Economic Transition Impact on Livestock Production in Central Asia: Survey Results

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ABSTRACT

The dramatic changes in the post-Soviet Central Asia have impacted on the livestock sector and the livelihoods of the rural communities. The most critical of these changes include the restructuring of former collective farms, the formation of new private farms and the changes in land tenure and property rights. The traditional markets have been lost to producers due to the disruptions in the market integration of the former production system and because of economic liberalization. New national trade policies and rules have created new trade barriers. Poor infrastructure and weak linkage to market outlets have constrained the access to the domestic markets. This led to a dramatic reduction of livestock numbers. The reforms are uneven in different countries and private farms are gaining increasing prominence in the countries with more vigorous privatization program. This study documents the constraints on livestock production faced by newly formed private farms and recommends actions at the technological, market and policy levels for improving livestock productivity and the welfare of rural communities.

INTRODUCTION

The five Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) have a total population of 56 million people and a landmass of 400 million hectares, out of which around 70% is arable land. There are important socioeconomic differences in these five countries. The most populated country, Uzbekistan, which has about 44% of the region's population has only 10% of the arable land, while Kazakhstan, which is the largest country, has the largest share (73%) of the arable land, and has about a third of the population. However, Kazakhstan, which is the most developed and industrious country, is the

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least dependent on agriculture, contributes to about 10% of the Gross Domestic Product (GDP), whereas this sector accounts for 44% of the GDP in Kyrgyzstan, and 34% in Uzbekistan. Agriculture is the main source of export earnings (31%) for Uzbekistan, making it a vital sector for the livelihoods of the large rural population.

Dramatic changes have taken place in the agricultural sector of these countries since the disintegration of the Soviet Union. These changes include the complete or partial *dismantling of the large agro-food complexes,* the *privatization of large-scale cooperative farms,* and *general economic reforms.* The consequences of these changes were a complete disruption and disintegration of the established marketing systems, loss of traditional markets, such as Russia, a decline in rural public services, a decline in agricultural investment, a complete transformation of the production systems from cooperative farms to mixture of different farms, and the immergence of individual private farms. *One of the outcomes of these changes and their effects were a sharp decline in livestock numbers in some of the countries.*

However, legal and institutional reforms did not keep pace with the changes in the production systems and in the wider economic environment. For example, a proper legal framework that establishes land property rights and that can stimulate private land ownership and the development of land markets did not proceed fast enough. These institutional lags had significant impact on the poor and the less powerful. Similarly, changes in the production systems from Collective to private ones were not supported by the necessary infrastructure in financial, extension and other farm services such as veterinary services that are essential for the development of a private-led market-oriented sector. These services have instead declined. The lack of financial services has limited the growth of emerging private farms. These farms face shortage of critical capital, which limited investment in farm machinery and the purchases of essential farm inputs. As a result, these farms operate old and inefficient farm machinery. Lack of information and extension services also became a constraint to producers in developing farm management skills and access to market information. These factors led to a *decline in the livelihoods of the rural population in these countries and the rise of rural poverty.*

Kazakhstan, followed by Kyrgyzstan, recorded the highest degree of privatization, while Uzbekistan followed by Turkmenistan, reformed gradually. These reforms were compounded with several problems that determined the loss of about 80% of the national flock in Kazakhstan and 70% in Kyrgyz Republic. With less reforms applied, the national flocks of Uzbekistan and Turkmenistan changed little in 10 years post-Soviet Union

As part of a forage and livestock improvement project, a socio-economic characterizations and diagnosis of the production constraints of livestock systems

in the CA countries were carried out. The main results of this diagnostic study are presented here. Objectives of the study were to characterize and diagnosis problems of emerging small ruminant production systems, and develop constraint analysis of markets and analysis of market potentials to reorient production systems, and identify solutions to market problems.

METHODOLOGY

The research was conducted in areas selected for the implementation of an "Adaptive Feed and Livestock" research project. These areas were selected on the basis of their importance in livestock production and representation of prevailing livestock production systems. A brief description of the study areas are given below.

Central Asian Republics' Study Sites

Kazakhstan

The study area in Kazakhstan is located in Jambul District (Rayon), in Zailiy Alatay foothills, 50 km north-west of Almaty city. The areas has open springs and wells used for irrigation. There were about 970 individual and peasant farms, seven production cooperatives, five joint-stock companies, two partnerships with limited liability, two national experimental farms exist in Jambul District (Rayon). There is a mixed livestock and meat production in Jambul District. The main agricultural produce is grains and vegetables (mainly potato), commercial crops (sugar beet and tobacco), and meat and milk. Currently, there are about 18 mills, ten private small medium scale bakeries, two pasta-producing plants, three meat processing companies and two butchering houses. The main market outlets for the region are in Uzun-Agash district center and the city of Almaty.

Kyrgyz Republic

In Kyrgyz Republic, the study covered private family and peasant farms located in the mountainous area of Kemin and Kochkor districts, with mixed crop-livestock systems. Kemin is closer to Bishkek city and operates as a peri-urban production system with strong interaction with cropped land. Kochkor is more rural and situated in the highlands.

Uzbekistan

In Uzbekistan, two areas with distinct production systems were selected: Parkent and Nurata. Parkent district is a peri-urban area located in a 45 km from Tashkent. Because of its diversified natural resources consisting of rangelands,

rainfed hay lands and irrigated areas, Parkent has a mixed crop-livestock production system. Small river streams and dug-wells provide water for domestic use and irrigation purposes. Cooperatives play an important role in the district's economy in terms providing employment for local people and supporting local schools and hospitals. Dairy cattle are supported by cultivated fodder, while sheep are managed on extensive rangelands with supplementary feeding in winter. The market outlet is the city of Tashkent.

Nurata is located in the Navoy Province, a traditional territory of Karakul sheep production with annual rainfall of about 250 mm. A large portion of the area (75%) extends over a steppe land having shrubs and grass vegetation. The district has nearly 350,000 heads of Karakul sheep (black, gray and sur), 4,000 cattle, 1,500 horses and about 1,000 camels. Most of Karakul sheep are raised in cooperatives. The main market outlets are in Samarkand and Tashkent. Production systems in both districts are dominantly represented by households and less by peasant farms and cooperatives.

Turkmenistan

In Turkmenistan, the study was conducted in Yerbent, Baharden, Geokdepa and Rukhabad districts of Ashgabat region. Surveyed farms are located at the borderline between the valley at the foothills and the Central Karakoum desert, with annual rainfall of 150 to 170 mm. All farms have access to irrigation and drainage channels. In Yerbent district, more extensive livestock production systems is dominant, where flocks migrate towards Central Karakoum desert in summer. Geyokdepe, Baharden and Ruhabad districts practice more intensive agriculture relying on cultivated fodder such as alfalfa. Livestock in these districts are managed around the farm throughout the year, supplemented with feed produced on the farm and with a short period of summer grazing in nearby mountains. The outlet for crop marketing is Ashgabat.

Sampling

Initially rapid rural appraisals were conducted to identify farm types and main production systems and market channels. Then a sample of different types of producers, traders, retailers and consumers were surveyed. The producers survey covered household plot farms, some of whom were members of the cooperatives and some non-members, private family and peasant farms, and cooperative farm managers. The consumer survey covered urban and rural areas.

A total of 700 producers were interviewed which and divided into three types of households. These were agricultural cooperatives (13), small holder household farms (250), some of which were members of the cooperatives and other which

are not members of cooperatives, and individual private family and peasant farms (410) which are small union of 2-7 farmers who pool their resources and work together. The sample structure is given in Table 1.

Table 1. Structure and numbers of surveyed farms, middlemen and consumers in Central Asian countries.

Targets	Kazakhstan	Kyrgyzstan	Turkmenistan	Uzbekistan
Producers				
Households	50	150	200	200
Private farms	45			15
Cooperatives	7			6
Total	102	150	200	221
Middlemen				
Rural market	30	50	91	25
Urban market	170	150	9	75
Total	300	200	100	100
Consumers				
Rural market	30	100	60	100
Urban market	170	200	40	300
Total	200	300	100	400

In Kazakhstan, the survey covered 50 households, 45 private family and peasant farms and 100 workers of 7 AC. In Kyrgyz Republic, the survey covered 150 private family and peasant farms, 200 middlemen, and 300 consumers.
In Turkmenistan, two livestock farm types, individual farms (IF) and private producers (PP), were surveyed. A total of 137 individual farms and 63 private producers were interviewed. In Uzbekistan, the survey was conducted in Parkent and in Nurata district. The surveys were completed in October-November 2001.

The producers survey focused on the nature and constraints of livestock production systems, including access to natural resources, production costs, capital, sources of income, and production constraints. The farm characteristics information gathered included farm management, family size and gender, land tenure and property rights, natural resources utilization, access to markets and opportunities for production diversification.

FARM CHARACTERISTICS

Farm Typologies

The agricultural reforms during the economic transition in the Central Asian countries have led to the formation of different farm types. The restructuring of the former collective farms (sovhoz and kolhoz) has led to the formation of a variety of farm types with different ownership forms and organizations. These countries are at different stages in the economic and institutional reform, which led to the co-existence of the different farm types. These include: (i) *household plots,* (ii) *family farms,* (iii) *peasant farms,* and (iv) *agricultural cooperatives* (such as joint stock companies, limited liability companies and cooperatives). All of them acquired their agricultural land as a share of former Collective farms. These farm types are described in Table 2.

The Household Plots

These are highly associated with the Cooperative farms. These are small-scale private farm enterprises, consisting mainly of vegetable gardens and livestock. Most of these households are associated with joint stock companies and cooperatives where they work or may be completely independent of them. In the former case, these households only receive wages and the later they receive their share of the profits (at least in principle) and may also work and receive wages. Many of these households are still dependant on the cooperative farms for employment, input supply (fuel, lubricants and machinery), provision of veterinary services, product marketing, community services such support for rural schools, kindergartens for children, hospitals and food stores.

The Family Farms

These consist of a single family who manage own crop and livestock production. In most cases they have a long-term lease of land, for example, 99 years in Kazakhstan based on what is known as the "Gos Act". The single-family production units may be associated with a nearby cooperative in many ways. They may work there, rent out their land or collect hay from their pasture land. In Turkmenistan, another form of family farms are the predominantly private livestock producers with larger holdings than crop-based households and do not own agricultural land. These types are common among sheep and camel producers in Yerbent district.

The Peasant Farms

These are small groups of related families who pool their resources and work together in partnership. They can legally operate as one operation managed by a

family member. They form an important group in livestock production and are increasingly gaining importance. In many cases they are totally independent of the former State farms, while in other cases, they significantly interact with agricultural cooperatives (Joint stock companies and production cooperatives). For instance, they may lease or rent out their crop land to the cooperative; they may also depend on the cooperative for feed supply and marketing animal products while the cooperative may depend on these farms for labor and raw material supply to their processing industry.

Both of the above two farm types (family farms and peasant farms) are private, but they only different in the number of owners. The family farms are owned by single families, while the peasant farms are formed by a few (2-7) closely related families and are managed as one unit. The two farm types are similar in all practical purposes and in the subsequent discussions they will be called as private family and peasant farms.

Agricultural Cooperatives

Include the joint stock companies, limited liability companies and the production cooperatives (*shirkats* and *dekhans*). They have large number of members and large-scale operations. Although many of these are reborn as private cooperatives, they are still managed, in many cases, as former collective farms. The joint stock companies and limited liability companies are common in Kazakhstan with up to 200 members and large farm operations. They have legal basis for longterm land ownership from 1949-'99 years.

The production cooperatives that exist in Turkmenistan (*dekhans*) and Uzbekistan (*shirkats*), where economic reform process is slower, are in principle supposed to function as modern cooperatives. However, they largely remain as former collective farms. They occupy large areas of arable land and play an important role in the functioning of both individual farms and households. Some have vertical integration of production, processing and marketing systems. Managers are still appointed by government authorities rather than by cooperative members. Revenues are distributed equally rather than on actual efforts. The property rights of the different forms of cooperatives are quite complex and are in a state of transition.

The description of one cooperative in Uzbekistan shows this complexity and challenges facing the policy and intuitional reform of former Collective farms. In some cases, there are contractual arrangement between cooperative farms and households. The cooperatives, in addition to providing employment to household farmers, act as government channels for delivering subsidized foodstuff (flour, rice, sugar, and winter clothes) to households. However, as the reform process continues and markets develop these may not remain as production units in the future.

Table 2. Characteristics of farm types in the survey from Central Asia.

Farm type	Ownership type	Number of owners	Land area
Kazakhstan			
Household plots	Private land ownership with the right of inheritance	Single families	Small plots below 1 ha
Peasant farms (individual farms)	Private land ownership on a long-term rent base from 5 to 49 years.	2-3 families, or the largest up to 7 families	Small from 7 ha and large up to 250 ha.
Agricultural Cooperatives	Private land ownership on a long term rent base from 49 to 99 years. This includes limited liability and joint-stock . companies	Large number up to 200 members	2,000-14,000 ha of total land
Kyrgyz Republic Family farms (Small-Scale individual farms)	Private land ownership	Single family farms Mainly livestock production	Mnimum 1 ha irrigated land in mountainous, and 5 ha in non-mountainous areas.
Peasant farms: Medium scale individual farms	Private land ownership	Several families Importance of crops increase	Land area varying from 5 to 150 ha
Agricultural Cooperatives	Private land ownership	Several households or family farms that are cooperative members.	Land area varying form 5,000-87,0000 ha
Turkmenistan			
Household plots	Private land ownership	One family	Small plots of about 1/4 ha and around 15 heads of sheep
Family farms	Private land ownership	One family	Variable ranging from 3 ha to 150 ha
Private (peasant) livestock producers	Mainly sheep and camel producers	2-3 families	No arable land, no land property rights, rely on sandy in Kuzikum used as common rangelands.
Agricultural cooperatives	Practically similar to old collective farms	Consists of cooperative members	Large farming units operating on vertical integration
Uzbekistan			
Households: -Shepherds -Non- shepherds	Private ownership with share of cooperative assets	One family	0.25-1 ha
Individual (peasant) farms	Private ownership. They can run their farming business individually or if they are members of the cooperative by taking their share and running their own farming	1-5 families	Variable ranging from 5 ha to 200 ha
Agricultural cooperatives (*Shirkats*)	Practically similar to old collective farms, but on paper the households are members of the Shirkat that produce under contractual agreements	Large households (up to 150 members)	Occupy large areas of land up to 14,000 ha in Parkent and over 100,000, mainly rangelands, in Nurata.

Box 1. Reforming Former Collective Farms: Boykozon (Uzbekistan)

Boykozon Farm is a former Soviet-style Collective farm, which has been transformed into a production cooperative or Skirkat. The farm has 8,000 ha, of which 3,000 ha are irrigated and 5,000 ha are rainfed. In principle, members of the cooperative who are the same households under the collective system own the farm. In reality, the new cooperative has the same management as before. The 1500 households in the farm are working within the cooperative through land leases. Individual households are given a lease of 15 years for about 5-10 ha for gain crops, potatoes, and 1-2 ha for fruit trees. This lease program is an attempt to devolve some farm management decisions to producers and provide incentives for hard work and higher productivity, and hence increase the overall farm efficiency.

In addition to the lease, farmers have written contracts, copies of which are available at the cooperative management office, which indicates land use plan, estimated cost of production, quota of production to be marketed through the cooperative, and allocation of proceeds from farm sales. The contract includes the allocation of the estimated revenue from sales in to cost of production, including wages paid to farmers and their families, cost of inputs such as fertilizer and fuel, machinery services, depreciation of pooled capital equipment, technical services by agricultural specialists, and others. The cooperative provides all inputs other than labour, machinery services and technical expertise.

The procedures for calculating these costs and particularly wages are not clear. What is clear is that the individual producer has less control over the income side of the production. It is reported that the net returns or profits of the farm are divided as follows: 30 % (less the wages already calculated in the cost of production) is paid to producers, 35% goes to the development of the farm, 28% is paid as dividends and 7 % is contributed to a social fund.

There are certainly efficiency and equity implications of alternative mechanisms of sharing responsibilities and roles between the Management Unit and producers in management and control in the production-marketing chain and in provision of services. Apparently policy makers has faced this concern and used the land lease and contractual arrangements are a step towards devolving some control of the production process to producers. This certainly improves production efficiency, but it is an intermediate remedy and does not sufficiently respond to the efficiency and equity concerns.

The challenge here is how to ensure that former Collective farms are transformed into equitable, and sustainable profitable market-oriented farms without facing the painful experience in the other Central Asian countries where the transformation came abruptly and as a result agricultural production fell sharply and many people lost their livelihoods. The challenge to the research community is to provide analysis of the costs and benefits of different courses of action.

Source: This assessment is based on an interview with the Collective's management.

Although the agrarian reform is still in its early stages of development, and may institutional reforms are yet to be completed, its impact on land tenure and farm structure has been significant. The large-scale farms no longer dominate agricultural production. The small- and medium-scale private farms (peasant farms, family farms and household plots) now form the most important sector in livestock production in countries with the more advanced stage of economic reforms such as Kazakhstan and Kyrgyz Republic. These farm types now hold

over 80% of the livestock, and supply the bulk of livestock outputs. For example, 90% of meat and dairy products are produced by small scale household farms in Kyrgyz Republic. In Uzbekistan, although average stock of animals per household is low, these farm types hold 86% of cattle and 67% of the whole population of sheep and goats.

These farm types have also more clearer land tenure systems and ownership structure. In Kyrgyz Republic the family and peasant farms are the dominant farm types producing nearly 65% of national agricultural output. Medium-scale private farms are developing gradually. However, their role in total livestock production is still small, as it varies from 1% (Uzbekistan, Turkmenistan) to 5-10% (Kazakhstan, Kyrgyz Republic). Nonetheless, development of suitable institutional frameworks that support the new organizational and ownership forms for complete shift from former Collective and State farms to private farms in an effective and equitable manner still remains a challenge to policy makers.

FARM RESOURCE ENDOWMENTS

The farm resource endowments for different farm types vary widely. As indicated earlier, the household plots have very limited agricultural resource base, only vegetable garden, about a dozen sheep and few cows. These households were, in the past, the labor force of the Collective farms which, in turn, provided them secured livelihoods and essential social services. Although many of them still rely on the agricultural cooperatives for employment, they have largely lost the livelihood security they enjoyed in the past, making them the most vulnerable group in the rural areas.

The livestock-based households in Turkmenistan do not own land but have larger sheep flocks, nearly 200 heads per household on average. This lack of feed resource-base makes them rely more on feed markets during critical periods. In Uzbekistan, livestock-based households have, on average, close to 300 heads of sheep and along with them manage another 750 heads for the Cooperative (Table 2). They own less than half a hectare of land. While the crop-based households have 24 heads of sheep and slightly less than a hectare cropland, they are relatively less experienced in livestock production; only 14% of them said they had experience in livestock production. These households raise livestock as additional source of income, however, they have virtually no grazing and hay land. The landless households in the survey were 13% in Kazakhstan, 12% of the shepherds in Nurata (Uzbekistan), and all the livestock producers in Yerbent (Turkmenistan) (Table 3).

But more critically, many of these poor-households have feed resource-base (hay and range lands). For instance, all households plot farms surveyed in Kazakhstan, and 62-86% in Uzbekistan have no rangelands. Only the shepherd

households in Nurata have rangelands. Similarly, these households farms (97% in Kazakhstan, 43-92% in different locations in Uzbekistan) have no hay land. This lack of feed resource-base severely limits the options for these households to reduce feed cost and increase farm income.

The family farms and peasant farms have larger agricultural resources (Table 4). However, their resource endowments significantly vary with in the sample in each country and between countries. The family farms in Kazakhstan have the largest land resources among these farm types, about 10 ha of irrigated land, 40 ha of rainfed land for crop and hay production, and nearly 50 ha of rangeland. However, they have relatively lower animal resources. This can be explained by the fact that livestock assets were easy to be liquidated for acquiring farm equipment and inputs during the transition period, when barter exchange became common in the rural areas due to cash shortages. This low livestock assets relative to the feed resource-base, however, indicate that these farms have a potential to build up their livestock resources. The proportion of goats in all farm types in Kazakhstan was high: 20% in cooperatives, 29% in family and peasant farms, and 48% in household plot farms.

The peasant farms in Kyrgyz Republic have fewer resources than those in Kazakhstan. They hold on average about 3-4 ha of irrigated land and have virtually no grazing or hay production land. However, these farm types have about 50 sheep, 4-10 cattle and 3-5 horses. Similarly, the family farms in Turkmenistan have about 8 ha of irrigated land on average, but have no grazing land or hay production land. They have much smaller sheep flocks but relatively more large-ruminants herds (cattle, horses and camels). Most of them rely on rented land. Out of 137 surveyed farms, 80% used rented land, and 20% were landowners. They all rely on common rangelands. The peasant farmers in Uzbekistan have on average 8 ha of crop land, mostly irrigated; about 60 heads of sheep and virtually have no rangelands. In Nurata district; average size of sheep flock is larger than in Parkent. Cattle is important in the Parkent region, near Tashkent city where these farm types have the largest cattle holdings among surveyed peasant and family farms; about 15 heads per household.

The distribution of landholdings is quite variable in the sampled family and peasant farms. The farms in Kyrgyz Republic seem to be the worse off where the majority (53%) have up to 3 ha. This category is only 11% in Turkmenistan and 6% in Uzbekistan. In Turkmenistan, the 3 to 5 ha landholding class of farms is important accounting for a third of the sample both in Turkmenistan (33%) and in Kyrgyz Republic (32%). The 5-10 ha holding sizes are the most frequent in Uzbekistan (46%) and are equally important (20%) in Kazakhstan and Turkmenistan. Only Uzbekistan and Kazakhstan have farms with landholdings over 25 ha. It worth noting that in Uzbekistan almost all (99%) shepard house-

holds who depend on regular water supply from cooperatives mentioned that water shortage as critical for animal production, while only 58% of other household plot farms who receive water from central systems mentioned similar constraints.

The land distribution analysis reveals that a significant portion of the farms have limited crop land, have no hay land, and have no grazing areas. The most striking resource distribution in the sample is that rangelands and hay lands were almost exclusively owned by large farmers. The family farms and peasant farms that do not own rangelands were 62% in Kazakhstan, 36% in Kemin, and 91% in Kochkor, Kyrgyz Republic, and 32% in Parkent and 45% in Nurata, Uzbekistan. Almot similar portions of the farmers have no hay land. These limitations on feed resources affects livestock productivity and the livelihoods of these resource-poor rural households.

Agricultural cooperatives have significantly large resources (Table 2). The crop-based cooperatives in Kazakhstan and Uzbekistan have land areas ranging from 15,000 to 40,000 ha, with about 13% to 34% irrigated cropland. The livestock-based cooperatives in the Nurata region of Uzbekistan, have relatively limited cropland below 2000 ha mostly (90%) hay land, and vast rangelands over 100,000 ha. All agricultural cooperatives also have large livestock assets, about 5000-30,000 small ruminants. Nonetheless, the more crop-based cooperatives, with large irrigated crops, have more large ruminants herds, mainly cattle, while those in drier areas have more small ruminant flocks.

Table 3. Land and livestock holdings of Cooperative farms in Kazakhstan and Uzbekistan.

Land area and livestock numbers	Kazakhstan		Uzbekistan			
			Parkent		Nurata	
	Mean	SD	Mean	SD	Mean	SD
Total arable land area (ha)	0.2	0.1	0.4	0.3	0.8	0.3
Irrigated	0.2	0.1	0.4	0.3	0.8	0.3
Hay land	-	-	-	-	-	
Rangeland	-	-	-	-	-	-
Sheep	12	8.7	9	6	24	11.3
Cattle	4	1.9	6	4	2	1
Horse	-	-	2	1	-	-

SD = Standard Deviation.

Table 4. Land and livestock holdings of family and peasant farms in selected Central Asian countries.

Country	Farm type	Location		Irrigated	Hayland	Rangeland	Total	Sheep	Cattle	Horses	Camel
				ha				No.			
Turkmenistan	Farmer	Yerbent	Mean	2.9	0.0	0.0	2.9	3	6		11
			SD	0.5	0.0	0.0	0.5	0.5	1.1		.
		Ruhabad	Mean	7.6	0.0	0.0	7.6	8	15	21	26
			SD	4.2			4.2	4.2	8.7	3.3	1.9
	Private producer	Yerbent	Mean	0.0	0.0	0.0	0.0	194	4	1	3
			SD	0.0			0.0	73.4	1.6	0.55	1.8
Kazakhstan	Peasants	Jambul	Mean	9.7	16.2	27.6	29.4	23	5		0
			SD.	0.6	13.4	20.5	24.0	23.7	3.8		0.0
Kyrgyz Republic	Farmer	Kemin	Mean	3.7	3.8	0.0	5.9	56	9	3	0
			SD.	2.4	2.4	0.0	1.6	28.2	4.1	1.8	0
		Kochkor	Mean	2.3	0.2		2.5	43	4	3	0
			SD.	0.7	0.1		0.6	18.4	2.4	1.8	0
	Peasants	Kemin	Mean	3.3	4.5	0.0	6.8	53	10	4	0
			SD	2.7	1.4	0.0	1.2	30	11.2	1.7	0
		Kochkor	Mean	2.9	0.0	0.0	2.9	52	6	5	0
			SD	1.4			1.4	23.8	2.3	2.8	0
Uzbekistan	Farmer	Parkent	Mean	6.7	0.2	0.8	7.7	17	16	1	
			SD	0.7	0.02	0.08	0.9	5.7	5.3	0.3	
	Farmer	Nurata	Mean	6.0	0	16	22	288	16	4	
			SD	0.5		1.7	2.4	92	5.3	1.3	

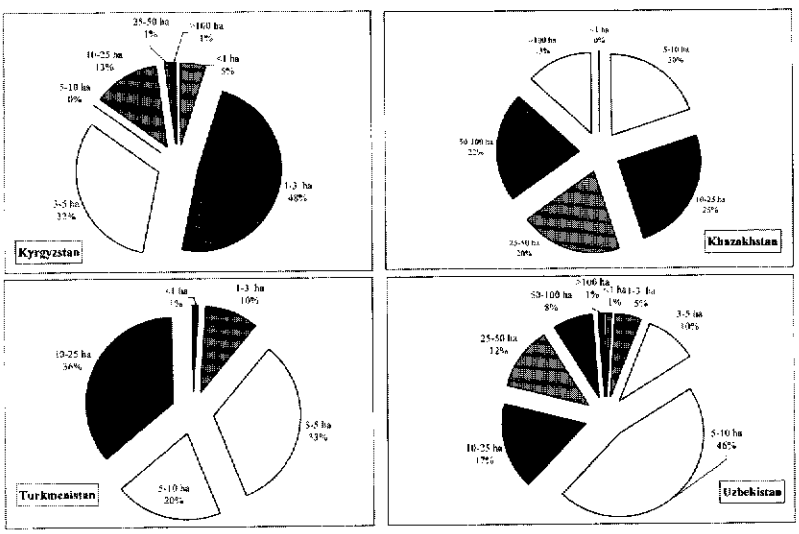

Fig. 1. Distribution of land ownership in Central Asia.

GRAZING ARRANGEMENTS

The countries have different rangeland endowments and the grazing pressure differs depending on the changes in livestock numbers and management systems. In many cases, the different rangeland resources are not equally utilized. The rangelands within the cropped areas, around settlements and around water points are degraded due to excessive use, while remote rangelands are underutilized due to the sharp drop of livestock population, particularly where a drastic decline in animal numbers has occurred, as in Kazakhstan. Farmers and local people in that country pointed out that summer mountainous ranges are not used at all and that newly emerging small-scale farms do not have the resources and capacity needed to organize themselves in order to graze remote ranges. In Kyrgyz Republic, only 23% of the surveyed peasant and family farms reported the use of remote ranges, which leads to overgrazing and declining of vegetation cover in the ranges near the settlements.

In Uzbekistan, where human population density is the highest, surveyed farmers pointed out lack of access and virtual reduction of grazing areas. Farmers in Nurata district have access to large areas of range that are used throughout the year, while in Parkent ranges are confined to foothill and mountainous areas. In the surveyed *shirkats* of Nurata, the stocking rates was 0.29 head/ha and in Parkent 2.5 head/ha. The stocking rates of peasant and family farms was 18 heads per ha, while that of household plot farms was 80 head per ha. The households and most peasant and family farms have virtually no rangelands and other feed resources, while the large private farms and cooperatives, in Turkmenistan and Uzbekistan, hold most of the rangelands. In Kochkor district in Kyrgyz Republic only 9% of peasant farmers have rangelands and in Kazakhstan about 38% of peasant farmers have rangelands. Similarly, in Uzbekistan, 45% and 32% of peasant farms in Nurata and Parket, respectively, have no rangelands.

As households increase their flock size, they increase their access and use of common rangelands. This creates pressure on grazing areas around settlements and pushes the cooperative (*shirkat*) flocks to increase their use of remote ranges. Farmers reported degradation of ranges around villages due to increased number of users. This occurs because many of the rangelands are common and all farm types use them intensively. As a result, a conflict is occurring between households and private (peasant and family) farms over rangeland use. However, peasant farms and family farms are progressively increasing their access to remote rangelands through consolidated and cooperative flocks. This increased use of remote ranges as common resource is already having its impact and farmers reported indications of progressive degradation.

These use of remote ranges, in principle, can reduce the cost of feed, avoid land degradation in areas around settlements, leading to more sustainable resource

management, and increase the efficient use of available grazing resources. These remote rangelands require either large flocks that can absorb the cost of moving and shepherding or community organization for collective action for joint-herding. The access to remote rangelands can be addressed by institutional innovations such as joint-herding. Collective grazing arrangements of the remote ranges are now being practiced in several communities through joint-herding of mobile flocks. The research project assisted 10 farmers in Kazakhstan to initiate the organization of mobile flocks for collective grazing of remote pastures. The results of this experience, in addition to other indigenous experiences in joint-herding, will contribute to the development of sustainable rangeland management in the region.

Family and peasant farmers in Kyrgyz Republic combine their flocks for joint grazing in public rangelands. The individual farmers in Turkmenistan do not use remote ranges frequently because (1) the herd is not large enough (to be viable for distant grazing, 300 heads are required), (2) the problem of water availability, and (3) high cost of grazing per head depending on the distances from the settlement: 5,000 Manat per head for 50 km; 8,000 Manat per head for 100 km; and 10,000 Manat/head for over 100 km ranges, and (4) lack of cooperation in organizing remote grazing. The utilization of remote rangelands by different farm types is shown in Figure 2.

The landless livestock-producers naturally use remote ranges more frequently than the individual crop-livestock farmers, but about 40% of them do not access. In Uzbekistan, shepherd households manage their own animals and those of the cooperative together, throughout the year, on remote ranges. The distances that flocks move per day depend on the condition of ranges and season of the year. Households farms (non-shepherd) join their livestock in consolidated flocks managed by a hired shepherd for 9 months (spring-summer-autumn) grazing in remote ranges. Similarly, in Uzbekistan, all the surveyed family farms in Nurata district graze their livestock throughout the year on remote ranges. Crop-based household farms join their small flocks in a consolidated flock, which is taken to graze remote ranges for 8-9 months per year.

The households farms in Kazakhstan and the peasant farms in Turkmenistan are dependent on the grazing resources around settlements and do not utilize remote rangelands. On the other extreme the shepherd households who move the cooperative livestock and their own in Uzbekistan, and the landless herders in Turkmenistan are the most frequent users of remote common rangelands. Agricultural cooperatives are also heavy users of remote rangelands, while the private family and peasant farms are less frequent users.

Although, increased utilization of remote rangelands may appear to have reduced the degradation and conflicts over the closer rangelands around settlements it will not solve the core problem of open access use. The problem is that as the number of users increase the pressure on these rangelands will increase. This will eventually lead to land degradation, shortage of feed resources and users conflict. There are already reports that in one case users were evicted from one site by others who claimed property rights over the site.

Another, factor that influences the use of rangelands is *government policy.* In some countries, like Kazakhstan, users do not pay any charges in accessing these remote rangelands. The fact that there is no charge for using these rangelands also raises questions about the sustainability of this management regime in the long term. Degradation of open access remote rangelands is already observed in Uzbekistan due to increased access as other sources decline. In Kyrgyz Republic, users pay a fee per head per month for utilizing these rangelands. In Turkmenistan, farmers do not pay for the use of the range directly but they are obliged to pay the cost of maintaining the wells in the rangeland territory that they use. This payment for well maintenance has virtually become the rent for using rangeland. All farmers who graze their livestock on the rangeland, where wells are located, pay the well-maintenance costs. Farmers agree among themselves that repair payment will be determined on the basis of each farmer's proportion of the flock.

Another important aspect of rangelands use is the issue of *equity in access.* In general, small-and medium scale farms have no grazing land resources while large cooperatives and private farms have large grazing areas. In Kazakhstan, for example, the household plot farms were the least able to utilize these remote ranges, mainly relying on the areas around the settlements, which face the highest degradation. Only a third of the individual farms grazed remote ranges through consolidated flocks and only few (2%) through private flocks, whereas over half of the agricultural cooperatives used the remote ranges, and about 45% relied on the areas close to settlements. But given their relatively large rangeland resources, the grazing pressure is not as great as it is in the common areas around the settlements.

In Kyrgyz Republic, rangelands are State property that can be used on a long-term lease basis (up to 50 years and longer). They are mainly allocated among large-scale farms (cooperatives or individual private farms). Family and peasant farms have limited rangelands. This inequitable land distribution is resulting the degradation of more easily accessible rangelands near the settlements and leading to conflicts between small farms and cooperatives.

Finally, the rangelands of Central Asia face a number of challenges. These include sustainable management, equity in access, and efficient use of all available resources. Further research is needed on the institutional arrangements, and

environmental as well as productivity indicators, to help communities and policy-makers to devise sustainable management of rangelands.

DIVERSIFICATION, COST AND INCOME STRUCTURE

Farm Enterprise Diversification

As the agricultural sector involves, and production systems develop, in Central Asian countries following macro-level policy and institutional changes, opportunities immerge for farm enterprise diversification that increase household income and reduce production risks. Farm enterprise diversification is however affected by a number of factors, including *government policy*, *natural resource base* (holding size, access to water, etc), *market opportunities*, and *farmer experience* and *entrepreneurship*. These factors vary in different countries and hence their effects are reflected in farmers' efforts to diversify their production.

The household farms, with their very limited land resources, mainly grow vegetables and different fruit trees on their plots. Peasant and family farms in Kyrgyz Republic cultivate grains (mainly wheat), sugar beet, potatoes and vegetables. Those in Kazakhstan grow grains, fodder crops as alfalfa and corn for silage, sugar beet, tobacco and vegetables. Fodder production is one of the profitable crops for in the study area. In Jambul District, farmers are growing tobacco as it has secured marketing from Phillip Morris Kazakhstan Company. Peasant and family farms in Turkmenistan grow fodder crops such as alfalfa, which makes about 42% of the total cropland, grains (wheat and barley) on about 30% of land, vegetables and melons occupy 12% and other crops about 17%. Farmers in Turkmenistan grow barley, alfalfa, fodder melon, maize and pumpkin as animal feed. Farmers participating in the research Project grew non-conventional source of fodder such as halophytes (*Climacoptera lanata, Suaeda altissima, Atriplex heterosperma, Atriplex ornate, Atriplex dimorphostegia, Atriplex canescens*) after a familiarization workshop organized by the Project. Farmers in Uzbekistan grow legume crops such as peas, mung bean and chickpea due to market demand.

In Uzbekistan and Turkmenistan, mandatory crop area allotment, especifically for cotton and wheat, considered as strategic crops, is in effect. Farmers prefer to allocate the largest area to alfalfa, a highly-value commodity in demand, which is sold at open market, while strategic crops are sold through government procurement agencies at relatively lower returns. In Turkmenistan, the flexibility for private farms to grow more area under forage crops is highly uncertain and are not necessarily free from administrative pressure. The district administrators may request even from legally private farmers to change the cropping structure based on district obligations to produce certain amount of strategic crops such as cotton and wheat. This can be regulated by the provision of inputs such as such as water distribution.

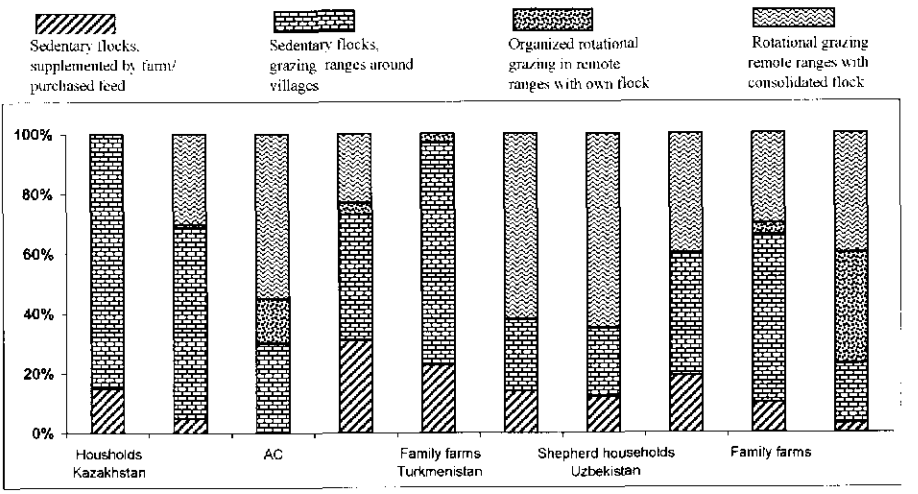

Fig. 2. The access of remote rangelands by farm types in Central Asian countries.

Farm Cost Structure

The cost structure depends on the crop and livestock diversification, and on the degree of intensification, for example use of irrigation. Overall, feed cost accounts for the highest share of the farm costs for the livestock-based farms with little grazing resources and cropland. This is expected given the long winter season of Central Asia. On the other hand, fuel, machinery and wage-labor formed the main costs in crop-based systems with more intensive crop production.

Major cost components of household farm types, in order of importance, are fodder, wages and machinery. These farms have limited crop land to produce feed in winter. The major cost of individual private farms and peasant farms in Uzbekistan was also animal feed, which accounted for about 40-60% of total farm operational costs. However, in the other three countries where production is more diversified and irrigation is used and fodder is produced on the farm, fuel, machinery and wage labor account for most of the farm cost in that order.

Some of these farms that which cultivate crops more intensively have higher fuel costs (involving land preparation, cultivation, field irrigation, and sowing) than household plot farms and other peasant and family farms. For example, in Kyrgyz Republic, private farms have higher fuel costs as they irrigate sugar beet and potato compared to the other farms which are mainly dedicated to livestock production.

Similarly, in Turkmenistan farms in this category had reported fuel and machinery as the highest cost shares due to their involvement in irrigated crops.

The main costs of the agricultural cooperatives were fodder and wages. A substantial portion of this feed cost is purchased concentrates: mixed fodder, sesame, cottonseed oil meal, husks, barley and maize are the most widely used types of concentrate components.

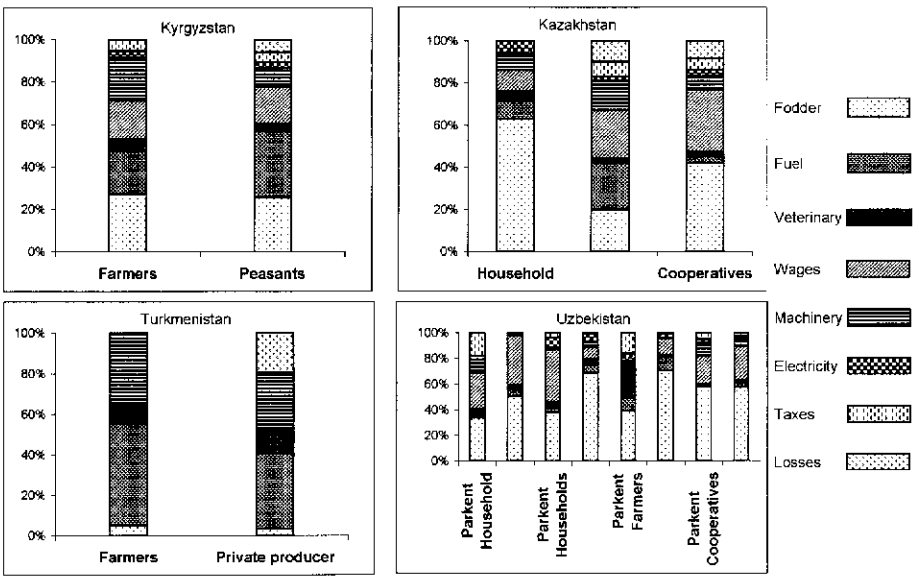

Fig. 3. The cost structure of surveyed sample farms in selected Central Asian countries.

Farm Income Structure

The composition of income for different farm types shows that sales of live animals are the main sources of income (about 40%) for household plot farm types both in Kazakhstan and in Uzbekistan, with the exception of those in Nurata area in Uzbekistan who reported pelts (shepherd households) and social welfare (non-shepherd households) as their main sources of income. The second most important source of income was the sales of mutton (25%) followed by milk and dairy (19%) in Kazakhstan, whereas in Uzbekistan the second most important source of income was milk and dairy (25%), followed by the social payments (21-23%). The contribution of wool, skin and pelts is very low (1-4%) except for the livestock-based households in Nurata region where skins and pelts were ranked first income contributor (26%), Cattle milk is a significant income source in Parkent household plots (23-25%) because of its proximity to the Tashkent market.

The income composition of the family and peasant farms in Kazakhstan differs form household farms in that the share of income from meat sales (close to 35%) is slightly higher than that from live animals sales (33%). The sales of live animal remains was the most important income source for family and peasant farms in other three countries ranging from about 50% to 90% of the income. This is followed by skins and pelts (16%) and meat (14%) in Uzbekistan, and cereals and meat sales in Kyrgyz Republic in that order. The higher share of meat sales in income indicates that private family and peasant farms have greater capacity of capturing the added value of slaughtered animals compared to the sales of live animals. The share of milk was low (5%) but it could increase in the future.

In Turkmenistan, private family and peasant farms generate 62% of income from livestock and 38% from crop production. Out of the income generated from livestock, the share of meat marketing represents 52%, live animal selling 34%, milk and dairy products 8%, pelts 5% and wool 1%. This indicates that farmers prefer to slaughter livestock and market meat rather than market live animals. In Kyrgyz Republic, fodder production is the most important source of income from crops 70%, other crops include melons 10%, vegetables 11% and others 9%. This shows that farmers produce fodder (such as alfalfa) not just for farm feed requirements, but also for income generation from direct sales. The non-existence of off-farm income may indicate lack of rural employment and slow adjustment of the former collective farm workers on the non-agricultural employment in rural areas.

The *Collective* farms can be distinguished into two types: those relying on grain production and those more oriented towards livestock production. The grain-oriented cooperative farms are those with large land resources in Kazakhstan and in Parkent area in Uzbekistan, generating about 30-40% of their income from grains. The livestock-oriented agricultural cooperatives are mainly those in Nurata district in Uzbekistan, with almost all of their income coming from livestock: 50% meat sales, 25% live animals, and about 20% skins and pelts. The importance of wool was very low below 6% in all surveyed farms. Overall, there have been greater diversity of farm income in the countries with the more advanced process of economic and institutional reform, namely, Kazakhstan and Kyrgyz Republic.

In summary, the sources of income for household plots, and private family and peasant farms are the sales of live animals, meat, forage crops, milk and milk products. In addition, some households depend on off-farm employment while others rely on social welfare. Agricultural Cooperatives mainly depend on grain crops, live animal and meat sales. The importance of pelts and wool as source of income has markedly decreased.

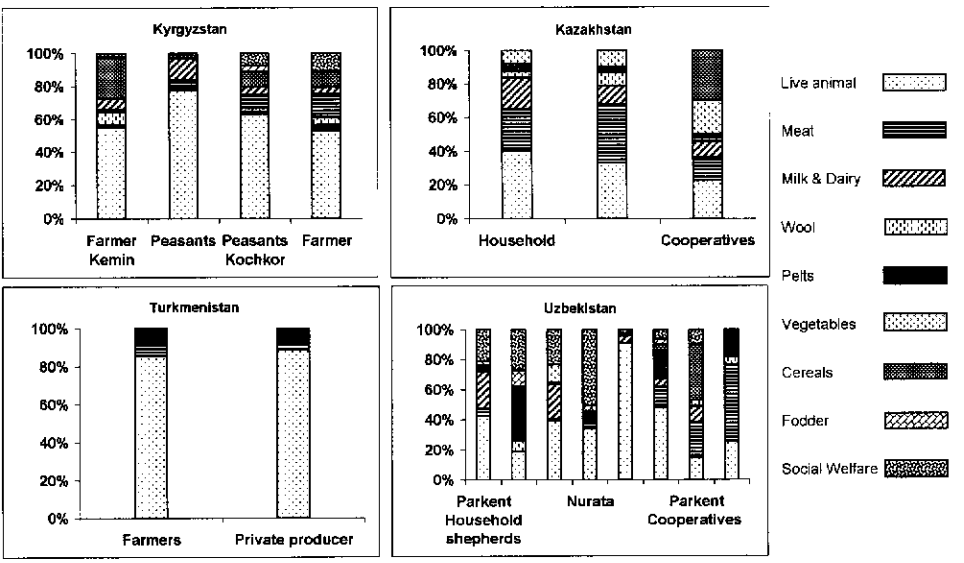

Fig. 4. Income structure of surveyed sample farms in selected Central Asian countries.

Several factors affect farm income. Among these are price fluctuations, market proximity, production diversification and government regulations. The seasonal fluctuation of prices affects significantly the income of farmers. Relatively higher prices for livestock products were observed in winter and beginning of spring and lower prices are observed in summer which is a season of high consumption of vegetables and fruits, whereas the demand for meat is high during winter, leading to high meat prices. The farmers who were able to market directly to the consumers or retailers or who were able to market added value products such as meat rather than live animal had higher income than farmers who sell to middlemen.

In Turkmenistan, individual farmers marketed about 83% of the live animals and 38% of the meat produced directly to retailers and consumers without middlemen. Small landless livestock producers mainly sell their meat to middlemen because of difficulties to access the market. Most of these producers are far from urban market centers and may sometimes use barter to trade their livestock for needed farm inputs.

In Uzbekistan, low market prices were perceived as major constraint to income generation. Farmers consider State regulations and shortage of buyers as factors causing low prices. State regulations also influences production and marketing of Karakul pelts and wool, which are required to be marketed through state processing enterprises that offer low prices and delay payment for long periods. Although the private sector is still in its early stage of development, it offers better market prices and does not delay payments.

MARKETING

The Central Asian countries have, since the collapse of the Soviet Union, entered a period of economic transition. During this transition, the newly independent states developed their own economic and trade policies and embarked on economic reform programs involving market liberalization, agrarian reform and institutional and policy reforms. One of the main effects of the economic reforms during the transition was the changes in agricultural marketing. As the highly integrated markets of the former Soviet Union has been dismantled by the new economic and political realities, traditional trade market linkages have disappeared.

The dismantling of the major agro-food complexes has resulted in the breakdown of traditional channels in domestic and regional markets. The degree of transformation from centrally planned to market-oriented economy, however, varied in different countries. This difference in degree of market liberalization and privatization of agriculture has determined the extent in which market can influence production and consumption patterns. However, new marketing system is immerging although at different rates in different counties depending on the stage on the economic and institutional reforms. Since the economic transitional period, demand and supply have increasingly become important in determining prices.

Market Structure

Most agricultural commodities are marketed through a marketing chain: *wholesale traders, processing enterprises, intermediate traders* and *retailers*. The wholesale traders mainly deal with wool, skins and Karakul pelts. Currently, wool is mainly destined at the local market, while the exports to Russia, China and Ukraine have dwindled. Pelts are also sold in local markets but there seems to be a demand from Russia. Milk is mainly for the local market. In most cases, wholesalers supply the products to processing enterprises, which also sell these products wholesale.

As a result of the changes in traditional market channels, large processing enterprises, which still remain as public entities, operate below full capacity due to the low pace in adjusting to market conditions, lack of cash to pay suppliers and lack of experience in marketing skills. It was estimated that only 5% of the milk processing capacity of the food complex in Jambul Province (near Almaty city) has been utilized in 1999, and 1.5% of its grain capacity has been used. Most of the product was sold as barter due to shortage of cash.

Similarly, processing companies have delayed the payment of 19 million soms worth of wheat production to a Cooperative farm (Boykozon) in 1999. Wheat is a national strategic crop and the farm has to sell it to the state at 25 soms per kg

while the market price is 70 soms per kg. Hence, there are important implications of the continued marketing through the traditional marketing channels. Intermediary traders buy products from producers and sell to processing enterprises or to consumers. These intermediaries often buy large number of animals in rural markets and sell them in larger urban markets. Processing enterprises, purchasing fresh products, process and sell them to intermediaries, wholesale or retailers. Individual farmers also process products and can be retailers. For example, farmers collects milk from neighbors, processes it at home into various milk products and sells the products. Retailers can be producers (households) selling live animals, milk and dairy products in the markets, and at home or retail shops selling food stuffs.

In Uzbekistan, where milk processing companies are less developed, individual intermediaries and retail shops dominate the market. Small-scale intermediaries usually sell small quantities of products mainly produced by themselves in their own farms (and in some cases collected from their neighbors). They sell on the average about 20 liters of milk and 15 liters of yogurt (*kefir*) per day and some are specialized on milk, yogurt, and cream. The products are processed in home conditions. Packaging is basic and it has neither labeling nor health and contents information. About 26% of the interviewed milk traders (milkmen) have no refrigerators for storage of the products.

Medium-size intermediaries usually buy products from several producers and sell on the average 30 liters of yogurt and 30 kg of feta cheese (*suzma*) per day. They mainly deal with yogurt, feta cheese, cottage cheese, cream and butter. They also process products in home conditions. Again packaging lacks proper labeling essential consumer information. Processing companies buy milk of about 2-20 t/day, as a rule from agricultural cooperatives and farmers. Processing plant is equipped with milk processing technologies and quality of dairy products produced at the plant in most cases is better and has good package. Due to the technologies available, the processing company can offer more diverse products.

In the Almaty region of Kazakhstan, most of milk processing (about 60%) is handled by processing companies that sell to retailer shops and large food stores. There are four major food companies operating in Kazakhstan who are dominant players in the dairy market. These are:

- *Food Master,* the biggest milk processing company in the Almaty region, 75% of its products are sold in supermarkets, small shops and regional markets.
- *Zhiger*, the second biggest company which produces about 20% of dairy products in the region, it has good technology to produce high quality products.
- *Agroproduct*, it holds 5% of the regional market for milk and dairy products in the region which are marketed through companies small shops.

- *Adal*, produces 40 types of dairy products and has vertically integrated marketing approach with a dairy farm covering part of the supply.

In Uzbekistan, both individual traders and processing plants act as wholesale traders of meat. Retailers in most cases sell meat to consumers. The retailers are mainly butcher shops and individual retailers in the bazaars. Butcher shops and food stores have appropriate conditions for meat storage such as refrigerators and freezers, whereas individual retailers do not have such conditions. Unsold meat is marketed at lower prices.

In Kazakhstan, the intermediaries have established a network of butchers in Almaty city, where they directly sell meat. These intermediaries receive a marketing margin of 33% of the purchase price. There is indication of specialization of different traders on one specific product where they developed linkages with supply-retail networks. For instance, 22% of the intermediaries deal only with beef, 12% live animal, 44% trade only milk and dairy products, and 20% mutton. Farmers need market information in order to be able to negotiate traders with the right price. The intermediary traders selling perishable products - meat, milk and dairy products, select their suppliers based on product quality, commission rates and volume of supply, while those marketing industrial products skin and wool, use purchase prices and product quality as major criteria.

The marketing strategies that farmers use for different livestock products vary. In all studies areas, wool and pelts are marketed through middlemen. In some cases, like in Uzbekistan the government marketing agency is the sole buyer. Market channels for other products vary by location. In Kazakhstan, direct sales to retailers and consumers is the most common marketing strategy. Agricultural cooperatives marketed substantial livestock products (21-53% of live animals, wool and pelts and meat) through barter trade. Private farms used barter trade much less. Direct sales was also more frequently used by crop-based private farms in Turkmenistan. In Kyrgyz Republic, farmers mainly marketed their products through middlemen. In Uzbekistan, wools and pelts were marketed largely through middlemen; however, the shepherd households sold their wool and pelts to the cooperatives. In general, private farmers used middlemen more than the households which indicates an increasing development of private marketing channels. Direct sales to retailers and consumers is the preferred marketing for live animals and meat by al farm types. One exception is that the majority of shepherds a households marketed their live animals through the cooperative and middlemen which normally gives lower price.

Finally, milk and dairy products are mainly marketed directly to retailers and consumers or through middlemen. For both live animals, and dairy products, household farms generally sell their products to the middlemen and the cooperative, while private farms sell directly. This shows that private farms are more able

than household farms in capturing at least part of the marketing value of their produce. It also means the household farms are the once most affected by the market distortions that may result from the domination of a single buyer, for example, when the cooperatives have protected dominance over certain markets.

Seasonal Price Fluctuations

Price fluctuation affects farm income and creates risk for producers. Prices fluctuate with the season depending on the changes in consumption patterns and production cycles of different products. Data from the survey indicated that the demand for some of the dairy products (milk, butter and cottage cheese) are high in spring but as supply increases, prices fall. This is a preferred season for the consumption of these products as they are considered fresh. At the same, this is when livestock can graze on green rangelands. Prices are the lowest in summer which is explained by the fact that summer is unfavorable season for selling these perishable milk products without appropriate refrigeration. Figure 5 shows seasonal fluctuations of prices for milk and dairy products in the markets of Uzbekistan based on survey data collected from urban centers.

Producer prices for animals are lowest in summer when the supply is the highest. In autumn, animal weights start to drop as grazing becomes scanty. This has a

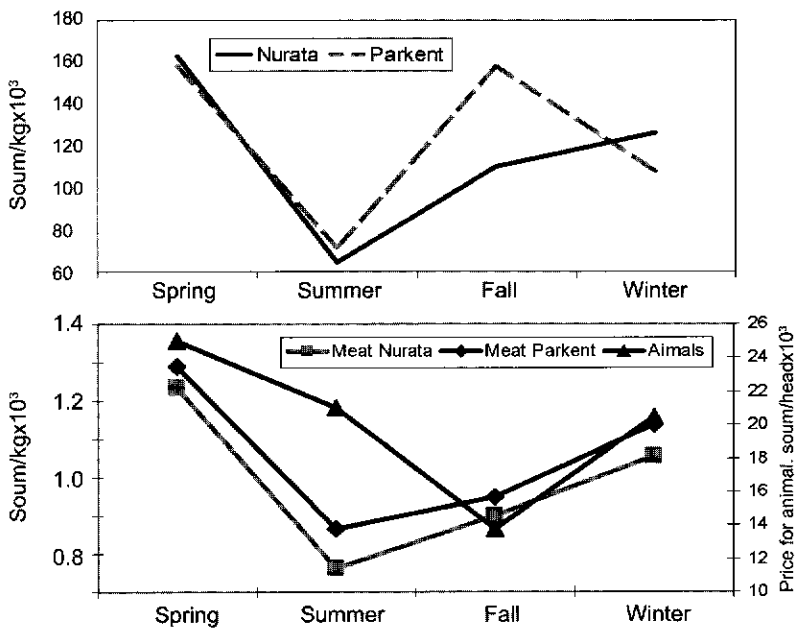

Fig. 5. Seasonal fluctuations of livestock and meat prices, Uzbekistan, 2001.

negative effect on producer prices. But in this season, farmers are preparing for winter and part of the stocks are sold for purchasing feed, hence increasing meat supply. However, this is also a season of weddings and celebrations which increases the demand for slaughter animal for festivity purposes. The net effects of these opposing factors is higher animal prices compared to the summer when body weight is better and supply is higher. The declining supply and lower animal weights continue into the winter while the demand for meant increases hence prices are highest in winter.

The marketing margins for middlemen fluctuate with prices: *higher prices means higher commissions.* Marketing margins also depend on product type, access to main markets (cities) and storage facilities. High price margins for live animals were reported in autumn when demand for live animals begins to grow due to the huge number of celebrations occurring during this period. Special seasons like the new year holidays and during celebration of sacred Ramadan month show highest consumption of meat products. The intermediaries' commissions on milk marketing include transport expenses (5-15%), processing (from 2% when it is processed at home up to 25 % in case of industrial processing), storage (up to 10 %), packing (only in case of industrial processing, from 5 to 25%). In the Almaty region study, the marketing margins for meat are estimated at 23-30%, fresh milk at 10%, and dairy products at 17%, except matured cheese which has 26% margin which associated with transportation cost.

Potential Demand for Sheep Milk Derivatives

In order to determine the potential for sheep milk derivatives in the market, intermediaries and consumers were asked about their perceptions of sheep milk and views on marketing. The potential for sheep and goat milk varies by country and by region. In Uzbekistan, 22% of the interviewed middlemen perceived demand for sheep milk and all those interviewed were willing to market sheep milk derivatives. They consider milk and yogurt of sheep and goats are in demand but not cheese and cottage cheese due to specific consumer taste preference.

Farmers are aware of the potential for dairy sheep. They consider the possibility of milking ewes if dairy types are introduced and market demand exists, but they also indicated the possibility of higher feed costs. In Narata district of Uzbekistan, which is major sheep breeding region, there is local experience in milking sheep. There were 29 respondents who sold sheep milk products. In this area, dairy sheep is viewed positively and currently ewes are milked mainly for home consumption. In Parkent District, where dairy cattle is well developed, local population milk goats mainly for home consumption. About 47% of the interviewed consumers in Parkent district and 88% in Narata district (Uzbekistan)

have tried ewe milk. Ewe milk and yogurt are demanded by the population in Narata and they are marketed during spring. Overall 69% of interviewed consumers in Uzbekistan are willing to try new ewe dairy products.

In Kazakhstan, fewer traders (8%) expressed positively about marketing sheep milk derivates and half of them (5%) are unwilling to market new products like sheep milk derivatives. In this country, where the traders are more established with networks and specialized with specific products, there is very low willingness to trade new products. The potential for dairy sheep products are in doubt although some of the (41%) of the urban consumers expressed willingness to try! The consumer survey revealed variations in the consumers' perceptions of sheep milk derivatives in rural and urban populations. Rural consumers are willing more than urban consumers. This willingness was higher in Uzbekistan, Turkmenistan and Kyrgyz Republic and much lower in Kazakhstan.

CONCLUSIONS

The economic transition in Central Asian countries had profound impacts on the rural areas. The results of this study raised a number of issues related to livestock production, marketing and policy. These issues raised in this study should guide further research and development initiatives in the livestock sector of the region. The main points summarized below:

Production

- Lack of forage is considered the most important limiting factor of livestock productivity. Many of the smallholder household farms and private family and peasant farms have limited feed resource-base (hay and rangelands) and this is a major factor restricting their options to reduce feed cost and increase farm income. These households do not access remote range lands due to their inability to organize and mount mobile grazing to long distances. However, increased access of common rangelands increases the conflict between large farms and small holders. Institutional arrangements to increase their access of remote rangelands and research on low cost feed rations will improve their productivity and must be a priority for further research.
- Surveyed farmers reported a number of animal diseases as main production constraints. Diseases caused by external and internal parasites, gastroenteritis, and respiratory diseases are common; cases of brucellosis were also reported. Livestock herders in Turkmenistan use remote grazing and they noted its advantages on reducing infectious diseases, particularly skin diseases. Tick-borne diseases are reported in the Central Karakoum area (Turkmenistan) where hot climatic conditions are favorable for such diseases.

- Private farms have difficulty in obtaining inputs such as farm machinery. Most machinery used is aged and inefficient in performing farm operations. The majority of farmers attributed reduction in forage production to lack of agricultural inputs, such as seeds and finances. Most farmers started to produce cash such crops as tobacco and sugar beet instead. There is a potential that farmers develop community-based organizations to cooperate in the acquisition of services and in marketing. This requires strengthening and capacity building of community-based organizations. Future research and development projects, therefore, should consider supporting community-based marketing organizations to increase farm income through improved livestock marketing.
- Credits for most farmers are difficult to obtain because of high interest rates and bank requirements that are inappropriate for farmers. Farmers do not have guarantors and property to be mortgaged.
- Lack of alternative off-farm employment. In the conditions of insufficient government support to agriculture and disintegration of the social infrastructure, the number of people employed in the agriculture sector has decreased significantly. The average wages of agricultural workers within the last 10 years dropped 6-fold; while the salary reduction in the industrial sector was much less. This leads to economic stagnation and poverty in rural areas.

Policy

- Agricultural policy is important factor that affect farmers choices and welfare outcomes. Monopolies still operate in some markets like that of pelts in Uzbekistan. Such monopolies and State regulation that depress producer prices can reduce profits, discourage private investment, and deteriorate the welfare of rural communities. Another policy that needs to be reviewed is the crop production quota requirements for wheat and cotton in Uzbekistan and Turkmenistan that limits farmers options to utilize high value crops that are demanded in by the market.

Marketing

- Markets face a problem of *government control*, *poor infrastructure* and *lack of private investment.* In the absence of effective institutional and policy support for agricultural and food marketing and processing, as well as of market information support services, farmers face difficulties in getting competitive prices for their products. Marketing is sometimes constrained by local monopolies that are often the only available option for farmers to purchase inputs and sell their produce.

- Product quality is an important factor in marketing and an important determining factor of sales and revenue. Marketing of perishable products need to be done in appropriate cooling and refrigeration systems for storage and transportation as well as clean environment for processing. Lack of investment in the marketing infrastructure and essential facilities cause deterioration of product quality, and reduce public confidence and profits. This is also critical as international food companies expand to these countries offering more popular brands.
- It was found in the marketing survey that many retailers of meat do not have appropriate conditions for meat storage - refrigerators and freezers. Some butchers and shops have appropriate conditions for meat storage, refrigerators and freezers. About 57% of the respondents indicated their willingness to pack and label the products if they have adequate resources and information.

- Consumers perceive that product quality can be improved by better storage facilities (refrigerators and freezers) better livestock breeding that produce products with higher fat content, improved processing and packaging (yogurt) high quality. Consumers also indicated their increasing awareness and preference for better packaging and labeling of products. The urban consumers in the Almaty region prefer the products with "good" trademark. There is a dire need for strengthening farmers-based organizations to improve the standardization and quality control of agricultural products in order to ensure that farmers do not loose out to imported products.
- There are marketing opportunities for different products at different markets based on season, product type and location. Improvements in livestock management such as strategic feeding and provision of feeding at specific times of the year can help producers target specific meat and dairy markets and increase farm income.
- The highest positive perception of sheep milk production was recorded in Turkmenistan (80%), followed by Uzbekistan (60%), but less so in Kazakhstan (10%) and Kyrgyz Republic (10%). Sheep milk products could, therefore, start in the rural areas where there is already experience. This could be later expanded to other areas. However, the development of this will depend on consumer tastes and preference, and prices. Cost of production, particularly feed cost, will play an important role in the success of dairy sheep products.