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REPORTS

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Contents

Acronyms

AE	agricultural enterprise
AI	artificial insemination
FAO TCIN	Investment Centre Division, Near East, North Africa, Europe, Central & South Asia Service
GDP	gross domestic product
HACCP	Hazard Analysis and Critical Control Point
HH	household farm
ISO	International Organization for Standardization
KAZMEMST	Committee for Technical Regulation and Metrology
MDF	modern dairy farm
MOK	Mal Onimderi Korporaziasi
MPE	milk processing enterprise
NGO	non-governmental organization
OIE	World Organisation for Animal Health
PF	peasant/small- and medium-scale farm
SPK	rural credit cooperative
TB	tuberculosis
UHT	ultra-heat treated
VAT	value-added tax
WHO	World Health Organization
WME	whole-milk equivalent
WTO	World Trade Organization

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Preface

Over the last five decades the global dairy sector has seen substantive changes with major intensification, scaling-up and efficiency of production driven by demand from a growing human population and disposal incomes. This growth was achievable through the developments in animal breeding, nutrition, feed efficiency, animal health, housing and automation and supporting policies, strategies and organizations. Such changes are not however reflected across the whole dairy sector and while some developing countries have seen a major expansion in small-scale milk production, small-scale dairying in other countries has largely stagnated.

Dairying contributes positively to human wellbeing in a variety of different ways: nutrition through quality food products, income and employment, organic fertilizer as well as assets and savings. There are however negative aspects associated with dairying including its contribution to Green House Gases, pollution and waste disposal, food safety and human health, use of grains for feed, animal welfare and erosion of biodiversity. In order to inform the public and to make rational policy and investment decisions related to the dairy sector, it is essential to fully understand these complex interactions and their consequences.

This paper provides a review of these issues for the dairy sector of Kazakhstan. It is a follow-up to and utilizes information and findings from a dairy subsector study prepared by the FAO Investment Centre. We hope this paper will provide accurate and useful information to its readers and any feedback is welcome by the author and the Livestock Production Systems Branch (AGAS)[1] or to the Rural Infrastructure and Agro-Industries Division (AGS)[2] of the Food and Agriculture Organization of the United Nations (FAO).

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Executive summary

Cattle production in Kazakhstan has passed through a number of stages. It was principally nomadic until the arrival of Russian settlers, who brought increasing restrictions on movement and the loss of key grazing areas. Shortly after becoming a Soviet Republic, Kazakhstan experienced the forced nationalization of livestock and it was acknowledged that some form of migration had to be re-established, which led to a system of summer and winter pastures with supplementary feeding. Since the break-up of the Soviet Union, most large-scale dairy farms have been disbanded and their livestock distributed among the former *kolkhoz* members, resulting in a situation in which 90 percent of all milk and 85 percent of all beef in Kazakhstan come from small household farms (Chapter 2).

The Kazakhstan dairy sector is divided into three main classes: household dairy farmers using communal pastures; peasant/small- and medium-scale dairy farmers holding land rights; and agricultural enterprises, usually continuations of the old *kolkhozes*. Modern dairy farms (MDFs) are a new phenomenon; these are usually turnkey projects that include dairy plants and use of imported cattle, installations and equipment. Household farms produce 90 percent of the domestic milk production, peasant/small- and medium-scale farms 6 percent, and agricultural enterprises 4 percent. The national dairy development plan pays particular attention to the latter two categories. A range of traditional dairy products are made from camel and horse milk, for which there would be a good market if the value chains were developed and better supported (Chapter 3)

Only 30 percent of all the milk produced in Kazakhstan is processed in factories. Home processing with sales to neighbours and relatives and at markets still accounts for an important part of dairy processing. The dairy industry operates at a low percentage of its capacity owing to the scarcity of raw milk and the high fluctuations in milk availability throughout the year. Milk powder is used extensively to compensate for the relatively high farm-gate price and handling charges for fresh milk, and to reduce the difference between summer and winter milk supply. There is a growing tendency for people to buy dairy products at supermarkets, where ultra-heat-treated (UHT) milk is the product of choice, as pasteurized milk has a limited shelf-life – especially in summer – owing to quality problems. There are large differences in milk prices among different parts of the country and throughout the year (Chapter 4)

The current system of pasture use is based on long-term leases, some of which are issued to people without livestock, who sublease to others. Household farmers with few animals do not hold leases, and depend on communal pastures and communal herding. Communal pastures are overused and cannot provide winter feed. There is need to reconsider the current management system for pasture access and use, to give greater priority to ecological considerations rather than financial ones. As well as its productive role, livestock also plays an important one in the livelihood of household farmers, and this should be taken into account when designing dairy sector development strategies (Chapter 5).

In the past, household livestock farmers obtained all livestock services, such as veterinary and insemination services and feed and fodder supplies, from the *kolkhoz*, which was also the point of sale of last resort. With the collapse of the *kolkhozes*, most of these services have disappeared. Some services are returning slowly, but the absence of, for example, good-quality concentrate, haymaking services and the collection and cooling of milk are hindering increases in productivity, production and quality in the household farming sector (Chapter 6).

Kazakhstan's policy-makers need to adjust dairy development plans to make them more region- and sector-specific. The MDFs, where all hopes and money seem to be vested, will not be able to match the current production share of household dairy farmers in the short term. In the Soviet era, production costs were less of a concern than production quantities, and some of the areas still being used are unsuitable for dairying with cattle. Possibilities for developing and improving existing value chains for fermented horse milk (*kumys*) and fermented camel/dromedary milk (*shubat*) should be explored and included in the dairy development plan. The most economic dairy system in Kazakhstan is when milk production is combined with fattening of young cattle on grazing with some supplementary feeding.

Kazakhstan's preparation for accession to the World Trade Organization (WTO) includes efforts to improve the quality and safety of its milk. Before accession, it is at least as important to reduce the cost of milk production and make the dairy processing industry more competitive, so it can compete with the expected increase in imports of dairy products (Chapter 9).

Introduction

The Republic of Kazakhstan is the world's ninth largest country and has one of its fastest growing economies, based largely on oil and gas production and mineral extraction. Per capita gross domestic product (GDP) increased from USD 1 260 in 2000 to USD 6 140 in 2008[1], with agriculture contributing 6.2 percent, services 51.9 percent and industry 41.9 percent[2]. The share of livestock production within agriculture's 6.2 percent of GDP is increasing steadily, and currently stands at 45 percent, of which the dairy sector contributes 38 percent and other livestock sectors 62 percent. With 47 percent of the total population living in rural areas, where many lack access to cropland but can send their livestock to communal pastures, it is clear that livestock plays a major role in the livelihood strategies of the population

Kazakhstan has a continental climate, with hot dry summers and cold to extremely cold winters. Most areas outside the mountainous east, south and north are semi-arid to arid. Of the country's land area, 69 percent is classified as rangeland, consisting of deserts, semi-deserts and steppes. Arable land covers only 11 percent and agricultural production is possible only with irrigation. The water for this comes from neighbouring countries, and is governed by bilateral and regional agreements; there is increasing tension over water-related issues in the region. Irrigated agriculture is mainly in the south; with the north depending on dryland farming and large-scale intensive livestock production. During the Soviet years, wheat production and dairying in central parts of the country depended on high levels of external inputs, and this region is now used for extensive livestock production systems based on natural pastures for grazing and hay production.

The end of the Soviet era brought major changes to the agriculture sector, which is still adjusting. The following chapter explains the effects of these changes on modes of producing, processing and marketing dairy products in Kazakhstan. It also describes Government policies for dairy development, which have recently been gathered into a Dairy Development Master Plan.

This review is a follow-up to and utilizes information and findings from a dairy subsector study prepared by the FAO Investment Centre as part of a series of four subsector studies (FAO TCIN, 2010). This review summarizes the findings from the subsector study and provides additional information on the development of the dairy sector including camels/mares milk production and the agro-ecological, social and institutional environment. The review concludes with the author's views on the way forward for the Kazakhstan dairy sector.

[1] www.worldbank.org.

[2] Statistical Yearbook of Kazakhstan, 2009: www.stat.kz.

Chapter 1
Historic overview of developments in Kazakhstan's dairy sector

THE PERIOD BEFORE ESTABLISHMENT OF THE SOVIET ECONOMIC SYSTEM (1880 - 1930)

Prior to contact with Russia and incorporation into the Soviet Union, the Kazaks were highly mobile pastoralist people who kept mixed herds of sheep, goats, camels, cattle and horses. They migrated annually on journeys of several hundred to several thousand kilometres between summer and winter pastures. Traditionally, horses, sheep and camels were the main sources of milk. Cattle played a minor role in people's livelihoods; the type of cattle kept was named after the Kalmyk people and is thought to have originated in India[3]. This Kalmyk breed has a high number of sweat glands, allowing it to endure high summer temperatures; it grows a long thick coat in winter.

Kalmyk cows probably weighed about 420 to 500 kg and bulls 750 to 850 kg, but it is not clear whether the breed still exists after extensive cross-breeding programmes during the Soviet era. Anecdotal evidence reports that there might be remaining pockets in western Kazakhstan. As there was hardly any crop production while the Kazakhs were nomads, cattle did not provide animal traction, but it is reported that soldiers rode oxen in warfare (Dr Soviet Satygul, personal communication, 2010).

The principal dairy products were different from those of today, but all traditional products are still produced and sold in small quantities. In the past, milk processing focused on preservation – through drying for winter use, when there was no fresh milk, and acidification for summer use, as no cooling facilities were available. Fermented mares' milk *(kumys)* is still produced by shaking the milk in a leather bag and leaving it to ferment. The best kumys contains small lumps of butter. In the past, mares' milk was consumed directly, but now it can be converted into powder, which is a highly sought-after product. Fermented camel milk *(shubat)* also demands high prices.

Sheep and goat milk were traditionally used for the production of butter, ghee and *qurt* (dried curd produced from strained buttermilk). Butter and ghee used to be stored in goat or sheep skins kept in underground holes filled with ice or snow. *Maiskoe maslo*, the first butter of the year with a deep yellow colour due to carotene, still demands a premium price on the markets, but no longer comes in sheep skins. *Qurt* is still widely sold in all towns, usually at cigarette outlets and in markets.

In the nineteenth century, the tsars started to build Russian settlements and fortifications along the Tien Shan and Altai Shan mountain ranges, to defend the empire against incursions from the east. These first Russian settlers were mainly tartars and Cossacks. State administration of provinces and districts was gradually established, and today's Kazakhstan was incorporated into the Russian empire. Herders faced the contraction of their pasturing areas as high-potential grazing areas (e.g., along rivers and in valleys) were converted to cropland and settlements, and restrictions on movement (herders needed permission to move their livestock out of the administrative unit) curtailed their mobility and access to long-distance pastures. The Russian settlers may have brought cattle with them. In border areas, cattle are predominantly brown, red and white, which are described as the prevalent colours of the Kalmyk breed.

The period from 1917 until forced collectivization in 1931 was one of turmoil, with particularly severe winters. Social unrest, famine, civil war and *dzuds*[4] caused massive losses of livestock and reduced mobility further. Many Kazakhstan families had to give up nomadic livestock keeping and turn to crop farming.

THE SOCIALIST ERA (1931 - 1991)

During the first years after the Russian revolution there were few political interventions in the cattle sector of what is now Kazakhstan. In the early 1930s, however, the Soviet government started to implement collectivization policies. Forced collectivization under Stalin met with massive resistance, causing major livestock losses and confiscation. Many

[3] www.kalmykphilly.org/forums/showthread.php?t=152 (accessed 20 October 2010).

[4] Heavy icy rain, which makes it impossible for grazing animals to reach the vegetation under the ice. It is usually associated with large-scale livestock mortality from hunger.

people fled, and Kazakhstan's livestock numbers fell from 7 million horses and camels to 1.6 million and from 22 million sheep to approximately 1.7 million. The resulting famine of 1931 to 1934 caused about 1.5 million human deaths, representing more than 40 percent of the total Kazakhstan population at the time. The Soviet government perceived pastoralism and nomadism as primitive, and sought to replace them with collective livestock keeping based on summer grazing in the steppe and winter feeding in the *kolkhozes.*

At the beginning of the Second World War, with a shortage of labour and fuel and the government in full political and economic control of Kazakhstan's previously pastoral society, migratory grazing was reintroduced. However, instead of being under tribal organization, it was now organized by the State through *kolkhozes*. Winter feeding of animals was replaced by the use of winter pastures with supplementation. Shepherds and their families lived with the herds and flocks in winter housing on the distant pastures (*zimofka*), and were supported by the *kolkhoz* through a system of technical and social services. Winter fodder reserves ensured a supply of feed in case of a *dzudz*. The provision of water, roads, electricity and communication services combined with the Kazakhs' traditional pastoral knowledge to generate a livestock production system that could produce far more than the carrying capacity of the pastureland, by importing and producing supplementary feed and fodder. This system was managed centrally, with the State funding the high costs of livestock feed, fuel, transport, machinery, and housing and services for shepherds and their families. The role of cattle increased at the expense of traditional nomadic species such as Bactrian camels, dromedaries and horses for meat and milk.

After the Second World War, many red cattle (Angler type) were brought from eastern Germany and sent to the Kazakhstan steppe, where Soviet government planners had decided to establish a dairy industry. These hardy animals turned out to perform better in the steppe environment and climate than either the traditional or the "Russian" black and white cattle, and most of the newly established dairy farms operated with what was now called the Red Steppe dual-purpose breed of cattle. Milk was transported to railheads where it was pasteurized and sent on to dairy plants in or near urban centres.

The Soviet government set up a system of livestock improvement, based on breeding farms (*plem-zavodi*), which supplied selected animals for the *kolkhozes*. For genetic improvements, these breeding farms depended on imports of animals, mainly bulls, and semen from Europe and America, as their own populations of registered and production-recorded cattle were not large enough to sustain local selection programmes.

Over time, with the increasing availability of (imported) winter feed, especially in higher-potential areas for milk production, black and white Friesian-type cattle became the best milk producers. The arrival of artificial insemination (AI), soon seen as the best way of improving animal production, opened the way for the "Holsteinization" of the Kazakhstan cattle population.

During the Soviet era, farm workers were allowed a private plot of land and few heads of livestock up to a maximum stipulated by *kolkhoz* rules. Much has been written about the extremely high productivity of privately cultivated land in comparison with communally farmed land, but less about the productivity of privately kept livestock. There was usually a symbiotic relationship between the private and the *kolkhoz* production systems. In many cases, the *kolkhoz* was the only place where its workers could sell their surplus livestock products, often in exchange for fodder, veterinary services and herding with the *kolkhoz* flocks and herds. Workers' salaries could be paid partially in-kind, with forage or animal feed. Individuals had access to genetically improved *kolkhoz* herds, by buying young stock or using AI services (Robinson and Milner Gullard, 2003). This close connection between private and *kolkhoz* livestock makes it difficult to distinguish private from *kolkhoz* livestock production, but it seems that a considerable share of overall *kolkhoz* livestock production came from privately owned animals, which were often more productive per head because they received more individual care and attention (Waedekin, 1973).

THE POST-SOCIALIST ERA (1991 – PRESENT)

After the demise of the Soviet Union, the heavily indebted *kolkhozes* were dismantled and their former members/workers were all given shares of the holdings, including livestock. Some *kolkhozes*, or parts of them, were privatized, and individuals or companies continued to keep their larger-scale dairy production going. This often led to conflicts over land and pastures between the new small-scale livestock farmers and these dairy entrepreneurs. The new farmers lacked organization and connections to government structures and usually lost the conflict.

After this redistribution of former *kolkhoz* livestock, people who had never had anything to do with livestock keeping – other than being, for example, a truck driver, bookkeeper, administrator or teacher at a livestock *kolkhoz* – suddenly had to make their living from livestock. The symbiosis between the *kolkhoz* and private producers, which had given private producers access to livestock services and markets for their surplus production, no longer existed. People

had to develop their own strategies for keeping livestock, including by establishing communal herding in which farmers take turns to herd the animals. In some instances, herders are contracted to tend farmers' young stock on distant pastures (*jailyau*), but the increasing practice of issuing long-term leases for pasture use to people not resident in the area has complicated this system.

With the collapse and dismantling of *kolkhozes*, household livestock owners lost access to haymaking, feed manufacturing, marketing, animal breeding and veterinary services. One of the major bottlenecks for the millions of usually landless livestock keepers in Kazakhstan is that no viable alternative support services have emerged.

THE GOVERNMENT'S DAIRY DEVELOPMENT MASTER PLAN

In 2009, the Government of Kazakhstan commissioned a number of studies to guide the formulation of master plans for the development of the dairy and beef sectors. The Ministry of Agriculture has prepared a master plan for the development of milk production and processing (Ministry of Agriculture, 2009) and a final report of its review of the general status of livestock breeding in the country (Tamarovsky, 2009); KazAgroMarketing has prepared the first draft of a master plan for the meat sector, with strategy recommendations (KazAgroMarketing, 2009). In 2006, a mission from Argentina's National Institute of Agricultural Technology collaborated with the Investment Fund for Kazakhstan in the areas of beef, milk, sheep, cereals and oilseed production. All of these plans are geared towards capital-intensive, large-scale mechanized production systems and give little attention to the realities of a large part of Kazakhstan's rural population, who make a living from small numbers of cattle.

Although the Dairy Development Master Plan acknowledges household dairy farms' large contribution to overall production (90 percent of the total), it uses its subsidy instruments to support the construction and operation of modern dairy farms (MDFs), each with 500 to 2 000 head of dairy cattle, which are imported and usually of the Holstein breed. MDFs receive subsidies for imported dairy animals, loan interest rates, milk prices[5] and AI services, to allow them to survive in spite of milk production costs that are more than twice than those in the household dairy sector.

BOX 1

A farmer from Shetsky calculates the benefits from a cow

"Besides a calf and milk, our cows also give fuel. If you have six or seven cows, you do not need to buy coal. A family needs 10 tonnes of coal for the whole winter, at 4 000 tenge (KZT) per tonne. So, just add up what a cow gives per year:

Fuel: KZT 6 000 to 7 000;
Milk: 2 000 litres at KZT 25/litre = KZT 50 000;
A calf: averaging KZT 15 000;
A total of KZT 72 000!"

ROLE OF THE DAIRY SECTOR FOR THE RURAL POPULATION

Agriculture serves three important purposes: social, environmental and economic. For more than 40 percent of the population and almost all the people in rural areas, agriculture – especially livestock production – is the basis of their livelihood. Cattle provide many rural families with dairy products and, through the sale of surplus milk, cash for purchasing other necessities. The sale of a few calves each year gives rural families the necessary cash for larger purchases (Box 1).

Without livestock, most rural people would be extremely vulnerable. If rural people cannot make a basic living from agriculture they migrate to cities, increasing the pressure on resources and services there. Agriculture must be made sustainable and must avoid damaging or depleting the environment. Currently, the government's strategic plan for agriculture focuses on the three strategic sub-directions of competitiveness, food security and accession to the World Trade Organization (WTO), but does not specify how government support will strengthen agriculture's social and environmental roles for household farmers and rural people in general. Large-scale livestock production models from the West have come at a high cost to the environment and animal welfare, and should be carefully planned and adapted before they are applied in Kazakhstan.

[5] For example, MDFs received a subsidy of KZT 40/litre (USD 0.26) until 2011, when the system switched to granting a subsidy of KZT 8 000/head per month (USD 53).

Chapter 2
Predominant milk production systems

The dairy farming sector in Kazakhstan can be divided into three sectors:

- the household farming sector, holding more than 85 percent of the cattle inventory and accounting for more than 85 percent of meat and 90 percent of milk production in the country;
- the peasant/small- and medium-scale farming sector, holding approximately 10 percent of the cattle inventory;
- the enterprise farming sector, holding the remaining 5 percent of the cattle inventory.

As in most other countries, it is extremely difficult to find reliable information on the exact numbers of livestock in Kazakhstan. People are concerned that the information they provide could be used for taxation purposes. Blanket free vaccination campaigns are often a good way of obtaining reliable estimates, but these do not occur in Kazakhstan. Another option would be a compulsory identification and registration system, in which all farms and households are inspected to check that all animals are identified. Kazakhstan has not managed to achieve this, in spite of three attempts.

THE HOUSEHOLD DAIRY SECTOR

Officially, this category consists of 2 232 000 household farms, of which 1 560 000 own an average of 3.4 head of cattle each. These farms are located within the boundaries of rural villagers and differ in size and number of animals. They usually have a full range of animals (cattle, sheep, goats, horses, pigs for non-Muslims, and poultry) and depend on communal grazing with rotational herding duties or a paid herder and purchased feed and fodder for feeding their cattle in winter. Horses and sheep are usually wintered in the open. These farms depend on people in the village who inherited the machinery for making hay and/or baling straw, which they sell. Winter feed is usually limited to straw and low-quality hay, supplemented by wheat bran, grain or occasionally oilseed cake. These farms are not officially registered, do not pay taxes and are not eligible for State subsidies. Their livestock inventory is estimated at roughly 85 percent of all the cattle in Kazakhstan, 70 percent of the small ruminants and 72 percent of the horses (Kazakhstan Statistical Agency). The picture in the camel/dromedary sector is less clear, but there is evidence that a declining number of these animals are owned by households, with a few large-scale dromedary/camel farms starting near Almaty[6].

In terms of size and production levels, some of this category of farms is comparable to those in the next category, but they prefer not to register, probably to avoid paying taxes and possible government interference. It is clear that a classification based on number of livestock units would give a better picture of farm size than the current method.

Milk produced in the household sector is often reported as being exclusively for home consumption, but part of it is sold through informal channels to relatives, friends and long-term clients in cities. From discussions and observations in rural settlements, it seems that the milk production of up to four cows is kept for home consumption and processing, if the household is not in need of immediate cash. Dairy processing is still an important activity for the rural population and provides products for sale to relations, neighbours and friends. People separate cream and make butter and ghee, stored in either glass jars or (now rarely) animal skins. Cottage cheese (*tvorog)* is also made; when no market is available, it is drained and dried in the sun to make *qurt*, which – along with dried buttermilk, butter and ghee – is the product of choice in areas that are distant from markets for fresh dairy products or milk collection. *Tvorog* is still widely consumed as a snack, and is sold at stalls and shops throughout the country, but there are no statistics on the amounts produced and consumed each year.

If more milk is produced than the household can process and/or market, it is sold to intermediaries and traders, for delivery to dairy plants. For many, especially older, people with no income other than a meagre pension, daily sales of milk provide the cash flow with which they buy bread, so dairy plants that pay cash the day after the milk is collected tend to capture the milk from this producer group.

From national statistics, it is not clear how extensively sheep are milked in Kazakhstan, but the practice has probably declined since the introduction of cattle breeds for milk production and sheep breeds for wool production; today's sheep breeds have lower milk production potential than the traditional breeds.

[6] www.youtube.com/watch?v=fje2ygfjvvo

This category of milk producers has no organized representation at either the regional or the national level. However, national non-governmental organizations (NGOs) have sometimes developed programmes to assist this sector with training, access to microfinance, the development of milk collection centres, etc.

THE PEASANT/SMALL- AND MEDIUM-SCALE DAIRY SECTOR

There are 169 481 registered peasant farms. This category consists mainly of former *kolkhoz* members, often directors and other leaders, who managed to secure winter or other sheds in pasturelands and tractors and equipment when *kolkhoz* assets were privatized and redistributed. Only 16 200 of these are farmers registered as owning cattle, of whom 1 600 own more than 50 percent of the total animals held in this category and have farms of more than 200 head of cattle each. It is not known how many of these are dairy farmers and how many keep beef animals or suckler cows. Their livestock inventory shows the highest growth rate over the last five years, at 10 percent according to statistics. Their share in the livestock inventory is 10 percent of cattle, 25 percent of small ruminants (mainly sheep) and a negligible percentage of horses. They usually own land and produce winter feed for their own use and sale to household farms. This category of farmers sometimes benefits from subsidies for fuel, fertilizers and seeds through development programmes managed by the local government.

Of the 70 000 peasant/small- and medium-scale farmers registered as being currently active, 40 000 are members of the National Farmers' Association based in Astana. This means that less than 25 percent of the nearly 170 000 farmers in this category are organized.

THE LARGE-/INDUSTRIAL-SCALE DAIRY SECTOR

Of 5 170 registered enterprise farms, only 841 are registered as having livestock, with 452 holding more than 95 percent of all the livestock in this sector. These are large-scale dairy farming enterprises, operating as corporate farms or cooperatives in an adapted continuation of the Soviet system. For example, most long-established dairy plants still own one or more large-scale dairy farms, as large dairy *kolkhozes* developed their own dairy plants to process their own produce. These large-scale dairy farms are in the same areas as the smaller farms owned by former *kolkhoz* members, and the former synergy that existed has sometimes been replaced by competition for resources between the two categories.

Another class in this sector are the independent landholders and companies with 49-year leases or outright ownership of pasture/rangeland. These usually lease the rangeland for grazing or hunting, but do not engage in dairying themselves. A number of State farms have remained, as pedigree breeding farms or research institutes.

The large-scale farming sector accounts for 5 percent of large ruminants, 5 percent of small ruminants and 6 percent of horses. This category of farms receives the largest share of the government's production and investment subsidies for development of the dairy sector, although they manage only a small proportion of the country's overall dairy herd. The MDFs receive a subsidy for AI, but have to use locally produced semen, which is often from untested bulls.

INTERPRETATION OF THE DATA

There are biases in livestock statistics. When central government links subsidies to individual livestock owners or allocates budget for local governments' agricultural programmes on the basis of livestock numbers, there are incentives for exaggerating the number of animals; on the other hand, when farmers are being asked to pay, such as for veterinary services or tax, there is a tendency to underreport. These factors, combined with the logistical difficulty of checking animal numbers on 2 232 000 household farms where some animals spend part of the year in collective herds or flocks, make it likely that the percentage of animals in the hands of medium-scale and enterprise farms is an overestimation, while the percentage on small-scale household farms is almost certainly an underestimation.

POTENTIAL FOR REGIONALLY SPECIFIC DAIRY PRODUCTS

People still consume traditional Kazakh dairy products when they are available. The supply is usually seasonal and prices are high. *Kumys* and *shubat* are the main liquid and *qurt* the main dry traditional products. There are no reliable statistics for *shubat, kumys* and *qurt*, as large parts are sold through informal channels.

Kumys: This fermented mares' milk is a sour and slightly alcoholic product. Milking horses is time-consuming and needs to be done five or six times per day with the foal at foot. As mares' milk is highly perishable, it needs rapid processing, which is usually done at home. There are collection schemes and processing plants of different sizes in the country, often linked to large enterprises keeping horses. These have developed markets for *kumys* and report no problems with marketing, especially when they store their products for sale in the winter. *Kumys* is highly sought-after and produced mainly in spring, when horses foal. The price per litre ex-farm is about 500 percent of the price for cow

BOX 2
Views from a *Kumys* producer in Karaganda

"It is more profitable to process horse than cow milk. I have helped some farmers to have more than 70 mares each so that they are eligible for a subsidy of KZT 100/litre. I pay them KZT 70/litre. To others with fewer than 70 mares, I pay KZT 100/litre. We buy for only four months per year, and bottle the *kumys*. I sell it for KZT 250/litre to a dairy that takes care of the distribution. I believe that the dairy sells it for KZT 280/litre to shops, and they sell it for KZT 320 to 500/litre, depending on the time of year. In the Russian Federation, we can get KZT 500/litre any time, but the local market is big enough. We also get a subsidy if our processing volume is big enough. That is why I placed my mares with farmers so that they are eligible for a subsidy. I pay them a lower price per litre, because I organized these additional horses for them, and my plant gets a government subsidy because I now process more than the minimum amount to be eligible for this processors' subsidy."

milk. It is sold from home, from roadside stalls or, after bottling in factories, through supermarket chains. In 2010, the producer price for mares' milk sold to a processor was between KZT 100 and 150/litre[7], and sales prices in shops and supermarkets were between KZT 350 and 450/litre. *Kumys* sold at the roadside costs KZT 200 to 250/litre, so farms that are close to a road and have the labour to prepare and sell *kumys* do not sell to factories (Box 2).

There is demand on the world market for horse milk powder, which is used in cosmetics and pharmaceuticals[8]. In central Kazakhstan, where people inherited cattle from the *kolkhozes*, there seems to be a gradual process of replacing part of the cattle population with horses for meat and, if marketing conditions are favourable, milk and *kumys* production. Although horses cost almost twice as much as cattle, they require far less care during the winter, and horse milk and meat demand higher prices than cattle milk and meat.

Shubat: This is fermented camel/dromedary milk. Kazakhstan has dromedaries in the west and Bactrian camels in the north and east. Milk production is between 1 500 and 2 000 litres per lactation for dromedaries, and less for Bactrian camels. Camel keeping in smallholding settings is diminishing, while a few large-scale companies are building up large herds and have captured the Almaty market for *shubat*, which costs about KZT 500/litre in supermarkets. Although there is a profitable market for *shubat*, it is difficult for smallholder camel farmers, who usually live in remote arid areas far from urban centres, to feed into the formal value chain for *shubat*.

There is potential for exports of camel milk and meat to the Arab world, but major work would be required to develop the necessary value chains, which are currently absent.

PHOTO: VAN ENGELEN

Photo 1
Dromedaries on a camel milk farm

[7] While cow milk cost KZT 25 to 30/litre in the same area.

[8] A horse milk plant in Karaganda has a contract for supplying horse milk powder to Germany at € 200/kg, which at 10 litres of milk per kilogram of powder generates an even higher price per litre.

Chapter 3
Analysis of the dairy value chains

Dairy value chains in Kazakhstan can be categorized according to:

- the length of the chain in terms of number of stakeholders;
- the animal species from which the milk is derived;
- the type of enterprise where the milk is produced and processed.

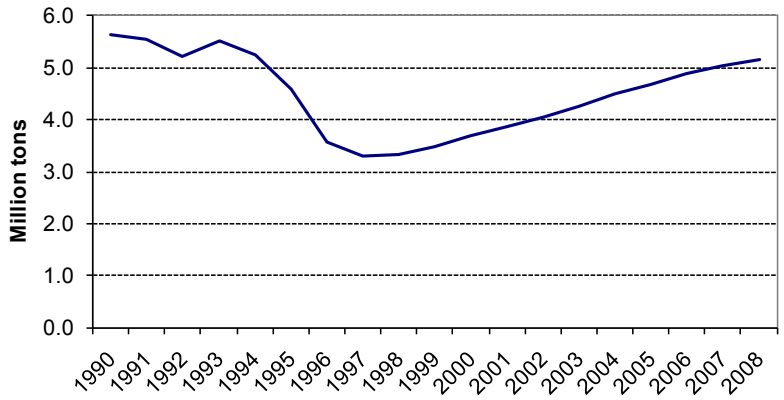
There are three main types of dairy processing system:

- home processing for home consumption and sale in the vicinity and to traders;
- localized dairy plants, sourcing milk from the surrounding area and selling dairy products in nearby villages;
- larger dairy plants, often with processing plants at more than one location, sourcing milk from a large area, making extensive use of milk powder, and transporting milk and a large range of dairy products from one area to another.

MILK PRODUCTION

Milk production in Kazakhstan declined sharply in the 1990s, and by 1997 was reported to be only 42 percent of its 1990 level. Part of this decline was a real decline in production, but part was the result of the difficulties with collecting reliable statistic after the *kolkhozes* collapsed and milk production dispersed to many more sites, both formal and informal. For the 11 years from 1997 to 2008, the volume of milk production increased by an annual average of 4.5 percent, almost returning to its 1990 level (of 5.6 million tonnes) in 2008. More of this growth is related to increases in the cattle population (which increased from 2.3 million in 2004 to 2.7 million in 2008, according to data from the Kazakhstan Statistics Agency) than to increased productivity. In 2008, national milk production was 5.2 million tonnes (Figure 1).

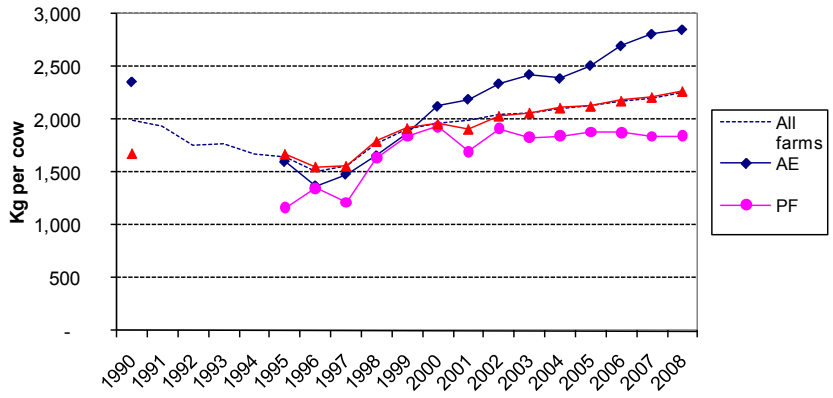
FIGURE 1
Milk production, 1990 to 2008



Source: Statistics Agency of the Republic of Kazakhstan.

Milk yield per cow also increased over the same period, by an average of 1.8 percent per year. In 2008, it exceeded its 1990 level (of 1 988 kg) to reach 2 253 kg (Figure 2).

FIGURE 2
Milk yields, by farm category, 1990 to 2008

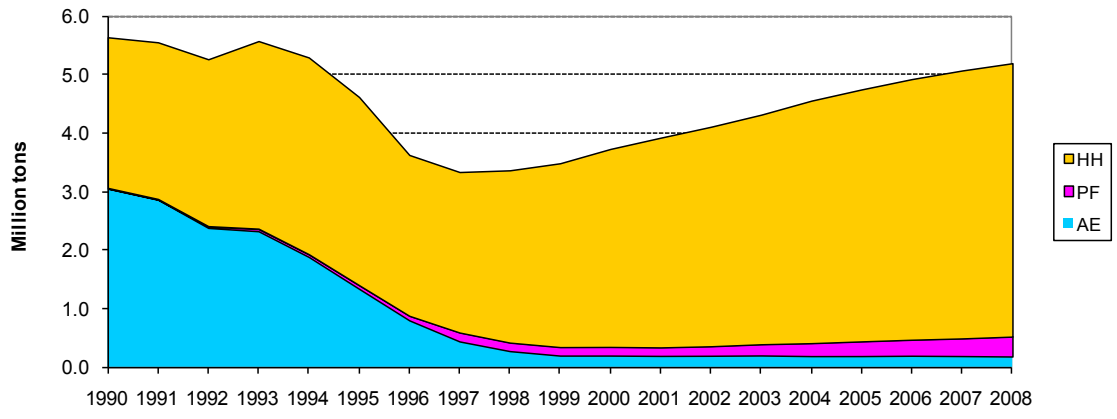


Source: Statistics Agency of the Republic of Kazakhstan.

The milk yield per cow in agricultural enterprises (AEs) was 25 percent higher than the national average, while that in peasant/small- and medium-scale farms (PFs) was 18 percent lower. However, it is worth noting that the animals on AEs, which are assumed to have better management and genetics (through AI), still produce only about 30 percent more than the animals in household farms (HHs), which do not practise genetic selection programmes and balanced winter feeding.

In 2008, HHs accounted for 90 percent of national fresh milk production (4.7 million tonnes). The remainder was produced by PFs (6.7 percent, or 0.35 million tonnes) and AEs (3.3 percent, or 0.17 million tonnes) (Figure 3).

FIGURE 3
Milk production, by farm category, 1990 to 2008



Source: Statistics Agency of the Republic of Kazakhstan.

Table 1 gives an overview of the amounts of milk produced in the various dairy sectors and estimates for how the milk is used.

TABLE 1
Milk and dairy product resources and their uses, 2008

	Whole milk equivalent (WME) *('000 tonnes)*	% of total
Milk and dairy product resources		
Total domestic whole milk production	5 198.0	71.5
Household farms	4 680.0	64.3*
Peasant/small- and medium-scale farms	347.9	4.8
Agricultural enterprises	170.1	2.3
Stocks at beginning of year	1 216.0	16.7
Imports	860.0	11.8
Total resources	**7 274.0**	**100**
Uses		
Livestock feed	644.2	8.9
Wastage	36.4	0.5
Other industrial uses	0.7	0
Exports	23.0	0.3
Total consumption	4 806.9	66.0
Domestic packaged milk and dairy products	1 420.0	19.5
Imported packaged milk and dairy products	860.0	11.8
Unpackaged milk and dairy products	2 526.9	34.7
Stocks at end of year	1 763.0	24.2
Total used	**7 274.2**	**100.0**

* Household farms account for 90 percent of domestic production.

Source: Statistics Agency of the Republic of Kazakhstan.

Table 1 shows that household farms are the main milk producers in Kazakhstan, but little is known about their milk processing and sales mechanisms. There is a considerable market for imported dairy products, which is being exploited by investors who have equity in local dairy companies or have bought them outright.

HOME CONSUMPTION AND PROCESSING

The shortest dairy value chain is that for home consumption and sale to neighbours in the village. All rural people with cattle produce milk and beef for own consumption and some sales. Home dairy processing seems to occur on household farms with up to four cows and/or producing about 100 litres. Above these amounts, households face logistics problems in processing and marketing dairy products, and sell their surplus liquid milk to an intermediary or directly to a factory with a collection scheme. There is great seasonal fluctuation, and milk collection often stops in the winter because it is not profitable for the dairy company; this means that farmers have to process and market their entire milk production. However, winter milk production in the household sector is extremely low owing to seasonal breeding and poor winter feeding.

The 41 percent of the Kazakhstan population living in rural areas obtains milk from its own or neighbours' cows. People usually boil the milk, separate the cream and process it into butter, cream and *tvorog* (cottage cheese), which is dried into *qurt* (dried butter milk) when there is too much to consume or sell as *tvorog*.

In the first 15 years after independence, farmers living nearby often went into urban areas to sell dairy products from the backs of their cars. This posed a serious risk for people's health and has since been banned.

BOX 3
Practises of a milk collector

Nurzhan is a milk collector, selling milk to the Ak Zhan dairy plant, not far from Pavlodar. In 2010, the winter milk price was KZT 40/litre, and the summer price about KZT 20/litre. Nurzhan uses a Lactan milk tester and offers a premium based on the milk's butterfat content. When this is less than 3.2 percent, he pays only 80 percent of the full price. The difference between what he pays for villagers' milk and what he gets from the factory is about KZT 10/litre. He has to operate a cooling tank and a collection and transport system. He knows about Agro Kredit Korporatia, but is worried by the interest rate, so prefers to work with his own capital.

PHOTO: VAN ENGELEN

A slightly longer value chain runs from home processors converting their milk production into dairy products for sale to a circle of steady clients, usually family and friends in nearby towns. This production system is highly seasonal and runs from February/March to September/October. There might also be some sales of stored butter and qurt during the winter months, to maintain cash flow. This category of household farms transports the milk over longer distances than those selling within their own village.

A relatively small group of small- to medium-scale dairy farms process their milk production and sell it daily at "green bazaars" in larger cities, where meat, fruit, vegetables and dairy products are sold. The need to produce sufficient milk for their customers every day forces this group of dairy farmers to feed their animals properly and spread calving throughout the year, to ensure steady milk production. In general, these dairy farmers invest more in their cattle and have higher management and production levels than the home consumption and home processing categories. Both categories are more likely to keep calves for meat production, to increase their returns on labour, while more specialized dairy farmers tend to sell the calves they do not need for herd replacement, use milk for processing and selling, feed their cows, and organize their production schedules to maximize milk production, processing and sales. Milk replacer for calves is becoming more common in this sector, but its availability is still erratic.

DAIRY PROCESSORS

Nearly all the milk processing enterprises in Kazakhstan were established from former Soviet enterprises, but new small units are starting to emerge. Most milk processors have outdated equipment. The regional distribution of dairy plants is generally consistent with the location of suppliers and the availability of fresh milk: almost 75 percent of all processing facilities are in northern, eastern and southern regions of Kazakhstan.

Most village dairy plants are based on the privatized dairy processing facilities of former *kolkhozes*, which can handle up to 20 000 litres per day. They usually have a fleet of small tankers to collect the milk, and they work through a network of intermediaries in the villages, who purchase the milk (Box 3). Most of these dairies do not have wide distribution networks, and local shop owners may even collect what they think they can sell directly from the factory. The product range is limited and packaging is usually basic (plastic bags, simple cups with lids). A very few processors in this category have leased Tetra Pak equipment. Most village dairy plants lack investment funds, and face competition from larger plants, particularly in sourcing raw milk. Their number is dwindling; while some focus on specialized and traditional products, such as *kumys* and *qurt*, which are hard to produce in larger-scale dairy factories, others are closing down. For example, of the 11 dairy plants in the Karaganda Milk Producers' Association in 2003, only five remained in 2010.

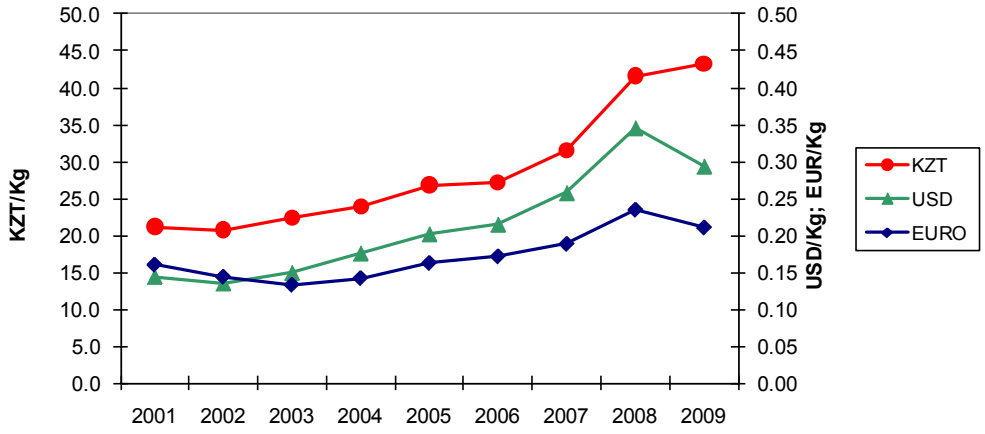
In addition, 14 larger-scale dairy companies operate in ten cities. These account for most of the 35 percent of total milk production that is processed in dairy plants (Annex 2). Almost all of them are either subsidiaries or partners of an international company. They have a much wider product range than the home processors and smaller local dairy plants. Many market the high-value, high-profit-margin products of their international partners' "home plants" in the Russian Federation or Europe, using the products' international names in their own local distribution networks. Most supermarkets sell the milk on a commission basis, and expect the dairy plant to send one of its own workers to pack the products in coolers, monitor expiry dates and keep displays organized and clean.

There are large regional differences in milk availability and demand, leading to high farm-gate prices in the far west and Almaty region and lower prices in the steppe and eastern parts of the country. Large dairy plants source some milk from distant areas, entering into direct competition with the smaller local dairy plants and their intermediaries. If the large dairy company has several plants, lower-value products will be produced in areas with lower milk prices, and transported to the larger urban centres. When supplies of fresh milk are scarce, dairy plants are likely to purchase milk that their competitors have refused for quality reasons. The absence of agreed minimum quality standards or bonuses/penalties based on the chemical, physical and bacteriological quality of milk results in dairies having to operate with generally poor-quality milk. Most large-scale dairy processors have to rely on high percentages of recombined milk to satisfy their markets, especially in winter. Although a regulation stipulates that no more than 50 percent of any dairy product can be made from recombined milk, there is anecdotal evidence that the actual percentage is often much higher.

MARGINS IN THE VARIOUS SEGMENTS OF THE DAIRY SECTOR

The average farm-gate price for fresh milk increased steadily from 2002 to 2006, by an average of 7 percent per year. Growth was even higher in 2007 and 2008, at 16.5 and 31.7 percent, to reach KZT 31.6 and KZT 41.6/litre, respectively (Statistics Agency of the Republic of Kazakhstan). This occurred when the prices of full fat and skimmed milk powder reached high levels on the world market. In 2009, when world market prices for milk powder declined, the growth in milk price was only 4.2 percent, to reach KZT 43.3/litre (Figure 4). These prices are very rough averages over time and over large geographical areas: prices can vary by a factor of 2 between winter and summer, and by a factor of 3 to 4 among different areas.

FIGURE 4
Farm-gate prices of fresh milk, 2001 to 2009



Source: Statistics Agency of the Republic of Kazakhstan.

Milk powder is imported in large quantities from Belarus and Ukraine, either informally or from the world market, when the price is right. The use of milk powder has a large effect on the price that dairy plants are prepared to pay farmers for fresh milk. In the steppe, KZT 25/litre seems to be the minimum price that farmers are willing to accept in summer; processors would switch to milk powder if the farm-gate price exceeded KZT45/litre, in any season.

The margins per litre are difficult to calculate, especially when milk powder is being used and a large range of products are produced. Tables 2 to 5 provide some examples.

TABLE 2
Technical and financial results from 100 litres of milk processed at home

Product	Quantity *(kg)*	Price *(KZT/kg)*	Total *(KZT)*	Remarks
Butter (*maiski*)	4	1 000	4 000	Yellow "May" butter is highest-priced
Tvorog (curd)	12	400	4 800	Basis for *qurt*
Whey	84	(10)	(840)	Usually fed to calves or pigs rather than sold
Total	**100**		**8 800**	**Gross milk price: KZT 88/litre**

Source: Interviews with farmers in Karaganda, Akmola and Pavlodar.

Table 2 shows that the per-litre income from processing milk at home is twice the average price paid by factories. Selling on the green market involves additional transport and other costs, but allows farmers to sell fresh cream at KZT 700/litre, in addition to butter and *tvorog* (Table 3).

TABLE 3
Technical and financial results from 100 litres of milk processed by a green market vendor

Product	Quantity *(kg)*	Price *(KZT/kg)*	Total *(KZT)*	Remarks
Fresh cream (20%)	15	700	10 500	No butter sold at green market, owing to competition from industrial butter
Tvorog	12	400	4 800	
Whey	70.5	(10)	(705)	Not usually sold
Total			**15 300**	**Gross milk price: KZT 153/litre**

Source: Interviews at Astana, Karaganda and Almaty green markets.

BOX 4
A woman at Astana market selling dairy products is reporting

"We pay KZT 18 000/month for our table, KZT 270 per day for the veterinary inspection, and KZT 230 per day for *akimat*. We can sell about 100 kg of product per day, and work six days a week. Our daily costs are thus KZT 1 220. With 100 kg of products sold per day, this works out at KZT 12.20/kg of market costs. And then there is the cost of our car, packaging material and our time! It is hard work."

Green markets are operated by contractors, who charge a monthly rent and a daily fee for cleaning and guarding. In addition, stallholders pay a daily tax and a veterinary inspection fee. From discussions with women market vendors, it appears that 200 kg of dairy products is about the maximum that can be sold each day; the average is about 100 kg (Box 4). This corresponds to the production of five to ten cows, with occasional purchases of milk from trusted neighbours. (This could be a violation of the food safety assurance system, as neighbours' cows might not be declared free from brucellosis or tuberculosis [TB], as the vendors' cows are.) The price ceiling for green market products is the price that commercial dairies charge for their own products in supermarkets, so green market vendors' profit has to come from lower processing and handling charges.

Table 4 gives an overview of the costs incurred and the results for the average product range of a large dairy in Almaty.

TABLE 4
Average production costs for a commercial dairy plant

Cost category	Cost *(KZT/litre)*	Remarks
Raw milk	62.9	KZT 47.9 for milk; KZT 15 for transport and collection
Other ingredients	22.1	Sugar, fruit, additives, starch, etc.
Packaging	30.4	
Spares for Tetra Pak machinery	0.5	
Other costs	15	Water, fuel, processing costs
Total costs	130.9	
Industrial result	9.4	Gross Margin

Source: Interview with a dairy technologist at an Almaty dairy plant.

The figures in Table 4 would imply a margin of 7.2 percent/litre over the whole product range, but with wide variations among products. There is little profit – or even a loss – from fermented dairy products, because of the milk price that factories in Almaty pay to intermediaries. However, factories have to produce these products, as much of the milk that reaches them is too unstable to use in other products and they have to offer a full range of dairy goods to their customers. Some companies produce these low-margin products at factories in areas with lower milk purchase prices, so that their factories in both high- and low-cost areas make low, but at least positive, margins per litre.

Margins in the dairy sector depend very much on the direct and indirect subsidies that government allocates to the dairy sector. The government policy for dairy development is guided by the Dairy Development Master Plan, which still focuses on dairy production in large, industrial-scale cattle units. Cost calculations per litre of milk show that milk production currently costs about half as much for the household sector as for larger producers. Table 5 gives examples of the costs and returns for different types of dairy farm. It also illustrates the vast price difference in farm-gate milk prices between the steppe and locations near Almaty (last two columns).

Under its policy of industrializing and modernizing Kazakhstan's agriculture, in recent years the government has increased its use of subsidies in a number of sectors. Although total support to agricultural production remains low by international standards, the country's agricultural policy provides a variety of support programmes for farmers and dairy processors. These include tax holidays, input subsidies, machinery modernization, short-term liquidity support, crop insurance support and transport subsidies, which are subject to reduction under the WTO Agreement on Agriculture. Most of these subsidies are geared towards direct price support, and fall into the WTO "amber box"[9]. Annex 1 provides an overview of the different types of subsidy.

IMPORTS AND EXPORTS OF DAIRY PRODUCTS

It is extremely difficult to assess the amounts of imports and exports, especially because of special agreements with Belarus, Ukraine and the Russian Federation, porous borders and the flexible interpretation of import/export regulations. Ready dairy products are being imported, as is obvious from their availability in shops. In 2008, official imports of ready dairy products totalled 0.9 million tonnes, or about 38 percent of the national market for packaged dairy products. About 1.4 million tonnes of whole milk was processed in 2008. Most factories operate at far below their capacity, especially during the winter. The country's overall capacity in industrial milk processing is about 2.0 million tonnes, but currently only 70 percent of this is being used. Milk is sourced from intermediaries, some of whom bring it from Kyrgyzstan and Uzbekistan. Officially, the Kyrgyz veterinary services authorize about 50 000 litres per day, but as much as 100 000 litres a day may be crossing the border with illegal traders, according to a spokesperson for the Kyrgyz veterinary services.

Consumption of ultra-heat treated (UHT) milk is increasing rapidly and is expected to rise by another 33 percent, to overtake the consumption of pasteurized milk (according to information from Tetra Pak Central Asia). Much UHT milk is currently produced from reconstituted milk powder, as the quality of the domestic milk supply is inadequate for long-life milk. This means that the demand for imported milk powder is likely to grow as UHT consumption increases, unless the dairy sector can improve the quality of local milk.

[9] The amber box is for subsidies that have to be reduced for compliance with WTO agreements.

TABLE 5
Technical and financial results from different types of dairy farm

	Medium-scale 500–2 000 cows	**Large-scale (AE) 500–2 000 cows**		**Medium-scale (PF) 100–500 cows**		**Small (HH) < 100 cows**	**Very small (HH) 1–5 cows**
	Akmola Oblast	*Almaty Oblast*	*North Kazakhstan Oblast*	*East Kazakhstan Oblast*	*Akmola Oblast*	*Almaty Oblast*	*Shetsky Rayon*
Number of cows	1 040	993	600	170	220	38	2
Yield per cow (kg/year)	5 800	5 640	3 000	3 609	3 200	3 200	2 250
Subtotal variable costs (KZT/litre)	31.6	25.7	38.8	22.5	27.7	44.6	25.0
Subtotal fixed costs (KZT/litre)	20.1	14.3	2.2	3.8	1.7	0.6	
Total production costs (KZT/litre)	**51.7**	**40.0**	**41.0**	**26.3**	**29.4**	**45.2**	**25.0**
Milk price ex-farm (including VAT 12%) (KZT/litre)	**60.0**	**60.0**	**50.0**	**49.0**	**60.0**	**90.0**	**30.0**
VAT (12%) (KZT/litre)	6.4	6.4	5.4		6.4		
Gross profit/loss (KZT/litre)	**1.9**	**13.6**	**3.6**	**22.7**	**24.2**	**44.8**	**5.0**
Tax on profit (KZT/litre)	0.4	2.7	0.7		4.8		
Total public support (KZT/litre)	24.8	17.4	15.3	11.0	18.9	0.0	0.0
Net profit/loss (KZT/litre)	**26.3**	**28.3**	**18.2**	**33.7**	**38.2**	**44.8**	**5.0**
Price margin (KZT/litre)	37.7	36.9	19.5	36.9	39.4	44.8	5.0
Profitability (%, with subsidy)	**50.8**	**70.6**	**44.3**	**128.1**	**130.0**	**110.3**	**20.0**
Profitability (% without subsidy)	**12.1**	**43.1**	**17.5**	**86.3**	**92.6**	**99.2**	**20.0**

Source: Interviews with farmers and data from the Statistics Agency of the Republic of Kazakhstan.

PHOTO: VAN ENGELEN

Photo 2
Kazakh "cowboy" rounding up cattle

Table 6 gives an overview of milk powder production, imports and exports from 2004 to 2008. Exports are mainly re-exports, as locally produced milk powder cannot compete on the world market, owing to the relatively high milk price and overhead costs.

TABLE 6
Production, imports and exports of milk powder, 2004 to 2008 (tonnes)

	2004	2005	2006	2007	2008
Production	2 604	4 277	4 444	3 847	3 426
Imports	8 400	21 288	11 048	12 288	17 075
Exports (re-exports)	3 459	11 288	1 910	1 836	14
Supply to domestic market	7 545	14 277	13 582	14 299	20 487
Imports on domestic market	4 941	10 000	9 138	10 452	17 061
Share of imports	65.5%	70.0%	67.3%	73.1%	83.3%

Source: Statistics Agency of the Republic of Kazakhstan.

Table 6 shows that milk powder production has increased by 30 percent since 2004, while imports have doubled. However, it is difficult to draw conclusions from these figures other than that there is considerable trade in milk powder for domestic use and re-exports. This also explains the large stocks of milk powder carried forward from year to year.

Chapter 4

The dairy sector and the ecological and social environment

There are three important areas where cattle interact with the environment: pasture use and winter fodder; manure production; and their contribution to the production of greenhouse gases. The pasture issue is particularly crucial for a sustainable ruminant production system in Kazakhstan.

THE STATE OF PASTURES

During the Soviet era, scientific institutes and universities, in collaboration with pasture specialists from the *kolkhozes,* built up an extensive knowledge base about the different types of rangeland and vegetation and their carrying and regenerative capacities. The combination of traditional Kazakh knowledge and pasture management practices with scientific expertise led to a range management system based on strategic supplementary feeding and high livestock mobility, which achieved returns from the range. Special *kolkhozes* produced forage, feed and seeds for pasture improvement. The Kazakhstan State Institute for Land Planning and Land Use monitored pasture use, productivity, botanical composition and other parameters. Special brigades went from *kolkhoz* to *kolkhoz* constructing and maintaining wells, building *zimofkas*[10] and establishing and maintaining rural electricity and telephone networks.

After the break up of the Soviet Union and the dismantling of the *kolkhozes*, the *kolkhoz* pasture management system fell away. Pastures were divided into use categories as communal pasture, State land reserve and areas subject to 49-year leases or outright sale. This, together with the fact that privately owned animals could no longer join *kolkhoz* herds and flocks on distant pastures, seriously curtailed the mobility of pasture use and quickly led to overgrazing of the pastures nearest to villages, with under use of more distant ones. Following the collapse of the service system, these distant pastures no longer had water supplies, winter housing and other services, making it impossible for herders and their animals to use them. At the same time, large areas – particularly in more arid zones – were taken out of wheat production, which had become unprofitable without subsidized prices for inputs and equipment.

The Kazakhstan Agency for the Management of Land Resources keeps track of land resources and publishes a yearly overview based on updates from local governments on the current status of land use and ownership in their areas. These overviews are an important tool for the government's distribution of area-based subsidies and support programmes. The Agency of Statistics also provides information about land distribution among different classes of use and user. From these data, it is clear that land sales and the granting of 49-year leases have resulted in an increasing area of land (currently about 30 percent) being in the hands of a relatively small number of people, who own only a fraction of the country's total livestock inventory. As the livestock population in the household farming sector is growing, pasture degradation is almost certain to increase, jeopardizing the productive future of both pastures and the livestock sector.

Pasture use is regulated in the Land Act and has no separate legislation. The Ministry of Agriculture has no technical department for pasture management, and there is no institution to help farmers match the availability of summer and winter grazing and fodder with their needs in a sustainable pasture-based livestock production system.

MANURE

Agricultural enterprises and modern dairy farms do not graze their animals, which are kept in sheds or pens throughout the year. These larger farms usually have installations and equipment for storing manure and utilizing it in crop production. In this system there is generally a limited risk of pollution.

The situation is different for small- and medium-scale farms, where stables are often old and poorly maintained. These farms usually have no specialized equipment for collecting and spreading manure, so localized pollution can occur. Most household farms collect and dry animal manure to use for heating during the winter. Low-quality bedding and forage that cannot be eaten by livestock are sometimes dumped in or near settlements, together with the ashes

[10] Sheds and kraals in pasture areas where shepherds and animals spent the winter months.

from fires. Owing to the dry climate, this material does not rot and is often burned. Some manure is used on home plots, which are usually planted with potatoes.

Experiments to explore the possibility of utilizing manure to produce biogas[11] have been set up in the Karaganda area. Cold winter temperatures slow this production, and require that some of the biogas be used to heat the digester and keep the process going. This technology does not seem to be suitable for household farms. The manure from cattle that have been fed high-fibre, poor-quality rations is not particularly suitable for biogas production unless it is mixed with other types of manure (pig and/or poultry), which are not readily available.

GREENHOUSE GASES AND CARBON SEQUESTRATION

Recently, ruminants have been found to be a major source of greenhouse gases. However, there are different levels of emission: animals fed exclusively on crop-based feeds produced with high fossil fuel and fertilizer inputs have a higher carbon footprint per kilogram of meat than animals from production systems based on perennial grazing. During the "virgin lands" programme of the 1950s, the Soviet Union brought more than 30 million ha of native steppe into wheat cultivation. During this process, natural vegetation was destroyed and excessive use of fertilizers and ploughing led to serious land and soil degradation. As all of this cultivation was conventional, the soil's organic matter content was soon depleted and a great carbon sink was destroyed.

After the collapse of the Soviet Union, subsidized inputs and favourable pricing policies for wheat came to an end, and large tracts of wheat land were left fallow. Contrary to expectations, these areas did not revert to natural steppe vegetation, instead pioneer plants and weeds of little to no value for livestock production took over[12].

Over the last six years or so, Kazakhstan has experimented with different ways of reseeding these former croplands with grasses and legumes, especially wheat grass (*Agropyron desertorum*) and sainfoin (*Onobrychis sativa* Lam.). Initial results are promising on marginal cropland that is still cultivated, especially if there is a cover crop for the first year, when wheat grass generates very little harvestable biomass. This rehabilitation of degraded land and former wheat fields requires high investments in land preparation and the application of fertilizers and herbicides, and it is unlikely that private farmers will engage in it unless they receive some form of compensation. The rehabilitation of communal pastures around settlements would require external support.

As well as increasing fodder production and restoring the environment, these land rehabilitation efforts would also promote soil carbon sequestration, which – together with agricultural sinks of zero tillage – could become eligible for Clean Development Mechanism support in the future. While part of the above-ground biomass is harvested and used as hay, the root biomass contributes towards sequestration through the gradual build-up of root and litter organic mass in the topsoil.

DAIRYING AND LIVELIHOODS OF THE MOST VULNERABLE POPULATION GROUPS

The average age of people in rural areas is higher than that in the cities, where young rural people migrate while their parents remain. Most of these people try to supplement their small pensions by producing vegetables, fruit and potatoes in home plots. Their dairy cows provide daily protein and cash flow for other basic needs, from sales of liquid milk. The sale of a calf in autumn often provides the cash for procuring winter supplies of coal and flour.

From the milk prices and production costs discussed in the previous chapter, it can be estimated that a cow producing 2 250 litres of milk a year, of which 750 litres is kept for the calf and home consumption, can generate KZT 15 000 to 20 000 per year, depending on the milk price, and manure can add to the winter fuel supply. This is excluding the returns on selling a calf in autumn/winter.

As already mentioned, livestock fulfils a social and environmental function as well as its economic one. So far, the government has focused mainly on the economic function, but broader government support to the livestock sector could also make a major contribution to alleviating rural poverty and improving people's diets and livelihoods. In addition, with the right measures in place, cattle's negative effects on the environment could be mitigated. This requires the development of new ways of viewing livestock's role in the life of the people, and household farmers' role in the national economy.

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[11] www.inforse.org/europe/pdfs/kz%20article%20p9%20sen%2044.pdf.

[12] http://ddr.nal.usda.gov/bitstream/10113/9996/1/ind44010560.pdf, and http://egov.kz/wps/portal/content?contentpath=/library2/1_kazakhstan/kr/ecologiya/int_projects/article/743&lang=en. (accessed 10 November 2010)

Chapter 5

Institutions for dairy development

In the past, livestock owned by individual farmers could take full advantage of the *kolkhozes*' livestock service infrastructure. As the *kolkhozes* were usually also the only market for milk, lambs and calves, privately owned livestock and their products helped the *kolkhozes* to meet their production targets. This created synergy between the *kolkhoz* and household livestock farmers, who were also employed by the *kolkhoz*. Households had access to winter forage, mixed concentrate feed and the services of veterinarians, agronomists and animal production specialists. Specialized services such as AI were available, and private animals were transported with the *kolkhoz* livestock to summer pastures, if not required at home for milk production.

Since the collapse of the *kolkhozes*, very few of these services are being provided by the public or private sector, so household livestock farmers have to depend on their own resources. The following sections discuss a number of organizations that are important for dairy farmers in Kazakhstan.

VETERINARY SERVICES

In a country where bovine TB, brucellosis in both small and large ruminants, rabies and anthrax occur, livestock keepers need veterinary services to control and prevent these diseases. In Kazakhstan, these services are provided by both the government and the private sector. The government veterinary services have recently been split into two sections:

- *central government veterinary services* under the Ministry of Agriculture and the Chief Veterinary Officer, responsible for policies, regulations, guidelines, food safety and oversight of public bodies;
- *provincial veterinary services* under local government, responsible for preventive animal disease control and prevention of epizootics.

Preventive veterinary work is tendered out to private veterinarians, along with certain inspection tasks. These private veterinarians tend to be the only source of curative veterinary field services for livestock keepers.

Under its new set-up, the government veterinary services need to find approximately 3 000 qualified veterinarians who are willing to live and work in rural areas and who have appropriate knowledge, skills and experience; these are not available. With an average salary of USD 300 per month it is obvious that public veterinarians will try to earn additional income through private veterinary practice, thus competing with local private veterinarians while often neglecting their public tasks, owing to lack of time and/or conflicts of interest.

In its drive to modernize and industrialize agriculture, the Kazakhstan Government is promoting exports of beef and dairy products. This will require World Organisation for Animal Health (OIE) declaration of "freedom from" status for a number of animal diseases. This strategic objective is an important driver of government actions in the veterinary field. Vaccination against brucellosis has been replaced by test and slaughter programmes, and there are plans for an animal identification and registration programme for ruminants and pigs. However, obtaining freedom from disease status is a challenge for a country surrounded by neighbours where many animal diseases (foot-and-mouth disease, brucellosis, bovine TB, classical swine fever) are endemic, given the frequent, albeit unofficial, inter-country trading of animals and livestock products and movement of animals for grazing.

BREEDING SERVICES

Animal breeding has two elements:

- selection of genetically superior animals;
- control of the reproductive process, to increase the presence of genes from these superior animals in the overall population.

During the Soviet era, extensive use was made of imported genetic material: buying committees purchased bulls for breeding from Western Europe and semen from an even wider range of sources. Holstein semen of North American origin was used extensively (and still is), to improve milk yields. However, this has probably had a negative effect on the fat and protein contents of milk delivered to factories in Kazakhstan (at 3.6 percent and 3.1 percent respectively), compared with average fat and protein contents in Europe (at just over 4 and 3.4 percent).

PHOTO: VAN ENGELEN

Photo 3
Kazakh **Byelagolova** *breeding cows on a breeding farm without individual identification*

At present, there are about 255 "pedigree farms" where farmers can buy pedigree animals. In Kazakhstan, the pedigree breeding system basically guarantees that the animals are purebred, comply with minimal standards for their breed, and come from lineages with at least three generations of known purebreds. In many countries, pedigree breeding is a private enterprise in which the government has only a regulatory and supervisory role. In the Soviet era, certain farms were certified as pedigree farms, and all the animals born there were considered pedigree. This system is still in operation in some other former Soviet republics, but the Kazakhstan system recognizes that certifying the farm does not guarantee that an animal bred there is pedigree, while proof of the animal's parentage and compliance with breed standards does.

There are complaints that the number of pedigree animals from Kazakhstan pedigree farms is decreasing drastically. The main cause of this drop is the government's subsidy system, which promotes the transfer of pedigree animals to other farms, but removes animals from the pedigree register when they leave their pedigree-certified breeding farms.

In Kazakhstan, the choice of cattle breed is important, and government officials promote the use of Holstein semen. However, as more than 90 percent of cattle are dual-purpose (kept for producing both milk and beef), it would seem more logical to use dual-purpose breeds, especially for smallholders and small- and medium-scale farms. Other breeds have proved more capable of reproducing under adverse nutrition conditions, such as during the Kazakhstan winter. Even after moderate to severe weight loss, these animals soon regain weight and increase their milk production when grasses start growing in spring. The breeds most suitable as semen suppliers are Original Braunvieh for cows of the Alatau breed, Fleckvieh for red-and-white cows, and Angler or Red Estonian for Red Steppe cows. Black-and-white cows can be inseminated or mated with more dual-purpose black-and-white bulls for household livestock farms or with Holsteins in the commercial dairy sector.

Cows in Kazakhstan have a highly seasonal calving pattern: the mating season coincides with the period in spring when grasses start growing and cows come into heat, so most calving takes place from February to May. This means that AI is usually a time-bound activity. At present there is no control of bulls and bull calves in villages, and animals are herded collectively, which makes the use of AI or improved bulls ineffective. To resolve this issue, young bulls should be kept away from breeding cows or be castrated. In some settlements, especially those where winter feed is scarce, there is a shortage of sufficiently mature breeding bulls, as most young bulls are sold before the winter starts; as a result, calving rates are often low. For household dairy farms, an effective breeding support strategy would be to release growing pedigree bulls to graze with cow herds, and to castrate all other bulls. The young pedigree bulls would mate the cows in summer, before returning to their original farms in autumn for fattening and slaughter. Small- and medium-scale farms usually have a breeding bull or use AI when an inseminator, semen and nitrogen are available. Large-scale dairy farms rely on AI.

The State-owned company Asyl Tulyk in Astana is responsible for selection programmes, but it is difficult to set up meaningful progeny testing programmes given the low number of farms where production control is possible. Most breeding bulls used by Asyl Tulyk were imported as young, untested pedigree bulls. Semen is collected and frozen, but the demand for it is low. Large-scale dairy farms prefer to import their own semen from tested bulls from well-known breeding programmes in the United States of America, Canada or Europe.

INPUT SUPPLIES AND MARKETING SERVICES

Most household farmers depend on what they can buy locally, such as hay or straw. Wheat bran is the most commonly used concentrate fed to animals, and is bought in town or from itinerate traders in villages. The prices charged by these traders are higher than those paid by groups of farmers organizing joint purchases and transport from urban markets. Medium- and large-scale farmers usually produce their own feed and fodder on their own land. Grass and Lucerne hay are the most common winter fodder; a shortage of appropriate equipment means that most silage is made on large-scale farms. Few feed mills remain. The feed mills of former *kolkhozes* that specialized in feed production are too large and outdated to be of economic use. Many large-scale farms have their own feed mills and produce simple formulas based on grain, Soya flour, cotton seed cake and a mineral vitamin mix.

Marketing through the *kolkhoz* has been replaced by sales to relatives and friends or to intermediaries/traders in towns near markets. Livestock markets are rare in the north, but more common in the south. Distances often prevent the sale of live animals in livestock markets, and most household farmers sell livestock from home. These animals are usually butchered on the farm and transported to town by the trader or farmer in the back of a car or on a trailer. Although the central and local governments assist farmers with the construction of slaughtering points, these are often too distant from farmers' homesteads. Most household farmers sell animals when they need cash. For example, livestock prices drop in August, when children return to school and university and animals are sold to generate the necessary funds. When such distress sales are required, the animals are often not ready for slaughter, so the traders who buy them feed them prior to further sale and/or slaughter, to increase their returns.

In distant and isolated locations, the lack of traders and markets makes it difficult to market livestock and livestock products, and transaction costs are high. In 2001, the Government of Kazakhstan set up a company to purchase animal products and animals from these disadvantaged areas and to develop new export markets. Mal Onimderi Korporazyasi (MOK) is a wholly government-owned joint stock company, but the combined demands of improving producer prices in distant and isolated areas, developing export markets and repaying loans from profits, in spite of subsidies, has proved extremely difficult for one organization to handle. Stocks of produce bought were difficult to sell, and usually incurred losses, and the requirement to use government purchase methods through tender meant the company dealt mainly with traders and was unable to offer farmers better prices. MOK is now increasingly active in activities such as beef farming and the development of feedlots and slaughterhouses. Financially, MOK has also not been successful, and the government has had to bale it out more than once.

ADVISORY/CONSULTANCY SERVICES AND AGRICULTURAL RESEARCH

The *kolkhozes* employed agronomists, livestock production specialists and veterinarians. These experts were in constant contact with the research institutes dealing with their respective areas of interest, giving them access to new information and developments. This system no longer exists and has not been replaced by an alternative.

Currently, most advice and farmers' extension comes through NGOs and information projects. Most research institutes face financial constraints. The funds available via KazAgroInnovation are directed towards modernizing the agrarian sector and creating infrastructure for realizing and disseminating scientific advances both within Kazakhstan and internationally, through centres of knowledge in the field of agribusiness. These centres hold one-week courses for interested, registered peasant/small- and medium-scale farmers. However, agricultural research in Kazakhstan is neither problem- nor client-oriented, and the few requests for research come from large enterprises. Few technologies have been developed for improving production in the household farming sector, such as through strategic winter supplementation, improved low-cost animal housing or improved home processing of milk.

FINANCIAL SERVICES AND SUBSIDIES

Most household farmers have very limited access to financial services. Most of the microfinance organizations active in rural areas require collateral, which most households are not able to provide. Rural households are not eligible for loans and people have no land title deeds. Social collateral systems for microfinance are poorly developed in Kazakhstan.

Medium-sized and larger farms with assets have access to credit facilities, especially for seasonal crop production. However, the credit products and interest rates currently available are not attractive for livestock development activities, which require a longer time frame for repayment and an initial grace period.

Through KazAgroFinance, registered farmers have access to credit and leasing arrangements, mainly for agricultural machinery and large-scale farming investments. The Agrarian Kredit Korporatia, part of KazAgroFinance, has a micro-credit facility that operates through rural credit cooperatives (SPKs). This is a relatively new phenomenon, and it is too early to tell whether it is making credit available to the people who need it most (Box 5).

BOX 5

Views from a Director of a small dairy plant in Pavlodar Oblast

"The SPKs started all right, but served only a small group. The underlying business plans were not sound. The ministry did not have the right type of specialists to help people, and they were not sufficiently interested. What is needed is training and awareness raising at the village level. Looking at the cost of feeding a cow (KZT 30 000 for 3 tonnes of hay, KZT 12 000 for 1 tonne of grain, and KZT 1 500 for herding), milk cannot give sufficient returns and often the cow is then sold for slaughter. SPKs could serve the intermediaries, but they do not seem to be targeted."

Most government funds for the livestock sector are channelled through the livestock marketing body Mal Onimderi Korporazyasi, the State veterinary services and the pedigree-breeding organization Assyl Tulik.

The current package of subsidies for the livestock sector – for breed improvement (AI and the purchase of registered pedigree animals), interest on credit, investment support and price support – will need to be revised to comply with WTO accession requirements.

SERVICES FROM ORGANIZATIONS

Farmers' organizations are a relatively new phenomenon in Kazakhstan, and do not yet have a legally recognized role in the agricultural development process. For example, organizations in Europe include those for maintaining and improving the genetic value of a breed, while pedigree breeding in Kazakhstan is still in the public domain.

Producer and processor organizations are beginning to emerge, but so far these have focused on lobbying the government and have done little to regulate the sector. For example, the dairy processors' association has not yet developed self-controlling practices for the sector. Milk rejected by one factory may still be accepted by another, which jeopardizes the maintenance of minimum quality standards. Kazakhstan's Farmers' Union represents the 193 000 medium-scale (peasant) farmers, of whom 170 000 are actively farming. This is a political organization, which finances its running costs from a compulsory crop insurance scheme and is financially independent from the government.

Chapter 6

Employment in the dairy sector

Currently, 265 milk processing enterprises (MPEs) operate in Kazakhstan. Of these, 18 are large (with capacity for processing more than 30 tonnes of milk per shift), 85 are medium-sized (10 to 30 tonnes per shift), and 153, or 60 percent, are small (less than 10 tonnes per shift). Shares of total processing capacity are 47 percent for large, 37 percent for medium-sized and 16 percent for small MPEs. A few plants have capacity for more than 100 tonnes per shift; most of these produce UHT milk and are associated with or owned by international dairy companies. According to the Agricultural Census of 2006/2007, there were 91 mini-dairy units, of which 74 percent were agricultural enterprises, 23 percent were peasant/small- and medium-scale farms, and 3 percent were household farms.

It is difficult to calculate how many people are employed in the dairy sector, as no statistics are available. Most factories have agents in villages, who check the milk quality and record the quantities. Factories also employ drivers, who collect the milk from villages, usually in 5- to 10-tonne trucks. Installations are generally old and poorly designed, so require more workers than factories with comparable capacities in the West do. There are no wholesalers of processed dairy products: factories have their own distribution systems to individual supermarkets. With more than 2 million household dairy farms, plus herders, milk collectors, intermediaries, transporters, factory workers, distributors and dairy workers in supermarkets, it can be estimated that the dairy sector provides income to between 2 and 2.5 million Kazakhstan families.

Chapter 7
Safety of raw milk and dairy products

Raw milk of high biological, physical and chemical quality results in increased yields of value-added products, with longer shelf-life and improved organoleptic properties. Much of the milk arriving at both large and smaller dairies is already of sub-optimal quality. This is because there are insufficient cooling facilities, especially in the household sector; long transportation distances affect the physical quality of the milk, reducing its fat content; and the addition of chemicals to stabilize the milk, along with other practices, affects its chemical quality. The shortage of raw milk means that dairy plants often buy sub-standard milk to meet their daily requirements.

In the short to medium terms, it is likely that households and small farms with inadequate milk quality will account for a large share of Kazakhstan's milk supply. The government should therefore focus on improving milk quality; guaranteeing the production of safe milk for domestic consumption is of paramount importance. This will require government support for all farmers, including household ones, and efforts to increase their awareness of and compliance with local and – for those interested in exporting – international requirements and standards for food safety. As well as investing in improved processes and technologies to ensure quality dairy products with a reasonable shelf-life, the dairy industry will have to start paying farmers according to quality.

Kazakhstan is a member of the International Organization for Standardization (ISO) and the technical policy for standardization is the responsibility of the Committee for Technical Regulation and Metrology (KAZMEMST), which has a regular budget. Together with national ministries and departments, KAZMEMST establishes technical committees to develop standards. The main document for ensuring the safety of milk and dairy products at all stages of the supply chain is the Technical Regulation on Requirements for the Safety of Milk and Dairy Products (No. 230 of 11 March 2008). However, not all producers and processors comply with these minimum quality standards, and an independent assessment of compliance has been difficult to achieve. Annex 3 gives an overview of current Kazakhstan quality standards. Local safety standards will also have to be harmonized with Codex Alimentarius.

Regulations require that all agents along the supply chain verify the hygiene and safety of all products, from inputs and raw materials to packing materials, and including buildings and equipment. This means verifying that their supply systems are part of a quality chain. For milk, such a chain involves not only the dairy farm but also the feed suppliers and veterinary practitioners serving the farm. In a Hazard Analysis and Critical Control Point (HACCP) system, quality guarantees are passed from one value chain stakeholder to the next.

Most dairies limit their controls to checking the milk's dry matter and fat contents and level of acidity. Milk and milk products marketed in informal street markets and bazaars lack any formal control. Although officially forbidden, this type of dairy trade still takes place, especially in rural towns. Kazakhstan has no accredited laboratories and no system of regular control and inspection by public services. Inspections are carried out only on demand or when a problem is suspected, when the inspection is limited to dairies and does not include the traders and/or producers further down the chain.

The new laws are based on the principle of prevention incorporated in the HACCP approach, but they have been applied in only a few dairies throughout Kazakhstan. In 2003, a workshop was held in Almaty to introduce the concept of HACCP in preparation for a training-of-trainers session on the theoretical and practical aspects of HACCP as a risk management tool. This was organized by the World Health Organization (WHO), an EU funded project and the Kazakhstan School of Public Health, in collaboration with the Laboratory of Canton Ticino and the University of Sion (Switzerland) and FAO, as part of the food safety public health initiative for the Central Asian Republics. Full application of HACCP principles in old installations is extremely difficult, as there are too many critical control points to manage.

Another area of concern for the safety of milk and dairy products is the presence of zoonoses in the cattle population. There are occasional outbreaks of brucellosis and non-pulmonary TB, both of which cause human infection through contact with animals or the consumption of unpasteurized animal products. In the larger dairy plants, this risk is mitigated by pasteurization but the household situation presents a risk, and the traditional practices of separating the fat from milk before boiling, and preparing butter from raw milk are serious health risks. The government can mitigate risks by informing people and raising awareness at the household level, but the eradication of brucellosis and bovine TB from Kazakhstan will not be achieved in the near future, given the veterinary status of neighbouring countries and the

continuous cross-border contacts and exchanges of livestock and livestock products. A regional approach and strategy will be required to control and eventually eradicate these zoonoses.

Chapter 8
Discussion and conclusions

DAIRY DEVELOPMENT STRATEGIES

Geographic diversity and strategies

The large agro-ecological and geographic diversity in Kazakhstan requires the development of more area-specific dairy development strategies that are in line with conditions in a particular area. The following main zones and dairy development systems are suggested.

Central steppe areas: The use of livestock species that are adapted to steppe conditions and the demands of mobility has been the traditional strategy for livestock production in this area. Horses, camels and sheep are the most culturally, environmentally and economically appropriate animals. Their capacity to graze in harsh conditions and resist in winter weather means that these species can generate the highest economic returns per hectare[13]. Winter feeding is mainly hay-based, and in areas with cropping potential, grain should be grown for supplementary feeding. Gradual reductions in the importance of cattle and increases in the numbers of horses, sheep and goats have already started. The main emphasis of production should be on meat, with traditional dairy products as a secondary objective.

Eastern and southern mountain areas: Traditionally, this is an area for mixed farming, with livestock migration between the mountains in summer and the lowlands in winter. Crop and forage production in the valleys provides winter feeding for the animals, while summer migration into the mountains, in a communal/paid herding system, frees up land and labour in the lowlands, for crop production, and protects crops from livestock damage. Dual-purpose cattle would be the most appropriate in this livestock production system.

Northern intensive cropping area: This area has the lowest shares of household and small- and medium-scale farms. It provides the conditions and economics of scale for intensive livestock production for local consumption, large-scale processing and export to the Russian Federation. Animal health standards, through animal identification and registration and regular testing and vaccination, can be achieved more easily and quickly in this area than in the other two. Systems for ensuring compliance with standards should be developed, tested and applied in this area before their blanket adoption across the country. The main cattle breeds on large-scale farms should be highly productive dairy breeds, and the semen used for AI should come from performance-tested bulls. Cows whose calves are not needed as replacement dairy heifers should be inseminated with semen from beef breeds, to ensure the production of bull calves that are suitable for beef production.

Pasture utilization

Ruminant production in Kazakhstan should remain grass and grazing-based, with supplementary feeding of grain and industrial by-products only at critical periods in an animal's life and production cycle, to enhance production and increase returns in ways that are economically and environmentally sustainable. For some time to come, production from landless households is likely to remain crucial to national livestock production, so household farmers with the desire and capacity to scale up their production should be encouraged and supported. Pastures provide both grazing and winter feed. Currently, the use of pastures is poorly controlled, and the system for issuing leases results in household farmers losing access to pastures. It is especially difficult for farmers with few animals to bring/send them to summer pastures; the resulting continuous grazing of animals near settlements has caused pasture degradation, land erosion and reduced animal productivity.

There is need for a dedicated pasture law that stipulates how pasture is used. The current pasture leasing system, in which pasture occupancy is granted to people without the livestock to use it rationally, should be replaced by a system in which everybody pays a pasture fee per animal head and period, with different prices for summer and winter grazing. Each settlement/group of settlements would be allocated an area with a combination of summer and winter pastures for which carrying capacities – and thus maximum stocking rate – have been estimated. Each settlement/

[13] Production cost calculations should form an important aspect of policy- and strategy making. However, as such calculations are lacking for the household farming sector, and as pasture is the most crucial resource, returns per hectare are probably the most appropriate parameter for making comparisons of different livestock production models.

group of settlements should elect a pasture management committee that regulates access to and payment for pasture use. With expert assistance, this committee would be responsible for drawing up annual grazing plans and organizing the formation of specialized herds, with lactating cows being kept nearer the settlements, while growing bulls and sheep and goats are sent further away. Each committee should also establish a system for hiring herders to take care of households' livestock on distant pastures, to reduce the grazing pressure around settlements. Animal health interventions could also be handled through these committees, and vaccination/testing made a precondition for grazing with communal herds/flocks.

Medium- and large-scale dairy farms with land titles should analyse whether they get the highest returns from grain production with marginal yields or pastures for grazing and hay production. As the costs of equipment, fuel and fertilizers increase, the minimum grain yield for break-even is also increasing. Grain production is more dependent on weather conditions than livestock production, which gives a more even spread of income over the year.

Increasing milk production

More than 90 percent of the milk produced in Kazakhstan comes from the household farming sector. Using communal pastures, very few external inputs and no external support, this sector provides dairy products for home consumption, generates income from the sale of milk and dairy products, and produces the largest share of Kazakhstan's commercially processed milk. The Government of Kazakhstan's Master Plan for the Development of the Dairy Sector focuses on promoting large-scale modern dairy farms (MDFs) to replace production from the household sector with better-quality milk, while not giving enough attention to the massive contribution that household farms make to overall milk production, and the social and ecological aspects of milk production.

A high percentage of household dairy farmers are elderly and their children have left the villages, so there is nobody to milk their cows. However, some household farmers have the potential to increase their herd sizes and improve the productivity and quality of their milk. If backed by appropriate government policy, many younger farmers could move into the small- and medium-scale dairy sector. MDFs' seem to be in continuous need for financial support through subsidies and grants from government. This gives the impression that this production model seems to be unprofitable and unsustainable under current production conditions, productivity and management level. Production costs will have to be controlled and productivity and overall production increased to make this type of dairy farming profitable.

Although the government has invested heavily in the development of MDFs, the share of milk produced in this sector has not yet increased significantly. For the future of the livestock sector and national milk production, it is imperative that household farmers are assisted in expanding their livestock numbers, improving their animals' productivity and increasing their contribution to more formal value chains. Small changes in numbers and productivity in such a large number of farms would have a much larger aggregate effect on total national milk production than larger changes in a far smaller number of farms.

Veterinary services

The public and private components of veterinary services in Kazakhstan are not sufficiently well defined: to supplement their low salaries, government veterinarians often neglect their public tasks to provide private veterinary services for which they charge. This discourages fully private veterinarians from developing their practices and carrying out contracted veterinary services for the government.

The existing model for providing veterinary services and controlling dangerous zoonoses and animal diseases must be revised to bring it into line with prevailing conditions and human resources in Kazakhstan. There is a shortage of qualified veterinarians to staff public veterinary services at the local level, and it would be better to establish teams of mobile, qualified and well-equipped veterinarians at the district level, to supervise private practitioners working under public-private contracts. Control of the quality and efficacy of locally produced vaccines and veterinary drugs must be brought up to internationally accepted levels, and OIE standards and standard operational procedures should be adopted as the national norms.

Veterinarians who graduated during the Soviet era and shortly after independence have had no or very limited refresher training. Given the constantly changing disease situation, production problems and veterinary innovations, there is need for continuing education of veterinary professionals. The current list of animal diseases targeted by the government should be reviewed and justified.

As villages are thinly distributed throughout Kazakhstan, it would be impossible to ensure access to qualified veterinarians for all villages. One option in more remote villages would be to develop community based animal health

services with paraveterinarians working under supervision of a private or public veterinarian with also contracted public tasks for additional income.

DAIRY PROCESSORS AND DAIRY FARMERS STRATEGIES

Less than 40 percent of the milk produced in Kazakhstan is processed in formal dairy plants. The major bottlenecks for processors are the uneven availability of fresh milk between summer and winter; the high costs of collection and transport; and the poor biological, physical and chemical quality of the milk. This puts local processors in a weak position against international competitors, which will have easier access to Kazakhstan markets after WTO accession. The government dairy development policy and strategies should assist dairies and livestock farmers in addressing these issues by:

- setting up a livestock training and extension system to increase the knowledge, skills and awareness of household and small- and medium-scale dairy farmers;
- organizing dairy farmers into producer groups for milk collection and cooling and the provision of animal health services, AI and animal feed and fodder;
- working with financial institutions to improve access to credit and finance for household farmers who lack the necessary collateral to be guaranteed/ underwritten by dairy plants, dairy traders/intermediaries and the government;
- assisting small- and medium-scale farmers with improved housing and management models and increased access to credit for modernizing existing fittings and equipment;
- providing support for MDFs. These face serious start-up problems because imported cattle have to adapt to Kazakhstan conditions and Kazakhstan workers and managers need better knowledge on management of highly productive animals that should be provided through training and management support. This should be an integral part of KazAgroFinance loans for setting up MDFs.

Dairy processors will have to comply with minimum quality standards and accept a system of premium payments for higher quality. The Dairy Processors' Association could do more in developing solutions to strengthen the sector that do not rely on subsidies. Developing a joint position on minimum standards and a payment system based on quality should be the priority.

GOVERNMENT INSTRUMENTS FOR PROMOTING AND IMPROVING DAIRY PRODUCTION

Considerable investments have been made for the promotion of AI and the maintenance of pedigree farms. Neither has had much effect on the majority of Kazakhstan's dairy farmers in the household and small- and medium-scale dairy sectors. Most large-scale dairy farmers use imported cattle and semen. In addition, milk production subsides have gone to the sectors that have proved to have the highest production costs per litre. Moving livestock selection breeding programmes away from government and into the private sector would be a first step towards establishing a more economical system of livestock genetic improvement.

For many farmers and farming areas, current production levels make dual-purpose animal production the most economic and robust production system. The indiscriminate use of Holstein semen across the board should be replaced by a rational AI policy, in line with regional differences in farming and production systems and skill and resource levels of farmers.

Subsidies should be used to promote dairy and livestock development policies and strategies for both the public and the private sectors, and should include all dairy farmers, to ensure the rapid improvement of milk quantity, quality and safety. This would strengthen the local dairy industry against imports, improve the efficiency of dairies, and reduce milk spoilage. Government funds should be used to guarantee dairy farmers who require credit to develop their dairy farming, and to strengthen training and extension programmes.

Preparation for WTO accession

When discussing WTO accession, most Kazakhstan planners and policy-makers focus on the opening of national borders to exports of all sorts of agricultural and livestock products. Most livestock products from Kazakhstan do not comply with the safety and quality standards required for international trade, and much work is still required in this area. In addition, the prices of most Kazakhstan livestock products are higher than those in other countries exporting dairy products or beef. It is therefore difficult to see how Kazakhstan's dairy industry – often operating in old buildings, with old equipment that was not designed for energy efficiency and compliance with modern food safety assurance systems – will be able to compete with its international equivalents.

The country needs a far more detailed development strategy for livestock grazing, which reflects regional differences in geography, culture and production conditions. In remote areas that are distant from dairy plants and urban centres, it may be better to replace dairy production with grass-based beef production and increased horse and/or camel/dromedary keeping. Producer organizations and government support could help develop access to markets in, for example, the Russian Federation for horse milk, and the Near East for camel and dromedary meat and milk. This would result in a more ecologically and economically robust livestock production system that is closer to the traditional Kazakhstan system. Under free market principles and WTO accession, dairy production should be near to feed resources and the market for milk: the current system of collecting milk from isolated and distant locations is only possible because the prices of dairy products are kept higher than they are in countries that are potential exporters to Kazakhstan. Tariffs and subsidies currently protect the sector from imports of cheaper dairy products.

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Annex 1
Overview of current subsidies in the dairy sector

Under the Law on State Regulation of the Agro-industrial Complex and Rural Areas (2005) and the Law on the Republican Budget for 2009 to 2011 (2008), to improve the productivity and quality of livestock products from domestic agricultural producers, the Government of Kazakhstan has provided a State loan programme to finance agricultural producers' investments in infrastructure and agricultural machinery.

In 2008, subsidies to the livestock sector amounted to KZT 10.4 billion, and credits and increase of KazAgroFinance's nominal capital constituted KZT 8.5 billion, of which KZT 7.5 billion was allocated to credits and support to the processing of livestock products.

The government provides four types of milk production subsidies: i) support for improving the productivity and quality of livestock products; ii) subsidized interest rates; iii) support for breeding improvement (including for AI); and iv) tax subsidies.

Subsidies for improving the productivity and quality of livestock products are provided to producers as partial cost recovery on the volume of milk sold to processing companies or on the open market, on condition that the producers use milk processors for the primary processing of milk.

In *distributing these subsidies*, priority is assigned to MDFs, then to agricultural enterprises, with the remaining funds disbursed to third-level peasant/small- and medium-scale farms that apply. Normally, MDFs and large AEs receive KZT 20 per kilogram of milk sold, medium-scale farms (AEs and large peasant farms) receive KZT 11/kg, and some small AEs and medium-scale PFs receive KZT 5/kg.

Subsidized interest rates for loans at the National Bank of Kazakhstan's refinancing rate are granted for the purchase of equipment for processing agricultural products, and the procurement of milk for processing. The total credit (loan or lease) should not exceed KZT 500 million.

Subsidies for breeding improvement are given to domestic agricultural producers to ensure pedigree products and to preserve and improve the livestock breeding sector. The subsidy is paid to: i) agents of breeding farms, based on sales of young reproductive and tested pedigree animals to farms, at KZT 150/kg of live weight for dairy cattle such as Black and White (Holstein), Red (Red Steppe), Brown (Alatau) and Palevopestraya (Simmental); and ii) livestock farms, on the purchase of semen from high-quality bulls to inseminate cows on breeding farms.

Tax subsidies take the form of preferential tax treatment. According to the Tax Code of Kazakhstan, value-added tax (VAT) is reduced by 70 percent for entities that derive at least 90 percent of their total annual income from milk processing and cheese production.

Annex 2
Dairy plants in Kazakhstan

Region	Total		Large (> 15 000 tonnes/year)		Medium (3 000–15 000 tonnes/year)		Small (< 3 000 tonnes/year)	
	No. of plants	Capacity *(tonnes)*	No. of plants	Capacity *(tonnes)*	No. of plants	Capacity *(tonnes)*	No. of plants	Capacity *(tonnes)*
Akmola	49	193 515	1	21 600	18	125 845	30	46 070
Aktube	21	84 940			7	55 660	14	29 280
Almaty	45	712 493	5	513 320	13	117 495	27	81 678
Atyrau	6	19 220			2	10 200	4	9 020
East Kazakhstan	17	106 006	1	48 000	7	44 300	9	13 706
Jambyl	14	99 000	2	42 500	4	43 100	8	13 400
West Kazakhstan	4	32 693	1	24 800	1	6 250	2	1 643
Karaganda	15	89 422			4	48 600	11	40 822
Kostanay	10	178 628	3	154 600	2	18 000	5	6 028
Kyzylorda	8	8 939			1	4 700	7	4 239
Mangistau	5	8 680			2	7 000	3	1 680
Pavlodar	20	158 100	2	79 000	4	33 400	14	45 700
North Kazakhstan	29	213 217	3	68 500	14	119 860	12	24 857
South Kazakhstan	13	120 000			6	108 000	7	12 000
Kazakhstan	256	2 024 853	18	952 320	85	742 410	153	330 123
% of total	100%	100%	7%	47%	33%	37%	60%	16%

Sources: Statistics Agency of the Republic of Kazakhstan; Ministry of Agriculture.

Annex 3
Milk quality and safety standards

Criteria	Grade		
	High grade	**Grade I**	**Grade II**
Smell and taste	Typical of milk, with no extraneous odours and flavours		Slightly sharp smell and flavour permitted in winter and spring
Acidity (° T)	16–18	16–18	16–20
Cleanliness:			
not below group	I	I	II
Bacteria count ('000/m3)	< 300	300–500	500–4 000
Somatic cell count ('000/m3)	< 500	< 1 000	**< 1 000**
Including pathogenous Salmonella (g)[a]	**25**	**25**	**25**
Density (kg/m3)		**>1.027**	
Antibiotics[b]	**Not allowed**		

Thermo-resistance: Grade III.
Sources: [a] GOST 13264-88 Cow Milk; [b] Sanitarian Regulations and Norms (No. 4.01.071.03).

Annex 4
Map of Kazakhstan