3

Smallholder dairy farming in Asia

This chapter describes the importance of livestock to resource-poor farmers in Asia then reviews the past, present and future for smallholder dairying in South and East Asia in terms of demand and production trends, and as an instrument of regional development.

The main points in this chapter

- Smallholder dairy farming has become a good income generator throughout Asia but the cost price squeeze of low milk prices and high production costs still limits farm profitability levels.
- Asia is a major importer of global dairy products and with current high milk prices, there are incentives to increase domestic production levels.
- Potential for growth in their domestic milk industries varies between countries, with Thailand, Vietnam, Afghanistan and Pakistan showing rapid increases whereas Philippines and Sri Lanka have decreasing cow numbers.
- High cost of land and low rural wages are stimuli for smallholder dairy development.
- Thailand is presented as a model for strengthening and enabling smallholder dairy farmers in Asia.

3.1 The importance of livestock to resource-poor farmers

Globally, agriculture provides a livelihood for more people than any other industry. Growth in agricultural production and productivity is needed to raise rural incomes and to meet the food and raw material needs of the faster growing urban populations. Enhancing agricultural productivity contributes to industrial growth by providing cheap labour, capital investment, foreign exchange and markets for manufactured consumer goods.

Livestock production makes an important contribution to economic development, rural livelihoods, poverty alleviation and meeting the fast growing demands for animal protein in developing countries. About half the world's poor (below the US$1/day poverty line) live in South and East Asia, and half the remainder in Sub-Saharan Africa. However, the number of rural poor in South and East Asia did not decrease between 1993 and 2002 (totalling 390 million people) and will exceed the number of urban poor

Figure 3.1 Making a small pit of Napier grass silage, mixed with molasses, in Central Java, Indonesia

until 2040 (World Bank 2007). For these people, a high priority is then to mobilise agriculture for poverty alleviation.

The case for promoting increased livestock production is pressing given the rapidly growing demand for animal products, and the global aim to halve, by 2015, the proportion of the world population living in abject poverty, most of whom are dependent in part, on food and income derived from livestock.

Livestock provide over half the value of global agricultural output and one-third in developing countries. Rapid growth in demand for livestock products in developing countries is viewed as a 'food revolution'. Because livestock products are more costly than staple foods, their consumption levels are still low in developing countries, although they are increasing as incomes rise. Increased dairy production and greater self-sufficiency save on foreign exchange. Livestock also contribute to rural livelihoods through employment and poverty relief by integrating with and complementing crop production, embodying savings and providing a reserve against risks. In addition, livestock have special roles in traditional culture.

In South and East Asia, smallholder dairying has become a good income-earning occupation for crop farmers in mixed farming systems. This is evident in Thailand, Malaysia and Indonesia where crop farmers turned to small-scale dairying and were able to make enough income and savings to give their children a college education. With further improvement in productivity and reduction in production costs, Chantalakhana and Skunmun (2002) believe that smallholder dairying in these countries can become a very sound and sustainable enterprise.

Figure 3.2 Farmers bringing bags of formulated concentrate from the local cooperative feed mill to their farm in West Java, Indonesia

Milk is nature's most complete food. Furthermore, dairying represents one of the fastest returns for livestock keepers in the developing world. It provides regular returns to farmers, especially to women, enhances household nutrition and food security and creates off-farm employment, as many as one job for each 20 kg milk processed and marketed (Hooten 2008).

3.1.1 Smallholder dairy farmers

There are often arguments as to what constitutes smallholder (as against large-scale) dairying. This book uses the following descriptor of dairy farms:

- Smallholder: up to 20 milking cows plus replacement heifers
- Semi commercial: 20–50 milking cows plus replacement heifers
- Commercial: more than 50 milking cows plus replacement heifers.

Smallholder dairy farmers are generally competitive and are likely to endure for many years to come, particularly where the opportunity costs of family labour and wages remain low. Furthermore, dairying is a viable enterprise in most Asian countries even among the landless and socially marginalised groups.

Policy makers should resist the all too common assumption that development efforts should move from smallholders towards supporting larger-scale, 'more efficient' milk producers to meet growing consumer demand. Instead, growing demand should be used as a stimulus to help continue and sustain smallholder dairy enterprises, particularly when they face increasing barriers to participate in value chain markets.

One good model to encourage is 'colony farming', which is established in centralised governed societies such as China but only recently evolved through dairy cooperatives in other countries such as Indonesia. With colony farming, smallholders house their herds together in a large dairy shed but are still responsible for feeding and maintaining their animals. These innovations require a large investment in buildings but they do allow smallholders to own and manage their own stock in a well-constructed durable shed and with the benefits of magnitude of size. This allows for communal forage production, large-scale silage making and bulk purchases of concentrates together with specialised labour undertaking machine milking and rearing of young stock.

3.1.2 What matters to dairy farmers most

Dairy farmers around the world have the same goal of running a profitable and sustainable business. These farmers, however, face different challenges in different countries, to achieve their primary goal. IFCN (2005) reported on a survey undertaken with dairy farmers from 30 different countries throughout the world, to prioritise major concerns affecting their business future. The concerns were grouped in various categories with percentages as follows:

- 85% reported that the joint market forces of low output returns and high input prices mattered most.
- 82% considered policy factors (such as global market, local/national market, environmental/animal welfare issues) to be important.
- 80% considered production factors (such as milk quota, labour, capital, land and animals) to be important.
- 50% expressed concern that despite recent advancements in their dairy sectors, many of the farm strategic factors (such as skilled management, optimal farm size, reducing production costs, diversification) lag below optimal levels for the majority of their farmers.
- 50% expressed similar concerns about the direct farm factors (such as feeding, breeding, animal health).

When the findings for China, India and Pakistan were grouped together to represent Asia, the key issues were prioritised as follows:

1. Low milk yield
2. High feed prices and shortages of feed
3. Insufficient veterinary and breeding services
4. Access to credit
5. Access to markets (except in China)
6. Strong informal sector (especially in India and Pakistan)
7. Low adoption of technology.

Improving the productivity, profitability and sustainability of smallholder farming is then a major pathway out of poverty. World Bank (2007) considers that this will require:

- Improving price incentives and increasing the quality and quantity of public investment

- Making product markets work better
- Improving access to financial services and reducing exposure to uninsured risks
- Enhancing the performance of producer organisations
- Promoting innovation through science and technology
- Making agriculture more sustainable and a provider of environmental services.

3.2 Smallholder dairying in Asia

3.2.1 An historical context

Dairy consumption in Asia has more than doubled over the last 25 years to reach nearly 260 000 Kt in 2007, 36% of global totals. With 39% of the world's dairy stock, producing 36% of the milk, imports make up 51% of the world's total dairy imports (FAOSTAT 2008). Since 2000, the dairy impetus has been even more dramatic in South-East Asia, with annual per capita consumption increasing by 10.6% (compared to 1.4% in South Asia and 1.1% globally), annual milk production increasing by 14.6% (compared to 2.9% in South Asia and 2.0% globally) while dairy imports have increased by 3.0% (compared to 1.6% throughout Asia and 2.2% globally).

In 2006 and 2007 long-term structural adjustments in international dairy markets occurred, which shocked dairy consumers worldwide. Global dairy supplies became tight due to the elimination of export subsidies for dairy exports by the European Union (EU) and export bans imposed by India. There were droughts in Australia and floods in South America, while feed grain prices rose due to demands for biofuels. Stocks held by key dairy exporters, such as the European Union (EU) and the United States (US), fell to record low levels in 2007. Constrained by stagnant milk production growth in these countries, the milk product trade declined marginally in 2007. Only 7% of the global production entered the dairy trade, and growth in this trade has been very slow because of fluctuating supplies by the few major exporters and the restricted market access by many countries. International dairy markets are still severely disrupted by extensive use of export subsidies, although this is now declining. The end result of all these occurrences has been the highest global prices ever for dairy products.

FAO use a relative food price index to describe international food prices, based on a trade weighted average of selected products in each food type, where a value of 100 is given for the 1998–2000 global price. This allows a direct comparison of food prices for a range of food commodities at any one time. In December 2007, food price indices were 295 for dairy, 226 for vegetable fats and oils, 210 for cereals, 137 for sugar and 127 for meat (FAO 2008b). Between 1990 and 2006, the dairy price index varied from 70 to 140, highlighting the current crisis experienced by dairy importers worldwide.

These factors are providing unprecedented opportunities for small-scale dairy farming in many developed countries (APHCA 2007), particularly in Asia where over 80% of the milk is produced by smallholder farmers. Another catalyst is the fact that dairy imports by developing countries reached US$21.3 billion in 2007, up from US$13 billion the year before. This was fuelled by a 67% increase in import prices which, in combination with escalating prices for basic foodstuffs, such as maize, rice and vegetable oils, raised regional concerns about national food securities.

Translating this into opportunities for local producers, strong consumption gains in Asia over the past 10 years have stimulated the dairy sector with production rising from 138 000 to 222 000 Kt in 2007. In fact, production gains in Asia have accounted for nearly 60% of global totals over the past decade.

Consumption of dairy products has always been strong in South Asia, where in 2007 each person consumed the equivalent of 93 kg milk, compared with the global average of 113 kg. However, the most rapid growth of milk consumption over the past decade has been in South-East Asia, which currently only consumes 31 kg milk/person/yr. Average gains in countries such as China and Vietnam have exceeded 11% pa, fuelled by growing incomes, changing diets and demographic trends favouring Western diets and strong generic promotion of milk products, particularly through the schools.

Asia, an area with high economic growth (5–6% pa in Growth Domestic Product), constitutes an important market for the major dairy exporters, dominated by New Zealand, the EU, Australia, the US and increasingly Argentina. While the region's dairy product imports, particularly those of milk powder, have nearly doubled over the period, from 10 000 to 24 000 Kt, the import dependency of the region has remained stable at nearly 9%.

Regional averages, however, tend to mask local realities and, in fact, while dairy imports by South Asia, limited by strong consumer preferences for fresh milk, availabilities of local product and barriers to imports, constitute only 1% of domestic consumption, imported milk products into South-East Asia region supply nearly 25% of domestic requirements. When calculating dairy imports as a share of processed milk, this share jumps up to over 90% in some countries.

Although Asia imports half of the global totals in milk products, there are import dependencies exceeding 80% in countries like Sri Lanka, Philippines and Vietnam where tariff levels are very low and consumers are familiar with and favour reconstituted milk products. In China, a country with double digit consumption gains over the last decade, imports constitute only 6% of total consumption. However, as they average 2500 Kt/yr, China is the largest importer of dairy products in the world, followed by Mexico, Russia, Egypt, Indonesia, Malaysia and Philippines.

International market prices for milk powder more than doubled over 12 months to reach US$5000/t in late 2007 (see Figure 7.1 in Chapter 7). However, such high prices were not maintained in the short to medium term. Increasingly, large Asian milk processors are gravitating towards local supplies of fresh milk, thus providing an impetus for developing the smallholder dairy sector.

3.2.2 The growth of dairy industries in South and East Asia

Dairy industries in tropical Asian countries have been developing at different rates over the last two decades, due to a variety of government (internal) and global (external) influences. The following graphs present an overview of the changes in numbers of dairy cows and milking buffalos (Figure 3.3) and their milk production (Figure 3.4) since 1990. For ease of comprehension, data are presented relative to the base data in 1990/92.

Growth in milking cow numbers has been modest in most countries (1–2% per yr), except for:

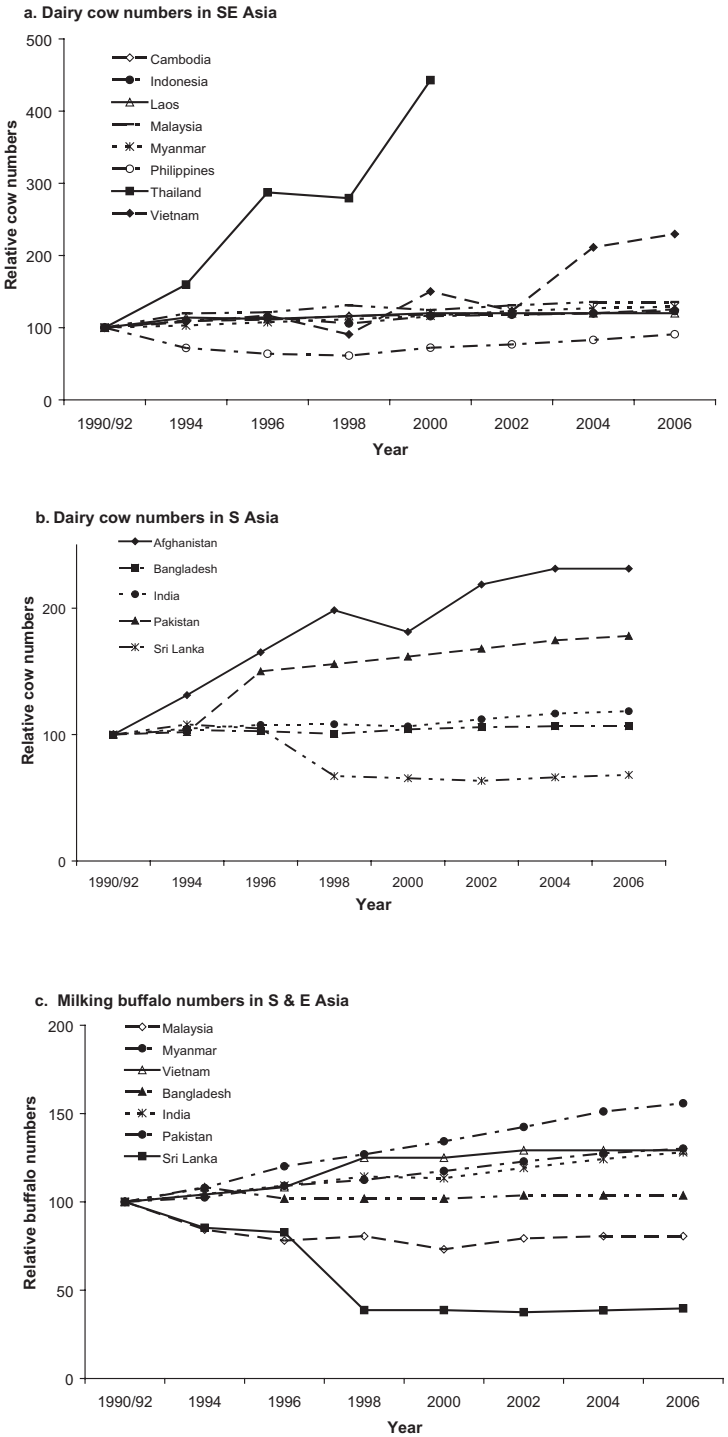

Figure 3.3 Changes in numbers of dairy cows in South-East Asia (a) and South Asia (b), and of milking buffalo in South and East Asia (c) relative to base numbers in 1990/1992

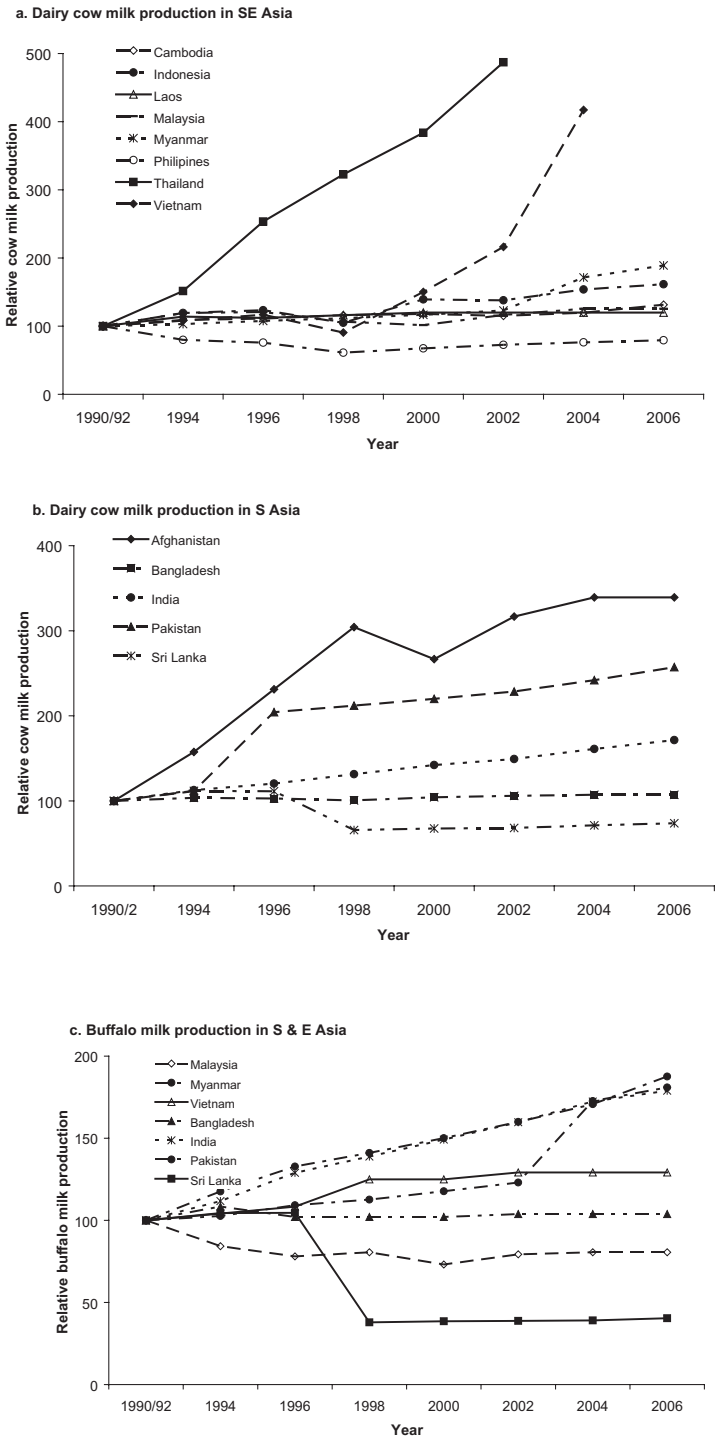

Figure 3.4 Changes in milk production from dairy cows in South-East Asia (a) and South Asia (b), and from milking buffalo in South and East Asia (c) relative to base level of production in 1990/1992

- Thailand, Vietnam, Afghanistan and Pakistan, which have all had rapid increases; Thailand, the fastest growing dairy industry in tropical Asia, had 660% more cows in 2006 than in 1990/92, growing at 40% per yr over this time period
- Philippines and Sri Lanka, where cow numbers actually decreased.

Relative growth in milking buffalo populations have also been modest (2–3% per yr) with Malaysia and Sri Lanka decreasing in numbers over the last 16 years. The fastest growing milking buffalo industry is in Pakistan, where numbers are growing at 4% per year.

Growth in cows' milk production has been modest in most countries (1–5% per yr), except for:

- Thailand, Vietnam, Afghanistan, Pakistan, which have had rapid increases; Thailand, the fastest growing dairy industry in tropical Asia, produced 610% more milk in 2006 than in 1990/92 and grew at 38% per yr
- Vietnam, where cow populations have been increasing at 8% per yr, while their total milk production has been growing at 30% per yr
- Philippines and Sri Lanka, where cow milk production actually decreased.

Growth in buffalo milk production has generally been faster than for dairy cows (namely 2–6% per yr), however, Malaysia and Sri Lanka both recorded reduced milk production from buffalo.

Table 3.1 presents the actual size of each industry in 2006, together with changes in their self-sufficiency in milk (from both dairy cows and milking buffalo, with very small contributions from camels, sheep and goats) since 1995 (the latest data available, GLIPHA 2008). India has the largest dairy industry in the world, which in 2002 accounted for 57% of the world's buffalo and 16% of its cattle. To help get this in perspective, the quantity of milk handled annually in the Indian informal market alone is greater than the annual world trade of exports of all dairy products, measured in liquid milk equivalents. Pakistan has the fourth largest dairy industry with the world's second largest population of milking buffalo. Myanmar's dairy cow numbers are sometimes queried by tropical dairy specialists because their 1.4 million cows are reported to produce less milk than the 300 000 cows in Thailand.

Malaysia and Philippines have consistently produced less than 5% of their consumed milk and dairy products while India, Pakistan, Bangladesh and Afghanistan produce all they require. Indonesia and Sri Lanka have been unable to keep up with increases in consumer demands over the last eight years, whereas Thailand and, in recent years, Vietnam have been slowly narrowing the gap between demand for dairy products and supply of raw milk. To help get national self-sufficiencies in perspective, Asian countries currently constitute more than half the world's importations of dairy products.

3.2.3 Future projections of demand and supply of milk in South and East Asia

Using FAO projections, Dalton and Keogh (2007) have forecast dairy demand and supply in 12 Asian countries, including China, Japan and South Korea, until 2020. They predicted the volume of dairy product consumption to increase in China, India, Pakistan

Table 3.1 The size of selected Asian dairy industries in 2006, and their self-sufficiency in milk in 1995, 2000 and 2003

	Dairy cow population (000 head)	Cow production (Kt or Million kg)	Buffalo population (000 head)	Buffalo production (Kt or million kg)	Self-sufficiency in milk (%)		
					1995	2000	2003
South-East Asia							
Myanmar	1406	808	313	171	88.4	83.1	86.3
Indonesia	374	578	–	–	51.0	48.8	47.3
Thailand	300	826	–	–	22.4	33.3	36.8
Cambodia	127	23	–	–	39.6	44.9	43.3
Vietnam	104	215	31	31	22.0	13.2	19.7
Malaysia	85	38	6	7	3.7	3.1	4.0
Laos	30	6	–	–	24.3	30.4	21.7
Philippines	6	12	–	–	0.9	0.6	0.7
South Asia							
India	36 586	39 775	33 173	52 100	99.9	100.1	100.0
Pakistan	7504	9404	10 130	21 360	99.6	99.7	99.8
Bangladesh	3870	800	56	23	93.2	88.2	88.2
Afghanistan	1850	2035	–	–	99.4	99.9	97.2
Sri Lanka	222	139	54	27	51.3	39.2	37.4

and Indonesia, and to a lesser extent in Thailand. Japan's dairy consumption is anticipated to decline while South Korea will experience a small increase in consumption by 2020. Import demand is projected to increase for Indonesia, Japan, Malaysia, Philippines, Thailand and Vietnam, while China's demands should plateau over the next decade. The only Asian country with dairy export potential is India.

Dalton and Keogh (2007) predicted that dairy product consumption (expressed as whole fresh milk equivalents) in the 12 selected countries will rise by 77 000 Kt, that is 55% above 2007 consumption levels. They considered that only 5200 Kt could be imported from global nations for which net trade data are available, thus requiring an additional 71 800 Kt to be produced domestically. Compared to 2007 production levels (129 000 Kt), this will require a 56% increase above projected levels of milk production from these countries over the next 13 years, or an average increase of 4.3% per year.

The Food and Agriculture Policy Research Institute (FAPRI 2007) have published data on projected demands and supplies of dairy products from selected countries in South and East Asia which is presented in Figure 3.5. The six Asian dairy industries for which predicted data (to 2016) are available vary greatly in size and predicted growth of cows' milk. The fastest growing will be Thailand (7% pa increase in milk production), while moderate growths are predicted for Philippines and Malaysia (3–4% pa), slow growth rates in India and Indonesia (1–2% pa) with Vietnam predicted not to increase

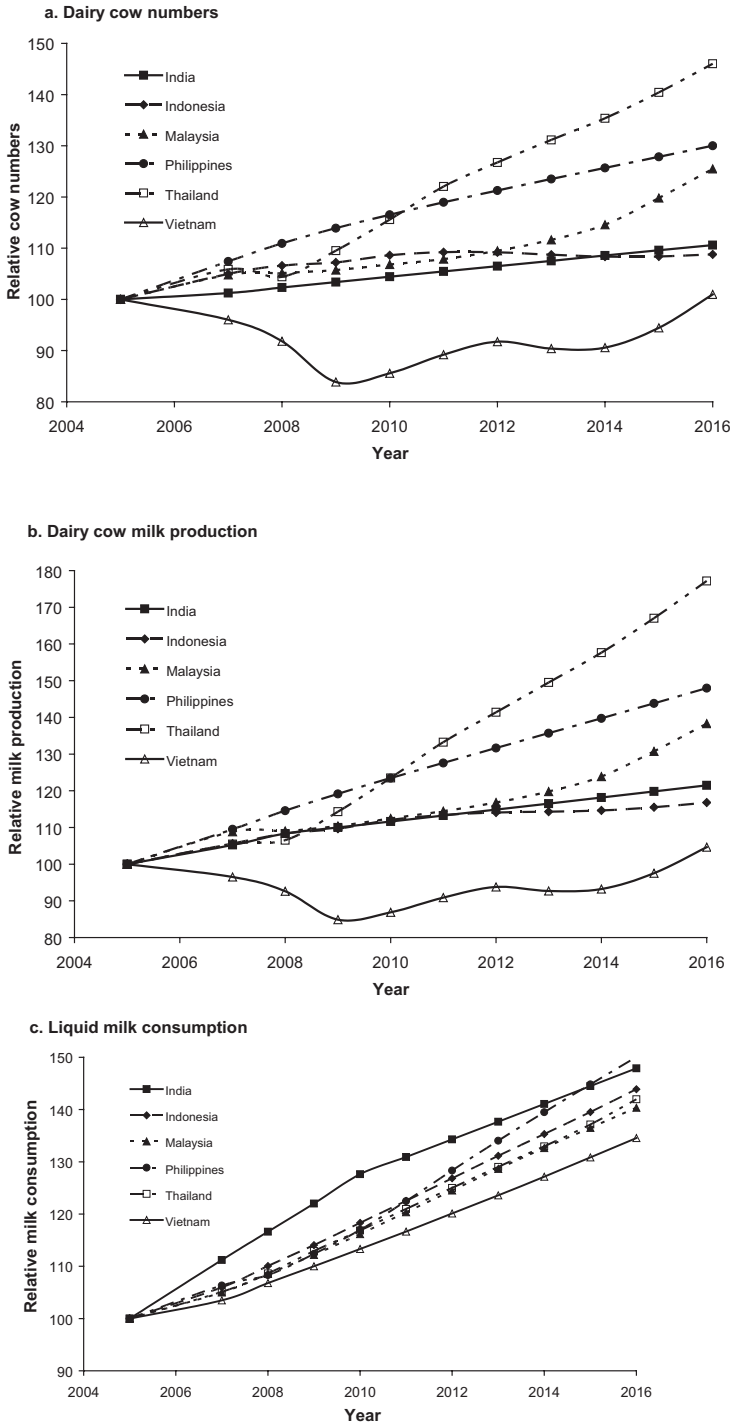

Figure 3.5 Projected changes in (a) dairy cow numbers, (b) milk production from dairy cows and (c) liquid milk consumption in selected countries in South and East Asia to base level of production in 2004/2005

its milk output over the next eight years. With predicted liquid milk consumptions of 3–4% pa in all six countries, there are likely to be major problems satisfying dairy demands in some of these countries. This is very relevant in the light of the findings of Dalton and Keogh (2007) because their prediction of 4.3% per yr dairy industry growth requirements are at the upper level of FAPRI's (2007) projected growth rates. Therefore achieving such high growth in domestic milk supplies will be a major challenge throughout Asia.

3.3 Development of smallholder dairy farming

Smallholder dairy development provides opportunities to address the persistent problem of rural poverty by transferring income from affluent urban households to their poorer rural counterparts, and improve food and nutritional security for poor rural and urban households. Commercialisation and intensification are frequently used as synonyms for development.

3.3.1 Objectives of dairy development

The three major objectives of any dairy development programs are to:

- Raise the living standards of traditional small-scale farmers and dairy market agents.
- Improve the nutrition of poor consumers; and, at the same time
- Sustain the natural resource base to ensure their long-term impact.

Such development can be achieved through:

- Creating employment in rural and peri-urban areas, both on-farm and along market distribution and value chains.
- Generating reliable income and asset accumulation for resource-poor farmers.
- Providing low cost and safe dairy products to poorly resourced (or using a recently coined term, resource-poor) consumers.
- Improving natural resource management and sustained farming systems through recycling dairy farm nutrients.
- Improving infant nutrition and social development in resource-poor households.

The objectives of a model pro-poor development program are to:

- Build on traditional dairy product consumption preferences, but at the same time promote demand for new products.
- Support the traditional domestic markets for milk and dairy products, while promoting a more formal marketing structure.
- Emphasise and support the role of the smallholder as a rural income generator while facilitating the intensification of mixed crop–livestock systems through providing appropriate improved animals, fodder technologies and enhancing farmer participation in local markets.

From work in Kenya, Hooten (2008) reported such policy and institutional changes to benefit both poor producers and poor consumers by decreasing milk margins by 9% through reducing transaction costs, milk spoilage and bribes.

3.3.2 Types of dairy development

Simplistically, Staal *et al.* (2008) separated dairy development into two types, traditional smallholder and commercial large-scale industrial. These categories were developed for the convenience of global dairy policy makers and many readers of this book would argue that there are many 'in between' dairy development programs.

1. **Traditional smallholder systems** reflect small-scale farm household systems often associated with informal milk marketing systems that predominate in many developing countries. These are generally based on mixed farming with cash crops and have small dairy herds with low levels of farm inputs and outputs. There are frequently nutrient deficits both on the farm and in the farm household. The farms are often located close to the markets and consumers. Their milk marketing is diffuse with many small-scale market agents, based on labour intensive handling and transportation. The farm outputs are destined for mostly low return liquid products which are limited in diversity, and with little emphasis on food safety. In addition, there is great diversity in market behaviour and the farmers have limited input into dairy policy making.
2. **Commercial large-scale industrial systems** represent large-scale industrialised production systems and the integrated marketing observed in most developed countries. These systems are usually single enterprise with large herds and high levels of farm inputs and outputs. With high capital inputs, their production systems are based on economies of scale. They have nutrient surpluses both on the farm and in the farm household. There is a high dependency on infrastructure (roads, water, electricity) and long market chains. Milk marketing is generally concentrated, consisting of few large-scale, vertically integrated marketing agents and industrial processors based on capital intensive technologies with diverse products destined for value added products, many non liquid. In addition, there is little diversity in market enterprise types with a larger input into domestic and international dairy policy making.

As with all generalisations, there are invariably exceptions. Indonesia, for example, is unique in that its dairy production sector is based on traditional smallholder farmers, but most of the milk is destined for industrial processing. The farms are located in the highlands of Java whereas the milk is transported long distances to the coastal cities where the processing plants were established, strategically located near the ports to source imported milk powder. The quality of local milk is such that it is best suited to making powder, because of its very limited shelf life as liquid product. Dairy consumption is not part of the Indonesian food culture and in fact, many farming families do not even drink their produce, because they consider it too valuable for local consumption. Chapter 6 provides further discussion on informal v formal milk markets.

Because it is much easier to 'showcase' large-scale dairies, they are popular with governments when planning high profile regional dairy development schemes. However, they require a much higher level of technical input than do smallholders, and once they become more heavily mechanised, 'more things can go wrong'. Hooten (2008) argues that in developing dairy industries, the growth and opportunity profile of such

Figure 3.6 Delivering the afternoon milk to a Milk Collection Centre in East Java, Indonesia

investments will eventually become stagnant compared to schemes more directed towards the poor, informal, smallholder dairy farmer. Such an opinion is not at deviance with those of many South-East Asian dairy specialists who attended a recent international animal production conference in Vietnam (Devendra, 2008).

3.3.3 The importance of rural wages and other growth factors

This shift from labour intensive towards capital intensive practices, both on-farm and in the market, is due primarily to the increased opportunity costs for labour. This shift to higher productivity of labour can be used as a measure of dairy development, reflecting change in all parts of dairy value chain.

In fact, Psilos (2008) has suggested that the rural wage rate is a key determinant of the optimum size of smallholder farms. Rising rural wages make other activities more attractive and tend to divert smallholders away from dairy farming. Because such dairy systems are labour intensive, their competitiveness relies on the low opportunity cost for labour. From surveys across the world's tropical smallholder dairy industries, dairy herd sizes grow as rural wage rates rise, when mixed farmers respond with capital investments (such as land for grazing as well as milking equipment and other labour saving devices) thus introducing economies of scale into their long-term plans for profitability and sustainability. Rising rural wages also provide the faming family with greater

opportunities for more remunerative off-farm wages, hence they are less likely to contribute their labour to dairy farming activities. Such farms may transition to specialised, small commercial farms where the emphasis is more on cash remuneration rather than various forms of income and asset building that makes dairying attractive to smallholder multi enterprise farmers.

The role of cow manure as an income generator varies considerably around Asia. In countries such as India and Pakistan, sun dried manure is an important domestic fuel for the kitchen where it can be an important contributor to farm profits. Some countries use manure in constructing houses, although its major sale benefit throughout Asia is as a fertiliser. In dense, subsistence regions in Kenya, Psilos (2008) noted that its sale value on smallholder farms was 130% of the value of raw milk. Financial benefits from manure are reduced when rural wages rise because manure handling is a labour intensive process.

The attractiveness of smallholder dairying then depends on low labour costs and lack of access to other farm investments. Where opportunities for other uses of labour are low and where soil nutrients and land are scarce, smallholder mixed dairy producers can successfully outcompete larger more specialised producers locally because they require lower formal financial returns from sale of milk.

Infrastructure, in the form of roads and milk collection and handling facilities, can also greatly influence the milk marketing sector. In fact, it partially sets the farm gate price for milk as Staal *et al.* (2008) noted that poor feeder roads can reduce milk prices paid to farmers by 3% for each additional km separating farm from market. This is not just due to the simple costs of transport, but also to the seasonal risks that such roads can impose.

Countries that do not have a strong tradition of milk production and consumption are particularly vulnerable to import competition and tend to be less self-sufficient in dairy products. This is more a function of demand rather than a lack of domestic supply. Where there are strong dairy traditions, most demand is for raw milk and traditional products, for which imports cannot easily be substituted, if at all. Supporting the development of traditional markets thus takes on the added feature of helping buffer domestic production from imports.

3.3.4 Losses in the dairy value chain

With regard to milk spoilage, recent FAO studies have quantified such economic losses in several smallholder dairy industries in Africa (FAO 2008a). For example, 27% of all milk produced in Uganda is lost, with 6% wasted at the farm level, while 11% and 10% of production is either lost to spillage or spoilage during transport or marketing, respectively. This amounts to a value of US$26 million per yr. In Kenya, the annual loss of 95 Kt is valued at US$22.4 million while in Tanzania, the 60 Kt annual loss is valued at over US$14 million. Dry season losses in Tanzania amount to 16% of production while losses in the wet season may surpass 25%. It is then likely that spillage and spoilage losses throughout South and East Asia, with similar smallholder dairy infrastructure as in Africa, could amount to 20–25% of total production. As most of these losses occur post farm gate, they have little relevance to the business management of smallholder farmers, so are rarely, if at all, incorporated into any farm based COP analyses.

3.3.5 Dairy development and farm technology

Dairy development is generally associated with technical changes to improve milk yield per cow. However it should be noted that:

- The use of exotic cattle is a rapid and potentially sustainable path to higher productivity, even for small-scale resource-poor farmers and in warm, semi arid or humid climates. However, there have been many repeated failures of such schemes for obvious but often ignored reasons.
- National and local breeding strategies need to address the realities of climate and disease risk to increase the likelihood of successful crossbreeding programs.
- Fodder technology should be an integral part of any dairy development program, particularly if it incorporates importation of stock of high genetic merit (or quality).
- The success or otherwise of intensive fodder production schemes is more likely to depend on availability of cheap labour, scarcity of land and good access to milk markets than it is on agro climatic setting. Where labour is scarce, intensive fodder cultivation practices and the feeding of crop residues to cattle are unlikely to be taken up unless mechanised. Promotion of such schemes should pay very close attention to labour opportunity costs.

Requisites for long-term sustainable dairy development

For dairy development to be sustainable, there must be:

- Adequate infrastructure and marketing opportunities.
- Access to reliable markets for increased milk production.
- Promotion 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 ensures adequate feed throughout the year.
- Management of animal wastes.
- Disease control measures.
- Adequate hygiene for milk collection.

3.3.6 Strengthening and enabling smallholders

Chantalakhana and Skunmun (2002) highlighted some of the challenges to food security in Thailand, which only produces 40% of its dairy products. Such conclusions would apply equally to most, if not all South and East Asian countries. Most smallholder farmers in Thailand have only limited primary education and would have forgotten how to read and write since leaving school. Unless farmers are well informed about new technologies, there is little hope for improved milk production. Such technology transfer is a real challenge, particularly when extension services are generally weak and ineffectual due to Thailand's centralised bureaucratic system. In recent years, government services are being decentralised but this has yet to occur at the local level. Because of a general lack of current market information, rural farmers are usually being

taken advantage of by local traders or middlemen. Easily accessible market information and fair market prices for farm commodities should enable smallholders to make the right choice of what to produce and for what sale price.

Farmer organisations or cooperatives can serve as effective means to strengthen farmers' bargaining power in dealings with the problems of food production, marketing and others. Strong farmer cooperatives are a key to profitable milk production. Successful dairy cooperatives in Thailand commonly involve dedicated farm leaders and little government intervention, except in the initial periods. Promotion and technical support by the government through farmer organisations involving farmers' participation in the process then provides a more effective and transparent means of reaching the grassroots level.

In Thailand, government policies in support of food security remain weak or are lacking in many areas, such as:

- Land reform, because landlord and rich business people have strong influence in political parties
- Land use planning and enforcement, where agro-economic zoning has been largely unsuccessful
- Support for research and development (R&D) for small farmers
- Efficient management of irrigation, where some irrigated and fertile areas have even been converted to housing estates and residential areas
- Support for efficient marketing systems for agricultural products
- Promotion of regional food processing and agro-industry, which has been inconsistent and ineffective in regions outside Bangkok.

Improving small-scale farm productivity

After several decades of dairy development in many Asian countries, average milk yields per cow per day still range between 8–10 kg as compared to average yields of 20–30 kg in developed countries. In addition, the average calving interval of dairy cows in smallholder farms is commonly as long as 16–20 months, when it could be reduced to 14–15 months. This clearly shows their low levels of farm productivity. Some technical solutions are available but they must be carefully selected so they will be suitable for small farmers and their socio-economic conditions. This means that scientists and extension workers must be able to understand factors influencing the acceptance of technology by farmers. Scientific knowledge alone cannot solve small-scale farm problems.

Some of the major challenges to such service providers are:

- Effective delivery of appropriate technology to benefit small-scale farmers at farm level
- Fair price policy and efficient rural livestock marketing systems promoted by national governments
- Promoting active and workable farmer groups or cooperatives
- Involving farmer participation in research and extension
- Linking public institutions and the private sector in technology delivery.

In conclusion, Chantalakhana and Skunmun (2002) called for new strategies to facilitate dairy development within Thai government industry support and dairy

cooperative structure, and again these are relevant to any developing dairy industry. These include:

- Establishing a national dairy board, consisting of representatives of all the industry stakeholders, to formulate and oversee national dairy policies to promote the smallholder dairy industry.
- Putting major inputs into strengthening dairy training for farmers, for example mobile extension units to provide on-farm advice.
- Establishing a national herd improvement program, firstly to select and multiply superior quality dairy sires and cows, and secondly to cull cows with below average milk yields. These cull cows could either be used for beef production in other areas or if slaughtered, the farmers should be provided with some compensation.
- Continued support for dairy research with highly selected topics aimed at solving 'real farmer's problems'.