

Milk for health and wealth

FAO Diversification booklet 6



Diversification booklet number 6

Milk **for health and wealth**

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Preface

The purpose of the FAO Diversification booklets is to raise awareness and provide decision support information about opportunities at farm and local community level to increase the incomes of small-scale farmers.

Each booklet focuses on a farm or non-farm enterprise that can be integrated into small farms to increase incomes and enhance livelihoods. The enterprises profiled in the FAO Diversification booklets selected are suitable for smallholder farmers in terms of resource requirements, additional costs, exposure to risk and complexity. The products or services generated by the enterprises are suitable for meeting demand on a growing, or already strong, local market and are not dependent on an export market.

The main target audience for these booklets are people and organizations that provide advisory, business and technical support services to resource-poor small-scale farmers and local communities in low- and middle-income countries. It is hoped that enough information is given to help these support service providers to consider new income-generating opportunities and how these might enable small-scale farmers to take action. What are the potential benefits? What are farmer requirements and constraints? What are critical ‘success factors’?

The FAO Diversification booklets are also targeted to policy-makers and programme managers in government and non-governmental organizations. What actions might policy-makers take to create enabling environments for small-scale farmers to diversify into new income-generating activities?

The FAO Diversification booklets are not intended to be technical “how to do it” guidelines. Readers will need to seek more information or technical support, so as to provide farmer advisory and support activities relating to the introduction of new income-generating activities. To assist in this respect,

each booklet identifies additional sources of information, technical support and website addresses.

A CD has been prepared with a full series of FAO Diversification booklets, relevant FAO technical guides, together with complementary guides on market research, financing, business planning, etc. Copies of the CD are available on request from FAO. FAO Diversification booklets can also be downloaded from the FAO Internet site.

If you find this booklet of value, we would like to hear from you. Tell your colleagues and friends about it. FAO would welcome suggestions about possible changes for enhancing our next edition or regarding relevant topics for other booklets. By sharing your views and ideas with us we can provide better services to you.

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Contribution of milk and milk products to sustainable livelihoods

The majority of the world's poor live in rural areas in developing countries. They depend on agriculture production for income and food security. Poor people should not have their income or food security deriving from a single source; they need a number of safety nets or livelihood diversifications.

At low risk and low cost, smallholder dairy production can be an important economic activity. Dairying can reduce poverty and improve livelihoods because of its high returns to land and labour, and its many forward and backward linkages. The trade of milk from rural areas to cities is an excellent tool for transferring capital from richer cities to poorer rural areas. Milk (and meat) has a high nutritional value and has a significant impact on people's nutrition, in particular for those with special requirements such as children and people living with HIV/AIDS. With rapidly growing urban populations and increasing attention being paid to diets, this may provide the best opportunity to date for profitable smallholder dairy development.

Although dairying requires a lot of labour, the demand is evenly distributed over the year and creates income opportunities beyond the farm gate. Dairy development often increases the workload of women, but it is also an opportunity for them to become more actively involved in an economic activity and the process of change. Moreover, women in some parts of the world spend a lot of time selling small quantities of surplus milk in the informal market but, through better organization of milk collection and marketing, they can be released from this work. Furthermore dairying generates a regular income for farming communities and this encourages men and women to participate in milk production activities.

Smallholder dairy development is a powerful tool for actively involving the poor in boosting rural economic growth, initiating a process of change and improving livelihoods. Smallholder dairy development needs strong upstream and downstream linkages to meet its requirements for services, inputs, processing and marketing. Above all, there is a real need for cooperation between many

smallholders. At the farm level, additional skills and knowledge are required to manage dairy animals, be they sheep, goats, camels, buffalo or cattle.

■ *Market potential for smallholder milk production*

Smallholder dairy development has to be driven by market demand. Cities in developing countries are growing rapidly and urban demand for dairy products is high. Predictions for future demand for milk indicate that consumption will more than double over the next 15 years. There is already a growing demand for milk beyond rural production and this represents both a challenge and an opportunity for the development of the dairy sector.

Many countries have seen the dairy peri-urban sector develop very quickly around the largest urban centres, responding to the growth in market demand and benefiting from the closeness to the market and the lack of effective links between rural producers and urban centres. In addition, growing demand for milk is often satisfied partly through imports of cheap dairy products. This can be an expensive option in the long term caused by lost opportunities in economic growth.

Hence there are opportunities for developing domestic milk production, not only for the benefit of rural development, but also the national export/import balance.

Indeed, milk production is already on the increase in many developing countries. The constraints are mainly the poor infrastructure and the weak linkages between rural producers and urban consumers. The infrastructure has to be improved anyway to overcome poverty in rural areas, and the development of smallholder milk production could help to justify and pay for this investment.

■ *Purpose of booklet*

What to do, and how to promote the sustainable development of smallholder dairy for the benefit of the poor is always country specific. This booklet demonstrates that dairy development is a powerful tool for economic growth, where feasible, and highlights the benefits to the whole rural community. Potential difficulties that may be encountered during the dairy development process are also identified and the steps to consider before deciding whether or not to select smallholder dairy production as a diversification opportunity are discussed.

Advantages of smallholder dairy development

■ *Benefits at the household level*

Highly nutritious product available for home consumption

Throughout the developing world, malnutrition affects many children seriously, causing reduced resistance to disease, retarded physical growth, poor learning capacity in school, and reduced physical activity. Milk consumption is very effective in addressing malnutrition as it contains essential micronutrients and is an

important source of protein and minerals. Child nutrition can also be improved by using milk sales income generated to purchase supplements to the diet of home-grown staple foods. It is well documented that the intake of livestock products mitigate the negative impact of HIV/AIDS (see Box 1). Further, the intake of small amounts of animal food improves children's ability to learn and be active in school – further details are in Box 2.

BOX 1 The role of livestock products as a medical treatment strategy in mitigating the impact of HIV/AIDS on poor people

HIV/AIDS is associated with acute micronutrient deficiencies which further compromise the immune system, which means that patients actually have double dietary requirements compared to non-infected people.

HIV/AIDS-infected people need to eat more saturated fats to raise their blood cholesterol level.

Animal-based foods provide a particularly dense combination of critical nutrients.

Red meat provides protein and is also a good source of iron, zinc, and vitamin B-6.

More emphasis should be given to the beneficial uses of livestock food products as important sources of micronutrients in helping to slow the progression of HIV/AIDS, thereby allowing heads of households to support their families for longer (Randolph and Sammons, 2005).

There is a need to make donor agencies, organizations and institutions involved in human nutrition programmes for HIV/AIDS affected families more aware of the contributions that livestock can make to household diets and food security on most smallholder farms in sub-Saharan Africa.

Source: Citation from Simon Mack. 2005. Proceedings from livestock week, Copenhagen.

BOX 2 The impact of milk and meat on the diet

“Observational studies in developing countries have suggested that diet quality, particularly an increase in animal source food consumption, is positively associated with child cognitive development. This study reports the first findings of an experimental study in rural Kenya, designed to test the impact of three different diets on cognitive development of school children. Twelve schools with 555 children were randomized to one of four feeding interventions: meat, milk, energy, or control (no feeding). Feeding continued for seven school terms (21 months) and cognitive tests were administered prior to the commencement of feeding and every other term of feeding. Results suggest that supplementation with animal source food has positive effects on Kenyan children’s cognitive performance. However, these effects are not equivalent across all domains of cognitive functioning, nor do all forms of animal source show the same beneficial effects.”

Source: Global livestock CRSP. 2002. The impact of dietary intervention on the cognitive development of Kenyan children.

“Stunting is widespread in developing countries and is associated with increased morbidity and impaired development. One third of children under the age of five in developing countries are stunted. Adding cow’s milk or milk powder to the diet of stunted children is likely to be an effective and relatively inexpensive way of improving linear growth and thus reducing morbidity and improving development. In some populations, however, the incidence of lactose intolerance is high, which may cause problems if milk and milk products are consumed.”

Source: Hoppe, C, Mølgaard, C & Michaelsen, K. C. 2006. Cow’s milk and linear growth in industrialized and developing countries. Annu. Rev. Nutr. 26:131-73.

Additional income and continuous cash flow

With careful planning of feed production and supply, and of the reproduction/calving pattern, milk production can take place regularly, all year around, and milk may be marketed every day. This creates a continuous flow of cash income for the farm family. This contrasts with many cash crops that are harvested and sold once or twice a year, and the work needed is unevenly distributed over the year. There are of course also many constraints in milk production which are discussed in the initiatives to increase

milk production section of this booklet.

Added value to crop production

Smallholder milk production is an important means of diversification and intensification in a range of (mixed) farming systems. Dairy animals ensure better utilization of resources like labour, land, and farm and industrial by-products, and also add value to crop production through the production of milk. Benefits arise through the marketing of milk, meat, hides and, in some cases, manure. Moreover, there are a number of non-marketed benefits from milk production, such as

the value of manure used on farm, the function of animals as security/saving and a means of financing sudden or periodic expenditures like medication or school fees, as well as their use as draught animals.

Milk production is based on ruminants that consume and digest otherwise more or less worthless farm wastes, like stalks, straw, hulls, vegetable residues and other plant material not useful for human consumption. These resources are often available at no or very low cost. Similarly, the residues from industrial production based on crops can be made available to smallholder dairy

farmers and used as fodder. Examples include molasses from sugar factories, brewers waste from breweries, oilseed cake from the oil plant industry, hulls and other wastes from the cereal and flour factories, pulp from various juice factories and the processing of vegetables.

■ *Source of empowerment through smallholder dairying*

Women's empowerment

In many societies, women are traditionally responsible for milking and feeding dairy animals, as well as marketing milk. Development of the



FIGURE 1 Meeting of smallholder women's group in Sudan
(Photo: © FAO/14588/R. Faidutti)

smallholder dairy sector can make a very positive contribution to the empowerment of rural women and enhance their equal participation and involvement in economic growth. Moreover, women's involvement and management of assets and cash income in the smallholder dairy sector, for example, through membership and leadership of dairy associations, increases their social status and their influence on decisions important for the daily life of rural families.

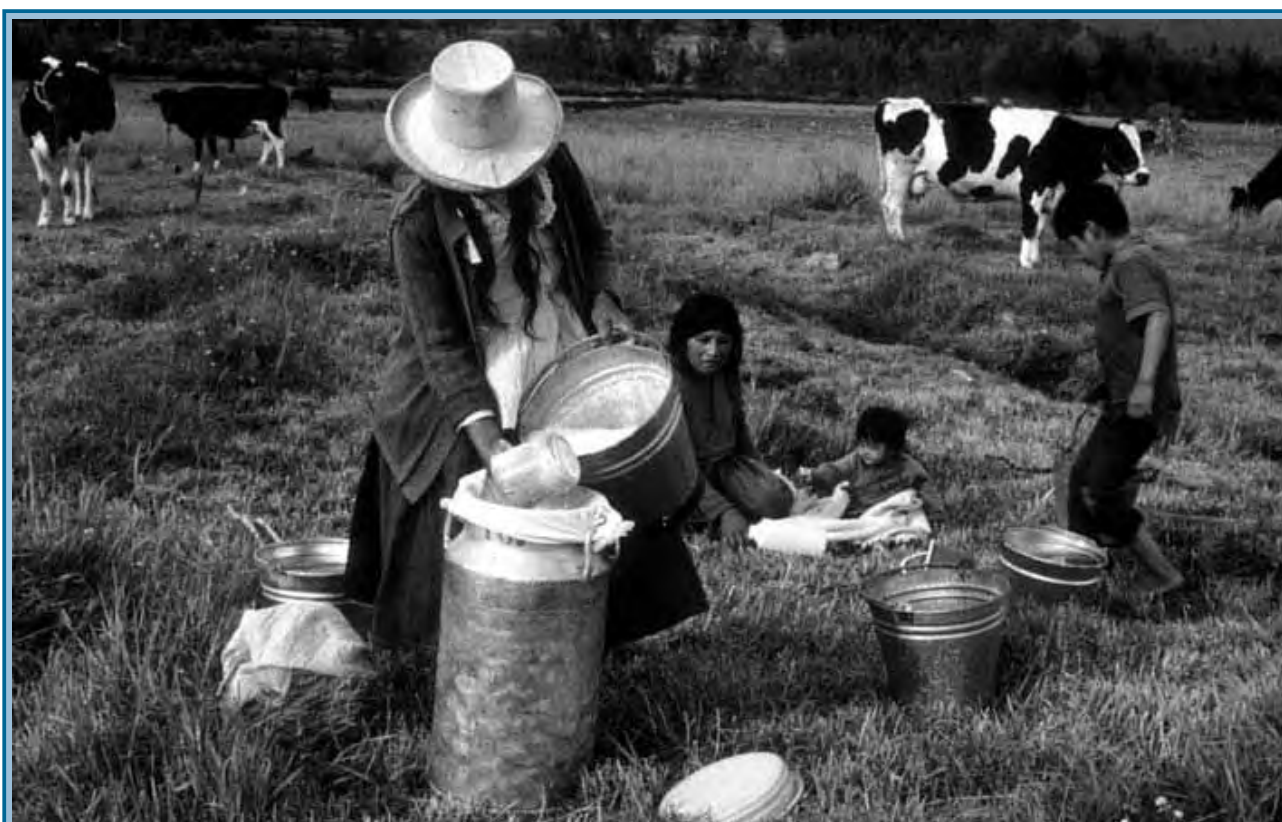
Opportunities for the rural poor

One animal is sufficient initially to participate in milk production

and even landless people can keep animals. However, in the long term, smallholders need several animals in order to develop a profitable dairy enterprise. Cows are often viewed as a form of saving which may be sold if there is an urgent need for a large amount of cash, but there is the risk that they may die or be stolen.

Participation by rural people in democratic and political processes

In many developing countries, participation by rural people in the political process is in serious deficit, partly because of their low level of organization. To realize



*FIGURE 2 A family and their dairy cows with milking equipment in Peru
(Photo: © FAO/17460/A. Odoul)*

the full benefits of smallholder dairying, strong producer-managed organizations need to be established and developed at local and higher levels owed to the small amount of milk produced by each farmer. History has demonstrated that strong producer organizations, based on the production

and marketing of farm produce, also empower the community in other aspects of life. This can help the community in having some influence on policy decisions associated with their daily life. One of the best examples of this is “Operation Flood” in India (see Box 3).

BOX 3 Operation Flood or India’s milk revolution

Over the last 25 years or so, the Indian dairy industry has progressed from a situation of scarcity to one of plenty. Dairy farmers today are better informed about technologies of more efficient milk production and their economics. Even landless and marginal farmers now own highly productive cows and buffaloes in many areas. The application of modern technologies and advanced management systems in milk processing and marketing has brought about a distinct change in the market place. Consumers now have a wide choice of products and packages.

The Operation Flood (OF) programme implemented by the National Dairy Development Board (NDDB) played a key role in bringing about this transformation. The importance of the OF programme lies in its focus on small rural producers. Lucrative alternate employment opportunities are often not available in Indian villages, making dairying an attractive option for many villagers. Low capital intensity, short operating cycle and steady returns make dairying a preferred activity among marginal and small farmers (those with less than two hectares of land) and even landless who depend for fodder on common grazing and forest lands. Over half of the rural households in India are marginal and small farmers. The majority of milk producers have 1–2 milk animals and account for some 70 percent of milk production. On average, milk contributes over one fifth of rural household income.

The Anand Pattern Cooperative structure comprises village level dairy cooperative societies, which promote district level union, which in turn promote state level marketing federation. Starting in 1970, the NDDB replicated the Anand Pattern cooperatives through the OF programme all over India. The Anand Pattern envisaged:

- Decentralized milk production by small milk producers**
- Milk procurement by primary dairy cooperatives of milk producers**
- Centralized milk processing by union of dairy cooperatives**
- Marketing of milk and milk products by the federation of unions**



BOX 3 Operation Flood or India's milk revolution *(continued)*

The primary milk producers democratically govern this entire federal cooperative structure to ensure that the higher tier organizations are geared to serve the purpose of the lower levels and the gains at all levels flow ultimately back to the milk producers in a significant measure. The core feature of the Anand Pattern model is farmer control at the three stages, of procurement, processing and marketing of milk and milk products. The value added at procurement and processing stages can be realized by the cooperatives only through control over marketing, thus making control over marketing an essential and critical feature for success. In contrast, many dairy cooperatives worldwide end up as suppliers of raw material to private companies, and the private companies own the brands and marketing.

In 2003, dairy cooperatives accounted for the major share of processed liquid milk marketed in India. Milk is processed and marketed by 170 milk producers' cooperative unions, which amalgamate into 22 state cooperative milk marketing federations. Over the years, brands created by cooperatives have become synonymous with quality and value.

Source: World Bank. 2004. A case study from reducing poverty, sustaining growth – what works, what doesn't, and why; A global exchange for scaling-up success. A global learning process and conference, Shanghai; May 25-2.

■ ***Stimulus to the development of the rural economy***

Employment opportunities in the rural non-farm economy

Most of the work involved in milk production on the farm is done by family members. It is estimated that smallholder dairy farming generates approximately an additional 50 full time wage employment opportunities per 1 000 litres of milk produced on a daily basis. Dairying also creates other jobs indirectly linked to milk production through supplying inputs and services to farmers. For example, small-scale traders are an important, and often a cost effective, link between producers

and consumers while they generate income for themselves.

Market-oriented development of the dairy sector also creates a market for service providers like blacksmiths, transporters, traders, pharmacies, financial institutions, veterinarians, general stores, and agricultural advisory services. The development of input and supply services generates economic activity and has a positive knock-on effect on rural livelihoods.

Justification for rural investment

Investment in the development of essential infrastructure, such as roads and communications, can be justified partly on the economic benefit derived from the dairy sector and on the

BOX 4 The flow of money from urban to rural areas

Dairies in Kitale and Eldoret, Kenya

In the period between 1975 – 85, DANIDA supported the renovation and expansion of two dairy factories in Kitale and Eldoret, Kenya, with spray-drying and Ultra High Temperature (UHT) equipment, and with milk collection and cooling centres. The increased capacities and the milk collection centres enabled an expansion in collected milk of an extra 200 000 litres per day during this period. With the milk price then at US\$0.30 per litre, this extra collection was equivalent to a flow of cash from urban to rural areas of approximately US\$3 million every week.

Kassela Cooperative around Bamako, Mali

At present, the extensive livestock system with low milk yield (1–2 litres per cow per day) is the main supplier of milk (and meat) in the sub-region. To increase the income of farm families a model was developed for crossbreeding (Zebu and Exotic), improving livestock health services and supplementary feeding which was expected to lead to an increase of milk production (5–12 litres per cow per day).

The model was applied in Kassela cooperative around Bamako and production increased from 220 litres per day (in 2003) to a total of approximately 800 litres per day (in 2005). The improvement generated an added value of Euro 2 660 in one year for the 35 members of the cooperative.

expectations that more benefits will follow from the development of other farming and non-farm businesses.

Strengthen rural-urban linkages

Economic growth in most developing countries takes place in and around the capital and a few major cities. Market-oriented smallholder dairy development enables farming communities to produce surplus milk that can be sold to consumers in urban areas for the benefit of economic growth and the improvement of livelihoods in the rural community. This creates linkages between poorer rural areas and richer urban areas,

and contributes to a more equal distribution of the benefits from economic growth (see Box 4).

Development of local monetary economy

Strengthening local purchasing power is an important stimulus to rural development. When a poor woman is able to sell a few eggs every day, a chicken each month or one litre of milk every day, this could increase her ability to buy things. Such small improvements are exactly what are needed to engage these people in the monetary economy and to demand goods and services. A transformation

like this among thousands of poor people also has a significant influence on local businesses. This can help to break the vicious circle of poverty

and at the same time create wage employment in a growing agro-industry that is needed to supply the bigger cities with food products.

Smallholder dairy production and marketing systems

■ *Smallholder production systems*

Milk produced by smallholders basically comes from one of three production systems.

Peri-urban dairying

These operations are based, at least in part, on purchased fodder and concentrate rations. This is a purely market-oriented system, located in and around bigger cities. The closeness to the market reduces transaction costs,

but the cost of production may be high because of the dependency on purchased fodder and concentrate. Moreover, the system has in-built public health and environmental risks as a result of high animal density within cities; consequently, the promotion of this system should be questioned. Experience has demonstrated that as soon as health and sanitary regulations are enforced to protect human health and the



FIGURE 3 Zero grazing dairy cattle in South Africa

(Photo: © FAO/21647/J. Spaul)

environment, and proper links are created between rural areas and cities, these systems are no longer viable when in competition with land-based rural production systems.

Smallholder dairying

These systems are mainly found in temperate zones, and have been very successful in the highlands of East Africa. Normally, it is a mixed farming system where manure is utilized for cash crop production. The feeding of dairy animals is based on grass, crop residues and cultivated fodder, supplemented with concentrates. Climatic conditions in temperate zones are suitable for improved or even exotic high-yielding breeds. The zero-grazing system is a specialized and intensive system derived from the smallholder system, and is one

where improved technologies have been implemented successfully (see Box 5).

A high population density stimulates the demand for milk and, when infrastructure is reasonably well developed with good linkages to urban areas, farmers often choose to intensify dairy production because of the economic benefits. Milk from this system enters both formal and informal markets, and the balance between the two marketing systems is delicate and full of conflicting interests from various stakeholders.

There is a great potential for improving the smallholder system through increasing productivity, reducing seasonal fluctuations and, most importantly, reducing transaction costs along the chain from farm to consumer. All investments need to

BOX 5 Technologies that have worked: genetic improvement and stall feeding

One of the most successful technologies for dairy development has been the package of genetic improvements in exotic breeds, combined with stall feeding. In hot, tropical environments local breeds perform best. However, in the more temperate areas of Eastern and Southern Africa, smallholder dairy farmers with crosses of exotic dairy breeds and local breeds, kept in a free stall system, have been adopted. In principle, the system is the same as in any other modern dairy farm in the world; only the herd size is different. The zero grazing system has been introduced through various programmes and demonstrations at the farm level, and has been promoted by advisory services. It is an excellent example of the massive impact a new technology can have on smallholder production systems, if the technology is appropriate.

be based on a proper market analysis indicating a significant increase in demand for milk in accessible markets.

Pastoral/agro-pastoral dairying

Milk production is land-based and the basic fodder is produced on farm, rarely supplemented with purchased concentrate. Usually it is a mixed farming system, where dairy animals are an integral enterprise, utilizing grazing land and residues from crop production to supplement farm income and improve family nutrition. Traditionally milk is shared in the local community and any surplus is marketed in villages. Although the cost of milk production is low, productivity is low and the marketing of milk in more remote urban centres is generally costly because of poor infrastructure and the lack of market linkages.

Pastoral and agro-pastoralists are, in many countries, among the poorest and one of their few ways out of poverty is to increase productivity of livestock by producing and selling more milk and meat; alternatively they migrate to the cities. However, the expansion of milk production in this system beyond meeting local demand could appear to be limited. Nevertheless there are excellent

examples from Kenya, India and other places, where a secured outlet for milk, as the only intervention, more than doubles milk production in a relatively short period of time. The main constraints to developing this dairying system are often overcome by reducing transaction costs through improved infrastructure and by means of appropriate technologies such as village processing of fresh milk to less voluminous dairy products with a longer shelf-life like yoghurt, cream or cheese.

■ ***Large-scale producers***

In addition to these typical smallholder milk production systems, a few developing countries have large-scale milk producers. Although they do not normally produce a major share of the total milk production, they can be important suppliers to the major cities and, as a result, may be in competition with smallholder dairy producers. However, they can also create an enabling environment and be the driving force needed for smallholder dairy development. They produce an amount of milk that is sufficiently large and stable to justify investment in a processing unit, which also creates a supply point for smallholders' milk (see Box 6 on page 14).

BOX 6 Private sector initiative for smallholder development, Kenya

Following the liberalization of the dairy industry in 1992, a number of private processors started buying milk from existing smallholders. The Kilifi plantation (also known as 'the Wilson Dairy') is a large, privately-owned, integrated dairy ranch and milk processing unit, situated north of Mombasa, Kenya. The ranch started a milk collection scheme, to date covering 650 small-scale farmers from the coastal lowlands and also seasonally from the traditional zebu herds in the semi-arid hinterland. In addition to providing a secure outlet for the milk, the farm supplies crossbred animals, private veterinary services and artificial insemination to smallholders.

■ ***Milk marketing systems***

Development of an efficient, feasible and affordable system for milk collection, transport, processing and marketing is of highest priority, and helps keep the price at an affordable level for consumers.

Informal and formal milk markets

The market for milk and milk products is a complex mix of informal and formal market activities in order to meet the demands from groups with very different incomes and preferences (see Box 7). Most milk is consumed as liquid milk. In general, milk in rural areas is sold untreated (and is usually boiled before consumption) whereas, in cities, some of the milk is pasteurised before it is sold to consumers. The proportion of pasteurised milk varies from country to country, and from city to city, depending on the level of industrialization and the enforcement of rules and regulations protecting the

public from well-known health risks associated with consuming raw untreated milk. In some countries, consumers' preferences are for raw and full fat milk over pasteurised milk and milk with a lower fat content. Raw milk is usually cheaper than pasteurised and packed milk, but runs the risk of being adulterated. However, mainly because of lower price, the informal market with raw milk will predominate for many years, except perhaps in major cities.

Milk vendors

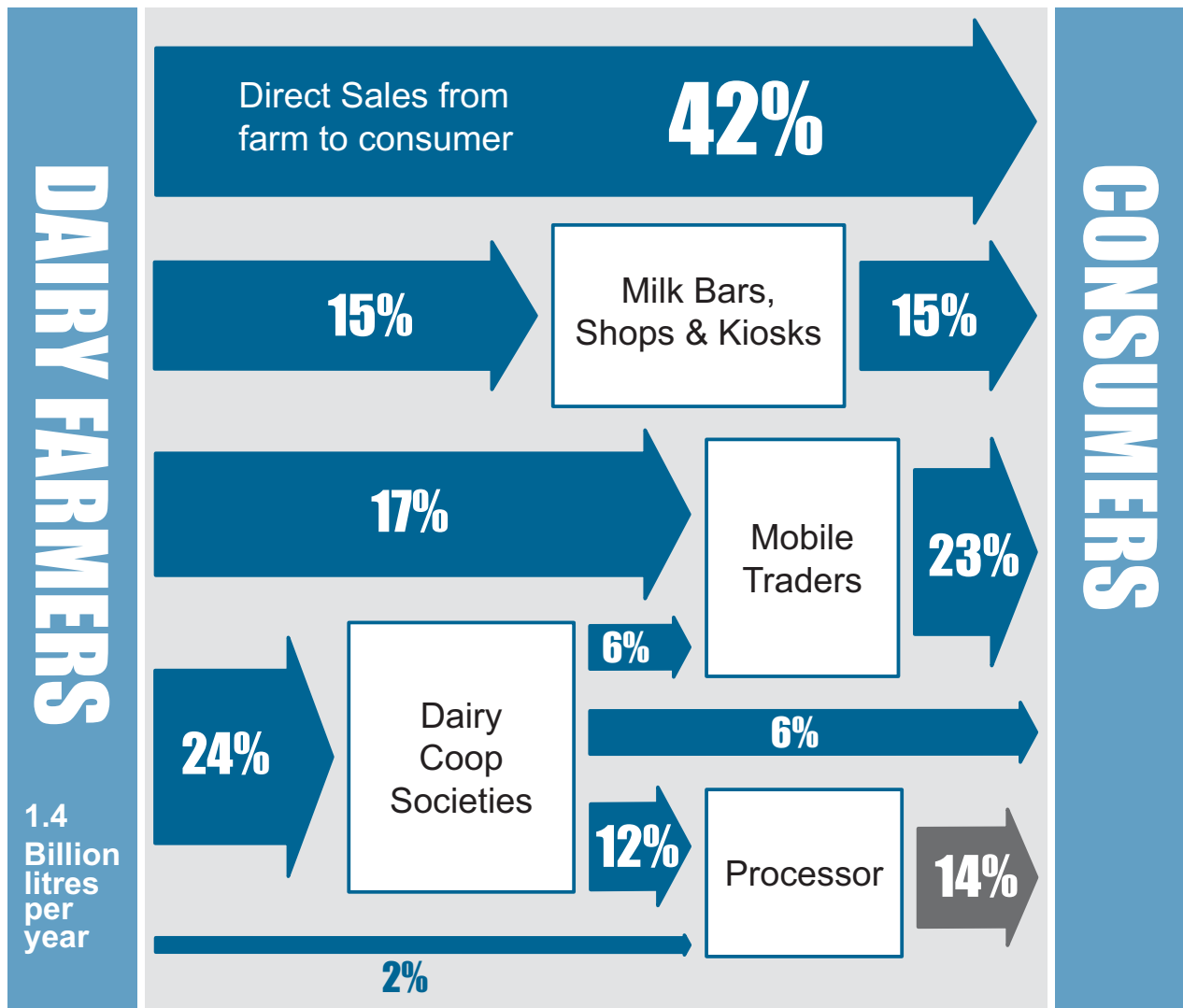
Farm-gate sales or farmer sales at local markets of raw milk is the most direct and cheapest marketing of milk; this is the normal entry into dairying for smallholders. However, there are limited opportunities for expansion, as the raw milk cannot travel beyond the local market.

Milk vendors come into the picture for linking farmers with a bigger market. The vendors are important in the initial stage of commercialization

BOX 7 Market flows

The figure below illustrates the mix of formal and informal market activities in Kenya. In 2002, only 14 percent of total milk produced was pasteurised through formal dairy plants. It was estimated that 55 percent of total milk produced was sent to the market, with the balance being used on the farm, for the family and young calves.

A major reason for this pattern is that milk is often only collected in the morning because of transport, storage and cooling problems and the evening milk is used for home consumption. Although it is difficult to get accurate figures for each country, the picture is similar in most developing countries.



Key

- ➡ Raw Milk Sales
- ➡ Pasteurised or UHT milk sales

Note: 1.4 Billion litres of milk marketed annually represents 55% of on-farm production. The remaining 45% is either fed to calves or consumed on farm.

Source: Smallholder Dairy Project & ILRI. 2002. *Employment generation in the Kenya dairy industry, Smallholder Dairy Project Policy Brief 2, Nairobi, Kenya.*

and, if properly trained and monitored, they are a good vehicle for stimulating dairy development by promoting and increasing the area for milk marketing. However, there are various problems with vendors, mainly because of their lack of knowledge and lack of business morals, making adulteration and unhygienic handling of milk a common phenomenon. This may be improved through training and licensing of milk vendors based on regulations for hygienic milk handling and marketing.

Small-scale processing

Although it must be expected that the marketing of raw milk in rural areas

will continue for the foreseeable future, there is certainly room for increasing demand for dairy products through developing village/cottage small-scale processing of milk to increase the shelf-life and the variety of dairy products. Small-scale equipment is available for pasteurisation, packaging in plastic sachets, and for butter, yoghurt and cheese making. This is an important contribution to promoting dairy development because producers need an outlet for daily milk production that is not sold as fresh milk. Without small-scale processing, surplus milk spoils and cannot be used for human food.



*FIGURE 4 Woman examining brine barrels where cheese is matured, Albania
(Photo: © FAO/17987/C. Grace)*

Assessment of opportunities for dairy sector development

■ *Dairy sector development*

The dairy sector usually develops through phases depending on the productivity of the dairy animals and the demand for milk from outside the farming community. Traditionally, smallholders produce milk for home consumption and whenever a little surplus is available, this is either sold or given to other family members and neighbours, or it may be processed into dairy products with a longer shelf-life like butter, soured milk or cheese.

The next phase occurs when, as a result of specialization and increased production, local surpluses have to be processed and transported to markets further away where demand is buoyant. Milk producers begin to cool and bulk milk to allow for more efficient transport to small-scale processing plants. The final phase is characterized by larger specialized dairy units with effective milk production and coincides with the rapid growth of urban centres with a high demand for dairy products. The amount of milk handled requires, and justifies, investments in an efficient cool chain from farmers to large-scale

industrial dairy processing plants for supplying urban centres with milk of high quality.

Consequently, the investments and interventions needed for the sustainable development of the dairy industry depend on the phase in which the sector currently operates. For this process to be developed profitably and sustained for smallholders and the emerging dairy industry, there is a need for well planned and balanced investment in input supply services, as well as processing and marketing infrastructure. At the macro level, a national policy for the development of, and investments in, the dairy sector should be prepared through a process with all stakeholders, (smallholders, middlemen, vendors, processors, final consumers, etc.), actively involved. This investment is partly private, but the public sector has to participate, mainly to ensure smallholders are included. The policy has to include food safety regulations with public health as the objective, but should also be sensitive to local consumption habits (for example, if milk is always boiled before consumption, pasteurisation is not necessarily a must).

Milk is a perishable product and smallholder milk production is characterized by the small volume per producer, often of poor quality. A poor infrastructure and transport system in an environment with a high ambient temperature easily results in milk turning sour before reaching a distant urban market or processing plant. Dairy farmers need to organize themselves to overcome the problems of collection, transport, processing and marketing. Smallholders need technical advisory services in animal feeding, management, milk hygiene, animal health, animal breeding and farm economics. The provision of these services has, until recently, usually been through government, but now greater reliance is placed on private sector service providers. Nevertheless, the government still has to support such services as a public good for smallholders to benefit, but the service provider does not need to be a government officer.

■ *Market research*

It is recommended that market and household surveys are conducted to assess if there is a demand for increased milk production before smallholders start investing in dairying. In all the interventions it is very important to keep the market in mind. Two questions which may aid in the decision making process are:

- Are there opportunities in densely populated areas and accessible urban centres?
- Is the market within the local community, rural cities, larger urban centres or the remote capital city?

Different markets have different requirements with regards to quality and quantity of consigned milk. In rural areas, there is rarely any real competition from imported dairy products and a growing local demand will justify interventions to increase milk production, as long as it will be cost effective for farmers to produce milk. However, when assessing the market for processed milk in cities, it is necessary to include imported dairy products as they compete directly with local production, processing and marketing.

In a market study, it is also important to assess the existing dairy industry, the processing capacity and its utilization. Key questions include:

- Is it cost effective and can the industry compete in price and quality with imported dairy products?
- Is the industry interested in buying (more) locally produced milk for processing instead of importing skimmed milk powder and butter oil?

- Could the industry become competitive through improved productivity and efficiency?
- Could locally processed milk win a higher market share if the price is reduced through cheaper technologies (for example, the marketing of bulk pasteurised milk would reduce the high price of packaging)?
- Can the area of production be linked easily to the market or processing industry in a cost effective manner?

■ *Farming systems*

If the area already under investigation has milk production included in the farming systems, it can be assumed that there is a local tradition and knowledge of milk production to build on.

Nevertheless, it is still important to determine whether the climatic conditions are suitable for milk production. Limiting environmental factors that are the most difficult to alleviate are temperature and humidity. In particular, in a hot and very dry or very humid climate there is a need for significant investment to mitigate the stress of heat and disease on the animals and the constraints on fodder production and water supply. This will be much higher than in a climate with moderate temperature and moderate to high

rainfall. The highlands in East Africa are an example of an environment conducive for milk production where climate is not a limiting factor. The selection of animals best suited to the environment and farming system are also critical considerations.

Even under unfavourable climate conditions, it can still be profitable for smallholders to engage in dairying. An excellent example is found around Mombasa on the Kenyan coast where a large-scale milk producer and processor is outsourcing milk production to the smallholder community in the vicinity. The driving force is the Mombasa city market for liquid milk (see Box 6).

■ *Local feed resources*

Feed resources have to be available or fodder production has to be feasible in areas where smallholder milk production is to be promoted. Without a basic fodder resource readily available, milk production becomes too expensive and the market will not pay the price for milk. In particular, it is important to assess the fodder supply during the dry season when there is no or limited crop production. Milk production in tropical areas often experiences high seasonal fluctuations because of the lack of fodder in the dry season, and these huge differences are a big problem for the processing industry and for marketing.



*FIGURE 5 Transport of fodder, Philippines
(Photo by J. Henriksen & M. Henriksen)*

BOX 8 New developments in local fodder resources, Tanzania

Concentrate

In Tanga and Iringa Regions, the harvesting and drying of leuceanea leaves has become a home industry, carried out both by livestock keepers and individuals without livestock. The dried leaves have become a much prized ingredient in concentrate, or is fed as a single feed. The potential for using home grown ingredients as concentrate is vast and requires very little input besides labour and land to grow the crop.

Fodder conservation

Lack of a suitable method of fodder conservation is often the factor preventing stable milk production throughout the year. Silage making is rather difficult for most small-scale farmers, whereas drying grass for hay making can be done cheaper and more easily than silage. In the southern highlands of Tanzania, locally manufactured hand operated hay balers are in use with a daily capacity of 80 bales of 15-20 kg attended by two operators. Bales make hay storage easier and cheaper than unbaled dried grass because of compaction. Furthermore, farmers have a clearer picture of their feed resources available at any given time.

The dairy plant needs a capacity that can cope with the peak production so as not to create problems for producers. However, seasonal fluctuations require higher initial investments that will increase consumer prices of dairy products if it is not possible to spread the costs over a greater throughput. In order to avoid under utilized capacity in the low season, the industry may supplement shortfalls in local supply with imported products. In contrast, the demand for milk is usually fairly constant throughout the year, perhaps with one or two peaks during festivals.

Seasonal fluctuations in production can be reduced significantly through various interventions, like fodder preservation, price differences, and better management of reproduction in dairy cows. However, if local feed resources look scarce in the first assessment but market opportunities are evident, then further investigations into fodder production should be undertaken. New opportunities for local fodder production will generate benefits for both smallholder milk producers and the local community by creating new employment opportunities (Box 8).

Initiatives to increase milk production

■ *Producer organizations*

Smallholder dairy development is not sustainable unless the many smallholders with a small amount of milk for the market join together in an association to strengthen their capacity in all aspects of dairying, particularly with regard to marketing. Without such an organization, milk producers are not able to fully exploit the potential of dairying and the addition of value for higher profit. Active producer associations and reliable contracts with dairies are almost preconditions for successful smallholder dairy development.

Marketing milk is relatively easy as long as it is sold fresh within the community, where consumers and producers have very similar tastes and preferences for milk and milk products, and transport distances are small. If longer distances and more processing is required, individual smallholders have insufficient volume and are no longer able to do their marketing alone. Hence a number of smallholders have to join forces to make milk production and marketing profitable. The collection, transport, processing and marketing of milk has

to be efficient and reliable as milk is a daily, all year round perishable product.

Smallholders' associations need to be closely linked to growing urban markets through the dairy processing plant in order to recognise and understand the requirements of urban consumers for fresh milk and dairy products of good quality and hygienic standards.

The organization of smallholders increases their power of negotiation not only with buyers of their milk, but also with input suppliers and service providers. They may also gain some influence on national policy for agriculture and infrastructure development. For example, financial institutions in many countries do not have products suitable for dairy farmers; farmer associations should participate in the development of appropriate financial services and attract support from government in facilitating this process. In addition, smallholder associations may be able to manage and control the agricultural technical advisory services with support from government. If advisors become more responsible towards

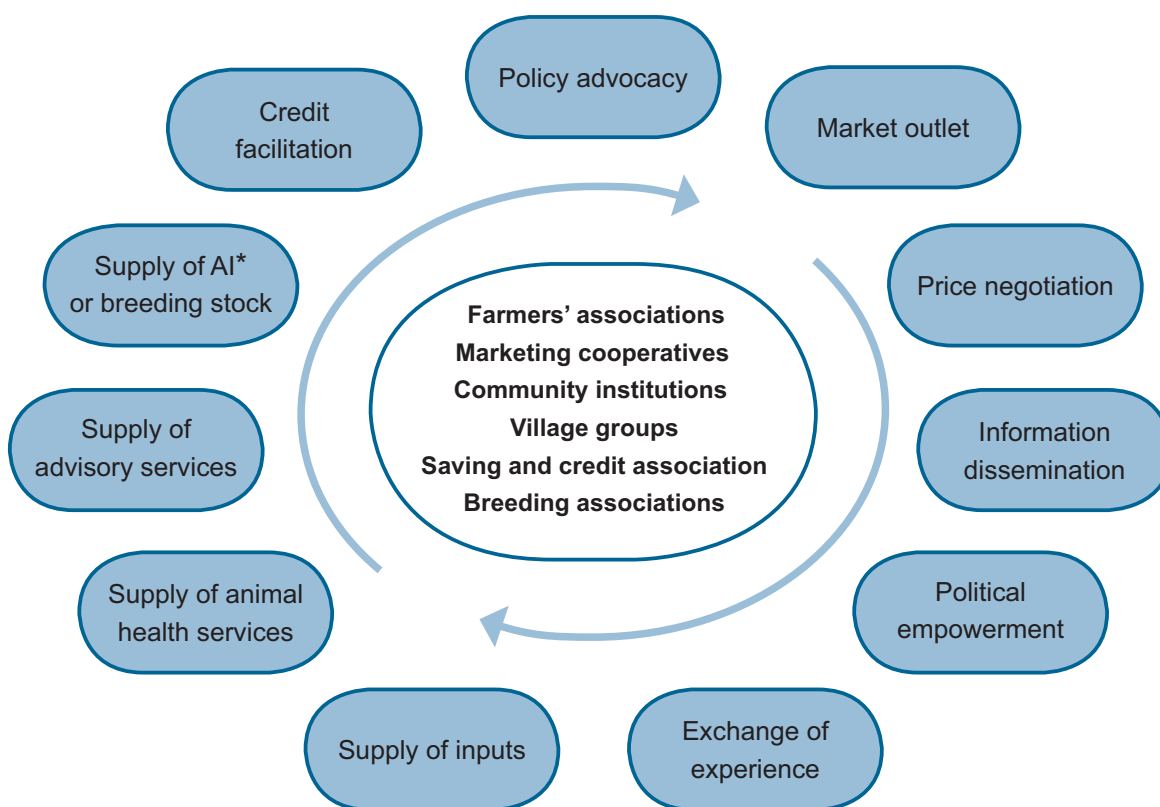
producers and their association, instead of being government officers, there is a greater chance that advisors will be more responsive to farmers' needs. The benefits of producer and community organizations are highlighted in Figure 6.

■ **Dairy animals**

The most important tool in milk production is the dairy animal. Throughout this booklet reference is made to the dairy cow as it is the most

common dairy animal and there is comprehensive knowledge available about the feeding, reproduction, breeding, health and milk production in the dairy cow. The differences with other dairy livestock are not that significant on issues like management and organization, milk processing and marketing. However, there are biological differences between cattle, buffalo, camels, goats, sheep and horses that have to be taken into account when planning milk

FIGURE 6 The multifaceted advantages of producer and community organizations



* AI (Artificial Insemination)

Source: IFAD. 2004. *Livestock services and the poor: A global initiative collecting, coordinating and sharing experiences.*

production from a specific animal.

Animals bring a certain genetic potential for milk production, which can be improved through breeding and selection of the best animals for the next dairying generation. Milk production can also be increased by incrementing the number of dairy animals and improving feeding efficiency.

■ *Fodder*

Natural tropical green resources are normally poor in nitrogen and have a low digestibility, compared to temperate varieties. In most places, there is a strong seasonality in production and availability because

of periods without rainfall. These facts have to be taken into consideration when planning feed for dairy animals and balancing the home-grown fodder with purchased crop residues, concentrates and supplements.

An important factor for reducing milk production costs effectively is to ensure optimal utilization of locally available fodder resources, through improved pasture management, the use of fodder trees and the treatment of fodder for improved digestibility. This should include appropriate addition of nutrients lacking in the available fodder. The introduction of feed crops like napier grass, maize and lucerne etc., are important



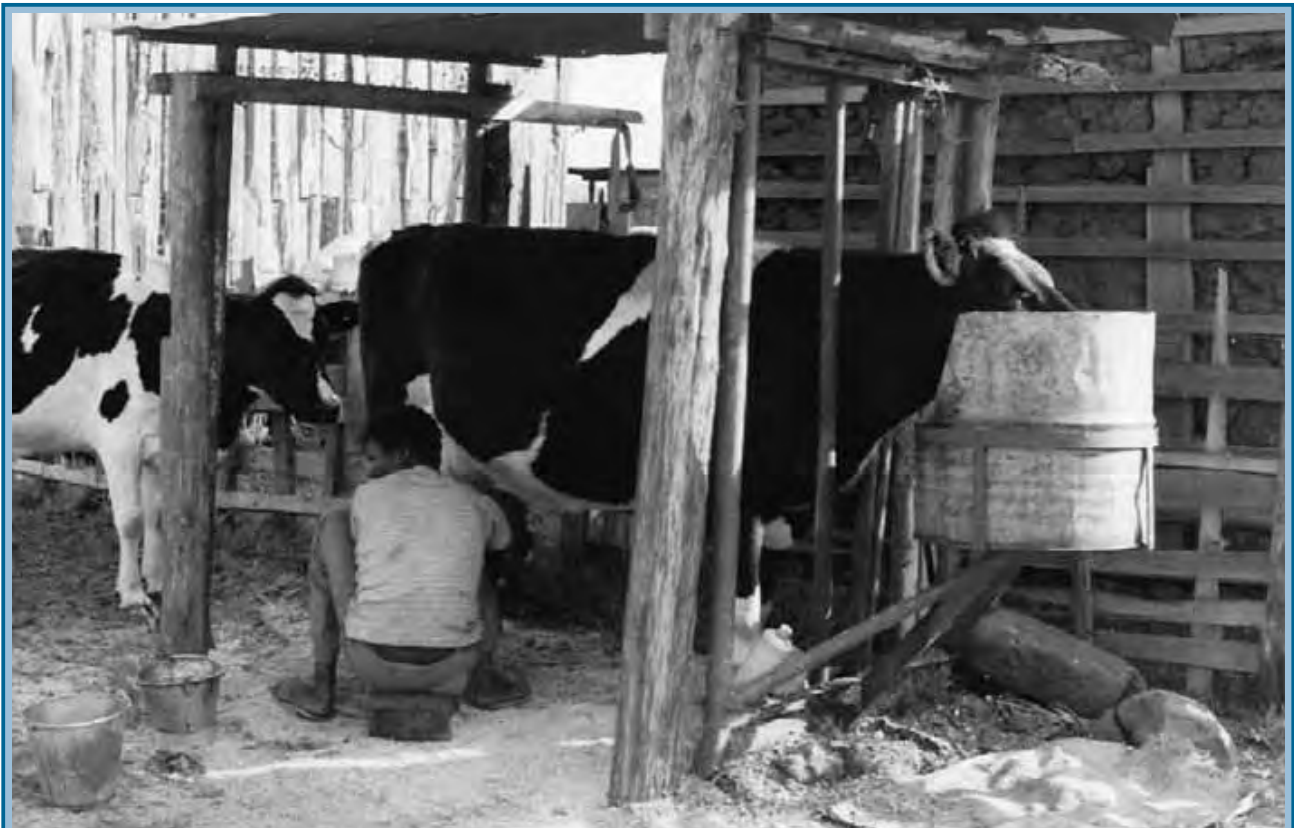
FIGURE 7 A Farmer giving fodder to his cows, Bolivia
(Photo: © FAO/19377/R. Jones)

alternatives to supplement natural pasture, but they would compete with land devoted to crops for human consumption. Economic calculations are required to help indicate what is the most profitable option for the farmer.

For all production systems it is a question of how much feed is available and what herd size can be sustained at a given milk production level. There will be a number of scenarios depending on the cost ratio between roughage and concentrate. Relatively expensive roughage will limit the use to what is required to keep rumination effective

(approximately 30 percent of total ration). However, if efficient use of concentrate makes milk production economically feasible, it is still a diversification option for the farmer, as long as the farmer maintains economic performance. Normally, irrigation is too expensive for fodder crops and should be allocated to high value crops for human consumption.

To balance the seasonality in fodder production, the farmer has at least two alternatives: **1** to conserve part of the surplus production in the growing season as dried fodder (grain or hay) or as a naturally preserved wet fodder (silage) made of green



*FIGURE 8 One-cow milking parlour semi- automatic, Kenya
(Photo by J. Henriksen & M. Henriksen)*

material such as grass, maize and napier; or **2** to purchase fodder which is normally more expensive depending on the local availability of crop residues and by-products from industry.

■ *Equipment*

Hygienic milk production and milk handling requires appropriate tools and utensils that are easy to maintain and clean. For instance, it is no good using old plastic containers for carrying milk as they are almost impossible to clean properly and may be used for storing other items as well.

A basic inventory of equipment for use at the smallholder level includes:

- bucket for milking which is easy to clean,
- washing cloth for cleaning the udder,
- wide-mouthed milk can of appropriate size for storage and transport of milk,
- brush for cleaning all utensils,
- cold water for cooling milk, if possible.

As milk production becomes commercialized, there is a need for an effective and well-coordinated



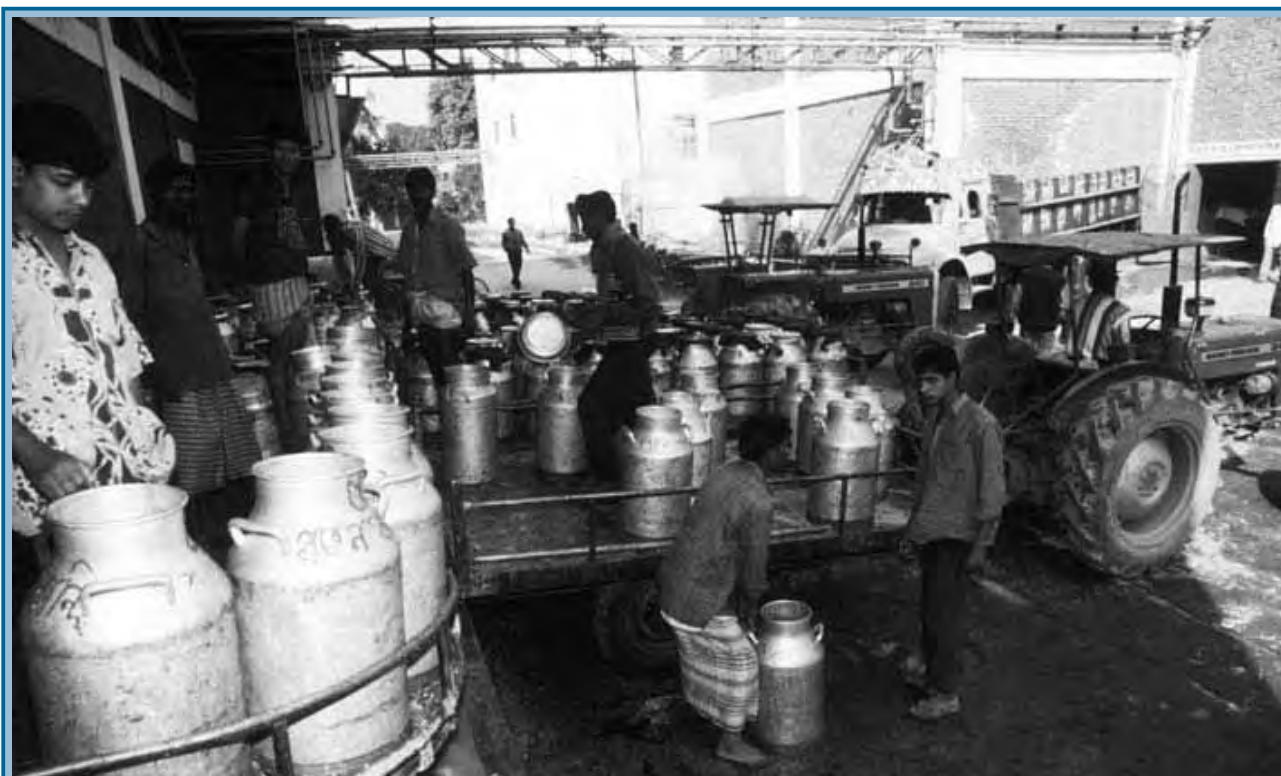
*FIGURE 9 A selection of milk cans, Nepal
(Photo by J. Henriksen & M. Henriksen)*

milk collection system, preferably managed by dairy farmers. Before milk is transported over longer distances it has to be cooled, either on farm or at a milk collection and cooling centre, with appropriate cooling equipment and facilities for storing the milk until transport.

The sophistication of the design of the milk collection point is largely decided by the quantity of milk it is expected to handle. In the case of a small village unit, aiming to collect a few cans of milk for transport to a plant, a simple building in the village may be all that is required. At the other extreme, a large intermediate centre can have a depot function

with refrigerated cooling systems, storage tanks, facilities for milk sale and simple processing equipment. A large plot of land is needed, as well as a regular supply of power and water and a building designed as a dairy plant. In general, the list of facilities would include: good water supply, 40–50 litres milk cans, hired transport, cooling options like in-can cooler, cold water tanks, electrical cool-tank, refrigerated bulk tank, etc.

The best approach initially is to begin small and simple, and then build up as things develop, rather than invest too much and to set up complex arrangements that cannot be paid for by the amount of milk handled.



*FIGURE 10 Milk arriving at processing plant where it will be pasteurised
(Photo: © FAO/22899/G. Diana)*

BOX 9 The milk cooler as a catalyst for development, Kenya

In Eten, east of Eldoret, a small dairy cooperative society tried to organize collection and delivery of milk to a dairy factory in Eldoret. The quantities were small, the roads poor, and the cost of transport threatened to ruin the cooperative. Although the collection figures of 3 000 litres per day fell short of the requirements for the installation of a milk cooler (at least 5 000 litres per day), a cooler was installed. The society had a strong democratic organization and sound accounts. Two years after installation of the milk cooler, the society was collecting 13 000 litres per day and Eldoret dairy had to install extra storage capacity.

■ *Milk collection centres*

The best motivation for farmers to diversify and invest in dairying is the presence of a safe and profitable market outlet, leaving the smallest possible risk for the farmer. The most efficient way to exploit a location's potential for milk production is to

open a milk collection centre and invite farmers to participate. Initially, this may be a public investment or a public-private partnership, as very few private investors would take the risk alone. The story in Box 9 is a success example.

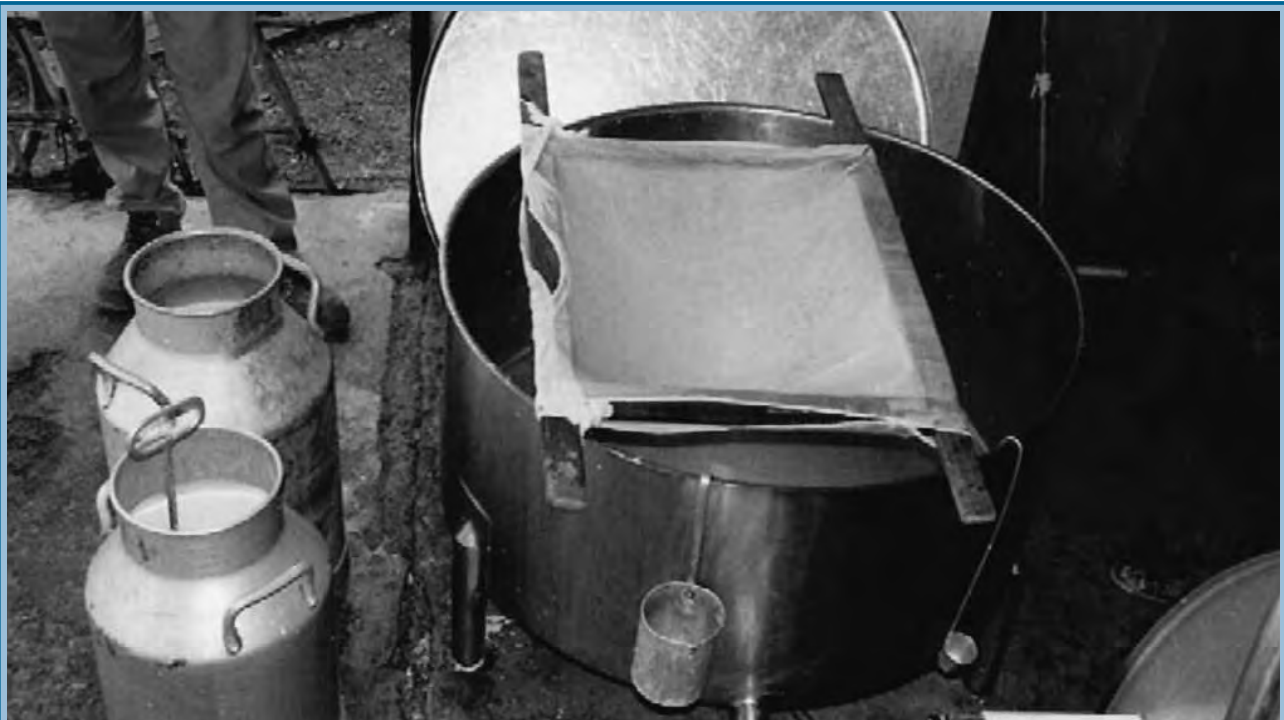


FIGURE 11 Milk reception point – use of filtering cloth, Nepal
(Photo by J. Henriksen & M. Henriksen)

■ *Technical knowledge and skills*

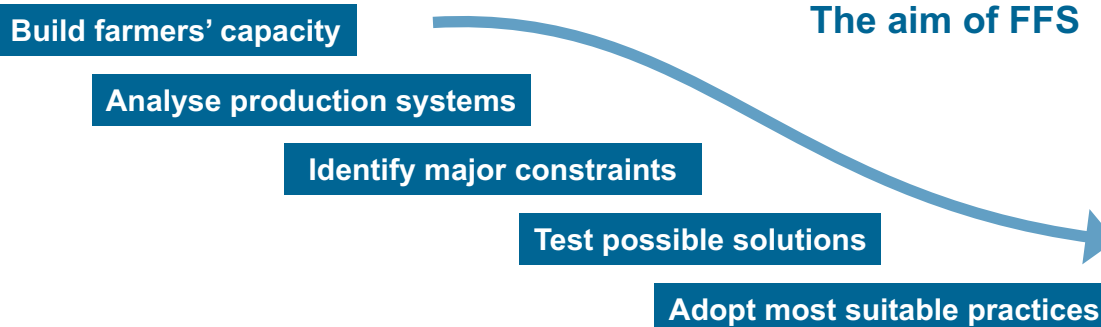
A long lasting intervention is to upgrade the technical know how of people involved in the value chain from milk production and processing, to marketing. When milk production becomes market-oriented, not only does the production system undergo significant changes according to market demand but also farmers have to understand the dynamics of commercial milk production. All inputs have to be used efficiently in order to compete in the market. For example, farmers have to be able to exploit the genetic potential of dairy animals and to improve them

using all available and affordable technologies, and input services. This requires formal education and qualifications of farmers; in particular it is important to develop the skills of the future generation of young commercial dairy farmers through a well-targeted educational programme.

The milk producer will need to acquire better knowledge of dairy animal husbandry through training sessions, on-farm demonstrations and other informative contacts with educational and research institutions, mainly through the advisory service. There is a specific need for training in clean and hygienic milk production.

BOX 10 The Farmer Field School (FFS) approach

Farmer Field Schools (FFSs) are based on an innovative, participatory and interactive learning approach. The FFS approach was developed by FAO in Southeast Asia as a way for small-scale rice farmers to learn the skills required for integrated pest management practices in their paddy rice fields.



The knowledge acquired during the learning process can be used to build on existing knowledge, thereby enabling farmers to adapt their existing technologies so that they become more productive, more profitable, and more responsive to changing conditions, such as market-oriented production or adopting improved technologies.

Source: Minjauw, B., Muriuk, H.G. & Romney, D.2002. *International FFS Workshop*.
<http://www.eseap.cipotato.org/UPWARD>

A Dairy Farmers' Field School approach is probably one of the best tools to reach many smallholders involved in dairying. Training takes place at a selected smallholder farm for a group of dairy farmers, with a facilitator assisting the farmers through the topics they have selected to be of current importance and priority (Box 10).

Farmers and their advisors also need to know about the economic issues for profitable milk production, including detailed knowledge about all costs involved in milk production, the elements of income from sales of milk and offspring, the value of manure, and the animal power



FIGURE 12 Weighing milk from a smallholder at collection centre, Philippines
(Photo by J. Henriksen & M. Henriksen)



FIGURE 13 Testing of milk quality at collection centre, Nepal
(Photo by J. Henriksen & M. Henriksen)

available for land preparation and crop production. Dairy farmers also need training in business management in order to manage their associations effectively. Private sector service providers also have to improve their skills and knowledge about milk production to provide the necessary input and services to farmers.

Milk producer associations, as well as associations for processors, need to improve their management skills and the quality of services to members. They need skills in negotiations with authorities to promote the influence of their members and for enhancing the dairy industry; and with companies and service providers to push for a better bargain on input supplies and services.

■ *Gender-based initiatives*

Specific initiatives may be required to enable women smallholders to share the benefits of commercial milk production, not only as producers but also as decision-makers. It may be necessary to take steps to ensure that they are adequately represented among the members and leadership of producer associations, they have equal opportunities to attend training courses and to access advisory services (Box 11).

■ *Improving diets and stimulating demand*

Dairy enterprises have the potential of providing milk to farming families for the benefit of their children and their future development. However,

BOX 11 Women as community-link workers in Koraput, Orissa, India

Community-link workers were used by the Integrated Livestock Development Programme to deliver low-cost livestock services. One man and one woman were chosen by the community in each village and were trained as community-link workers. The training covered simple first aid, poultry vaccination, de-worming sheep and goats, and the castration of bucks and rams. The workers were provided with essential equipment such as thermo flasks, vaccines and medicine kits. Some of the women workers were supplied with bicycles. Most of the women workers had little education, and their role was not a very traditional one for women and was therefore challenging. For them to function effectively, they needed additional training and confidence-building measures to prepare for their new roles, which challenge traditions.

Studies demonstrate that it is easier to reach women when the community-link worker is a woman, and that many women have been able to improve the living conditions of their households. However, initiatives to involve women also have to strengthen their fundamental need for influence and social empowerment, otherwise the impact will be constrained.

Source: IFAD. 2004. Orissa case study. Livestock services and the poor, a global initiative collecting, coordinating and sharing experiences.

these potential benefits may not be readily appreciated by the smallholder community. A better understanding of the importance of a well balanced diet for children's ability to fully utilize their potential for growth and education has to be promoted in rural societies, as well as the potential benefits of milk, the deriving products and other livestock food products.

The nutritious quality of milk has to be communicated to all groups of the population and the continuous development of dairy products can increase consumption and demand for milk. This could be a shared responsibility between public health authorities and the dairy sector and its organizations, or either could act independently.

Institutional support for smallholder dairy development

■ *Role of government*

There is a need for public investment in the smallholder dairy sector to assure a balanced and well planned investment in input, collection, transport and marketing and to assure that smallholders are not excluded from the economic development process.

The government is responsible for preparing and implementing agricultural policies and a regulatory framework to provide:

- an enabling environment for producer and processor organizations, and provide vertical coordination between them;
- the development of infrastructure, such as cooling and collection centres, possibly under public-private partnerships;
- a clear definition of responsibilities of the public and private sector;
- an overall investment climate that will promote private investments in livestock production; and
- education and training programmes for dairy farmers, dairy processors and traders.

Responsibilities of the public and private sectors need to be clearly defined, agreed upon and appreciated by all stakeholders. Table 1 indicates the major issues for discussion in this process. Government has often limited resources and it is important to give priority to investments in areas where demand is highest and where the largest impact is to be expected.

■ *Consultative body*

The future development of the dairy industry will necessarily be towards industrialization and linking smallholders to rapidly growing urban markets, where processed and packed dairy products dominate. The many stakeholders, including milk producers, processors, traders and consumers, each with different priorities, need to create a platform for dialogue, where they can discuss future investments in the dairy sector in order to ensure high milk quality to consumers while developing a profitable and efficient dairy industry.

Such a consultative body, often established as a National Dairy Development Board, comprises members democratically elected

TABLE 1 Approximate public and private sector responsibilities for service provision in dairy development

Service provision	Responsibility	Funding	Oversight	Comment
Breeding services	Private	Private	Public–private partner	Initial subsidy might be justified.
Clinical veterinary services	Private	Private	Veterinary associations	Initial subsidy might be justified.
Preventive veterinary services	Public	Public-private	Public	Only for the main contagious diseases; this could be implemented through contracting private veterinarians
Food safety requirements	Public	Public	Public	Based on detailed risk analysis of threats of zoonosis.
Advisory services	Private–public	Initially public with cost-sharing	Private–public	Mainly private delivery, even for public financed services.
Milk collection	Mainly private	Private-public investment in infrastructure	Private	Initial subsidy might be justified.
Milk processing	Private	Mainly private	Private	Initial subsidy might be justified.
Research	Mainly public	Mainly public	Public–private	(Initial) Public funding
Education	Public	Mainly public	Public–private	(Initial) Public funding
Infrastructure	Mainly public	Mainly public	Public	Milk collection and cooling centre through public-private partnerships in infrastructure.
Input supplies	Private	Private-public contracts for public goods	Private, with public quality monitoring	Quality and health assurance.

from the stakeholder associations. It usually has the role of promoting, coordinating, monitoring and regulating the dairy sector. In addition to establishing dialogue with government, the Board may advise government on public issues of importance for the dairy sector, such as taxation, subsidies and trade regulations.

■ *Role of producer organizations and stakeholder associations*

For dialogue between the public and private sector stakeholders to be productive for development of the dairy sector, the different groups of stakeholders should organize themselves according to their interest. Traders, milk kiosk owners, dairy processors and milk producers should join forces in separate associations where they can elaborate their own interests and develop interventions for their own benefit.

The overall umbrella organization of the dairy industry sector, such as a National Dairy Development Board, is the forum where all these organizations send representatives for mutual discussions and decisions for the benefit of the total industry, from producers through traders and processors, to the consumer.

It is important that the stakeholder organizations are able to establish a clear legal basis to enter into business development on behalf, and for the benefit of, their members. Farmers' ability to establish an association is often very complicated and costly and in many countries there is an urgent need to review and update legislation for promoting market-oriented development of the smallholder sector. Special legislation (in particular for cooperatives) too often becomes a barrier and prevents farmers' associations from establishing business activities.

Support services and enabling environment

An appropriate infrastructure linking milk producers to markets and to input suppliers and service providers is extremely important. Without a guaranteed outlet for increased milk production and affordable access to technical advisory services, animal health services and financial services, farmers will not be able to cope with the many constraints they will encounter in the process of growth and economic development.

■ *Technical services*

A smallholder dairy farmer needs the following technical services:

- Agricultural technology advisory services on feeding, management, milk hygiene and farm economics.
- Animal health and veterinary services, both preventive (vaccinations, tsetse control, etc.) and curative (treatment of individual animals for diseases such as wounds, udder infection, mastitis).
- Breeding services through artificial insemination or natural breeding.

The public sector in most developing countries has traditionally financed many of these services through the employment of government officers. In the future, with a more market-oriented approach, coupled with diminishing budgets and general management problems, the role of the public sector is changing from an implementing agent to an authority responsible for setting standards and regulations, monitoring and undertaking quality control to ensure that public funds are used wisely and that the users of such services are getting their entitlements.

There will be an increasing need for advisory services because of the growing demand for food, particularly dairy products, derived from the population increase and expanding urban centres. It is unrealistic, however, to think that smallholder dairy communities will be able to cover all the costs for technical services for the foreseeable future. Moreover, farmers are not the only ones benefiting from advisory services; the public, traders and industry benefit as well and the costs should be shared accordingly.

BOX 12 Veterinary services provided by dairy cooperatives in Kenya

A member of a dairy cooperative can send a note requesting a visit by a veterinarian technician through the milk collector on the early morning route. The note is returned to the cooperative office with the milk, and the farmer receives a visit on the same day. Members are charged for the services on a cost-recovery basis, which is deducted from the month-end milk payments. Non-members can obtain services at an additional fee and by paying in cash.

Source: IFAD. 2004. Orissa case study. Livestock services and the poor, a global initiative collecting, coordinating and sharing experiences.

Benefits to the public include for example, better use of natural and human resources, economic growth in rural areas, and the creation of employment opportunities. Dairy industry benefits include more milk of better quality for more economic processing and marketing.

These services have to be available and accessible for smallholders to invest in milk production. There is a strong need for public investment in making these services available in an affordable and appropriate way for the smallholder farming community, and for involving smallholders and their organizations in the process and in the management of capacity building, for example in training and advisory services. Similarly, the private sector has to be involved in developing services, like veterinary animal health service/treatments and supply of feed and animals. Based on a mixture of private and public arrangements, it should be possible for the private sector to have

a much better chance of creating a profitable business in servicing the farming community while farmers benefit from easier access to service providers (Box 12).

■ **Public investment**

A market-oriented growth of agriculture and livestock has to be promoted to achieve economic development in rural areas. Regarding public investment, the main components are:

- Human skills development: through associations, farmer groups or cooperatives, to enable them to manage a number of services with public financial support.
- Training and educational programmes in commercial milk production: for farmers, processors, other stakeholders and, most importantly, the next generation of farmers.

- Road and other communication infrastructure: milk requires daily access to markets because it is a perishable product, and farmers need easy access to breeding and veterinary services.
- Public elements of technical services: for example, effective livestock vaccination campaigns and consumer protection against the threats of zoonosis and adulterated dairy products of low quality.
- Matching-grant systems or supporting investments in collaboration with private investors: in production,

collection and processing infrastructure for the benefit of rural economic growth. For example, the establishment of an agroprocessing industry close to a milk production area would further enhance the utilization of waste products, reduce pollution and create wage employment opportunities in rural areas.

- Research in milk production, processing technologies and equipment, and marketing, appropriate for the existing production system and its future development. Action research involving smallholders would



FIGURE 14 District veterinary officer (left) with a Mandalay dairy farmer who has been helped in improving the herd of milk cows. Locally-bred cows have been crossed with pure bred Friesian, and their progeny (seen here) are producing much more milk than the local breed, Myanmar (Photo: © FAO/11302/F. Botts)

facilitate the quick transfer of improved and appropriate technologies to the farming community.

- Linkages: to ensure close links between research, education and advisory services.

Public investment in infrastructure improvements may be justified, together with other interventions to increase productivity, partly by the economic benefit from the dairy sector as well as the expectations that more benefits will follow from other sectors within agriculture and business.

■ *Financial services*

The lack of financial services is often a limiting factor for the rural smallholder sector to move from subsistence to market-oriented activities. Access to credit is one of many conditions for investment in improved production methods and systems. Often government services have been used to supply the smallholder sector with credit; however, generally these systems do not work. It is now agreed that a sustainable credit scheme has to be linked to existing or new banking systems, like the Grameen bank in Bangladesh has demonstrated so



FIGURE 15 A farmer discussing credit matters with his cooperative
(Photo: © FAO/22898/G. Diana)

convincingly. Financial institutions have to develop credit services that smallholders can use in the prevailing production system and, if appropriate, they should also be profitable for the financial institutions. Saving programmes should be developed in parallel to a credit scheme. When a microcredit scheme opens in a remote rural area, initially it is generally found that the savings option is used as much as the credit option.

The in-kind revolving heifer fund is an effective mechanism for overcoming some of the most common capital constraints. Selected households receive an in-calf heifer and pass on the first female calf to the next qualifying beneficiary. For sustainability, it is important to ensure that beneficiary households have sufficient labour, knowledge, skills and access to feed and to care for the animals appropriately.

■ *Policy, regulations and their enforcement*

Dairy policies in developing countries have often been based on standards from industrialized countries with a modern industry, where raw milk sales and smallholder milk production have disappeared. Some of these standards may be inappropriate in developing countries. Consumers often prefer raw milk and are not willing to pay a higher price for pasteurised milk.

Moreover, they do not see the health risk in raw milk and, indeed, this risk is largely eliminated when milk is boiled before consumption. Both formal and informal markets play important roles in meeting consumer demand; and realistic standards for both markets need to be considered.

Regulations for standards and food safety are important for the development of the formal market. The cost of pasteurising, packing and cooling milk and maintaining a cool chain distribution system require regulations to protect against unfair competition, especially seasonal, deriving from cheaper unprocessed raw milk. The public health hazards of transmission of zoonotic diseases through milk (especially brucellosis and tuberculosis) are real, but have to be balanced against the complications of control and the cost of pasteurisation, and the fact that most raw milk is boiled by households before consuming it. In general, producers in peri-urban areas benefit from an unregulated market, whereas more distant producers suffer. On the consumption side, pasteurised, packed and cooled milk, is out of the reach of most of the poor. It is a matter of policy where to strike a balance.

Public health concerns need to be addressed in ways that deal with the realities of local market,

without threatening smallholder dairy livelihoods. In most developing countries, the major part of milk is sold unprocessed directly to consumers or through a milk collector. It is only in bigger cities that industrial processed milk has a higher market share and consumer acceptance.

Policy interventions should include:

- Policies to enable the promotion of village/ cottage milk processing systems for local markets.
- Guidelines for quality control and milking hygiene appropriate and directly applicable to producers, collectors and processors in the private sector in the milk chain (formal as well as informal). For local products it is possible to develop a guide for good

hygiene practices for all players, compromising between the economics of smallholder milk production and marketing, and public health issues.

- Promotion of systems where producers benefit economically from the added value of better quality. It is important to consider quality when setting the price.

The provision of information and education for all stakeholders in the chain from producer to consumer is important to ensure the proper quality of milk and to avoid any health risks. The licensing of traders and processors to allow monitoring of milk quality and handling procedures could be a means to achieve this. However, licensing in itself is not sufficient, and further training is essential for improving milk quality.

The role of advisors

A stepwise approach is recommended to consider the following issues and capacities before supporting interventions to develop milk production:

1

Smallholders' capacity

In terms of knowledge and skills, animals, land, fodder, water, crops and production system.

2

Location

Smallholders' access to service providers, transport and communications infrastructure, and input supplies.

3

Market

Farmer to market linkages, demand for milk and milk products, and processing capacity.

4

Policy and institutional environment

Education and training, research and advisory services, animal health services, financial services, government policy and regulatory framework, and investment incentives.

Once the decision has been made to proceed, key steps may include:

- opening a milk collection centre in close partnership with a milk producers' association;
- improving farm and livestock management;
- identifying local agents of change and commercialization;
- introducing simple and adaptable technologies through training and in close cooperation with the dairy farmers' association;
- sustaining advisory services and animal health services through private-public partnerships;
- mentoring and training dairy advisors to become farmer advisors and facilitators of change in market-oriented development;
- supporting farmers' associations and facilitating their involvement in: the provision of services and inputs to farmers; the organization of milk collection, cooling and transport; and as a policy dialogue partner for institutions and organizations involved in interventions and investments.

Opportunities and challenges

■ *Opportunities for improved livelihoods*

The introduction of market-oriented dairy development should be carefully planned, and should start with: **1** an identified market opportunity; **2** an assessment of local knowledge of management of dairy animals or livestock as such; and **3** a study of local availability of feed and water resources.

When such information is assessed in favour of dairying, the development of milk production will improve the assets of smallholder families. The labour resources of the family may be better utilized through the added value in milk. Women in particular should have opportunities to acquire additional skills and be involved

in economic activity, resulting in strengthening their position within the family and the local community. Milk production provides a continuous cash flow, which makes smallholders stronger financially, socially, and in a better position to withstand problems. Box 13 describes the opportunities for improved livelihoods in smallholder dairy development as experienced in Tanzania.

Development of the smallholder dairy sector requires a high level of organization of numerous dairy farmers. In turn, involvement in organized production also enables farmers to empower themselves in relation to the authorities, service providers and traders. The improved level of organization not only benefits

BOX 13 Improved livelihoods, Tanzania

In every village in Njombe in the Iringa Region, farmers who own one or two dairy cows have better houses with corrugated iron roofs, are better dressed, all their children go to school (some even to private secondary schools), and they have a better maize harvest, etc. For a poor family, owning one or two cows means the net wealth of the family increases by US\$400-500. In addition, the family can sell a few litres of milk every day, generating an income of US\$0.20 per day. Furthermore, the family can sell a young heifer or a bull calf every year, adding approximately US\$150 to income. They also have manure for their crops.

dairy farmers but is an advantage for the whole rural community.

The creation of employment beyond the farm gate presents an opportunity for the poorest of the rural population, without land and livestock, to improve their livelihoods significantly. It also contributes to slowing down the rural exodus to urban centres. The construction of improved infrastructure and the creation of links to urban centres, together with the establishment of a service and supply industry, results in an increased standard of living for the rural population in general.

Smallholder dairy development brings cash to rural areas and the importance of increased local purchasing power is significant, resulting in increased demand for inputs and services, and attracts business people from the cities. These services are also available for the rest of the rural community. Dairy development has the potential to boost rural economic growth in general. Indeed, when the conditions are sound and favourable, there are no alternative interventions that have the same impact on: rural employment, regular cash income for many of the rural poor, quality food available for poor rural children, improved soil fertility through manure input, and social security for the poor through livestock banking.

Whether or not smallholder dairying takes off and breaks the vicious cycle of poverty depends on the context. India is an excellent example where smallholders are still the most important milk producer (the average herd size is only two cows) and today India is the biggest milk producer in the world.

■ *Challenges*

Dairy development is a complex and long-term process depending on a variety of factors at the macro and micro levels, including technological, social, economic and political issues. Major constraints for the successful development of the smallholder dairy sector are the following:

- Weak producer organizations with poor management and lack of political influence.
- Lack of research and education directed towards the smallholder dairy sector.
- Lack of reliable farm input supply and services, including financial services.
- Poor infrastructure which acts as a general constraint for economic growth in rural areas, often with seasonal failures.
- Unreliable and costly access to profitable urban markets.
- Unfavourable land tenure systems.

- Technical constraints:
 - low technical knowledge at the farmer level, including a poor understanding of market requirements,
 - low nutritious quality of feeds and seasonal fluctuations in availability,
 - low genetic potential for milk production in dairy animals,
 - inefficient reproduction in dairy animals,
 - heavy load of parasites on the animals,
 - poor quality milk unable to meet the strict hygiene requirements of the market,
 - lack of trained personnel in the collection, processing and marketing chain.
- Institutional constraints:
 - advisory services are often inappropriate (and even non-existent) for smallholders,
 - animal health services are poorly equipped and unreliable in rural communities.

Despite these many constraints, smallholder milk production is increasing in many developing countries. However, to include rural smallholders in this positive development process, it is important to identify solutions specifically for the smallholder sector, and not rely on solutions for the large-scale sector. It can also be seen from the long list of constraints that some lie within the farm household, whereas others are beyond the farm gate. An integrated approach is therefore needed, combining technical, organizational and institutional interventions.

Overall it is important that a proper balance is maintained between promoting smallholder milk production and achieving food security, improving livelihoods and minimizing the risk for human health.

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Journals

International dairy journal, Elsevier

Journal of dairy Science, Stanford University press

Journal of dairy research, Cambridge University press

Sources of further information and support

ASARECA Animal Agriculture Research Network

<http://www.asareca.org/a-aarnet/>

Dairy Development Authority, Uganda

<http://www.dda.or.ug/>

Domestic Animal Genetic Resources Information Network (DAGIS)

<http://dagris.ilri.cgiar.org/>

FAO Milk and Dairy products

www.fao.org/ag/againfo/subjects/en/dairy/home.html

FAO Lessons in Dairy

<http://www.fao.org/ag/againfo/subjects/en/dairy/lessons.html>

FAO Dairy commodity (Dairy outlook list and school milk)

www.fao.org/es/esc/en/20953/20999

FAO Small-scale Dairy farming

<http://www.fao.org/ag/againfo/subjects/documents/Dairyman/Dairy/title1.htm>

Got Milk? Promotional website

www.gotmilk.com

International Dairy Federation

www.fil-idf.org

**The International Research Center on Utilisation of Information in Milk
Production of Small Ruminants**

www.cirval.asso.fr

International Livestock Research Institute

www.ilri.org

Kenya Smallholder Dairy Project

www.smallholderdairy.org

Mongolian milk for health and wealth

www.mongolia-dairy.mn

National Agricultural Advisory Services, Uganda

www.naads.or.ug

National Dairy Development Board, India

www.nddb.org

**World Bank ALIVE Partnership for Africa Livestock Development,
Poverty Alleviation and Sustainable Growth in Africa**

www.alive-online.org

Notes

Notes

SMALLHOLDER DAIRYING OFFERS HIGH RETURNS TO LAND AND LABOUR, A SOURCE OF REGULAR INCOME, GIVES WOMEN AN OPPORTUNITY TO BECOME ECONOMICALLY ACTIVE, encourages cooperation between smallholders through backward and forward linkages and transfers capital from urban centres to rural areas through the trade of milk. Milk also improves nutrition and can be of particular importance to children, the elderly and people suffering from HIV/AIDS. All in all, dairying is a relatively low risk and low cost economic activity that has the potential to reduce poverty and improve livelihoods.

This booklet addresses how to promote sustainable development of smallholder dairy for the benefit of the rural poor. It is aimed at people and organizations providing advisory, business and technical support services.

