SUPPORTING SMALLHOLDER DAIRYING IN ASIA

L. Falvey and C. Chantalakhana*

Tropical Asia is the largest milk-producing region of the world. Its efficiency as an integrated smallholder production system provides financial, health and social benefits to millions of rural dwellers. Variations between cultures and economic circumstances define local options for further development of smallholder dairying. Notwithstanding the success of this industry, it has been misunderstood in some international development agencies and national policies, and as a consequence has not attracted the same analysis and investment as other sub-sectors of agriculture and rural development. Technological and environmental efficiencies suggest that smallholder dairy industries may demonstrate a higher likelihood of sustainability than the mono-cultural industries of developed countries. The contributions, success, and social and economic spin-offs support a revised consideration of smallholder dairying in the national development policies of tropical Asia.

Smallholder dairying is a major Asian activity, as is clear in India, the world’s largest milk producer and consumer. Nevertheless, assessments of investment potential by international development agencies have largely rested on assumptions that smallholder dairy producers in Asia behave in a similar manner to past smallholders of more developed countries (ADB, 1991; World Bank, 1987). In some cases, it is assumed that smallholders will evolve into larger producers in free market environments. Analyses for the future of smallholder dairy producers are then based on gross comparisons of natural resource endowments rather than labour or available options. As this favours the competitive advantages of temperate climates, smallholder dairying in Asia is discounted as non-viable without subsidies. The success of existing industries that have become established with minimal foreign involvement belies these conclusions. This discussion draws on global experts and scholars (see Falvey and Chantalakhana, 1999) in smallholder dairying to present a conceptual framework for new approaches to international development analysis in Asian dairying consistent with current thought on ‘alternative’ agriculture approaches (Conway, 1995).

* Respectively Chair of Agriculture, Institute of Land and Food Resources, University of Melbourne and Professor, Kasetsart University, Bangkok.
Globalization of international milk processing is creating markets for generic milk products. At the same time, they are creating a niche for low cost producers of milk. Bifurcation of the market into two distinct industries and product groups is likely to suit both milk product exporters such as New Zealand and Australia with their subsidy-free and low cost industries, as well as the low cost production systems of less developed countries (De Boer, 1999).

I. STATE OF THE ART

Management around social and environmental limitations has been the key to success of smallholder dairying industries. Examples include selection of cattle suited to individual environments and management systems, such as the countless generations that produced the stable breeds in India, and cultural behaviours that enhance animal welfare. The use of buffalo for milk production in India may in fact be seen as a broadening of the concept of selection. In that case, ‘selecting’ a different species and then selecting for genetic characteristics within that species has allowed production from a wider range of physical environments associated with socio-economic demands for other outputs, such as draught and meat.

As distinct from the past, the use of new techniques and knowledge in genetic upgrading now allows the production of suitable animals from cross-breeding of local with temperate dairy breeds, cross-breeding of local with locally improved dairy breeds, and selection within local breeds. Artificial insemination has been widely proven for rapid upgrading of Asian dairy breeds. However, such programmes rely on constant evaluation of milk output and hence require sound herd recording systems (Na Phuket, 1999).

Smallholder production systems show low outputs of milk per animal. When analyzed on a cost benefit basis, the use of by-products or other waste as feed, and multiple outputs such as draught and meat production are seen to raise the efficiency of smallholder production systems above those of dairying monocultures. In addition, feeding technologies now allow increases in milk production by matching nutrition to physiological state, age, and management of draught requirements (Zerbini and Wold, 1999).

Integration of dairy farming with crop production systems is foreign to western mono-cultural approaches. Models of an integrated farming system indicate incremental benefits from dairying as an adjunct to cropping, draught, meat, pig production, and a range of other farm-based enterprises (Remenyi, 1985). However, models do not facilitate simple economic rate of return analyses that partitioned all inputs between industries. The problem is common to ‘alternative’ agricultural approaches now seen as synergistic with conventional development technologies (Cornell University, 1999).

Many agricultural systems in highly populous areas may prove unsustainable, although they must be tolerated in the short term to overcome peaks in human
population growth and the development of new technological innovations (Conway, 1984). Low-input integrated farming systems offer such higher production as they circulate nutrients with high efficiency while incidentally accumulating few toxic products in any one area. Systems developed in integrated dairy production in highly populous areas as Indonesia, China, Viet Nam and India provide an indication of the probable sustainability of these systems (Egan, 1999). Dairy industries based on high cow turnover rates, high veterinary and metabolic enhancing chemical inputs, and concentration of waste in more developed countries appear to be less sustainable (Falvey, 1999).

The future for smallholder dairy development will rely on continued education of smallholders and research. Research must acknowledge integrated systems and the role of smallholders, while focusing on such technical parameters as: breeding systems, herd recording, feeding systems, production of breeds, the multiple uses of animals, management of reproduction and health, and milk harvesting systems (Cornell University, 1999). The strong social research requirement of smallholder dairying contrasts with that of dairy research in more developed countries while the technical elements share common scientific bases. The future for individual countries in smallholder dairy production is likely to vary according to the stage of development of a country, the relative levels of market protection, and an understanding of smallholder dairying by international development agencies (Chantalakhana, 1999).

II. MODELING UNSUITED TO POLICY

Policies for encouraging smallholder dairying in the Asian tropics cannot rely solely on modeling because of its integration with the very lives of smallholders. Conventional analysis seems appropriate for large processing facilities, yet many smallholder systems rely on locally developed processing technologies that, in such countries as India, handle larger volumes of milk than technological demanding western systems. Modeling of the farm production system would be largely an academic exercise and would include variables common to many smallholder integrated systems such as:

**Feeding systems:** crop residues; pastures; communal pastures; concentrates; preserved pasture; supplements

**Breeding systems:** local breeds; local breeds crossed with temperate dairy breeds; local breeds crossed with local dairy breeds; near pure bred and purebred temperate dairy species

**Production systems for fodder:** specialist fodder producer; production of own fodder; roadside harvesting; communal management

**Stimuli for development:** development banks; local banks; government programmes; aid organizations; local initiatives; non-government organizations
Physical environment: wet tropics; dry tropics; high altitude; low altitude; rainfall distribution; temperature variations

Management: epidemic disease management; herd and individual animal management; housing; feeding for production; private services for animal health; production systems; milkers as specialist service providers

Applicable technologies: herd recording; by-pass protein feeding; urea and alkaline straw treatments; vaccination programmes

Milk market: local fresh milk; local pasteurized milk; export from local area; processing for local boutique markets; selling to large factories; domestic use; mixing with imported milk powder

Processing: village level; area collection and processing; factory-based; multinational factory-based

Integrity of dairy system: specific dairy enterprise; mixed farming enterprises; adjunct to other farming activities; adjunct to other wage earning activities; fully integrated with farming system

Multiple animal outputs: draught; meat; asset management; religion; status

Sustainability: short term; medium term; long term; comparison with other food production enterprises; comparison with dairy sustainability in other countries

Animal species: cattle; buffalo; goats; sheep; other

External environment: implications of GATT; policies of financing and funding agencies; involvement of multinational processing facilities; local ability to collectivize

Land ownership: landless; own land; own dairy-shed land; utilization of farming in conjunction with communal land; communal grazing; family assets; migratory production

Outputs: raw milk; family security; income; infant and family nutrition; marginal incremental output to an integrated system; benefits from animal manure for cropping; maintaining additional animals for work; meat consumption; additional animals for sale.

III. DAIRYING AND DEVELOPMENT

Comparison of stages of development against other slightly more developed countries is an unreliable input to planning. For example, the success of smallholder dairying in India owes much of its success to cultural elements that do not appear common to other regional countries. Nevertheless, the stage of market development for milk products may be of value. For example, the relatively undeveloped markets of the Lao People’s Democratic Republic suggest that smallholder fresh milk production would need to be competitive with imported Thai milk. The lower wage rates and land rentals of the Lao People’s Democratic Republic have in fact favoured such development.
IV. MARKET PROTECTION

Market protection has stimulated a range of industries, including dairying, to improve national food security (Gunawardana and Quilkey, 1987). Assuming that such industries remain unviable when protection is removed have proved erroneous where market demand has risen with increased product availability during the period of protection, such as occurred in Thailand through the 1970s and 1980s. Demand has also been shown to increase with urbanization and wealth creation. In a rapidly developing economy such as Thailand, the improved nutrition and childcare observed among the middle class, caused milk consumption to rise from virtually zero to levels of demand several times above current production capacity. In this situation, a premium may be possible for local fresh milk above products reconstituted from imported milk powder.

Dairying development in tropical Asia differs from the circumstances which we see working in general agricultural development. The circled area of figure 1 represents the paradigm of agriculture as the engine of growth (Tribe, 1995), which explains the relationship between increased agricultural production and economic development. A significant agricultural base producing a surplus provides a basis for industrial development, often initially through agro-industrial products, to create greater economic wealth, increased economic activity and employment leading to a general increase in demand. While the dairy industry can play a part in such economic development, expansion of dairying may also be a response to economic development itself as demand for milk as a safe and nutritious food for children expands and creates a reliable market base, as shown in the section below the circle in figure 1. Dairying can thus be both a first and second wave component of economic development, a factor often omitted from analyses based solely on the agriculture as the engine of growth paradigm.

V. LARGE-HOLDERS AND PROCESSING

Large-holder dairies are commonly associated with existing enterprises of diverse products where marginal costs in marketing and distribution allow efficiencies. However, reliance on high cost imported products reduces this competitive advantage and is causing rationalization of intensive dairies, particularly those based on United States technologies. The relationship between small and large-holders has developed into a smallholder supplier and processing facilities linked with larger producers, although smallholder cooperative processing offers greater security and social equity (Belavadi and Niyogi, 1999).

Smallholders tend to gradually increase the number of animals in their herds, from two to six to 12 for example, according to their management capabilities, access to low cost feeds and labor, location with respect to milk collection and markets, land
and water availability and the comparative productivity of other agricultural enterprises. Trends among smallholders to shift from hand milking to simple machine milking are evident in some areas supplying high quality raw milk to local processing facilities serving middle-class markets. A revolution in milking through labour savings and increased animal health and milk hygiene appears to be beginning with local innovations. Likewise, cooling of raw milk and improved hygiene will determine the rate of smallholder dairy expansion.
Future smallholder dairying is likely to be connected through cooperatives or as satellites for processing facilities evolving according to market needs, cost structures, and the cultural requirements of a country or region. The short term future would confirm the importance of such cultural factors as; reticence to kill male calves, reliance on traditional health and nutritional information, reducing seasonality of employment in crop production, affinities in working with animals in particular bovines, and utilizing by-products for low to medium output dairy enterprises.

VI. SPECIALIST MARKETS

Smallholder producers in the Asian tropics supply niche markets for a range of agricultural commodities. A niche can be maintained in both market and production terms as a result of historical origins, and cultural preferences, such as the range of locally demanded dairy products in South Asia. In the same manner that effective use of low cost labour is an alternative to organic chemical application in the production of a higher-priced ‘organically’ horticulture products, smallholders can provide fresh milk and cater to local tastes.

Lower costs of production can compensate for lower levels of output, particularly where high-cost fashion elements of the dairy industry are avoided, such as expensive imported breeds. Cross-breeding to produce optimal genotypes for smallholder management and local nutritional regimes have been observed to develop as the viability of smallholder dairying industries in a location is recognized. Thus research should be oriented to local needs that are not met by imported technology (ILRI, 1995 and 1996).

The range of economic benefits from smallholder dairying yet to be universally acknowledged in national planning and socio-economic analyses includes:

- year round engagement of rural and peri-urban labor
- utilization of agricultural and other by-products
- integration with cropping systems management
- conversion of by-products to 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 production of meat for traditional markets in circumstances of rising costs as draught power declines as the primary bovine product
- a basis for rural and peri-urban 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 persons making a reasonable local living from dairying
VII. INTERNATIONAL DEVELOPMENT AGENCIES

Smallholder dairying in the tropics has not been a popular area for investment by multinational development agencies such as the World Bank and the Asian Development Bank, or even for most bilateral aid agencies (EEC, 1984; Falvey, 1992; NMDC, n.d.). Much of this unpopularity has been related to the high levels of protection afforded to many dairy industries and a consequent assumption that the tropical industries may not survive without protection. Large multilateral financiers and funders of development activities require large projects and necessarily have focused on industries with which they are familiar; this has worked against the interests of smallholder dairying in tropical Asia. Analyses of the viability of dairy industries in tropical countries have commonly assumed models similar to those of more developed countries.

Notwithstanding the emphasis on large-holder dairying, funding agencies have shown flexibility in supporting other smallholder activities, such as cropping through new technologies, and irrigation, fertilizer, and credit infrastructure. Smallholder dairying has been largely overlooked, except by some European bi-lateral programmes (for example, DANIDA, 1994). Arguments that it is economically inefficient to assist the selection of dairy breeds adapted to the environmental, feed and social conditions of a tropical country are belied by the obvious success of India in developing locally adapted breeds. Local knowledge, needs and opportunities offer scope for unforeseen innovations; the exceptional Operation Flood in India provides one example of how local socio-cultural values can allow collectivization to the benefit of smallholders (Patell, 1997).

VIII. CHARACTERISTICS OF THE FUTURE

We feel that the future of smallholder tropical dairying in the tropics will be characterized by unique factors valued in their own right, rather than as variations from the western norm. Such characteristics would include:

- production of milk as one of many outputs from integrated farming systems
- reliance on smallholder dairying for the majority of local milk and products
- a increased focus for low cost fresh milk production for local towns
- production of boutique milk products, in many cases orientated to local tastes
- utilization of waste and by-products as principle animal feeds
- adaptation to and utilization of available local inputs
- self-help development and communally-owned processing facilities
- optimizing rather than maximizing milk yield within low cost systems
national agricultural research system investment in smallholder dairying

rural and urban links through fresh or non-perishable product.

Indigenously developed techniques and selective adaptations from international research have led smallholding dairying in the Asian tropics to a point where a future seems assured. Understanding the integrated approaches of smallholder Asian agriculture, a wider challenge for development agencies and policy makers, remains the primary constraint to appropriate development in the sector.
REFERENCES


NMDC, no date Development Cooperation in the Beef and Dairy Sector (The Hague, Netherlands Ministry of Development Cooperation).


