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ECONOMIC CONSIDERATIONS FOR SMALLHOLDER CATTLE MILK AND MEAT
PRODUCTION AND MARKETING: I. ECONOMIC POLICIES,
SUPPORTING INSTITUTIONS, MARKETING AND DEMAND

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Introduction

1. African livestock producers have been relatively successful with their traditional systems of low-input, low-output per head. Despite low per animal productivity, return to investments in livestock is not low in most traditional African livestock systems. Animals are held because they usually provide high and secure economic return relative to other investment options. Depending on the species, returns are realised in the form of milk, draught power, meat, dung for fuel and manure, hides and skins, and wool and hair. Livestock are often the most important and secure form of investment and savings available. Livestock do not necessarily require land ownership and as investments or savings, livestock provide security and can be drawn on for food purchases, family emergencies, school fees, ceremonies, and social events.
2. However, output of meat and milk in sub-Saharan Africa is low and growth has been disappointing, lagging behind population growth rates. As a consequence, the trend in per caput output of livestock products has been negative (Anteneh, 1984a; Anteneh et al 1988).
3. Livestock production can be increased by increasing numbers or by increasing output per animal. Increased productivity per animal usually involves increasing one or more inputs. Much is known about ways of increasing output per animal. However, in Africa, more often than not, it is found that the cost of increased inputs exceeds the value of the increased output per animal. Moreover, low input systems are usually low risk systems relative to high input systems especially where purchased feed or exotic animals are involved. Risk can pose a major constraint for low income, near subsistence producers who can ill afford to jeopardize their subsistence.

4. Finding technologies appropriate to African conditions will require more investment in adaptive research focusing on economical ways of increasing livestock output. Perhaps equally as important is the development of a more favourable economic environment to make some of the currently available technologies viable. This may require policy changes, and investments in facilitative institutions and marketing systems to provide the services necessary to support technological change.
5. ILCA (1987) has classified the main constraints to increased livestock production in two broad categories. The first is socio-economic and institutional which involves government policies on exchange rates, commodity prices, imports, land tenure, manpower (e.g. for extension and animal health services), and marketing infrastructure. The second category is technical which involves feed and nutrition, genetics, health and disease, and other constraints, including such things as water shortage, toxicity, and poor management. These technical constraints also involve economic considerations.
6. ILCA's economics program in the Cattle Milk and Meat Thrust (CMMT) focuses on both broad constraint categories and includes the following breakdown of major activities:
 - i. Identifying constraints to and opportunities for improved meat and milk production; specifically to examine commodity price policies, the supply of inputs and marketing systems.
 - ii. Investigating marketing strategies, quantifying present and future demand for milk and meat products, and analyzing credit policies for smallholder cattle producers.
 - iii. Assessing new technologies from an economic viewpoint. This will enable us to determine how much productivity

needs to be increased, or what risks need to be reduced, to insure adoption. We will also need to determine the benefits of new technologies in terms of output, income stability and welfare and to whom such benefits accrue.

7. These considerations are addressed in two parts. Part I, which this network paper contains, discusses the considerations relating to economic policy, supporting institutions, and marketing and consumer demand. Economic considerations in production will be the subject of Part II and will be produced in a subsequent set of the ALPAN series.

ECONOMIC POLICIES AND SUPPORTING INSTITUTIONS

Economic policies

8. The success of any livestock development scheme depends in part on the broader development objectives pursued by a country and the corresponding government policies used to secure those objectives. Broad policy objectives of governments often include economic efficiency, economic growth, equity, food security, stabilization and inflation control, revenue generation and sustainability. Each of these objectives can be pursued through a variety of policy instruments including taxes, subsidies, tariffs and price controls. While some of these objectives and policy instruments are mutually reinforcing, in a number of cases they can conflict with each other. For example, the equity objective is often framed in the context of providing food (including milk and meat) at prices the poor can afford. If done by means of consumer subsidies, it may mean favouring the urban sector (rich and poor) at the expense of the rural population. On the other hand, if the supply of cheap food is achieved by paying food producers low prices, this may discourage domestic production which conflicts with the efficiency and other

objectives.

9. Thus, a key consideration in any livestock development scheme is to understand the underlying development objectives and the policy environment within which the scheme will operate. Taking dairy development as an example, it may simply be that economic conditions, together with technology and infrastructure, have developed to the point that inherently stimulates a vigorous response in the dairy sector. Or it may be that dairy development is being driven by food security or self-sufficiency goals. Dairy development schemes that are driven by either food security or self-sufficiency goals will have different self-imposed strictures on the extent of dairy sector development with varying implications for producers and consumers.

10. A strict self-sufficiency goal implies that all dairy consumption must be supplied by domestic production. The opportunity cost of this option (i.e. the benefits foregone by not using the resources applied in dairy production in the best alternative) may be quite high and efficient economic growth may become jeopardized, particularly if the country does not have a comparative advantage in dairy production. On the other hand, a balanced food security goal based on careful analyses of trends in international trade and a country's comparative advantage may call for dairy imports to supplement domestic supplies. The implication then is that the trade-offs among objectives need to be recognized and carefully weighed in order to strike an appropriate balance among goals. At the same time, it will be necessary to consider how the livestock sub-sector fits in with the rest of agriculture and how consistent the natural and economic conditions are with an expanded livestock sub-sector. Such careful analysis will permit the identification of new policies that need to be instituted to promote livestock development as well as the removal of those policies hampering

development. At this point, it is worthwhile to use an example from the West African region to examine how the economic policies pursued by governments have influenced the development of the livestock sub-sector.

11. Again, taking dairy production as an example, various studies (Mbogoh, 1984; Nwoko, 1986; von Massow, 1989) have shown that in West Africa, government objectives with respect to the dairy sector have frequently been pursued through the use of direct measures including consumer price controls, import tariffs, import licences, foreign exchange allocations and physical quotas on imports. Exchange rate policies while not directly targeted at the dairy sector, have also been cited as influencing dairy development through the impact of over valued currencies on consumption and production of dairy products.
12. A priori, some of these measures (e.g. high import tariffs, physical quotas and import licences) can be expected to lead to high domestic prices which may in turn serve to stimulate domestic dairy production. Conversely, consumer price controls and over-valued exchange rates will tend to encourage imports and discourage domestic production. A related issue here is the surplus dumping of dairy products by producers of Western Europe and North America which has resulted in downward pressures on international prices of milk and other dairy products and availability of these commodities for importation on cheap commercial and/or concessional terms (food aid).
13. The combined effect of domestic and external influences on the dairy sector will differ across countries. For the region as a whole, it appears that the overall impact of domestic economic policies and surplus dumping by developed countries has resulted in an adverse impact on domestic dairy production. On the other hand, in West Africa as a whole

dairy consumption has increased more rapidly than dairy production. While total dairy production grew at about 2% per annum between 1975 and 1985, the corresponding growth rate for dairy consumption was about 5% (Seyoum, 1988). In most countries production per capita has actually declined as production increases have lagged behind population growth. At the same time, consumption per capita has been growing at about 2% per annum. The growing excess demand has been met by imports. Total dairy imports in volume terms grew at an average of 10% per annum between 1975 and 1985. Over this period, imported dairy products in the West African region accounted for 45% of total consumption of liquid milk equivalents. The corresponding figures for individual countries range as high as 90% for Cote d'Ivoire, 85% for Ghana and 81% for Liberia. The imported dairy products were mostly dried milk (48%) and evaporated and condensed milk (44%) from EEC countries (Seyoum, 1988).

14. Ordinarily, it could be argued that given the high income elasticities of demand for dairy products and increases in population and per capita income, the huge imports of dairy products into West Africa should not come as a surprise. However, an analysis of the trends in West African milk consumption and dairy imports found that less than two-thirds of the increases in commercial dairy imports could be explained by increases in population and per capita income (von Massow, 1989). Von Massow (1989) found that economic policy in general, and inappropriate prices and over-valued exchange rates in particular, have stimulated dairy imports into West Africa beyond what was expected from growth in population and per capita income. Over-valued currencies tend to encourage imports and discourage exports. Thus, the production of export commodities are directly discouraged through lower prices and domestic production of imported commodities is inhibited by the downward pressure on their prices from imported goods.

15. Having briefly examined the impact of economic policies on some aspects of livestock development in West Africa, two questions might be posed at this stage:

(i) what should be the main policy objectives of smallholder cattle development schemes?

(ii) what policies are needed to encourage and promote smallholder cattle production in West Africa in order to reverse the present dependence on imports?

16. Regarding the first question, the main aim of smallholder livestock development schemes should be a combination of increased production efficiency and adequate opportunities for sale of meat and dairy products at reasonable prices. Smallholder cattle development schemes should also aim at reducing risk and uncertainty in dairy production and incomes. In the absence of price stabilization policies and effective marketing information, price fluctuations may be large due partly to the perishable nature of livestock products (Pinstrup-Andersen and Slade, 1987). By reducing risk and uncertainty the contribution of livestock products to the incomes of producers will become more stable, thus ensuring the sustained interest of the smallholders.

17. In order to achieve these objectives, however, appropriate policies will be needed. This brings us to the second question. Pricing and marketing policies that will provide adequate incentives to smallholders to produce meat and milk within competitive cost structures are essential. Available evidence from other parts of Africa indicates that the price elasticities of supply for animal products are relatively low. For example, Rodriguez (1987) obtained a short-run supply elasticity of 0.6 for milk in the commercial dairy sector of Zimbabwe. This means that a 10% rise in milk price will induce an increase of 6% in milk output. Thus, given

the existing level of technology, a substantial increase in output in response to rising prices should not be expected. A key point here is the production response which can be expected within the existing technology. The response may be very different, however, if the price rise stimulates adoption of new technology packages, which at the same time reduces cost per kg of output.

Supporting institutions

18. Overall, it is important for governments to implement appropriate pricing and marketing policies as well as provide facilitating institutions and infrastructure to encourage additional investment in livestock production to increase output. Some of the more important facilitating institutions include agricultural extension for providing information, education and training necessary to support technological change; veterinary and animal health services; efficient markets for inputs and outputs; credit institutions; and land tenure institutions.
19. The importance of these supporting institutions is illustrated by two specific examples of dairy development experiments: the first is the zero grazing project in Kenya. The Kenya projects seem to be viable and growing in numbers. The second is the cross-bred dairy cows introduced by ILCA in the Ethiopian highlands, which have not been sustained after ILCA's support was withdrawn at the end of the on-farm test period.
20. The zero-grazing system is a relatively complex system involving high producing dairy cows; appropriate building structures to facilitate feeding, sanitary milking, manure management, calf rearing, and animal health management; and high yielding forage (napier grass) managed for maximum nutritional value and sustained by regularly applying manure

from the stalls as the grass is cut.

21. This system has been introduced in various parts of Kenya including the coastal area where tick and tse-tse burdens are present. The systems are successfully operated by farmers with no previous experience with cattle. The confinement aspect of the system helps reduce the tick-borne disease and trypanosomiasis hazards to manageable levels.
22. The Kenyan zero-grazing system requires a high level of extension input over an extended period of time to teach the broad range of management skills required by the systems whether or not the farmers have previous experience with livestock. A regular supply of concentrate feeds is required as well as a ready market for the milk. Veterinary and breeding services as well as credit are required. Clearly, the zero grazing technology is not a viable technology without the existence of the supporting institutions and markets for inputs and outputs. With this support, however, the system offers great potential for increased dairy output, with significantly reduced inputs per unit of product leading to significantly higher incomes for small farmers.
23. In 1982, ILCA initiated a study to test a technology consisting of the integration of cross-bred dairy cows with improved forage production for farmers in the Ethiopian highlands near Debre Berhan research station (Gryseels et al, 1988). Over a three-year period 40 dairy test farmers (DTF) joined the experiment. The DTF participated in a group training course on forage production, dairy husbandry, animal health, and economics and marketing. The training course was provided by ILCA staff. The DTF adopted the dairy test package at their own risk and expense. Cross-bred cows were provided by ILCA with 50% cash down payment and 50% on credit. Improved cross-bred bulls were available at the ILCA research station. ILCA also provided veterinary services, supplementary wheat

bran, and forage seeds at cost. The farmers themselves decided whether or not to accept ILCA's recommendation and paid cash or used short-term credit for inputs received from ILCA.

24. Results from 1983 to 1985 showed that cash income of the DTF were 120% higher than the control farmers. Farmers indicated satisfaction with the cross-bred cow and improved forage technology indicating higher income, regular cash flow and availability of milk for children as the main advantages. The test was concluded in 1986 and a follow-up survey was undertaken in 1987, 15 months after the end of the test period. The inavailability of continued institutional support after ILCA's withdrawal resulted in farmers facing major problems in sustaining the application of the technology.
25. During the test period ILCA provided a source of concentrates. However, after the test period concentrates proved difficult to obtain and sources were unreliable. A follow-up survey showed that only 11% were using concentrates. Some farmers were located near the Dairy Development Enterprise (DDE) milk collection points. However, the system of milk collection does not always work efficiently and frequent breakdowns occur. Farmers faced severe problems in marketing milk, particularly during fasting periods of which there are 140 days during the year. The absorption capacity in nearby Debre Berhan town is limited and marketing costs are high.
26. Disease problems also emerged as a major constraint after ILCA withdrew its veterinary services in 1985. Veterinary drugs proved difficult to obtain. The availability of appropriate cross-bred bulls also proved to be a major problem.

27. While land tenure was not a constraint mentioned by the DTF, their tenure rights are not secure. Farmers do not own their land. They have use rights but have no guarantee that they will next year have access to the same land they till this year. As a result farmers may be discouraged from investing in land improvements. In general, it is thought that insecurity of tenure may inhibit the adoption of certain technologies. A similar case in point might be the adoption of alley farming technology in West Africa (Francis, 1987). This technology requires a considerable initial investment and its benefits accrue over a long time. In some cases, ownership of trees is separated from land use rights, and often, land use rights are also not secure over a long enough term to recover investment costs in trees. ILCA in collaboration with the University of Wisconsin Land tenure Center is undertaking a study of the role of land and tree tenure in the adoption of technology in the case of alley farming in West Africa.^{1/}

28. It was clear that effective extension and veterinary services as well as effectively functioning markets for inputs (concentrate feeds) and milk were essential in maintaining the cross-bred cow and improved forage technology. The existence of these supporting institutions appear to be a necessary condition for the adoption of the cross-bred cow and forage technology in the Ethiopian case.

^{1/} Issues related to communal tenure on rangeland are not addressed here; for in-depth treatment of some of these issues see Bromley (1989), Bromley and Cernea (1989), Conrad and Clark (1987), de Ridder and Wagenaar (1983), Gordon (1954), Jarvis (1984), Sandford (1982, 1983) Swallow et al. (1987) and Swallow (1990).

29. Further, there is a potential problem when these support systems are created through donor programs which must be donor sustained over a long period of time. Unless these support systems can be taken over by the national institutions, there is a chance that the technology cannot continue, and in reverting to the pre-support system technologies the farmers could be worse off than if they had never adopted the output-increasing technology in the first place. This potential problem needs to be addressed in promoting new, higher-input technologies. Considerations also need to be given to how institutional support systems can be phased in to meet the incremental needs of technological change.
30. Research is needed to indicate the cost and potential benefits to national economies from the establishment of effective supporting institutions which appear necessary for the adoption of output-increasing livestock technologies. Clearly, a holistic approach is needed to the improvement of efficiency of small-scale livestock production, while at the same time putting in place a set of consistent policies to provide adequate incentives and an economic environment that will help promote self-sustaining growth within the sector.

MARKETING AND DEMAND

Salient features of market and demand analysis

31. In reference to agricultural commodities, marketing is the performance of all business activities involved in the flow of goods and services from the point of initial production until they are in the hands of the ultimate consumer (Kohls and Uhl, 1985). Marketing involves the transformation of goods in space, time and form from producers to consumers. We want these processes to be efficient, i.e. the

transformations in space, time, and form should be accomplished at the lowest possible cost consistent with consumer preferences and incomes. Thus, the fundamental issue is economic efficiency in meeting consumer demand. The marketing system must provide information flows from the consumer back through the processing, transportation and storage functions to the producer. The producer responds to price signals producing commodities in relative quantities dictated by prices and costs. The efficient marketing system responds by providing goods and services over time and space and in the form consumers want at the lowest possible cost.

32. The general justification for marketing studies is to determine whether or not the marketing system is functioning efficiently. It is thought that efficiently functioning markets benefit both producers and consumers. Marketing research can range from studies of aggregate demand to those addressing the questions of how items are placed on the grocery store shelf. Such a broad range of issues requires different approaches to research. Kohls and Uhl (1985) present the following main approaches: (1) market functions, (2) market organization (structure, conduct and performance), and (3) participating institutions and organizations.

33. Market functions are classified as:

- a) physical functions of transportation (space utility), storage (time utility), and processing (form utility);
- b) facilitative functions including standardization, financing, risk bearing, and market intelligence (or information); and
- c) exchange functions including buying (assembling) and selling.

34. Market organization is analysed in the following terms:

- a) structure - - number and size of firms, product differentiation, and conditions of entry;
- b) conduct - - firm's price, product and promotional strategies; and
- c) performance - - trends in food prices, stability of prices, margins, profits, trends in marketing costs etc.

35. In analysing the institutions of marketing, the concern is with the nature and character of the various intermediaries and related agencies and the place in the marketing process the intermediaries occupy. These can be classified as follows:

- a) Merchants which comprise retailers and wholesalers;
- b) Agents including brokers and commission agents;
- c) Speculators;
- d) Processors and manufacturers; and
- e) Facilitative organizations such as grain exchanges, livestock auctions, and stockyards.

36. Demand and supply relationships are also of interest in market studies. In demand analysis, the main parameters of interest are the relationships between consumption and product price (price elasticity) and the relationship between consumption and income (income elasticity). The price elasticity of demand measures the percent change in consumption expected from a one percent change in price. Income elasticity measures the expected change in consumption from a one percent change in per caput income. The location of demand, quality of product demanded, the form of the commodities (or product mix, especially for perishables) and accompanying services are also important in connection with

consumption/demand analysis.

37. Both the price and income elasticities are useful in projecting the future levels of demand. Price elasticities are also useful in assessing the probable impact of government policies affecting commodity prices or the probable impact on consumption of increased marketing efficiency. Demand analysis including the patterns of consumption are also useful in product promotion. Consumption patterns can be affected by demographics (e.g. family income, size, age composition, religion, urbanization, ethnicity, education), commodity price levels, availability and prices of substitutes, etc.

Purposes of marketing studies

38. Marketing studies are thus undertaken for various reasons, including the following:

- i. To understand the efficiency of the existing marketing system and of alternative marketing systems. This may help in developing lower cost or more effective marketing which may, through lower marketing margins, result in both higher prices for producers and lower cost for consumers. The higher producer prices may stimulate production, while the lower consumer prices will stimulate demand. This should not be construed to mean that traditional marketing systems are inefficient. As will be mentioned later, many studies have found existing traditional systems to be efficient in the context of the infrastructures of their economy.
- ii. To learn how the marketing system links with the whole production system. This will help in understanding and minimizing marketing constraints to increased agricultural output.

- iii. To learn how government pricing policies will affect consumption and production of certain commodities and estimate the potentials for stimulating or inhibiting output through price policy.

- iv. To study how consumption patterns are affected by demographics, ethnicity, urbanization, etc. This may be especially useful in identifying niches in terms of consumer groups and commodity forms.

Some lessons from past livestock marketing studies

- 39. In the livestock sub-sector, some rather notable mistakes have been made as a result of misdiagnosis of the efficiency of traditional marketing systems. It is fair to say that these diagnoses were not founded on careful research. For example, during the 1960s many observers diagnosed the private livestock marketing systems in Africa to be inefficient and not capable of bringing sufficient capital for needed development of marketing infrastructure and information systems. This led to large donor investments in marketing infrastructure, mainly through statal and parastatal marketing organizations, sometimes to the detriment of the more efficient private agents.

- 40. The performance of the statals and parastatals, with few exceptions^{2/} proved mostly disappointing to disastrous. Ariza-Nino et al (1980) found that ... "Throughout the 1970s the traditional marketing system for livestock and meat in

^{2/} Notable exceptions appear to be the Zimbabwe Cold Storage Commission, the Malawi Cold Storage Company and the Botswana Meat Commission.

West Africa demonstrated remarkable ability to adjust to changing conditions. It should continue to do so in the future. Given the shortcomings of the physical infrastructure, the system operates efficiently. Little evidence of monopoly power or collusion among traders and butchers has been found. High marketing costs and rates of return on capital in cattle trade reflect the high transport costs and taxes involved, and risks and uncertainties encountered. Calls for reorganization of the livestock and meat trade appear unnecessary."

41. Bekure and McDonald (1985) conclude ... "In the past governments in Africa have intervened in various ways in order to regulate and increase the efficiency of the marketing system. These interventions have ranged from the control of livestock and meat prices to the outright purchase and sale of animals and meat. Experience, however, shows that the scope for increasing efficiency lies neither in attempts to regulate and control the market participants, nor in efforts to control prices, nor in the creation of parastatals but rather in facilitating the operations of the market participants and instituting measures which reduce their costs."
42. Most of the agricultural marketing policy and marketing efficiency studies of the 1970s have dealt with livestock and meat marketing. There are virtually no parallel studies of dairy marketing systems. For this reason most of ILCA'S current and planned work in marketing focuses on dairy products.
43. Mbogoh (1984) reviewed some experiences of dairy development and marketing in selected sub-Saharan African countries including Kenya, Ethiopia, Burundi, Zambia and Nigeria. Overall, he found that the pricing problem appeared to be at the core of dairy development and marketing improvement

programs. Marketing and processing development tends to be along lines that involve very high cost operations, and in order to keep consumer prices down, the practice has often been to limit the price paid to producers. In some cases, direct sales of raw milk to consumers have been banned under the ruse of protecting human health. However, few studies demonstrating a significant health problem have been undertaken to support this contention. The undeclared and real objective is to eliminate competition from the more efficient traditional marketing system. Mbogoh (1984) notes that the major goal of development-oriented policies should be to try to achieve improvements in both operational and pricing efficiency of the production and marketing systems.

44. von Massow (1985) studied dairy imports and import policy in Mali and their implications for the dairy sector in the Bamako area. He found that the marketing system then in existence did not provide sufficient services to stimulate domestic production. Local milk production was largely neglected in favour of processing and distributing imported milk products. His results suggest that greater emphasis on market system development was necessary to stimulate local production.

45. Debrah and Anteneh (1987) studied milk sales by intra-urban, peri-urban and rural producers in and around Addis Ababa, Ethiopia. Rural producers were stratified into two sub-samples: one group located near rural fluid milk collection centers (0-3 km) and the other group located far from collection centers (> 3-15 km). They found that small intra- and peri-urban producers sold whole milk directly to nearby households. Approximately 50% of the milk consumed in Addis Ababa was produced by intra-urban producers. Larger producers, mainly located in the peri-urban areas, sold milk to the Dairy Development Enterprise (DDE), a state-owned milk processing plant, at approximately 50 to 60% of the price per

litre which the smallholders received by selling fresh milk directly to consumers.

46. The small-scale producers (with 1 to 3 lactating cows) are able to economically sell their surplus to nearby neighbours. As the number of lactating cows increases, the cost of direct sales to neighbours in terms of labour time increases while the per unit cost of transportation to the dairy plant decreases. Thus, the larger producers in the intra- and peri-urban areas find it economical to sell to the dairy plant while the smaller scale producers find it more economical to bypass the dairy plant and sell directly to consumers. Another factor encouraging sales to DDE is that preferential treatment in the allocation of concentrate feeds is given to those producers who deliver to DDE.
47. Despite the need to import hay from the surrounding countryside at considerable expense, the small scale urban producers are able to compete successfully with peri-urban and rural producers in supplying urban consumers. Their marketing costs are low. They can deliver the milk to a nearby consumer within minutes of milking; total transport costs are minimal; refrigeration and packaging are also saved. Consumers boil the milk (usually even if it has already been pasteurized) so lack of processing by smallholders poses no health problems and eliminates yet another cost of marketing through commercial channels. A major part of the cost of hay is recovered through the sale of dung cakes for fuel.
48. Indeed, the contrast with the costs of marketing through commercial channels is remarkable. The DDE plant receives milk at EB 0.50^{3/} per litre and sells at EB 0.70 per

^{3/} EB = Ethiopian Birr = US\$ 0.48 (1990)

litre. Thus, the marketing margin (which is substantially subsidized) is EB 0.20 per litre or 40% of the price paid to producers. The small-scale producers sell directly to consumers for EB 0.74 to 0.86 per litre.

49. The DDE, however, is playing an important marketing role by serving the larger scale producers and extending a market for fluid milk into the rural areas. The farmers are responding to the marketing opportunity by shifting from butter production to fluid milk. Careful financial monitoring is important to indicate economic efficiency of its operations and pinpoint the possibilities for increasing the operating efficiency.
50. Thus, the parallel formal and informal marketing channels existing for the same product may improve overall efficiency over what could be achieved with only one or the other system. The phenomenon of smallholder dairying in intra- and peri-urban areas is not unique to Addis Ababa, but can be found in many sub-Saharan African cities, especially in the highland and semi-arid zones. The main economic considerations supporting this pattern are: first, small-scale milk production is profitable and competitive; second, transport costs in both collection and distribution are very high and by locating close to the consumers both are minimized; third, milk is highly perishable, so locating close to the consumer eliminates the need for expensive refrigeration, processing and packaging; and fourth, quality control by consumers is easy.
51. While direct sales are economically feasible for urban and peri-urban producers, rural producers often have very limited direct outlets for fresh fluid milk. Preservation and transport to urban markets is expensive and frequently not feasible. Various traditional processed products (e.g. butter, ghee, soured milk, cottage cheese) have long been the

main dairy products of smallholders and pastoralists.

52. Waters-Bayer (1986, 1988) has studied dairy production and marketing of the settled Fulani agro-pastoralists in central Nigeria. While their herds number 50 to 60 head, they are still considered small scale in terms of dairy production. Average daily milk surpluses per household, above requirements for calves, varied from 2 kg in the dry season to 6 kg in the wet season. The women of the household divide the surplus between household use and sales. These producers are typically located in rural rather than urban areas.
53. The Fulani producers in this area have traditionally produced and marketed milk in two main processed forms: a soured milk product called nono, and butter. Women market the nono and butter on a regular but not necessarily daily basis. Another form of marketing involves additional processing by combining the milk with a cereal dumpling (usually of millet, but sometimes of maize or sorghum) or with kuka juice^{4/} (Waters-Bayer, 1988). Prices vary by season per unit liquid milk which is also diluted more in the dry season with kuka juice. Thus the de facto variability in the price of milk is even greater than the variation in the price per unit of liquid milk product sold.
54. Optional marketing through a modern commercial dairy plant is very inefficient by comparison - - "Per litre of raw milk, the closest dairy plant offered less than one quarter of that which women gain as year-round average by processing it as nono and butter" (Waters-Bayer, 1988). The plant did not offer collection service from the rural areas, and made no adjustment in price during the dry season. It is perhaps significant that the main purpose of the dairy plant has been

4/ A mixture of water and kuka, the pith of baobab fruits.

to recombine imported powdered skim milk and butteroil for sale as liquid milk usually at relatively low prices compared to local dairy products.

55. There is a growing demand from rising populations for dairy products. Urban fluid milk markets are attractive for urban and peri-urban producers. Rural producers may mitigate high transport and preservation costs by processing their milk into butter and cheese. Further research into improving small-scale processing and marketing may provide greater benefits to rural producers than promotion and development of large-scale modern dairy processing plants. The justification of each system is based on economic efficiency considerations. In the case of dairy products, space, time and product form aspects of marketing are all critically linked. First, we are dealing with a highly perishable product. Second, production is far removed from consumption centers in many parts of Africa.

56. There is a need to explore and describe the existing marketing infrastructure and the present marketing chains linking production with consumption in each country. Currently, ILCA has dairy consumption surveys underway or recently completed at Bamako in Mali and at Ibadan and Kadunain Nigeria. We plan to initiate another in the Mombasa area in connection with the Kenya coastal dairy research program.

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