

Working paper



International  
Growth Centre

# Dairy Hub

A Community  
Dairy Development  
Programme



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# Dairy Hub: A Community Dairy Development Program (CDDP) by Tetra Pak

## 1. Pakistan's Dairy Sector<sup>1</sup>

Pakistan is the 4<sup>th</sup> largest milk producer in the world with an annual production of over 33 billion liters of milk. There are over 56 million cows and buffaloes and 10 million smallholder farming families supplying over 60 million consumers.

Though Pakistani producers compete with those in the rest of the world, the dairy sector faces numerous issues. One of the major challenges facing the dairy sector is the growing gap between milk supply and demand. The supply-demand gap was 1.5 billion liters in 2009. The demand was growing annually by 15% while supply was increasing by only 3 - 4%. This ever widening supply gap was expected to increase to 3.6 billion liters by 2015, resulting in increasing competition for decreasing supply of milk and increase in consumer prices.

Another major challenge arises from the fact that more than 92 percent of the animals are owned by smallholders who had little ownership of land to manage them. The small farmers do not have sufficient resources and lack training in animal husbandry that leads to poor animal health and low milk yield. There is no system for monitoring animal health, milking practices, temperature maintenance during transportation and storage. Furthermore, the small farmers lack knowledge of modern breeding practices. As a result cows of Pakistani breed only produce 1300 liters of milk annually as compared to 9000 liters produced by an American cow.

The smallholder dairy producers face other daunting challenges in production, transportation and marketing of milk because of poor infrastructure, financial insecurity, quality assurance, price regulation, untrained manpower, and seasonality.

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<sup>1</sup> Information in this section is based on author's knowledge and experience of the dairy sector, on the chapter 'Milk Collection at Nestle Pakistan Ltd.' by Arif Iqbal Rana and Mohammad Kamran Mumtaz in Haksöz, Ç., Seshadri, S. and Iyer, A.V. (2011) "Managing Supply Chains on the Silk Road: Strategy, Performance and Risk" and Tetra Pak Pakistan publication, Spirit (2009)

A fragmented farm base coupled with low productivity makes collection practices inefficient. Access to proper infrastructure such as cold chains is limited. This leads to post harvest losses of up to 20% in some areas. The smallholder farmers' input cost of production (a major cost being cost of animal feed) is increasing. Though market price of milk is rising as well it does not compensate for the high production cost. Disparity between input and output prices has verse effects on farm profitability. These challenges pose a serious threat to the development of the dairy industry in Pakistan.

Farm profitability of these small farmers is further aggravated by government's various regulatory measures for price control on milk and continuous increase in input prices. Small and subsistent farmers barely survive this regulatory and economic environment. The primary reasons for their survival are the use of family labor on the farm and access to free grazing, both factors keeping the production costs relatively low. However, this is only an artificial calculation of costs since no price is put on family labor. Similarly, marketing costs are minimized through localized sales and non-use of any sophisticated equipment.

The regulatory pressures and rise in input prices especially also affect large dairy farmers with considerable investments in large dairy herds, using hired labor, purchasing feed and veterinary inputs, and marketing infrastructure. These factors have led to the pulling out of many well established large farmers whereas it has also discouraged new farmer investment in dairy production and marketing.

According to Azhar Ali Syed, CEO Tetra Pak Pakistan, Pakistan's dairy sector is at an important crossroads: cost of milk production and milk prices is going up while the quality of milk is deteriorating.

## 2. Structure of the dairy sector in Pakistan<sup>2</sup>

Dairy farming in Pakistan is characterized by fragmented small holder dairy farmers and unorganized farms mostly operating on non-commercial basis though some commercial and corporate farms exist. According to the Livestock census held in 2006, majority of the farms (small farms) in Pakistan operated with small herd sizes. Among the 8.4 million reported dairying households, over 82 percent of the households owned less than 6 animals. The small farmers (this may include farmers with more than 6 animals that still do not belong to the commercial farmer category) contributed 90% to the total milk supply in Pakistan.

As far as geographic distribution of milk production is concerned, approximately 80% of the milk is produced in rural areas. Peri-urban and urban areas account for another 15% and 5%, respectively. Only 3-5% of total production in the country is marketed through formal channels. The remaining 97% is produced and marketed in raw form by informal agents in the marketing chain.

### 2.1 Small Farms

The classification of farms is done on the basis of objectives of farm ownership. These small farms are operated at subsistence or near subsistence level i.e. dairy is not a major source of income for the small farm owners. They do not have true dairy farming knowledge and formal links to market for a profitable dairy farming business and are hence unable to get commercial benefit out of dairy farming. The majority of the small farms have less than six animals though some small farms may have animals exceeding this figure.

A key feature of subsistence dairying is that women are involved in dairy while men concentrate on other tasks considered more important. The majority of the small holders keep a large portion (almost 75%) of the milk produced for home use. They use the milk

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sold to supplement their agriculture income. The primary purpose of animals is agriculture.

Furthermore, the small farmers do not have sufficient land to cultivate their own fodder. They cannot also afford costly feed for their animals. Hence more than half of the feeding requirement for these animals is provided by grazing. Small herd sizes also do not provide economies of scale and cost to retain them is usually higher than the revenue generated from selling of milk provided by these animals. Hence cost per liter is usually higher for small holders.

## *2.2 Corporate and Commercial Farms*

The two types of farms that are being run for business purpose are the corporate and commercial farms. Both corporate and commercial farms are operated for profit. A major difference between corporate and commercial farms is that corporate farms belong to large organizations like the Sapphire Group that owns more than 1000 animals at the farms while the commercial farms are operated by individuals or small companies with lesser capital investment as compared to corporate farms. Commercial farms usually have a herd size of over fifty animals. Both corporate and commercial farms have modern farm equipments installed, use state-of-the-art farm infrastructure and farm management practices. The corporate farms and most of the commercial farms also have farm managers for better management of farms.

Though the corporate farms are few in number, many large commercial farm projects are sprouting. Such farms are initiated on a commercial basis by investors interested in reaping the benefits of the ‘white revolution’<sup>3</sup>. These farms, usually with 30 or more animals, are built in accordance with modern farm designs i.e. they are built keeping in mind the requirements of better rearing, higher yields and long survival of the animals. For instance, these farms would usually have a bathing area for animals, drinking area with plenty of water supply, feeding area and sheds to protect the animals from heat. The

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<sup>3</sup> White Revolution was the vision of Pakistan Dairy Development Company to revolutionizing the dairy sector in Pakistan and make it one of the world’s most competitive dairy sectors

animals at these farms are usually fed on foods with high nutritional values. The feeds on these farms include concentrates<sup>4</sup>, wheat, rice straw, barseem, sorghum and maize (different types of animal feed).

Commercial farm owners have better knowledge of good farm management practices. They also have access to better medical facilities for their animals. They take advantage of good breeding practices such as artificial insemination to improve the quality of animals and hence their yield. Better animal stock with good farm management practices and high-nutrition feed results in higher yield for commercial farms. However, because of low number of such farms (since these farms require hefty investments and high operating costs majority of the low income farmers cannot afford building and maintaining such farms) their contribution in overall milk production in the country is low.

### **3. Dairy Sector Projects to Uplift the Social and Economic Status of Small Farmer in Pakistan – Community Development Projects**

#### *3.1 Engro Model Village Program*

After the floods that hit Pakistan in early 2011, Engro took an initiative to provide assistance to the people affected by this situation through its Model Village Program. This Program is based in Addu of Muzaffargarh, Tehsil Kot, Ehsanpur, UC Rakh where the company plans to provide shelter, medical, educational and vocational training facilities to 200 families. For this purpose 166 homes are to be constructed in the area and animal farms with quarantine spaces for new born animals and separate areas for processes like mating, feeding and milking of the livestock established. The program is also expected to improve roads and sanitation in the vicinity while providing facilities for grey water harvesting to facilitate easy provision of purified water. Along with this a solar energy plant is to be set up that would supply electricity for all homes and street

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<sup>4</sup> Animal feed prepared by mixing cattle feed with different nutritional values to ensure that animals fulfill their nutritional requirements.

lights (For MVP Home Design, Master Plan and some important facts and figures refer to exhibit 11).

The partners of Engro for this project are Ansaar Management Company (AMC), Farmer Development Organization, Pakistan Poverty Alleviation Fund (PPAF) and Government of Punjab.

### *3.2 Engro Khushaal Livestock Program*

After 2010 floods in Pakistan, Engro Foundation in collaboration with USAID Pakistan initiated a project named 'Khushaal Livestock Program' for rehabilitation of livestock in flood affected areas of Larkana and Dadu. This project is being headed and supervised by Engro Foods.

Engro's Khushaal Livestock project, worth PKR 77.35 million, targets 15,000 households and over 100,000 animals in some of the major flood affected areas. The project provides health and nutritional supplements such as mineral mixtures, multi-cut grass seeds (jowar), oat seeds and vaccinations for animal diseases such as foot and mouth disease (FMD). By early 2011, Khushaal Livestock project had provided FMD Vaccination to 28,645 animals, oat seed and DAP<sup>5</sup> packages to 2,015 households and mineral mixture packages to 975 households.

### *3.3 Small Entrepreneur Development Project*

The Small Entrepreneur Development Project was initiated in March 2009 in the Punjab province by Swiss Agency for Development and Cooperation (SDC) in cooperation with Nestle Pakistan Limited. The major goals of this project were creation of economic opportunities, income generation and tackling problems such as food security in rural areas of the country. Livestock and dairy farmers were provided training and assistance to both enhance their skills as small entrepreneurs and improve their market linkages.

Nestle had established two demonstration/training farms for this purpose. These training facilities were established by the Nestle-Agri services. The main training facility was the

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<sup>5</sup> Dai Ammonium Phosphate is a essential crop nutrient.

Sarsabz Demonstration and Training Farm located on Multan Road near Okara in the province of Punjab and was home to more than 250 imported cows. This farm also provided animal sheds, milking machines, hostel for farmers and some necessary equipment for high quality livestock management. The second training facility was the Sukeki Farm located in Lahore. These training facilities were established over 103 acres of leased land.

### *3.4 Pakistan Dairy Development Company*

Pakistan Dairy Development Company (PDDC) was formed by the Small and Medium Enterprise Development Authority (SMEDA) in 2005 to develop the dairy sector in Pakistan. Two prominent programs being operated by PDDC and funded by the Government of Punjab (GOP) are i. Model Farm Programme and ii. Cooling Tank Programme. The programmes are structured through a public-private partnership with GOP pledging Rs.2.4 billion. The Model Farm Programme required heavy investment by GOP for implementation of new farm management practices and to reach its target of 2440 model farms by 2015. By 2010, the programme had resulted in almost 30% increase in milk production at farms participating in the program. The Cooling Tank Programme was set up through a soft loan with mark-up by GOP. The program was able to initiate 360 milk collection centres which allowed more milk to be chilled after production to maintain quality.

Another project is training of the dairy farmers and facilitating them in efficiently running their dairy business. PDDC in this project aims to achieve maximum benefit for the whole society with the main goal of improving the quality of the dairy sector. Through this project farmers are trained to adopt modern farming practices. They are trained on animal husbandry, animal health, good farm management practices, harmful effects of certain practices that are currently thought of as beneficial (for instance use of oxytocin injection), animal reproduction and animal rearing. They are also taught to prepare fodder keeping in view nutritional values of various intakes. Importance of cutting the crops on time and silage making is also emphasized to get crops with highest nutritional values. Farmers are encouraged to de-worm their animals, give their animals

vaccines for Foot Mouth Disease (FMD) and HS (Hidradenitis Suppurativa) disease. PDDC also helps farmers make their animal sheds on modern lines following the example of model farms. These sheds have good ventilation, had mist showers to keep animals cool in summers and have areas divided based on animal age and type (there are different areas for cows and buffaloes and for heifers and milking animals). The sheds also have separate areas for animal feeding and milking.

As a result of the trainings and guidance provided to the farmers (associated with PDDC), they keep their animals free, give them plenty of water, provide them high nutritional value food at right time intervals, allow the animals to reproduce and avoid harmful practices such as use of certain hormones and vaccines.

The activities are expected to have a huge impact on the dairy sector. According to Aziz Ahmed, Team Manager Southern Sindh, Pakistan Dairy Development Company and the man leading these initiatives in Sindh for PDDC, “All these improvements have increased the milking capacity of animals by 2-3 liters per day and have proved to be extremely beneficial for the community as a whole.”

In addition to the programmes run by Pakistan Dairy Development Company, SMEDA the parent body of the company itself took initiatives such as building training centers and running capacity building programs. SMEDA also formed Support Services for Agricultural Credit (SSAC) that offers easy credit to farmers. However, most of these initiatives are in initial phases with SSAC in pilot stage having facilitated 350 individual cases.

### *3.5 Lahore Dairy Development Board - LDDDB*

LDDDB's projects are funded by the Australian Government seeking an increase in milk production through improved technologies and farm management techniques. The capacity of these programs is limited to Okara and Bhakkar but the project can be improved to include more neighboring villages. Currently these projects are greatly impacting Okara and Bhakkar and also some of the villages that are surrounding them.

### *3.6 Tamkeen Project*

After the floods of 2011 Jassar farms planned to take an initiative of increasing the overall quality of the livestock for the flood affected people. This project was projected to start in the 3<sup>rd</sup> quarter of 2011. Jassar Farms planned to give out semen to the village smallholder farmers from elite bulls that were already present in their farms. The semen would be injected into female cows to improve the quality of offspring.

The company expects the offspring to be capable of producing more milk (incremental milk yield of 2000 liters per cow per year and incremental income of 706 USD per cow per year) and meat if they are slaughtered. It is a 5-6 year program and its main objective was to fulfill at least 25 percent (15.2 million doses) semen requirement of the flood affected areas. The semen was being provided free of cost to the farmers impacted by the floods.

According to Jassar Farms ‘the genetically modified breed will have the capacity to produce approximately 200%-300% milk as compared to the local breed present now’.

### **4. Tetra Pak<sup>6</sup>**

Tetra Pak is one of three autonomous groups (companies) in the Tetra Laval Group – a private group that started in Sweden. The other two companies are DeLaval and Sidel. Tetra Laval is headquartered in Switzerland.

Tetra Pak supplies food processing, packaging and distribution equipments to food processing companies across the world. The philosophy upon which it conducts business is to make food safe and available, everywhere.

Tetra Pak supplies various different types of customized carton packaging solutions for its customers. The company also develops its own state-of-the-art processing solutions

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<sup>6</sup> <http://www.tetrapak.com>, accessed on June 28, 2011

and design and service complete plants. It operates in more than 165 markets and has over 20,000 employees.

Tetra Pak's motto "**protects what's good**"™ reflects the philosophy upon which the company conducts its business in order to make food safe and available, everywhere.

#### *4.1 Company History*

Tetra Pak is the tenet of Dr. Ruben Rausing, who initiated the development of the tetrahedron shaped package in 1951. The objective was to develop environmentally friendly efficient packages that could protect food and prevent it from being wasted. This was done by forming a tube from a roll of plastic-coated paper, filling it with the beverage and sealing it below the level of the liquid.

#### *4.2 Processing Solutions*

Tetra Pak provides processing equipments across five food categories: beverage, cheese, dairy, ice cream and prepared food. The company delivers both pre-developed individual processing units and customized, automated production solutions. The automation in Tetra Pak's equipments is meant to reduce human error and maximize food safety. This is backed by technical support over the lifetime of the products the company supplies.

#### *4.3 Packaging Solutions*

Tetra Pak, from its network of production facilities, supplies both packaging equipment and packaging material to more than 9,100 packaging machines across the globe (see exhibit 1).

In 2010 more than two third of Tetra Pak's packages were aseptic. Aseptic packages give packaged contents longer shelf life. Using aseptic packaging the packaged products can be distributed and stored without refrigeration. The system is especially useful in the distribution of milk and other liquid food products.

#### *4.4 Distribution equipment*

Tetra Pak offers its customers a range of different types of distribution equipment – including conveyors, tray packers, film wrappers, crates and roll containers – all of which are developed, produced and marketed by Tetra Pak.

### **5. Tetra Pak and Dairy<sup>7</sup>**

Tetra Pak has 120 years of experience in the dairy industry. Tetra Pak offers a complete portfolio of milk processing and packaging solutions and can supply products ranging from a single valve to a complete green field factory. The company also produces customized solutions based on the needs of its customers.

Its sister firm DeLaval has over 100 years of experience in Dairy equipment and farm supply. The company develops, manufactures and markets equipments and complete systems for milk production and animal husbandry. The company supplies system solutions for milking, herd management, animal traffic control, feeding, cooling, and energy recovery.

### **6. The Dairy Hub Concept**

‘Dairy hubs have performed well since they were first introduced by Tetra Pak in 2009’. The remarks made by Umer Ghumman, Marketing Manager at TetraPak and the master mind behind the dairy hub concept are based on 2010 results from the dairy hubs. The regions in which the hubs operated have shown improvement in the quality of milk supplied by seventy to eighty percent, increase in average daily yield per animal by over twenty percent, increase in milk collection during flush by three thousand liters per day and decrease in milk cost by two percent.

Spearheaded by Ghumman, the first dairy hub was established for Engro Foods in November 2009 in Kassowal, District Sahiwal while the second dairy hub was established for Nestle in Mian Channu later during the same year. Now that these dairy

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<sup>7</sup> <http://www.tetrapak.com>, accessed on June 28, 2011

hubs have completed one year of operations Tetra Pak is concerned about their scalability and sustainability.

The dairy hub community dairy development program is a one-herd concept consisting of 20 villages located within 15-20 km radius (these villages formed a hub) under which the smallholder dairy farmers' milk production is organized and developed. The milk from the small farmers who belong to the dairy hub is collected by the dairies that operate in the area. The hubs are owned by dairy processors.

The main idea of the dairy Hubs is to increase productivity of milk in rural areas by smallholder capacity building and to measure success of animal productivity at the same time. By treating the cows owned by a group of smallholder farmers as one herd under the dairy hub program, Tetra Pak aimed improvements in the quality and quantity of milk supplied by the farmers. This milk is collected by the dairies to process (since the small farmers would not have to sell their milk to the unregulated Milk Traders under the dairy hub program, Tetra Pak expected savings in margins enjoyed).

Other than improvement in quantity and quality of milk this approach enabled documentation of the rural economy i.e. reliable record-keeping of cows, breeding/genetics, medical treatment and milk production. It also created the foundation for increased traceability and the application of the Pakistani Quality Standards.

The Community Dairy Development Program is driven by the private sector and runs alongside other longer-term backward integration initiatives; such as the creation of large, modern farms. According to Tetra Pak 'the solution is in line with the public-private body, "Pakistan Dairy Development Company's" (PDDC, or Dairy Pakistan) strategy to formalize the Pakistani Dairy Industry'.

## 7. History of Dairy Hubs

The solution was developed through analysis of the key issues along the dairy value chain; analysis of recent reports and documentation (for example from the PDDC White Paper, the Ministry of Agriculture, the World Bank and IFCN<sup>8</sup> reports) Tetra Pak's involvement in the work of the PDDC; as well as fieldwork by two consultants over six months (visiting processors, farmers of all sizes, cooperatives, private milk collection centers and local ministry of agriculture sites).

Various dairy processors around the world have attempted backward integration through installing milk cooling and collection centers to try to capture smallholder milk however often this has had only limited success on collected volumes, and no impact on producers' milk production volumes or milk quality. This was due to lack of loyalty the smallholder have to the processor and the strong, local, historical ties with the informal Milk Traders.

The low impact of previous trainings on production and quality was often due to diluted (fragmented) support services at ground level. Furthermore the production and quality levels of milk from smallholders showed little improvement over time.

Governments have also supported the integration of smallholders into the formal industry. In Turkey a subsidy system is introduced to reduce the gap between the informal milk trader who is able to offer a higher price for the milk from the smallholder (due to no tax burdens and adulterating the milk to increase volumes and quality) and the formal industry whose farm-gate price is effectively lower due to taxation and strict controls. This subsidy is being offered to farmers since 1987; whereby the government pays a premium to those farmers who deliver their milk to the formal processor rather than the informal middleman. Like other initiatives the subsidy system is only partially successful, due to the loyalty ties in rural areas compared with the level of subsidy

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<sup>8</sup> IFCN: Dairy Report 2007: "For a better Understanding of Milk Production world-wide"

offered and the way subsidy is paid (the local informal milk trader offers credit lines, regular cash payments and often has a long relationship link with the producer).<sup>9</sup>

The Community Dairy Development solution integrates, localizes and develops a number of different dairy solutions which have been used in the past. The aim is to marry together the successful elements of past solutions and experiences, in localized, manageable and replicable areas (the dairy hubs), to create loyalty between the smallholder producers and the formal processing industry and safeguard the availability of safe dairy products for Pakistani consumers.

As demand for dairy products increases in Pakistan, dairy processors are finding it increasingly difficult to source good quality farm-produced milk to process. It is expected that the Dairy Hub Solution would run alongside other backward integration initiatives; such as the creation of large, modern farms and elements of CDDP, for example, the veterinary hospital, mechanized milking, breed improvement, animal selection and silage making techniques programme.

## **8. Tetra Pak and Dairy Hubs**

The Dairy Hub concept is part of Tetra Pak's Dairy Development initiative. Tetra Pak introduced the concept in 2009. Dairy hub is a community dairy development program (CDDP) in which villages within 15-20 km radius are considered as one community. Milk yield improvement efforts are then targeted towards this community. Services like mobile veterinary clinics, dairy training programs are provided to this community so that their daily milk yields and hence profitability could be improved. According to Tetra Pak 'Dairy Hubs allowed it to make milk safe, hygienic and easily accessible for human consumption, while promoting growth in milk production to meet increasing demand'.

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<sup>9</sup> "Impact Assessment on Milk Incentive policies in Turkey: Antalya Province Case" Cengiz SAYIN, Nisa MENCET, Suleyman KARAMAN 2007: Plenary Paper prepared for presentation at the joint IAAE- 104<sup>th</sup> EAAE Seminar Agricultural Economics and Transition "What was expected, what we observed, the lessons learned".

The basic benefit of dairy hubs for Tetra Pak is sustained development of the dairy industry. It expects better quality and higher quantity of milk supply to lead to a higher demand for its aseptic processing and packaging technology and products. In 2010 only about 3-4 percent of milk produced in the country was UHT processed and packaged in Tetra Pak cartons. With the Dairy Hubs Program, substantial growth potential for packaged milk is envisaged.

## **9. Dairy Hub Infrastructure and Technology**

Dairy Hubs consist of a central building with instant cooling, milk testing equipment, quality control, data recording from all registered producers, veterinarian and training facilities. Furthermore community veterinary hospitals are established along with mobile clinics and vaccination camps.

Trainings are a key component of the Dairy Hub program. At the time dairy hubs were introduced Tetra Pak planned to organize trainings and capacity building programs in collaboration with DeLaval, Livestock and Dairy Development Board (LDDDB) and the University of Veterinary and Animal Sciences (UVAS). The following trainings were to be conducted under the Dairy Hub umbrella. Some of the trainings programs such as ‘Train the Trainers’ and ‘Dairy Hub Staff Training Program’ are already being implemented while others are in the pipeline.

### *9.1 Train the Trainers (TOT)*

The objective of this two month program is to train and uplift the knowledge of staff involved in training and developing the small farmer for improved productivity and efficiency.

The curriculum includes Rural Sociology, Ruminant Nutrition, Reproduction, Calf Rearing, Crop Production and Silage, Milk Collection and Hygiene, Genetics, Cattle Housing, Farm Economics, Farm Machinery and Health.

### *9.2 Dairy Hub staff training program*

The duration of this training program is four months. The program is similar to the TOT program except that it includes more theory and longer duration in the field. The program was started in September 2009. Participants of the first program included employees from organizations such as Engro Foods, Nestle Pakistan and LDDDB.

### *9.3 Women Livestock Extension Worker Program*

The objective of this four month training program is to empower women, by focusing on imparting dairy management skills to rural women and to uplift their economic status. This is expected to improve livelihood and food security at the household and community level while enhancing income level and self employment generation in the country.

The minimum requirement for enrolling in the course is matriculation. The curriculum includes Rural Sociology, Introduction of common animal diseases, reproduction, para veterinary nursing, calf rearing, crop production and silage making, milk collection and hygiene, introduction of cattle housing, farm economics, tail docking and dehorning.

### *9.3 Herd Management Diploma*

Herd Management Diploma is another training program that was planned under the Dairy Hub umbrella. The diploma is a one year program with the objective of creating a talent pool to bridge the gap of qualified dairy professionals in the dairy sector of Pakistan.

The student selection criteria are as follows:

- They should be graduate
- Have a two year diploma as Livestock Assistant
- Have a rural background and understanding of rural sociology
- Have long term career interest in dairy

Successful trainees are expected to bridge the gaps between traditional and modern techniques of dairy farming. They are also expected to motivate farmers and inspire other students to join the efficient herd management club all over Pakistan.

The herd management diploma includes courses such as rural sociology, calf rearing, management of heifers, health, fodder, feeding, animal breeding and selection, housing, dairy cattle, milking machines and guidelines of good farm management practices.

According to the initial plan theory and practical classes will be conducted at UVAS and various field areas. The certificates/ degrees will be awarded by UVAS on completion of the training.

Other trainings include Dairy Hub software training for measuring, monitoring and evaluating milk development, economic record keeping for checking profitability of dairy farms, breed improvement and artificial insemination and nutrition improvement.

As per the plan a smallholder training kit (Video Training and published material) is developed in collaboration with the TEVTA (Technical Education and Vocational Training Authority), Royal Agricultural College (England) and the University of Veterinary & Animal Sciences, Lahore, Pakistan. Due to the low literacy levels of the rural population, the course consists of visual aids to be fixed to a branded board on the farmers shed wall after field training.

#### **10. Dairy Hub Operations: The Village Milk Collection Center Producer Groups and Milk Collection through Dairy Hubs**

According to the dairy hub plan laid out by Tetra Pak each dairy hub would operate from a central building which will be located such that it is easily accessible by all village milk collection centers (VMCs). There will be a village milk collection center for each village within the dairy hub. Each village milk collection center will have a producer group of over 100 smallholder producers (with an average of 5 milking cows or buffalo per smallholder).

To avoid spoilage of milk during transportation<sup>10</sup> the centers will be located such that the producer group supplying milk to the VMC is in close proximity and it takes a maximum of two hours to deliver milk from cow to the VMC. As new producers are recruited within the Dairy Hub new producer groups will be formed and new village milk collection points created to ensure that the VMCs remain close to the producer. VMC points would remain open between 6am and 10 pm.

A milk collection agent will be appointed at the village milk collection center to collect milk from the producer group after applying necessary quality tests (using a lacto scan, which tested Fat, SNF(solid non fats), Density, Protein, Lactose, water adulteration, content, temperature, freezing point, conductivity and pH) on the milk being purchased from the small farmers. Additionally, regular random alcohol tests to measure total bacteria count will also be conducted. After application of regular quality test milk will be poured in a chiller where it will be cooled to approximately 15° centigrade. Each VMC would have at least one agent.

In addition to this each village milk collection center would have its own field service executive. The field service executive would offer constant training and support to registered producers in the field through frequent on-farm visits. The field service executives would support small farmers in implementing good animal and hygiene practices which will be taught during trainings.

The field visits did not make clear to what extent the village milk collection centers were implemented according to the plan. However, they did exist and were operational under the regular milk collection set up of the organizations operating in the dairy hub area.

The purpose of these village milk collection centers is to ensure collection of quality milk in as large quantity as possible. The milk collected at the VMCs is transported to the

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<sup>10</sup> Early, quick cooling is critical to maintaining the quality of milk. The USA Grade A Pasteurized Milk Ordinance of the Food and Drug Administration (2003) states: “All raw milk and milk products are maintained at 7°C (45°F) or less until processed ...”bacteria starts developing in milk if kept at high temperatures for long period of time. Milking was usually done at 38 degree centigrade.



Other than receiving, testing, cooling and dispatch of milk the central Dairy Hub office performs several additional functions. It ensures proper training of farmers in animal husbandry and nutrition, availability of veterinary medical facilities, enrichment and preservation of animal fodder, improvement of breed through artificial insemination, supply of clean water 24 hours a day, mechanized milking (milking machines are provided to a selected number of farmers) to improve yield per animal, and software monitoring of milk development & profitability enhancement of smallholder dairy farmers. The dairy hub building also offers a one-stop-shop with farm supplies for animal welfare and feed. By putting such infrastructure in place Tetra Pak expects to reduce TBC (Total Bacterial count) to less than 1,000,000 per ml and eventually 500,000 and increase daily yield from 6 to 8 liters per animal per day.

In order to ensure smooth operations the Dairy Hub office initially employed a Dairy Hub manager, supported by one veterinarian, one quality controller and one financial/administrative controller. Over a period of time more agri-services executives were to be employed as the number of smallholders increased. The veterinarian supported the smallholders through feed improvement, breed improvement (through artificial insemination programmes), animal husbandry, record keeping and competence development.

All Dairy Hub and Village Milk Collection Point staff, which included women, were to be from the local community. However, the staff employed by the processors did not necessarily follow the initial dairy hub plan.

## **11. Dairy Hub Performance Measurement**

The impact of the dairy hub solution may be measured in several ways. Following are some of parameters that are being measured:

- Volume of milk (liters/tonnes) being supplied to Processor at what cost.

- Quality of Milk (based on Total Bacteria Count and protein stability).
- Number of smallholder farmers and cows integrated and positively impacted by the Dairy Hub solution.

## **12. Dairy Hubs' Impact on Village Small Dairy Farmers**

The dairy hub program offers simplified free of cost trainings to increase animal productivity of the small farmers e.g. trainings on animal feeding and disease prevention, agri-services, cooling and testing equipment. Furthermore, the program makes an agreement with smallholder farmers to collect all milk produced (surplus to home and farm consumption), all year round (subject to quality checks) and to be paid weekly in cash.

The payment structure ensures that:

1. smallholders benefit from secured weekly cash payments
2. smallholder producers registered with the dairy hub are pressurized to improve milk quality (prices paid to farmers are adjusted according to quality of milk)

## **13. Tetra Pak's Expectations from the Dairy Hubs (Dairy Hub Targets)**

Short term objectives of the Dairy Hub Project were to improve quality and quantity of milk available to processors and develop smallholder livelihoods and security. Long term objective was to develop the dairy industry (through competency development and formalization of the industry).

By conceptually treating the registered smallholder's cows as "one herd" (as a large farm does) Tetra Pak expected to achieve benefits like economies of scale in purchasing farm supplies, reliable record of animal data (health, vaccination programs, feed, fertility, etc), improved quality and overall genetics of the "herd" and better disease control and traceability.

The Dairy Hub program promised to address a range of other issues that the stakeholders in the dairy industry faced. The program was expected to, for instance:

- Give smallholder farmers access to markets through supply agreements with weekly, secured payments from the dairy processors. Through the loyalty premium, a smallholder with five cows would be able to earn an estimated 6,100 Pakistani rupees (PKR) per year in addition to the price paid for the milk and quality premiums which were to be paid in cash on a weekly basis. Tetra Pak expected this security to enable smallholders to plan expansion of their farms through the purchase of small pieces of equipment, better feed and more animals.
- Improve Smallholder's business through education and capacity building – leading to uplift in good animal practices and hence better animal welfare at the smallholder level and increase in quality and quantity of the milk produced.
- Stem the population flow from rural to urban areas because of improved ability and opportunity to earn a good living in rural areas.
- Enable better milk quality as new techniques are employed and the milk supply chain gets controlled by the regulated formal industry. This would in turn benefit consumers who would receive better quality and hygienic milk.
- Benefit the milk processors through quick development of a source of better quality and quantity of milk by taking control of their supply chain through cooling and other support.
- Support the government with formalization of the industry through enhanced tax revenues, an ability to monitor and control production, and over a period of time, a reduction in milk imports.

According to Tetra Pak, "Dairy Hubs will tackle poverty in rural areas, which is a significant impact as almost 58 percent of the country's population lives in rural areas". World Bank's "World Development Report: Agriculture for Development" (2007) substantiates that 'for Pakistan, development in agriculture is a key driver for achieving the Millennium Development Goal of reducing poverty by half by 2015. The dairy sector in the agriculture economy provides opportunity for poverty reduction as less than 5

percent of milk in Pakistan is produced through formal channels whereas the remaining 95 percent is handled through informal channel which lacks knowledge, equipment and infrastructure to enter formal milk supply channels'. Dairy Hubs are expected to offer a system- wide solution to farmers and enhance their capacity, capability, competitiveness and profitability by providing them these facilities. According to company reports 'potentially 10 million farming families and 12.18 million dairy farms in Pakistan stand to benefit from the Dairy Hub program'.

#### **14. Dairy Hub Pilot Projects**

The Dairy Hub Pilot Project was launched in Kassowal - Iqbal Nagar, during 2009. Kassowal was part of Sahiwal district in the Punjab province and was a high milk producing area of Pakistan. The dairy hub in Kassowal was established for Engro Foods. By the end of 2009 another dairy hub project was launched for Nestle in Mian Channu.

Tetra Pak provided funding for the dairy hub operations except staff salaries which were paid by the producer in charge of the hub.

##### *14.1 Engro Dairy Hub*

The total number of farmers and animals in the area where Engro Dairy Hub operates is 2000 and 12000 respectively. Out of these 700 farmers and 5000 animals are associated with the dairy hub (any farmer who shows interest in and commitment towards the program may register with the dairy hub to avail its services free of charge; the farmer himself may at some stage show willingness to invest in an improvement project e.g. shed renovation as he learns about the benefits of various projects from the dairy hub team, in which case he will incur the cost of the project and the dairy hub team will provide guidance). 77 farmers and 1777 animals are monitored through dairy hub management system (the dairy hub management system tracks animal health, performance and so forth and farmers are gradually being made part of the system, see exhibit 7). A total of 32 trainings were performed in 2009 and 80 trainings were performed in 2010 (for details see exhibit 8A).

By the end of 2010 there were 2400 households in the dairy hub region that were involved in milk production. Out of these 1755 were small farmers with herd size ranging between 1 and 5 animals. 530 were medium farmer with herd size of 5 to 10 animals. 115 were large farmers with herd size of more than 10 animals.

Engro dairy hub operates from the dairy hub office in Kassowal. The hub consists of twenty villages spread over an area of over 45 square kilometers. The hub team is headed by the Dairy Hub Manager. The manager is supported by Admin and Accounts Officer, Lab Analyst, Veterinary Doctors, Agronomists and Field Supervisors (see exhibit 4A for Engro Dairy Hub Organogram).

Engro, through its dairy hub staff, ensures that small farmers receive adequate training and services for efficient operation of their dairy business. Through dairy hubs Engro wants to improve the socio economic condition of small farmers, improve quality and quantity of milk and reduce cost. By targeting socio economics of the region in which Engro operates its dairy hub, it aims at improving social status of farmers, empower women, impact farmer economics and create an image of Engro as a preferred buyer. Quality would be improved by decreasing TPC (total bacterial count) and increasing SNF (solid non fats). Quantity would be increased by increasing milk production per animal, milk collection in the region and EFL (Engro Foods Limited) collection share. Cost would be lowered by lowering the average price of milk per dairy farmer and lowering landed cost of milk (total per liter cost of milk collection, which includes milk price, chilling and transportation costs).

In order to meet the objectives set for the dairy hubs, several activities are being performed by the dairy hub team in collaboration with Tetra Pak Pakistan. Training kits have been developed; trainings are being organized for trainers and small holder farmers; vaccination and de-worming camps are being held; mobile milking machines, mastitis detection kits and silage making choppers have been provided to farmers; animal feed, concentrate, mineral, vaccines and medicines are made available to farmers through Khushali Ghar (translated 'prosperity house' these are depots that provide these items);

extension services like farmer meetings, evening meetings, model farm visits are provided; animal husbandry practices like free water access for animals, letting them free to move on the farm, high nutrition feed preparation are introduced; breed improvement program has been initiated; animals are being tagged and software (dairy hub management system, see exhibit 7) has been developed for animal data recording. Farmers are also being facilitated in making of silage and hay.

In addition to this a community training hall has been established in a school and a dairy hub veterinary clinic established in the region.

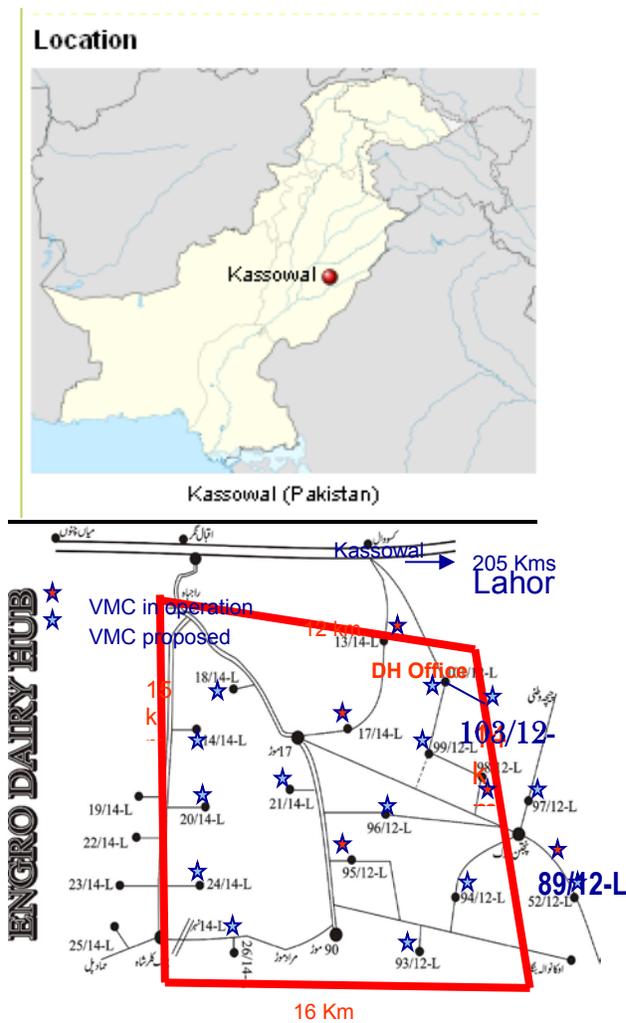


Fig 2 - Kassowal District Pakistan

As a result of these activities Engro achieved several benefits as indicated in exhibit 8A.

### *14.2 Nestle Dairy Hub*

Total number of farmers and animals in the area where Nestle operates its dairy hubs is 2608 and 12331 respectively. Out of these 550 farmers and 5000 animals are associated with the dairy hubs. 241 farmers and 3212 animals are monitored through dairy hub management system.

Nestle established its dairy hubs in Mian Channu in December 2010, following the establishment of Engro dairy hub. However, it operates its dairy hubs differently than Engro. The main office of the dairy hub is formed at Nestle's existing central collection unit. This is the place where milk from various collection centers is chilled en route to the plant. The senior management team of the dairy hubs is stationed at Nestle's central collection unit (see exhibit 4B for Nestle Dairy Hub organogram). Controlled from the main office are three district offices which are located 10 – 20 kms from the main office in Mian Channu. These offices are located in Tulamba, Iqbal Nagar and Mohsin Wal and house field supervisors. Each district office is under one 'Dairy Hub Development Executive'. The four Field Supervisors reporting to the Development Executive operate from the district office. Each district office is responsible for services in eight villages within 8 – 10 km radius of the office.

Nestle's main objective in establishing the dairy hubs is to collect milk directly from the small farmers and improve the quality of milk collected. Other objectives are improving milk yield by improving nutrition, improving breed by artificial insemination, controlling diseases such as mastitis, FMD and HS, increasing milk density by promoting large commercial farms and presenting dairy farming as a profitable business to the dairy farmers.

The dairy hub team strives to meet Nestle's objectives in establishing the dairy hubs. The hub team, in collaboration with Tetra Pak Pakistan and SolveAgriPak, conducted a total

of thirty nine trainings in 2009 and one hundred ninety three trainings in 2010 (details in exhibit 5B). The team carried out several other activities such as vaccination of animals, establishing veterinary clinics and training halls, under the dairy hub umbrella (see exhibit 6).

As a result of constant struggle of the Nestle dairy hub team several improvements in milk collection and delivery system have been noted. In almost one year of operations Nestle is working with two hundred ninety DFs (direct farmers with less than 20 LPD of milk), thirteen PFs (progressive farmers with milk between 20 and 50 LPD) and five CDFs (commercial dairy farmers with over 50 LPD of milk). Milk collection has increased and animal milk yield improved (see exhibit 8B).

One of the farmers reported an increase in milk yield per animal per day from 11-12 LPD to 18 LPD. The farmer said *'I am not going to sell the milk to the dhodis<sup>11</sup> even if they offered 45 rupee per liter. Dhodis do not care for our well being nor do they give incentives. Company provides trainings to us, helps us improve our system and gives us incentives'*.

Dr. Sohail, a veterinary doctor and Nestle Dairy Hub Development Executive, reported *'Nestle gives the small farmers incentives for their milk which is not provided by the Dhodis. Any farmer who supplies above 100 liters of milk per day gets one rupee more per liter. Farmers supplying above 150 liters of milk per day get additional one rupee and so forth. This is beneficial for the farmers and they are happy with this'*.

## **15. Contribution by Tetra Pak**

Tetra Pak is involved in dairy hub infrastructure planning, coordination between various stakeholders and project partners, supply of technological expertise relating to milk production, trainings, and media outreach to spread the project objectives and successes. Details of initial plan of activities to be carried out by Tetra Pak are as follows:

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<sup>11</sup> Dhodis are middle man, they buy milk from farmers and sell it to retailers.

1. Providing all technical guidance regarding dairy Hub.
  
2. Training throughout the supply chain
  - On ground trainings and capacity building of Farmer
  - Dairy Hub Staff Training (4 months)
  
3. Sponsoring one year herd supervisor diploma launched by University of Veterinary and animal sciences.
  
4. Developing training kit consisting of 15 core topics on livestock and dairy development.
  - Electronic (TV) Training programs
  - Printed Training Books
  
5. Software to monitor & evaluate farm data.
  
6. A Team of experienced professionals full time working on the project:
  - i. Marketing Manager (Project Manager dairy development initiative)
  - ii. Manager Dairy Hub
  - iii. Project Executive for Dairy Hub Software
  - iv. Project Executive communication for TV programs electronic & printed training kit
  - v. Female Trainer
  - vi. Male Trainer
  - vii. Training Coordinator

However, at the time of the study Tetra Pak had involved an outside dairy consultant ‘SolveAgriPak’ to support the dairy hub program on its behalf. SolveAgriPak conducted trainings of the dairy hub staff, provided external support to the dairy hub team and

monitored the program on regular basis. The actual dairy hub team belonged to the processor operating the hub.

### 16. Future Prospects/Plans in 2009

Tetra Pak had proposed the dairy hubs as a cost-effective alternative (but in addition to) dairy processors building large commercial farms. The Dairy Hub model was initially created, to be driven by the dairy processors, for linking smallholders to formal markets through milk processors in a financially viable, replicable way. However, according to Tetra Pak the model could also be used by other agencies (the government, UN agencies, NGOs, Community Groups etc.) using different financing models (grants / loans / etc), to kick-start uplift in production in different regions of the country; as long as the link to the processor is assured.

In fact the company felt that “for a bigger impact government intervention in replicating this model across Pakistan was mandatory. The government must develop infrastructure in dairy farming areas, provide support in acquiring land on lease, and provide access to water and power to attract local and foreign investment in the rural areas and engage in consumer awareness campaigns.”

According to company sources, in addition to the above, Tetra Pak’s aim was to create 25 Dairy Hubs collecting million liters of milk per year by 2012. The company expected each dairy hub to organize approximately 800 smallholders per community and collect up to 78 tonnes of raw milk per community per day by year 2020. Once this designated milk capture capacity was reached, a new community would be created.

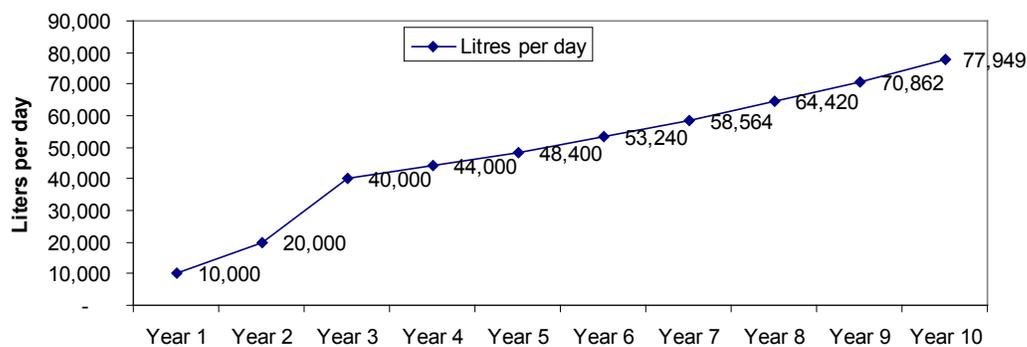


Figure 3 – Planned Increase in Milk Collection (LPD - liters per day)

## 17. Future Outlook

Punjab government has approved five hundred million rupees for seven dairy hubs. Some of this funding was later on diverted to the flood affected villages. However, after the cuts three hundred fifty million are still reserved for four dairy hubs. Under the program seventy percent of the required funding will be provided by the government and thirty percent will be provided by the corporate sector. The program is to be executed by the Dairy Association of Pakistan. Moreover, the livestock department of the government has established four dairy hubs, one each in Jaranwala, Rahimyar Khan, Sahiwal and Jhang.

In addition to this the Department for International Development (DFID) of United Kingdom has agreed to provide support to the dairy hubs through Punjab Economic Opportunities Program (PEOP)<sup>12</sup>. This program was started by DFID in April 2007. Under the program, economic activities were to be carried out in four selected districts of Punjab. A budget of 30 million pounds was allocated for the project. Over 50 percent of this budget was dedicated to rural development and public sector policy.

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<sup>12</sup> <http://projects.dfid.gov.uk/projectPrintScreen.aspx?Project=113484>, accessed November 17, 2011

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