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Linking school milk with smallholder dairy development strategy: Thai experience and design considerations for a pilot project in Bangladesh

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However, the authors alone are responsible for the views expressed in the report.

The Authors

Executive Summary

The FAO Regional Office for Asia and the Pacific is coordinating the implementation of two linked regional projects in Bangladesh, Myanmar and Thailand – one on improving productivity and market access of smallholder dairy producers, and another on linking school milk with dairy development. The link between the two projects is to test a hypothesis that 'local milk for local schools' can serve as an important incentive for stakeholders to develop smallholder dairy as well as reduce malnutrition among children. The purpose of this study was to review past and ongoing nutrition and school feeding programmes in Bangladesh and Thailand and draw lessons for designing a pilot school milk project in Bangladesh linked to the smallholder dairy development project.

A review of nutrition and school feeding programmes in Bangladesh reveal that in the past there were some nutrition programmes to address food security of poor people but virtually nothing on school feeding with or without milk in that domain. Currently, there is an on-going school feeding programme implemented by the WFP in collaboration with the Ministry of Primary and Mass Education in a number of districts. This program was initiated as a pilot project and provided micronutrient fortified biscuits to primary school children as snacks to reduce malnutrition, enhance school attendance, reduce drop out, and improve school performance. The government has recently decided to expand the coverage of the programme with own resources.

A pilot project on school milk was implemented by Tetra Pak and Land O'Lakes (a large US NGO), for a number of years in three upazillas in Jamalpur district. This was based on USAID granted commodity aid (powder milk, wheat, edible oil) to facilitate school feeding to address malnutrition. The aid granted milk powder was sold to local milk processors and UHT milk was bought back to serve primary school children. The primary interest of Tetra Pack in sponsoring this project was to test the acceptability of UHT milk among Bangladeshi dairy processors and consumers as a vehicle to create business opportunities for its milk processing technology. Since marketing of pasteurized milk requires good transportation network and refrigeration facilities, the market for pasteurized milk outside Dhaka is limited. Tetra Pack saw this as an opportunity for UHT milk. Being dependent on imported powder milk, the project had no link with local dairy production. The project ended when USAID commodity grant was stopped. By then however a number of dairy processors had created UHT processing facility and the market for this product is expanding, especially outside Dhaka. There are a number of other small projects in which milk is sporadically distributed among children but none of these can be classified as school milk programme *per se.*

In Thailand, dairy development prospered under strong Royal patronage and government policy support since the early 1960s. Throughout the 60s, 70s and 80s, dairy development efforts were facilitated by dairy breed and feed development, promotion of dairy farming as an alternative to crop farming for income and employment creation, promotion of dairy cooperatives for organizing milk collection, processing and marketing alongside private dairy processors, and tax and tariff and investment policy to protect domestic dairy sector from international competition. Consequently milk production increased rapidly and the share of domestic production in total consumption also increased. However, by the late 1980s,

producers started facing problems in marketing milk especially when processors tended to import powder milk due to low world market price, so producers protested several times about lack of stable market and remunerative price for raw milk. On the other hand, in spite of rapid income growth in the economy over nearly two decades, malnutrition was widespread especially among children even though a school lunch programme was in place. About that time, FAO had drawn the attention of policy makers through its school milk advocacy programme about the virtue of school milk to address malnutrition among school children.

Against this background, and based on the experiences of two pilot projects on school milk in Bangkok, under a new Royal patronage, the government launched a national school milk programme in 1992 with full government funding alongside an ongoing school lunch programme. The objective of school milk program was to provide dairy producers an outlet for a share of their milk output and to reduce malnutrition among school children. During the first three years, only kindergarten students were provided with milk. Other grades were included gradually reaching the 6^{th} grade in the 17^{th} year after inception of the programme. Since 1992, the dairy sector in Thailand experienced rapid growth in terms of number of dairy farmers, dairy cattle population, yield and output, number of dairy cooperatives and processing capacity. The school milk programme played a key role in this process. The journey has not been always smooth though, as the programme had to undergo several changes in terms of its governance and management during the last two decades to address issues related to milk collection from producers, contracting processors for delivery to schools, milk prices along different points in the supply chain, quality of school milk and administration of the school milk budget. The important aspect of these changes were that these were done in consultation with all the stakeholders including the country's Cabinet, the highest policy making body.

The Bangladesh component of the smallholder dairy development project and the pilot school milk project are planned to be implemented in partnership with the Grameen Motsho Foundation (GMF), a member of the Grameen Bank family of organizations. GMPF had implemented a Community Livestock and Dairy Development (CLDDP) project with UNDP funding during 1999-2005 in several districts in northwest Bangladesh among landless and poor households already engaged in an aquaculture programme to improve livelihood through increased livestock income. In case of dairy, the project helped landless and poor households to acquire dairy cows by providing credit, promoted crossbred cattle through providing artificial insemination service and concentrate feeds to increase milk yield, provided a compulsory insurance service to reduce risk from death of cows and heifers, created milk collection and chilling facilities to provide a stable market outlet at remunerative price. After the project finished in 2005, GMPF continued livestock related activities with accumulated savings and other own resources.

It is understood from FAORAP and GMPF that that the new smallholder dairy project will be implemented in two of the three districts – Sirajganj, Kurigram and Thakurgaon- where GMPF have on-going livestock activities with or without dairy.

Based on a review of the status of the current dairy and other livestock activities and facilities of GMPF, it appears that the school milk pilot project may be implemented in either Nimgachi in Sirajganj district or Ranishankail in Thkurgaon district or in both the locations. However, the possible nature of link between the smallholder dairy project and the school milk project will depend on the milk marketing strategy to be adopted in the dairy project. Several milk marketing options and their pros and cons for linking the school milk pilot have been discussed in detail. In short the options are as in the table below. A choice has to be made after careful consideration of each option.

	Milk marketing option for the smallholder dairy project	Implication for the school milk pilot
1	Sell chilled milk to a large processor e.g. Rangpur Dairy, Aarang Dairy, Pran Dairy under time bound contract minus required amount for school milk.	Link with school milk pilot is unsuitable as chilled milk is unsuitable for delivery and for school feeding.
2	Add mini pasteurization plant to existing chilling plant at each site to serve school milk, sell remaining chilled milk to others	Link with school milk pilot need to recognize that there is no tradition of drinking cold milk among children. So implication of drinking cold milk and cold chain to supply safe cold milk need to be addressed.
3	Create a central facility for pasteurization collecting milk from three project sites.	Link with school milk need to consider points made in relation option 2 and additionally this option will be more expensive
4	Add mini UHT plant to chilling plant at each site or at a central place for both school milk and outside sale	Highly suitable for school milk pilot. But need large initial investment and may not be competitive with other UHT processors
5	**S**ell chilled milk to a large processor having UHT facility e.g. Rangpur Dairy, Aarang Dairy or Pran Dairy under time bound contract and buy required quantities of UHT milk for the school milk pilot.	Highly suitable for school milk pilot. May be difficult to find a buyer for chilled milk having UHT facility on reasonable terms Cost of collection of raw milk and delivery to processor will be high and " local milk for local school' philosophy may be unrealized.
6	Sell chilled milk to Grameen Danone under time bound contract and buy back required quantities of fortified yoghurt or Fermented Milk for school milk pilot.	Fermented milk highly suitable for school milk pilot with minimum logistic for distribution. Fortified yoghurt also suitable for school milk subject to establishment of delivery cold chain. Establishment of delivery cold chain for fortified yoghurt for school milk likely to be difficult and expensive especially if school pilot is located in Thakurgaon due to distance. " Local milk for local market" may not be visible as it will get diluted with Grameen Danone's overall processing operations.

1 Background and Objectives of the Study

The Food and Agriculture Organization, Regional Office for Asia and the Pacific (FAO RAP), is in the process of implementing two complementary regional projects with funding from the CFC, FAO, APHCA and the participating countries. The projects are :

Project 1: Smallholder dairy development in Bangladesh, Myanmar and Thailand : improving the bargaining power and sustainable livelihood of smallholder dairy farmers through the enhancement of productivity and market access in dairy.

Project 2: Enhancing milk consumption and livelihoods through school milk programmes linked to smallholder dairy operations in Bangladesh, Myanmar and Thailand.

In Bangladesh, the projects will be implemented in partnership with the Grameen Motsho O Pashushampad Foundation (GMPF), an organization operating within the umbrella of the Grameen Bank – a specialized bank wellknown for its innovative micro-credit without collateral. It is envisaged that in project 1, productivity improvement and options for enhancing market access will be tested and school milk programme may be one of the outlets for a portion of the marketed milk. While in project 2, the efficacy of school milk as a market outlet for the development of smallholder dairy sector will be tested. The envisaged link between the two projects is that the school milk programme will be piloted in the same area(s) where the productivity and market access enhancement project will be implemented assuming that "local milk for local schools" may serve as a powerful incentive for smallholder dairy development efforts by actors or stakeholders in the dairy value chain from producer to consumer.

In order to help design the pilot school milk project in Bangladesh, this study was conducted with the following objectives or terms of reference:

1. Review ongoing and past nutrition programmes in Bangladesh giving special attention to dairy products based programmes targeted at school children.

2. Conduct a thorough review of the school milk programme in Thailand and incorporate lessons from this review in design of pilot interventions in Bangladesh (see point 5 below)

3. With respect to points (1) and (2) above, examine the role of public policy, costs and modalities of implementation, and linkages to private sector and draw lessons for design and implementation of school milk programmes based on local smallholder milk production

4. Identify a matrix of indicators which are critical to effectively piloting and monitoring local interventions. These could include complexity of design and monitoring, institutional capacity to implement and monitor these programmes, commitment to the idea (both public and private), required infrastructure and logistic support, cultural preferences, etc.

5. In partnership with GMPF, identify suitable locations for piloting interventions in Bangladesh within the CFC supported smallholder dairy development project areas and develop a strategy for piloting interventions

In order to fulfill these objectives, a review of literature was conducted on school feeding programme with or without milk in general and those in Thailand and Bangladesh in particular. Key stakeholders involved in dairy policy and projects, especially with respect to school milk programme, in Bangladesh and Thailand were consulted; these included government departments and other organizations, universities and research institutions, dairy cooperatives, dairy processing companies and NGOs, local government authorities, schools, and dairy farmers. Discussions were also held with senior managers of GMPF, the agency responsible for implementation of the Bangladesh component of the regional projects, especially about their past dairy operations, current activities and facilities in the context of plans for implementation of the new projects. And above all, discussions were held with FAO RAP officials responsible for coordination and execution of the regional project.

The report is organized as follows. In section 2, nutrition and feeding programmes in Bangladesh with a focus on school feeding are reviewed. In section 3, the development of the dairy sector in Thailand and the role of school milk programme in the development process is reviewed. In section 4, public policies on dairy and school milk, and their implications for dairy development in Thailand and Bangladesh are compared. In section 5, issues to be considered for designing the proposed pilot school milk project in Bangladesh are discussed and on that basis, a framework with alternative options for implementing the pilot project is suggested.

2 Review of Nutrition and Feeding Programmes in Bangladesh with a Focus on School Milk

Poverty and malnutrition have been pervasive problems in Bangladesh since her independence. Child malnutrition reflected in high rates of underweight, stunting and wasting has declined over time but is still above the WHO thresholds for very high levels, typically found in emergency situations (Table 2.1). Key macro- and micro-nutrient deficiencies especially Vitamin A, iron, zinc and iodine, and low birth weight and maternal undernutrition continue to be major public health problems in the country. These problems impair physical and mental development of children in general and also create nutrient-specific outcomes such as night blindness due to Vitamin A deficiency, and overall increase in vulnerability to other health and disease problems.

Table 2.1 Status of poverty and child malnutrition in Bangladesh

Poverty Indicators	**1990-95**	**2010**
Poverty headcount ratio	59.0	31.5
Poverty gap ratio	17.0	6.5
Population below minimum level of dietary energy consumption (%)	28.0	20.0
Under 5 child malnutrition indicators	**1993-94**	**2007**
Percent of children underweight for age (underweight)	56.3	41.0
Percent of children short for age (stunted)	54.6	43.2
Percent of children underweight for height (wasted)	17.7	17.4

Source: GOB, 2011a

Given the above, reduction of poverty and malnutrition is a major goal of national economic development polices and programmes. Additional specific programmes and projects have been implemented to address malnutrition. A review of the literature, and programme and project portfolios on feeding and nutrition revealed that in order to address problems of malnutrition the following programmes/projects have been implemented in the past and some are still active:

- National Food and Nutrition Policy and Programme
- Bangladesh School Feeding Programme of the World Food Programme
- Bangladesh School Nutrition Programme of Land O'Lakes and Tetra Pack
- School Milk Programme of Arla Foods
- Health, Nutrition and Food Security Project of CARE-Danone Japan

A detailed discussion on these follows.

2.1 National Food and Nutrition Policy and Programme

Nutrition issues are addressed in national food policy and national health policy. The National Food Policy 2006 was adopted on the basis of assessment of past achievements and status of food security at that time (FPMU, 2006a). The goal of the national food policy

is " to ensure a dependable food security system for all people of the country at all times " and the objectives are:

- to ensure adequate and stable supply of safe and nutritious food,
- to ensure purchasing power of the people to increased food accessibility, and
- to ensure adequate nutrition for all (especially women and children).

Thus the objectives captured the three dimensions of food security – availability, access and nutrition or utilization – as implied in the definition of food security adopted at the World Food Summit 1996 (FAO, 2008).

Various strategies and actions are in place to achieve the three objectives. Activities under objectives 1 and 2 have nutritional implications and consequences but those are not nutrition programmes *per se*. Under objective 2, in order to enhance accessibility of food, one of the instruments used is public food distribution and one of its functions is to supply food grains to various food-based safety nets. Food grains distributed through this channel involve relief, subsidized sales and food for work programmes but normally no feeding programmes except in case of emergencies such as during or after a severe flood or cyclone. Thus food distributed through the safety net programmes is not a feeding programme though they have nutritional implications. The core nutritional goals are addressed through objective 3 of the food policy, i.e. to ensure adequate nutrition for all especially women and children, and by the national health policy.

The National Food Policy 2006 (FPMU, 2006) and the National Food Policy Plan of Action 2008 -2015 (FPMU, 2008) have updated the nutrition goals and actions based on the 1997 National Food and Nutrition Policy and the National Plan of Action for Nutrition, and embedded them in the NFP PoA with outputs and outcome indicators to monitor progress. The NFP PoA includes eight key areas of intervention that include long term planning for balanced food, balanced and nutritious food at minimal costs for vulnerable people, nutrition education on dietary diversification, food fortification and supplementation, safe drinking water and improved sanitation, safe quality food supply, women's and children's health, and promotion and protection of breast feeding. Again none of these is a feeding programme *per se* though they have nutritional implications.

The main goal of the National Health Policy is to achieve sustainable improvement in health, nutrition, and family welfare status of the people, particularly of the poor and vulnerable groups, including women, children, and elderly. Nutrition issues received public policy attention since the mid 1970s through the establishment of the Institute of Public Health Nutrition (IPHN) in 1974 to provide technical support to formulate policy and strategy for nutrition related activities and programmes and also to conduct research, training and surveillance, and the Bangladesh National Nutrition Council (BNNC) in 1975 to develop policy & strategy. But these institutions in the past mainly contributed through data generation and awareness building without any action programmes and without functional integration with mainstream health programmes. This has changed in the mid 1990s when for the first time the health policy also has put a strong emphasis on nutrition issues and these are addressed through a number of programmes and projects.

The Health, Nutrition and Population Sector Programme (HNPSP) operated two projects namely National Nutrition Programme (NNP) and Micronutrient Supplementation. (MNS). Facility based services were provided through the MNS and community based services for basic health and nutrition were undertaken through NNP. These included treatment of acute malnutrition in children through micronutrient supplementation (Vitamin A, iron, zinc, iodine) , iron-foliate supplementation for women, and antenatal care and counseling during pregnancy (GoB, 2011a; GoB, 2011b). The National Strategy for Infant and Young Child Feeding in Bangladesh is focused on direct interventions targeted to child nutrition during the "window of opportunity" from pregnancy through the first two years of a child's life. The International Code of Marketing for Breast Milk Substitutes regulates activity of private sector marketers to ensure that they do not unethically market breast milk substitutes to mothers, which can thwart progress towards appropriate breastfeeding practices (GoB, 2011a; GoB, 2011b). The National Policy for Arsenic Mitigation, and the corresponding 2004 Plan of Action was designed to address issues of arsenic poisoning.

A variety of other stakeholders are implementing supporting and smaller-scale interventions related to direct nutrition inputs. Other health and nutrition interventions (such as immunization, iron-foliate supplementation, etc.) are implemented through the public health system and private healthcare providers. Interventions to improve infant and young child feeding are currently implemented with varying intensity and scale and by a number of NGOs and other stakeholders across Bangladesh.

Among a long list of projects and activities, only vulnerable group feeding programme has a direct feeding activity involving supplementary feeding. Supplementary food is additional food to normal meals and snacks given to the targeted beneficiaries every day, except Fridays and Government holidays, in the Community Nutrition Centres. The food kept in *putty* packets consists of roasted and powdered rice and lentils, molasses and oil. One large *putty* packet (600 Kcal) is 4 times bigger than a small packet (150 Kcal) distributed to each pregnant woman having BMI <17. The criteria for selection of beneficiaries for supplementary feeding were revised in September 2007. Accordingly, pregnant women of households with absolute poverty would receive 4 small *putty* packets per day from the 4th month of pregnancy for 150 days; severely malnourished children would receive 2 small putty packets per day; and first degree and second degree malnourished children would receive 1 small *putty* packet per day from 7 to 24 months. Once the recipients reach a threshold level of nutrition based on predetermined indicators such as BMI and other parameters of nutritional status, they are considered to have graduated in terms of basic minimum nutritional status and are excluded from the programme and new entrants are registered.

All other activities under the NNP and MNS involved either distribution of tablets or similar materials e.g. Vitamin A tablets or deworming tablets once or twice a year or services and promotional activities to improve awareness. One of the awareness building activity called **School Nutrition Education Programme** is aimed at improving the awareness of teachers and students about better nutrition through training, and inclusion of nutritional topics in school curriculum, for which additional grants are made to the schools to complement the main budget received from the Education Ministry. However, NNP and MNS run as projects and they do not cover the entire country

There was evidence of lack of coordination and duplication of activities between HNPSP and NNP projects so they are currently under reorganization into a single entity called National Nutrition Service with the following objectives:

- To implement and mainstream comprehensive package of nutrition services to reduce maternal and child nutrition and ensure universal access
- To develop and strengthen coordination mechanisms with key sectors (especially Ministry of Food and Disaster Management, Ministry of Agriculture, Ministry of Livestock and Fisheries, Ministry of Local Government and Rural Development and Cooperative) to ensure a multi-sectoral response to malnutrition
- To strengthen the human resource capacity to manage, supervise and deliver nutrition services at the different levels of the health system
- To strengthen link with central MIS
- To conduct operations research for ensuring an evidence-based response.

Implementation of this integrated service is planned within the Sixth Five Year Plan period - 2011-2015 (GoB, 2011a) and there is no direct feeding programme under this service, nearly all its activities are focused on capacity building of health and nutrition service providers and awareness building among the citizens, especially the poor and vulnerable groups.

2.2 Bangladesh School Feeding Programme of the World Food Programme

School feeding programmers are common in industrialized countries. The main objective of such programmes is to provide meals or snacks to reduce short-term hunger in the classroom so that the students can concentrate and learn better without disrupting class routines. Since primary and secondary education is compulsory in most developed countries, regularity in attendance is usually expected even then school feeding is considered to ensure it further. In developing countries, school feeding programme is not as common as in the developed countries but where it exists, the objectives are often multiple e.g. reduction of short-tem hunger and malnutrition, attaining regularity in attendance, and better academic performance which may be poor in the absence of feeding programmers.

In Bangladesh, some government schools in the urban areas introduced in-school distribution of snacks (*tiffin)* as early as the 1950s and in most cases students required to pay a monthly fee for the snacks. School lunch proper is rare if exit at all. The GOB has devoted a significant share of its budget for over a decade to providing incentives to families to send their children to school. In an effort to increase primary school enrollment of children from poor families, the GOB had launched the Food for Education (FFE) programme in 1993. The FFE programme provided a free monthly ration of food grains (rice or wheat) to poor families in rural areas if their children attended primary school. Ahmed (2004) referred to a number of studies that showed that the FFE did raise primary school enrollment. The Primary Education Stipend programme, which replaced the FFE programme in 2002, provides cash assistance to poor families if they send their children to primary school. The GOB also provides cash assistance to girls in secondary schools through four secondary school stipend programmes. These conditional cash transfer programmes aim to increase the enrollment and retention rates of students in primary and secondary schools throughout rural Bangladesh. A recent study indicates positive influence of these

programmes on educational attainment (Ahmed, 2004). As a result of these educational investments, Bangladesh has made commendable progress in the education sector over the past decade. Over 90 percent of children eventually enroll in school, and few disparities now exist between boys and girls. A World Bank report on poverty in Bangladesh notes that Bangladesh and Sri Lanka are the only countries in South Asia that have achieved gender as well as urban-rural parity in school enrollments (World Bank, 2002).

While the achievements of the education interventions have been impressive in terms of enrolment and attendance, academic achievement is disappointing, especially in primary schools. Hunger is a likely reason. Widespread under nutrition in Bangladesh remains a critical barrier to children's learning. So introduction of school feeding programme was considered as having a good potential to improve children's learning performance. And, in July 2002, in order to diminish hunger in the classroom as well as to promote school enrollment and retention rates, the Government of Bangladesh (GOB) and the World Food Programme (WFP) launched the School Feeding Programme (SFP) in several districts covering chronically food insecure areas of the country. The goals of the programme were to increase school enrollment and attendance by providing supplementary food as an incentive; reduce school repetition and dropout rates, improve attention and learning capacity by reducing short-term hunger, and thereby improve school achievement. The programme also aimed to improve nutritional status and health by reducing micronutrient deficiencies and providing a protein/calorie supplement. The WFP also intended to use the SFP as a mechanism to encourage schools to provide water from tested, arsenic-free tube wells, and to provide separate toilet facilities for girls, as the lack of such facilities was viewed as a potential barrier to girls' school enrollment. The WFP also hoped to encourage greater participation by women in the School Management Committees (SMC) and more active involvement of the SMC in school activities in general.

The programme was implemented through distribution of fortified biscuits to elementary school children in the targeted schools six days a week during the school year. The SFP provided a mid-morning snack consisting of eight fortified wheat biscuits to some one million children in approximately 6,000 primary schools in highly food-insecure rural areas in a number of districts, plus four slum areas in Dhaka City. The WFP provided contracted local biscuit manufacturers with imported wheat and micro-nutrient mix, and acted in an advisory capacity to improve hygiene and quality control. WFP-imported wheat earmarked for SF was bartered against biscuits from contracted local factories. The biscuits were delivered to WFP's partner NGOs and stored at regional warehouses before sending to schools. The selected service-providing NGOs were responsible for preparing delivery plans, checking attendance and distribution, inspecting the schools for good storage practices, hygiene and sanitation, and for reporting back to WFP. For each school, a school management committee (SMC) — comprised of parents, teachers and school officials — oversaw the distribution process. Each SMC had at least one female member. SMCs, NGOs and GOB officials were provided with training to operate the SF programme (management, food storage and handling, hygiene and sanitation, etc.).

At a cost of U.S. 6 cents per packet of eight, the biscuits provided 300 kilocalories and 75 percent of the recommended daily allowance of vitamins and minerals (vitamin A, zinc,

foliate, and iron). These biscuits are produced locally by confectionary factories on contract with the programme at a cost of 0.56 US cents a packet. Since there are 240 school days in a year, this amounts to US$13.5 per child per year. The cost includes storage, transportation, vitamin mineral premix, freight, quality assurance, and NGO service provider cost for monitoring, reporting, and distribution.

In 2003, the SF programme covered 1.21 million primary school children in 6,126 schools (3,748 GOB and 2,378 NGO schools) in 36 upazilas in 9 districts of Bangladesh (rural areas of 32 upazilas and urban slums in 4 upazilas in Dhaka City). From 2002 to 2004, a total of 160,000 metric tons of wheat were allocated to the SF programme, for a total estimated cost of US$27.1 million to the WFP and US$3.2 million to the GOB. The wheat was to be bartered for local production of about 46,000 metric tons of biscuits.

Rogers et al (2004) reported the results of a mid-term evaluation of the impact of the project based on a baseline survey conducted in may-June 2002 and a follow up survey in July-August 2004. Ahmed (2004) reported the findings of a comprehensive evaluation based on a number of surveys at the household, school and community levels in addition to achievement tests for the schoolchildren, carried out in late 2003. The studies concluded that school feeding programme in highly food-insecure rural areas improved the diet and nutritional status of children. After rice, SFP biscuits were the most important source of energy, protein, and iron in the diet of programme participants. Participating students also appeared to share SFP biscuits with younger siblings and sometimes other household members. Sharing created an interesting spillover effect: energy from SFP biscuits accounted for 7 percent of total energy intake of children ages two to five in beneficiary households in the rural areas.

The children's calorie intake from biscuits had a statistically significant positive impact on their daily calorie intake and body mass index (BMI). When contribution of other actors were controlled for, SP had raised school enrollment by 14.2 percent, reduced the probability of dropping out of school by 7.5 percent, and increased school attendance by about 1.3 days a month. An extremely high percentage of mothers reported several positive effects of the SFP on their children. They noted that those children's interests in attending school and concentration on studies had increased; they were livelier and happier than before, and their incidence of illness had declined.

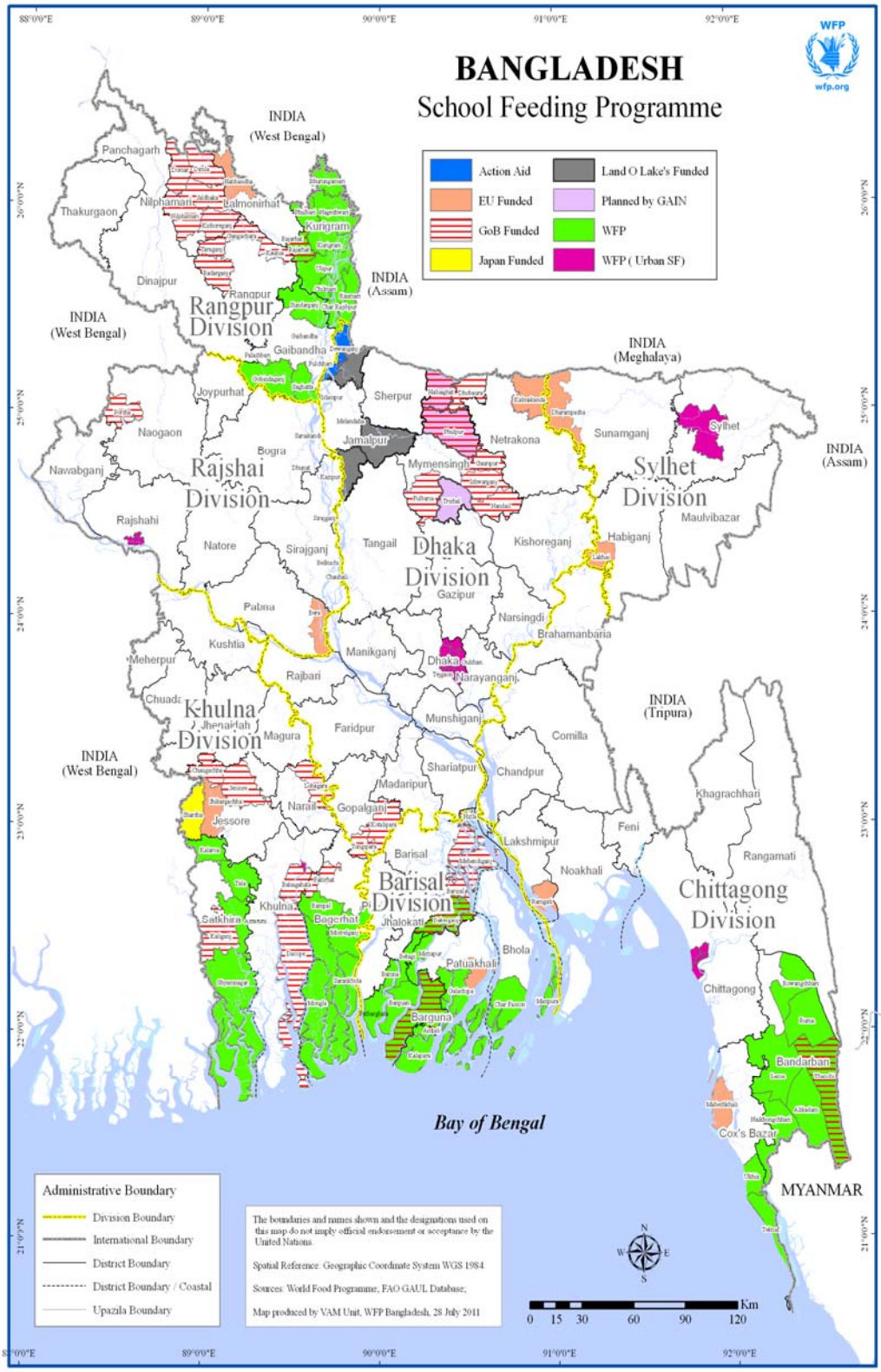
Given the positive impact, School Feeding was integrated into the WFP Country Programme, as well as the subsequent Emergency Operations and the Refugee Operation in Cox's Bazar. In total, approximately 1.1 million primary school children are currently supported under these three programmes in the formal and non-formal 7,500 Government and non-government schools in 43 upazilas in 14 districts. The school feeding programme is being implemented under the country programme 2007-2011 jointly with the Government of the Peoples Republic of Bangladesh in various high food insecure areas of the country, where education performances are low. In addition to the FFE, under country programme WFP also assists primary schoolchildren under the Protracted Relief and Recovery Operation (PRRO) to support refugees along the border with Myanmar. Currently a total of 9,000 school age camp children have been receiving school feeding assistance under PRRO (www.wfp.org).

Following the WFP model of providing 75g of fortified biscuits along with the essential learning package, a number of projects are being implemented. A UNICEF-GOB joint project on Hard to Reach Urban Working Children is being implemented with CIDA and SIDA funding in 27 upazilas in 6 districts covering over 73,000 students. The MPME is implementing a project with Saudi funding in 33 upazilas in 14 districts covering 1.2 million students and another EU funded project in being implemented 10 upazilas in 10 districts serving 200, 000 students. The geographical areas covered by these and other programmes are shown in Figure 2.1

Other programmes are in the pipeline. The Government of Bangladesh was scheduled to launch its own school feeding programme in poverty-prone areas in January 2011. Initially, 1.2 million primary school children were planned to receive fortified biscuits. The government planned to allocate US$90 million from its own resources, over a period of three and half years for the implementation of the programme. Based upon the government request, WFP has been providing technical assistance which is focusing currently on issues such as project design and management, selection of NGOs and biscuits factories, procurement, quality control, logistics, monitoring and evaluation and a feasibility study to identify an alternative local food basket. The estimated cost of the technical assistance over three years is US$4.5 million. The implementation of this programme has been delayed due to inadequate preparation.

Global Alliance for Improved Nutrition (GAIN), a UN sponsored organization, is also planning to implement a pilot project to distribute various fortified foods to the school children in 3 upazilas in one district covering 17000 students. Based on experiences in India, the project also includes provision for school meals in the form of *Khichuri* – a mixture of cereal, pulses and vegetables.

Figure 2.1: School feeding programmes run by various agencies in Bangladesh



Source: www.wfp.org

2.3 Bangladesh School Nutrition Programme of Land O'Lakes and Tetra Pack

2.3.1 Genesis

Child malnutrition impairs physical and mental development that can't be compensated in later years even with better nutrition. Since milk is a highly nutritious food – rich in protein, fat and 14 of the 18 essential micronutrients- school milk has been used as a tool to address this problem since the second world war in Europe and North America. In recent years, this has been piloted and adopted often with donor support in a good number of developing countries having high incidence of child malnutrition. Since 2000, FAO has been performing a complementary role by creating awareness about the value of milk and the virtue of school milk programme.

Tetra Pak is the world's leading supplier of food processing, packaging and distribution systems. It is one of the world's leading suppliers of high quality hygienic packaging for milk, known as ultra high temperature (UHT) treated milk. Because of its longer shelf life without refrigeration, it is easy to transport, store and distribute UHT milk in both urban and semi-urban or rural areas thereby expanding the scope for expansion of milk market in countries with poor infrastructure (roads, electricity, and refrigeration facilities). The size of the processed milk market in many developing countries is fairly small and pasteurization is the main processing technology used. In order to expand its business opportunities in such countries, Tetra Pack has often adopted non-conventional approaches and initially invested in creating demand for its technology. Initiation or participation in school milk programmes developed by others to address child malnutrition has been one of the strategies used by Tetra Pack since the 1960s. In some case, support has been extended for increasing milk production through better technology and management and also improving market access. In 2002, this approach was formalized as a business strategy through its Food for Development Office, and entry stage promotional investment has been usually categorized as investment under its corporate social responsibility programme[1].

Under such an approach, in partnership with Land O'Lakes (LOL), a large American NGO having long term experience in the dairy and rural development programmes in both the USA and developing countries, Tetra Pack implemented a school milk programme in Indonesia since 2000. The project not only benefited 500,000 primary school students when fully operational, it also created a substantial business for Tetra Pack technology and materials for processing school milk and later for processing milk for the commercial market. Based on that experience, Tetra Pack identified Bangladesh as a potential target for business because of its large population with milk drinking tradition and a widening gap between its domestic production and demand which is met by import. In Bangladesh as well, Tetra Pack adopted school milk with UHT milk as an entry point and together with LOL applied to the USDA's Global Food for Education Initiative, a pilot project which donated surplus agricultural commodities from the United States for school feeding programmers in developing countries. In 2002, USDA donated nearly 35,000 metric tons of commodities including wheat, non-fat powdered milk and soybean oil to LOL for a three year period.

[1] Barker and Hinsch, *http://www.tetrapak.com/ Document%20Bank/ FfDO/ BSNP_TetraPak_casestudy.pdf*

Responsible for the execution of the programme, LOL used a portion of the donated powdered milk for the school milk programme while the majority, along with the other commodities, was monetized to cover the programme's operating expenses. The Government of Bangladesh (GoB) supported the programme by waiving all taxes on nonmonetized commodities that would directly benefit the population of the country. Tetra Pak linked LOL with local milk processors, provided technical know-how and quality hygienic packaging. GOB approval for the project was procured from the NGO Bureau, which administer and oversee all NGO activities in the country, and consent of the Ministry of Education and Culture was obtained by the NGO Bureau.

2.3.2 Implementation and governance of the programme

The pilot project was implemented in four upazilas in Jamalpur district during 2002-2009 with a break in 2004 (see below). The present LOL office in Dhaka informed that all hard and soft copy materials on the project, especially on its implementation and governance mechanism, were lost or destroyed when the office of LOL was shifted to a new site sometime back. However, an account of the project is narrated below based on verbal account of the knowledge and experience of some staff of LOL and some supplementary general information derived from a public awareness document available on the websites of GAIN, Tetra Pack and LOL[2]
(

The project was implemented in four upazilas - Jamalpur Sadar, Sharishabari, Islampur, Melandaha - in Jamalpur district. The implementation procedure followed was as below.

- LOL was responsible for execution of the project. In consultation with local civil and school administration, all government approved primary schools and madrashas as well as BRAC's non-formal schools in the four upazilas were chosen. Jamalpur Sadar had both rural and urban schools. School Management Committees and school teachers were informed and educated about the objectives and operational mechanism of the project and about their individual and collective responsibilities in assuring proper implementation of the project activities. Beneficiary students were also exposed to the project's objectives and operational mechanism, about health and hygiene, about the nutritional value of milk and precaution necessary to avoid health hazard from drinking milk at school, and about their own roles in making the project a success. An additional Parents' Committee was formed to ensure wider participation and monitoring of activities.
- MOUs were signed with private dairy processors (Pran and Aarong) to make 200 ml UHT milk packets and a biscuit manufacturer to make packets of 40 gm micronutrient fortified biscuits. Tetra pack provided UHT and biscuit making technologies to these companies. Since USDA supply of commodities came in one or two lots, those on receipt from the USDA were delivered to the local processors and

[2] *http://www.tetrapak.com/Document%20Bank/FfDO/BSNP_TetraPak_casestudy.pdf*;

http://www.fas.usda.gov/excredits/FoodAid/FFE/gfe/congress2003/__asia.htm#Bangladesh : *Land O'Lakes, Inc.;* www.Gain.org .

valued at an agreed price. Against that value, manufactured UHT milk made of powder milk and fortified biscuits made of what flour and other ingredients were delivered by the manufacturers at upazila warehouses at an agreed price every week based on requisition from the LOL Dhaka office. Thus no cash transaction was required so long as there was balance from the delivered commodity value.

- Until local manufacturers were ready to produce UHT milk, it was imported from Thailand for distribution during the initial stage of the project (the exact duration of this arrangement is unclear).
- Contracts were made with small local businesses, mainly transport service providers, for regular once a week delivery of milk and biscuits to the schools at fees which was reviewed periodically (supposedly there was a focus person at the school to receive the materials).
- MOUs were signed with BRAC and three local NGOs (Padakhep, Usha and EFERD) for overseeing and monitoring the distribution, accounting, record keeping, and reporting to LOL. Each local NGO was responsible for monitoring a number of schools and BRAC had an overall supervisory role.
- Each student and each teacher was given a milk packet and biscuit packet every day of the effective school days for immediate consumption at the school. As a complement, deworming tablets were provided twice a year to reduce illness and improve the uptake of nutrients from food consumed at school and at home. At the end of each week, requisition for the next week would be sent by the school to upazila warehouse by taking into account any unused balance during the current week. The upazila warehouses would send the collated requisition for that upazila to LOL office in Dhaka which would further send the requisition to the manufacturing companies.

In 2002, at its peak, about 263, 000 students and nearly 5000 teachers in about 967 schools were served by the project. Several problems were faced or observed during the first year of implementation. These are:

First, the most important problem observed was duplication in student enrolment: some students enrolled at a primary school as well as at a madrasha or at a primary school/madrasha as well as at a BRAC non-formal school. The government-run food for education and later cash for education programmes served as incentives for this malpractice as poor people with support from school teachers and school management committees tried to derive benefits from all conceivable sources and ways. This practice led to the delivery of more packets of milk and biscuits than were actually required and these packets ended up in unintended hands. Since both the products were attractive to the target population, it was difficult to instill disciple and a fair distribution system.

Second, although consumption at the school was expected, it was difficult to enforce the procedure as some packets were taken home to share with other siblings or members of the family. This was quite natural given the level of malnutrition and poverty on the one hand and attractiveness of the products supplied on the other. Even better off beneficiaries did not abstain from this practice.

Third, most schools had no extra room or space for use as a store for safe keeping of the milk packets and biscuits during the week, so usually these were stocked at a corner of the teachers' room. Apart from the risk of pilferage, the physical conditions of the rooms in some schools were poor, so there was the risk of quality deterioration when stored for several days.

Fourth, access roads to many schools were of poor quality and transportation (rickshaw, rickshaw vans, baby taxies etc) used to carry the products from upazilla warehouses were also sometimes not of appropriate design and quality. These twin problems sometimes led to damages to some product packets, which required careful scrutiny before distribution to avoid health hazard of the children. Although ultimate rate of rejection was not very significant as a result of this problem, the intensity of monitoring and checking required turned out to be high.

In order to address the problem of double enrolment, at the end of year one, in consultation with various stakeholders, BRAC's non-formal schools were dropped from the project as these accounted for most of the double enrolment. Consequently in 2003, the number of students and teachers served by the project dropped respectfully to about 175,000 and 3250. Precautionary and corrective measures were taken to address other problems and adjustments were made with time and experience.

Even though the USDA had originally committed a three year grant, no delivery was made in 2004 apparently because of some changes in USDA policy on commodity grant for school feeding due to depleted food stock and some procedural complexities. Consequently supplies to the schools had to be stopped in 2004. After negotiations, the grant was renewed for 2 years and deliveries were made during 2005 and 2006. But some changes were made in the project area coverage. Jamalpur Sadar included both urban and rural schools, and in general incidence of poverty there, especially in the urban areas, was lower. So it was replaced by Madarganj upazila in 2005. As a result, number of students served dropped to about 150,000 which also had helped to deal with the budgetary limitations.

In 2006, a new grant was received for 2007-2009 period. No further grant could be procured so the project ended in December 2009.

2.3.3 Impact of the programme

Reportedly a baseline and an end of project survey were conducted but systematic analysis to assess impact of the project was not done. The content of the survey also could not be gathered. However, it has been claimed that attendance rate in Jamalpur district increased from 43% in 2002 to 82% in 2009 as the incentive of receiving milk and biscuit increased enrolment and decreased absenteeism, and academic performance also radically improved as the students no longer needed to struggle on an empty stomach.[3] It has been also

[3] A LOL monitoring report mentioned various impacts of the project including school attendance, student performance, student behavior etc during the first year of the project but the figures and narration are at times contradictory and some are exaggerated (http://www.fas.usda.gov/excredits/FoodAid/FFE/gfe/congress2003/asia.htm#Bangladesh: Land O'Lakes, Inc.)

mentioned that the project created a demand for about 25,000 litres of milk every school day, created about 500 jobs for local people providing various services, contributed to the food security for 2500 family members, and created employment of about 175 BRAC and other NGO staff for monitoring and supervision of the project activities[4].

With time, Tetra Pack realized that the expansion of its business opportunity would depend on the market for UHT milk which in turn would depend on increased availability of raw milk. But raw milk supply was inadequate due to low productivity of indigenous cows, scattered smallholdings having meager marketed surplus and poor quality of product. So instead of further investment in school milk programme, Tetra Pack initiated collaborations with CARE Bangladesh and Pran Dairy to invest in ongoing dairy value chain activities to increase smallholder productivity and market access. Subsequently, it partnered with Pran dairy to expand its network of milk collection centres to collect milk from smallholders as well as provide them technology and management training for increasing productivity.

2.4 School Milk Programme of Arla Foods

One of the biggest exporters of milk powder to Bangladesh is the Danish-Swedish dairy giant Arla Foods, which has supplied between 2500 to 8000 tonnes of milk powder to Bangladesh per year in recent years. Arla Foods manufactures Dano, the leading powder milk brand in Bangladesh accounting for over 20% of powder milk sales in the country. Dano milk powder is usually imported in bulk and repackaged for retail sales.

A recent study published by Action Aid, an international NGO, found that European subsidized export of milk powder seriously adversely affects the dairy sector in Bangladesh, especially its smallholder producers as in many other developing countries where EU exports milk powder. Some of the recent reports by ActionAid have directly blamed Arla Foods as profiting from EU-subsidised milk powder sales to Bangladesh though the same has not been recognized by the company (Curtis, 2011; Tibbet, 2011).

The company presents itself as a socially responsible company and have some activities in different countries under its CSR domain. One of its CSR activity is called “Children for Life”, which provides one glass of milk a day to around 800 children in three countries – Vietnam, the Dominican Republic, and Bangladesh. The project costs DKK 1 million (€134,228) amounting to 0.08% of the company’s net profits in 2010. In Bangladesh, the project began in 2010 and “provides teaching, food and milk” for 235 pupils at a school in the slum area of Korail on the outskirts of Dhaka (Arla Foods, 2009). No further details about the objectives, management, governance and impact of the project in Dhaka could be gathered except the information that Arla's primary donation to the project is its own imported milk powder. The company’s CSR report is explicit in stating that this CSR project is intimately related to its sales strategy. Its 2010 report states: “The Children for Life project was conceived ...by

[4] (Barker and Hinsch *http://www.tetrapak.com/Document%20Bank/FfDO/BSNP_TetraPak_casestudy.pdf*; www.Gain.org).

the department responsible for sales of milk powder across the world. …Apart from the three countries in which the Children for Life project is currently running, Nigeria and China are also important markets for Arla Foods' milk powder. For this reason, there are plans to set up similar projects there" (Arla Foods, 2009). Yet, a 2007 study prepared for the FAO states: "School milk feeding schemes based on imported pre-packed milk are seen as counter-productive to sustainable smallholder dairy development" (Haque, 2007).

2.5 Health, Nutrition and Food Security project of CARE-Danone Japan

2.5.1 Grammen Danone

Grameen Danone (GD), a dairy enterprise, is a member of the Grameen family of enterprises. It is registered as a social business in which the investment is shared by three parties – 50% by four enterprises of the Grameen family of enterprises, 20% by Danone and 30% by Danone Community (a fund created by Grameen Bank and Danone for investment in social business globally). It is a social business in the sense that its activities are targeted to the poor smallholder milk producers, and poor consumers and traders, and any profit earned by the enterprise is proposed to be reinvested to expand the size of the enterprise for the benefit of its target constituency.

It has built a dairy processing plant in Bogra town with a capacity to process 10 tons of raw milk per day into micro-nutrient (Vitamin A, zinc, iron, iodine) fortified yoghurt (called *Shakti Dai)* for selling mainly to poor rural children between 3 and 12 years of age. The enterprise currently procures 60-80% of its milk requirement from 370 farmers in Shariakandi upazila through three collection centers, two of them having chilling facilities; the remaining 20-40% is procured from milk traders in other upazilas. The aim is to collect the entire requirement from smallholder producers with 1-2 cows, who are also provided with some inputs at cost price and technical advice to increase productivity. While other large dairy processors pay producers weekly or fortnightly and may refuse to buy small quantities or extra milk during flush season or at any time, GD pays cash daily at the time of collection, guarantees to buy every day any amount. Even though GD's purchase conditions are somewhat better than those of other processors, GD still faces problem to keep seller loyalty whenever price offered by other processors is increased, which they do more frequently than GD, to ensure adequate supply of milk.

The collected milk is processed into fortified yoghurt and packed in 60g cups which have a shelf life of 6 days if stored at 2-6ºc. About 80-90% of daily capacity is utilized. Currently about 40% of the output is sold in the rural areas and 60% in the urban areas – mainly in Dhaka and Chittagong. Retail price per cup is Taka 8 in Dhaka and Chittagong and Taka 7 in Bgora and elsewhere. In Bogra district, rural sales are channeled through a network of Rickshaw Van Sellers (RVS) and Shakti Ladies (as they are called due to their selling of S*hati Dai*). The RVS have a rickshaw van on which a Danone provided cool box is mounted and the van driver is supplied daily by GD marketing staff about 1000 cups of yoghurt. He receives a basic salary from GD plus a commission on the volume sold daily. The RVS supplies 100-200 cups of yoghurt to each of 5-8 Shakti Ladies who stock the cups in a cool bag supplied by GD, and sell by walking in the villages, markets and near schools. They also get a commission from GD and profit margin from the retail price.

Outside Bogra district, the rural sale is conducted manly through CARE-Bangladesh's network of village women retail traders. In each of about 80 upazilas in various districts, CARE has a hub consisting of one entrepreneur (more like a small wholesaler) who is assisted by CARE to stock and supply on credit a mixture of consumer goods to about 30 mobile retailer ladies who in turn sell these items in villages and markets. The retailers get commission and pay back after selling. CARE purchases some amount of S*hakti Da*i from GD and supplies to about 40 of its 80 hubs for selling through its rural women retailers.

Sales of *Shakti Dai* grew steadily on a yearly basis since launching the product in 2007 (Table 2.2) but with significant monthly variation within a given year (Figure 2.2).

Table 2.2 Sales of Shakti Dai, 2007-2010

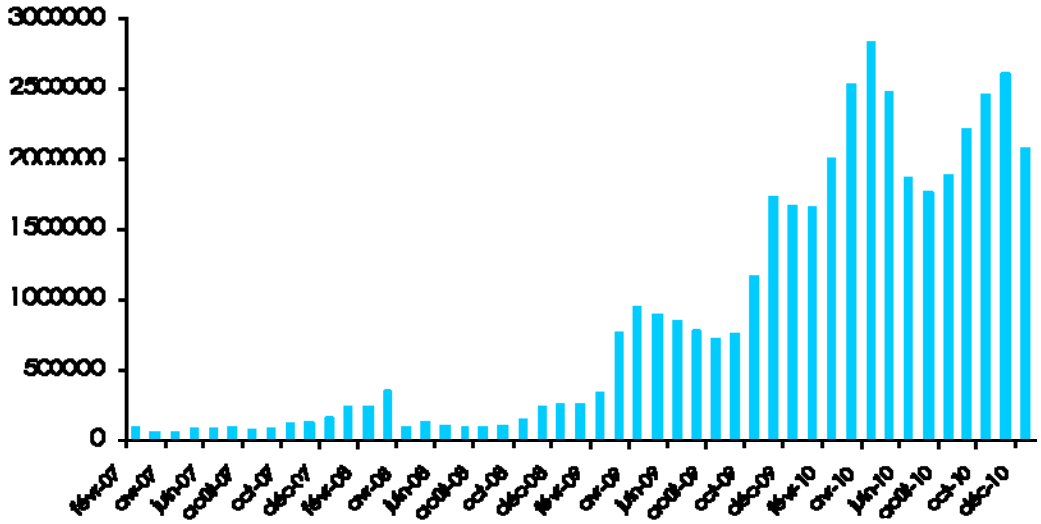
	2007	2008	2009	2010
Sales in Tonnes	78.1	149.6	701.2	1590.0
Sales in Mil KT	4.9	127.0	801.0	1785.0
Cups sold /Day	3414.0	6532.0	35319.0	86860.0

Source: Graeme DANONE (unpublished data)

GD has adjusted rural retail price of *Shakhti Dai* downward in the recent past yet the management feels that the current rural retail price of Taka 7 is beyond the purchasing power of majority of the rural poor children, who are its primary target beneficiaries. So the company intends to try to reduce price further. On the other hand, GD is currently in the process of building another processing unit in Saver near Dhaka mainly to serve Dhaka and other urban markets. By 2020 the company looks forward to replicating the Bogra model across Bangladesh to be able to cover the needs of all the kids of the country. The company will welcome partners to invest in this social business and take responsibility of various clusters of these mini plants to extend healthy nutrition over the rest of the country.

It is claimed that the source of raw milk for the Proposed Saver plant will continue to be smallholder dairy producers but from which geographical areas remain unclear because of the already intense competition among processors to collect milk from the major milk sheds of Dhaka. Even if the Savar and other future plants are run with raw milk procured from local smallholders and even if 'extending healthy nutrition over the rest of the country' is a stated goal, making urban areas as principal target markets could potentially mean driving expansion of GD's business into the large and expanding urban market for convenient and nutritious snack like *Shakti Dai*, neglecting the original objectives of GD as a social business to serve mainly rural poor and malnourished children.

Figure 2.2 Sales evolution for *Shakhty Dai:* a bumpy learning curve



Source: Grameen DANONE (unpublished presentation)

2.5.2 CARE-DANONE Japan project

This project is being implemented with a three year grant from Danone Japan. The project is implemented in 50 primary schools in 5 upazilas in Bogra district to increase awareness and appreciation among teachers, school children and their families about hygienic health practices like using toilets, washing hands, brushing teeth, using soap for various daily purposes, and about the virtue of balanced and nutritious food. The programme includes class lectures and discussions, feedback sessions, practicing school gardening to produce vegetables for earning income or for consumption at school, taking learned messages to parents and other family members for their awareness and practice. Many of these topics are already in normal school curriculum but deliberations are inadequate and theoretical due to lack of sufficient number of staff and other resources. The project therefore provides complementary resources including a part-time specialist instructor and teaching materials to teach the project objectives through a number of lecture modules, and it is hoped that the school will eventually internalize these practices in their normal teaching programmed.

The CARE instructor holds one session per fortnight on the designated modules and on that day each attending student (and teacher) is given a cup of micronutrient fortified *Shakti Dai,* bought by the project from GD. This requires about 10,000 cups of *dai* per session. The

project has made arrangements with private transport service providers to collect *Shakti Dai* packets from GD factory and deliver to designated project school on the designated day. Thus two cups of yoghurt is given free each month as an incentive to attend the sessions earmarked to achieve the project objectives. So about 1200 kgs of yoghurt is distributed every month to the school project. Since this is not exactly a school milk (yoghurt) programme, its impact pathway and indicators are difficult to chart. The project is in its first year of implementation and during the field trip, the project staff and a participating school claimed to have observed better school attendance and class performance even from this small amount of supplement. But such an association may be difficult to establish because the yoghurt cup is given only on project related session days when attendance obviously may be high.

2.5.3 Problems in the cold chain and a new product innovation

It appears that all the cold chains used for marketing *Shakti Dai* - RVS and Shakti Ladies, CARE's retailer ladies and delivery to the CARE project schools – pose problems for maintaining and assuring quality and safety. There are three types of risks.

First, The cool box on the RVS's van and the cool bag carried by the Shakti Ladies and CARE's women retailers assure safety and quality for 24 hours or upto 48 hours if ice bottles or ice packs are put inside, in which case fewer cups can be accommodated. If these sellers can't sell all products within this time limit, there is real possibility of product quality deterioration, so GD guarantees to take back unsold products, and actually does so, which entail losses. Even though return rate is still negligible because of the close proximity of the plant in Bogra district and intensive supervision, it may be high when larger geographical areas are to be covered.

Second, if any retailer sells degraded product without realizing its real quality, this may create health hazard and jeopardize the market potential of the product in general. Such an incident has not occurred yet because of close supervision and surveillance by GD as well as promotional education of the retailers about the risks of selling degraded products. All these lead to enhanced cost in terms of money and manpower.

Third, road conditions and transportation vehicles used in the rural areas are not always good. So during transportation, due to too much jerking, dai packets may be damaged. Selling such damaged cups is prohibited and they are taken back as unsold yet a retailer may not notice or detect such minor defects and inadvertently sell such products. The risk of selling minor torn dai cup by any retailer is low yet it can't be ruled out altogether. Even supervision and surveillance may not guarantee full protection against this risk.

GD is continuously evaluating its monitoring results and feedback to sharpen the safety measures to assure quality and safety, but realizes that marketing in rural areas will continue to be a serious challenge. While trying to improve the safety of the cold chains for *Shakti Dai,* it has been working on product innovation in order to produce a product with longer shelf life. And recently they have come up with a product named or described as 'fermented milk', which is actually a micronutrient fortified mixture of cereals and milk packed in a small 40g pouch. This is neither a pasteurized product nor a UHT product but its

self life under normal room temperature is 21 days. So no cold chain will be required for its marketing, and transportation will also expected to be less hazardous compared to that for *Shakti Dai.* It is claimed that the 40g pouch meets 30% of daily nutrient requirement of small children. If two of these are taken instead of one 60g *Shakti Dai* cup, 50-60% of daily requirement can be met.

Limited amount of the product is being currently produced for pilot testing its acceptability, shelf life in real retail market conditions and delivery mechanisms, and their advantages and disadvantages. There is no plan yet to replace *Shakti Dai* altogether with this product as both products are expected to have their own market niches. One of the distribution channels used for pilot testing is the twice a month distribution to the CARE-Danone Japan school project which will be supplied at the rate of two pouches per day due to lesser cost than one cup of *Shakti Dai.* Therefore, 40,000 40g pouches of fermented milk will be delivered per month in place of 20,000 60g cups of *Shakti Dai.* The primary advantage of this new product is that it will solve the problems of running a cold chain that is costly to run and supervise yet not fully secure to assure quality and safety of the product.

3 A Review of Dairy Development and School Milk Programme in Thailand

An understanding of the objectives, governance and contribution of the Thai school milk programme requires a brief examination of the evolution of the dairy sector in the country because the structure of the sector prior to the introduction of school milk program in 1992 provided the context for its introduction while the situation after its introduction has been significantly shaped by the school milk program.

3.1 Milk production and import growth, 1961-2008

Historically, smallholder crop-livestock mixed faming dominated Thai agriculture until very recently. Cattle and buffaloes in these systems were primarily used for draught power and meat (mostly after culling) as milk consumption beyond infancy was not common. In the 1940s and 1950s, Indian and Pakistani settlers in the suburban areas of Bangkok used to raise some dairy cattle because of their tradition of consuming milk and milk products like cheese, yoghurt and sweets (Chantalakhana quoted in FAO, 2002). In the 1950s, under a joint programme of the United Nations and the Thai Government, powder milk was distributed to health clinics and schools to enrich diet of vulnerable people as well as to make the Thai population familiar with milk. In 1956, a Dutch company started producing plain and flavoured liquid milk out of imported powder milk to serve upper class urban consumers. These rudimentary consumer markets perhaps provided the trigger for subsequent development in production, import and consumption of milk in the country.

From a modest level of production and import in 1961, the sector experienced phenomenal growth (Table 3.1). From 1975, annual production level approximately doubled every five years. Increased domestic production resulted from rapidly increasing number of milk cows as well as increase in productivity. Yield per cow per year increased from about 1000 kg in 1961 to about 3000 kg in 2001- an additional 500 kg yield per animal was achieved every 5 years since 1961. From 1970 onwards, production growth far surpassed import growth so share of domestic production in consumption increased. Per capita consumption increased from 2 litres/year in 1984 to 23 litres/year in 2002. Between 1996-2006, consumption per capita increased by over 6% annually. In 2006, share of domestic production in total consumption (in liquid milk terms) was 30% compared to 20% in 1996 (http://www.aphca.org/reference/dairy/chiangmai_workshop_feb08.html). Due to high consumption growth, during 1996-2008, import level exceeded agreed quota under WTO/TAFTA though the gap decreased in more recent years (Table 3.2). By 2010, per capita consumption increased to 28.6 litres/year and share of domestic production in total consumption increased to nearly 50%. And 80-100% of raw milk production has been converted into ready to drink milk . There are now 20, 000 dairy farmers raising over 250, 000 milk cows and the industry employs over 250, 000 people throughout the production-processing-marketing chains (Jarialerttsakdi, 2010).

The nature of growth of the sector prior to the introduction of the SMP in 1992 has been influenced by interlinked efforts in the areas of breed development and promotion of dairy farming, organization of farmer cooperatives, promotion of dairy consumption and

investment in dairy processing. Since 1950, several steps were taken by different agencies for dairy development in the country. A brief discussion on these aspects follows.

Table 3.1 Milk production and import in Thailand, selected years

Year	No of milk Cows	Whole milk production (tons)	Import (tons)	
			Skimmed milk powder	Whole milk powder
1961	2000	2000	624	1535
1965	2000	2300	2036	2277
1970	2800	3500	22426	4428
1975	7200	14000	20767	6656
1980	15000	30000	25054	11247
1985	26431	57895	25840	18896
1990	44450	130278	47536	17336
1995	99456	307229	79919	41192
2000	201000	520115	53024	48249
2005	300000	888220	69671	33016
2008	262000	786186	60666	25402

Note : The import levels shown in this table differ from those shown in table 3.2. Most likely, figures in Table 3.2 refer to only whole milk powder.

Source: FAOSTAT.

Table 3.2 Quantity of milk quota and tax for imported milk powder, 1995-2008

Year	Based on WTO/ TAFTA Agreement (Tons)		Tax (%)			Actual imports)Tons(
	WTO	TAFTA	Within quota	Actual tax	Over quota	
1995	45,000	-	20	5	237.6	55,000
1996	46,111	-	20	5	235.2	88,000
1997	47,222	-	20	5	232.8	88,000
1998	48,333	-	20	5	230.4	88,000
1999	49,444	-	20	5	228	88,000
2000	50,556	-	20	5	225.6	55,600
2001	51,667	-	20	5	223.2	65,000
2002	52,578	-	20	5	220.8	73,000
2003	53,889	-	20	5	218.4	68,348
2004	55,000	-	20	5	216	67,252
2005	55,000	2,200	20	5	216	67,200
2006	55,000	2,200	20	5	216	64,700
2007	55,000	2,200	20	5	216	59465
2008	55,000	2,200	20	5	216	65,431

Source: FAO RAP based on DLD and Bureau of Trade unpublished data

3.2 Breed and feed development[5]

Systematic efforts for breed and breed development in Thailand began in 1950 when Kasetsart University in Bangkok, then under the Ministry of Agriculture and Cooperatives (MAC), initiated a research program on dairy cattle breeding at its experimental dairy farm with a herd of imported Swiss Brown cattle. The herd did not perform well in Thai conditions. In 1952, a herd of RedDen (Red Danish) cattle was imported for adaptation but that also did not perform well (FAO, 2002). Subsequently in 1958, the Department of Livestock Development (DLD) imported a herd of Holstein Frisian from Germany and maintained at a Thai-German experimental farm but this also did not perform at a level required for viable commercial dairy farming.

In 1962, following a visit by His Majesty the King of Thailand to Denmark, a Thai-Danish Dairy Farm was established at the Royal initiative at Muak Lek in Saraburi Province for dairy research. When the cooperation programme finished in 1971, the Dairy Farming Promotion Organization (DFPO) was established and it took over the farm. The Thai-German farm was also handed over to DLD in 1977. Experimentation with RedDen and Frisian and their crosses by DLD and DFPO research centres continued at varying intensity until 1980 but performance at the station and in actual farm conditions turned out to be poor or unsatisfactory.

Given the above, in 1980, a herd of 50-50 Shahiwal:Frisian cross was imported from Pakistan to upgrade the Frisian blood content after adaptation. Research and adaptation of breed also involved development of appropriate feeds and rations, breeding services, disease control and management packages for optimal performance. This strategy appeared to have proven somewhat satisfactory as average daily milk yield under farm conditions increased from about 8-10 kg in the 1980s and 1990s to about 15 kg at present. The national dairy herd is presently composed of animals with about 87.9% Frisian blood.

Thus the unique feature of dairy development in Thailand is that it has been pursued not by trying to develop any breed based on indigenous genetic material or by upgrading any indigenous breed using exotic blood but by adapting imported crosses of exotic breeds. Further enhancement of productivity of the current national herd is the present research goal but feed still remains a major constraint for productivity improvement because crop residues and low quality roughage is a major share of the ration used by farmers, and the quality varies widely between farms and regions depending on the type of material available. Also land is scarce so allocation of land for fodder production is problematic for smallholders farms. This issue received priority attention in research and DLD has developed a hybrid high yielding Napier grass, which is being multiplied and disseminated at present. It is expected that successful dissemination of this fodder will help resolve major part of the feed constraint and improve productivity significantly.

[5] Partly based on an interview with Theera Rukkwamsuk and Pipat Arunvipas, Associate Professors. Department of Large Animal and Wildlife Clinical Science, Kasetsart University, Kamphaengsaen Campus, 8 September 2011.

3.3 Promotion of dairy farming

Alongside experimental and on-farm adaptive research on breeds, feeds and management, efforts were made to promote adoption of dairy by farmers as a commercial enterprise. Systematic promotion of dairy was started in earnest after the 1962 royal initiative to establish the Thai-Danish Dairy Farm. A package around 5 cows and other technical and financial support services were developed for dissemination by the Farm as well as the DLD. Training, extension, veterinary and artificial insemination services were provided free. Soft loan was provided by the Bank of Agriculture and Agricultural Cooperatives for acquisition of animals, equipment, and for building animal house. After establishment of the DFPO in 1971, it has played an important role in introducing technology to farmers and organizing dairy cooperatives in the central region. In 1978, the DFPO undertook an ambitious 10 year plan to raise fresh milk production to a level required for attaining self-sufficiency, which, along with various supporting policies, accelerated growth though sel-suficiency has not been achieved yet as demand growth outstripped supply.

Although the central region received more attention in early days for dairy promotion due to its proximity to Bangkok as the market for milk, dairying was considered as a potential activity for increasing farm income and reducing poverty throughout the nation and for reducing regional disparities. Therefore dairy was promoted in all the regions in varying intensity by providing various forms of incentives and support services. In some regions farmers used to produce cassava, sugarcane or corn, which were not very remunerative due to low yield and low local and world market prices which threatened their livelihood. So DLD and DFPO's promotional messages on dairy attracted them as an alternative livelihood strategy. Local leaders and innovators provided additional impetus for adoption of dairy as a new enterprise. Of the 74 provinces in Thailand, only two had no dairy farms in 1993. Although central region had the highest concentration of dairy animals, growth rate overall was strongest in the north-east region where animal numbers in 1995 was about 14 times more than in 1986 (Table 3.3). Such widespread diffusion of dairy farming is a feature uncommon in many developing countries where dairy development has been largely promoted in high potential pockets with limited success. Not only dairy expanded geographically, herd size also increased rapidly. In the 1980s few dairy herds had over 50 head of cattle, by 1994-95, in the central and south regions, respectively 25% and 34% of the herds were of this size category (Table 3.4).

3.4 Promotion of dairy cooperatives

Profitability and viability of farms depended on remunerative market access. Urban areas, especially Bangkok, were the main consumption centres. In the absence of tradition of milk consumption in the rural areas, there was little local market for the producers. It was necessary to link farmers with dairy processors who served urban markets with pasteurized and UHT milk. This linkage was not feasible for individual producers because of their small individual volume of output and their dispersed location. Both these factors entailed high transaction costs for farmers to market milk and milk processors for collection. Therefore, farmers were encouraged by the Cooperative Promotion Department of DLD to form dairy

cooperatives and establish milk collection and chilling centres from where processors could collect milk for processing.

Table 3.3 Distribution of dairy cattle population by region, 1986-1995

Year	Region				
	Central	North east	North	Southern	All regions
1986	51 708	5 705	4 686	1 506	63 605
1987	55 598	4 163	5 829	2 086	67 676
1988	68 908	14 881	8 563	2 575	94 927
1989	103 041	16 463	10 346	2 926	132 776
1990	118 052	25 234	11 022	3 229	157 537
1991	151 067	25 539	10 618	3 970	191 194
1992	168 213	38 355	11 879	4 052	222 499
1993	166 688	46 121	19 609	4 771	237 189
1994	164 199	47 355	14 861	5 203	231 618
1995	185 370	79 678	16 706	5 493	287 247
Ratio 1995/1986	3.58	13.97	3.57	3.65	4.52

Source : FAO, 2002

Table 3.4: Percentage of total dairy cattle numbers by herd size and region, 1994-95 average

Herd size	Central	Northeast	North	South	All regions
1 – 2	6.7	4.9	0.6	4.8	3.1
3 – 4	11.5	9.7	2.0	11.1	6.1
5 – 9	20.8	19.4	12.4	21.6	16.1
10 – 19	19.1	22.7	34.8	16.6	27.9
20 – 49	16.2	21.7	34.7	11.8	26.7
50 – 99	5.1	10.2	7.8	6.7	7.3
100 – 499	5.2	11.4	5.4	16.4	6.6
500 and over	15.4	0.01	2.4	11.1	6.2
Total	100.0	100.0	100.0	100.0	100.0

Source: FAO, 2002

Legally, establishment of a cooperative society required a minimum of 60 farming families, with at least 300 cows between them. Farmers had to have passed a training course on dairy farming and have a minimum of 10 rai of land and a minimum of 5 cows. The distance from the milk collection point should be no more than 20 km and there should be an approved market or buyer for the milk. Importantly, the intending cooperative should have access to veterinary and artificial insemination facilities or have these on their own. However, in reality, initially some non-dairy farmers were taken as members by some societies to raise capital and some members having less than 5 cows were also accepted as members. Number of cooperatives increased from 27 in 1988 to 58 in 1993. Average membership of a cooperative was 254 during this period : 274 during 1988-90 and 234 during 1991-93 indicating that the average size of a cooperative became smaller over time. Total number of members increased from 7616 to 13358 between the two years, annual average membership was 11080.

Initially, the cooperatives often lacked the financial resources to invest in milk collection facilities and in transport and processing facilities. There were limited number of people in the dairy cooperatives with an adequate knowledge of management, accounting and extension. Even in the early 1990s, for many cooperatives, the scarcity of trained personnel resulted in them being run by government officers. Cooperative members had little, if any, say in the operation of the cooperatives (Thirasuttakorn quoted in FAO, 2002). So in order to help cooperatives run their own organization effectively, government assistance to cooperative societies included the following :

- Grants to cooperatives for investment in cattle and equipment;
- The provision of loans to farmers for purchase of animals and animal feed.
- Training of farmers through extension programmes in dairy cattle management and dairy cattle health;
- Training and education of members in organizational and financial management.

On the other hand, the cooperatives were involved in the following activities:

- The operation of milk collection centres where the farmers could deliver milk. This milk was purchased at a base price adjusted for butterfat content, protein content, bacterial count, sediment, water content and farm hygiene.[6]
- The processing of milk if there was own processing plant or the sale of the milk to other processors.
- Operating feed mills, if established, to produce feed concentrate and feed rations for members.
- The bulk purchase of equipment used by member dairy farmers on their farms.
- Providing extension services to farmers to improve farm management.
- Facilitating loans from the Bank for Agriculture and Agricultural Cooperatives.
- Running seminars to improve management practices.

Since the early 1980s, the Thai government pursued a policy of promotion of decentralization of investment for development and to that end the country was divided into several investment zones, and various forms of incentives like reduced duties, tax breaks, credit on easy terms were provided to encourage investment in zones away from Bangkok. Agriculture in general and dairy processors and dairy cooperatives in particular took advantage of these facilities to increase herd size, establish chilling and processing facilities and feed mills. By 1990, 12 private dairy processing companies invested 631 million Bhat of which 48% was Thai capital, the rest was foreign. Companies under exclusive Thai ownership invested 27% of the value, joint ventures invested 57% of the value and exclusive foreign subsidiaries invested 16% of the capital. Similarly, large investment was made in dairy feed mills along with feeds for poultry and pig industries. Some cooperatives also established their own processing plants and feed mills taking advantage of the incentive policies (Table 3.5). At present there are 117 dairy cooperatives of which 60 have processing

[6] After the 'melamine in milk' scandal in China, protein content has been dropped as a criteria for assessing quality in Thailand because of the possibility of melamine use to enhance protein content (Interview with Baan Bueng Dairy Cooperative, 10 September, 2010)

facilities. In addition, there are 5 processing plants owned by the DFPO and about 30 private processors of varying sizes of which Nestle, Foremost, Melji and Dutch Milk are the largest.

3.5 Milk market and price prior to introduction of the school milk programme

Initially dairy producers had very limited local market for raw milk, so they formed cooperatives to facilitate bulk selling to private processors who served urban markets. One or more processors usually signed a contract or MOU with a cooperative for purchase of milk at an agreed price. The farm gate price of milk was determined by the DFPO and DLD on the basis of estimated cost of production and a margin to match the open market retail price of pasteurized milk. Cooperatives usually received payments twice or thrice a month as agreed and members in turn received at the same frequency. Processors were also subjected to import quota as mentioned earlier. Thus subsidies and organizational support in the production sector and protection in the market provided an environment for rapid growth in output in the 1980s. However, retail price was determined by processors based on world market price as well as local market conditions without government interference. So, when world price for powder milk fell and/or milk exporting countries pursued subsidized exporting policy, domestic dairy producers and cooperatives faced problems in selling milk because large processors found import more economic than buying milk from dispersed domestic market. Transaction contracts were often ignored and enforcement of those contracts became difficult. In 1984, dairy farmers and cooperatives agitated over unsold milk and demanded assured market for milk to continue dairy farming, which led to the adoption of a number of measures including introduction of school milk programme for promotion of consumption and market expansion.

3.6 School milk programme as a new market outlet

3.6.1 Background and evolution

Partly in response to the farmers' complaint about unsold milk, The National Milk Drinking Campaign Board was established in 1985 in order to publicize milk as a nutritious food and promote its consumption. This organization and the National Youth Bureau conducted a campaign with private sector funding to publicize the dietary value of milk under a slogan : "Have you had your milk today?" (Itsaranuwat and Robinson 2003). The campaign also initiated a pilot programme in 1985 in selected areas of Bangkok and Chiangmai in which the parents of primary school and kindergarten children purchased milk at 25 percent less than the normal price through monthly coupons in order to create a taste for milk among small children and prepare them as potential future consumers of milk.

Malnutrition (especially protein-energy malnutrition) among pregnant and lactating women and preschool and school-age children continued to be a principal nutritional problem in Thailand even though the nation has enjoyed rapid economic growth in the past several decades. Previously malnutrition was regarded as a health problem and was addressed under the health programme but since 1982, the problem was linked with poverty alleviation and community development programmes. Experiences of two previous pilot school lunch programmes (SLP) provided a basis for approaching the nutrition problems of

Table 3.5 The status of three dairy cooperatives

	Wangnamayen Dairy Cooperative Ltd Sa Keow Province	Nakhon Pathom Dairy Cooperative, Nakhon Pathom Province	Baan Bueng Dairy Coopearive Chonburi Province
Year established	1987	1974	1985
Membership at inception	200	10	25
Membership at present	1300	281	158
% members dairy farmers	100	100	60
- inception			
- Present	100	28	40
Number of cows at inception	1000	Few	150
Number of cows at present	42000	5000	3200
Raw milk production per day - tons	150	22	8
Collection centres	5	na	na
Year processing factory established	1998-2000	1985	1992
Processing - pasteurized milk	70 t/day	20t/day	10t/day
-UHT milk	60-70 t/day	None	None
% Sales to school programme	80	95	95
Other enterprises established	Feed mill, rice mill, coffee shop, minimart, gas station,	Gas station, mini mart, coffee shop	200 cow dairy farm
Enterprises in pipeline/under Construction	Powder milk factory, drinking water factory, 1000 head dairy farm	None	None

Notes:

a) All the cooperatives had started with few members, sometimes as an informal group. For example,,Baan Bueng Dairy Cooperative started as an informal dairy group in 1985 with 25 members and 150 cows primarily to pool milk for selling to a processor. Membership kept growing so in 1988, it registered as a cooperative with 122 members having about 3000 cows. Initially all of them received grants from one or more sources e.g. the central and provincial governments, cooperatives and in some cases, external donor.

b) Growth of membership and size of business of a coop depended on success of the initial effort, adoption of dairy by farmers in the area as well as leadership and management. Leadership quality made a lot of difference. For example,. strong leadership of the Wangnamayen Dairy has transformed it into a large multi-enterprise business group in a relatively backward area and it has plans to expand further.

c) Members are generally promise bound to sell milk to its collection/processing unit at prices determined by the government or by themselves. They also have obligations to supply school milk – either pasteurized or both pasteurized and UHT. But recently some cooperatives are facing the problem of default from members, e.g. some members of Baan Bueng Coop sell a significant portion of their milk to outside buyers at higher prices rather than selling to its own processing plant. Therefore, the coop has to buy milk from outside to

fulfill school milk obligation. The result is lowered profit and bonus for members for now but such behavior may eventually make the coop suffer losses and eventual collapse.

d) All the cooperatives have various packages to serve members, e.g. credit, AI and vet services, feeds for cash or credit etc, to improve production. Recently they have been facing the problem of decining membership due to retirement of older generation and lack of interest in the younger generation to engage in dairy or agriculture. So some cooperatives have both dairy and non-dairy farmers and others have only dairy farmers as members. Average dairy herd size is increasing in varying degrees which may compensate loss of member.

Source: Field visit and interviews

children through school lunch programme. One such program was initiated by the Bangkok Metropolitan Administration in 1977 targeting the city's lower income households with funding from the government, the private sector and some individuals. Another initiative was taken in 1987 by the then National Primary Education Authority under the Ministry of Education, which directed every school to implement a free school lunch programme for all students and some financial assistance was provided to schools in deprived rural communities where agricultural production was low or not feasible and students were unable to afford to buy lunch (Kachondham et al. 1992). Although insufficient funding impeded full coverage of all schools and all students, these initiatives promoted public recognition of the importance of school feeding which eventually led to the adoption of The Fund for School Lunch of Primary School Act B.E. 2535 in 1992, under which central government fund was allocated to all primary schools to provide lunch to all KG-Grade 6 students suffering from malnutrition and to a lesser extent, to students living in poverty in remote rural areas. The objectives were to enhance food security, promote desirable/healthy eating habits and promote full growth and development of children. The mode of implementation of the programme (food menu, procurement and delivery, supervision and management) and student coverage varied widely across schools and regions and between rural and urban areas.

The pilot school lunch programme implemented suffered from some deficiencies e.g. the food menus provided were often small and low quality in terms of nutritive value, which highlighted the need for improving the size and quality of the lunch menu. Around the same time, FAO drew attention of the Thai government to experiences with school milk programmes implemented since the second world war in Europe and the USA and more recently in many developing countries. The message was that milk contained protein, fat and over 12 essential micronutrients required for healthy growth of children. If these are missed in infancy and early childhood, the resulting deficiency in physical and mental growth can't be recovered or compensated fully even with better nutrition in later years. So in 1992, in addition to the school lunch act, School Dietary Supplement (Milk) Project was introduced to address the problems of child malnutrition as well as to create market for Thai dairy farmers. In 1992, 1993 and 1994, central government funding was allocated to provide 200 ml milk to kindergarten students throughout the country for 120 days. Subsequently all grades in primary schools were gradually covered and duration of milk supply was also increased to 200, then 230 then 260 days (Table 3.6).

After the introduction of the school milk programme in 1992, both producer price and factory gate (processor) price for delivery of school milk were determined by DFPO and DLD. Thus, a delicate balance had to be maintained to give both producers and processors adequate incentive to make the system work. Given the fact that the entire budget for

school milk came from the government, budgetary implication also became a factor in the determination of prices at different points. In the early stage of the school milk programme, farm gate price was 38-40% of the factory gate price of school milk, but this ratio gradually increased to over 50% in recent years (Table 3.7). The implication of increased producer share of the factory gate price depended on who supplied school milk. Initially school milk was mainly supplied by private dairy processors, so they benefitted from a smaller producer share of retail price of processed milk. Over time, taking advantage of various policy support, a large number of cooperatives also created processing facilities and became suppliers of school milk. A significant proportion of cooperatives now sell over 80% of their raw milk output to the school milk programme.

Table 3.6: Budget, coverage and number of students involved in the school lunch and school milk programmes, 1992-2010

Year	Budget (THB million)		Coverage (grades)		Number of students (Mill head)	Number of days provided
	SLP	SMP	SLP	SMP	SMP	SMP
1992	30	279	K-P6	K	0.69	120
1993	220	424	K-P6	K	1.26	120
1994	1333	1208	K-P6	K	1.62	200
1995	2147	1715	K-P6	K-P1	2.8	200
1996	2286	2213	K-P6	K-P2	3.52	200
1997	2412	4335	K-P6	K-P3	5.01	200
1998	2525	5324	K-P6	K-P4	5.39	200
1999	2966	5356	K-P6	K-P4	5.84	200
2000	3213	5981	K-P6	K-P4	5.9	200
2001	3272	6070	K-P6	K-P4	6.22[a]	200
2002	3079	6752	K-P6	K-P4	5.84	230
2003	2556	6819	K-P6	K-P4	5.96	230
2004	3394	6853	K-P6	K-P4	5.99	230
2005	5005	7000	K-P6	K-P4	6.09	230
2006	5279	6989	K-P6	K-P4	6.07	230
2007	5144	6570	K-P6	K-P4	5.37	230
2008	na	6520	K-P6	K-P4	5.33	230
2009	na	10010	K-P6	K-P6	7.11	260
2010	na	14000	K-P6	K-P6	8.4	260

a. K means kindergarten. In 2001, students of grades 5 and 6 with malnutrition problems were included, hence this enhanced number of students served.

Source: Department of Livestock Development (DLD), unpublished data; Kanemasu, 2007

3.6.2 Governance of the programme

Although the programme significantly contributed to increased production and consumption of milk in the early stages, its governance raised new issues, which were resolved through policy changes. From inception in 1992 until 2000, the Office of the

National Primary Education (ONPE) purchased the milk for the schools it supervised. The purchase was on a competitive bidding basis. Potential bidders could bid for supplying one or more schools depending on their capacity and interest as some did not want to sell entire output to school programme. The lowest bidder usually would be awarded the contract but sometimes the distance between the supplier's processing facility and the school could be prohibitive for timely and efficient delivery. During this period, only condition about the form of the product was that 200 ml packets of pasteurized milk should be supplied. There

Table 3.7 Farm gate, factory gate for delivery to school and retail prices of milk, 1986-2011

Year	Farm gate price, Bt/kg raw milk* (a)	Retail price, UHT milk Bt/kg** (b)	School milk price, Bt per/lit pasteurized milk (c)	School milk price, Bt per/lit UHT milk (d)	Farm gate price as share of retail UHT price (e) = a/b	Farm gate price as share of pasteurized school milk price (f) = a/c
1986	6.55					
1987	6.59					
1988	6.62					
1989	6.65					
1990	7.01					
1991	7.12					
1992	7.51		20.00			0.38
1993	7.98		20.00			0.40
1994	7.96		20.00			0.40
1995	7.96		20.00			0.40
1996	9.07		20.00			0.45
1997	9.39		20.00			0.47
1998	10.66		22,20			0.48
1999	11.25		22.20			0.51
2000	11.17		22.20			0.50
2001	11.33		22.20			0.51
2002	11.34	31.69	22.20		0.36	0.51
2003	11.35	32.28	22.20		0.35	0.51
2004	11.38	32.16	22.20		0.35	0.51
2005	11.48	32.35	22.20		0.35	0.52
2006	11.50	32.86	22.20	23.45	0.35	0.52
2007	12.91	34.01	23.45	29.70	0.38	0.55
2008	14.56	36.10	25.70	32.60	0.40	0.57
2009	16.50	41.73	31.30	39.30	0.40	0.53
2010	17.00	42.10	31.30	37.75	0.40	0.54
2011	18.00	43.20	31.85	38.05	0.42	0.57

Note: Retail price of pasteurized milk could not be collected, so only retail UHT price is shown. Usually price of UHT milk is higher than that for pasteurized milk. National school milk programme started in 1992, so prices are shown since then. UHT milk distribution in school milk started much later. School milk is served in 200 ml packets and priced as such but price is shown per litre for easy comparison with farm gate price

Source: *Office of Agricultural Economics, Ministry of Agriculture and Cooperatives
**Bureau of Trade and Economic Indices, Ministry of Commerce

was no restriction or specification on the source of raw material to be used so raw milk or powder milk or a mixture could be used as raw material. Also there was no restriction or specification on the type of packing and labeling to be used so pouch or sachets or paper cartoons could be used for packing, and any kind of labeling the company or cooperative preferred could be used. Therefore, school milk could not be separated from commercial milk which might require a different quality standard. As the coverage of the programme increased, demand for milk increased rapidly, and since lowest bidder was awarded the supply contract, various kinds of quality problems arose as suppliers tended to use more powder milk of questionable quality when world prices were low, and adulteration with water to increase volume was also common. Together these problems led to deterioration of the quality of milk in some cases.

In order to address these problems, several policy measures were taken. In 2000, it was proclaimed that only raw milk could be used to prepare packets to supply school milk, the objective being elimination of dilution with powder milk. In 2001, a common design for school milk packets was provided which every supplier of school milk had to follow. As a result, school milk was given a separate identity from commercial milk even though the labeling included the name and logo of the supplier. A system of zoning at the provincial level was introduced so that only specific suppliers satisfying specified criteria could supply a particular zone. This arrangement would also ensure supply of local milk to local schools and create a sense of ownership of the programme among all stakeholders involved. However, later the province level zoning was found to be very restrictive, so it was redefined at the regional level, which means that processors in a given region could participate in a bidding process to supply milk to one or more schools in the region depending on processing capacity of the processor. As a result some processors might be left out of the school milk programme if they failed to win any bid. In 2003, there was a proposal to define zone by fixing the distance between school and processing plant at a maximum of 100 km but this was not implemented due to the small number of dairy processors in the country and their concentration in a few locations.

In 1999 the central government adopted a policy of decentralization of civil administration by giving more authorities to Local Administrative Organizations (LAO). So the administration and governance of schools became the responsibility of LAOs, and rather than sending central government funds directly to schools from the Education Ministry, the fund was channeled through the Interior Ministry to the local organizations for further distribution to individual schools. Since 2001, in line with the general school fund allocation, central government fund for school milk has been sent to the local administrtative organizations. However, the regional zoning for supply of milk to schools by processors had to be synchronized with the LAO boundaries. More than one LAO might fall within the boundary of a zone. So based on decisions of the National School Milk Committee and directives of the Dairy Farming Promotion Organization (which serves as the secretariat of

the committee), a tri-partite agreement used to be signed between the LOA, the schools and the milk processors that are allocated quota to supply milk to schools within the zone. Under the agreement, the processor was obliged to supply agreed and required quantity of milk directly to the school but would receive payment twice or thrice a month from the LAO on the basis of certified invoice submitted by the school. The local organization in turn would receive reimbursement from the Interior Ministry every quarter or on a half yearly basis. This means that the local organization had to use its own cash to pay the processors more frequently than it received reimbursement from the central government.

Initially milk was supplied only on school days but later school holidays were also included in the programme. For holiday season, the UHT milk was introduced in the program and the students were given bulk supply to take home.

The above measures helped solve the marketing problems of producers although not fully. Farmers sometimes faced the problem of unsold milk as some processors, contrary to rules, mixed some milk powder with raw milk whenever it was economic. This was prompted by two factors. First, raw milk had to be purchased at prices fixed by the Ministry of Agriculture and Cooperatives and the price was high in relation to the world market price. On the other hand competitive bidding to get school milk supply quota required that the offer had to be at lower prices. There was thus the possibility of a mismatch between these two market prices. Moreover, due to lack of local demand and competition among suppliers, retail price of commercial pasteurized milk market was also very low in many areas, so processors might incur losses in the commercial milk market sector. This situation made room for adulteration with powder milk or water to reduce cost in order to compete at lower price to supply school milk, which then might be of lower or poorer quality.

In order to address these problems, in 2005 the government intervened by introdcing a rule that in order get a right to supply milk to school, a processor had to buy a portion of raw milk from domestic producers to get import permit for another portion, and that a processor could supply to the school programme only up to the amount of raw milk it purchased. However, the problems created by mis-matched prices at producer, retail consumer market and school levels continued to disrupt smooth running of the dairy sector in general and management of the school milk programme in particular. For example, there was unsold milk (in 2009, out of 2559 tons of milk produced per day, MOUs were signed with producer cooperatives for 1088 tons to supply school milk and for 1354 tons for commercial marketing, leaving 107 tons unsold) and there was occasional news about corruption in milk auction in some places. In order to address these problems, the governance mechanism of the school milk programme was changed a couple of times between 2005 and 2009, e.g. the zoning system for allocation of milk to schools was rescinded and reintroduced with some modification; the roles of the Ministry of Agriculture and Cooperatives, the DFPO, the DLD, the School Dietary Supplement (Milk) Sub-Committee, the Dairy Cow and Product Committee were defined and redefined. At the end, between 15 December 2009 and 16 February 2010, several deliberations by the Cabinet and other relevant bodies and committees led to the adoption of a series of decisions to address the problems of the sector in a comprehensive manner. Some key elements of those decisions are as follows:

a) The system should ensure that dairy farmers can sell all their milk at reasonable/remunerative price, school children can get quality milk processed in the country without adulteration with powder milk or other substance; producers can sell and processors can purchase, process and sell milk at minimum logistics and transactions costs; flow of funds is adequate and timely so that all payments between parties are made in a timely manner.

b) The School Dietary Supplement (Milk) Sub-Committee will act as the Central Committee for management of the School Milk Programme and the DFPO will act as the Secretariat of the Committee. The DFPO is authorized to sign MOU with all processors who will sell school milk to the LAOs and distributors. Thus the DFPO has two roles. It is a regulator and monitor assessing the amount of raw milk available, the amount of milk to be distributed to schools, designate areas where processors will distribute milk, and monitor and certify the quality of raw milk and processed milk. And it is also a supplier of milk from its processing units to the school milk programme.

c) Based on the accumulated experiences in running the programme since 1992, the School Dietary Management (Milk) Sub-Committee developed a set of mandatory criteria and guidelines for various stakeholders involved in the system for proper running of the programme. The criteria and guidelines include the following (details are in Appendix B):

- Criteria for selecting entrepreneurs to join the project
- Criteria for granting rights and designating school milk distribution areas to entrepreneurs in the project
- Guidelines for purchase of school milk by LAOs and private schools
- Guidelines on school milk transportation and storage
- Measures to monitor and control the distribution of school milk in school milk dietary supplement (milk) project
- Guidelines on prices for pasteurized and UHT milk

d) The entire programme will be financed by the central government and several ministries will have specific roles. The Ministry of Interior will be the buyer for government schools administered through LOAs, Ministry of Education will be the buyer for private schools; the Ministry of Agriculture and Cooperatives will administer quota allocation for raw milk sales; the Ministry of Public Health will be responsible for product approval and quality control, and the Ministry of Industry will be responsible for issuance of production license for processors.

3.6.3 Outcome of the programme

As is evident from the foregoing discussion, school milk is an integral part of the Thai dairy industry so much so that it almost accounts for nearly 37 percent of domestic raw milk production. The program also aims to create a more sustained demand for milk and milk products by developing a taste for milk. Although systematic studies on the milk drinking habits after grade 6 are not available, observers attribute at least part ot the growth in per

capita milk consumption (from 2 litres in 1984 to approximately 29 litres per year in 2009) can be attributed to the school milk program. (Table 3.8).

Studies to measure the nutritional impact of milk drinking habits of Thai population are r also rare. During the early stages of the program, some systematic records were kept in the schools on height and weight of children under the school milk programme as well as on their school attendance but these were not subjected to any systematic analyses. However, in 1995, a study by Mahidol University conducted in 1995 acknowledged the importance of school milk as a supplementary drink in meeting the nutritional requirements of school feeding. Also, the casual observations related to falling malnutrition levels (child malnutrition levels in Thailand dropped to less than 5% in 2006 from 18% in 1992, the year of inception of the school milk programme) and growth in average heights of elementary school children suggest that school milk consumption may have contributed a fair share of these changes along with other factors such as general economic growth, school lunch programme etc. (Chittchang 2005; Kanemasu, 2007; Jarialerttsakdi, 2010). Jarialerttsakdi (2010).

Table 3.8 Some impact indicators of the school milk programme, 1992 and 2009

	Base year	Base year value	2009 value
Number of dairy cows	1992	43940	280,000
Raw milk production, t/year	1992	134,011	840,691
Milk used for school milk prog, t/year	1992	16,560	312,000
Overall liquid milk market, t/year	1992	552500	1,900,000
School milk as % of raw milk production	1992	12	37
School milk as % of milk consumption	1992	3	16
Domestic raw milk as % of overall consumption	1992	24	44
Milk consumption per capita, l/year	1992	na	29
Milk consumption per capita by school student, l/year	1992	24	52
Number students served by school milk, million	1992	0.69	7.1
Annual budget million Bhat	1992	278.6	10010
Number of dairy cooperatives	1996	62	117
Number of dairy cooperative members	1996	15525	20000
Number of dairy processors -Total	1992	70	91
of which cooperatives		na	61
Number of processors selling milk to schools -Total	2003	69	68
of which cooperatives		na	na
Number of processors making pasteurized milk	2003	69	72
Number of processors making UHT milk	2003	11	11

Source: FAOstat ; Department of Livestock Development; other unpublished sources

Further, increased consumption and demand for milk, even if artificially supported the beginning as a public sector demand, induced changes in different fronts. An expanding

market induced existing producers to increase herd size and volume of production and new producers to enter the sector. Between 1990 and 2000, number of dairy cows doubled and milk production more than doubled every five years. Currently share of domestic raw milk constitute 44% of overall milk consumption in the country (Table 3.8).

Major expansion took place in the producer cooperative sector. Number of societies increased from 62 in 1996 to 117 in 2009 and average membership of cooperatives increased from about 15000 to about 20000 between the two years (Table 3.8). Seventy two percent of the members were dairy farmers and they owned 82% of the total number of dairy animals in the country.

The size and capacity of the processing industry also increased rapidly. Number of dairy processors increased from 70 in 1992 to 91 in 2009. Number of private processors increased to 30 by 2010 though Nestle, Foremost, Dutch Milk and Melji control perhaps over three quarters of the private sector market. During 1995-2000, cooperative processing plants processed 78% of national milk output, the rest was processed by private processors who also processed imported powder milk. Since then many more cooperative societies established their own processing plants rather than just selling chilled milk to private processors. Sixty eight out of 117 cooperative societies now have processing units, others sell chilled milk to private and cooperative processors (Table 3.7).

Thus, school milk and cooperatives played a major role in the growth of the dairy sector because in the absence of the guaranteed market provided by the school milk programme and group efforts to create collection centres and processing facilities to compete with private processors, who otherwise could control the raw milk and retail markets, there would have been serious market constraints for the growth of the dairy in Thailand.

4 Implications of Policies and Implementation Modalities of School Milk Programmes in Thailand and Bangladesh

In Thailand, smallholder agriculture did not have a strong dairy component because of the absence of a milk drinking tradition among the population. So dairy development required developing new dairy breeds of cattle and all the other supporting infrastructure. This has been achieved in a remarkable manner under Royal patronage and strong public sector policy support in the form of (a) identification and development of suitable breed and feeding systems, (b) promotion of dairy farming among producers through extension and training, (c) promotion of dairy cooperatives as well as private dairy processing for facilitating marketing and processing by providing support in the form of low interest credit, tax relief, exemption of import duties, organizational and management training, (d) adoption of milk price policies including tax and tariff policies to protect the domestic dairy sector as well as keep import open for private dairy processors to meet consumer demand at reasonable cost, and (e) school milk programme as a vehicle to provide a regular guaranteed market outlet for a significant portion of domestic milk output at an incentive price as well as address the problem of malnutrition among children and prepare them as future consumers of milk.

The issues surrounding domestic dairy production, marketing, import and urban consumer market are obviously highly interlinked and they have been handled in an integrated manner. The school milk programme was introduced at a critical juncture of the evolution of the dairy industry in Thailand when due to other supporting measures, production growth was high but market for domestic raw milk was limited and imports were cheap due to global dairy surplus and subsidized sales by developed countries. The school milk programme not only provided a stable guaranteed market outlet for a significant portion of the domestic output, with full public sector policy and budgetary support, it became an anchor for the dairy sector. The market share of school milk increased over time and about 50% of domestic production is now marketed through this channel.

There were several challenges in the implementation of the school milk programme. The system of governance evolved over time based on experiences gathered as well as knowledge derived from similar programmes implemented in other countries. The key lesson from the evolving governance mechanism in Thailand is that it has been developed with the participation of all stakeholders – the dairy producers and dairy cooperatives, private dairy processors, public sector organization like the Department of Livestock Development, Dairy Farming Promotion Organization, the research organizations, local civil administration and central government ministries of education and interior, and above all the country's cabinet, the highest policy making body.

In 1992, the year of inception, the overall budget for school milk programme was about THB 279 million or about US$12.5 million. In 2009, the budget increased to THB 14000 million or US$467 million. This was due to increase in student numbers, number of grades and number of days covered by the programme, and increased production costs. Government budget allocation per student per day has been changed thrice—from THB 5 (US$0. 17) in

1992, to THB 6 (US$0.20) in 1999 and THB 10 (US$0.17) in 2004. Per year per student costs were US$25, 37 and 39 in 1992, 1999 and 2004 respectively (Kanemasu, 2007; Anon., 2010). Sometimes it is stated that Thai dairy developed due to highly subsidized public investment support, which is true. But considering overall public sector expenditure, the school milk programme cost has been so negligible yet it has generated so many times more benefits throughout the economy in many ways that there are possibly few other public sector investment options which have produced similar outcomes. It should be noted that the school milk programme is a supplement to a regular school lunch programme for which the per student per day cost is slightly less than that for the school milk programme. Together the two programmes ensure adequate nutrition for school children in addition to their economy wide benefits.

In Bangladesh, smallholder mixed farming traditionally has a dairy component and the population has a milk consumption habit as part of daily diet. The cows are low productive due to feed constraint, diseases and poor management. Demand growth has been high due to income growth and urbanization but poor supply response of smallholder producers means that the increasing demand-supply gap is met by import of powdered milk. Commercial processing of milk collected from rural areas started in the mid 1970s by a public sector/cooperative type enterprise. The capacity of the processing industry has increased especially since the mid 1990s due to the entry of private sector processors in the industry but even now no more than 15-17% of raw milk output is processed by the formal processing sector. No consistent public policy has been pursued to strengthen the domestic dairy sector. Policies related to import of powdered milk and related tax and tariff policies primarily served the interests of importers and dairy processors. Neither consumers nor domestic producers benefited from these policies (for a detailed analysis of the policy barriers for dairy development in the country, see Jabbar, 2010).

Smallholder producers of milk have small marketed surplus, so transaction costs of marketing such small quantities is high. Similarly, for dairy processors, collection of small quantities of milk from highly scattered small producers with poor access to good roads also entail high transaction costs. The types of market institutions and infrastructures required to address these problems and link small rural producers with urban milk consumers have not developed adequately to uplift the dairy sector. There may be many options for the development of such market institutions and infrastructure for dairy development, and dairy cooperatives or dairy groups and school milk may be important elements in this framework. Unfortunately, nothing of that sort happened in Bangladesh due to various reasons. Dairy cooperative is a stated strategy for dairy development (GOB 2007) but very little support is available on the ground in terms of budget allocation for manpower and institution building to promote dairy cooperatives as an important vehicle for dairy development. It has been argued that the cooperative dairy enterprise – Milk Vita- is run by public servants with little actual participation of primary members, and it suffers from poor and inefficient management (See Jabbar, 2010 for details). School milk is not even mentioned as a tool in any policy and strategy document related to agriculture, livestock, health, food and nutrition or education (See Sixth Five Year Plan, GoB, 2011b, which is the latest most comprehensive policy document).

There is a national food policy, the main objective of which is to ensure food security for all at all times. It encompasses availability, access and nutrition or utilization dimensions of food security. There are programmes and projects related to nutrition but only one or two are related to feeding malnourished infants and pregnant mothers. There is a programme on school nutrition but that is focused on increasing awareness among teachers and students about balanced food and nutrition and general hygiene. There is no public or private sector supported school feeding programme operational in the country though some urban schools provide mid morning or lunch time snacks, which is usually paid by parents. There are two exceptions, however.

One is a school feeding project run by the WFP with mainly USAID donations since 2002. It involves commodity aid for local production of micronutrient fortified biscuits for distribution among primary school children on school days in a number of districts having high incidence of malnutrition. The objective is to reduce malnutrition, and increase school attendance and performance. The programme is being administered in collaboration with the ministry of education. During 2002-2004, full cost per student per year was US$13.5 and total cost of the project was about US$30 million, about 10% of that was provided by the government of Bangladesh. The ministry has recently decided to expand this programme with mainly government funding and some technical and financial support from the WFP (for details see section 3).

The other pilot project is a school milk project implemented by Land O, Lakes with USAID funding and technical support from Tetra Pack. A detailed account of the project has been given in section 3. The key feature of this project is that public sector was virtually bypassed or avoided, except taking project approvals from the relevant ministries. It was a fully aid funded pilot project and no advocacy was done with public institutions to share project cost or get more involved in its management or scale it up. As a result, the project failed to create any public sector interest.. Since the milk was given free, and full financial account of the project for implementation and governance could not be gathered from LOL, the budgetary implications of running such a project could not be assessed.

Thus it can be concluded that the Thai school milk programme made significant contribution to the development of the dairy sector and alleviate child malnutrition because of strong public policy support and budgetary commitment to the programme. On the other hand, no school milk programme has been tried in Bangladesh at any scale to test its potential for development of the dairy sector or alleviate child malnutrition which is widespread. An aid funded pilot school milk project has been implemented but without any link with the domestic dairy production and marketing activities and without involvement of the public sector in design and implementation as its primary goal was to test the potential for business opportunities for a multinational food processing company.

5 Design Considerations for a Pilot School Milk Project in Bangladesh

5.1 Choice of sites for the smallholder dairy project and implications for choice of site for the school milk pilot

It is understood from FAO RAP and Grameen Motsho O Pashushampad Foundation (GMPF) that the Bangladesh component of Project 1(productivity improvement and enhancement of market access) will be implemented in three sites—Sirajganj, Thakogaon and Kurigram. But the implementation site for project 2 (school milk pilot) is yet undecided. A decision on this will be made based on a discussion on the pros and cons of implementing in one or more sites but the choice of the site itself will largely depend on the marketing strategy adopted for project 1. A brief discussion on potential management and marketing options for these projects is discussed below...

5.1.1 An overview of the Community Livestock and Dairy Development Programme and lessons for the smallholder dairy project

Grameen Bank (GB) got involved in fisheries and aquaculture activities during 1986-88 by taking 25 year lease of a total of 930 fish ponds/projects covering 1000 ha spread over several districts in central and Northwest Bangladesh from the Department of Fisheries, Government of Bangladesh for aquaculture by landless poor community members to alleviate poverty. GB reorganized these ponds/projects into a number of Farms (administrative units) for management purposes. Then a multilayer system of management was introduced in which the lowest unit of a Farm was a group of landless households who would manage one or more ponds in partnership with GMPF staff on a cost and profit sharing basis. GMPF would provide training and inputs for production and assistance in marketing. The group would share feed cost, provide labour for feed distribution and keeping the pond clean, and guard the ponds against theft. In return, the group would get 40-60% share of profit based on the size of the pond and volume of output. In 1994, Grameen Motsho Foundation (GMF) was created as an independent organization to manage the aquaculture projects of GB. The foundation extended its activities into dairying by incorporating dairying into its activity profile with support from UNDP. The project, called Community Livestock and Dairy Development Project (CLDDP) was executed in 18 upazilas in seven districts. The organization was then renamed as Grameen Motsho and Pashu Foundation (GMPF) in 2003. Some features of the project are as follows:

- A multilayer management structure was introduced. In line with the management of the aquaculture activities, three Farms were created for management of the livestock activities: Joysagar Farm covering Sirajganj, Pabna and Bogra districts; Dinajpur Farm covering Dinajpur, Thakurgaon and Panchagor districts, and Jamuna Borropit Farm covering Tangail and part of Sirajganj districts. Under each farm, at the bottom was village dairy groups comprising dairy producers. A number of groups were federated under a Centre and a number of centres were under the supervision of a Farm.
- The members were extended micro-credit to acquire various species of livestock under a number of livestock packages and one such package was for dairy animals.

The GMPF would purchase the animals for the members based on their preference to make sure the credit was used for the intended purpose.

- An insurance scheme was introduced to cover risks of death of dairy cows and heifers and a premium equivalent to 3% of the purchase value of the package was collected once every three years (initially by deducting from the approved credit) . In case of death of an animal, 80% of the value of the package would be paid as compensation.
- Treatment, health care and artificial insemination services with semen purchased from the Department of Livestock Services were provided on demand at reasonable prices and regular monitoring of health and pregnancy of the cows were done. Improved fodder production was promoted by distributing Napier and other grasses.
- Community feed mills were established in strategic locations to supply quality protein feed at reasonable prices and also to sell to non-members. The members would share 70% of profit/loss of the mills though basically managed by GMPF staff.
- Community milk collection centres were established in each project site at convenient locations to collect milk from members and to deliver to chilling centres (called community dairy enterprises) also established at convenient locations with total storage capacity of 16000 litres/day. Members were given 'fair' price for the collected milk but they were free to sell to other buyers if prices were better there even if this meant low capacity utilization of the chilling plants. This flexibility was allowed as the objective was to ensure increased income of the members and CLDDP plants were there as an alternative fall back outlet. A manual pasteurization unit was established in Nimgachi but was not eventually operated as production of quality product proved to be difficult.
- Processing and marketing beyond chilling was not planned in the project because of lack of scale and comparative advantage. The chilled milk was sold to commercial processors like Milk Vita, Bikrampur Dairy or to sweet makers in district towns. There was no formal time bound (short or longterm) contract with any buyer so CLDDP always had to arrange sale of chilled milk on a casual basis., hence sometimes ran into difficulties in selling milk. When the chilling plant was full and a buyer was not immediately available, members were compelled to sell to other buyers often at low prices because of low bargaining power in those circumstances.
- Biogas technology was promoted and willing households were helped to set up biogas digesters at reasonable cost.
- Members had to make personal savings with the CLDDP. The project also accumulated funds by making various levies on transactions made by the project with members and non-members or from saving from certain activities e.g. the pay out from the insurance scheme was much lower than the premium collection.

The project was completed in December 2005. Thereafter, by using funds accumulated during the project, livestock activities have been continued to some extent with credit and other technical support. In case of dairy, loan and technical support was continued where there was demand but milk collection and chilling could not be sustained at the same scale. Reportedly, this was due to the complexity of the dairy enterprise, especially for marketing of milk.

Some visible indicators of achievement and impact of CLDDP can be observed on the ground including adoption of crossbred cows, improved feeding and treatment of animals, increased milk yield, production and sales, increased household milk consumption, accumulation of assets (increased number of cows owned, better quality dwelling houses out of increased income), children being schooled, better knowledge and skills in livestock rearing, and accumulation of project funds through members' savings to continue operations at some level without depending on donor funds. Quantitative information on some indicators of physical achievements made during the project and post-project periods as obtained from GMPF are shown in Table 5.1.

Table 5.1 Selected performance indicators of the CLDDP and its subsequent activities

Performance indicators	CLDDP 1999-2005	Post-CLDDP 2006-2010	Total 1999-2010
Village Group Members (VGM) for dairy	6760	4356	11116
VGM male	3197	-254	2943
VGM female	3563	4610	8173
No of milk cows/heifer distributed	4249	4840	9089
Other livestock distributed [nos]	4286	10061	14347
Dairy loan distributed [M.Taka]	106.2	121.01	227.21
Other livestock loan distributed [M.Taka]	23.4	135.05	158.45
Milk production litres (million)	5.208	8.529	13.737
Milk chilled and sold litres (million)	2.183	2.898	5.081
Community milk collection centres established	39	0	39
Chilling centres established (nos.)	10	0	10
Chilling centres in operation (nos.)	10	4	-
Mini milk processing plant established (nos.)	4	0	4
Production and sale of packed milk (nos)	92738	0	92738
Community feed mill established (nos.)	3	0	3
Community feed mill in operation (nos.)	3	2	-
Milk cows insured (nos.)	4250	4241	8491
Premium collected (million Taka)	1.98	3.59	5.57
Compensation paid (million Taka)	1.49	1.28	2.77
No of cows died	163	70	233
Bio gas plant constructed (nos.)	283	68	351
Artificial Insemination carried out (nos.)	8769	13650	22419
No of calves born	4700	8074	12774
No of services per calf born	1.9	1.7	1.8
N animals vaccinated	88215	111783	199998
N animals dewormed	13531	18105	31636
% members consume milk	100%	100%	
Livestock development fund generated (M. taka)	12.75	20.98	33.73
Personal savings fund of VGM (M. taka)	2.46	5.22	7.68

Source: GMPF, unpublished data

In general, these statistics tell a positive story regarding the impact of CLDDP. However, a closer scrutiny of the activities during and after the project suggests that the sustainability of some of the activities could have been further enhanced by providing a more stable and independent organizational structure for the village groups and investment in training on management and accounting skills. As such, the project focused more on production activities instead of developing dairy as a business enterprise. Also, even though farmers were organized into small groups, they were almost always supported either by the project or by GMPF. This may have affected their ability to independently chart their own future. Finally, although processing beyond chilling was not considered in CLDDP (and perhaps for good reason), adequate attention to and investment in development of an exit strategy supported by a plan of action on strengthening its market access could have facilitated consolidation of gains during the project period and more sustained growth in future.

5.1.2 Marketing strategy for the smallholder dairy project and implications for link with the school milk pilot

Given the above background of the CLDDP, what should be the implementation and exit strategy for the new projects? Especially what should be the marketing strategy? Should there be site specific strategies or a common strategy for all three sites? And where does school milk fit as an element? Assuming that the lessons from CLDDP will be used to develop an organizational model and an exit strategy, possible marketing strategy options that can be considered and their pros and cons are summarized in Table 5.2

Comparison of the various options indicates that, everything considered, options 'e' and 'f' rank high for making a choice between them as advantages of these options outweigh their disadvantages and they are better than all other options. While negotiating with processors, potential for creation of goodwill for their products may be highlighted along with benefits to be derived from contribution to the school milk as a corporate social responsibility.

Next in rank may be option 'c' but widely dispersed three sites – two of which are fairly small in terms of membership would be ahandicap for organizing a central processing facility and a corresponding marketing strategy. If this option is chosen, portion of sales proceeds has to be used to buy UHT milk from a processor or fermented milk or yoghurt from Grameen Danone. Consequently, direct link between the smallholder dairy and the school milk projects will be lost and the principle of 'local milk for local school' will also remain unfulfilled.

Option 'd' has something to recommend but it would require that GMPF internally articulate its longer term vision and a strategy to use the limited resources from the current projects to jumpstart the process of building towards that vision. Such an articulation may also guide the strategy to be pursued with Tetrapak or other providers of UHT technology.

Table 5.1 Milk marketing options for the CFC project and their pros and cons including implications for school milk

Milk marketing option	Pros	Cons
a. Sell chilled milk to a large processor e.g. Rangpur Dairy, Aarang Dairy, Pran Dairy under time bound contract minus required amount for school milk	• Available chilling equipment can be used in all three sites, so no capital expenditure will be required for processing, and no major cost for marketing • Sale can be split, e.g. Thakurgaon and Kurigram product may be sold to Rangpur Dairy, Sirajganj product to Aarang or Pran	• Finding buyers willing to pay reasonable price may be very difficult, especially in Thakurgaon and Kurigram • Link with school milk need to recognize that there is no tradition of drinking cold milk among children, so implication of drinking cold milk and cold chain to supply safe cold milk need to be addressed.
b. Add mini pasteurization plant to chilling plant at each site 2000 l/day capacity in Ranishakail and Kurigram and 15000 l/day in Sirajganj) for school milk and sell chilled milk to others	• Allow entry into pasteurized milk market with own brand (need to decide which name) • Because of small scale, local district markets may be targeted with the slogan "local milk for local market"	• Small scale plant may be costly and uneconomic to operate, especially in Thakurgaon and Kurigram and finding a supplier within short time may be difficult • Assurance of quality standard may be difficult as experienced in Nimgachi under the CLDDP so staying in the competitive local market may be difficult • Link with school milk needs to recognize that there is no tradition of drinking cold milk among children, so implication of drinking cold milk and cold chain to supply safe cold milk need to be addressed. • Entry into larger city markets may be difficult so marketability of collected milk may be a problem • Pasteurized milk may be boiled before serving, but a strong cold chain for delivery and storage, and boiling facilities at school will be required. Both are expensive and operationally unsuitable
Create a central facility for about 20000 l per day pasteurization capacity collecting milk from three sites	• As in case of b. • Because of slightly larger size, some economy may be gained in plant establishment and processing cost	• Finding a supplier of pasteurization plant within a short time may be difficult. • Milk collection and marketing costs will be high, uneconomic and • Uncompetitive due to dispersed project sites • **Link with school milk unsuitable and expensive** •
d. Add mini UHT plant to chilling plant at each site or at a	• Long shelf life and no need for cold chain will allow access to district towns and rural markets with own	• Tetrapack is the only current supplier of UHT technology in Bangladesh. Minimum plant size they are willing supply is 20,000

central place (see last column) for both school milk and outside sale	brand and with the slogan "local milk for local market" • **Highly suitable for school milk pilot** • Larger city markets may be targeted later through marketing agencies • Possible to think beyond the project size and its life; subject to availability of funds, create a plant to process milk collected from all three sites - members and non-members- to achieve economies of scale. This will make exit easy as established market link can be continued by stakeholders after project life	l/day at the cost of about Tk 250 million or US$ 3.38 million. Daily running cost will be TK 160, 000 or US$2200. Both are prohibitive for the current project budget. • May not be competitive with other UHT processors
e. Sell chilled milk to a large processor having UHT facility e.g. Rangpur Dairy, Aarang Dairy or Pran Dairy under time bound contract and buy required quantities of UHT milk for the school milk pilot.	• No need to invest in processing equipment and marketing logistics • Sale can be split, e.g. Thakurgaon and Kurigram product may be sold to Rangpur Dairy, Sirajganj product to Aarang or Pran • Overall marketing cost may be less than in other options • **Highly suitable for school milk pilot** • Arrangement may be mutually beneficial if both parties recognize the importance of smallholder dairy dev and see complementary roles rather than as competitors • This will allow an easy exit as established market link can be continued by stakeholders after project life	• May be difficult to find a buyer for chilled milk having UHT facility on reasonable terms • Cost of collection of raw milk and delivery costs of chilled milk likely to be high, especially for Thakurgaon and Kurigram due to distance. Split sales may reduce cost. • "Local milk for local market" will be limited to the small school milk component
f. Sell chilled milk to Grameen Danone under time bound contract and buy back required quantities of fortified yoghurt or Fermented Milk for school milk project	• No need to invest in processing equipment and marketing logistics • Overall marketing cost may be less than in other options • **Fermented milk highly suitable for school milk pilot with minimum logistic for distribution** • **Fortified yoghurt also suitable for school milk subject to establishment of delivery cold chain** • Arrangement may be mutually beneficial as the importance of smallholder dairy dev is recognized by both parties • This will allow an easy exit as established market link can be continued by stakeholders after project life	• Establishment of delivery cold chain for fortified yoghurt for school milk likely to be difficult and expensive especially if school pilot is located in Thakurgaon or Kurigram due to distance • " Local milk for local market" may not be visible as it will get diluted with Grameen Danone's overall processing operations

Given the above, either Sirajganj or Thakurgaon may be chosen for piloting the school milk project and appropriate protocol detailing terms of delivery may be signed by the school milk project with the smallholder dairy project and other relevant parties for supply of milk.

The chilling plants in both the sites are currently located in inappropriate locations, so whichever site is chosen, the chilling plant needs to be relocated to a new site with adequate space and good access road. Sirajganj has good access to market for raw or chilled milk as other dairy processors are there as competitors and because of the presence of other operators, piloting school milk may face problem. Thakurgaon is fairly isolated so school milk can be tested without the influence of other interventions but it has poor access to milk market and long distance may mean operations will be expensive.

5.2 Organization and management of the school milk pilot

5.2.1 Factors to be considered in deciding implementation modalities

A pilot project is essentially an experiment to test one or more hypotheses. In an action oriented pilot project, the purpose is to test how to do certain thing to achieve certain goal or objective, and to learn what will work and what will not, and why. The lessons learned can then be used to better design for scaling up or replicating the project activities or to do nothing if nothing really worked in the pilot.

School feeding programmes (SFP) with or without milk have been in place as routine or in project form in both developed and developing countries for several decades. Much research has been conducted on the system of governance and impact of such programmes. But it is not always easy to draw conclusions about success or failure of such programmes/projects based on individual project studies. Adelman et al. (2008) reviewed impact of SFP (food for education programmes – both in-school feeding and take home food but no milk content) in a number of developing countries and found that such programmes had significant impact on school attendance of enrolled students, especially where baseline attendance was very low and malnutrition severe. Potential impacts on school participation by children not previously enrolled in school are not well known. There is mixed evidence that school meals can improve performance on math and literacy tests, and they may improve cognitive development, depending on the type of food provided, the size of the food rations, and programme duration.

Greenhalg et al. (2007) conducted a critical review of 18 SFP (reported in 29 articles) in disadvantaged children that included trials from five continents and spanned eight decades. Although they found that the programmes had significant positive effects on growth and cognitive performance, the trials had many different designs and were implemented in varying social contexts and educational systems; by staff with different backgrounds, skills, and cultural beliefs; and with huge variation in the prevailing social, economic, and political context. Because of such diversity of situations, the authors closely looked at aspects that determined success and failure so that policy makers and project designers can decide on the type of projects that should be implemented. They identified three categories of factors : factors that appeared to enhance efficacy of SFP, factors that appeared to reduce efficacy, and factors under which SFP appeared not to work. These are summarized below.

Factors enhancing efficacy of SFP

- Target group has clear nutritional deficiency, especially inadequate energy intake, and pilot is oriented to correcting this rather than to short term hunger relief

- Intervention designed by or with local teams having knowledge about local problems, norms and culture rather than designed by distant 'experts' having no or little local knowledge
- Well organized schools that form part of an efficient distribution chain for the food supplement to be offered
- Measures are in place (e.g. close supervision of eating) to ensure that the supplement is consumed at school
- Palatability and acceptability of the product is confirmed beforehand, and persons having intolerance or allergy to the product are excluded
- Use local ingredients and cooking methods (in case of supplying cooked food)
- In extreme poverty, intervention is designed so that attending school is more economically viable than keeping children at home
- Intervention seeks to induce a change in home diet by educating or inspiring children

Factors reducing efficacy

- Participants are not aware of, have not signed up to, or trained to take account of the objectives and methods of the pilot
- Design involves role conflicts or ethical difficulties for staff or project implementers, e.g. targeting some students and not others, which then creates the possibility of violating rules from both supply and demand sides
- Insufficient measures in place to reduce confounding actions e.g. benevolent attention given to some target object or distribution outside target population
- Adverse prevailing policy e.g. policy conflict with pilot project objectives

Factors making SFP unworkable or ineffective

- Food offered provides too little of the missing nutrient or is not consumed due to unpalatability or other reasons
- Supplementation occurs too late to impact on growth and cognitive ability as it is known that supplementation needs to be given as early as possible
- Compensatory reduction in food given at home when school meal is substantial, which is likely to occur among extreme poor households due to insufficient food supply at home for the entire family
- School food may reduce bioavailability of some nutrients, e.g. milk supplement may reduce the absorption of iron and zinc in some circumstances

These experiences from around the globe are useful for designing the school milk pilot project under consideration. And these should be shared and discussed with all stakeholders at the beginning of project implementation so that the stakeholders may appreciate the objectives of the project, give adequate consideration to pros and cons of various factors that may help or hinder the operation and success of the pilot as well as what need to be done to make them work.

5.2.2 Choice of schools and grades to be served

The pilot project intends to serve 2000 primary school students preferably in one site or upazila. Once the upazilla is chosen based on options and discussion in section 5.1.2, the

next step is to decide types of schools and grades to be included in the programme. Generally there are three types of schools – government primary school, registered or government approved primary schools and government approved madrashas (latter two are not directly government schools but get government grant to meet part of cost). Outside these, there may be informal or nonformal schools run by BRAC or other NGOs, unapproved madrashas and privately run unapproved kindergartens in some upazila towns. For purposes of this pilot project the first three categories should be chosen. The difficulties of inclusion of other types may be guessed from the experience of the LOL executed school nutrition programme discussed in section 2.

The next question is whether all students or certain grades in a primary school should be served. Thai school milk programme served only kindergarten students in the first three years, then added other grades gradually reaching 6th grade in the 17th year after inception. The reason was that the objective was to address the problem of malnutrition among children and it is well known that supplementation given at the earliest stage of infancy has the highest impact. Nutritional impact diminishes with age and may be negligible beyond certain age. In Bangladesh, kindergarten schools are rare in rural areas and attendance in primary school begins at the age of 6, which is already late for achieving maximum nutritional impact from milk supplementation. Therefore, even though incidence of malnutrition is generally high in Bangladesh, in order to create maximum impact with limited available resources in the pilot project, it will be advisable to include only grades 1 and 2. It will be possible to monitor students in these two grades for up to three years. If all grades are served, students of grades 3-5 will leave after one or two years with the project so impact on them can't be assessed fully and properly.

A relevant question is if school teachers should be provided with milk packs, and if so which teachers. Normally there are only 5 teachers in a standard primary school and three of them – the Head teacher and two class teachers - will be directly involved in the project giving quite a bit of time. Other teachers will also need to stand by or provide occasional help in some form or other so it is justifiable and advisable to include all the teachers and staff (e.g. the bell boy, the cleaner) in the recipient list and adequate provision should be made for them with the proviso that once list has been made and agreed, that should be strictly adhered to. Recall that slackness due to ethical lapses or benevolent behaviour in distribution reduces the efficacy of the school feeding programme.

There may be 50 or more primary schools in the three categories in a upazila. So only a subset of these can be covered in the project to accommodate 2000 students. The number of schools to be included to cover 2000 students will depend on the number of students in the two grades in each school. In the absence of any objective criteria to include or exclude a school, there may be problems of choice, especially local power structure may interfere and influence choice and the resulting choices may mean highly dispersed schools, which may create problems of logistics for distribution of milk. If for convenience in administration of the pilot, a less dispersed distribution is desired, then a central point may be chosen at first, say the primary school at the centre of the upazila HQs. Then the radius may be increased from that point to include additional schools until 2000th student is found. However, in this process, some schools are found which do not have adequate or secured

space or store for storing milk or may have other inadequacies to properly run the programme. In such cases, local stakeholders need to be involved to decide about their status. Once this is done, a list of the chosen schools should be made. This exercise will require the permission and help of the upazila Education Officer, rather informally as a preparatory work prior to the Ministry's formal approval, so he/she needs to be briefed and his/her assistance sought in preparing the basis for seeking permission from the ministry.

In order to work with the chosen schools as partners, approval of the Ministry of Primary and Mass Education will be required. Given its status as a company or NGO, GMPF should also explore if permission from the NGO Bureau or any other authority will be required. The application for permission should include (a) brief background to the project and its objectives, (b) the choice of the upazila and its justification, (c) criteria and method for choice of schools in the upazila and the list of the chosen schools, (d) grades and number of students to be served in each school and duration, (e) request to authorize chosen schools as well as the upazila school administration authority to collaborate with the project and actively participate in its implementation. Permission from the Ministry of Health and family Planning will also be required as Upazila Medical and Public Health officials need to be involved (see below)

5.2.3 Management structure for the project

Successful management of the project will require active participation of all stakeholders under clearly defined roles, responsibilities and accountability. In order to achieve this, a simple but effective management structure needs to be developed. The structure may include

(a) a School Milk Management Committee (SMMC)
(b) a School Milk Project Committee (SMPC)
(c) the School Milk Project Office (SMPO)
(d) The Head Teachers of participating schools

The role of the SMMC is to provide oversight and overall supervision including formulation of rules, norms and principles for running the project, to evaluate progress, undertake periodic audit of accounts and quality of products and services, and to settle any problems and disputes. Members of this committee may include:

Upazila Education Officer as Chair or Convenor
Upazila Medical Officer
Upazila Public Health Officer
A representative of the civil administration
Head Teachers of the project schools
Chairman of each Participating School management Committee
One or more Municipal Authority/ Union Parishad chairman
School Milk Project representative (may serve as member-Secretary)

The SMMC may meet once every quarter or more frequently if required to deal with urgent issues.

The role of SMPC is to see more routinely and closely than the SMMC that the project is run according to adopted and agreed procedures and to address urgent problems and issues that may arise, e.g. problems arising out of untimely delivery or nondelivery of a consignment, poor quality of products delivered, pilferage of stock from any school etc. The decisions of SMPC should be sent to the SMMC for information and approval ex post. This committee may include :

Upazila Education Officer as Chair or Convenor
Upazila Public Health Officer
Two Representatives of the Head Teachers on the SMMC
School Milk Project representative (may serve as member-secretary)

The SMPO will work under the guidance of the SMMC and the SMPC for dealing with routine day to day affairs of the project, including arrangement of all logistics for acquisition and distribution of milk, keep records and accounts, monitor quality and safety of milk along the entire supply and distribution chain, assure consumption at school and environmentally safe disposal of packets.

At the school level, the primary responsibility lies with the Head Teacher, who is expected to engage relevant class teachers to assist him/her in the execution of the programme. The responsibilities include giving requisition and taking delivery and storage of supplies, monitoring quality and safety of products, distribution to classes, assuring consumption at school, keeping records and accounts, and arrange environmentally safe disposal of packets, bring any issue or problem to the attention of the SMPO etc.

5.2.4 Organization and implementation of the project

Several steps and/or tasks are involved in the implementation process. Some are required in the beginning to launch the project and others are to be routinely followed. Heset (2010) has recommended a number of best practices in the organization and management of school milk programmes giving specific examples from a number of countries. However, best practices need to be adapted to local conditions to make them effective. Using those as guides and giving consideration to practices in other developing as well as developed countries, the following steps are suggested for organization and implementation of the proposed school milk project.

Establish supply chain from supplier up to school store room and set up logistics like store room or store space, refrigerators, cool boxes, cool bags or other tools as required. This will require making transaction contracts between parties at every step in the chain, e.g. between the school milk project and the milk supplier for delivery to the upazila store, between local transporters and project office to deliver to participating schools. Actual form of equipment and arrangement will vary partly depending on the type of product – UHT milk, fortified yoghurt, fermented milk - to be ultimately chosen for the programme.

The contract with the milk supplier should specify, among others, that the milk packs (UHT milk or yoghurt or fermented milk) must be made out of raw milk and not powder milk, and that the firm must supply own produced product and not buying from a third party, that specified type of transport vehicle has to be used for delivery, and the firm must agree to inspection if required by public health and food standard authorities.

The contract with local transport service providers should also include, among others, the specification of type of transport vehicle to be used, the schedule of collection from store and delivery to the school.

Conduct orientation sessions for project stakeholders to create awareness about objectives of the project, roles of various stakeholders and knowledge from other countries and Bangladesh about factors responsible for success and failure of such projects, so that stakeholders may understand their expected roles. In such sessions, small and large posters and leaflets on purpose of school milk may be distributed. Such materials may contain information on properties of milk, its nutritional value, effect of malnutrition in children and role of school milk. The posters should be widely distributed in the community and hanged on school notice boards. Also videos or other visual materials on school milk programme obtained from other countries may be shown.

Conduct more intensive sessions with school staff, other project staff and community members who are more directly responsible for execution of activities on a daily basis. The purpose will be to discuss and agree on specific roles and responsibilities of each staff involved. In this discussion various protocols or procedural matters, forms for records and accounts and how to use them at what frequency should be thoroughly discussed with responsible staff. The following handouts and forms should be used.
Procedural protocols to be distributed to schools :

- Attribute of school store room (dry, clean, secure door and windows, screen in windows, sufficient capacity, pallets or shelves for milk storage)
- Stock management procedure (first in first out, stock movement records, status of unused packs and requisition adjustment, regular inspection and sign up on finding on number, quality/state of packs, losses etc)
- Daily distribution and consumption procedure (dedicated school focal person, withdrawal procedure from store, distribution procedure in classroom (e.g., only those present, line up for delivery or stay at seat, any other courtesy), consumption procedure, consumption recording, collection and disposal of used packs)

Recording forms to be distributed to schools

- Forms for recording stock movements e.g. way bill, school ledger, store room stock sheet, individual student consumption record (this may be different from school attendance register)
- Baseline data form to collect student data on initial health status (age, height, weight, other health indicators, food allergy status, family information (size and composition, food consumption behavior and status especially status of milk consumption at home etc), attendance record, class performance record

- Periodic record on students including end of project record (yearly record on age, height, weight and any record on major sickness during the year, any major change in consumption status at home)

Implement the activities

- Conduct the baseline survey. Teachers, students and their parents need to be informed before filling the form and its purpose explained. Teachers need to be trained or guided in filling the form.
- Ensure initial stock of milk packs
- Start distribution and consumption and monitor acceptability or rejection and appropriate steps to address findings
- Continue distribution, consumption, data collection and monitoring
- Conduct end of project survey (actually third yearly record will do that but additional information may be collected on household characteristics if impact analysis includes analysis of associative or causal factors)
- Analyze data for impact, and also summarize lessons on project design and implementation procedure.

The review of literature presented earlier showed that there is enough evidence to show that school milk has significant impact on attendance and performance through improving nutritional status. Therefore question may arise if this project needs to collect data or keep records to make similar impact assessment. In theory, there may not be a need to keep records or analyze data to prove that school milk will also work in the pilot project area. But practically, without maintaining a rigorous discipline in the distribution and consumption of milk at school, the main purpose of the project will be lost as lack of discipline and record keeping may lead to significant pilferage, take home and shared consumption with other household members, and worst, some packs may even end up in the market. On the other hand, a little bit of extra work on record keeping done in a systematic manner may generate good quality data for analysis by scientists and some new knowledge and insights on school milk impact and its management procedure may emerge. So it is worth investing some time and effort in proper record keeping on students.

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Appendix B

Criteria and Guidelines for the Thai School Dietary Supplement (Milk) Project According to the Resolution passed by School Dietary Supplement (Milk) Management Sub-Committee at Meeting No.1/2010 on 29 January 2010

1. The criteria for selecting entrepreneurs to join the project

1.1 The entrepreneurs have been granted Permit for Factory Operation.
1.2 The entrepreneurs have been granted Food Production Permit.
1.3 The entrepreneurs have been granted Certificate of Food Recipe.
1.4 The entrepreneurs have been granted Certificate of Good Manufacturing Practice Procedures by Food and Drug Administration and have passed the inspection of a place of production in the last 12 months and can present the formal Inspection Report.
1.5 The entrepreneurs have signed MOU to purchase milk from raw milk sources and the entrepreneurs must ensure that they will purchase the raw milk throughout 365 days according to the price and standard of raw milk purchase set by Dairy Cow and Product Committee.
1.6 The entrepreneurs do not have any overdue bill to pay any farmer or agricultural institute.
1.7 The entrepreneurs are the producers. They cannot hire other entrepreneurs to process milk or administer for them. Except for UHT milk, the entrepreneurs who have the contract to sell mainly pasteurized milk can hire others in case the amount of raw milk is higher than the amount of pasteurized milk distribution and during school breaks.

2. Criteria for granting rights and designating school milk distribution areas to entrepreneurs in the project

2.1 The entrepreneurs are granted the rights in accordance with the amount of raw milk specified in MOU that they have signed with The Cooperative Promotion Department (only MOUs in School Milk Project) and this amount has to accord with the real amount of raw milk being purchased.
2.2 In the budget year for 2010, the rights and school milk distribution areas will be granted and designated according to the MOUs signed in 2009-2010 (1 October 2009–30 September 2010) since MOUs were already signed. However, in the budget year for next year, the potentials of entrepreneurs, their past conduct, and other criteria set by the Committee, will be taken into consideration before specifying the amount and designating the distribution areas in the new MOUs.
2.3 The amount of 1 ton/day of raw milk, being produced and purchased 7 days a week, will become 4,800 bags or cartons of milk per day (calculate the volume by subtracting specific gravity and 1% loss). The entrepreneurs will be granted distribution rights or deliver 6,720 bags or cartons of milk to schoolchildren 5 days a week. In another word, 6,720 students per day get to drink milk.
The amount of raw milk according to MOUs signed in 2009–2010 totals 1,211 tons per day. The milk will be distributed to 8,137,920 students. This number is

close to the number of pre-school children and schoolchildren in 1st to 6th grades in primary schools nationwide in 2010.

2.4 After each entrepreneur is granted the rights to distribute certain amount of milk, the distribution areas or the delivery areas of school milk to schoolchildren will be designated. The allocation criterion in each province specifies that there should be at least 2 entrepreneurs and distance will be taken into consideration to ensure fairness.

Regarding the distribution rights or the delivery areas of school milk to schoolchildren in the 2nd semester in 2009, the organizations which have not purchased any milk, especially private schools, which receive the budgets for the first time this year, first the rights will be granted to Dairy Farming Promotion Organization of Thailand which will purchase surplus raw milk according to resolutions No. 8/2009 and No. 9/2009 passed by Dairy Cow and Product Committee and then the rights will be granted to the entrepreneurs who produce UHT milk from raw milk that they cannot distribute in the 2nd semester in 2009. Concerning the criteria of distribution rights, Dairy Farming Promotion Organization of Thailand, the entrepreneurs, and the distributors can discuss and come to a conclusion together.

2.5 After the rights are granted, the distribution areas are designated, or the milk is delivered to all schoolchildren nationwide, the list of entrepreneurs and delivery areas will be made and sent to Local Administrative Organizations, private schools all over the country, and the entrepreneurs. The purchasing contracts between Local Administrative Organizations or distributors and Dairy Farming Promotion Organization of Thailand or the entrepreneurs to whom powers of attorney are given by Dairy Farming Promotion Organization of Thailand, then will be signed.

The entrepreneurs will receive powers of attorney from Dairy Farming Promotion Organization of Thailand. They will sign guarantee agreements with Dairy Farming Promotion Organization of Thailand. Each entrepreneur should also present Letter of Guarantee issued by a bank, collateral or guarantor to Dairy Farming Promotion Organization of Thailand. The collateral cannot be worth less than 5% of the value specified in the MOU. All entrepreneurs have to comply with conditions set by Dairy Farming Promotion Organization of Thailand and School Dietary Supplement (Milk) Management Sub-Committee.

3. Guidelines on the Purchase of School Milk by Local Administrative Organizations (LAOs) and Private Schools

3.1 Dairy Farming Promotion Organization of Thailand sends the LAOs and private schools nationwide the list of entrepreneurs.

3.2 Dairy Farming Promotion Organization of Thailand gives powers of attorney to the entrepreneurs in the list so that the LAOs and private schools can sign purchasing contracts with these entrepreneurs in their areas.

3.3 The LAOs and private schools sign purchasing contracts with Dairy Farming Promotion Organization of Thailand or the entrepreneurs to whom powers of attorney are given by Dairy Farming Promotion Organization of Thailand. The special purchase procedure is adopted when signing contracts with the LAOs as specified in the Cabinet's Resolution on 15 December 2009 and the Resolution

passed by Committee on Granting Privileges to Organizations and State Enterprises (The Comptroller General's Department) on 14 January 2010.

3.4 The entrepreneurs deliver school milk to the LAOs and private schools as specified in the purchasing contracts. The purchasing contracts shall state that the LAOs and private schools pay the entrepreneurs monthly after the entrepreneurs deliver due amount each month. The entrepreneurs shall receive the power of attorney from Dairy Farming Promotion Organization of Thailand to ask for payment from the LAOs and private schools.

4. Guidelines on School Milk Transportation and Storage

4.1 The Transportation of School Milk by Entrepreneurs

- Pasteurized milk must be transported in a truck equipped with cooling system. The temperature shouldn't be higher than 4 degrees Celsius. The cold temperature has to be maintained at all time while transporting the milk. In the 2nd semester in 2010, all school milk has to be transported by a truck equipped with cooling system.
- UHT milk must be transported by a container truck or a truck which has roof or is covered with canvas. The school milk packed in paper boxes can be laid on top of each other but not higher than 10 boxes in a row.

4.2 The Storage of School Milk by the LAOs or Distributors

- Pasteurized milk has to be stored in the refrigerators. If it will be kept in a container, the container has to be clean and the ice used has to be clean. The temperature has to be maintained at not higher than 8 degrees Celsius.
- UHT milk has to be stored in a clean area where animals which carry diseases cannot gain access to. The UHT milk has to be packed in the paper boxes and these boxes can be laid on top of each other, but not higher than 8 boxes in a row. The paper box which is covered with plastic film can be laid on top of each other, but not higher than 5 boxes in a row. The UHT milk has to be kept in a raised area, at least 10 centimeters higher from the ground. The temperature should not be higher than 45 degrees Celsius. The area shouldn't be wet nor directly exposed to the sun.

5. Measures to Monitor and Control the Distribution of School Milk in School Milk Dietary Supplement (Milk) Project

5.1 A Committee on Monitoring and Controlling School Milk Quality will be established. This committee is a sub-committee appointed by Dairy Cow and Product Committee.

5.2 A Provincial Committee on School Dietary Supplement (Milk) Project will be established to monitor and control School Dietary Supplement (Milk) Project in the areas. The governors appointed the deputy governors to be a chair of the former School Dietary Supplement (Milk) Project. There were representatives of the LAOs and relevant individuals serving in the committee. Animal Husbandry Official served as a secretary and Cooperative Official served as an assistant secretary in the committee. All former members of the committee still serve in the present Provincial Committee on School Dietary Supplement (Milk) Project. The chair of Dairy Cow and Product Committee appointed the Deputy Director General of Department of Livestock Development to be a chair, Bangkok Animal

Husbandry Official to be a secretary, and Director of Office of Cooperative Promotion in Area 1 and 2 (Bangkok) to be an assistant secretary of the former Bangkok Committee on School Dietary Supplement (Milk) Project. All former members of the committee still serve in the present Bangkok Committee on School Dietary Supplement (Milk) Project.

5.3 The entrepreneurs, who do not comply with the criteria and guidelines on School Dietary Supplement (Milk) Project, who give false information to the relevant committees, and whose products don't meet the standards required, the contracts will be terminated.

6. The Distribution Prices

The LAOs and private schools purchase the school milk at the prices set by School Dietary Supplement (Milk) Management Sub-Committee (the prices cannot be higher than standard prices set by Dairy Cow and Product Committee or the Cabinet) from the 1st semester in 2010 onwards. The prices are as follows:

Pasteurized milk	6.06	baht	per bag
UHT milk	7.30	baht	per carton
	7.20	baht	per bag

In the 2nd semester in 2009, School Dietary Supplement (Milk) Management Sub-Committee passed a resolution asking the private schools to buy all UHT milk to solve the problem of UHT milk processed by the entrepreneurs who purchased surplus raw milk. In the 2nd semester in 2009, the entrepreneurs agreed to sell UHT milk at 7.00 baht per bag.