

## **A Case Study of Milk Processing: The Idara-e-Kissan Cooperative**

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### **Abstract**

*The paper focuses on Idara-e-Kissan, a vertically integrated cooperative in the dairy sector, which procures fresh milk, processes it and uses the profits earned in urban milk product markets to provide development services to member farmers. The analysis suggests that, compared to a control group of non-members, the cooperative's members had 29% higher net returns per milk animal, 9% more milk buffaloes, 6% fewer dry buffaloes and they used three times more milk fat-enhancing cottonseed cake. The members had better access to animal vaccination, artificial insemination, and visits from livestock extension workers; they were able to secure more animal treatments per year, and reported greater satisfaction with service provision. The cooperative's successes were more modest in areas where the benefits of inputs and services provided were more public, e.g. livestock breed improvement and enhancing fodder productivity, indicating that there is an important role for the government in supplying public goods such as livestock/agriculture R&D.*

**JEL Classification:** L66, Q12, Q16, Q18

**Keywords:** Milk, Dairy, Livestock, Cooperative, Pakistan

### **I. Introduction**

Pakistan's agricultural development strategy has in the past focused heavily on crops and tended to ignore the other sub-sectors within agriculture, including livestock. The motivation for this asymmetric emphasis came from the requirement to ensure food security by developing the capacity to produce enough grains for a large and growing population, and the need to provide raw materials to the industrial sector that was heavily concentrated in cotton textiles. These efforts, along with the availability of seed fertilizer technologies, contributed to the onset of the Green Revolution, which had a profound impact on the structure of

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Pakistani agriculture. As discussed below, one of these interesting consequences was a change in herd composition within the livestock sector in favor of milch cows and buffalos and a reduction in the number of male bulls. This created tremendous potential for milk production without adding significantly to the demand for feed and fodder resources.

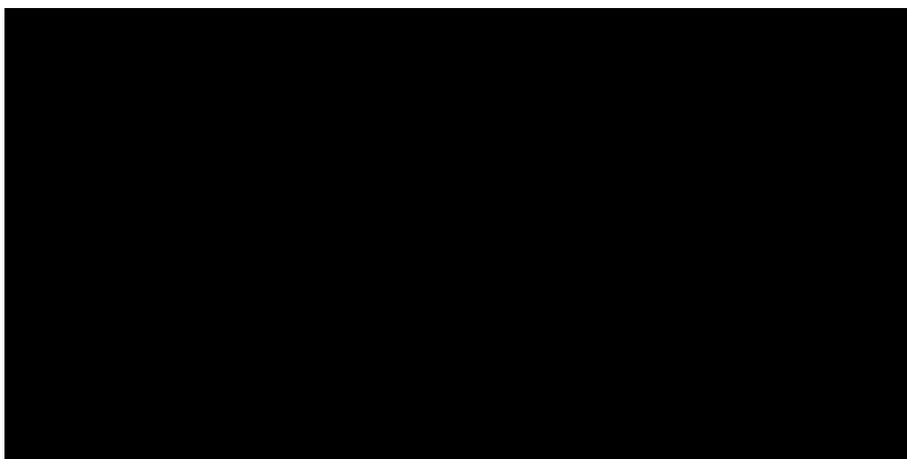
The milk production system in Pakistan is characterized by large numbers of small, geographically dispersed dairy producers who have marketable surpluses of milk but face diseconomies of scale in marketing it to demand centers in distant urban areas. The traditional middlemen who procure milk from rural areas close to the cities offer at best modest returns to the farmers. In the past couple of decades, two institutional developments have taken place in the milk processing sector. One is the penetration by large commercial dairy processing firms that procure milk from farmers, process it, and produce a range of milk products that are marketed in urban markets. The other is a vertically integrated farmers' cooperative that not only procures milk from member farmers but also provides them with development services aimed at increasing productivity. This paper is a case study of *Idara-e-Kissan* (IK), a farmers' cooperative operating in the milk processing sector. IK owns milk processing plants and markets its products in urban centers all over the country.

The next section highlights the economic significance of the livestock sector and reviews livestock policies. The two sections that follow describe (respectively) livestock production and marketing systems. The methodology of the paper is discussed in Section V. This is followed in Section VI by a close look at the *Idara-e-Kissan* cooperative, its institutional model, and its operations. Economic analysis of returns on milk production of IK members and a control group of non-members is presented in the next section. Based on this analysis, Section VIII identifies the successes and limitations of the cooperative. The final section draws conclusions.

## II. The Livestock Sector in Pakistan

### *Economic Significance of the Livestock Sector*

The livestock sector is the single largest sector within agriculture, contributing a little under half (46.8%) of agricultural value added. Its share in national GDP is 10.8%. The total value of livestock products in 2004-05 was Rs 484,216, which is more than the combined value of all major crops e.g. cotton, wheat, rice, and sugar cane. During the last five years, the average growth rate of the livestock sector was 3.2% per annum compared to 2.4% for the major crops.

**Figure-1: Contribution of Agricultural Sub-Sectors to GDP (% Shares)**

It is estimated that 30-35 million people are engaged in livestock related activities and generate 30-40% of their income from livestock enterprises. This supplemental income is very significant in view of the tendency of the declining size of ownership holdings in agriculture and the growing number of the landless in the rural economy. Livestock enterprises are particularly important for the landless and small farmers because livestock provides an alternative form of asset ownership, independent of land. For these poorer segments of the rural population, livestock ownership acts as insurance in the event of crop failure and provides a repository of household saving that can be liquidated in case of emergencies. Finally, for subsistence farmers, livestock products in the form of fresh milk and butter or *desi ghee* provide food security for the family and help meet nutritional requirements in terms of calories and protein.

An observation made during the present study was that in contractual milk supply arrangements, the daily supplies of fresh milk can serve as collateral that can be used by small farmers and landless livestock holders to obtain short term credit from the milk buyer (usually traditional *dodhi*<sup>1</sup> or even VMC).<sup>2</sup> This is noteworthy since the small farmers and

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<sup>1</sup> The traditional milk collector who goes from door to door collects the milk and sells it to other consumers in the village, nearby town, or to milk shops or *beoparis/dodhis* from the town.

<sup>2</sup> Village milk collector, a term popularized by commercial milk collectors such as Nestle, *Idara-e-Kissan* and others, refers to the person collecting milk from farmers on their behalf. The VMC does not go from door to door but maintains a fixed place in the village where the individual farmers bring their milk.

landless workers have very limited access to credit because of a lack of assets that could serve as collateral. This issue will be taken up in more detail in a later section.

### ***Livestock Policies***

The First Five Year Plan (1955-60) document mentions a number of problems facing the livestock sector.<sup>3</sup> Livestock herds had been depleted when evacuees took livestock heads with them while the incoming refugees slaughtered livestock to meet their food needs. The imbalance between supply and demand worsened further because the proportion of meat eaters in the population increased.<sup>4</sup> The requirements for draft power in agriculture placed further demands on the meager livestock population. The livestock breeding farms were producing inadequate numbers of superior breed bulls for distribution. At the same time, there were inadequate feed resources available within the country. Animals were undernourished and disease prone. It was estimated that 15 *lakh*<sup>5</sup> male buffalo calves died each year due to starvation. With only 500 veterinary hospitals and dispensaries available in the country, either the farmers had to bring sick animals from long distances to the veterinary facilities or the veterinary staff had to travel the same distance to reach them. Effective control of disease and the provision of health treatments for the animals were very difficult under these circumstances.

Livestock was reared mostly in rural areas while milk and milk products were consumed both in rural and urban areas. Because the marketable surplus of milk available with individual farmers was too small to justify a trip to the nearest town, it was sold to middlemen who often exploited the farmers by charging an amount in excess of the cost of their services, reducing farmers' returns on the one hand and charging higher prices to the consumers on the other. The Plan document noted that some milk production also took place in 'congested and insanitary pockets by *gujar* colonies in the heart of cities, where animals were kept in unhygienic conditions with the result that the milk was generally contaminated.'

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<sup>3</sup> Government of Pakistan (1957), First Five-Year Plan 1955-60, National Planning Board.

<sup>4</sup> This was due to in-migration of meat eating Muslims from India and out-migration of mostly vegetarian non-Muslims.

<sup>5</sup> 1 *lakh* = 100,000.

To deal with the myriad of problems, some of the Plan recommendations were:<sup>6</sup> (i) promoting production of superior breed bulls at subsidized private farms from where the government would procure these animals at *controlled prices* for distribution to villages, (ii) emphasis on preventing disease among animals through vaccination and inoculation, with legislation for compulsory mass inoculation to be put in place if there was a 'lack of willing cooperation' from farmers, (iii) removal of livestock from within cities to outskirts, particularly removing *gujar* colonies from Lahore, establishing them outside the towns, and making provision for the government to purchase milk produced by *gawalas* for 'clarifying, straining, cooling and pasteurizing it before distribution to registered depots where it would be sold to consumers in sealed bottles to avoid adulteration; the milk produced outside cities was to be 'checked and tested for purity' and the violators punished, (iv) re-organization of the dairy industry, especially encouraging the small farmers to specialize in dairy farming by keeping about six cows, producing much of the needed feed, and joining together in cooperatives to 'assemble, transport and *perhaps* to process milk [emphasis added].'

The purpose of the above review of the livestock component in the First Five-Year Plan is twofold. First, is to provide a sort of benchmark that would be readily comparable with later policies and developments in the sector. It is clear that the government wanted to keep production in the private sector but saw an important role for itself in marketing, distribution and even processing of livestock and livestock products. It would not hesitate to intervene in the market to alter prices. It sought to institute administrative controls, rather than providing incentives, to address milk quality issues and preferred to replace a whole class of marketing intermediaries with state procurement agencies for the purpose of ensuring compliance with hygienic standards. More interestingly, it anticipated that any collective action in the milk production system would most likely occur through a bottom up process starting with the collection and transportation of milk. Farmers' collectives engaged in the processing of livestock products, while being desirable and in the realm of possibilities, were in its opinion relatively less likely.

Second, while some of the problems mentioned in the First Plan document have been addressed, many remain unresolved even today. It is important to understand (i) which problems have been addressed satisfactorily and which continue to exist, and (ii) whether it is possible to categorize areas of success from areas of failure. The respective

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<sup>6</sup> This list of Plan recommendations is not exhaustive. For a full range of recommendations and more details see Government of Pakistan (1957), pp. 246.

commonalities within 'successes' and within 'failures' may hold clues to what works, what does not, and why. We will return to these issues towards the end of this paper.

Reviewing past government policies in the livestock sector, Burki et al (2005) note that the Second Five Year Plan, which shifted the focus towards large-scale manufacturing development, was unable to address the issue of increasing milk production capacity. The authors point out that the seed-fertilizer-water revolution overshadowed non-crop agricultural issues, such as those in the livestock sector. The only exception was perhaps the fact that milk supply schemes for Lahore and Karachi envisaged under the First Plan became operational, and in the late sixties with UNICEF support, subsidized milk was made available in Karachi to low-income families and school children. Both plants however shut down later as government patronage was withdrawn.

A positive spin-off of the industrialization strategy pursued by the government was in the form of 23 milk pasteurization and sterilization plants being set up in the country that relied mostly on recombining and pasteurizing skimmed milk imported under the World Food Program [Anjum et al, (1989)].<sup>7</sup> However, there was limited consumer acceptability of 'recombined milk and its short shelf life.' As a result, these plants failed, indicating that the inability to ensure a supply of fresh milk was a major constraint to the successful development of the milk processing industry (Burki et al, 2005). Fresh milk, however, could only be collected from geographically dispersed farmers with limited marketable surplus. At the time, market mechanisms were not adequately developed to perform this task.

The combination of government incentives to the manufacturing sector<sup>8</sup> in the late seventies and the introduction of ultra high temperature (UHT) milk, along with aseptic packaging material, led to renewed interest in milk processing. But consumer demand was not strong, probably due to the high prices of UHT milk and low household incomes.<sup>9</sup> The emphasis shifted in the eighties towards corporate farming to increase the supply of livestock products while the government focused on animal breeding, nutrition, and creating conditions conducive to induce private investment in

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<sup>7</sup> Cited in Burki et al, *ibid*.

<sup>8</sup> These included tax exemptions, duty free machinery imports and domestic and foreign currency financing.

<sup>9</sup> The price data for UHT milk is not available for the late seventies but a comparison of its price with that of fresh milk in 1994 (the first year when both prices are available) shows that the real price of UHT milk was more than 100% higher than the price of fresh milk.

the sector. Sadly, significant progress could not be made on either front during that period or subsequently in the nineties.

In retrospect, perhaps the single most important factor contributing to increased milk production in Pakistan was the unintended consequence of the Green Revolution era policies, particularly, tractorization. With increasing numbers of tractors imported into the country and later assembled locally, the need to maintain male buffaloes and bullocks for draught purposes diminished, thus freeing up feed and fodder resources that allowed the average herd composition to shift in favor of female cows and buffaloes. A comparison of the results of the 1986 and 1996 Livestock Censuses indicates that in the inter-census period, the population of bullocks reported to be 'for work' declined by 33.5%.<sup>10</sup> Thus, increased milk production came largely from increased numbers of milk animals.

Recent livestock policies aim at increasing private sector participation, raising the productivity of livestock and milk production systems, and enhancing the growth rates of both milk and meat products.<sup>11</sup> The growth in milk and meat production was 3.0% and 2.7% respectively during 2006-07. The Medium Term Development Framework envisages raising the growth rate of milk production to a level between 8.0% to 10% by the year 2010. Similarly, the MTDF target for the meat production growth rate is set at 8.5% by 2010. Key policy initiatives include the deregulation of milk and meat prices, strengthening the policy and regulatory capacity of MINFAL, streamlining credit availability, and creating a level playing field for the local dairy industry.

### *Current Livestock Policies*

It is clear that, unlike the early livestock policies reviewed above, the current policies are more market oriented. The government seems to be moving away from directly intervening in the markets and carving a role for itself in processing and distribution. The emphasis now is on encouraging the private sector to operate in these spheres and regulating its activities, rather than replacing it with the public sector. However, as the analysis in this paper shows, although the private sector and especially cooperatives have tremendous potential in enhancing productivity in the sector, there are critical areas where the private sector may not be able to operate on its own

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<sup>10</sup> Government of Pakistan (1998), 'Livestock Census 1996-Punjab,' Agriculture Census Organization, Statistics Division, Lahore.

<sup>11</sup> See MINFAL, Food Agriculture & Livestock Division, Livestock Wing website [http://www.pakistan.gov.pk/divisions/ContentInfo.jsp?DivID=10&cPath=91\\_97560&ContentID=5335](http://www.pakistan.gov.pk/divisions/ContentInfo.jsp?DivID=10&cPath=91_97560&ContentID=5335).

without government support. These areas are primarily those requiring government investments in providing public goods required by the sector. The central message of this paper is that a basis for healthy division of labor exists between the private and public sectors, whereby both focus on activities in which they enjoy their respective comparative advantage.

### ***Cooperatives Movement in Pakistan***

This section briefly reviews the cooperatives movement in Pakistan with a view to providing background for a case study of *Idara-e-Kissan*. The cooperative movement dates back to the British-era Cooperative Credit Societies Act, 1904. After independence, cooperatives expanded in scope to include commercial activities, but in 1952 due to inefficiency and mismanagement, the government directed the movement to withdraw from these activities upon the recommendation of the Cooperative Inquiry Committee (Sarwar et al, 1986). The Cooperatives Development Board was established in 1962 and it successfully implemented projects in agricultural credit, marketing and processing. The Board was abolished in 1966. Several ordinances issued by the government thereafter curtailed the autonomy of the cooperatives movement. In 1976, the Federal Bank of Cooperatives was established to provide credit facilities to Provincial Cooperatives Banks and to regulate them. At present, cooperatives are the responsibility of the provincial governments and are registered with the Registrar of Cooperative Societies.

Attempts were made in the mid-1970s to extend activities of cooperatives to the dairy sector but success was modest due to constraints related to poor infrastructure and private sector intervention (Uotila and Dhanapala, 1994). However, the experience of *Idara-e-Kissan* has been encouraging in collecting, processing and marketing milk and milk products, using the cooperative model. More recently, the Competitiveness Support Fund has decided to provide a grant for the Balochistan Dairy Cooperative Project. A Memorandum of Understanding has been signed for the Dairy Cooperative between the Balochistan Rural Support Program (BRSP), the University of Balochistan, SMEDA, and the Livestock and Dairy Development Department, Quetta.<sup>12</sup>

### **III. Livestock and Milk Production System in Pakistan**

The Livestock Census 2006 indicated that there were 27 million buffaloes and 30 million cattle in the country. About 65% of buffaloes were

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<sup>12</sup> Dairy Strategy Working Group, see <http://www.psidac.com/ver/2/index.php?m=static&e=dairy>.

found in the Punjab, followed by 27% in Sindh; the shares of NWFP and Balochistan were small. Likewise, slightly fewer than half the cattle were found in the Punjab, 23% in Sindh, 20% in NWFP and 8% in Balochistan (Table-1a).

**Table-1a: Livestock Population and its Regional Distribution**

	Cattle	Buffaloes	Sheep	Goats	Camels	Horses	Mules	Asses
In Million								
Pakistan	29.56	27.33	26.49	53.79	0.92	0.34	0.16	4.27
Province	Per Cent Distribution							
NWFP	20	7	13	18	7	22	43	13
Punjab	49	65	24	37	22	47	41	52
Sindh	23	27	15	23	30	13	12	24
Balochistan	8	1	48	22	41	18	4	11

*Source:* Livestock Census, 2006.

The livestock population includes a range of large and small animals including buffaloes, cattle, camels, horses, mules, goats, sheep and poultry. Data on the populations of selected types of livestock are presented in Table-1b.

**Table-1b: Livestock Population in Pakistan (million)**

Year	Buffaloes	Cattle	Goat	Sheep
1990-91	17.8	18.7	37.0	26.3
1995-96	20.3	20.4	41.2	23.5
2000-01	23.3	22.4	49.1	24.2
2004-05 (P)	26.3	24.2	56.7	24.9

*Source:* Pakistan Economic Survey, 2004-05.

Since 1990-91, the population of milk animals increased from 17.8 million buffaloes and 18.7 million cattle, to 26.3 million buffaloes and 24.2 million cattle. During this period the buffalo growth rate was higher at 3.4% compared to the growth rate in the cattle population, which was only 2.2%. The data from the 1986 and 1996 Censuses suggest that in-milk cows

increased 60% during the decade compared to an increase of 36% in the numbers of in-milk buffaloes.<sup>13</sup> The population of goats has also increased over the last fifteen years, but their contribution to total milk supply is small.

**Table-2: Production of Fresh and UHT Milk (million liters)**

Year	Fresh Milk	UHT Milk
1971-72	6,181	
1975-76	7,562	
1980-81	9,730	
1985-86	12,519	
1990-91	16,108	
1995-96	20,725	91.4
2000-01	26,284	194.2
2004-05 (P)	29,472	354.9 (predicted)

*Sources:* Economic Survey of Pakistan 2004-05, and Burki et al, 2005.

The increase in the livestock population, particularly of in-milk cows and buffaloes, is reflected in increased milk production in the country.

The supply of fresh milk has increased at an average annual growth rate of 11.4% between 1971-72 and 2004-05. Looking at the period covered by the two livestock censuses (i.e. 1986-1996), the average annual growth rate of fresh milk supplies was 6.6%.

A more recent phenomenon has been the rapid increase in the supply of UHT milk. The supply of UHT milk, which was only 91.4 million liters in 1995-96, increased to 305.2 million liters in 2003-04, registering a growth rate of 29.2% per annum during this period. The phenomenal growth in supplies of processed milk indicates that Pakistan's dairy sector is coming of age. This has been a result of a structural change that is beginning to take place in the milk collection, marketing, processing and distribution systems. The institutional innovations that accompany this shift are quite interesting and form the key focus of this case study. Before proceeding to a more formal analysis of these shifts, we look at milk production systems in Pakistan.

<sup>13</sup> See Government of Pakistan (1998), 'Livestock Census 1996,' Agriculture Census Organization, Statistics Division, Gulberg, Lahore. Also see Burki, et al, 2005.

A general typology of milk production systems in Pakistan is presented below based on previous studies that identify the following four dairy production systems.<sup>14</sup>

*Rural Subsistence Small Holdings:* These farmers have no more than 2-3 animals, including young stock, and produce mainly to meet family needs. The input use levels in this group are very low.

*Rural Market Oriented Small Holdings:* These consist of mostly stall-fed herds of fewer than six animals. To enhance milk production, farmers add concentrates to the feed, consisting of green fodder and straw. According to the 1996 Livestock Census, about 82-83% of the households owning cattle and buffaloes own up to six animals (Burki et al, 2005). The majority of the milk-selling households belong to this category, which provides the bulk of the marketed milk supply.

*Rural Commercial Farms:* This group comprises specialized dairy farms and mixed crop-livestock farms having more than 40 animals, mostly buffaloes. Because of economies of scale and the availability of adequate financial resources, it becomes possible to maintain breeding bulls on such farms. Many farmers in this category pursue breed development and keep highly productive milk animals. Although these farms tend to have a high turnover and are more organized, their overall contribution to total milk supply is insignificant because of their small numbers, as less than 0.5% of total dairy households have herds of this size.

*Peri-Urban Commercial Dairy Farms:* This system flourishes around all the big cities in the form of *gawala colonies*. The typical herd sizes range from 15-50 animals, mostly buffaloes. This is a high-turnover, high-cost system. Their cost disadvantage stems primarily from their distance from cheap fodder sources in agricultural hinterlands. As a result, the *gawalas* keep only the animals that are lactating or very close to the lactation stage. Dry buffaloes and cows are either sold back to farmers or to the slaughterhouses. However, marketing margins for this group tend to be high because there are few or no market intermediaries between them and the final consumers.

Sharif et al (2003) suggest that 80% of milk is produced in rural areas, another 15% in peri-urban areas and about 5% is produced in cities.<sup>15</sup> The study estimates that 90% of marketed milk is from what it describes as

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<sup>14</sup> See for example, Sharif et al (2003), which presents a similar typology following Ather and Raja (2002), and Mohyuddin and Wahla (1994). Also see Burki et al (2005).

<sup>15</sup> See p. 25.

'subsistence farmers' and the remaining is supplied by commercial farms. The former category is broadly defined and seems to include what the above typology describes as the "rural market-oriented small holdings" because the really small subsistence farmers have little or no marketable surplus.

#### IV. Milk Marketing and Distribution System

Information on milk marketing channels was collected from key informants during fieldwork for the present study. Descriptions of the milk marketing system are also found in Sharif et al (2003) and SDPI (2004).

The milk marketing system in Pakistan consists of two main channels:

- (a) Traditional channels that market unprocessed milk
- (b) Non-traditional channels, primarily specialized in the marketing of processed milk, and dominated by procurement and distribution activities of commercial milk processing firms.

While the traditional channels supply unprocessed milk, the range of products moving through non-traditional formal channels include ultra heat treatment (UHT), milk marketed in aseptic packing (Tetra Pack) as well as in Poly pack. Processed milk is also available in the form of pasteurized milk sold either in pouches or as open milk available from milk shops. The market shares of various types of milk are shown in Table-3.

**Table-3: Market Share by Milk Type**

Processed/Raw	Type of Milk	Market Share in Volume (%)
Processed Milk	UHT Tetra pack	5%
	UHT Poly pack	-*
	Open pasteurized milk sold at milk shops	3.8%
	Pasteurized pouch	-*
Raw/Unprocessed Milk	Open milk sold at milk shops	1%
	Open <i>Gawala</i> milk	90%
	Direct home delivery	-*

\* less than 0.5% share

**Source:** Sustainable Development Policy Institute, Islamabad, 2004.

### *Traditional Milk Marketing Channels*

The traditional milk marketing channel involves the collection of milk from farmers in remote areas by the village *dodhi*,<sup>16</sup> who then transports it by means of a bicycle, motor-cycle, or horse-tonga to small towns or transaction points along the main roads and highways linking towns with cities, where it can be purchased by a *dodhi* from the city for onward supply to urban consumers. At some point in this journey, unprocessed milk may be brought to a creamery where it undergoes skimming and re-constitution in accordance with its intended use in urban areas (see Box-1 below). The unprocessed milk reaches the final consumer through a variety of vendors, including retail milk shops, *halwai* shops, and *gawalas*. The latter typically are based in large *gawala* colonies on the periphery of urban centers. *Gawalas* supply directly to the urban consumers.

Transportation costs for moving milk from small towns or transaction points on main highways, to cities, ranges between Rs 10-50 depending on the size of the utensil, mode of transportation and distance involved (Sharif et al, 2003). The lower transportation costs apply to buses. Because of the distances involved and hot climatic conditions in summer, the danger of milk spoilage is great, forcing *dodhis* to add water or ice to milk, both of which are generally of unacceptable quality because of the severe problem of water cleanliness in Pakistan. Other additives used for prolonging the life of milk include antibiotics, hydrogen peroxide, carbonates, bicarbonates, caustic soda, and formaline.<sup>17</sup> Moreover, the vendors, especially *gawalas*, also add water as well as starch and reconstituted powder milk to increase the volume, and hence their profits. In general, due to adulteration with various additives, the milk supplied through the traditional channels does not meet hygienic standards. Households in middle to low income groups, who are the main consumers of unprocessed milk, are therefore at risk because of such practices.

An important issue with respect to the traditional milk marketing channels is the price received by the farmers. As a rule of thumb, the longer the supply chain and the less the competition (especially by non-traditional marketing intermediaries), the lower the price received by farmers selling through the traditional channels.

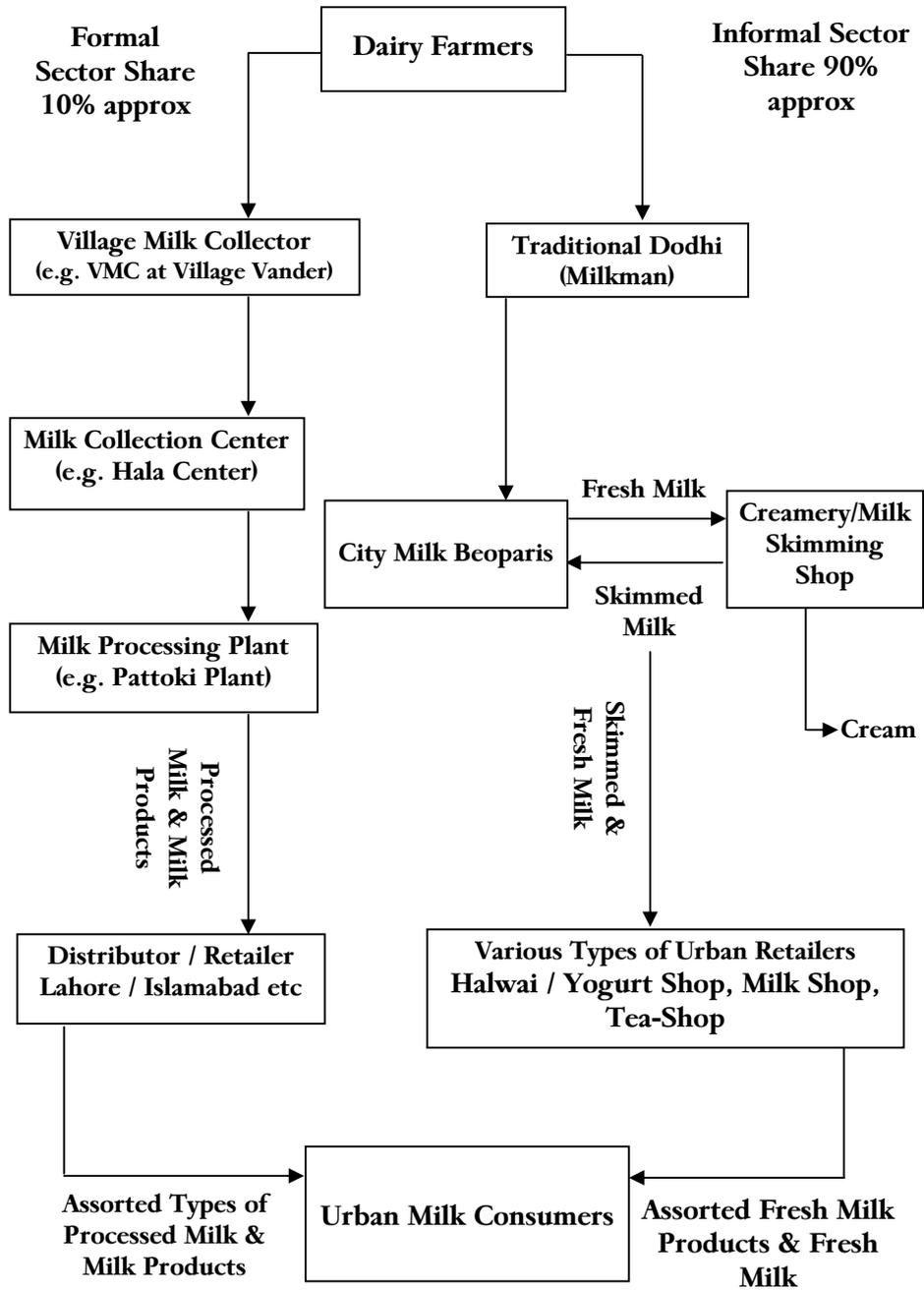
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<sup>16</sup> The village *dodhi* is often referred to as a *katcha dodhi* while the city *dodhi* is called a *pakka dodhi*.

<sup>17</sup> See Small and Medium Enterprise Development Authority, 2000. Also see Sustainable Development Policy Institute, 2004.

It must be appreciated however that the relationship between the *dodhi* and the farmer is complex. Milk sales by farmers are not spot market transactions but involve longer-term quasi-contractual arrangements. The *dodhi* wants an assured supply of milk at the lowest price. The farmer, on the other hand, wants a good price for milk in addition to a supply of credit at times of need. This mutual dependence has resulted in a loaning or 'advance' system whereby from time to time the *dodhi* provides an advance to the farmer for production expenses, or to meet occasional social obligations (childbirth, wedding, and funeral expenses, etc). The advance is offset against a regular supply of milk during the season at a fixed price.

**Schematic Representation of Milk Marketing Channels**



### Box –1: Case Study – Creamery/Milk Processing Shop

**Location:** *Jamber, Lahore-Multan Road,  
District Kasur, Tehsil Pattoki*

Farmers sell milk to a *village-dodhi* living in the same village. The price is Rs 500 per 40 kilograms or Rs. 12.5 per one kilogram. The *village-dodhis* sell milk to *city-beoparis* who come to Jamber from Lahore to buy milk. The going price is about Rs. 550 per 40 kg or Rs 13.75 per kg. Before transporting the milk from the area to Lahore, the city-beoparis bring it to a creamery/skimming shop located at Jamber on Multan Road, for skimming the cream.

The amount of cream extracted depends on the planned end-use for the milk. The end-uses are:

*Khoa* (concentrate) used in making *methai* i.e. Pakistani sweets

*Kounda milk* for making yogurt

*Thanda Doodh* (chilled milk) sprinkled with crushed nuts and sold at retail outlets for drinking during summer

*Karahi Doodh* (boiled milk) boiled and sold to urban consumers for household uses

*Tea milk* sold to teashops and restaurants mostly in urban areas and along main highways and roads.

The fat-intensive uses such as making *khoa* have relatively less fat removed from them, while milk sold to teashops has most of the fat removed from them.

The *khoa* milk is made by mixing 8 parts pure fresh milk with 12 parts skimmed milk. Buffalo milk has 6-8% fat. Eight liters of pure fresh milk would contribute 480-640 grams of fat to 20 liters of reconstituted *khoa* milk (8 liters pure and 12 liters skimmed). Thus the fat percentage in *khoa* milk would range from 2.4-3.2%. For comparison purposes note that the proportion of fat in commercially available UHT and pasteurized milk (including IK's 'Hala' brand) is 3.5%.

The fat percentage in milk intended for other purposes could not be known because the key informant refused to provide this information.

The fat extracted from milk is purchased by the skimming shop at the rate of Rs 60 per 40 kg. The key informant said that 4 kg fat could be extracted from 40 kg milk. This works out to be 10%, which is on the higher side because buffalo milk does not have more than 8% fat, and cow milk has an even lower fat percentage.

The fat purchased by the creamery is sold at Rs 80 per 40 kg. This fat is sold in Lahore, Karachi or Hyderabad, depending on price. The dairy owner has a brother in Karachi and a friend in Hyderabad, who handle sales in their respective markets.

**Source:** Field Investigations (August-September 2005).

There are basically two models for milk procurement in the formal sector:

- (a) Commercial procurement
- (b) Vertically integrated cooperatives

The commercial procurement model is based on a more or less arms length relationship with the farmer. This approach relies on relatively higher prices offered for raw milk to ensure continued supplies. Some of the suppliers may be traditional *dodhis* who, taking advantage of the arms length relationship, serve as intermediaries between small farmers and milk procuring firms.

The second model comprises a vertically integrated cooperative working within a participatory framework. This is the approach used by *Idara-e-Kissan* (IK), which is a vertically integrated farmers' cooperative. IK procures milk from geographically dispersed dairy farmers through a network of village milk collectors, transports it to its processing plants and markets milk products under the brand name of *Hala*. We study this organization in detail in section 6. Under this modality, instead of price, the incentive is a package of livestock related development services provided to member farmers either free or at cost.

*Idara-e-Kissan* membership is open to anyone with at least one cow or buffalo in villages where a milk collection center is in place. The organization does not collect membership fees. But members need to supply 300 liters of milk in a six month period, to become eligible for receiving member services for the next six months. Of course, the choice of IK operational areas is made strategically by IK management, which serves to limit membership. This is necessary if the cooperative is to realize economies of scale in bulk procurement, transportation and handling. Nevertheless, the organization has been expanding its operations into new areas (see section 6.1.2 below for details). Being a non-profit organization, all IK profits must be used to finance member services.<sup>18</sup>

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<sup>18</sup> IK's internal financial information was not available to the author. It should be noted however that IK accounts are audited.

**Table-4: Milk Processing Firms**

<b>Firm Name</b>	<b>Location</b>	<b>Installation Year</b>	<b>Capacity in 2003 (Liters/Day)</b>	<b>Remarks</b>
Milko	Lahore (Vita)	1977 (2000)	50,000	Not Operating
Nestle Milkpak	Sheikhupura	1981	1,250,000	UHT, Powder
Pakistan Dairies	Sahiwal	1983	40,000	Not Operating
Halla	Lahore	1984	75,000	UHT, Pasteurized
Chaudhry Dairies (CDL Foods Ltd.)	Kasur	1986	509,000 8,000 1,000	UHT Milk Milk Powder Desi Ghee
Milkways	Tandlianwala	1987	90,000	Being Initiated
Ravi Dairies			50,000	UHT Milk in Pouch
Pakistan Milkfoods	Jhang	1988	25,000	Condensed Milk
Premier Dairies	Raiwind	1999	100,000	Powder milk
Millic Dairies	Sialkot	1985	300,000	Not Operating
Sialkot Dairies	Sialkot	1985	100,000	Powder Plant
KNK Dairies	Raiwind			Being Installed
Patpattan Dairies	Pakpattan	1989	100,000	Not Operating
Noon Dairies	Bhalwal	1956	80,000	Milk, Butter, Cheese
Milk Flow	Karachi	1998	100,000	UHT Milk
Prime Dairies	Raiwind	1980	25,000	Ice Cream, Yogurt
Pak. Dairies	Sahiwal	1979	100,000	Not Operating

**Source:** Niazi, M.A., and U. Farooq, “*Estimation of Demand for Milk in Pakistan*”. Socioeconomic Research Studies 2003-2004. Federal-SSI, Pakistan Agriculture Research Council, Islamabad.

Regardless of the institutional aspects, both models rely on village milk collection points where a designated Village Milk Collector (VMC) is present for collecting milk from individual farmers, both in the mornings and in the evenings. The payments to farmers are usually made on a weekly basis. The firm announces a base price for milk containing 6% fat and the VMC tests the milk brought in by each farmer for fat content.

**Table-5: Base Prices Paid for Milk by IK and Nestle (6% Fat)**

Milk Processor	Base Price Paid Rs/ Liter*
Idara-e-Kissan	Rs. 13.5
Nestle Milkpak	Rs. 15.5

\* *Source:* Fieldwork conducted from late August to early September 2005.

The price paid to the farmer depends on the fat content of the milk. In the lean (summer) season, there is usually a premium added to the base price of milk. *Idara-e-Kissan* paid a premium on milk delivered during the lean period from 15 April –15 August.

The village milk collector is responsible for transporting milk to the collection centers, such as 'Hala'. These centers are equipped with chillers and Plate Heat Exchange (PHE) systems, both meant for cooling milk to 2°C. From thereon, insulated trucks are used to transport milk to processing plants to produce a range of products including UHT milk, pasteurized milk, yogurt, and *desi ghee*, etc. Milk products are marketed to urban consumers through retail outlets.

## V. Methodology and Scope of the Study

The objective of this study is to analyze the experience of *Hala/Idara-e-Kissan* (IK) in milk collection, processing and marketing activities with a view to learn lessons useful from the perspective of rural growth and poverty alleviation in Pakistan. The scope of the study is limited to IK operations in the Punjab but the lessons learnt have wider applicability.

The methodology of the study consisted of conducting structured and semi-structured interviews and meetings with a range of key informants that included dairy farmers, milk market intermediaries, staff of IK and government officials in livestock sector organizations. In addition, a small structured survey of dairy farmers was conducted in Kasur and Okara districts.

Farmer meetings were conducted in the following villages:

- (i) Village Bhoneke Uttar, Tehsil Pattoki
- (ii) Village Vander, district Kasur

About 15-20 farmers attended each meeting.

In addition, key informant meetings were held with market intermediaries, including the traditional *dodhi*, IK village milk collector, and the owner of a milk skimming shop/creamery at locations listed below.

- (ii) Village 15-R district Okara (meeting with *dodhi*)
- (iii) Village Vander (meeting with IK village milk collector)
- (iv) Location, Jamber on Lahore-Multan Road (meeting with the owner of the creamery)

To gain an understanding of the IK organization and its operations, several meetings were held with the IK senior management and staff and visits made to their operational facilities in the field. The following IK facilities and Operational Centers were visited.

- (i) IK Head Office, Lahore
- (ii) IK milk processing plant, Pattoki
- (iii) IK center, feed production facility and semen production unit, Chochak
- (iv) IK center, 4-GD

The structured survey of dairy farmers was conducted in Kasur and Okara districts. Before initiating the survey, two formal questionnaires were developed and pre-tested in the field. One questionnaire was for IK member farmers and the other for non-members. The latter served as the control group.

The IK members were selected from village Vander in district Kasur. This village is 8 km from IK's 'Hala' milk collection center and 25 km from the IK Pattoki milk plant.<sup>19</sup> This is an IK operational village where the organization has two village milk collectors (VMCs). In operational terms, this means that farmers had milk collection points located in close proximity, where they could easily take their milk supplies after the morning and evening milking.

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<sup>19</sup> The IK processed milk products are sold under the brand name 'Hala', named after this first IK operational center.

The control group farmers were selected mainly from village 15-R in district Okara. IK does not operate in this village but Nestle has a milk collection point here. In addition to the main cluster of houses in the village, many livestock keepers were scattered in *dairas*<sup>20</sup> around the village. Most of the farmers interviewed came from *dairas*. This means that a Nestle VMC was not located in their proximity and they would have to travel greater distances on foot to bring milk to the VMC twice a day.

Because the focus of this study is on poverty alleviation, a sample was selected from small farmers owning between three to five milk animals. Households owning fewer animals, while poor, are not expected to have significant marketable surplus to benefit fully from the operation of organizations such as the IK. On the other hand, households with larger herds are not truly representative of typical dairy households in Pakistan and are expected to be relatively better off.

For the purpose of sample selection in the IK operational village, a list of IK members was prepared with the help of the IK staff. This list also indicated members' livestock holdings. A sample of households with a herd size of between 3-5 animals was randomly selected to be interviewed.

The control group sample was selected by first preparing a list of farmers owning 3-5 animals with the help of an informant in this village. A random sample was selected for interviewing. Substitutions were made for non-available farmers by selecting other farmers with similar herd sizes.

A team comprising the author and two enumerators conducted the interviews. The filled survey questionnaires were reviewed in the field by the survey team before proceeding to data entry. For the purposes of entering survey information, a data input template was created. The entered data were checked for errors and consistency before undertaking analysis.

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<sup>20</sup> A '*daira*' is a location away from the main villages but near their fields where farmers have a few rooms for storing implements and keeping animals. Some farmers return to the villages in the evening. Many farmers, especially smaller ones take up full time residence at a *daira*, as they have no house in the village.

## VI. Idara-e-Kissan

### Genesis of Idara-e-Kissan Organization

The genesis of IK was the 1983 Pattoki Livestock Production Project (PLPP)<sup>21</sup>, initially supported by the German Government and implemented through technical assistance from GTZ. The emphasis was on extension and education of farmers with a view to improve productivity and farmers' incomes through the development of a participatory organization. During an in-house workshop of the project, it was realized that extension alone was not enough to achieve these objectives.<sup>22</sup> So a service provision element was added that included animal health, reproduction, feeding, extension and social components. This decision had its roots in the realization that increased farmer incomes were highly fungible and not always invested in livestock.

Initially, the project model was based on the collection of milk from farmers in 15 villages and selling it to private dairies in Lahore. The project provided price guarantees and assurances to buy all milk offered for sale by farmers. However, difficulties in selling milk to private dairies, especially during the flush season, underscored the need for creating processing capacity. The Pattoki milk processing plant was established in 1987 to help address the milk marketing problem, and with it the organization – *Idara-e-Kissan* – was also created as a means of developing a private enterprise that would generate its own funds, be financially self-sustaining, and involve members in the decision-making process of milk processing and marketing. *Idara-e-Kissan* was registered under the Pakistan Society Act in June 1989. In 1992, PLPP terminated and IK's own administration has been running the organization since then.

#### *Initial Investment Costs*

The initial investment in IK, from 1984 to 1992, was Rs 200 million. The German government's contribution was Rs 180 million, which included Rs 100 million in local expenditures for the establishment of the Pattoki milk processing plant, vehicles, equipment and other hardware.

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<sup>21</sup> Pattoki is a town in Punjab province located 75 kilometers from Lahore on the Lahore-Multan Road. Also see section 6.1.2 on growth of operation for geographic areas of operation.

<sup>22</sup> Discussions with CEO, Idara-e-Kissan.

### ***Growth of Operations***

The original IK model was developed in areas around Pattoki, in the milk belt along the left bank of the Ravi between Balloki and Gugera-Saddar/Akbar Chawk. This area consists of the western parts of the administrative districts Kasur and Okara. In the *Idara-e-Kissan* lexicon, this is IK-1. Now the IK model has been extended to more areas, as shown below:

- IK-1: Kasur, Okara
- IK-2 Syedwala (on right bank of Ravi), Sheikhupura
- IK-3 Arifwala, Hujra Shah Muqem
- IK-4 Sargodah, Layyah

IK-4 is the newest area. The historical evolution of IK operations is summarized in the table below:

**Table-6: Evolution of IK Operations**

<b>Years =&gt;</b>	<b>1992</b>	<b>1996</b>	<b>2000</b>	<b>2004</b>
Villages Under IK Operations	87	139	351	519
Farmer Members	1,817	7,143	10,753	20,164
Milk Collected -6% Fat (million liters)	4.66	9.62	37.65	47.10

**Source:** Information provided by IK

Demand for UHT treated packed milk is limited due to modest income levels in Pakistan and its real price has fallen consistently over the years. IK evolved a new strategy focusing on lower cost segments of the marketing, involving cheaper packaging to market affordable products such as unpacked pasteurized milk. This has helped the bottom line.

Flush season milk has always been difficult to sell (IK faced the same problem as other dairies). To deal with strong seasonality, IK started a powdered milk plant (in 2001) with production capacity of 1 ton per hour. This plant works during the September-April period, i.e. 8 months a year.

Despite increasing the scale and scope of operations, and greater geographic dispersion of its activities, IK operates under the same basic model. This model is described below.

### **The *Idara-e-Kissan* Model**

Any livestock keeper in a target village can become a member if he/she owned one buffalo or one cow and is able to supply 300 liters of milk during a six-month period. Members are entitled to members' services during the next six months. A village with 15 members can form a Village Committee (VC) and elect a '*nomainda*' or representative at the village level for a five-year term. The villages in the Union Council elect Council members who form the Governing Body. The Governing Body meets quarterly and makes policy decisions. In addition there is an Executive Committee (EC) for operational decisions. The members of the EC are nominated. The Governing Body must approve any decisions made by the EC.

### ***Milk Collection System***

From a milk collection perspective, each operational village (i.e. where IK collects milk) has a village milk collection point, where farmers deliver milk. A village milk collector (VMC) is present in the mornings and the evenings to receive milk, which is tested for fat content in the farmer's presence and both the quantity of raw milk and its fat percentage are recorded. The price farmers receive depends on the fat percentage and payments are made weekly.

From here on, the responsibility for storing and transporting milk shifts to the VMC, who is a self-employed person and operates under the close supervision of the village council and can be dismissed by them. Unlike the traditional *dodhi*, the VMC does not have price-setting power. The base price of milk (containing 6% fat) is announced by the IK and the VMC gets a commission for collecting, storing, and transporting the milk from the village to the collection center. The VMC in Village Vander received Rs 1.50 per liter for collecting milk and delivering it to the IK center at Hala.<sup>23</sup> Upon delivery at the center, milk is again tested for fat content and quality. If the delivered milk is rejected by the center, the financial liability is of the VMC and not of the farmers.

Each center can receive milk from 35-60 villages. The milk collection centers are equipped with chillers and PHE systems for cooling milk. The chilled milk is transported in truck-mounted insulated containers to processing plants. The transporters receive a commission for transporting

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<sup>23</sup> This amount can be higher if road infrastructure is inadequate and the distance from the village to the collection center is greater.

milk. For instance, the commission for transporting milk from Hala Center to the Pattoki processing plant was Rs 0.35 per liter.

### ***Package of Development Services***

Apart from the participatory nature of the organization, what distinguishes IK operations from those of the other commercial milk processing firms is the package of veterinary and other services offered to its members. Because IK is registered under the Pakistan Society Act, the members cannot receive income from the organization's activities. The profits from commercial milk processing and marketing operations are used to finance a range of development services. These include services directly related to livestock activities as well as social services aimed particularly at rural women.

IK staff members, some of whom are self-employed and stationed in villages, provide these services. This creates an incentive structure vastly different than the one facing the salaried staff at government veterinary and extension agencies. Professional staff hired by the IK supervises service delivery. The package of services is described below.

- Artificial insemination (AI) – These services are provided, free of charge to members, by IK technicians for the purpose of bringing about genetic improvement in herds and boosting their fertility. IK also maintains semen production at the Chuchak center to provide fresh insemination services.
- Animal Vaccination – farmers' livestock is protected against diseases by vaccination programs administered by the veterinary staff of IK. Vaccination is free of charge for members
- Animal Health Treatment – These services are provided at a nominal charge and part of the cost of medication is reimbursed to farmers after they have supplied 300 liters of milk during the 6-month period (as stipulated in their membership conditions). In practice, in Village Vander, the VMC collected the medication bill immediately and later offset it against the members' milk supply. An important aspect of this program is access to treatment services in case of an emergency. At such times, a veterinarian or needed IK staff is rushed to the farmers at their call. This solves some of the farmers' most serious problems, i.e. non-responsiveness of government veterinary staff and high cost of private treatment.

- **Feed Improvement** – To improve productivity, IK procures quality concentrates such as cottonseed cake and supplies them to farmers at cost. It also produces balanced rations (known as '*vanda*') and a mineral mix at its feed production unit located at Chuchak. IK makes efforts to provide quality fodder seed to farmers to raise productivity and to ensure adequate availability during the lean season. Towards the latter objective, farmers are also encouraged to grow non-traditional varieties of fodder. The improved seed for hybrid sorghum and *barseem* is obtained from Sargodah, and that of maize from Yusufwala.
- **Extension Services** – The aim of this program is to educate farmers about animal health, fodder, and feeding practices. Also demonstration plots for fodder are set up. The cost of seed and other inputs for these is borne by the farmer but fertilizer is supplied free by IK. The organization helps farmers procure quality seed from seed multiplication agencies in the private sector.
- **Social Services** – The IK operates a women's program, which is aimed at supporting their role in rural households and involving them in a services package. The program has family planning, mother and child health, adult literacy, health education components, as well as a goat distribution component for poor women.

The Table below provides information on delivery of selected services.

**Table-7: IK Service Provision Levels (selected services)**

Service	1992	1996	2000	2004
Veterinary Cases	10,125	42,826	73,757	127,144
Animals Vaccinated	90,513	219,180	249,802	363,014
Artificial Insemination Cases	4,513	8,063	14,202	15,707
Target Group Meetings	811	2,637	3,425	6,486
Mother & Child Care Cases	720	10,333	19,080	21,674
Health & Livestock Meetings (Women)	134	1,540	2,623	3,240

*Source:* Information provided by *Idara-e-Kissan*

### *Cost of Development Services*

*Idara-e-Kissan* is a non-profit organization. Profits from its commercial operations are used to finance development services for its members.

**Table-8: Costs of Development Services**

Year	Cost of Development Services (Rs million)	Turnover (Rs million)	Services Cost as %age of Turnover
1998	28.54	395.49	7.2 %
1999	27.32	516.12	5.3 %
2000	31.29	731.76	4.3 %
2001	40.61	697.23	5.8 %
2002	58.10	658.51	8.8 %
2003	53.80	793.77	6.8 %
2004	61.91	922.48	6.7 %

*Source:* Information provided by *Idara-e-Kissan*

From 1998 to 2004, the cost of development services has ranged from 4.3% to 8.8% of *Idara-e-Kissan's* turnover. The average for this period is 6.4%. The outlay on services was about Rs 62 million in 2004. A more detailed breakup of costs is not available, but Table 7 indicates that development services include some social services as well, although this does not appear to dominate livestock related services.

### *Constraints*

Transportation infrastructure is very important for collecting and transporting milk. In the Punjab, the farm-to-market road network has gradually expanded. But roads constructed many years ago are now in need of repair.

The power supply is not reliable causing difficulty in the operations of the milk chilling unit. Sometimes the electricity supply is not available for as long as two days. Generators are used when the power supply is cut off, but they are very expensive. Even obtaining a new electricity connection is difficult, which makes expanding into new areas (by setting up chilling units) very challenging.

The law and order situation is not satisfactory, especially in areas near the rivers. There have been incidents where IK staff motorcycles were stolen. This makes operations difficult because it interferes with the movement of cash to collection centers and VMCs. The staff at the Chuchak

Center said it is sometimes difficult for the doctor to make emergency calls for the treatment of animals after-hours because of the law and order situation. The doctor on these occasions travels with an armed escort provided by the farmer requesting the service. This raises the transactions costs and makes the task of receiving emergency animal treatment more difficult for farmers.

In the past, *Idara-e-Kissan* did not get direct support from the government but was a user of government R&D and production in various fields. For instance, the IK obtains vaccines from the government but these are not always available. Last year they could not obtain them. Moreover, the government does not provide good breeds of animals to ordinary farmers in good numbers. One key informant, talking about livestock raised on government farms said, "*Their animals are only meant for the Horse and Cattle Show.*"<sup>24</sup>

Recently, the government has decided to collaborate with the IK to provide 80 milk chillers at market prices. The cost would be paid back in installments. In Sargodah district, the government will provide a soft loan to the IK for setting up a milk collection program that includes collection, chillers, training and extension.<sup>25</sup> Moreover, in Layyah District, the Government of Punjab is planning a joint venture with IK. This would involve setting up of a processing unit. The Government of Punjab would invest in the development activities of IK.<sup>26</sup>

## VII. Economic Analysis

This analysis is based on a structured survey that covered 36 dairy farmers, equally divided between IK members and non-members (control group). The sample was chosen from smaller dairy farms having 3-5 animals.

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<sup>24</sup> Horse and Cattle Show is a government sponsored event held every spring in Lahore. Among other attractions, cattle and horses of good breeds are displayed on this occasion. The stark contrast between these animals and the non-descript breeds found on typical farms in the Punjab seems to have prompted this comment.

<sup>25</sup> Discussions with the General Manager (Development), and Deputy General Manager (Development), Hala/IK, Pattoki Dairy Plant.

<sup>26</sup> Discussions with Director General Livestock, Government of Punjab, Lahore.

**Table-9: Basic Information about IK Member and Non-Members Farms**

	IK Member Farm	Non-Member Farm
Animal Units Per Farm	6.83	6.84
Animal Units Per Buffalo	1.50	1.50
No. Milk Buffalo Per Farm	1.70	1.56
Milk-Buff Animal Units Per Farm	2.55	2.34

*Source:* Survey Data (2005)

The IK member farms and the farms in the non-member control groups are identical in terms of average herd size, both owning between six to seven animal units. The average number of milk buffaloes in IK farms was marginally higher at 1.70 compared to 1.56 in the control group farms.

### ***Enterprise Budgets***

This section presents enterprise budgets for one buffalo both for IK member farmers (see Table-10 below) and the control group of non-members (see Table-11 below).

**Table-10: Budget (Per Milk Buffalo) for IK Member Dairy Farmer**

	Unit	Quantity	Rate (Rs)	Cash (Rs)	Cost Per Animal Unit (Rs)
Milk	Head	2,003.36	14.58	29,209	
Calf-Female	Head	0.397	3,500.00	1,390	
Calf-Male	Head	0.397	2,500.00	993	
<b>Total Value of Production</b>				<b>31,591</b>	
<b>Input Costs</b>					
<i>Rabi Fodder Costs</i>					
Barseem	Acre	1.15	22,285	25,628	3,752.23
Oats	Acre	0.08	10,000	800	117.13
<i>Kharif Fodder Costs</i>					
Sorghum Fodder	Acre	1.25	5,738	7,173	1,050.15
Sadabahar Fodder	Acre	0.06	6,400	384	56.22
Maize Fodder	Acre	0.33	6,060	2,000	292.80
Other Kharif Fodder	Acre	0.16	6,066	971	142.10
Cottonseed Cake	Bag	13.07	454	5,935	2,327.33
Mineral Mix	Bag	0.66	14	9	5.44
Wheat Straw	Mds	59.00	112	6,608	967.50
Choker	Kg	4.40	6	24	3.54
Gur	Kg	15.33	27	411	60.15
Wheat Grain	Kg	29.35	10	301	44.05
Oils	Kg	3.30	139	459	67.16
Masalas		-	1	90	13.18
Health Treatment (Net of Reimbursement)	Total Rs			340	49.78
Vaccination	Total Rs			3	0.44
De-Worming	Total Rs			25	3.66
Breeding Costs	Total Rs			21	3.07
<b>Total</b>					<b>8,956</b>
<b>Cost Per Milk-Bufferalo</b>					<b>13,434</b>
<b>Net Returns Per Milk Bufferalo</b>					<b>18,157</b>

*Source:* Survey Data (2005)

Table-11: Budget (Per Mil Buffalo) for Non-IK Member Farmers

	Unit	Quantity	Rate (Rs)	Cash (Rs)	Cost Per Animal Unit (Rs)
Milk	Lit	1,599.04	12.85	20,548	
Calf-Female	Hd	0.397	3,500.00	1,390	
Calf-Male	Hd	0.397	2,500.00	993	
Adult-Male	Hd				
Total Output				22,930	
<b>Input Costs</b>					
<i>Rabi Fodder Costs</i>					
Barseem	Acer	1.00	18,377	18,377	2,686.70
Oats	Acer	0.03	5,000	150	21.93
Lucerne	Acer	0.13	25,000	3,250	475.15
<i>Kharif Fodder Costs</i>					
Sorghum	Acer	1.16	4,162	4,828	705.84
Sadabahar	Acre	-	6,400	-	-
Maize Fodder	Acer	0.50	6,909	3,455	505.04
Other Kharif Fodder	Acer	0.06	5,824	349	51.08
Cottonseed Cake	Bag	3.90	440	1,716	733.33
Mineral Mix	Bag	-	14	-	-
Wheat Straw	Md	58.00	63	3,654	534.21
Choker	Kg	28.00	6	175	25.58
Gur	Kg	16.00	22	352	51.46
Wheat Grain	Kg	2.50	10	26	3.75
Oils	Kg	0.67	123	82	12.05
Masalas		-	1	60	8.77
Health Treatment (Net of Reimbursement)	Total Rs			283	41.37
Vaccination	Total Rs			30	4.39
De-Worming	Total Rs			7	1.02
Breeding Costs	Total Rs			22	3.22
<b>Total</b>				49,089	5,865.00
<b>Cost per Milk-Bufferalo</b>					<b>8,797.00</b>
<b>Net Return</b>					<b>14,132.00</b>

*Source:* Survey Data (2005)

### ***IK Members***

The IK member farmer produces on an average 2003 liters of milk per buffalo per year and earns gross revenue of Rs 29,209 from milk sales to the IK.

The cost of inputs is presented in the table on a per animal unit basis. The IK farmers' major input costs are Rs 5,410 for fodder or 60% of total input cost per animal unit. On an average the farmers had 1.23 acres of land under *Rabi* fodder, mostly *barseem* but also some oats. The acreage allocation to *Kharif* fodder was 1.8 acres, which was mainly sorghum but some farmers also planted maize fodder. Very few farmers used non-traditional fodders such as motgrass and *sadabahar*.

The second most important input cost is that of concentrates and supplements. Together these costs add up to Rs 3,488 per year or 39% of total input cost per animal unit. About two-thirds of this expenditure is the cost of cottonseed cake, which is fed to lactating buffaloes to increase their milk productivity.

The animal health costs (Rs 57) is small partly because IK subsidizes animal health treatment and vaccination. But this should not obscure the importance of these costs. Because the figures presented in the budget are averaged over all the farmers, including those whose animals do not fall sick, the average cost appears small. But in reality, the farmer whose animal falls sick bears the full cost of treatment, which is substantial.

On a per buffalo basis, the average cost for IK farmers is Rs 13,434 and net returns are Rs 18,157.

### ***Non-Member Farmers***

The budget for dairy farmers who were not IK members is presented in Table-11. The average milk yield per animal for this group comes to 1,599 liters per year. These farmers received on an average Rs 20,548 by selling the milk to the traditional *dodhi*.

The main input cost for non-*IK* farmers was also the cost of fodder, which was Rs 4,445/animal unit per annum, accounting for 75.8% of input costs. The area allocated to *Rabi* fodder was 1.16 acres, which was mostly under *barseem*. The area under fodder in the *Kharif* season was 1.72 acres out of which 1.16 acres were for sorghum fodder and an additional 0.5 acres were planted as maize fodder.

The cost of feeding concentrates and supplements to milk animals was Rs 1,369. The share of cottonseed cake in this was 54% while wheat straw accounted for another 39% of this cost. Medical costs were small (Rs 50) but as mentioned earlier, averaging these costs over all farmers – including those whose animals do not fall sick – results in a smaller expected value in an *ex-ante*, probabilistic sense. The farmers whose animals actually fall sick pay much more, *ex-post*.

The non-IK farmers had a total cost of Rs 8,797 per milk buffalo and they earned a net return of Rs 14,132.

### ***Comparison between IK-Member and Non-Members***

A brief comparison of productivity related variables for both IK members and non-members is presented below in Table-12.

**Table-12: Comparative Productivity Levels -- IK Members vs. Non-Members**

	<b>Difference (IK Over Non-IK)</b>
Net Returns Per Milk Buffalo (Rs/Year)	+ 28.5%
Milk Prices Received (Rs/Litre)	+ 13.5%
Milk Yield Per Buffalo (litre/year)	+ 25.3%
Number of 'Wet' Milk Buffaloes	+ 8.97%
Number of 'Dry' Milk Buffaloes	- 6.00%

**Source:** Survey Data (2005)

Table-12 above shows that IK member farmers enjoy 28.5% higher net returns per milk buffalo compared to non-members. This is a result of 13.5% higher prices received based on the fat test. Note that the base price offered by IK for 6% fat milk was Rs 13.50/liter. Therefore, the average price received of Rs 14.58/ per liter indicates that milk produced by IK members had more than 6% fat. Because the non-members sold to the traditional *dodhi*, no fat test was conducted on the milk they supplied. *Dodhis*, however, have lots of experience and reasonably good idea of milk quality (including fat content). So apart from the *dodhi's* own margin, possibly lower fat content of their milk (as judged by the *dodhi*), could be another factor explaining the lower prices they received. Moreover, by eliminating the middleman and consolidating milk collection operations to a scale larger than that of the typical *dodhi*, IK may be able to achieve economies of scale in transportation

and handling, some of which may be passed on to the farmers.<sup>27</sup> Finally, IK members had 9% more milk buffaloes and 6% fewer dry buffaloes.

### *Sources of Productivity Differences*

Having established that productivity at the IK members' dairy farms is higher compared to farms operated by non-members, we now try to trace the sources of these differentials. These can be divided into two groups --- (a) access to services and (b) usage levels of inputs

**Table-13: Sources of Productivity Difference**

Service/Input	Access to Services (%)		Usage Levels*	
	IK Members	Non-Members	IK Members	Non-Members
Artificial Insemination	28	6	-	-
Vaccination	83	72	2.3	1.5
Animal Health Treatment	44	44	4.4	1.9
LS extension workers' visit	56	0	2.9	0
Loans / Advances	78	39	Rs 3,264	Rs 2,285
Cottonseed Cake (Mds)			13.1	3.9
Wheat Straw (Mds)			59.0	58.0
Rabi Fodder (Acres)			1.23	1.16
Kharif Fodder (Acres)			1.80	1.72

\*Note: Unless otherwise stated, the figures refer to average number of times the service was used by farmer

**Source:** Survey Data (2005)

In terms of access to services, the IK members seem to enjoy a clear advantage in artificial insemination, vaccination and number of visits by livestock extension workers. The percentage of farmers having access to animal health treatments is about the same in both groups but this does not imply equal access, because service usage levels are greatly different. The IK farmers get between 4-5 animal treatments per year on an average while non-members average only about 2 treatments during the same period. Despite similar service coverage, the IK members' usage rate is almost twice

<sup>27</sup> The author is thankful to an anonymous referee for this point.

that of the non-members. The same pattern is seen in the number of vaccinations. The IK members' animals on an average get between 2-3 vaccinations during the year while non-members' can manage only between 1-2 vaccinations for their herds. This means that IK members protect their animals against more diseases compared to non-members.

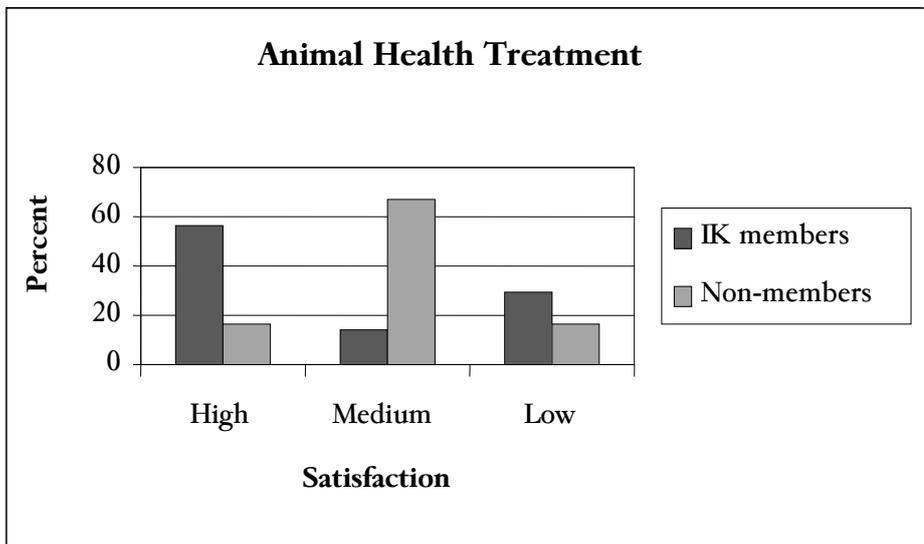
A comparison of input usage levels is presented in the lower panel of Table-13. In both the *Rabi* and *Kharif* seasons, the area allocated to fodder is somewhat higher on IK members' farms, but the difference is not very significant. The same is true of wheat straw. From amongst the inputs, the single most important contribution to productivity seems to come from cottonseed cake. The IK members reported using 13 Mds of cottonseed cake whereas non-members used only about 4 Mds. Although the number of milk buffalos is higher on IK members' farms (1.7) compared to non-members farms (1.56) the difference in cottonseed cake usage is far more to be explained just by differences in herd composition.

### ***Service Quality and Productivity***

Not all productivity differences can be attributed to quantitative aspects of services delivered. Service quality is also a very important factor in explaining productivity difference between members and non-members. The survey collected information on service quality that is presented below.

below shows satisfaction levels of IK members with animal health services delivered by IK staff versus the satisfaction levels reported by non-members for services delivered by the private sector and government veterinary staff. It is clear that the distribution of IK members' satisfaction ratings is skewed towards high satisfaction, while that of the non-members is centered almost symmetrically at the medium satisfaction level. Farmers reported during the field survey that even the government veterinary staff engages in private practice and charges fees just like the private sector. So given that these services are delivered mostly on a payment basis to non-members, higher satisfaction levels reported for IK delivered services is all the more significant.

**Figure 2: Service Quality and Productivity - Animal Health Treatment**



**Figure 3: Service Quality and Productivity Vaccination Service**

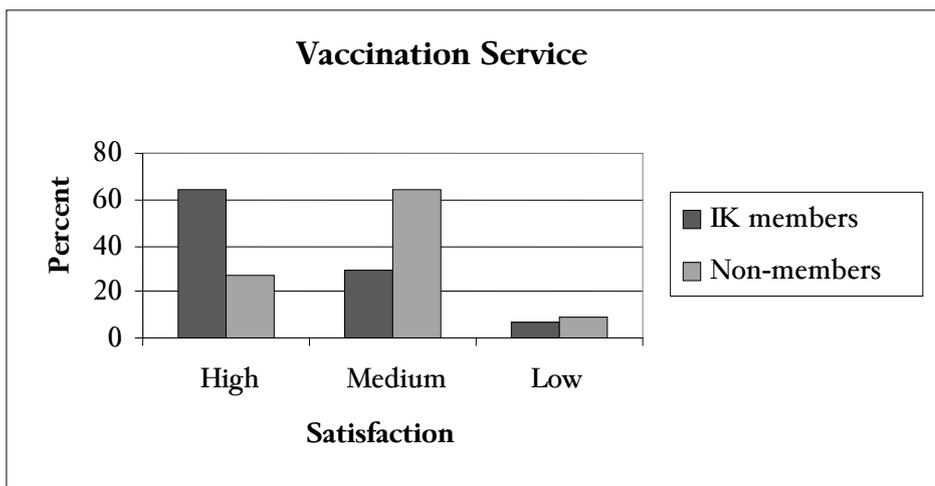


Figure 3 above also shows the same pattern as the previous figure. The majority of IK members (above 60%) express a high level of satisfaction with the free vaccination services provided by the IK staff. The fact that IK Village Veterinary Assistants (VVAs) are self-employed, with income coming from commissions on delivery of veterinary and vaccination services, partly explains the better quality of services delivered and higher farmer satisfaction levels.

Compared to this, an almost equal proportion (above 60%) of non-members express only medium level of satisfaction with services obtained from non-IK sources, and only 25% or so expressed high satisfaction with service delivery. It may be pointed out that fewer numbers of vaccinations for herds of non-members (see Table-13) may be explained by the difficulty they face in obtaining quality, hassle-free, services.

### **VIII. What Works and What Doesn't**

*Idara-e-Kissan* is a vertically integrated dairy cooperative. Unlike traditional cooperatives that own dairy farms, IK collects milk from thousands of geographically dispersed farmers, who are also its members. The cooperative delivers a package of veterinary and livestock extension services that are financed by profits from commercial operations. The milk procured from members is priced on the basis of fat content. Members tend to obtain better prices for milk compared to those offered by the traditional *dhodhi*.

The returns of IK members are 28.5% better than those obtained by non-members, who follow a low-input/low-productivity strategy. Apart from the approximately 13% higher price received for milk, this gap is also due to 25% higher productivity on IK members' dairy farms.

To support productivity, IK provides members with a range of services that include vaccinations, subsidized animal health treatments with partial or full reimbursement of medication costs, feed supplements and mineral mix and balanced feed rations. Members also get access to livestock extension. IK procures quality fodder seed from seed producing farms in the private sector for its members and sets up demonstration plots.

A greater proportion of IK members are covered by animal health treatment services and have more herd vaccinations as compared to non-members. Moreover, members' satisfaction with these services is higher compared to satisfaction levels reported by non-members from services provided by government agencies and the private sector.

On the other hand, some limitations of the approach were also noted from the analysis of data and discussions with farmers in the field.

First, although farmers used cottonseed cake, it was privately supplied by VMC and there is no guarantee if it was the same high quality cake that IK procures for its members.

Second, no IK member reported using *vanda* – a balanced feed ration, which IK produces at its feed production facility at Chuchak. It seems that farmers try to concentrate on milk fat-enhancing cottonseed cake instead of using more balanced ration *vanda* ration because the IK pricing policy is based on milk fat content whereas the benefits of including *vanda* in the feed in terms of improved animal health and productivity are less immediate. Also cotton seed cake is a more traditional ingredient of animal feed than *vanda* and, therefore, some resistance to changing traditional practices may also be involved.

Third, no IK member reported using improved fodder seed supplied by IK. Moreover, no members planted any non-traditional fodders such as motgrass or *sadabahar*.

Fourth, artificial insemination was used by a greater percentage of IK members compared to the control group. But the majority of farmers still used natural services from the bulls available in the village. Unless concerted breed improvement efforts are made, milk yields from non-descript breeds available to the farmers is likely to remain low.

Fifth, IK extension service effectiveness is limited as indicated by the failure of farmers to adopt balanced feed rations and non-traditional fodder varieties. But another area of weakness is herd management. While vaccination helped control some diseases, other diseases that depend on better herd management, such as mastitis, are still common. Farmers do not adopt hygienic practices required to control such diseases, again indicating less than fully effective extension.

## IX. Conclusion

The *Idara-e-Kissan* case underscores the scope for enhanced productivity and income growth in the dairy sector through the formation of a vertically integrated cooperative. However, unlike the typical cooperative that takes profits and distributes them back to members, the IK operates as a non-profit organization that uses profits to finance member services. This has increased the productivity and incomes of the members when compared to non-members.

The most successful services have been animal health treatment, vaccination and to a somewhat lesser extent, livestock extension. Improved productivity of IK member farmers is greatly driven by higher use levels of feed concentrates. Evidence of success has been less definitive in the areas of breed improvement, including artificial insemination, and enhancing fodder productivity.

A useful way to characterize the successes and the remaining challenges is the public-private good paradigm. The successes have been in areas where, on the one hand, the benefits were private and could be captured by the individual participating farmers or were largely restricted to IK membership with only small spillovers. On the other hand, the costs of these services were relatively smaller and highly divisible. Benefits of animal health treatment and livestock extension are clearly highly excludable for non-members. Vaccination has spillover benefits beyond IK membership because a significant increase in the proportion of vaccinated animals may limit the incidence of some diseases in the entire livestock population. But, arguably, the spillovers are small because IK operations cover a small proportion of the entire livestock population.

By comparison where the benefits were truly public – breed improvement or development of improved fodder varieties – results were less spectacular. These are also areas where large, lumpy investments are required and project gestation periods are also long. These results are hardly surprising given what is already known from the public goods' literature. A farmers' cooperative may overcome some transaction costs and enhance productivity and members' incomes, it cannot escape the classic under-provision incentives for public goods. This is especially true where the public goods in question require very substantial investments in the production of new knowledge, requisite infrastructure, laboratory facilities, and scientific personnel.

In view of this, the government has two strategies. It could actively pursue the up-scaling of the IK model. This approach would bring limited benefits but would largely amount to doing what the private sector could do reasonably well even on its own. Alternatively, there could be a division of labor between the government and the private sector and cooperatives whereby the government invests in public goods such as the creation of new scientific knowledge and products in areas of livestock breed improvement and fodder variety development as well as dissemination, while the private sector concentrates on overcoming transaction costs, provision of short-term credit to members, expanding membership, and creating a product range to penetrate high end segments of markets so as to increase profits and the members' benefits. The latter approach capitalizes on the comparative advantages of the public and private sectors and is likely to achieve better results.

An important observation during the case study was the use of milk as collateral for short-term credit. But this form of credit is usually extended by the traditional *dhodis* who typically offer a low price for milk.

It was noted that village milk collectors of IK also provided some short-term credit, although outside the framework of the IK agreement with farmers. This suggests that there may be the possibility of developing micro credit products aimed at small dairy farmers.

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