# 3

# Small holder dairying

### This chapter

Describes features of small holder dairy systems, their descriptors and benefits of their intensification.

### The main points in this chapter:

- small holder dairying flourished in peri-urban areas but shortages of roughages have forced farmers into high concentrate usage
- rural areas provide greater roughage supplies, which generally reduce feed costs thus increasing profitability
- there are many descriptors for small holder dairy systems – these can be categorised as physical, farm family/financial and institutional
- intensification provides many benefits to farmers but requires certain prerequisites to be sustainable.

## 3.1 Features of small holder dairy systems

Milk is a cash crop for small holders, converting low value forages and crop residues, and using family labour, into a valued market commodity. Small holder dairy systems are common throughout the developing countries of Asia, Sub-Saharan Africa and Latin America. The main difference between systems is whether they are pasture-based, as in most parts of Latin America and Sub-Saharan Africa, or if dairy production is a part of crop–animal systems, which is more common in Asia.

Devendra (2001a) categorises small holder dairy production systems into three systems:

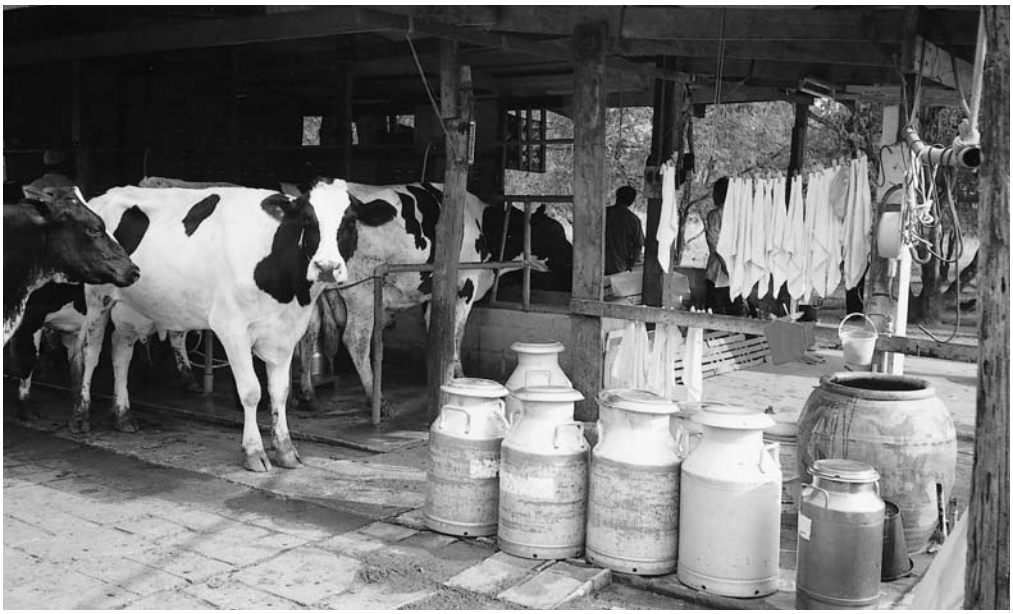
1 traditional, usually with ad hoc marketing arrangements, such as many peri-urban farms
2 cooperative, formed from natural aggregation and concentration of farms

3 intensive, where herd sizes become larger – one recent example is colony farming in Indonesia, where large sheds house up to 200 cows, but the small herds are still owned by individual farmers, who may share the labour and rewards of communal forage production and herd management.

One important feature of all small holder dairy systems is their rapid expansion throughout the humid tropics, driven essentially by the urban demand, and the opportunities to generate income. The ownership of between 1 and 20 animals, and a small area with crops or pasture, leads to a situation in which milk production becomes the major component of farm income. Such models are common in peri-urban areas, where good markets and production services are often found. Unlike beef cattle on small holder farms, dairy cows have rarely been used as draught animals, thus allowing all their feeding management to be directed towards producing milk and calves.

Dairy farmers can produce milk from six different types of ruminant animals, large (cattle and buffalo plus camels in Africa and yaks in Asia) and small (goats and sheep). Small ruminants are rarely milked in the humid tropics. Of the two buffalo ecotypes, river buffalo are the traditional dairy stock, with swamp buffalo rarely milked. Most milk in the humid tropics is derived from cattle, with some buffalo milk produced in Myanmar, Vietnam, Philippines and Thailand. The large buffalo milk producing countries, India, Pakistan, China and Nepal, are not located in the humid tropics. This manual will then concentrate entirely on milk production from dairy cattle.

Feeding and nutrition have been highlighted repeatedly as major constraints to animal production systems globally. The significance of improved nutrition is particularly important since feed costs make up 50% to 60% of total costs of milk production (see Chapter 17). In small holder systems, inadequate land and size of operation are further production constraints.



Small holder dairy farm in Chonburi province, Thailand.

Small holder dairy farm in Central Luzon, Philippines.

### 3.1.1 Peri-urban versus rural-based systems

Many countries have peri-urban areas where small holder dairying has flourished on the outskirts of large towns and cities. Such areas have access to good supplies of feed, such as:

- green fodder, native and cultivated grasses and legume forages
- crop residues such as rice straw and maize stover
- agro-industrial by-products and non-conventional feeds
- concentrates.

Too frequently the limited amounts of good quality roughages combined with an intensive approach to peri-urban areas have forced dairy farmers to rely heavily on concentrates. This has increased feed competition with the needs of other livestock species. In general, the feed requirements of livestock in the humid tropics of South-East Asia are in excess of supply (Devendra 2001a). Better use can be made of local resources. Improving low quality roughage through better feed management, and preserving high quality green fodder by improved storage methods are the most promising strategies for reducing feed costs and the dependence on other feed stuffs. The greater availability of forages, whether they be sourced as by-products from crops or from areas of specialist livestock fodder production, is encouraging a rural-based small holder dairy industry. The relative profitability of peri-urban and rural-based dairy farms is discussed in Chapter 17.

There are major constraints to dairy production, however, whether it be peri-urban or rural, such as:

- choice of species or breeds
- availability of animals
- feed resources and improved feeding systems
- improved breeding, reproduction and animal health care

- management of animal manure
- organised marketing and marketing outlets.

### 3.1.2 Gender roles on small holder dairies

As the cows are generally located in close proximity to the home, dairying offers more opportunities for females to become closely involved in the daily management than with other farming pursuits. This is important in the village life of South-East Asia, where women have traditionally been the home makers and family rearers.

The cultural and religious bonds that limit the contribution of females to managing the family budget have frequently been loosened in many small holder dairying communities. In West Java, for instance, Innes (1997) has documented gender roles in small holder farm activities in four dairy cooperatives. She reported that women were responsible for over 40% of the management and spent 52% of their working hours on farm-related jobs. Men were largely responsible for sourcing forages, often from large distances particularly during the dry season. However, women frequently milked the cows, transported the milk to the collection centres, cleaned the shed and looked after the young stock. This has important implications in technology transfer, which has traditionally been the male's domain. Since milking hygiene is largely the responsibility of women, milk quality is definitely an area where extension should be directed towards them. Workshops on feeding management and young stock are two others areas where more attention should be given to attracting women participants.

## 3.2 Descriptors of small holder dairy systems

There are nearly as many types of small holder dairy systems as there are farms, because most farms are unique in some way. There are many descriptors of individual farms and these could be categorised into three types: physical, farm family/financial and institutional.

Physical descriptors of individual farms include:

- **magnitude of scale –** farm size, herd size, annual milk production, proportion of farm income from milk sales, off farm family income
- **stock type –** multipurpose (milk, meat, draught), upgraded local stock, milking buffaloes, dairy genotypes, imported or locally sourced
- **sheds and other equipment –** flexibility for future expansion, 'colony farm', forage chopper, milking machines
- **home grown forages –** forage type, forage area, multipurpose crops, fertiliser usage (manure, inorganic, by-products), harvest interval, forage conservation policy, tree legumes, communal forage area
- **purchased feeds –** forages, crop by-products, agro-industrial by-products, formulated concentrates, feed costs as proportion of total farm costs
- **externally sourced forages –** beside road sides, around rice paddies, government forest, plantation estates
- **dry season feeding strategies –** accept feed shortages, conserved quality forages, cereal straws, regularly sourcing forages from distant locations

- **farm production characteristics –** bull calves reared for beef, use AI or herd bull, hand or machine milk harvesting, heifer replacement policy.

Farm family/financial descriptors of individual farms include:

- **land ownership –** purchased, leased, essentially landless
- **stock ownership –** direct purchase, finance loans and government stock credit schemes with low interest and/or repayment with female calves
- **labour –** years of dairy experience, family members or occasional employed labour, gender role on farm activities and decision making
- **family income –** off farm income, other farm enterprises, proportion of farm income from dairy enterprise, proportion of dairy income from sales of milk, manure, calves and cull cows
- **farm management skills –** reproductive management, risk aversion, motivation to improve skills, concerns about environmental sustainability, preferred methods of seeking new information
- **milk price –** payment for volume only or milk composition and quality, farmer input into price, entire enterprise under cooperative or government control.

Institutional descriptors of individual farms include:

- **milk marketing –** cooperative (fresh milk, processed milk), milk processor or bulk purchaser, local consumers (raw milk, processed in farm kitchen), transport raw milk to collection point
- **farmer support system –** supported by dairy cooperative, milk processor and/or government, discussion group networks
- **monitoring milk quality –** measures of milk quality, price signals (premium/penalties), vaccination records to ensure withholding periods are followed, individual or farmer group feedback, incentives/motivation to improve hygiene
- **price control –** formal or informal contracts for farm inputs as well as milk sales
- **cooperative agreement –** volume fee or set farmer fee for membership
- **cooperative services –** veterinary services (foot trimming, routine vaccinations), artificial insemination services, subsidised semen, formulated concentrates, bulk purchase of feeds, bulk supply of forages (maize green chop or silage), provision of financial loans, supermarket for farm and family supplies, regional animal health services (eg mastitis, brucellosis)
- **government support –** effluent and odour legislation, infrastructure of extension services
- **additional support –** contract calf or heifer rearing, local discussion groups (technical, administrative), cooperative farmer training programs, availability of credit from lending organisations, access to farm management and profitability advice, degree of institutional support flowing through to individual farmers
- **sustainability of farming –** improved soil fertility, reduced soil erosion, changes in environmental pollution, production per unit of water
- **regional economic parameters –** liquidity of farming families, changes in stock prices at local level, changes in price of purchased feeds (forages, by-products, formulated concentrates)

- **other performance indicators of farming households –** number of children going to school, improvement in human health, stability of dairy cooperatives, growth of regional and national dairy markets, relative price of imported dairy products.

## 3.3 Benefits of intensifying small holder dairying

Small holder farms generally yield low outputs of milk per animal. However, on a cost-benefit basis, the use of by-products or other waste as feed, and multiple outputs such as draught and meat production, the continued efficiency of small holder systems can outweigh the apparent efficiencies of dairying monocultures. Application of current technologies will allow increases in the production and efficiency of milk production by better understanding the nutrient requirements for milk production, in addition to those for growth and draught purposes.

The term 'intensification' requires clarification. In general terms, intensification is understood to be increases in efficiency for a unit of a given resource. For advisers and researchers of crop–livestock or pasture-based livestock production, the term is often interpreted as increasing productivity per unit of land, usually associated with an increase in stocking rate.

There are many benefits in improved productivity and profitability of small holder dairy farmers. In addition to higher levels of milk production (hence gross returns) per cow and/or per farm, Falvey (1999) lists the following:

- year-round engagement of rural and peri urban labour
- utilisation of agricultural and other by-products
- integration with cropping systems management
- conversion of by-products into organic manure for application to crops
- provision of nutritious and hygienic food for children
- production of meat from male calves and older cows
- reducing the cost of meat production for traditional markets as draught power declines as the primary bovine product
- a basis for rural and peri-rural industrial development through milk factories
- the development of new products for niche exports
- reducing rural to urban population drift
- draught and traction as a dairy industry by-product or adjunct
- landless people making a reasonable local living from dairying.

In spite of several decades of dairy farming in developing countries, the productivity of small holder dairying has remained relatively low due to a lack of appropriate dairy research. Furthermore, small farmers because of their socioeconomic and agro-economic conditions being greatly different to those in developed countries, cannot readily adopt the science and technology available in developed countries. Even the most appropriate technology is rarely transferred to small holders due to a lack of effective services. There must be institutional support to facilitate dairy industry growth through mechanisms such as providers of farmer credit, farmer training centres, well-equipped milk collection centres, processing and marketing facilities, farmer cooperative or groups and

appropriate research and extension infrastructures and methodologies. School milk programs have been successful in developing small holder dairying through establishing new markets by promoting milk drinking to improve health among children, particularly in rural areas. It is then essential that any production technology being transferred is relevant to the needs of small holders as well as being feasible, given their local support networks of dairy cooperatives, advisers (government and agribusiness), creditors and milk handling and processing infrastructures.

For intensification to be sustainable, there must then be:

- adequate infrastructure and marketing opportunities
- access to reliable markets for increased milk production
- promotion of dairy development through government policy
- availability of credit for purchasing of livestock and planting pastures
- available productive and adapted forage species
- ready access to information
- a farm management system which ensure adequate feed throughout the year
- management of animal wastes
- disease control measures
- adequate hygiene for milk collection.