Subregional Report on Animal Genetic Resources: **Central Asia**

Acknowledgements
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Introduction

This document is one of a set of subregional and regional reports prepared as part of the Annex to *The State of the World's Animal Genetic Resources for Food and Agriculture*. It consists of two sections:

- a factsheet; and
- a synthesis of priorities.

The factsheet is a compilation of background material on the significance of livestock to the subregion's economy and food security; the characteristics, distribution, and relative significance of the various livestock production systems; and the characteristics of animal genetic resources.

The priorities presented in this report are based on the outcome of consultations held at the subregional level to review a draft report on strategic priorities for action, which had been prepared by FAO as a global-level synthesis of priorities identified in the Country Reports submitted as part of State of the World process. The consultations, which were held during the final quarter of 2005, took the form of e-mail conferences and/or physical meetings, and provided an opportunity for country representatives, from both technical and policy backgrounds, to identify priorities and to further strategies for cooperation.

Subregional factsheet: **Central Asia**

1 Importance of livestock to the subregion's economy and food security

The countries of the Central Asia subregion, as defined for the purposes of this report, include Afghanistan, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. A climate with low rainfall and extreme temperatures, and a landscape of mountains, deserts and steppes characterize the subregion. The subregion is sparsely populated with an average of 25 people per km^2, compared to a worldwide population density of 43 people per km^2. The region contains about 4.75 percent of the world's total land area, 2.4 percent of the world's total human population and 2 percent of the agricultural population. A summary of general information for the subregion is shown in Tables 1, 2 and 3.

Kazakhstan is the largest country, covering 44 percent of the area of the Central Asia subregion, the next largest is the Islamic Republic of Iran which covers 26 percent of the subregion. Uzbekistan has the highest population density in the subregion followed by Tajikistan, Afghanistan, the Islamic Republic of Iran, Kyrgyzstan and Turkmenistan. Kazakhstan has the lowest population density, harbouring 6 people per km^2. Natural resources in the subregion include major deposits of petroleum, natural gas, coal, iron ore, and precious and semiprecious stones.

The countries of the subregion are predominately agricultural economies. On average, 49 percent of the total labour force is engaged in agriculture, but there are big differences between the individual countries. Afghanistan has by far the highest proportion of the labour force engaged in agriculture – almost 60 percent, while for Kazakhstan the figure is 19 percent. On average, agriculture contributes 30 percent to gross domestic product (GDP) in the subregion, with big differences between individual countries. Cotton, grain (mainly wheat), fruit, vegetables and livestock (cattle, sheep and goats) are the main agricultural products. In addition, Afghanistan accounts for 70 percent of world opium production, and its expanding poppy cultivation and opium trade may account for one-third of the country's GDP. A large proportion of land is taken up by permanent pastures, especially in Kazakhstan and Turkmenistan. The rugged terrain and extreme weather conditions found in the subregion provide a harsh environment for economic development.

Within agriculture, livestock is the major subsector. The subregion has a vast area of rangelands (260 million hectares in the five Commonwealth of Independent States (CIS) countries discussed in this report). Meat and wool, in particular, play a major role in food security and income generation. For Afghanistan, it has been estimated that livestock products contribute 16 to 18 percent to GDP and about 14 percent to exports, in addition to 9 percent contributed by carpets and rugs (CR Afghanistan). Livestock production contributes 15 percent to the GDP of both Kyrgyzstan and Uzbekistan.

CENTRAL ASIA

TABLE 1
Land area and population

	Land area (x 1 000 km²)	Population 2003 (million)	Population density (x km²)	Population growth rate (%)	
				1975–2002	2002–2015
Afghanistan	652	27,2	42	2.3	3.5
Iran (Islamic Republic of)	1 636	68,2	42	2.6	1.3
Kazakhstan	2 700	14,9	6	0.2	-
Kyrgyzstan	192	5,1	27	1.6	1.1
Tajikistan	140	6,4	46	2.2	1.5
Turkmenistan	470	4,7	10	2.2	1.3
Uzbekistan	414	25,8	62	2.2	1.4

Data from UN and FAO statistics.

TABLE 2
GDP and economic contribution of agriculture

	GDP[1] 2003 (US$billions)	Value added in agriculture[2] 2003 (% of GDP)	Agricultural population[1] 2000 (%)
Afghanistan	4.7	57 (in 2000)	58
Iran (Islamic Republic of)	137.1	11.3	25
Kazakhstan	29.7	7.8	19
Kyrgyzstan	1.9	38.7	24
Tajikistan	1.6	23.4	31
Turkmenistan	6.2	24.8 (in 2000)	33
Uzbekistan	9.9	35.2	26

[1] Data from UN and FAO statistics.

[2] Data from World Bank statistics.

TABLE 3
Land use

	Land use					
	Arable (%)		Permanent pasture (%)		Forest / woodland (%)	
	1992	2002	1992	2002	1992	2002
Afghanistan	12	12	46	46	3	0
Iran (Islamic Republic of)	10	9	27	27	7	-
Kazakhstan	13	8	69	69	4	-
Kyrgyzstan	7	7	47	49	4	-
Tajikistan	6	7	25	23	4	-
Turkmenistan	3	4	66	65	9	-
Uzbekistan	11	11	55	54	3	-

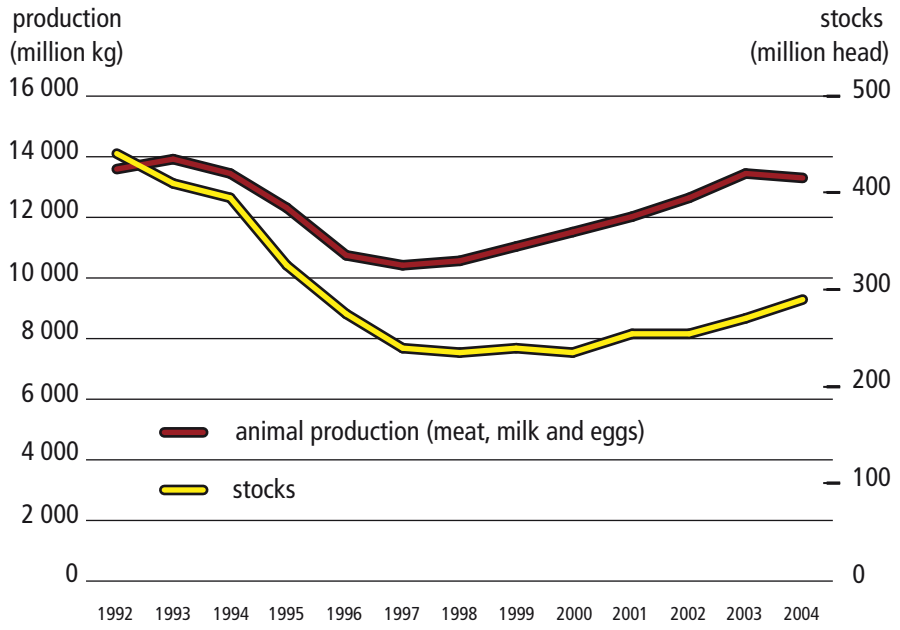
Data from UN and FAO statistics.

In 2002 the total human population of the Central Asia subregion was estimated to be 152.3 million, an increase of more than 22 million people since 1993. Annual growth rates for the period 1975 to 2003 varied from 0.2 percent in Kazakhstan to 2.6 percent in the Islamic Republic of Iran. Projected annual growth rates for 2003 to 2015 include 1.1 percent for Kyrgyzstan and 1.5 percent for Tajikistan (UNDP, 2004).

Five out of the seven countries making up this subregion became independent in 1991 following the break up of the Soviet Union and are now members of the CIS. Since independence, these countries have been in the process of transition from a centrally-planned to a market-oriented economic system. The process has been both complex and painful.

Each of the five former Soviet countries of Central Asia experienced negative growth during the 1990s, with growth rates for GDP during 1990 to 1997 ranging from -3.5 percent in Uzbekistan to -9.6 percent in Turkmenistan, -10.5 percent in Kazakhstan, -12.3 percent in Kyrgyzstan, and -16.4 percent in Tajikistan (Babu and Tashmatov, 2000). This decline in growth rate was accompanied by a severe drop in livestock production and livestock numbers in all five countries after independence (see Figure 1). The main reason for the decline was the elimination of massive government subsidies for livestock products which had helped boost production and consumption during the Soviet era. Without these subsidies, producers could not sustain output levels, consumer prices rose, and demand fell (USDA, 2004). Another reason was that the supply of agricultural inputs by the centrally-planned system abruptly stopped after the break up.

FIGURE 1
Trends in animal stocks and production during the post-independence years in the CIS countries



Source: FAOSTAT.

A similar drop in livestock numbers and livestock production was observed in Afghanistan. Afghanistan's economy has suffered severely from war and drought. Large numbers of livestock were lost during 25 years of conflict, socio-economic disruption, lack of stable government and about seven years of drought. Reports from the Agricultural Survey of Afghanistan (ASA) suggest that these losses amounted to at least 40–50 percent of all draught oxen, 67 percent of all small ruminants and 70 percent of Karakul sheep. The Islamic Republic of Iran was the only country in the subregion that experienced a positive growth rate in terms of livestock numbers and animal production between 1992 and 2004.

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Except for Kazakhstan, all Central Asian countries are designated as low-income food-deficit countries. These countries are particularly vulnerable to food insecurity and to fluctuations in global food prices (IFPRI, 2000). Generally, however, the countries of Central Asia experienced economic recovery in the period from 1998 onwards. This growth was driven by increased levels of private domestic consumption and exports, the latter being boosted by higher prices for oil and other primary commodities on which most of the subregion was heavily dependent. Indeed by 2000/2001, for the first time since the break-up of the Soviet Union in 1991, most countries of Central Asia were experiencing a strong or high rate of economic growth, considerable price stability, more balanced budgets, large trade surpluses and, in several cases, rising external reserves (UNESCAP, 2002).

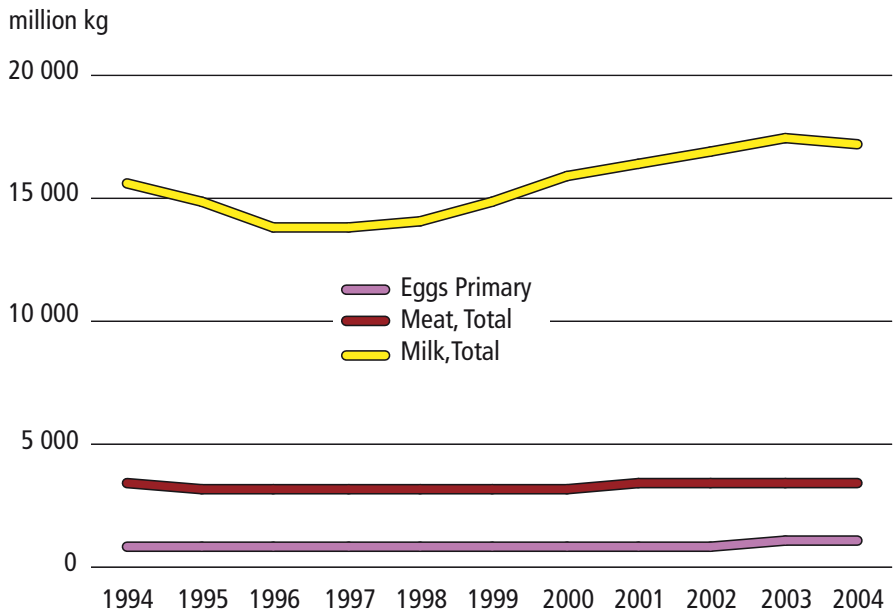
1.1 Production and consumption

The Central Asia subregion gives high priority to dairy production, producing almost 3 percent of total world milk production during the last decade (FAOSTAT). Traditionally, in some areas in Central Asia milk and milk products are staple foods. The diet of Central Asian nomads was very much dependent on their livestock and consisted primarily of milk products and meat. The traditional nomadic animals – sheep, goats, horses, yaks and camels – would be milked and the milk used to make butter, yogurt (ayran) and qurut, a dried round-shaped sour curd, which could be consumed at times when fresh milk products were not available – during winter, or at other times when food shortages resulted from droughts and severe weather conditions (Köçümkulkïzï and Waugh, 2001).

With the progressive privatization of the agricultural sector, large state and cooperative holdings were fragmented into small unproductive units, in most cases consisting of a handful of animals. The newly formed production systems were confronted by the dissolution of Soviet markets and the cessation of production-supporting services. This led to a decline in livestock productivity and stagnation of livestock production, as many traditional products no longer had a reliable market (IFAD, 1999). However, in the late 1990s livestock production levels started to increase again. Milk production began a phase of growth in 1998, and production is expected to increase moderately in the future. Although the size of the milking herd has continued to fall, feed availability has improved, thus raising yields per cow. Production is moving away from the large, former state-run farms to small-scale ownership and production.

Meat production in Central Asia declined from 1994 to 1999, following the same trend as animal stocks in the region – see Figure 1 and Figure 2. In Kazakhstan alone, up to 36 million sheep formerly kept the home market and other parts of the Soviet Union supplied with wool, pelts and mutton. Now there are just 8 million sheep remaining in the national flock, the difference being equivalent to the complete elimination of sheep from the Syrian Arab Republic, Jordan and Lebanon together (Iñiguez, 1999). Expansion of sheep numbers and higher carcass weights in Afghanistan and the Islamic Republic of Iran are expected to boost production (FAO, 2003a). Mutton and chicken dominate meat intake in the region. The production of eggs shows the same trend – a decline following the independence of the CIS countries, and then an increase after 1997.

FIGURE 2
Total meat, milk and egg production in Central Asia, 1994–2004



Source: FAOSTAT.

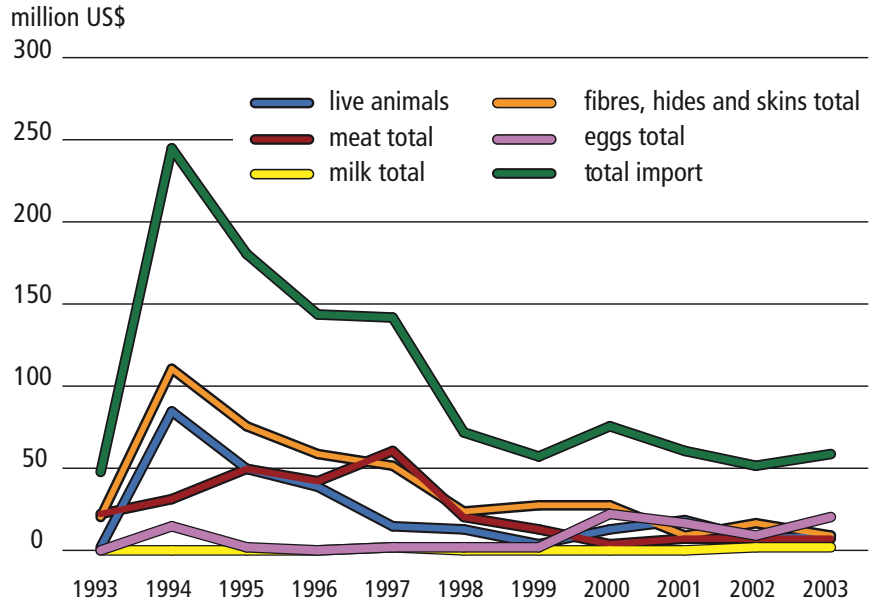
The decrease in production had a strong effect on protein intake in the subregion. For example, in Kazakhstan in the period from 1990 to 1995, the average annual consumption of basic food products fell by 27 percent. It declined by a further 7.7 percent from 1995 to 1996. Meat and meat product consumption declined by 31.5 percent between 1990 and 1997. Although the data relate to Kazakhstan, they are broadly representative of all countries in the region (Babu and Rhoe, 2001). Based on figures from FAOSTAT, Suleimenov and Oram (2000) calculated that from 1992 to 1996, the percentage decline in cattle and sheep populations in Kazakhstan was 25 percent and 44.7 percent, respectively. Along with the decline in the supply of meat, the demand for meat and meat products declined from 2.23 million tons to 1.75 million tons during this period. However, rising population and increasing urbanization is expected to increase the demand for meat and meat products in the future (Pandya-Lorch and Rosegrant, 2000). Increasing levels of poverty contribute greatly to food insecurity in Central Asia. Food security in terms of calorie intake has not been achieved for all in Central Asia. For example, in Kazakhstan in 1996, 20.5 percent of the population fell below the World Health Organization's (WHO) recommended intake of 2 200 calories per day (Babu and Rhoe, 2001).

1.2 Imports and exports

In 2004, Central Asia was a net exporter of live animals, milk and eggs (Figure 3), but a net importer of meat and hides and skins (Figure 4). Export of eggs is dominated by the Islamic Republic of Iran, where the poultry industry is highly developed. The Islamic Republic of Iran is also responsible for the fact that this region is a net exporter of live animals, especially sheep, cattle, chickens and mules. Historically, Central Asia was always a net exporter of hides and skins, but this situation has changed since 2002. Before the break up of the Soviet Union, there was a continuing market demand for pelts and wool of many different qualities. The Karakul sheep industry, devoted to pelt production, dominated the steppe regions of Uzbekistan and parts of Kazakhstan and Turkmenistan. Pelts were produced from newly born lambs – the most expensive astrakhan coming from deliberately stillborn lambs taken from older ewes destined for culling (Iñiguez, 1999). Pelts were marketed throughout the Soviet Union and the countries under its influence. Pelts were also supplied to the luxury Western market which was, and still is, very easily saturated. Only a few thousand pelts are required each year by the fashion industry. Now,

this tiny specialist trade in astrakhan to adorn the very wealthiest of couture buyers is virtually all that remains of the once substantial export market which disappeared along with the Soviet Union (ibid.).

FIGURE 3
Exports of live animals and animal products in Central Asia



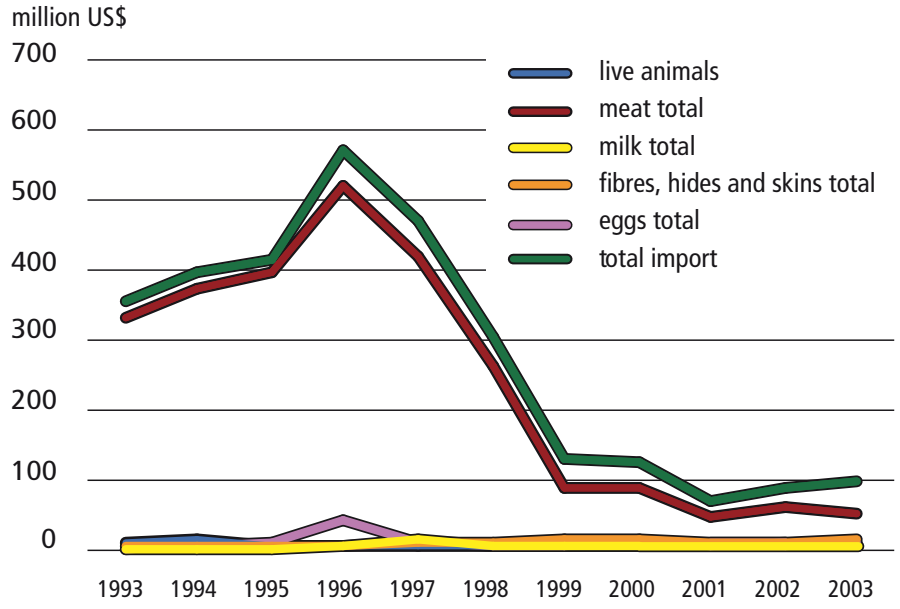
Source: FAOSTAT.

Large areas of Central Asia were also devoted to wool production from a number of indigenous sheep breeds improved by cross-breeding with imported fine-wool types such as the Merino. Once again, the principal outlet for this wool was formerly the large market in the Soviet Union and associated countries. However, under the free market system, wool produced in Central Asia is not currently able to match that from Australia and New Zealand for quality and price in a crowded world market.

Milk, on the other hand, was always imported in larger quantities than it was exported. However, this situation has recently changed; in 2004 the subregion became a net exporter of milk. Kyrgyzstan produces the bulk of fresh cow milk for export in the subregion; it almost quadrupled the amount of fresh milk exported in 2004 compared to that of 2003. Within the subregion, Kazakhstan is the main importer of milk.

Central Asia is a net exporter of live animals, but a net importer of meat and livestock products. Sheep are the main animal species exported, and the Islamic Republic of Iran is the main exporter. The main import products include chicken meat, beef and veal, and wool, of which Kazakhstan, Tajikistan and the Islamic Republic of Iran, respectively, are the main importers. Figures 3 and 4, respectively, show the value of exports and imports of live animals and animal products in Central Asia during the period 1993 to 2003. The total export of live animals and animal products decreased up to 2004, coinciding with negative economic growth during the 1990s. The main share of total meat imports to Central Asia was made up of beef and veal, but this situation changed in 1998. In 1993 the share of beef and veal in total meat imports was 66 percent, this share decreased to 22.8 percent in 2003, with an absolute difference of US$207.3 million. The share of poultry meat increased in relative terms – from 21 percent in 1993 to 73 percent in 2003, but the absolute value actually decreased from US$70 million in 1993 to US$37 million in 2003.

FIGURE 4
Imports of live animals and animal products in Central Asia



Source: FAOSTAT.

1.3 Projected demand for livestock products

Among the factors affecting food security are population growth, economic growth, food production and food demand. It is projected[1] that the population of each Central Asian country will increase. The demand for cereal and meat products is expected to rise by 3.37 million tons (32 percent change) and 0.91 million tons (47 percent change), respectively, by the year 2020 (IFPRI, 2001). Figure 5 shows that total milk, meat and egg production for Central Asia is predicted to increase to 2030.

In spite of the negative economic growth during the 1990s, all of the Central Asian countries are expected to have a 3 percent economic growth at least up to the year 2020 (Pandya-Lorch, 2000). Central Asian countries will need to import some cereals and double their imports of meats in order to meet increased demand (Pandya-Lorch, 2000). Demand for meat per person per year in Central Asia is projected to increase by 5 kg between 1995 and 2020. Net meat imports are projected to more than double to 0.38 million tons between 1995 and 2020 (IFPRI, 2001).

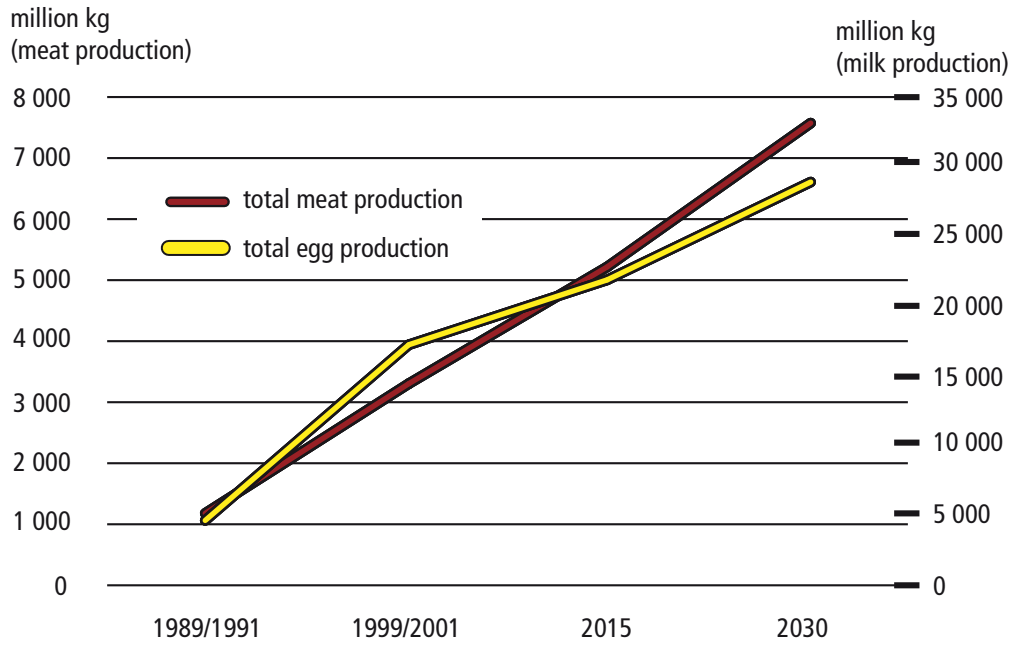
TABLE 4
Annual growth rates: livstock numbers, meat and milk production for Central Asia

	Annual growth rate (percentage)	
	1990–2000	2000–2015
Total livestock numbers	5.4	1.3
Total meat production (kg)	10.6	3.2
Total milk production (kg)	14.3	1.6

Source: FAO (2003b).

[1] The projections were calculated using the International Model for Policy Analysis of Commodities and Trade (IMPACT), which was developed by researchers at the International Food Policy Research Institute. The projected figures are for the period 1995 to 2020 as reported in Pandya-Lorch (2000).

FIGURE 5
Total meat and milk production Central Asia past and projected



Source: FAO (2003b).

1.4 Poverty

The Central Asian republics are currently facing serious development challenges with respect to increasing food security, alleviating poverty and minimizing natural resource degradation. The past decade's transition from a centrally-planned economy towards a market-oriented economy has not been adequately supported by institutional development. As a result, the standard of living has declined (IFPRI, 2000). Compounded by a decline in livestock numbers, which have fallen drastically in all countries of Central Asia, these circumstances have resulted in increasing levels of poverty in rural areas. Problems in the livestock sector have been aggravated by reduced shipments of imported feed concentrates, and the disruption of fodder production and conservation for critical winter feeding.

Poverty rates can be quantified on the basis of a poverty line, which provides a threshold in income or consumption below which a household can be classified as poor. Some poverty lines aim to be internationally comparable and, thus, are useful for producing continental and global totals. Widely cited examples are US$1 day^{-1} and US$2 day^{-1} lines published by the World Bank. Data based on an international poverty line show the number of people who cannot purchase a roughly similar basket of commodities (World Bank, 2001). The proportion of the population living below the: US$1 day^{-1}, and US$2 day^{-1} poverty lines in Central Asian countries are shown in Table 5.

TABLE 5
Poverty rates by country

Country	Less than 1US$/day	Less than 2US$/day
Afghanistan	*	*
Iran (Islamic Republic of)	*	*
Kazakhstan	1.5	15.3
Kyrgyzstan	*	*
Tajikistan	*	*
Turkmenistan	20.9	59
Uzbekistan	3.3	26.5

Sources: World Bank (2001) as presented by Thornton *et al.* (2002).

*Data unavailable.

2 Livestock production systems

2.1 Overview

In this report, livestock production systems will be described according to the classification produced by Seré and Steinfeld (FAO, 1996a) (see Annex for details of the classification), but based on updated data from 2004 (FAO, 2004a). The livestock production systems of the Central Asia subregion are all classified as arid/semi-arid and include grassland-based production systems, mixed rainfed production systems, and mixed irrigated production systems. The region contains mountains, vast deserts and in particular, treeless, grassy steppes. The semi-arid climate, with long, cold winters, makes large parts of Central Asia unsuited to crops (FAO, 2003c). Most of the area is dedicated to permanent pastures, which cover almost 400 million hectares, or 65 percent of the total land area (FAOSTAT). Roughly 260 million hectares of these rangelands form the world's largest contiguous area of grazed land (USGS, 2006). Under the allocation method used by FAO (1996a), most of these permanent pastures lie within the mixed rainfed system, while only 10 percent of the total area of permanent pastures in Central Asia is found in grassland-based production systems. The area of arable land in the subregion is on average only one-sixth of the area of permanent pastures. Table 6 gives general data, on production of the main livestock products and productivity levels in the different systems occurring in Central Asia.

Grassland-based systems

Central Asian countries have a rich heritage of nomadic civilization, and in the past, transhumant stock rearing was the main land use (FAO, 2003c). Annual rainfall is typically low, and extremes of heat and cold occur. Much of the land could, therefore, only be briefly used each season by domestic herbivores grazing off vegetation flushes. Pastoral people exploited the desert and steppe, seasonally moving their herds of cattle and horses and flocks of sheep to different pastures (Kerven *et al.,* undated.). Nomadic, transhumant and agropastoral systems were common.

Traditional forms of mobile pastoralism were widely practised in the Soviet Republics of Central Asia until the 1930s. Production was based on common property systems and intensive group interaction (e.g. risk sharing, high mobility, herd diversification and labour division). Mobility patterns in Central Asia were determined by topography, and long distance horizontal and vertical movements (transhumance) were common (FAO, 1996b). Kyrgyz livestock keepers, for example, practised transhumant grazing of sheep, cattle and horses and, in some areas, yaks and Bactrian camels (Miller, 2001). Traditionally, horses were the main livestock species, being best suited to long transhumance and foraging in deep snow (FAO, 2003c). Rangeland use was regulated by tribal councils.

However, during the 1930s mass collectivization took place and the economic system became based on public (state) and collective ownership of productive resources, including the majority of the livestock population. During the collectivization process, nomadic pastoralists were forcibly transferred to permanent settlement, which brought traditional nomadism to an end. Sedentarization of nomads in Kazakhstan was completed in a period of only five years (FAO, 1996b). Semi-nomadic types of production emerged, under which animals grazed during winter and spring in a fixed location where

houses, shelters and water points are provided, while during summer and autumn animals grazed pastures at more distant locations (ibid.).

The new systems involved the introduction of improved breeds, and specialized commercial production oriented towards exporting livestock and livestock products to Russia (Miller, 2001). Sheep became much more important and profitable (FAO, 2003c). Livestock still moved between seasonal grazing lands, but many of the summer pastures became intensively grazed as the collective and state farms established large flocks. Winter grazing lands were often located hundreds of kilometres away and animals were transported by trucks and trains between seasonal grazing lands (Miller, 2001).

Since the transition of the CIS countries from a centrally-planned to a free-market economy, the agricultural sectors in these countries have undergone substantial changes as a result of privatization, land reforms, price liberalization, and decentralization of decision-making. The system of collective livestock production has ceased to function, and pastoral livestock production in most countries has adjusted to the market economy. In Kyrgyzstan, for example, privatization of state and collective enterprises took place in 1992. Livestock were shared out among individuals working in the enterprises, and private herding then developed. Currently, three-pasture transhumance continues, but multispecies herds are now normal. Natural pasture is almost all common grazing (FAO, 2003c). Despite these changes, the importance of the livestock industry, and in particular pastoral livestock, to the CIS countries of Central Asia, has remained as high as it was during the Soviet era (FAO, 1996b).

Grassland-based systems can be also be found elsewhere in the subregion. Nomadic small ruminant production remains significant in Afghanistan (FAO, 2000). Nomadism is practised on a limited scale in the Islamic Republic of Iran (FAO, 2004b).

Dairy milk output is relatively high in this system, and milk yield, in kg per cow per year, is about 1 000 kg more than the average in Central Asia. Total dairy milk production is 2.5 million kg, which is almost 15 percent of the total dairy milk production in the region, produced by 9 percent of the dairy cows. Pastoralists are often interested in keeping small ruminants, as they are easier to handle and trade (FAO, 1996). Almost 15 million sheep and goats are held in this system, almost 7 times the number of cattle (FAO, 2004a).

In Kyrgyzstan and Kazakhstan grassland-based systems in cold semi-arid zones can be found. In these locations, winter shelter is necessary and a major survival strategy is to have the herd fat enough in autumn to survive through winter and spring. In much of this area, the terrain is rough, and horses are used for herding as well as being kept for meat and milk. Mixed herds are the rule, involving large and small ruminants, horses and often camels. Herders have little interaction with crop producers as there is little farming and crops are limited to favoured, often irrigated, sites. Winter camps are in relatively cold areas and do not usually have access to alternative sources of employment or sources of bought fodder (FAO, 2003c).

Extensive livestock production remains an important component of Central Asian economies. In the extreme climates that occur in this subregion, livestock is often the most viable enterprise. Local breeds are often well adapted to the harsh conditions. For example, local breeds of sheep can thrive in the extreme climates of the low-lying Kara Kum and Kyzl Kum deserts which extend over much of Turkmenistan, Uzbekistan and southern Kazakhstan (Kerven *et al.,* undated).

Mixed production systems

Both mixed rainfed and mixed irrigated systems of the arid/semi-arid tropics/subtropics can be found in Central Asia. These systems support 93 percent of the people living in Central Asia. In the Islamic Republic of Iran, for example, it is common for animals to be held in support of crop production. Flocks of sheep and goats are taken out from the villages to adjacent communal ranges during the summer grazing season. Crop residues, weeds, wheat and barley stubble are other sources of animal feed. Cattle, donkeys and horses are also kept under this system. The cattle, when present, are kept on the farms or graze close to the village, as they cannot move very far because of the topography of the rangelands. Meat is the main output of the system and milk, directly or in processed forms, is mainly consumed by the households (FAO, 2004b).

In Afghanistan, cattle are an important source of draught power and milk for subsistence purposes (FAO, 2000). In some parts of the country, milk and dairy products are also sold. Villagers also keep sheep and goats, but this is a less common than keeping cattle (ibid.). Normally the small ruminants of the village are herded in joint flocks. Goats utilize alternative feed sources and are used to lead the combined flocks. Most of the animals are moved out of the hotter lowlands in the early summer to reach the better grazing areas and cooler weather of the highlands. During winter, most village sheep and

TABLE 6

Resource base, production and productivity data by production system in Central Asia

	Grassland-based			Mixed rainfed			Mixed irrigated			Landless	TOTAL
	Temperate/ Highlands	Humid/ Sub humid	Arid/ Semi-arid	Temperate/ Highlands	Humid/ Subhumid	Arid/ Semi-arid	Temperate/ Highlands	Humid/ Sub humid	Arid/ Semi-arid		
Parameters:											
Human population (millions)			9.7			15.5			120.8		146.1
a. Resource base											
a1. Permanent pastures (million ha)			43.2			246.8			108.3		398.3
a2. Arable land (million ha)			3.7			29.7			29.4		62.7
a3. Irrigated land (million ha)			2.9			3.6			14.9		21.3
a4. Livestock numbers											
cattle (million head)			2.2			3.5			17.3	2.7	25.7
dairy cows (million head)			1.0			2.1			8.4		11.4
buffalo (million head)						0.009			0.5		0.5
sheep and goats (million head)			14.8			10.6			106.0	5.4	136.7
b) Major outputs (million kg)											
beef and veal meat			150			240			780	180	1 400
buffalo meat			0			0			12	0	12
sheep and goat meat			130			100			630	53	900
pig meat			20			130			7	57	200
poultry meat			10			20			330	580	900
eggs			30			50			280	490	800
dairy milk			2 500			4 100			10 700	0	17 200
other milk			30			50			1 400	0	1 500
milk production total			2 500			4 100			12 100	0	18 700
c) Productivity and density indicators											
beef and buffalo meat kg/head			71			69			44	68	52
sheep and goat meat kg/head			9			9			6	10	7
milk yield kg/cow			2 535			1 970			1 276		1 509
d) Self-sufficiency of systems											
rum meat kg/inhabitant			29			22			12		16
monogastrics meat kg/inhabitant			3			10			3		8
eggs kg/inhabitant			3			3			2		6
milk kg/inhabitant			258.5			264.8			100.0		128.1

Sources: FAO (2004a); FAO (1996a).

goats are housed during the night and during bad weather. Hay, straw, leaves, and various local types of roughage and concentrates are given as supplementary feeding during this period. Supplementation with concentrates for two months is a common practice (ibid.).

Mainly in the northern part of the country, flocks of Karakul sheep are kept for astrakhan pelt production. The ability of the Karakul to produce meat and wool under very extreme climatic and ecological conditions has helped it to survive years when war and lack of demand on the international markets reduced the importance of pelt production (ibid.). The main source of feed is natural pasture in one of the driest parts of the country. Different pastures in are used in different seasons; supplementary feeding with hay and concentrates is practised during winter or other periods of scarcity. With an increasing demand for meat, Karakul farmers have started to recognize that rearing lambs for mutton can be more profitable than pelting the lambs, but the security situation and the need for cash in spring are still important reasons favouring pelting (ibid.).

Mixed rainfed system

The mixed rainfed system in Central Asia covers nearly a quarter million ha of permanent pasture and another 30 million ha of arable land, which is about 60 percent of the total area of permanent pasture and arable land in Central Asia. Sheep and goats are the predominant livestock species. More than 10 million sheep and goats are held in this system, 3.5 times the number of cattle (FAO, 2004a). Buffaloes are also found, but fewer than in the mixed irrigated system. The output of pig meat is higher in this system than in the other systems within the subregion. However, the total number of pigs in Central Asia is very low; population numbers are 0.16 percent of the world total (FAOSTAT). The amount of milk produced per inhabitant is 265 kg per year, which is higher than the figures for the other systems.

Mixed irrigated system

The mixed irrigated system supports the majority of people in Central Asia – 83 percent live in the arid and semi-arid zones of the mixed irrigated livestock production system. Ruminant numbers are large in these systems. Small ruminants (sheep and goat) are particularly important in this system, 106 million sheep and goats out of the total of about 137 million in Central Asia live in this system. They are an important source of income for the poor mainly because they require low initial capital and maintenance costs, and use marginal land and crop residues to produce milk and meat. Only in the mixed irrigated system is buffalo meat produced. Outputs of beef and veal meat, sheep and goat meat, and poultry meat are highest in the mixed irrigated system, but the output of pig meat is the lower than in the other systems. The total milk production, most of it from cows, is highest, although the milk yield per cow is low compared to the other systems.

Landless system

Landless ruminant production systems can be found in the Central Asian CIS countries. The Islamic Republic of Iran also has landless cattle husbandry. The animals are kept in industrial units and modern barns scattered across the country. The livestock raised in this system are housed all year round and are fed entirely on cultivated fodder, along with supplements and imported feed. The cattle are usually kept in the vicinity of cities where the veterinary, sanitation and marketing services can be easily accessed; the outputs are both dairy and meat products (FAO, 2004b). In Uzbekistan, pig and poultry production industries are found near large cities and industrial centres (FAO, 2001).

2.2 Roles and functions of livestock in Central Asia

The economic and social life of nomadic people very much depends on their livestock. Their herds provide food such as meat and dairy products, wool and leather from which to make clothes and all kinds of other household items such as felts, quilts, pillows, and mattresses and decorations for yurts (portable dwelling structures used traditionally by nomads in the steppes of Central Asia). Animals were also the most important exchange commodity. In the past, qalïng (kalïm), bride price, and qun, blood price, were paid in cattle. Today, in some rural regions of Kazakhstan and Kyrgyzstan, the bride price is still paid partly with cattle in addition to money. Horses, oxen, yaks and camels served as means of transportation (Köçümkulkïzï and Waugh, 2002).

The importance of livestock can be heard in traditional greetings. Nomadic Kazakhs and Kyrgyz will often greet each other by asking Mal-janïngar amanbï? i.e. "Are your cattle O.K.?". At a wedding, the most important blessing or wish among the Kyrgyz is Aldïngardï bala, arqangardï mal bassïn! i.e. "May you have a lot of children running in front of you and a lot of cattle behind you!" (Köçümkulkïzï and Waugh, 2002).

Central Asian nomads prize horses greatly. Horses are relatively easy to take care of, and in contrast to other animals, they can survive through cold winters. They are also the fastest moving domestic animals. The mountain pastures and grasslands of the steppes are particularly suited to raising horses. Although, traditionally, horses would not normally be ridden just for recreation, the nomads' skills on horseback were developed through participation in various games. These activities include races, mounted competitions involving struggling for the possession of a headless goat carcass, and traditional courtship competitions to determine who was most deserving of the future bride (Köçümkulkïzï and Waugh, 2002). The sport of polo developed out of traditional riding competitions of the horse nomads of Central Asia (ibid.). Horses were also important in the rituals of nomadic hospitality both because of fermented mare's milk (koumiss), and as gifts which would be presented to honoured guests along with full harness. Koumiss is important both for food and for ritual purposes. Today, semi-nomadic Kyrgyz make money by selling it to travellers (ibid.).

Camels are also important to the culture of the Kazakhs and Kyrgyz and feature in the legends and folktales of Central Asia. The camel was the most important animal for the development of the long-distance overland trade across Asia – involving the dromedary in western Asia and the Bactrian camel in the higher and colder regions of Central and East Asia. Camels are extremely well adapted for transport purposes – they do not require roads, can carry heavy loads, survive on sparse vegetation, and can go for days without drinking. In addition to transport, camels provide their keepers with wool for making ropes, cloth and felt. The Kazakhs also make a drink called shubat from camel milk (ibid.).

There are many benefits from integrating crop and livestock production; roles and functions of livestock in mixed farming systems are summarized in Table 7. In mixed farming systems, besides providing food, livestock are a source of draught power, fertilizer, serve as a form of insurance, and making possible the utilization of land that is marginal for crops (Sajise, 1998). It is suggested that crop–livestock systems will see important growth in the future and will remain the dominant systems in Asia (Devendra *et al.,* 2005).

TABLE 7
Roles and functions of livestock in mixed production systems

• Large ruminants provide power for operations such as land preparation and for soil conservation practices.
• Both ruminants and non-ruminants provide manure for the maintenance and improvement of soil fertility.
• The sale of animal products and the hiring out of draught animals provides cash for the purchase of fertilizers and pesticides used in crop production.
• Animals grazing vegetation under the tree crops control weeds and reduce the use of herbicides.
• Animals provide entry-points for the introduction of improved forages into cropping systems. Herbaceous forages can be undersown in annual and perennial crops, and shrubs or trees established as hedgerows in agroforestry-based cropping systems.

Source: Devendra *et al.* (2005).

The grassland-based systems of Central Asia make productive use of rangelands that are only suitable for grazing as the rainfall is too low for sustainable cropping under rainfed conditions. Livestock play a significant role in the livelihoods of poor people in these production systems, as they are often one of the few assets they own. Ruminant livestock in grassland-based systems are kept to produce meat and milk for consumption and sale (FAO, 2004c). However, as described above they have a number of other important roles in pastoral societies.

The role and function of livestock in landless systems in Central Asia is restricted to the output of animal products such as meat and eggs.

2.3 Projected changes in production systems

Grazing systems have limited scope for expansion. Throughout the world, traditional grazing areas are coming under increasing pressure due to growth in the human population and subsequent competition to use the land for other purposes. To some extent, in some countries, these systems can intensify by incorporating new technologies, especially in the higher potential areas. Where this is not facilitated by strong institutions, local empowerment and regulation of access to resources, and where population pressure persists, grazing systems are threatened with resource degradation through overgrazing (Steinfeld, 1998). Moreover, good pastureland is being converted into cropland, leaving increasingly poorer land for grazing and mixed farming (ibid.). However, rangelands have often proven to be more resilient than originally believed, and breeding and raising livestock in the drier areas and finishing them in more intensive systems closer to the final markets may offer an option to increase productivity and improve pastoralists' income (ibid.). Overall, current trends are that the share of grassland in livestock production is falling and that of cropland in support of industrial livestock production is rising; as a result, grazing systems will diminish in importance (Rae, 2002).

Extensive, grassland-based livestock production will continue in the arid and semi-arid regions of Central Asia. The climate is harsh and rainfall is very unreliable, and livestock keeping is the only feasible form of agricultural land use and source of livelihood for the local population. However, there is a risk that open access to the rangelands leads to land degradation and loss of pasture species (FAO, 2004c). In parts of the subregion, an increase in small ruminant production on permanent pastures is contributing to natural resource degradation and the loss of plant biodiversity (Aw-Hassan *et al.,* undated.). However, there is considerable potential for the development of effective methods of communal ownership and control, to combat such problems and promote sustainable production (FAO, 2004c).

Pastoralism will continue for the near future in Central Asia, because it is, generally, an efficient, means of utilizing the grazing lands of semi-arid zones (Kandagor, 2005). Indeed, "traditional" forms of migratory pastoralism are re-emerging in Central Asia. In the cold desert regions of Central Asia, herds/flocks move to escape extremes of cold, aridity or lack of natural forage. These deficiencies can be remedied through capital expenditure on industrial inputs – livestock shelters, water development and (most importantly) cultivated/irrigated forage. These inputs were formerly provided by the state, through collectives. Since privatization, the costs have to be met by the individual livestock-owning family. It may be more attractive for these livestock keepers to move their animals rather than to invest in expensive inputs to alleviate problems of resource insufficiency on site – hence the re-emergence of migratory livestock keeping (Kerven *et al.,* undated).

Describing recent trends in pastoral livestock keeping in Central Asia, Kerven et al. (undated) note that: "In response to newly-emerging market conditions, pastoralists with privately-owned animals are altering their grazing and livestock husbandry systems. One option is making maximal use of the natural pastures, by lengthening the migratory cycle and reducing dependence on expensive cultivated fodder. This requires sufficient herding labour and secure access to grazing land. Another choice is to continue supplementing the natural forage with purchased or home-grown fodder. This option depends on a high domestic or international price for livestock products, in order to justify the cost of animal feed. A third option is to stop raising animals for surplus, and instead to grow crops under irrigation and retain animals only for home use. Other livestock-keepers are leaving agriculture altogether and seeking employment in the towns."

Mixed farming systems will see continued intensification and important growth, with livestock production based on crop by-products and surplus. Some productivity gains can be achieved by further enhancing nutrient and energy flows between the crop and livestock component. Involution of the mixed farming system is a potential threat in some locations, where the stability and sometimes very existence of mixed farming is threatened by declining soil fertility, triggered by population pressure, fragmentation of arable land, poverty and lack of market access (Steinfeld, 1998).

Central Asia harbours one of the largest blocks of irrigated areas of land in the world, some of which borders sheep production areas. By exploiting the ability of this cropland to grow high-energy forage and feeds to supplement natural grazing, there is potential for the intensification of meat and milk production (Iñiguez, 1999). Given low personal purchasing power in the former Soviet republics, China's expanding economy may provide an alternative market for these products. Seasonal demands associated with religious celebrations in the Gulf States and in West Asia offer another potential market (ibid.). There is still substantial sheep genetic diversity in Central Asia, and an extensive knowledge base has been accumulated in national research centres. This will make it easier to re-orient production systems to supply specific market requirements (ibid.).

Landless systems in Asia are mainly established in the vicinity of large and medium-size cities. Excessive animal densities can cause nutrient surpluses and other environmental and human health problems. These systems are profitable in the short run, but their sustainability is doubtful. A potential solution is to allow specialized commercial production to operate in an "area-wide" integration with crop production where nutrient balances are maintained and the land's capacity to absorb animal waste is respected (Steinfeld, 1998).

Two important structural changes apply across production systems – a general growth in scale and a trend from horizontal to vertical integration. Levels of livestock production and processing are increasing in response to technological development and market requirements (FAO, 1999).

2.4 Impact of production system trends on animal genetic resources

- In Central Asia, and especially the CIS countries, grasslands are often heavily overgrazed (FAO, 1997b). If the sustainability of the production systems is threatened, the breeds kept under these systems will also be threatened. However, in some areas extensive herding seems to be the only practical way of earning a living from the land, in which case, breeds well-adapted to these systems will be preserved.
- Mixed systems will see continued intensification and important growth. As these systems adopt new technologies which allow for the intensification of production, existing genotypes are replaced with what are perceived to be improved varieties (Blackburn *et al.,* 1998). Also more emphasis will be placed on monogastrics. Native breeds sustained in mixed farming systems will be threatened.
- Landless systems will further increase in importance in Central Asia. The introduction of high-yielding breeds and specialized modes of production especially in landless monogastric systems will lead to losses in genetic diversity.

3 Animal genetic resources

3.1 Status

Table 8 gives total population sizes and number of breeds for the major livestock species recorded in the Central Asia subregion, and the subregion's share of the world's total population and number of breeds. Tables 9 and 10 show the transboundary mammalian and avian breeds in Central Asia.

TABLE 8

Total population size and number of breeds of the major livestock species in Central Asia and their share of the world total

	Population size (×1 000)	Number of national breed populations	Share of world total	
			Population (%)	Number of breed populations (%)
Buffalo	559	3	0	2
Cattle	23 742	65	2	2
Yak	n/a	3	n/a	11
Goat	31 776	46	4	4
Sheep	92 534	110	9	5
Pig	1 495	11	0	1
Ass	2 009	19	5	11
Horse	1 847	55	3	4
Camel[1]	374	14	2	12
Chicken	336 703	28	2	1
Duck[2]	1 870	6	0	1
Turkey	2 784	6	1	3
Goose (domestic)	1 080	1	0	0

Source: FAOSTAT (estimates of 2005 live animal populations).

[1] Dromedary and Bactrian camel.

[2] Domestic duck and Muscovy duck.

TABLE 9
Transboundary mammalian breeds in Central Asia

Cattle	Goat	Horse	Sheep
Aberdeen-Angus	Angora	Adaev	Arabi
Ala-Tau	Bezoar	Akhal-Teke	Argali
Aulie-Ata	Kurdi	Arab	Australian Merino
Black-Motley	Lori	Caspian	Baluchi
Brown Swiss	Markhor	Don	Hampshire Down
Bushuev	Russian Central Asian Local Coarse-Haired	Karabair	Herki
Central Asian Zebu	Sahelian	Karabakh	Jaidara
Galloway	Soviet Mohair	Kazakh	Karakul
Holstein (black and white)		Kurdi	Kazakh Fat-Rumped
Jersey		Orlov Saddle Horse	Lincoln Longwool
Kalmyk		Russian Trotter	Makui
Kazakh		Thoroughbred	Marco Polo's Sheep
Kazakh Whiteheaded		Waziri	Red Karaman
Kurdi		Yabu	Red Sheep
Latvian Brown			Romanov
Red Steppe			Sary-Ja
Santa Gertrudis			Shirazi
Simmental			Soviet Merino
			Turki
			Urial

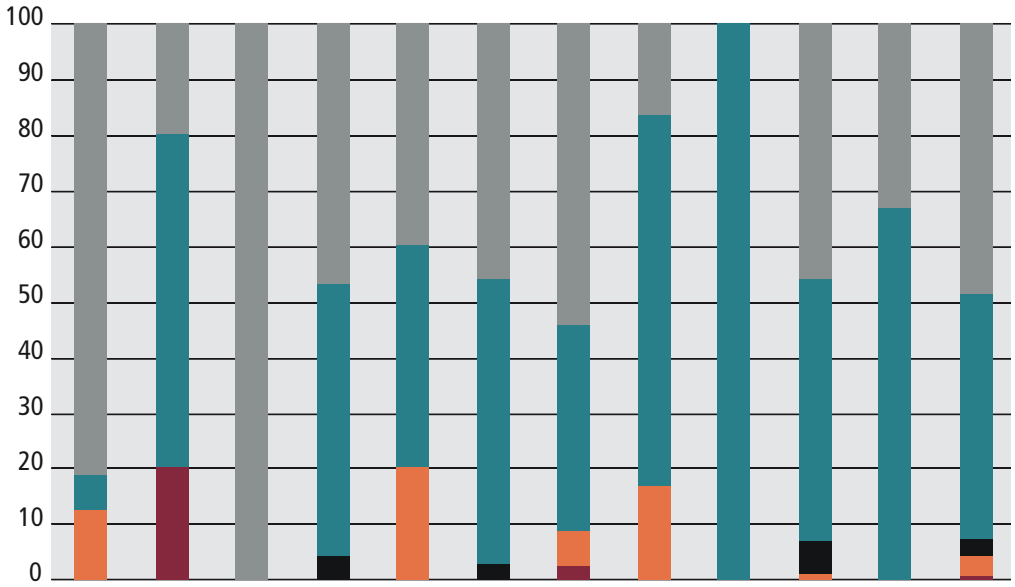
Ass	Bactrian camel	Dromedary	Pig	Rabbit
Hamadan	Kazakh Bactrian	Arab Camel	Landrace	Chinchilla
Khulan	Mongolian Bactrian	Turkmen Arvana	Large White	
Meskhet-Javakhet			Ukrainian White Steppe	

TABLE 10
Transboundary avian breeds in Central Asia

Chicken	Duck	Guinea fowl	Turkey
Commercial strain, layer, Leghorn	Pekin	Grey Guinea fowl	Bronze
Commercial strain, layer, Lohmann Brown			White
Commercial strain, layer, Lohmann White			
Commercial strain, Rodonit			
Cornish			
Fayoumi			
New Hampshire			
Plymouth Rock			
Rhode Island Red			

Figures 5 and 6 illustrate the structure of the data recorded in the Global Databank for Farm Animal Genetic Resources, showing the risk status of the mammalian and avian breeds recorded for each species in the Central Asia subregion up to 2005. Of the extant mammalian breeds in Central Asia only 4 percent are categorized as at risk. However, this is probably an underestimate of the actual situation, primarily due to lack of information. Population data is available for only 55 percent of the mammalian breeds, and those that are most at risk of extinction are usually those for which it is most difficult to obtain accurate census information (FAO/UNEP, 2000). For avian breeds in Central Asia, information regarding population size and risk status is very inadequate.

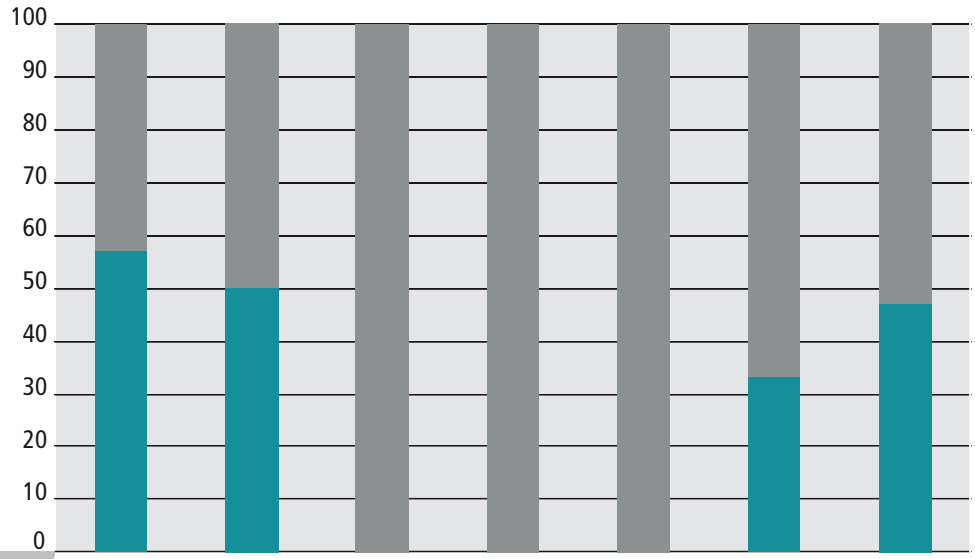
FIGURE 6
Risk status of Mammalian breeds recorded in Central Asia* up to December 2005: absolute (table) and percentage (chart) figures



RISK STATUS	Ass	Bactrian Camel	Buffalo	Cattle	Dromedary	Goat	Horse	Pig	Rabbit	Sheep	Yak	Total
critical	0	1	0	0	0	0	1	0	0	0	0	**2**
endangered	2	0	0	0	1	0	3	1	0	1	0	**9**
extinct	0	0	0	2	0	1	0	0	0	6	0	**9**
not at risk	1	3	0	24	2	19	17	4	1	47	2	**120**
unknown	13	1	3	23	2	17	25	1	0	46	1	**132**
Total	**16**	**5**	**3**	**49**	**5**	**37**	**46**	**6**	**1**	**100**	**3**	**272**

*Breeds that are also recorded in countries outside Asia are excluded from the analysis.

FIGURE 7
Risk status of avian breeds recorded in Central Asia* up to December 2005: absolute (table) and percentage (chart) figures

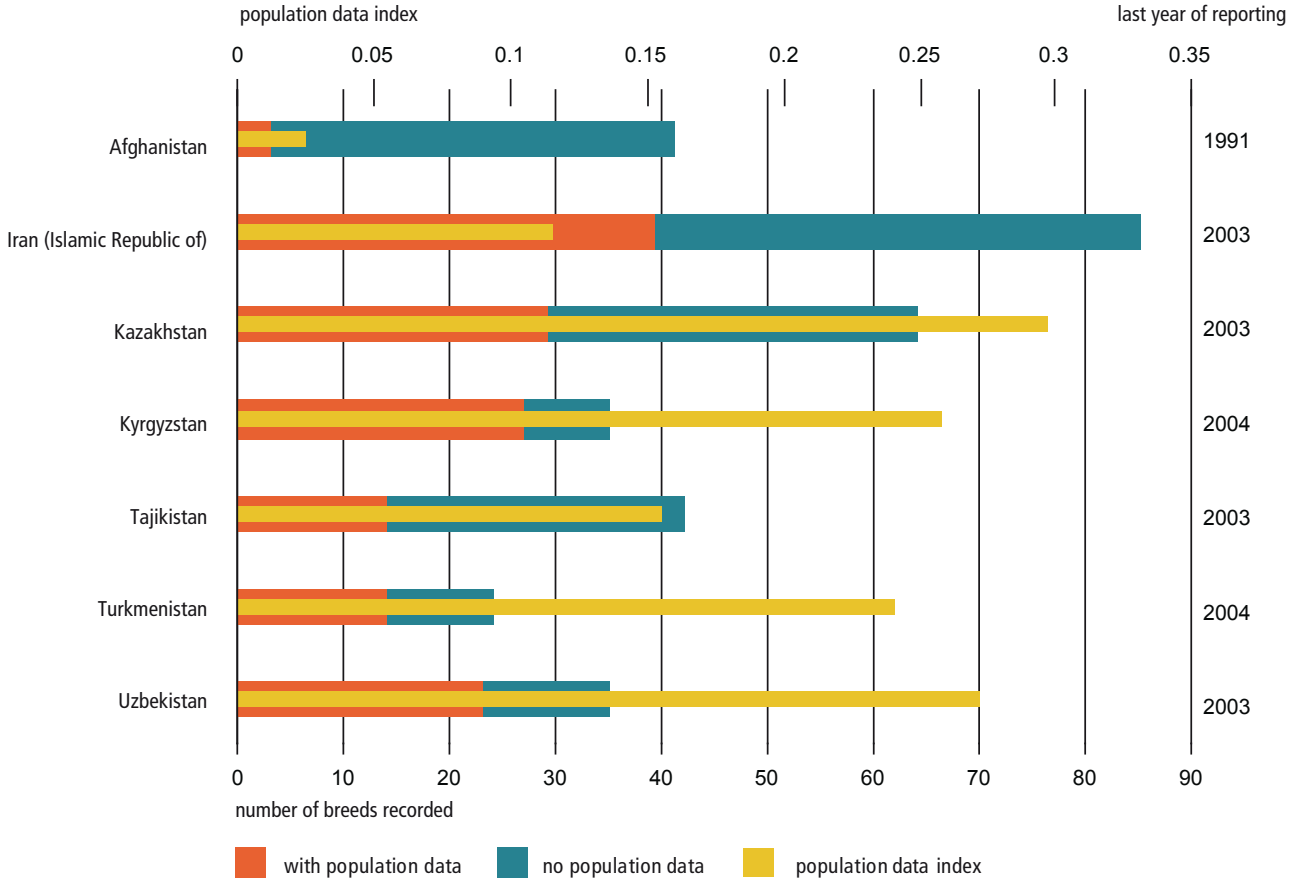


RISK STATUS	Chicken	Duck	Goose	Guinea fowl	Quail	Turkey	Total
not at risk	12	1	0	0	0	2	**15**
unknown	9	1	1	1	1	4	**17**
Total	**21**	**2**	**1**	**1**	**1**	**6**	**32**

*Breeds that are also recorded in countries outside Asia are excluded from the analysis.

Figures 7 and 8 provide general overviews of the quantity and quality of the population data provided by each country for their animal genetic resources. The total number of breeds recorded by each country is shown. For all countries, breeds are split into those with population data and those with no population data (risk status unknown). When one or more fields in the Global Databank for Farm Animal Genetic Resources are completed then the breed is identified as having population data. For those breeds recorded as having population data, a population data index (PDI) is calculated, which gives an indication of the completeness of the data provided by the country. Selected basic population data fields, regarded to be the most important and used in the calculation of risk status, are considered – population size (absolute or range), number of breeding females, number of breeding males, and the percentage of females bred to males of the same breed (FAO/UNEP, 2000).

FIGURE 8
Population data status and index for mammalian breeds recorded by Central Asian countries up to December 2005

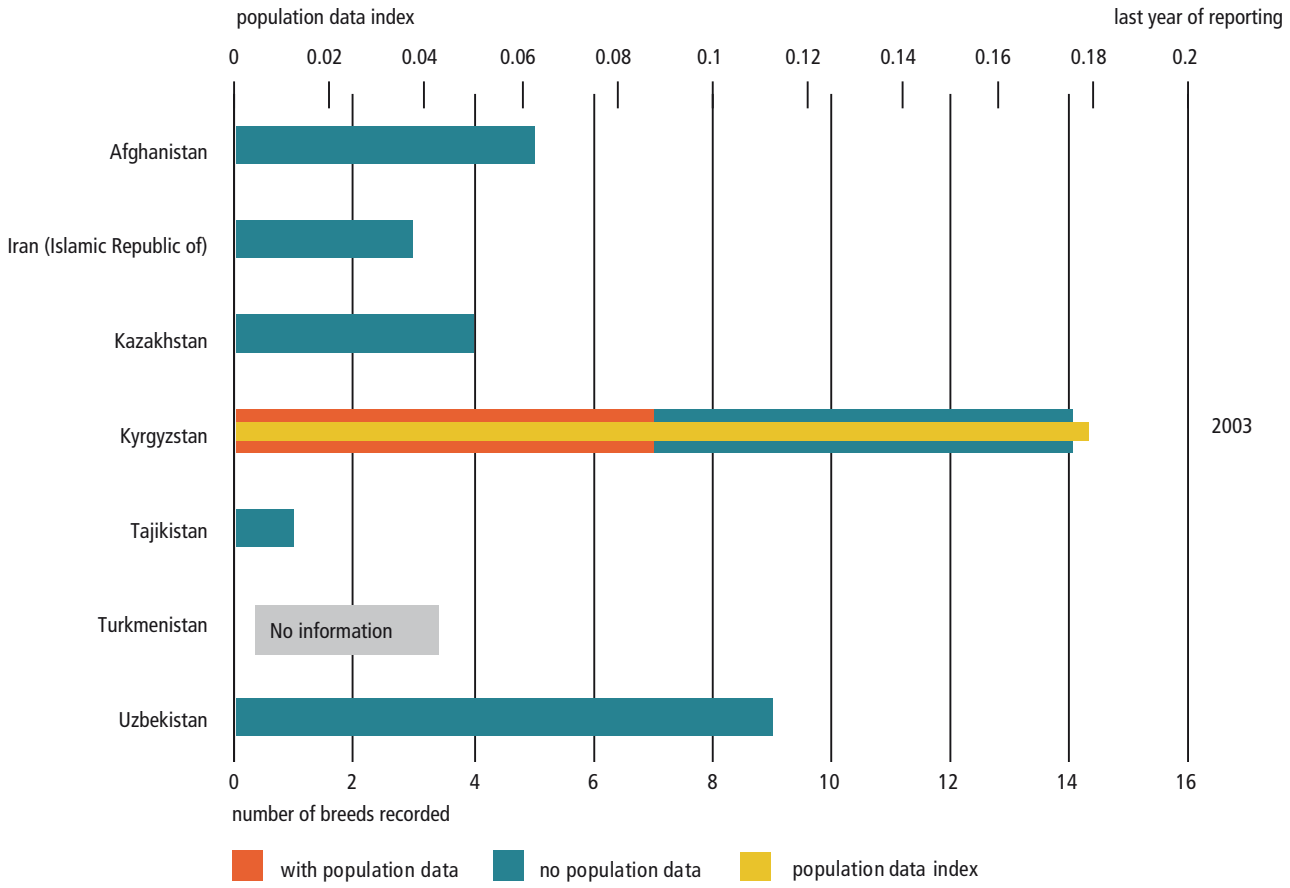


With population data: Those breeds with information recorded in one or more of the 16 population data fields.

No population data: Those breeds with no information recorded in any of the 16 population data fields.

Population Data Index (PDI): For each country the PDI was calculated only for those breeds recorded with population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

FIGURE 9
Population data status and index for avian breeds recorded by Central Asian countries up to December 2005



With population data: Those breeds with information recorded in one or more of the 16 population data fields.

No population data: Those breeds with no information recorded in any of the 16 population data fields.

Population Data Index (PDI): For each country the PDI was calculated only for those breeds recorded with population data. The PDI is the fraction of selected population data fields (population size, number of breeding females, number of breeding males and the percentage of females bred to males of the same breed) that contain information, averaged across breeds.

3.2 Threats to animal genetic resources in Central Asia

The most important threats to animal genetic resources in Central Asia are environmental degradation, rapid political and economic change or instability, natural disasters, and livestock diseases and/or their control measures.

Overgrazing has reduced the productivity of dry rangelands and threatens extreme desertification, while in the mountains it has, in some areas, destroyed or retarded woody plant growth and reduced the stability of slopes, causing erosion, mud slides and reduced capacity for water retention (FAO, 2005). The rangelands of Kyrgyzstan, for example, were overgrazed and mismanaged during the Soviet era, with the alpine grazing lands the most severely affected (Miller, 2001). The situation has deteriorated in the post-Soviet period, with land around villages becoming badly degraded (ibid.). This environmental degradation threatens the sustainability of production systems in the affected areas and, hence, of the associated livestock breeds. In Uzbekistan for example, rangeland degradation is a serious problem for Karakul sheep production. In recent years, a sharp decrease in the productivity of Karakul sheep, especially in the winter period has been observed (CGIAR, 2001). The main reasons for this are considered to be a fall in the productivity of the rangelands (< 0.3 ton of dry matter per ha) and the failure of the sheep owners to provide additional feed, particularly during the winter (ibid.).

The transition from centralized economic planning to competition in the world market hit agriculture, and particularly livestock production, hard. Not only did markets evaporate, but the support infrastructure which had been geared to dealing with large state farms was also not well adapted to the needs of small private farmers (Iñiguez, 1999). The new republics, which formerly exported wool, pelts, and meat from large numbers of small ruminants, suffered from an economic downturn in their traditional markets. As their outlets disappeared, farmers were forced to respond with equally dramatic cuts in herds and flocks – a critical erosion of valuable genetic resources (ibid.). Other knock-on effects of the transition have been severe. It has proved impossible to retain the same level of organized breeding services as before, and this threatens the genetic quality of the remaining animals (ibid.).

Animal genetic resources in Central Asia also face threats from endemic and epidemic diseases and their control measures. Diseases such as Newcastle disease, foot-and-mouth disease, rinderpest, brucellosis, echinococcosis, tuberculosis and avian influenza are major threats to livestock in Central Asian countries. Outbreaks of Newcastle disease, which is endemic in many countries in the subregion is a major problem for rural poultry production. Foot-and-mouth disease is one of the most contagious diseases of mammals and has a great potential for causing severe economic loss. This disease is endemic and at a high prevalence in many countries in Central Asia; not one country in the subregion is on the official World Organisation for Animal Health list of disease-free countries and zones (OIE, 2005). Rinderpest is a disease which has caused catastrophic losses of cattle and buffaloes in the past. Worldwide efforts are made to eliminate the disease and it has been limited to a small number of locations; however, several Central Asian countries have not yet been declared free of rinderpest (OIE, 2005). Recently, avian influenza outbreaks have occurred in Afghanistan, the Islamic Republic of Iran and Kazakhstan. Besides deaths caused by the disease itself, massive numbers of birds are culled as part of eradication efforts. According to FAO guidelines on avian influenza, immediate stamping out is the most appropriate response. Stamping out usually involves the destruction of all poultry in a defined radius around infected areas and of poultry on "at risk" farms (FAO, 2004b). The loss of support services such as ready access to veterinary advice has increased the threat of disease to flocks and herds in CIS countries (Iñiguez, 1999).

Natural disasters are a further threat to animal genetic resources, and droughts lead to serious losses among the subregion's livestock. Water scarcity and fluctuations in rainfall, often lead to severe, droughts which can reduce the ruminant population in affected areas by as much as 50 percent (FAO, 2000; Iñiguez, 1999).

Another threat is the increasing availability of alternative means of achieving many of the functions traditionally performed by livestock. For example, the introduction of mechanized transport has resulted in a decline in the use of the dromedary (FAO, 2000).

3.3 Unique resources highlighted

Central Asia is a known centre of diversity for a number of livestock species. There is strong evidence that, more than 10 000 years ago, the domestication of small ruminants took place in this region, and there remains a rich genetic diversity among sheep and goats, including many breeds that are well adapted to a range of arid and semi-arid environmental conditions (Iñiguez, 2005).

Among the notable small ruminant genetic resources of Central Asia are the Gissar sheep from Tajikistan and Uzbekistan; various Karakul strains from Kazakhstan, Turkmenistan and Uzbekistan; goat breeds for cashmere and mohair from Kazakhstan and Kyrgyzstan; and sheep and goat breeds with milk production potential from the Caucasus (CGIAR, 2001).

Most of the sheep in this region are fat-tailed – with a remarkable variability in types of tail. The fat tail is an adaptation that allows sheep to cope better with fluctuations in feed availability; they utilize feed stored as fat deposits in periods of scarcity, and replenish their fat tails in periods of plentiful feed. It is predicted that global warming will cause some dry areas to become even drier. Under such conditions, adaptations such as those available in the breeds of this region may be extremely valuable (Iñiguez, 2005).

One of the typical fat-tailed sheep of the region is the Karakul. It is extremely well adapted to the harsh and changing conditions of the steppe. The Karakul sheep industry, devoted to pelt production, dominated the steppe regions of Uzbekistan and parts of Kazakhstan and Turkmenistan. It is also found in the Islamic Republic of Iran and Afghanistan. Pelts were produced from newly born lambs – the most expensive astrakhan coming from deliberately stillborn lambs taken from older ewes destined for culling (Iñiguez, 1999).

The Saraja sheep breed, bred by Turkmen people, is a fat-tailed breed unique to the CIS countries. It provides good quality semi-rough heterogeneous white wool, used for producing Turkmen carpets (CR Turkmenistan, 2004). In Kazakhstan, Soviet Mohair goats can be found, which have strong constitutions and can withstand long distance drives (FAO/UNEP, 2000).

A unique horse breed found in this subregion is the Caspian miniature horse. Because of its diminutive appearance, the Caspian is often wrongly labelled a pony (Pickeral, 2003). The Caspian horse is very similar in appearance to an Arabian. Studies are currently being carried out to determine whether the Caspian is the ancestor of all modern hotblooded breeds, including the Arabian. This breed was once thought to have been extinct for 1 300 years, but was rediscovered in 1965. Along with the Asian wild horse it is widely believed to be the oldest type of horse in the world today (ibid.).

Another notable horse breed from this subregion is the Akhal-Teke, which originated from Turkmenistan, where it is the national emblem. This ancient breed, considered to be the predecessor of the Arabian and English thoroughbreds, was developed by nomadic tribes of the steppes and is highly adapted to the local conditions (Maslow, 1997). The breed has achieved great success in equestrian sports and is famed for its endurance on long marches (ibid.).

The dromedary (*Camelus dromedarius*) is native to some of the countries of the subregion. These one-humped camels can tolerate relatively long periods without food or water (FAO/UNEP, 2000), and are well suited to conditions prevailing in the subregion's drylands. An example is the Arvana breed, developed in Turkmenistan thousands of years ago. They are now reared in all parts of Turkmenistan, as well as in Uzbekistan, and southern districts of Kazakhstan. They are also found in northern parts of the Islamic Republic of Iran, and Afghanistan, where they may have been introduced by the Turkmen migrants in the twelfth century during the conquest of these countries. For the nomadic Turkmen population living in the Kara-Kum desert, the Arvana has been the only animal supplying milk, meat, wool and transportation for almost a millennium. The Arvana is a typical milk yielding, pack carrying and smooth riding breed (Dmitriez and Ernst, 1989).

Another camel species, the Bactrian camel (Camelus bactrianus), can also be found in this region. This two-humped camel was domesticated on the border of the Islamic Republic of Iran and Turkmenistan and spread across an area bordered by the Crimea, southern Siberia, Mongolia and China. It is thought that domestication took place independently of the domestication of the Dromedary. Bactrian camels are stockier than the dromedary and covered by thicker wool (FAO, 1982). In Afghanistan, Bactrian camels can be found in the Small Pamir Mountains (FAO/UNEP, 2000).

Another unique animal found in Central Asia is the yak. This bovine species is adapted to cold and harsh conditions and produces meat, milk, leather, wool, hair and draught power without need for intensive management and feeding. Yaks are found only in mountainous countries such as Kyrgyzstan. Kyrgyz people living in high mountainous regions have a strong tradition of breeding yaks and processing raw materials from these animals. However, the total number of yak in Kyrgyzstan has been declining during recent decades; in 1978 there were 79 300 head, but only 20 000 head were left at the beginning of 2000 (ILRI, 2002).

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ANNEX 1 Import and export figures

TABLE A1
Export of livestock and livestock products in Central Asia

Product	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	3 100	84 410	49 670	38 158	14 816	13 684	4 125	12 474	18 252	8 253	9 197
Meat, total	22 090	31 335	50 263	42 997	61 661	19 962	13 187	3 278	8 685	7 305	8 342
Beef and veal	22 090	31 335	50 263	42 997	61 661	19 962	13 187	3 278	8 685	7 305	8 342
Mutton and lamb	11 000	11 500	13 412	2 225	1 023	174	140	337	215	52	0
Goat	0	0	22	0	0	0	0	0	0	0	0
Pig	0	1 700	3 771	4 540	6 112	2 660	2 573	506	2 599	333	548
Poultry	90	1 785	1 326	1 400	3 218	2 177	1 899	1 690	3 225	5 714	7 072
Horse	0	0	28	108	375	235	92	14	0	0	0
Other	0	700	1 877	1 193	789	259	275	445	812	649	515
Milk total	0	0	74	725	2 405	76	151	547	528	1 419	3 160
Eggs total	400	15 028	1 559	601	1 388	2 522	1 572	23 300	17 464	9 450	19 757
Fibres hides and skins	19 730	111 370	75 706	58 670	52 530	23 858	28 463	28 484	9 289	16 276	9 289
Other	2 301	2 426	3 361	2 657	9 308	11 153	9 101	8 188	6 184	9 223	9 839
TOTAL	47 621	244 569	180 633	143 808	142 108	71 255	56 599	76 271	60 402	51 926	59 584

Source: FAOSTAT.

Note: value in US$1 000

TABLE A2
Import of livestock and livestock products in Central Asia

Product	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Live animals	8 951	10 420	3 085	1 530	1 794	4 902	3 521	3 799	4 092	5 219	7 566
Meat total	330 957	374 410	395 198	520 139	420 569	261 873	88 588	84 669	44 168	57 885	51 242
Beef and veal	218 960	321 571	316 072	391 787	297 501	108 549	43 856	37 327	25 843	26 485	11,703
Mutton and lamb	40 084	18 100	17 368	55 016	17 252	38 980	2 878	880	357	415	289
Goat	0	0	81	0	0	0	0	0	0	0	0
Pig	2 200	1 789	1 672	75	185	1 918	286	718	258	454	342
Poultry	69 683	32 949	59 835	72 870	105 282	112 040	41 460	45 149	17 451	29 864	37,820
Horse	0	0	0	0	0	8	1	17	0	131	1
Rabbit	0	0	150	1	0	0	0	1	0	0	0
Other	30	1	20	390	349	263	92	459	135	299	244
Milk total	280	550	370	4 234	12 437	1 374	1 463	1 397	1 875	1 494	2 985
Eggs total	3 920	3 255	9 760	39 054	6 066	4 947	3 790	8 396	3 555	6 675	11 224
Fibres hides and skins	0	2 439	2 481	2 256	8 429	6 747	14 298	13 489	8 267	8 211	12 087
Other	10 850	4 461	6 058	6 795	20 612	24 871	16 446	11 256	6 702	5 203	9 717
TOTAL	354 958	395 535	416 952	574 008	469 907	304 714	128 106	123 006	68 659	84 687	94 821

Source: FAOSTAT.

Note: value in US$1 000

ANNEX 2 Classification of livestock production systems

FAO (1996)[2] used the agro-ecological zones (AEZ) described by the Technical Advisory Committee (TAC, 1994)[3] and provided a comprehensive description of global livestock production systems using quantitative statistical methods. In this system the distinction is based upon grassland-based systems (LG), mixed-rainfed systems (MR), mixed irrigated systems (MI) and landless systems (LL). The landless livestock production systems are not linked to agro-ecological zones.

- Grassland-based systems (LG) are livestock systems in which more than 90 percent of dry matter fed to animals comes from rangelands, pastures, annual forages and purchased feeds and less than 10 percent of the total value of production comes from non-livestock farming activities. Annual stocking rates are less than 10 livestock units per hectare of agricultural land. A further distinction is made between Temperate Zones and Tropical Highlands (LGT), Humid and Subhumid Tropics and Subtropics (LGH) and Arid and Semi-arid Tropics and Subtropics (LGA).

- Mixed-rainfed systems (MR) are defined as rainfed systems in which more than 10 percent of the dry matter fed to livestock comes from crop by-products and/or stubble or more than 10 percent of the value of production comes from non-livestock farming activities. A further distinction is made between Temperate Zones and Tropical Highlands (MRT), Humid and Subhumid Tropics and Subtropics (MRH) and Arid and Semi-arid Tropics and Subtropics (MRA).

- Mixed-irrigated systems (MI) are defined as irrigated systems in which more than 10 percent of the dry matter fed to livestock comes from crop by-products and/or stubble or more than 10 percent of the value of production comes from non-livestock farming activities. A further distinction is made between Temperate Zones and Tropical Highlands (MIT), Humid and Subhumid Tropics and Subtropics (MIH) and Arid and Semi-arid Tropics and Sub-tropics (MIA).

- Landless systems are defined as those where less than 10 percent of the dry matter consumed is produced on the farm where the livestock are located, and where annual average stocking rates are above 10 livestock units (1 LU = 1 cattle or buffalo or 8 sheep or goats) per hectare of agricultural land. Furthermore, landless monogastric (LLM) and landless ruminant systems (LLR) are distinguished. The former are mainly industrial, intensive and vertically-integrated pig and poultry enterprises whose economic outputs are higher than those of ruminant enterprises. In landless ruminant systems, the value of production of the ruminant enterprises is lower than that of the pig and poultry enterprises.

[2] FAO. 1996. *World livestock production systems. Current status, issues and trends*, by C. Seré, H. Steinfeld & J. Groenewold. FAO Animal Production and Health Paper No. 127. Rome.

[3] TAC. 1994. *Animal agriculture in developing countries: technology dimensions.* Development Studies Paper Series. Morrilton, Arkansas. Winrock International.

Subregional priorities
Central Asia

1 Issues

In Central Asian countries there is no modern database on animal numbers, breeds or their characteristics. In the former Soviet republics of Central Asia historical data exist. However, these cannot be used for the development of national strategies, because of the changes that took place during the process of transition to a market economy. These changes included loss of animal genetic resources (AnGR) kept in specialized breeding farms, and indiscriminate cross-breeding resulting from the collapse of breeding structures and institutions.

The animal production sector plays an important role in the national economies of all Central Asian countries, contributing between 15 percent (Kyrgyzstan and Uzbekistan) and 27 percent (Afghanistan) of the GDP. However, in the view of e-mail conference participants from the transition countries of Central Asia, the agricultural sector in these countries is perceived as marginal, in spite of its social and economic importance and the great role that animal production plays in these societies.

2 Inventory and characterization

In view of ongoing and expected changes in production systems, projected growth in demand for animal products, identified threats to AnGR, and the views expressed during the subregional e-mail consultation, the countries of Central Asia should:

- Initiate actions to develop their own strategies to address national priorities related to breed inventories, monitoring and characterization.
- These actions should be implemented with the coordination and support of FAO.
- The existence of breeds common to almost all countries of the subregion, and similarities in natural and socio-economic environments, indicates that characterization could be carried out on a subregional basis, while each country should establish its own inventory and database.

3 Sustainable use and development

There is a need to increase policy-makers' awareness regarding the importance of AnGR, and to support countries in establishing sustainable approaches to livestock development (including measures aimed at contributing to the alleviation of poverty).

The starting points for actions could be the creation of a communication platform for the exchange of ideas and experiences.

Other priorities in this area include:

- involvement the media;
- preparation of promotional material and information on AnGR, stressing their contribution to food security and to social stability in the country;
- enhancing the awareness of policy-makers, inviting them to national and international meetings and events that emphasize the importance of AnGR;
- organizing joint training for technicians from countries that have similar conditions in terms of their AnGR;
- organizing these joint training activities in a country where the necessary technical support and equipment are available; and

- enhancing international educational opportunities for students, to build capacity in the use and development of AnGR.

The countries of the subregion require more pragmatic and well-targeted assistance in developing national programmes for the improvement of local breeds in line with present and projected market requirements.

It is necessary to identify niches for specific products in each country, to involve specialists in the development of new products, and to develop marketing schemes for these products. Special product development and promotion should be integrated within rural development programmes. Markets for existing special/traditional products also need to be further developed. If and where necessary, there should be exchange of breeding material between related breeds, and development of marketing schemes for special products.

4 Conservation of animal genetic resources

Ex situ conservation: the entire system had broken down because of a lack of financial resources. *In situ* conservation was not considered in the past, but should have a stronger role in the future. No government funds have been earmarked to date for implementation of a strategy for AnGR conservation.

There is a need for actions aimed at creating and increasing awareness of the need for conservation of AnGR, and for the establishment of an adequate institutional framework at national level.

At the subregional level, national organizations should act jointly to integrate the work that has to be done by professionals from different countries, especially in case of the subregion's transboundary breeds. The majority of work can be funded by the government, with some support from international donor organizations.

5 Policies, institutions and capacity building

Creating and increasing awareness of the role of AnGR in the national economy of each country; the development of national strategies for sustainable management, use and conservation of AnGR; and the establishment of the necessary institutions, are the basic priorities in the Central Asia subregion.

In this respect, several priority actions are proposed:

- supporting capacity building and improvements in the expertise of local experts through national and subregional seminars on management and conservation of AnGR;
- improving the flow of information and exchange of experience between Central/Eastern European countries and Central Asia;
- promoting good examples in the management, use and development, and conservation of AnGR;
- supporting computerization of research institutions and the use of information technologies in the management of AnGR;
- strengthening research to support the sustainable use and development of AnGR through enhanced investment by both the public and private sectors;
- monitoring the impact of changes in the agrarian structure and production technology in order to increase competitiveness of animal production;
- revising the existing system of agricultural support and introducing necessary reforms in financial support to AnGR and farm subsidies;
- increasing the efficiency of administrative and special services and associations affecting AnGR;
- coordinating national initiatives on a regional basis, identifying needs for action and mobilizing resources;
- stimulating and developing the utilization of AnGR in traditional farming systems that allow the survival of a relatively rich genetic diversity;
- developing international information exchange between countries including on national, regional and inter-regional issues related to AnGR;
- strengthening cooperation in the subregion; and
- strengthening and providing particular support to National and Regional Focal Points including National Coordinators.