not available, but as an indication of the order of magnitudes, the total subsidy expenditure under the Seventh Plan (1987-91) amounted to Rs 33.2 billion. Of the total subsidy, about 44 percent was allocated to the primary sector (which include livestock activities) (GOI, Eighth Five Year Plan, 1992-97).

6.50 **National Bank for Agriculture and Rural Development (NABARD).** Commercial banks provide 75-80 percent of the investment required for dairy ventures. For projects involving an outlay of more than Rs 100,000, refinance facilities are provided by the NABARD. The NABARD is the apex development institution for the rural credit system; its primary function is the refinancing of agricultural development loans of the cooperative, commercial, and regional rural banks. Refinancing is available for veterinary clinic construction livestock production activities (such as, cattle and poultry raising), and small-scale food processing, feed mixing, and veterinary drug production. Investments are subject to NABARD standards on enterprise size and unit costs.⁸³

6.51 In 1992-93 NABARD refinancing of loans to the livestock sector totaled Rs. 621 million, two-thirds of which went to Andhra Pradesh, Maharashtra and Tamil Nadu (Table 6.9).⁸⁴

6.52 **National Credit Fund for Women.** The National Credit Fund for Women provides another source of credit for livestock activities. The fund provides credit to poor women through voluntary associations and self-help groups (including women's credit cooperatives and women's development corporations) to support income-generating activities. The fund is managed by the Department of Women and Child Development. In 1994, the fund reached Rs 310 million and had covered 34 voluntary associations in ten states since its December 1993 inception. So far, Rs 23.8 million has been disbursed to 13,461 beneficiaries for investments in milk cattle and other livestock, retail trade, catering, vending, and so on. About 30 percent of the fund (Rs 7.1 million) has been directed toward dairy cattle raising.

Table 6.9: NABARD Refinancing Disbursements for the Livestock Sector by State, 1992-93. (Thousands of rupees)

State	Total	Share (Percent)
Andhra Pradesh	177,000	28.50
Maharashtra	110,900	17.86
Tamil Nadu	108,800	17.52
Punjab	59,300	9.55
Karnataka	58,300	9.39
Haryana	33,900	5.46
Uttar Pradesh	16,300	2.62
Kerala	13,900	2.24
Madhya Pradesh	11,100	1.79
Rajasthan	7,100	1.14
West Bengal	6,700	1.08
Orissa	5,200	0.84
Gujarat	4,600	0.74
Himachal Pradesh	2,400	0.39
Goa	2,200	0.35
Delhi	1,900	0.31
Bihar	500	0.08
Jammu & Kashmir	400	0.06
Assam	300	0.05
Nagaland	200	0.03
Sikkim	100	0.02
Total	621,100	100.00

Source: NABARD.

6.53 The fund targets families earning less than Rs 11,000 in rural areas and Rs 11,800 in urban areas. The ceiling for short term loans is Rs 2,500 (\$82) to be paid within 15 months and Rs 5,000 (\$164) for medium term loans to be repaid within 3-5 years. The interest rate charged to the voluntary associations is 8 percent per annum, with a ceiling of 12 percent per annum for the ultimate borrowers.

⁸³ The approved loan amount for the establishment of a veterinary clinic, for example, is set at Rs 350,000 plus a grant of Rs 50,000.

⁸⁴ JPS Associates, 1994, "Supplementary Information on Livestock Sector in India."

H. Livestock Insurance

6.54 The General Insurance Company, a parastatal, provides insurance to livestock producers. The National Commission on Agriculture proposed livestock insurance in 1974 to encourage farmers to invest in higher-quality animals. For animals under government schemes such as IRDP, the premium rate is subsidized by the government. While the premium rate is fixed at four percent of the value of the animal, the beneficiary pays for only 2.25 percent of the value of the animal and the remainder (1.75 percent) is subsidized by the government.

6.55 Insurance schemes for poultry include comprehensive coverage for poultry farms, epidemic poultry insurance schemes for hatcheries, and poultry insurance schemes for parent stocks.⁸⁵ The comprehensive program for farmers covers broilers to the age of eight weeks and layers to the age of 72 weeks. The premium charged under the IRDP is Rs 0.25 per bird per batch or Rs 1 per bird a year. Nonparticipants the IRDP program pay Rs 1.20 per bird year. For layers, the premium charged under the IRDP scheme is Rs 0.80 per bird a year and 4.5 percent of the value for non-IRDP participants.

6.56 While livestock insurance helps address the risks associated with livestock production and might be required for the effective implementation of credit schemes, the government should not pay for the insurance of commercially viable enterprises—commercial enterprises should be graduated to full-cost insurance. The savings that result could be used to finance activities (such as research and extension for small farmers) that are more directly targeted at the poor.

I. Policy Issues and Recommendations

6.57 The Indian livestock sector's ability to achieve its targeted growth in productivity and output will be greatly influenced by the quality, availability, and accessibility of livestock services. Livestock services do not have to be supplied exclusively by the public sector, however. Economic theory, supported by international experience, shows that adequate supply of certain livestock services could still be assured if these services were provided by the private sector.

6.58 The projected livestock population growth and the increased emphasis on more productive crossbreeds, coupled with other sectors' competing demands for financial resources will increase budgetary and administrative pressures on the central and state level animal husbandry and dairy departments. Indeed, ensuring an adequate supply of quality livestock services in the face of declining real spending on animal husbandry and dairy activities poses a serious challenge for the future (para 6.10). A more efficient allocation of resources is critical. Achieving needed objectives will require:

- ◆ Redefining public and private roles in the livestock sector;
- ◆ Creating a level playing field; and
- ◆ Establishing appropriate incentives.

⁸⁵ Alpha Agritech Consultants, Ltd., 1994, "Poultry Development," Consultant's report prepared for the World Bank.

6.59 Public and private sector roles. The appropriate roles of the public and private sectors in providing livestock services are determined by the economic characteristics of each service. Public involvement is required when market failures exist. There are three categories of services where this applies:

- ◆ *Delivery of public goods.* The benefits from these types of services which include sanitary controls and basic research, are available to the entire community, and it is impossible to restrict use to the individual or group who paid for the service. Because of the free-rider problem, the private sector has no incentive to provide these services. They must, therefore, remain a public sector responsibility.
- ◆ *Products or services whose quality cannot be immediately assessed.* Also called moral hazard problems, incentives exist to pass on substandard products such as veterinary drugs, vaccines, and semen, since quality cannot be judged at time of purchase. Public sector regulation is necessary to ensure that products meet established quality and safety standards.
- ◆ *When externalities or spillovers occur because the service is used.* Services such as vaccinating for infectious diseases protect an individual farmer's animals from diseases (private benefits), and at the same time reduce the risk of a disease transferring to other farmers' animals (extra social benefits). Since farmers purchasing the service do not consider these extra social benefits, they tend to use the service less often than is socially optimal. Consequently, the government needs to control or subsidize these services to increase their use by farmers.

6.60 A new perspective. The role of state governments in the Indian livestock services sector must be adapted to market realities (Table 6.10). The private sector can efficiently and effectively provide those services classified as private goods or toll goods. In the case of private goods, the user can exclusively appropriate the benefits and is thus willing to pay the private fees. Consequently, private suppliers can appropriate the returns for the delivery of these services. Examples include clinical services, artificial insemination, and the production and distribution of veterinary pharmaceuticals. The private sector can also efficiently deliver toll goods. Toll goods are products or services whose supply does not diminish as a result of one person's use, but access to them can be restricted so that only those who pay for the product or service can enjoy their benefits. Toll goods include milk recording or herdbook registration.

6.61 Future policies should strengthen the capacity of central and state agencies to manage tasks that remain in the public sector, such as basic research and most agricultural extension activities. Policies should limit public sector involvement in the delivery of private goods and, more importantly, phase out all public sector involvement with these tasks as the private sector becomes more established. In addition, public responsibility does not necessarily imply public implementation. Some services, such as vaccinations, food inspection, and veterinary research, can be subcontracted by the state governments to the delivery of private sector. The government's role in these activities will be reduced to monitoring and regulation. In some countries, vaccinations (Argentina, Brazil, the U.S., the EU, and West Africa) and food inspections (the U.S. and the EU) are being subcontracted to private veterinarians, and delivery is regulated through the inspection of vaccination and inspection certificates. Such an approach will require some modifications in India's regulations.

6.62 Creating a level playing field. Public sector domination of the delivery of livestock services also constrains private initiatives in commercial functions. To remove these barriers, establishing a level playing field between state governments and private veterinarians will be critical. Specifically, clinical care, veterinary drugs, improved genetic stock and semen, and artificial insemination services should be provided with full cost recovery. Otherwise, private practitioners are not be able to compete against the subsidized public sector.

6.63 Establishing appropriate incentives. Incentives to encourage public sector veterinarians to enter private practice should be introduced. Such incentives could include granting a one year leave of absence, assuring that the government will cease all interventions in areas where private veterinarians operate, assuring that the government will subcontract services at remunerative rates, leasing out existing public sector facilities to prospective veterinarians, and allowing private importation of veterinary drugs.

6.64 It has been argued that full cost recovery will lead to a drastic decline in the use of

Table 6.10: Economic Classification of the Types of Livestock Services

Service	Type of Economic Good		Measures to Correct for			Public Sector		Private Sector
	Public	Private	Toll Good	Externality	Moral Hazard	Funding	Provision	Provision
<i>Clinical Interventions</i>								
Diagnosis		X**						YY
Treatment		X**						YY
<i>Preventive Services</i>								
Vaccination		X*				Y*	Y*, S	YY
Vector (tick) control		X*				Y*	Y*,S	YY
<i>Veterinary Surveillance</i>								
Epidemiology	X					YY	YY,S	Y*
Diagnostic Support		X*				Y*	Y*,S	YY
Quarantine				X		YY	YY	
Drug Quality Control					X	YY	YY,S	
Food Hygiene/Inspection					X	YY	YY,S	
<i>Provision of Veterinary Supplies (incl. vaccines)</i>								
Production		X						YY
Distribution		X						YY
<i>Production Services</i>								
Semen production		X						YY
Artificial Insemination		X						YY
<i>Veterinary Research</i>								
Basic Research	X					YY	YY,S	Y*
Applied Research		X*				Y*	Y*,S	YY
Agricultural Extension	X	X*				Y*	Y*,S	Y*
Milk Recording				X				YY
Herdbook Registration				X				YY
Livestock Insurance		X						YY

X* - private good with consumption externalities;

X** - private good with consumption externalities only in the case of infectious diseases;

YY - economically justified;

Y* - economically justified only in special circumstances;

S- delivery can be subcontracted out.

Source: Adapted from D. Umali, G. Feder, and C. de Haan, 1994, "Animal Health Services: Finding the Balance Between Public and Private Delivery," *World Bank Research Observer*, Vol 9, No. 1, pp. 71-96.

services such as clinical care, vaccination, and artificial insemination, especially by the poor. India's long tradition of livestock raising and management and its considerable experience with veterinary services have made farmers appreciate the value of these services—a fact that should not be underestimated. Given the importance of livestock in many families (as a source of protein and income, draft power, insurance substitute, and store of wealth), the preservation of this asset is highly valued. Indeed, cooperatives already explicitly (through low direct charges) and implicitly (through lower milk procurement prices) charge their 8 million (mostly poor) members for veterinary services. Full cost recovery would only improve the market transparency of these fee structures.

6.65 Experience in other developing countries has shown that farmers are willing to pay for services that are reliable and effective. Working in Kenya, Leonard (1984) found that total availability of services improved markedly and that the poor gained greater access to the services when cost recovery was introduced.⁸⁶ When veterinary services became commercially oriented in the 1980s, with staff charging for their curative visits, the work output increased significantly and inequality in distribution was reduced by at least half, and the more fully commercialized veterinary staff graduated their charges according to the consumer's ability to pay.

6.66 For a full cost recovery program to succeed, the delivery of quality and consistent services must be guaranteed. Moreover, a promotional campaign must accompany the program to bolster farmer appreciation of the returns from investing in livestock services.

6.67 Expanding the extension services incorporated under the Eighth Five-Year Plan offers good possibilities for absorbing the public sector staff that will be displaced by privatization. Their extensive veterinary training and familiarity with local conditions provide a strong foundation for effective extension provision. The continual training of public sector staff in extension techniques, technologies and approaches will be necessary to ensure the effectiveness of these measures.

⁸⁶ D.K. Leonard, 1984, "African Practice and the Theory of User Fees, International Livestock Center for Africa, Addis Ababa, Ethiopia. Unpublished manuscript.

Annex A: Marketing Channels for Livestock and Livestock Products

Livestock Marketing Channels

The market for live animals is not very developed. There are no separate markets for different species of animals (i.e. sheep, goats, cattle, buffaloes). Farmers usually bring their animals to the weekly or fortnightly village markets on foot or occasionally on trucks, where they are assembled in the market yard (Figure A.1). Cattle and buffaloes, milk and draft, are assembled in the same yard, with most exchanges facilitated by brokers. Because of the lack of contacts in the terminal markets and/or access to transportation, local traders primarily perform the assembly function for wholesalers. Sheep and goats are similarly transported to the local village markets on foot or by truck if the market is distant and sold in lots of 10s, 20s or truck loads (around 200) to other shepherds, local butchers, and traders. Most of the sheep and goat are consumed locally. Vertical linkages between processors/butchers and livestock producers are quite rare. Farm-wholesale marketing margins amount to about 20-30 percent of the consumer price. Market facilities are generally inadequate or if available are poorly maintained. In most markets, for example, weigh bridges are not available.

Marketing of Wool

The marketing channel for wool is quite similar to that of meat, although the Government and the Wool Marketing Federation intervene more extensively in the market (Figure A.2). The government procures from 10 to 15 percent of marketed wool. There are 61 wool markets situated in 13 states in India (Annex Table 4.2), with about 40 percent of wool trading occurring in Rajasthan. The farmer's share of the price of unprocessed wool is about 80 percent. The remainder is accounted by the cost of shearing (8-10 percent), transport (about 3 percent), local taxes (about 3 percent), commission charges (about 3 percent), and miscellaneous costs (about 2 percent). It is estimated that on average, the profit margin of the yarn merchant is 5-20 percent (Table A.1).

Table A.1: Percentage breakdown of yarn processing margin.

Cost Category	% Share
Yarn Sale Price	100
Cost of clean wool	65-80
Spinning cost	7-8
Wastage	8-10
Transport and Packing	1-1.4
Profit Margin	5-20

Source: Alpha Agritech Consultants, Ltd, 1994, "Small Ruminant Development," Report prepared for the World Bank.

Figure A.1: Marketing Channel for Livestock in India

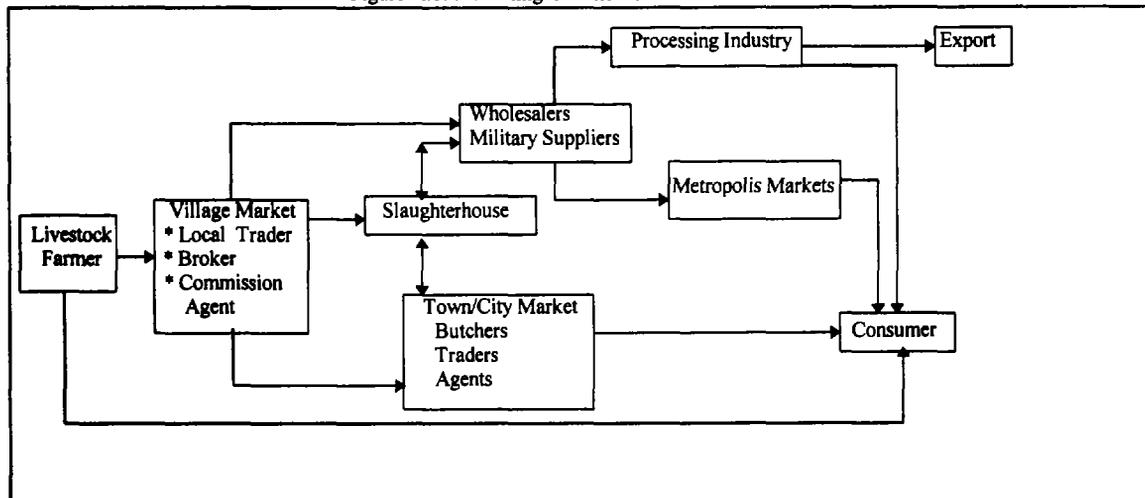
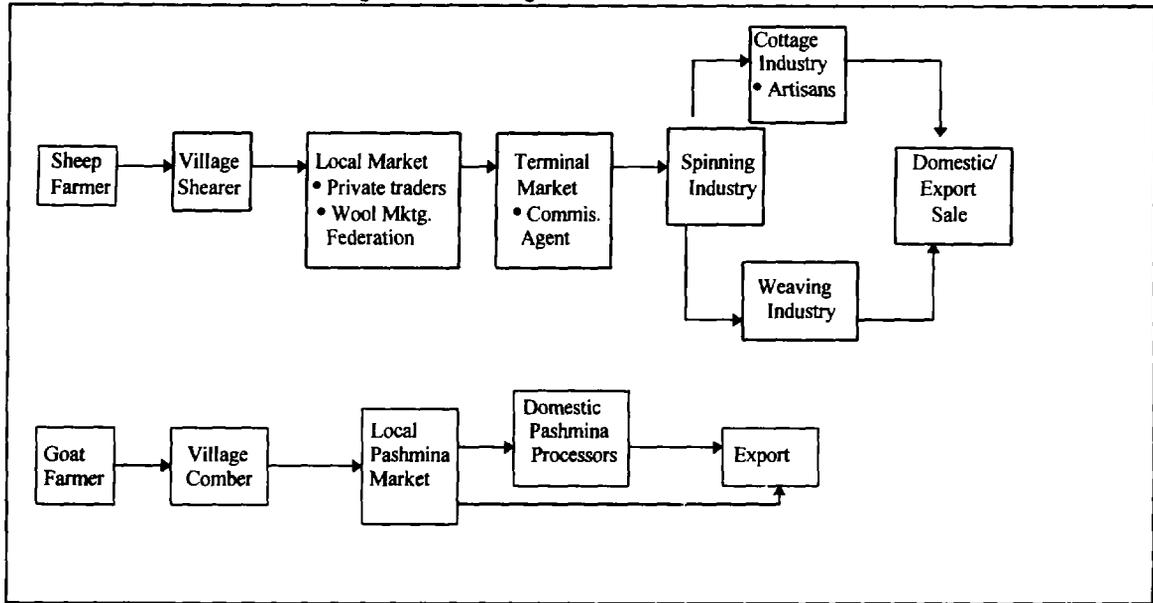


Figure A.2: Marketing Channel for Wool and Goat Hair



Wool Quality.¹ Grading facilities are available only in a few states, such as Rajasthan, Uttar Pradesh, Gujarat, and Punjab, but the grading systems followed are not uniform across states. The lack of grading facilities in other areas further hampers the standardized pricing of raw materials. Wool is graded based on the average diameter of wool fibers and percentage of hairy fibers.

The quality of wool and hair produced in India (most with a diameter greater than 30 μ) are more suited for furnishings, carpets, and industrial fabrics. Only about 3,000 to 5,000 mt (8-12%) of wool produced locally have diameters of less than 25 μ , which are suitable for apparels. Wool produced in the temperate north and north-western regions is superior to those of the eastern and southern regions.

A National Wool Development Board under the Ministry of Textiles, GOI was established in 1989. It provides financial assistance, amounting to Rs 8.7 million in FY 1993-94, to the State Boards and Corporations. There are currently eight wool boards/federations in different states, which serve as links between farmers and processors.² However, they have largely been ineffective in coordinating with farmers, farmer's cooperatives and societies and with end-users (e.g. the small-scale cottage industry, wool mills and international marketing agencies).

Wool Processing Industry. The wool processing industry is small compared to the cotton, art silk, and man-made fiber industries. The vertically integrated (combing, spinning, weaving, and machine carpet production) sector complement the decentralized (hosiery, power looms, hand-knotted carpets, handloom, and khadi) sector in meeting domestic and export

¹ Alpha Agritech Consultants Ltd, 1994, "Small Ruminant Development," *op.cit.*

² These boards/federations include: APCO Wool in Secunderabad; H.P. State Cooperative Wool Procurement and Marketing Federation Ltd, Shimla; Karnataka Sheep and Products Development Board, Bangalore; Rajasthan State Cooperative Sheep and Wool Marketing Federation, Jaipur; Gujarat Sheep and Wool Development Corporation Ltd, Ahmedabad; Jammu & Kashmir State Sheep Products Development Board, Srinagar; U.P. Poultry and Livestock Specialties Ltd, Lucknow; and Maharashtra Sheep and Development Corporation Ltd, Pune.

market demand. During 1993-94, domestic wool production was estimated at 42,200 mt, while the wool processing industry demand was estimated at 79,000.³ To meet the deficit, wool is imported amounting to as much as 30,000 mt of wool, 25,000 mt of rags and waste, and 2,000 mt of wool and hair tops, valued at over Rs. 3 billion.⁴

To a large degree, wool imports, mainly from Australia, have been driven by the limited supply of finer wool (diameter less than 25 μ), which the apparel industry requires for garment production. To reduce the import burden, the government has launched a breeding program to cross-breed indigenous sheep with exotic Rambouillet/Merino. During the last 8 years, about 10,000 fine wool sheep have been imported. However, the program has had very limited success.

Marketing and Processing of Hides and Skins

Hides and skins are traditionally collected from villages, towns, and cities and transported to major terminal markets. In recent years, tanneries are also obtaining skins at the district level markets. The major terminal markets for skins are Madras, Calcutta, Kanpur, Delhi, Bombay, and Hyderabad. However, because most of India's animal slaughter take place in small villages and urban units, the quality of the hides and skins retrieved following slaughter is very poor.

The Indian leather industry has 125 medium and large scale units, 1200 small-scale units and thousands of tiny tanneries in rural areas. Three states, Tamil Nadu, Uttar Pradesh and West Bengal account for over 80 percent of the country's leather output; Tamil Nadu alone accounts for about 50 percent, largely because it allows slaughter of cattle. In addition to absorbing domestic supplies, the industry imported skins from various countries to facilitate higher capacity utilization. In 1990-91, leather raw materials (including skins) worth Rs 1.9 billion were imported. Footwear, leather garments and high value-added product industries have sprung up to take advantage of the export incentives and growing export opportunities. Several European firms have established joint ventures in the leather sector. Some are producing shoes, while others concentrate on producing leather soles. About 40 foreign firms are presently exploring joint venture opportunities in the Indian leather industry. Footwear is the single most important item produced from leather. The estimated end uses of leather are: 60 percent footwear, 12 percent garments, and 10 percent bags.

The leather industry exhibited tremendous growth as a result of a combination of factors; these include the liberalization of capital good and component imports (specifically the reduction in duties), simplification of export procedures, and a conscious decision of the GOI to encourage exports of value-added leathers. These measures comprised a ban on the export of raw skins and semi-tanned leathers, suede, soft skins and products, imposed in April 1990. Increasing costs of production (especially wages) and growing concerns about the negative environmental impact of tanneries in developed countries helped improve the competitiveness of Indian leather products. India has a competitive edge due to low wage rates. In addition, it also has more lax environmental regulations, in view of the fact that tanneries are among the most polluting industries.

At present, the industry is faced with serious problems including sizable losses due to defective curing, preservation, storage, and handling of skins and environmental pollution resulting from improper disposal of waste products from the tanning process. To address the

³ Ministry of Agriculture, 1994, *Department of Animal Husbandry and Dairying Annual Report 1993-94*.

⁴ Alpha Agritech Consultants Ltd, 1994, 'Small Ruminants, Development,' *op. cit.*

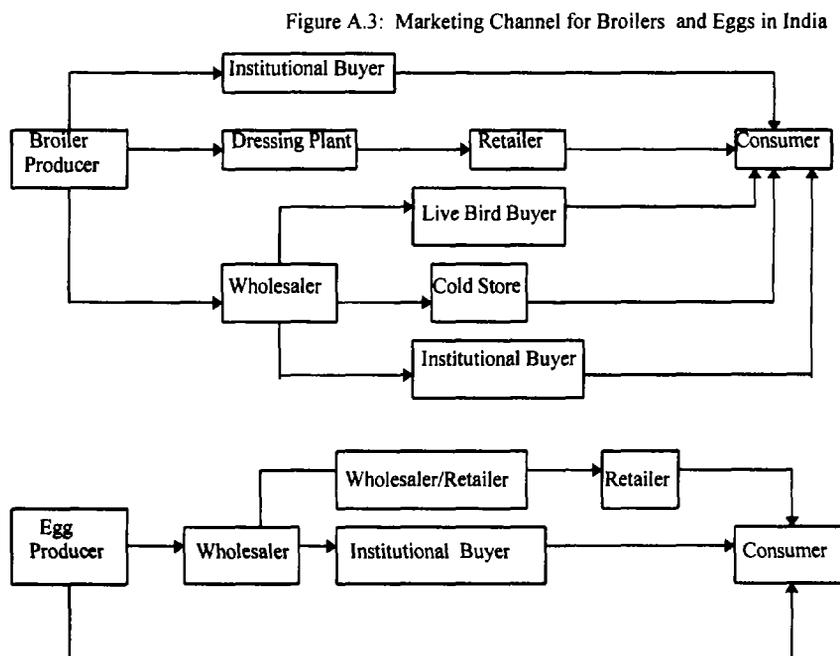
pollution problem, the government is restricting the establishment of new units and the expansion of existing tanneries.

Poultry Marketing

Broilers are sold live, fresh dressed, dressed chilled, or frozen. The first two categories account for the bulk of total sales. The marketing channel for broilers is illustrated in Figure A.3. Broiler farms are generally located within a 100 km radius of big cities. In certain markets, auctions are held daily. In others, farmers sell the birds to traders or processors. Egg marketing, on the other hand, is primarily handled by traders and commission agents (Figure A.3).

The poultry processing sector in India is still undeveloped. In 1994, only about 4 percent of domestic poultry production is processed in modern plants; the balance is processed in small retail meat shops or in households under unhygienic conditions. Processing of broilers in rural markets is uncommon due to storage and distribution problems. A number of private export-oriented egg processing projects is in the pipeline. One egg powder processing plant has been operational in Bombay since the seventies.

Future development of the poultry industry should focus on more hygienic slaughtering plants and cold storage facilities supported by mechanical dressing plants. Increased private sector investments in these technologies will be greatly influenced by both macro and sectoral policies to the extent that they affect the profitability of the ventures.



Source: *Indian Poultry Industry Yearbook 1994*.

Annex B. Government Programs in Wasteland Development

The government recognizes the importance of protecting and regenerating its wastelands and forests. The Wastelands Development Program was launched in 1985 with the setting up of the National Wastelands Development Board (NWDB) for dealing with the ecological crisis caused by acute shortages of fuelwood and fodder and the need to make the afforestation program a people's movement. The program was restructured in 1990 to make it more broad-based and comprehensive as well as to adopt a mission approach for enlisting peoples' participation, harnessing the inputs of science and technology and achieving inter-disciplinary coordination in program planning and implementation.

A National Forest Policy was formulated in 1988 with the principal aim of ensuring environmental stability and maintenance of environmental balance. Also the Forest Conservation Act 1980 was amended in 1988 to facilitate stricter implementation and to plug certain loopholes. In the Seventh Plan (1985-90), there was a considerable increase in the total area brought under the afforestation program. While the total afforestation during the Sixth Plan (1980-85) was only 4.65 million ha., the coverage in the Seventh plan was 8.87 million ha.

A number of afforestation programs was taken up to secure people's participation. Under this scheme priority was given to:

- a) establishment of decentralized nurseries and school nurseries
- b) block plantation specially on community land
- c) pasture development through people's institutions and involvement; and
- d) assistance in the implementation of the Tree Patta system.

An appraisal of the various afforestation schemes reveal some deficiencies:

- a) they have no specific plan of action for meeting fuel wood and fodder requirements except for the continuance of the scheme for rural fuel wood plantation, which does not directly address these issues,
- b) the rural poor and tribes, who depend mostly on public and forest lands for their living, have at best, been given restricted access to the areas taken up for development,
- c) the schemes for wasteland development are usually directed towards a single use, i.e., fuel or fodder when they should be adopting an integrated approach, and
- d) the existing wasteland development schemes generally are also not based on integrating control of run-off rain-water for reducing erosion, soil and water conservation and water harvesting.

The Eighth Plan (1992-97), proposes the popularization of the system of silvipasture which could be adopted by the community as well as by individuals. It is also proposed that grassland reserves be established in Government land. It is envisioned that with people's participation and

provision of appropriate technology by the government, the biomass production of grasslands could be improved 4- or 5-fold in 3-4 years¹.

In 1992, the NWDB was placed under the newly created Department of Wastelands Development. At the same time, the National Afforestation and Eco-development Board (NAEB) was set up under the Ministry of Environment and Forests. The NWDB is responsible mainly for the wastelands in the non-forest areas. Its aim is to monitor land degradation, putting such wastelands in the country to sustainable use, such as increasing biomass availability (especially fuelwood and fodder). The NAEB, on the other hand, has the responsibility of promoting afforestation, tree planting, ecological restoration and eco-development activities as well as regeneration of degraded forest areas and lands adjoining the forest areas, national parks, sanctuaries, and other protected areas as well as ecologically fragile areas like the Western Himalayas.

In spite of Government efforts at rehabilitation, the fact remains that almost half the recorded forest area is considered to be degraded and all accessible areas are extremely overgrazed (NAEB). Therefore, continued support for government programs is strongly needed and justified. Social forestry projects which were initiated in 1981-82 for periods ranging from five to eight years continued into the Seventh Plan. They envisaged tree planting and afforestation of 1,984,600 ha. of wastelands with total investment of Rs. 9,117,300,000 or a cost of Rs. 4594/ha (Planning Commission, Eighth Plan). The Ministry of Environment and Forest has set an average of Rs. 8,000 per ha. as a fixed norm for such investments.

¹ In Maharashtra, 9474 hectares of degraded lands were developed between 1981 and 1991. With an investment of Rs. 5500/ha for soil conservation measures, site preparation, sowing of grasses, planting of fodder trees, weeding, protection and after care, dry fodder yield increased from less than 500 kg./ha./yr. to an average of 1900 kg./ha./yr. For some areas fodder yield were as high as 3000 kg/ha/yr. This yield is mainly grass and does not include lopping from trees.

Annex C

Export Oriented Units And Units In Export Processing Zones

Eligibility	Units undertaking to export their entire production of goods (except the sales in the Domestic Tariff Area (DTA) as may be permissible under the Policy) may be set up under the Export Oriented Unit (EOU) Scheme or Export Processing Zone (EPZ) Scheme. Such units may be engaged in manufacture, production of software, agriculture, aquaculture, animal husbandry, floriculture, horticulture, pisciculture, poultry and sericulture. Units engaged in service activities may also be considered on merits.
Importability of goods	An EOU/EPZ unit may import free of duty all types of goods, including capital goods, required by it for manufacture, production or processing proceeded they are not prohibited items in the Negative List of Imports.
Second hand Capital goods	Second-hand capital goods may also be imported in accordance with the provisions contained in Chapter V.
Leasing of Capital goods	An EOU/EPZ unit may, on the basis of a firm contract between the parties, source the capital goods from a domestic leasing company. In such a case, the domestic leasing company will be eligible to import the capital goods free of duty and supply it to the EOU/EPZ units on such terms and conditions as may be mutually agreed upon between the two parties. The capital goods shall, however, remain as a part of the capital assets of the EOU/EPZ unit till the export obligation is discharged by the unit and they shall not be diverted for any other use.
Value Addition and Export Obligation	The Unit shall achieve a minimum Value Addition (VA) of 20%, but units engaged in the manufacture or production of items specified in Appendix II shall achieve the Value Addition (VA) norms indicated therein. Items of manufacture for export specified in the letter of permission/letter of intent alone shall be taken into account for calculation of value addition and discharge of export obligation.
Legal Undertaking	The unit shall execute a bond/legal undertaking with the Development Commissioner concerned and in the event of failure to fulfill the obligations stipulated in the letter of approval/intent, it would be liable to penalty in terms of the bond/legal undertaking or under any other law for the time being in force.
Minimum Export Price (MEP)	If the export of any good from the Domestic Tariff Area (DTA) is subject to Minimum Export Price (MEP) under the Policy, the export of that good by a EOU/EPZ unit also will be subject to the same MEP.
Automatic Approvals	Project applications satisfying the conditions mentioned in para 3 of Ministry of Industry Press Note No. 13 (1991 series) may be given automatic approval within 15 days by the Development Commissioner of the EPZ concerned. In the case of EOUs, such approval shall be granted by the Secretariat of Industrial Approvals (SIA).
Other cases	In the other cases, approval may be granted by the Board(s) of Approval set up for this purposes or Secretariat of Industrial Approvals, as the case may be.
DTA Sales	The entire production of EOU/EPZ Units shall be exported except: (a) Rejects upto 5% or such percentage as may be fixed by the Board of Approval. Rejects may be sold in the Domestic Tariff Area (DTA), subject to payment of the applicable duties; and (b) 25% of the production in value terms may be sold in the DTA. DTA sale shall be subject to fulfillment of minimum value addition and export obligation. No DTA sale shall be permissible in respect of jewelry, diamonds, precious and semi-precious stones/gems, motor cars, alcoholic liquors, silver bullion and such other items as may be stipulated by Director General of Foreign Trade by a Public Notice issued in this behalf.

However, in respect of an EOU/EPZ unit in agriculture, aquaculture, animal husbandry, floriculture, horticulture, pisciculture, poultry and sericulture, the unit is free to sell upto 50% of the production in value terms in the DTA subject to fulfillment of minimum value addition and export obligation.

Export Obligation

The following supplies shall be counted towards fulfillment of the export obligation:

- (a) Supplies effected in DTA under global tender conditions;
- (b) Supplies effected in DTA against payment in foreign exchange;
- (c) Supplies against Advance Licensees and other import licenses;
- (d) Supplies, with the permission of the Development Commissioner, to other EOUs/EPZ units.

Exports through Export House/Trading House/Star Training House

An EOU/EPZ unit may export goods manufactured by it through an Export House/Trading House/Star Trading House recognized under this Policy or other EOU/EPZ units. This permission extends only to the marketing of the goods by the Export House/Trading House/Star, Trading House or other EOU/EPZ units. The manufacture of the goods shall be done in the EOU/EPZ units. The value addition and export obligations as well as any other obligation relating to the imports and exports shall continue to be discharged by the EOU/EPZ unit.

The Development Commissioner may also permit

- (a) Supplies or sale, in reasonable quantities, of samples of goods produced by EOU/EPZ units for display or canvassing orders on payment of duties leviable. Such samples may also be allowed to be removed from the unit on furnishing a suitable undertaking for return of such goods.
- (b) Bringing back for repair/replacement goods sold in DTA but found defective. Such goods may be removed from the unit subject to the satisfaction of the Customs authorities as to the identity of the goods.
- (c) Transfer of goods to DTA for repair, testing or calibration, provided that in the case of an EOU unit this permission may be granted by the customs authorities.

Benefits for supplies from the DTA

Supplies from the DTA to EOU/EPZ units will be regarded as "deemed exports" and, besides being eligible for the benefits under paragraph 122 of this Policy, will be eligible for the following benefits:

- (a) Refund of Central Sales Tax;
- (b) Exemption from payment of Central Excise Duty on capital goods, components and raw materials; and
- (c) Discharge of export obligation, if any, on the supplier.

Conditions

The benefits stated under paragraph 106 shall be available provided the goods supplied are manufactured in the country.

Benefits for EPZ/EOU Units

Concessional Rent: The units set up in the EPZs will be eligible for concessional rent for leave of industrial plots and standard design factory (SDF) buildings/sheds allotted for the first three years at the following rates:

For Plots: The concession will be 75% for the first year, 50% for the second year and 25% for the third year if production had commenced in the first year or the second year. The concession will not be available for the third year if production had not commenced by the end of the second year;

For SDF buildings/sheds: The concession will be 50% for the first year and 40% for the second year if production had commenced in the first year. The concession will be 15% for the third year if production had commenced in the first year. The concession will not be available if production had not commenced by the end of the first year;

	<p>Tax Holiday: EOUs and EPZ units will be exempted from payment of corporate income tax for a block of five years in the first eight years of operation;</p> <p>FOB value of export of an EOU/EPZ unit can be clubbed with FOB value of export of its parent company in the DTA for the purpose of according Export House, Trading House or Staff Trading House status for the latter;</p> <p>100% Foreign Equity: Foreign equity upto 100% is permissible in the case of EOUs and EPZ units.</p>
Inter-unit transfer	<p>Transfer of manufactured goods may be permitted by the Development Commissioner from one EPZ unit to another EPZ unit, one EPZ unit to a EOU, one EOU to an EPZ unit or from one EOU to another EOU.</p> <p>Goods imported by an EOU/EPZ unit may be transferred or given on loan to another EOU/EPZ unit with the permission of the Development Commissioner.</p>
Subcontracting	<p>The EOU/EPZ units may be permitted to sub-contract part of their production for job work to units in the DTA on a case to case basis. Requests in this regard will be considered by the concerned Customs authorities on the basis of factors such as feasibility of bonding, fixation of input and output norms, and furnishing of undertaking/bonds by the concerned units.</p>
Sale of Imported Materials	<p>In case of EOU/EPZ unit is unable, for valid reasons, to utilize the imported goods, it may re-export them with the permission of the Development Commissioner, subject to clearance from Customs with reference to valuation etc. Such goods may also be transferred to an Actual user in the DTA with the permission of the Development Commissioner on payment of applicable duties.</p> <p>Imported machinery/capital goods that have become obsolete may be disposed of, subject to payment of customs duties on the depreciated value thereof.</p>
Disposal of scrap	<p>The Development Commissioner may, subject to guidelines laid down by the BOA in this behalf, permit sale or their disposal in any other manner in the DTA of scrap/waste/remnants shall be fixed by the Board keeping in view the norms specified by a Public Notice issued in this behalf by the Director General of Foreign Trade.</p>
Private bonded Warehouses	<p>Private bonded warehouses may be permitted to be set up in EPZs for stock and sale of duty-free raw materials, components etc. to EOUs and EPZ units subject to the following conditions:</p> <ul style="list-style-type: none">(a) The private bonded warehouses shall be locate within the EPZ;(b) Imports for such private bonded warehouses shall be made only against specific licenses. No license shall be given to import items which are not required by the consuming units; and(c) The items imported by the private bonded warehouses shall not be permitted to be sold in the DTA.
Period of Bonding	<p>The bonding period for units under the EOU Schemes shall be 10 years. The period may be reduced to 5 years by the BOA in case of products liable to rapid technological change. On completion of the bonding period, it shall be open to the unit to continue under the scheme or opt out of the scheme. Such debonding shall, however, be subject to the industrial policy in force at the time the position is exercised.</p>
De-Bonding	<p>Subject to the approval of BOA, EOU/EPZ units may be debonded on their inability to achieve export obligation, value addition or other requirements. Such debonding shall be subject to such penalty as may be imposed and levy of the following duties:</p> <ul style="list-style-type: none">(a) Customs duty on capital goods at depreciated value but at rates prevalent on the dates of import;(b) Customs duty on unused raw materials and components on the value on the dates of import and at rates in force on the dates of clearance.

Conversion Existing DTA units may also apply for conversion into an EOU but no concession in duties and taxes would be available under the scheme for plant, machinery and equipment already installed.

Value addition Value Addition for the purposes of this chapter shall be expressed as a percentage and shall be calculated for a period of five years from the commencement of commercial production according to the following formula:

$$VA = \frac{A - B}{A} \times 100, \text{ where}$$

VA is Value addition.

A is the FOB value of exports realized by the EOU/EPZ unit; and

B is the sum total of the CIF value of all imported inputs, the CIF value of all imported capital goods, and the value of all payments made in foreign exchange by way of commission, royalty, fees, dividends interest on external borrowings during the first five years period or any other charges. "Inputs" mean raw materials, intermediates, components, consumables, parts and packing materials.

Note: If any input is obtained from another EOU/EPZ unit, the value of such inputs shall be included under B

2. If any capital goods imported duty free is leased from a domestic leasing company, the CIF value of the capital goods shall be included under B.

3. In the case of projects where the investment in land, building, plant and machinery exceeds Rs. 200 Crores, the value of capital goods shall be amortized over a period of seven years; i.e. in such cases, only 5/7th of the CIF value of the imported capital goods shall be included under B..

India
Livestock Sector Review
Statistical Annex

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Annex Table 2.1a: All India Livestock Population and Percentage Growth Rates, 1961-92.

Species	Year (million animals)					
	1961	1972	1978	1982	1987	1992
Cattle	175.60	178.30	180.00	192.40	195.87	192.65
		1.5%	1.0%	6.9%	1.8%	-1.6%
Buffalo	51.20	57.40	62.00	69.80	76.77	78.55
		12.1%	8.0%	12.6%	10.0%	2.3%
Sheep	40.20	40.00	41.00	48.80	44.84	44.40
		-0.5%	2.5%	19.0%	-8.1%	-1.0%
Goat	60.90	67.50	75.60	95.20	99.41	117.00
		10.8%	12.0%	25.9%	4.4%	17.7%
Pigs	5.20	6.90	7.60	10.10	10.76	10.50
		32.7%	10.1%	32.9%	6.5%	-2.4%
Poultry	114.20	138.50	59.20	107.70	258.34	410.00
		21.3%	-57.3%	81.9%	139.9%	58.7%

Note: percentage figures are period growth rates.

Source: India Directorate of Economics and Statistics.

Annex Table 2.1b: Livestock and Poultry Population (1987 Census), 000.

States	Cattle	Buffaloes	Sheep	Goats	Pigs	Horses & Ponies	Mules	Donkeys	Camels	Yaks	Mithuns	Total Poultry
Andhra Pradesh	12374	8757	6872	4876	724	10		52				39045
Arunachal Pradesh	311	12	28	108	243	5	1			8	97	1121
Assam	7278	623	67	2134	642	14						11451
Bihar	20841	4872	1520	15032	1043	111	4	28				15880
Goa Daman Diu	112	40		18	86			84	56			608
Gujarat	6240	4502	1559	3585	93	16						5490
Haryana	2201	3828	890	674	339	33	16	68	128			5336
Himachal Pradesh	2245	795	1112	1120	17	19	23	8		2		753
Jammu & Kashmir	2765	565	2493	1396	2	104	17	17	2	21		3805
Karnataka	10175	4036	4727	3888	302	20		35				15689
Kerala	3424	329	30	1581	137							17993
Madhya Pradesh	28549	7351	834	7751	601	92	7	62	15			9371
Maharashtra	16979	4753	2872	9191	334	42	1	67				24828
Manipur	770	141	16	44	383	1					19	3018
Meghalaya	587	28	15	194	280	5						1590
Mizoram	50	5	1	20	82	2					1	838
Nagaland	203	15	1	72	314						12	1124
Orissa	13576	1509	1840	4804	590	1						12597
Punjab	2832	5577	508	537	97	33	15	36	43			15276
Rajasthan	10922	6344	9933	12577	207	29	3	184	719			2605
Sikkim	184	3	11	98	31	2				5		254
Tamil Nadu	9343	3129	5881	5921	661	6		51				21567
Tripura	828	16	3	441	89	1						1865
Uttar Pradesh	26323	18240	2181	11321	2411	217	80	263	36			9317
West Bengal	16511	965	1460	11890	898	18		1				35823
Union Territories												
A&N Islands	45	14		44	30							443
Chandigarh	6	20		1	3	1						169
Dadar & N. Haveli	46	4		19								100
Delhi	55	285		22	42			3				220
Lakshadweep	3	-		15								51
Pondichery	89	10	5	31	1							108
ALL INDIA	195867	76768	44859	99405	10682	782	167	959	999	36	129	258335

Source: Directorate of Economics & Statistics and State Departments of Animal Husbandry and Dairying.

Annex Table 2.2 : Production of livestock products, 000 mt, 1980-1992.

Commodity	1980	1988	1989	1990	1991	1992
Milk	31560	48700	51500	54900	58400	60850
Cow milk	13255	22000	24000	26700	28200	29400
Buffalo milk	17358	25239	25955	26300	28200	29250
Goat milk	947	1461	1545	1900	2000	2200
Meat		3062	3291	3570	3710	3769
Beef & veal	853	1043	1126	1271	1185	1216
Buffalo meat	821	1043	1042	1048	1176	1182
Mutton & lamb	154	148	160	173	168	167
Goat meat	302	378	385	410	455	456
Pig Meat		357	359	360	361	366
Poultry meat	179	225	289	334	362	382
Eggs (billion pcs)	10.6	18.89	20.204	21.115	21.984	22.913
Wool (million kg)	32	40.8	41.7	41.2	41.6	40.6

Source: Milk and meat production figures are from *FAO Production Yearbooks*, various issues. Egg and wool figures are from the Department of Animal Husbandry and Dairying, 1993, *Report of the Technical Committee of Direction for Improvement of Animal Husbandry and Dairying Statistics*.

Annex Table 2.3 : Value of Output from Livestock 1986-87 to 1990-91, current prices, Rs billion.

Commodity	1986-87	1987-88	1988-89	1989-90	1990-91
Livestock Output					
Milk Group	162.01	182.88	207.9	247.8	292.69
Meat Group	38.27	42.6	50.36	62.27	69.82
A. Meat	32.05	36.33	43.07	54.36	60.47
Beef	4.18	4.57	5.77	6	7.3
Mutton	12.8	14.2	16.44	21.23	24.24
Pork	2.02	2.21	2.66	4.37	4.87
Poultry	13.05	15.35	18.2	22.76	24.06
B. Meat products	1.87	1.89	2.12	2.1	2.38
C. By Products 1	4.35	4.38	5.17	5.81	6.97
Eggs	8.29	9.03	10.26	12.02	13.43
Wool and hair	0.99	1.14	1.18	1.38	1.45
Dung	25.77	31.51	36.42	39.99	43.47
Others	10.19	12.54	15.33	13.39	15.82
Total	245.52	279.7	321.45	376.85	436.68
Value of Ag. Output 2	744.05	835.15	1041.03	1154.47	1374.11
GDP 3	2600.3	2948.51	3535.17	4058.27	4726.6
%Livestock/Agriculture	33.0	33.5	30.9	32.6	31.8
% Livestock/ GDP	9.4	9.5	9.1	9.3	9.2

Note: 1 - includes hides, skins, others; 2 - agricultural output at factor costs; 3 - GDP at factor costs.
Source: Central Statistical Organization, 1993, *National Account Statistics*.

Annex Table 2.4: Egg Production By Region and State, 1990-1994, million pcs.

State/UT	1990	1992	1993	1994	Percent of Total, 1990-94
Northern Region					
Punjab	1660	1423	1548	1589	0.06
Haryana	1038	1212	1349	1480	0.05
Uttar Pradesh	921	900	982	1040	0.04
Rajasthan	513	501	547	581	0.02
Himachal Pradesh	151	147	160	168	0.01
Chandigarh	148	146	159	168	0.01
Jammu & Kashmir	127	124	135	143	0.01
Delhi	122	119	130	138	0.01
Western Region					
Maharashtra	2530	2471	2695	2850	0.11
Gujarat	540	526	574	608	0.02
Goa	204	199	217	230	0.01
Dadar&Naga	4	4	5	5	0.00
Haveli					
Daman&Diu	1	1	1	1	0.00
Eastern & Central Region					
Madhya Pradesh	1170	1139	1242	1316	0.05
West Bengal	1122	1091	1190	1261	0.05
Bihar	1090	1059	1155	1224	0.05
Assam	620	605	660	770	0.03
Orissa	515	503	548	580	0.02
Manipur	75	73	80	85	0.00
Meghalaya	66	64	70	74	0.00
Tripura	36	36	38	40	0.00
Arunachal Pradesh	30	30	33	35	0.00
Nagaland	29	29	32	34	0.00
Sikkim	15	16	18	19	0.00
Andaman&Nicobar	15	49	53	56	0.00
Mizoram	2	2	2	2	0.00
Southern Region					
Andhra Pradesh	5690	5557	6060	6420	0.24
Tamil Nadu	3115	3040	3313	3510	0.13
Karnataka	900	880	960	1015	0.04
Kerala	798	776	848	899	0.03
Pondicherry	14	14	15	16	0.00
Lakshadweep	4	4	5	5	0.00
All India	23300	22740	24800	26290	1.00

Source: Planning Commission, Government of India.

Annex Table 2.5: Value of Poultry Product Output, 1980 -1993, Rs million.

Year	Eggs	Poultry Meat	Total
1980	3510	4440	7950
1985	7370	10870	18240
1990	12020	22760	37490
1991	17360	31650	49010
1992	18400	34020	52420
1993	21900	41500	63400

Source: India Poultry Industry Yearbook, 1994.

Annex Table 3.1: Distribution of Forest Resources, 1993.

Category	Area (000 sq. km)	Percentage
Dense Forest with crown density of ≥ 40 %	385.6	11.73
Open forest with crown density of 10 -40 %	250.3	7.61
Mangrove Forests	4.3	0.13
Scrublands with tree cover of crown density < 10 %	58.9	1.79
Non-forest lands	2,588.2	78.73
Total	3,287.3	100.00

Source: Alpha Agritech Consultants Ltd, 1994. "Feed and Fodder Production, Consultant's report.

Annex Table 3.2a: Estimated Feed and Nutrient Balance in India, 1991.

Estimated Nutrient Availability and Requirements in India, 1991.				
Nutrient	Availability million mt	Requirement t million mt	Deficiency million mt	Percent Deficiency
Dry Matter	530.25	766.19	235.94	31%
Digestible Crude Protein	15.10	35.82	20.72	58%
Total Digestible Nutrients	283.16	412.80	129.65	31%
Estimated Feed and Fodder Availability and Requirement in India, 1991.				
Feed Component	Availability million mt	Requirement t million mt	Deficiency million mt	Percent Deficiency
Straw/stovers	398.88	583.62	134.74	31%
Green fodder	573.50	744.73	171.23	23%
Concentrate	41.98	79.40	37.42	47.9%

Note: Based on data from Singh and Majumdar (1992), Annex Table 3.5b.

Annex Table 3.2b: Feed Balance in India, 1992.

Resource Development Region	Fodder Demand	Agro-Waste as Fodder	Fodder from Forest & Wasteland	Status
1. Himalayana UP Division	6531.7	3291.2	2465.8	Deficit
2. Himachal Pradesh Division	6807.1	3363.1	2532.2	Deficit
3. Jammu and Kashmir Division	5508.1	3097	2193.3	Deficit
4. Himalayan Sub-Region	1599.9	795.1	639.9	Deficit
5. Assam and Associated Hills	7231.7	1512.2	2892.7	Deficit
6. Plains Sub-region	19713.5	4191.4	6707.5	Deficit
7. West Bengal Plain Division	35153	9845.5	3919.5	Deficit
8. North Bihar Plain Division	16974.3	9352.1	3297.6	Deficit
9. South Bihar Plain Division	12618.6	6772.4	3684.2	Deficit
10. Eastern UP Plain Division	27190.6	17914.3	3339.1	Deficit
11. Central UP Plain Division	24005.8	14780.9	3145.3	Deficit
12. North Western UP Plain Division	17929.1	22405.9	1599.8	Surplus
13. South Western UP Plain Division	14848.4	16067.2	1055	Surplus
14. Delhi Division	276	434.8	76.2	Surplus
15. Punjab-Haryana Plain Division	29918	70966.9	2049.4	Surplus
16. Rajasthan Division	2842.9	7118.2	308.1	Surplus
17. Bihar-Chhotanagpur Plain Division	18201.1	2426.5	7280.4	Deficit
18. West Bengal Plateau Division	2169.3	509.5	814.2	Deficit
19. Orissa-Inland Division	19296.7	5215.5	7718.7	Deficit
20. Madhya Pradesh-Eastern Hills and Chhatisgarh Division	21374.2	5933	85443.4	Deficit
21. Maharashtra-Wainganga Plain & Hills Division	3680.8	1162.3	1472.3	Deficit
22. UP-Bundelkhand Division	6775.5	3611.2	1120.9	Deficit
23. MP-Northern Plains and Plateau	9807.7	6013.5	3432.7	Deficit
24. MP-Central Plateau and Hills	14315.4	11155.8	5685.3	Surplus
25. MP-Vindhyan Hills & Plateaus	14426.9	3236.1	4666.1	Deficit
26. East Rajasthan Plains & Hills	25182.7	16508.4	9410.4	Surplus
27. South Rajasthan Plateau & Hills	10035	1981.6	3794.3	Deficit
28. Maharashtra-Deccan Plateau	11474.7	11181.8	4589.9	Surplus
29. Maharashtra-Kahndesh, Marathwada & Berar Sub-Division & Hills	18629.2	8024	7338.1	Deficit
30. MP-Malwa Plateau Division	14466.8	10244.1	5511.6	Surplus
31. Rajasthan-Malwa Division	1622.3	618.9	648.9	Deficit
32. Andhra-Telengana	21970.7	5210	8788.3	Deficit
33. Andhra-Rayalaseema Division	6408.6	1803	2563.5	Deficit
34. Andhra-Chittoor Division	2896.4	771.2	1158.5	Deficit
35. Madras-Inland Division	14424.6	4323.2	5540.1	Deficit
36. Karnataka Plateau Division	12392	3711.6	4956.8	Deficit
37. Karnataka-Karnataka Plateau Division	15650.8	6873.5	6125.5	Deficit
38. Coastal Orissa Division	13500.8	3025.4	4047.9	Deficit
39. Coastal Andhra Division	15311	8098.4	6124.4	Deficit
40. Madras-East Coast Division	17040	7793	5485.3	Deficit
41. Pondicherry Division	206	77.5	13.4	Deficit
42. Madras-West Coast Division	301.9	127.6	120.7	Deficit
43. Madras-Nilgiri Division	2467.9	11.9	579.3	Deficit
44. Kerala Division	7634.8	1509.5	2328.8	Deficit
45. Mysore Coastal Division	2696.2	504.4	1078.5	Deficit
46. Mysore Hill Division	3885.8	1034.4	1554.3	Deficit
47. Maharashtra-Konkan Division	4124.3	3024.3	1619.7	Surplus
48. Goa Division	7367.8	169.2	509.1	Deficit
49. Gujrat Plain & Hills Division	17441.7	9020.7	4258.8	Deficit

Annex Table 3.2b cont'd Feed Balance in India, 1992.

Resource Development Region	Fodder Demand	Agro-Waste as Fodder	Fodder from Forest & Wasteland	Status
50. Saurashtra Plain Division	8031.9	3201.2	3039.1	Deficit
51. Gujrat Hills Division	148.3	51	59.3	Deficit
52. Western Dry Division	4006.9	3721.9	1602.8	Surplus
53. Rajasthan Dry Division	15309.2	24627.6	2874.7	Surplus
54. Andaman & Nicobar Division	205.7	26.9	82.3	Deficit
55. Lakshadweep Division	23.9	0.1	1.4	Deficit
India	613146.2	368436	176425.3	Deficit

Source: P. Singh and A. B. Majumdar, 1992, "Current Status of Feed and Forage in Management of Livestock in India," *Agricultural Situation in India*, August, pp. 375-382.

Annex Table 3.2c: World Bank Feed Balance in India Estimates, 1995.

	Livestock population	Concentrate Needs (kg/day)	Total Annual Requirement (mt)	Roughage (kg dm/day)	Total Annual Requirement (mt DM)
Demand					
Cattle (A)					
Cross bred	8000000	3	8.8	7	20.4
Improved local	7000000	1.5	3.8	7	17.9
Cross bred young	3000000	1	1.1	5	5.5
Others	180000000	0.05	3.3	6	394.2
Buffaloes (B)					
Improved	5500000	3	6.0	7	14.1
Others	70000000	0.05	1.3	6	153.3
Subtotal (A+B)			24.3		605.4
Small ruminants					
Improved	2000000	1	0.7	2	1.5
Others	165000000	0	0	2	120.5
Subtotal			0.7		121.9
Poultry					
Improved layers	40000000	0.11	1.6	0	
Improved broilers	30000000	0.06	0.7	0	
Others	310000000	0	0	0	
Subtotal			2.3		
Pigs					
Improved	1000000	2.5	0.9	1	0.4
Others	9500000	1	3.5	2	6.9
Subtotal			4.4		7.3
Total			31.6		7.3
					734.6
Supply		Concentrate			
	Grain yield	Extraction	Available	Straw/gra	Available
	(Mt.)	rate (%)	Conc. (mt)	in ratio	Straw (mt)
Wheat bran/straw	55	13	7.2	1.3	71.5
Rice bran/straw	73	10	7.3	1.4	102.2
Barley straw	2	0	0	1.3	2.6
Legumes hulls/straw	12	3	0.4	1.3	15.6
Maize/stover	8	90	7.2	2	16
Millets stover	7			2	14
Sorghum stover	8			3	24
Subtotal Brans			22.0		245.9
Oil seeds					
Groundnut cake/straw	7.1	60	4.3	1	7.1
Sesame cake/straw	0.7	70	0.5	1	0.7
Sunflower cake	1.2	70	0.8	0	
Rape seed cake/straw	5.8	70	4.1	2	11.6
Soy bean cake/straw	2.3	80	1.8	2	4.6
Linseed cake/straw	0.3	70	0.2	2	0.6
Subtotal			11.7		24.6
Total Concentrate			33.7		270.5
Grazing			Area	DM per ha	Total yield
Forest			74	1.5	111
Barren and non-arable land			20	1	20
Permanent Pasture land			12	3	36
Land under trees and groves			3	0.5	1.5
Arable Wasteland			16	1.5	24
Fallow land			10	2	20
Subtotal					212.5
TOTAL			135		483

Annex Table 3.3: Prices of Selected Feed Ingredients, \$/mt, 1990-93.

Commodity	1988	1989	1990	1991	1992	1993
Maize						
India	186	155	133	129	177	119
India Support	104	102	103	92	95	87
World Price (CIF)	127	160	161	136	167	160
Sorghum						
India	208	229	205	132	271	179
India Support	104	102	103	90	93	85
World Price (CIF)	144	189	188	148	204	187
Barley						
India 1	140	120	127	123	109	
India Support	97	89	103	88	81	85
USA No2 Western, Portland	126	120	122	122	118	110
Soybean						
India	396	326	291	265	321	232
India Support	230	228	229	196	203	190
World Price (CIF)	281	299	253	234	255	269
Rapeseed						
India	497	451	325	410	361	297
India Support	309	283	328	264	259	249
World Price (CIF)	174	227	230	173	197	200
Peanuts						
India	477	322	417	415	392	276
India Support	309	308	331	284	289	262
World Price (CIF)	192	235	284	282	262	252
Soybean Meal						
India Ex-mill Bombay 50%			137	133	102	207
USA, 48% prot., Decatur			206	200	208	214
Rapeseed Meal						
India, Delhi	148	102	130	112	107	145
Hamburg, CIF	153	167	135	131	139	157
Peanut Meal						
India, Bombay	205	167	214	173	175	134
USA Southeast Mills FOB	n/a	n/a	212	206	173	197
Rotterdam, CIF	202	209	187	154	155	165
Soybean Oil						
India, Bombay						840
US, Decatur						472
Peanut Oil						
India, Bombay	1503	1349	1642	1580	1257	948
USA Southeast Mills FOB	738	750	953	931	563	665

Source: Indian cereal and oilseed prices, domestic and world, are from A. Gulati and G. Pursell, "Trade Policy Incentives and Resource Allocation in Indian Agriculture," forthcoming and Ministry of Agriculture, *Agricultural Prices in India*, various issues. Oil and Oilmeal prices are from the Ministry of Agriculture, 1993, *Agricultural Prices in India 1988-90 and 1990-92*; USDA, 1994, "Grain and Feed Annual," AGR No. 4010 and USDA, 1994, "Oilseeds and Products Annual", AGR No. 4037. World market prices are from USDA, 1994, *Feed Situation and Outlook*, FDS-330 and USDA, 1994, *Oilseeds: World Market and Trade*, FOP 11-94.

Annex Table 3.4 Volume and Value of Feed Ingredient Exports and Imports of India, 1980-91.

Commodity	Unit	1980	1985	1986	1987	1988	1989	1990	1991
Barley									
Imports	mt	0	0	0	0	0	0	0	0
	1000\$	10	0	0	0	0	0	0	0
Exports	mt	5300	100	0	100	0	0	0	0
	1000\$	1080	20	0	20	0	0	0	0
Maize									
Imports	mt	14400	0	10600	0	81000	200000	0	0
	1000\$	5030	0	1640	0	12530	28000	0	0
Exports	mt	0	23900	0	200	0	0	0	0
	1000\$	0	4950	0	50	0	0	0	0
Groundnuts									
Imports	mt	0	0	0	0	0	0	0	0
	1000\$	0	0	0	0	0	0	0	0
Exports	mt	20098	25196	14929	4492	21856	32400	49196	26820
	1000\$	19497	16995	10201	3884	14449	20300	31395	24960
Soybeans									
Imports	mt	7100	0	0	0	0	0	0	0
	1000\$	3870	0	0	0	0	0	0	0
Exports	mt	1400	13300	1800	1700	3900	1000	300	1800
	1000\$	340	2480	350	380	1070	280	70	350
Rapeseed									
Imports	mt	2800	0	2500	712500	145100	0	0	0
	1000\$	120	0	20	18150	3390	0	0	0
Exports	mt	100	0	300	1600	0	0	0	2000
	1000\$	10	0	20	150	0	0	0	200
Soybean Oil									
Imports	mt	762058	422000	183580	494681	199949	41700	25276	38100
	1000\$	444315	295000	88320	200479	109447	30000	21491	30000
Exports	mt	0	2657	4332	0	0	0	0	0
	1000\$	0	1928	2165	0	0	0	0	0
Groundnut Oil									
Imports	mt	3	450	462	108	1	200	0	400
	1000\$	2	410	477	91	2	200	0	550
Exports	mt	0	0	0	0	0	0	6	0
	1000\$	0	0	0	0	0	0	11	0
Rapeseed oil									
Imports	mt	151418	213000	265445	345055	185317	28200	2533	15000
	1000\$	85900	150000	103520	123598	95979	15000	1700	9000
Exports	mt	0	0	5	0	6	0	0	0
	1000\$	0	0	10	0	18	0	0	0
Soybean Cake									
Imports	mt	100	2500	9200	800	1200	2500	300	0
	1000\$	10	220	780	70	150	450	40	0
Exports	mt	87900	373100	584000	325600	723200	985000	1260500	1437000
	1000\$	20350	59880	100330	70710	195570	198000	244290	257300
Peanut Cake									
Imports	mt	0	0	1375	0	287	0	0	0
	1000\$	0	0	118	0	27	0	0	0
Exports	mt	400512	186304	221459	289938	244029	483000	87949	230200
	1000\$	70259	24891	33841	56130	33685	75000	12603	35000
Rapeseed Cake									
Imports	mt	310	2100	1063	0	0	3300	0	0
	1000\$	10	180	114	0	0	650	0	0
Exports	mt	4672	65379	206505	44093	116577	617000	496902	594600
	1000\$	655	3516	14414	3226	11442	68000	37580	45000

Source: *FAO Trade Yearbook*, various issues.

Annex Table 3.5: Production Area, Volume, and Yields of Major Feed Ingredients, 1980-92.

Commodity	1980	1985	1986	1987	1988	1989	1990	1991	1992
Barley									
000 ha	1771	1253	1369	1225	1143	1081	991	977	943
000 mt	1624	1556	1963	1669	1577	1722	1486	1642	1650
Yield mt/ha	0.92	1.24	1.43	1.36	1.38	1.59	1.50	1.68	1.75
Maize									
000 ha	6005	5797	5923	5561	5897	5915	5954	6040	5950
000 mt	6957	6644	7593	5721	8229	9651	9073	8700	9740
Yield mt/ha	1.16	1.15	1.28	1.03	1.40	1.63	1.52	1.44	1.64
Millet									
000 ha	18158	16207	16645	13851	17106	15946	15120	14540	15000
000 mt	9337	7399	8383	6866	11353	10721	10470	10462	10600
Yield mt/ha	0.51	0.46	0.50	0.50	0.66	0.67	0.69	0.72	0.71
Sorghum									
000 ha	15809	16097	15948	15999	14599	14838	14498	12370	14500
000 mt	10431	10197	9185	12196	10170	12898	11878	8400	13000
Yield mt/ha	0.66	0.63	0.58	0.76	0.70	0.87	0.82	0.68	0.90
Soybean									
000 ha	608	1340	1527	1543	1734	2253	2365	2450	2500
000 mt	442	1024	891	898	1547	1806	2419	2280	2950
Yield mt/ha	0.73	0.76	0.58	0.58	0.89	0.80	1.02	0.93	1.18
Peanuts									
000 ha	6801	7125	6982	6844	8529	8710	8297	8350	8600
000 mt	5005	5121	5875	5854	9658	8101	7622	7428	8200
Yield mt/ha	0.74	0.72	0.84	0.86	1.13	0.93	0.92	0.89	0.95
Rapeseed									
000 ha	3471		3979	3719	4619	4865	4697	5722	7065
000 mt	1428		2681	2605	3455	4412	4125	5152	5840
Yield mt/ha	0.41		0.67	0.70	0.75	0.91	0.88	0.90	0.83

Source: FAO Production Yearbooks, various issues.

Annex Table 4.1: Number of State Farms and Other Infrastructures - 1991-92 State-wise

Sl. No.	States/UT Breeding	Cattle Breeding Farms	Buffalo Breeding Farms	Poultry Breeding Farms	Duck Farms	Hatch-eries	Pig Breeding Farms
1.	Andhra Pradesh	10	2	14	-5	5	
2.	Arunachal Pradesh	4	-	16	-	5	5
3.	Assam	7	1	25	1	21	5
4.	Bihar	-	15	1	15	5	
5.	Goa	1	-	1	3	1	
6.	Gujarat	9	3	11	1	11	-
7.	Haryana	4	-	43	-	44	2
8.	Himachal Pradesh	5	-	6	-	4	-
9.	Jammu & Kashmir	2	-	37	-	-	-
10.	Karnataka	15	1	12	-	33	3
11.	Kerala	-	-	9	-	-	-
12.	Madhya Pradesh	13	3	16	1	15	2
13.	Maharashtra	15	2	36	1	33	1
14.	Manipur	1	1	2	1	16	3
15.	Meghalaya	4	1	10	1	1	10
16.	Mizoram	5	-	10	2	1	5
17.	Nagaland	6	1	6	1	5	8
18.	Orissa	14	3	8	2	12	2
19.	Punjab	4	-	8	-	5	8
20.	Rajasthan	3	1	5	1	8	1
21.	Sikkim	4	-	2	-	1	4
22.	Tamil Nadu	7	2	7	-	18	2
23.	Tripura	3	1	3	1	4	6
24.	Uttar Pradesh	7	4	33	2	33	9
25.	West Bengal	9	1	39	7	23	3
	UTs (Total)	1	1	10	2	6	6
	All India Total	160	29	383	26	317	102

Annex Table 4.1: (Contd.) Number of State Farms and Other Infrastructures 1991-92-State-wise.

Sl. No.	States/UTs	Rabbit Breeding Farms	Sheep Breeding Farms	Sheep & Wool Extn. Centers	Wool Grading Centers	Intensive Cattle Development Projects	AI Center
1.	Andhra Pradesh	-	-	241	-	-	3000
2.	Arunachal Pradesh	1	1	7	1	1	25
3.	Assam	-	1	-	-	11	731
4.	Bihar	1	20	4	8	1652	
5.	Goa	-	-	-	-	-	47
6.	Gujarat	1	4	168	2	8	3477
7.	Haryana	-	2	59	2	-	2273
8.	Himachal Pradesh	2	5	5	-	10	640
9.	Jammu & Kashmir	-	16	84	-	12	-
10.	Karnataka	12	6	73	-	2	2191
11.	Kerala	-	2	-	-	8	2400
12.	Madhya Pradesh	-	4	26	1	22	2461
13.	Maharashtra	-	9	-	2	8	3870
14.	Manipur	-	-	-	-	1	70
15.	Meghalaya	1	2	-	-	2	80
16.	Mizoram	-	-	-	-	-	20
17.	Nagaland	1	1	1	1	1	5
18.	Orissa	2	2	-	-	4	2378
19.	Punjab	-	2	38	1	12	46
20.	Rajasthan	-	6	142	-	-	1989
21.	Sikkim	-	2	2	-	-	53
22.	Tamil Nadu	-	10	-	-	-	5454
23.	Tripura	-	1	-	-	2	16
24.	Uttar Pradesh	7	19	298	3	7	2723
25.	West Bengal	-	3	-	-	8	1343
	UTs (Total)	-	-	-	-	-	-
	All India (Total)	27	99	1164	16	126	37032

Annex Table 4.1 : (Cont'd) Number of State Farms and Other Infrastructures - 1991-92 State-wise.

Sl. No.	States/UTs	Gaushalas	Rinder pest Check Post	Slaughter Houses	Carcass Utilization Centers	Liquid Nitrogen Plant	Milk Processing factories	Liquid Milk plant
1.	Andhra Pradesh	-	-	382	--	-	-	-
2.	Arunachal Pradesh	-	2	-	-	1	-	-
3.	Assam	5	6	5	-	6	-	-
4.	Bihar	13	47	-	-	5	1	-
5.	Goa	-	1	-	-	5	1	-
6.	Gujarat	53	8	38	-	-	3	3
7.	Haryana	57	11	42	-	6	3	14
8.	Himachal Pradesh	2	4	37	-	9	-	6
9.	Jammu & Kashmir	-	-	33	-	7	-	3
10.	Karnataka	1	5	860	-	-	-	-
11.	Kerala	-	-	715	-	-	5	9
12.	Madhya Pradesh	7	21	139	-	10	-	-
13.	Maharashtra	-	13	387	1	12	-	-
14.	Manipur	-	10	-	-	1	-	-
15.	Meghalaya	-	3	-	-	1	1	6
16.	Mizoram	-	4	-	-	1	-	-
17.	Nagaland	-	13	7	-	1	-	1
18.	Orissa	1	12	52	-	8	3	33
19.	Punjab	57	5	91	-	7	-	-
20.	Rajasthan	350	9	195	-	5	-	-
21.	Sikkim	1	5	21	-	2	-	1
22.	Tamil Nadu	-	10	183	-	8	3	7
23.	Tripura	-	15	397	3	19	-	-
24.	Uttar Pradesh	10	-	11	-	1	-	-
25.	West Bengal	-	-	4	-	1	-	1
	UTs (Total)	13	-	-	-	-	-	-
	All India Total	544	124	3643	4	106	23	87

Source: Ministry of Agriculture, India, 1993, *Report of the Technical Committee of Direction for Improvement of Animal Husbandry and Dairying Statistics.*

Annex Table 4.2: Major Wool Markets in India.

State	No. of Markets	Location
Andhra Pradesh	1	Adoni
Bihar	4	Chaibasa, Daudnagar, Dehri on gone, Obra
Gujarat	7	Anjar, Deesa, Gadra, Humatnagar, Jamnagar, Mahuva, Rajkot
Himachal Pradesh	1	Rampur
J & K	4	Srinagar, Anantnag, Leh, Sopian
Tamil Nadu	10	Ambur, Coimbatore, Dindigal, Erode, Madras Parambalur, Salem Theni, Vaniambadi, Wallajah
Maharashtra	2	Bombay, Sholapur
Karnataka	5	Bangalore, Bijapur, Hubli, Kolar, Raichur
Punjab and Haryana	6	Abohar, Amritsar, Fazilka, Gudarbah, Panipat
Rajasthan	10	Beawar, Bikaner, Barmer, Bhilwara, Jaipur, Jaisalmer Jodhpur, Kekri, Osian, Pali
Uttar Pradesh	8	Bagheshwar, Bhadohi, Gauchar, Jaulibi, Kalpi, Orai, Mizapur
Delhi	1	Delhi
Total	61	

Source: Alpha Agritech Consultants, Ltd, 1994, "Small Ruminant Development," Consultant's report prepared for the World Bank.

Annex Table 4.3: Total Volume and Estimated Value of Food Aid to NDDB, 1971-1992.

Year	Skim Milk Powder			Whole Milk Powder			Butter Oil			Butter		
	Vol 000 mt	Price/mt	Value \$000	Vol 000 mt	Price/mt	Value \$000	Vol 000 mt	Price/mt	Value \$000	Vol 000 mt	Price/mt	Value \$000
1971	6.28	595	3734	0		0	2.29	na		0		
1972	9.98	610	6090	0		0	2.45	na		0		
1973	11.98	692	8290	0		0	3.71	na		0		
1974	9.05	965	8730	0		0	4.28	na		0		
1975	10.56	1243	13125	0		0	3.21	na		0		
1976	26.86	1102	29597	0		0	7.17	na		0		
1977	17.63	1464	25814	0		0	1.78	na		0		
1978	7.82	708	5534	0		0	4.68	na		0		
1979	22.40	386	8654	0		0	6.04	na		0		
1980	31.15	975	30367	0		0	12.29	1875	23046	1	1525	1955
1981	18.81	1035	19470	0		0	9.37	2400	22495	1	2125	1806
1982	77.44	938	72600	0		0	14.04	2353	33017	4	2146	8514
1983	37.57	745	27992	0		0	9.33	1975	18429	3	1771	6123
1984	7.70	663	5098	0		0	0.60	1580	946	1	1360	816
1985	48.97	666	32626	0		0	15.86	1283	20339	6	1013	6501
1986		738	0	9.52	930.00	8849.88	2.81	1200	3376	3	1000	3492
1987		840	0	5.86	962.50	5639.29	0.34	1200	413	1	1000	800
1988	22.00	1588	34925	0		0	3.03	1481	4491	6	1250	7574
1989	17.99	1750	31483	0		0	1.66	2013	3331	7	1775	12982
1990	14.99	1425	21362	0		0	0.00	1625	0	0	1375	0
1991	0.00	1425	0	0		0	1.00	1669	1669	0	1413	0
1992	11.99	1681	20165	0		0	0.00	1644	0	0	1363	0
Total	411.17		315924	15.38		14489.17	110.94		131551.46	34		50564

Source: Volume of food aid are from NDDB. Commodity prices are from FAO (1971-79) and GATT, "The World Market for Dairy Products, International Dairy Arrangement," various issues. GDP deflators (1990=100) are from the IMF, International Financial Statistics Yearbook, various issues.

Annex Table 4.4: Wholesale Prices of Selected Livestock and Poultry Products and Feed Ingredient Prices, 1980-1993.

Year	Eggs Rs/000pc	Broilers Rs/mt a	Beef Rs/mt	Mutton Rs/mt	Milk Rs/000li	Bal. Cattle Feed Rs/mt	Maize Rs/mt	Grndnut Oilcake Rs/mt	Rice Bran Rs/mt
1980	370	10500	6500	15080	3230	1020	1520.1	1390	400
1985	493	14000	6790	25080	5000	1280	1648.5	2170	460
1986	na	na	7000	28020	5240	1300	2087	2420	550
1987	na	na	7750	29970	5860	1390	2219.5	3100	590
1988	na	na	10000	32400	6650	1610	2582.5	2920	620
1989	na	na	10000	34780	7200	1840	2509.4	2590	640
1990	624	18500	11160	38665	7305	1970	2332.5	3390	760
1991	745	21700	14000	45330	8090	na	2943	3722	880
1992	855	23730	15000	50700	9325	na	4600	4162	1280
1993	921	25310	na	na	na	na	3639	na	na

Note: Beef prices are for Bombay; mutton prices are averages of Bombay and Calcutta markets, milk prices are averages of Bombay, Madras, Kanpur, Calcutta and Delhi; maize prices are all India; ground nut oilcake prices are averages of Andhra Pradesh, Gujarat, Karnataka, Tamil Nadu, Madhya Pradesh, Rajasthan, and Uttar Pradesh; rice bran prices are for Madras.

Source: Egg and broiler prices are from the *India Poultry Yearbook 1994*, Beef, mutton, milk, feed ingredient prices from 1980-90 are from the Ministry of Agriculture, 1993, *Agricultural Prices in India 1988-90 & 1990-1992* Maize prices are from A. Gulati and G. Pursell, "Trade Policy Incentives and Resource Allocation in Indian Agriculture," forthcoming. Cattle feed prices are from R.P. Aneja, 1993, "Pricing Policies and Marketing of Milk," in *Dairy India 1992*.

Annex Table 4.5: Real Wholesale Prices of Selected Livestock Products, 1980-92.

Year	Real Wholesale Prices (1990-100)		
	Beef Rs/mt	Mutton Rs/mt	Milk Rs/000li
1985	9771	36090	7195
1986	9557	38255	7154
1987	9957	38506	7529
1988	11834	38342	7870
1989	10902	37915	7849
1990	11160	38665	7305
1991	12337	39945	7129
1992	11899	40219	7397

Source: Price data are from Annex Table 4.4. WPI deflators are from the IMF, *International Financial Yearbook*, various issues.

Annex Table 4.6: Wholesale Prices of Poultry Feed, 1980-1993, Rs per mt

Year	Broiler Mash	Layer Mash	Layers Rs/chick	Broilers Rs/chick	Maize	Grndnut Extract (45%)	Rice Bran	Toasted Soybean Meal (50%)
1980	2227	1747	4.25	3.25	1320			
1985	2730	2322	5.25	4.40	1649			
1990	3893	2946	8.50	7.25	2333	2868	1360	3020
1991	4458	3118	10.40	8.50	2943	3041	1557	3020
1992	5367	4189	11.50	9.50	4600	3768	2077	2650
1993	5183	3961	12.65	9.50	3639	4270	1615	6300

Note: Feed ingredient prices are for Bombay only

Source: Mash prices are from the *Indian Poultry Industry Yearbook 1994*. Maize prices are from A. Gulati and G. Pursell, "Trade Policy Incentives and Resource Allocation in Indian Agriculture," forthcoming. Other feed ingredient prices are from the Directorate of Economics Statistics, *Agricultural Prices in India*, various issues

Annex Table 5.1: Value of Agricultural and Livestock Trade, \$million, 1987-92.

Item	1987	1988	1989	1990	1991	1992
Total Trade						
Exports	12069	13960	16609	18215	18057	19563
Imports	17128	20330	21247	24188	19619	23580
Net Exports	-5059	-6370	-4638	-5973	-1562	-4017
Agricultural Products						
Exports	2335	2179	2655	3078	3048	3199
Imports	1690	1933	1275	1085	811	1676
Net Exports	645	246	1380	1993	2237	1523
Food and Animals						
Exports	1857	1769	2100	2017	2380	2303
Imports	673	1052	688	577	427	1090
Net Exports	1184	717	1412	1440	1953	1213
Live Animals						
Exports	13.20	11.20	10.90	10.30	10.40	10.90
Imports	8.00	7.40	7.20	2.90	3.20	3.40
Net Exports	5.20	3.80	3.70	7.40	7.20	7.50
Meat+Meat Prep						
Exports	68.90	65.30	71.90	78.70	103.80	113.00
Imports	0.08	0.03	0.40		0.01	
Net Exports	68.82	65.27	71.50	78.70	103.79	113.00
Dairy Prod & Eggs						
Exports	3.10	2.20	2.60	2.50	9.10	7.60
Imports	116.10	76.60	58.50	2.10	11.70	62.90
Net Exports	-113.00	-74.40	-55.90	0.40	-2.60	-55.30
Hides & Skins						
Exports	0.03	0.03	0.03	0.30	0.70	0.70
Imports	4.90	20.60	20.60	36.90	20.80	20.80
Net Exports	-4.87	-20.57	-20.57	-36.60	-20.10	-20.10
Leather Products						
Exports	960.35	1155.40	1251.10	1459.00	1413.60	1424.70
Woolen Products						
Exports	62.49	61.60	84.50	99.70	84.90	na
Imports ¹	78.00	100.00	86.60	71.10	53.30	103.00

Note: 1 - greasy wool.

Source: *FAO Trade Yearbook*, various issues.

Annex Table 5.2: Imports and Exports of Selected Livestock and Poultry Products, mt & \$000, 1988-92.

Product	Volume mt					Value \$000				
	1988	1989	1990	1991	1992	1988	1989	1990	1991	1992
Total Meat										
Imports	10	170	170			2	40	33		
Exports	5788	7392	72360	91700	103690	64700	76600	77810	103000	112860
Buffalo Meat										
Imports				1					8	
Exports	51205	65700	63361	81459	94000	50349	59300	59709	84861	95000
Poultry Meat										
Imports	1	70				8	120			
Exports	9	250		125	160	9	700		206	80
Sheep/Goat Meat										
Imports	6	100				12	280			
Exports	6146	7474	8327	7622	7000	13791	16000	17503	15377	15200
Canned Meat										
Imports	2					8				
Exports	3		177	191	60	8		456	493	150
Edible Offals										
Imports										
Exports	522	500	621	2497	2500	544	600	547	2553	2550
Milk All										
Imports						5339?	52355	2048	3592	52352
Exports						704	1210	568	4022	3091
Milk (fresh)										
Imports	119	0	0	259	0	101			25	
Exports	0	0	0	0	0					
Milk (dry)										
Imports	33709	27000	579	824	25000	53088	52000	1317	1501	50000
Exports	193	600	314	2265	1500	549	1100	499	3935	3000
Milk Cond&Evap										
Imports			480	895	1000			731	1714	2000
Exports			24	30	30			51	66	70
Eggs (in shell)										
Imports	0	0	0	0	0					
Exports	530	500	1524	5794	5000	411	400	1524	5794	5000
Butter										
Imports	8901	2000	14	3192	4200	22972	5400	36	8038	10500
Exports	313	325	249	340	300	961	970	767	1012	1000
Cheese ad Curd										
Imports	63	250	3	7		217	750	24	56	
Exports	183	200	12	2		105	140	34	8	

Source: *FAO Trade Yearbook*, various issues

Annex Table 5.3: Exports of Leather and Leather Products, Rs million, 1985-1992.

	1985	1986	1987	1988	1989	1990	1991	1992
	(Rs in million)							
Semi-finished leather	491	525	726	450	211	123	Nil	-
Finished leather	2882	4009	4860	6499	6935	7899	7262	8181
Footwear	330	804	1280	1302	1714	2804	4561	5232
Footwear components	1903	2407	3238	4256	5182	5730	7024	6576
Leather garments	167	623	1057	1662	3329	5548	7805	9700
Leather goods	852	940	1287	1915	2929	3434	5495	7236
Total	6625	9308	12448	16084	20300	25538	32147	36925

Source: C.L.R.I., 1994. *Indian Leather 2010*.

Annex Table 5.4: Export Earnings from Different Woolen Products, Rs million.

Sl. No. Product	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
1. Woolen/worsted fabrics	70.00	65.00	47.50	51.00	62.50	140.00	100.0
2. Woolen knitwear	460.00	597.50	565.00	687.50	789.00	960.00	980.00
3. Woolen blankets, traveling rugs and blanketing cloth	75.00	40.00	14.00	21.00	37.00	37.50	47.50
4. Shawls, scarves, mufflers and rumals	140.00	45.00	50.00	49.00	74.00	80.00	225.00
5. Machine-made carpets	25.00	27.50	10.00	10.00	15.00	10.00	01.00
6. Woolen handloom textiles	-	-	-	-	267.50	380.00	392.30
7. Others	40.00	42.50	20.00	35.00	135.50	137.50	157.50
Total	810.00	811.50	766.50	857.10	1370.50	1745.00	1913.20

Source: Wool Development Board, Jodhpur.

Annex Table 5.5. Comparative Structure of Import Tariffs for Livestock and Livestock Products in India, EEC, U.S., and New Zealand, 1994.

Item	Tariff Rate			
	India	EEC	U.S.	New Zealand
I. Live animals				
Poultry	20%	\$6.2/100 kg	\$2- \$4.4/100 kg.	Free
Cows, heifers, bulls, goats, sheep, swine, and pureline poultry stock	10-50%%		\$1.50/head for goats; free for bovine and swine	Free
II. Meat and Edible Meat Offal				
Fresh, chilled, or frozen meat of bovine animals, swine, sheep, and goats	10 %	20% plus \$196-337/100 kg. for bovine; \$53-99/100 kg. for swine	\$4.4/100 kg for bovine; free for swine	Free for bovine meat; 12-15% for swine; free for sheep and goat meat
Fresh, chilled, or frozen edible offal of bovine animals, swine, sheep, and goats	10 %		Free to \$3.3 per 100 kg	Free
Fresh, chilled, or frozen meat and edible offal of poultry	10 %	\$24-111/100 kg.(does not incl. duck liver)	\$11-\$22/100 kg.	12.5-17.5%
III. Dairy Products and Eggs				
Milk and cream	40%		\$0.4/100 li.	7.5-8.5%
Buttermilk, curdled milk and cream, yogurt, kephir and other fermented or acidified milk and cream	40 %		\$0.4/100 li. buttermilk; \$3.2/100 li. sourcream; 20% for yogurt	7.5-16%
Whey	40 %	\$169/100 kg.	10%	7.5-15%
Butter and other fats and oil derived from milk	45 %	\$270/100 kg.	\$12/100 kg.	Free
Cheese and curd	40 %	\$178-437/100 kg.	6-20%	Free
Birds' eggs, in shell, fresh, preserved or cooked	40 %	\$4.01-34.3/100 kg.	\$0.035/dozen	Free
Birds' eggs, not in shell, and egg yolks	40 %	\$40-161/100 kg.	\$12-59/100 kg.	Free
Dried milk powder	10-40%%	\$134/100 kg.		7.5-15%

Sources: Kohli, D.N., P. Avasthi, and K.K. Bassi.(no year) *1994-1995 Customs Tariff.*; Derringer, Inc. 1994. U.S. Custom House Guide. North American Publishing Co.; International Customs Tariff Bureau. 1993. International Customs Journal: *EEC*; International Customs Bureau. 1991. International Customs Journal: *New Zealand*.

Annex Table 5.6: Financial Assistance under APEDA.

Activity	Nature of Assistance
Market Information and Project Preparation (i) Assistance to growers and exporters for feasibility studies, market surveys, etc. (ii) Development of database, market intelligence by APEDA	Up to 50% of the cost of the study subject to a ceiling of Rs 200,000 per beneficiary APEDA sponsored program
Infrastructural Development (i) Assistance for purchase of specialized transport units for meat (ii) Assistance to exporters/producers, growers/cooperative organizations and federations for establishing pre-cooling facilities (iii) Setting up of mechanized post harvest handling facilities and sheds for grading, sorting, quality control and packaging (iv) Establishing cold stores at ports/sea ports for export purposes	Up to 25% of the capital cost, subject to a ceiling of Rs 150,000 per beneficiary Up to 50% of the capital cost subject to a ceiling of Rs 500,000 per beneficiary - same as above - - same as above -
Export Promotion and Market Development (i) Supply of product samples for the purpose of test marketing, product information, and promotion (ii) Publicity and promotion through preparation of product literature, publicity material, films, etc (iii) Brand publicity through advertisements (iv) Product/market promotion by APEDA	Cost of samples or freight or both to be decided on case to case basis, ceiling of Rs 50,000 per exporter Up to 40% of the total project cost subject to a ceiling of Rs 100,000 per beneficiary Up to 40% of the cost subject to a ceiling of Rs 50,000 per beneficiary APEDA sponsored program
Packaging Development (i) Program for development of packaging standards and design (ii) Assistance to exporters for packaging development	APEDA sponsored program Up to 60% of the cost of packaging development subject to a ceiling of Rs 100,000 per beneficiary
Quality Promotion (i) Assistance to exporters, producer trade associations, public institutions, etc. for setting up/strengthening quality control activities and laboratories (ii) Assistance to exporters and producers for specialized consultancy services towards installing ISO 9000 or other recognized international quality control systems and developing quality control manuals	Up to 50% of the cost, subject to a ceiling of Rs 500,000 per beneficiary Up to 50% of the cost subject to a ceiling of Rs 200,000 per beneficiary
Meat Plant Upgrading (i) upgrading of public sector slaughter houses/processing plants engaged in export production to meet international specifications	Up to 50% of the modernization costs.
Human Resource Development (i) Assistance to growers and manufacturers-exporters for upgrading technical skills of supervisory, technical, and managerial personnel through training in India (ii) Assistance to recognized association of growers/exporters for information dissemination	Up to 50% of the cost of the approved training program Up to 50% of the cost of publication for the purpose of dissemination of information, subject to a ceiling of Rs 10,000 per organization.
Research and Development Assistance to research institutions for research and development to enhance exports	APEDA sponsored program

Source: APEDA, 1994.

Annex Table 6.1: Domestic Production of Poultry Biologicals in India.

Type	Prodn (million doses)	
	Public	Private
Ranikhet Disease (F1 strain)	57.5	50.4
Ranikhet Disease (R2B strain)	76.3	92.6
Ranikhet Disease (Lasota strain)		289.8
Fowl Pox	52.2	
Pigeon Fox	0.7	
Marek's Disease		179
Fowl Cholera	0.0002	3.3
Fowl Spirochaetosis	0.1	0.06
Infectious Bronchitis		63
Infectious Bursal Disease (live)		83.5
Infectious Bursal Disease (killed)		3.3
Infectious Bronchitis		63
IBD + RD		5.9
Coryza		x
Salmonella pullorum (plain antigen)	x	x
Salmonella pullorum (colored antigen)	x	x
Avain tuberculin	x	
PPL0 antigen	x	

Note: x - produced but no figures available

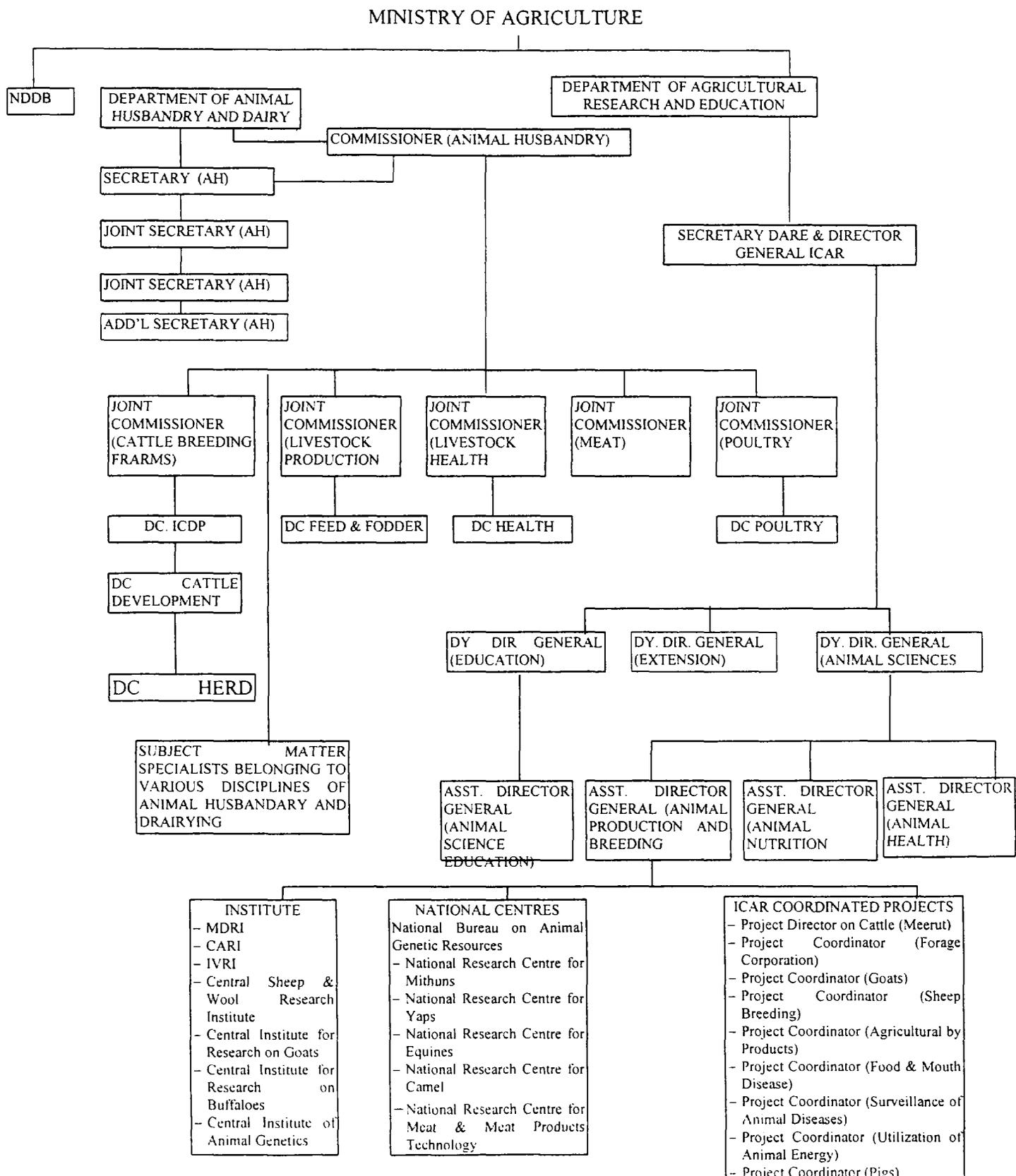
Source: Alpha Agritech Consultants (Pvt) Ltd (India), 1994, "Poultry Development," Consultants report.

Annex Table 6.2 : Central and Centrally Sponsored Schemes for the Livestock Sector, 1991-1994, Rs million.

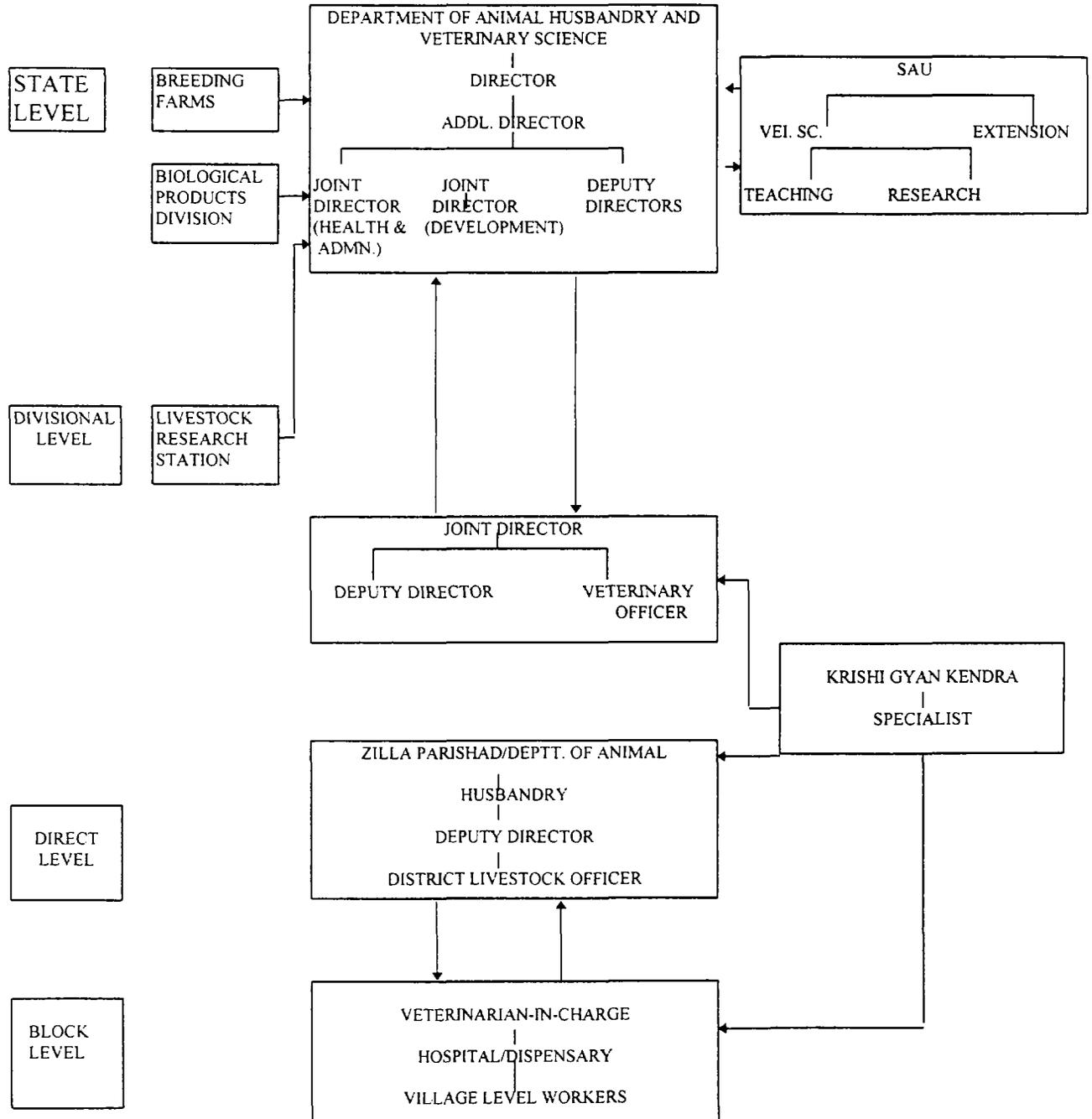
Program	1991-92		1992-93		1993-94
	Budget	Expenditure	Budget	Expenditure	Budget
I. Central Program					
Cattle Devt Orgn	27.5	25.2	39.5	39.4	43.0
Poultry Devt Orgn	27.0	16.5	20.0	20.9	21.0
Nat'l Poultry Devt Board	1.0		2.0	2.0	40.0
Sheep Devt Orgn	13.5	11.1	16.5	16.0	17.0
Feed & Fodder Devt Orgn	18.0	13.8	22.5	23.0	28.0
Directorate of An. Health Services	21.0	2.1	13.0	10.3	20.0
Strengthening of An. Husbandry Div	0.5	0.5	5.0	1.5	5.5
An. System Project, incl. Central Coordinating Agency for Meat Prodn			1.5	1.0	12.0
An. System Project, incl. Central Coordinating Agency for Meat Prodn			1.0	1.5	5.0
An. Husbandry Extension			5.0	5.0	16.0
Subtotal	108.5	69.2	126.0	120.6	207.5
II. Centrally Sponsored Schemes					
Frozen Semen Technology & Progeny Testing Program	31.0	37.0	37.0	37.0	37.0
Feed & Fodder Devt Assistance for States	7.0	6.6	25.0	34.0	63.5
Rinderpest Eradication	140.0	82.8	200.0	203.0	244.0
Animal Disease Control Assistance for States	46.0	26.3	60.0	60.0	84.0
Professional Efficiency Devt	3.0	3.7	7.5	7.5	10.0
Abattoir Improvement and Establishment of Carcass Utilization Centers for States	17.0	20.0	75.0	16.0	65.0
Integrated Sample Survey for States	14.0	11.3	14.0	14.0	16.5
Nat'l Bull Production Program	12.5	7.4	20.0	20.0	37.5
Nat'l Ram/Buck/Rabbit Prodn Program	22.0	13.0	7.5	7.0	14.5
Pack Animal Devt	1.0	1.5	1.0	1.0	4.5
Integrated Piggery Devt Assistance for States	2.0	3.5	4.0	6.5	25.0
Subtotal	295.5	213.1	451.0	406.0	601.5
III. Schemes Dropped/Transferred					
Backyard Poultry Prodn for Women	4.5	0.8	-	-	-
Pilot Small/Medium Size Abattoir Survey and Feasibility Reports	3.0		-	-	-
Assistance for State Level Poultry Corporations/Federation	9.5	9.5	-	-	-
Special Livestock Breeding Program	177.2	138.9	-	-	-
Subtotal	194.2	149.2	-	-	-
IV. Secretariat	2.1	0.5	3.0	3.5	5.0
V. TOTAL	600.3	432.0	580.0	530.1	814.0

Source: Ministry of Agriculture, 1994, *Department of Animal Husbandry and Dairying, Annual Plan 1993-94*.

**ANNEX FIGURE 1: ORGANIZATIONAL STRUCTURE OF THE CENTRAL GOVERNMENT (GOI)
MAJOR AGENCIES DEALING WITH THE LIVESTOCK SECTOR**



ANNEX FIGURE 2: REPRESENTATIVE STATE LEVEL ORGANIZATIONAL STRUCTURE OF AGENCIES DEALING WITH LIVESTOCK ISSUES



IMAGING

Report No: 14522 IN
Type: SR