Turkmenistan
Agricultural sector review

FAO INVESTMENT CENTRE

COUNTRY HIGHLIGHTS

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ACRONYMS AND ABBREVIATIONS

CIS	Commonwealth of Independent States
EBRD	European Bank for Reconstruction and Development
ETC	Early Transition Countries
FAO	Food and Agriculture Organization of the United Nations
GAO	Gross Agricultural Output
GDP	Gross Domestic Product
GOST	Gosudarstvennyy Standart, or State Standards (a set of regional technical standards developed under the Soviet Union as part of its national standardization strategy)
Ha	Hectares
ISO	International Organization for Standardization
MoA	Ministry of Agriculture
SPS	Sanitary and Phytosanitary Measures
TBT	Technical Barriers to Trade
WTO	World Trade Organization

INTRODUCTION

The main objective of this agricultural sector review in Turkmenistan is to establish an initial policy discussion with the Government of Turkmenistan to point to areas where investment opportunities are most likely to arise in the future.

The first chapter discusses the primary agricultural production in Turkmenistan. In addition, it compares Turkmenistan with its immediate neighbours in Central Asia when relevant, illustrating that Turkmenistan should be placed in the same category as the small Central Asian states and southern Kazakhstan due to the importance of its natural resources.

The second chapter discusses the next stage in the agricultural value chain–agricultural commodity and input markets. This chapter describes the state control mechanisms for four strategic crops—cotton, wheat, sugar beets, and rice—on one side and the relatively unfettered and unorganized individual sector on the other.

The third chapter analyzes the food processing sector in Turkmenistan. It discusses the importance of the state and private sector and provides case study evidence on two important supply chains: bread & milling and dairy.

The fourth chapter discusses the importance of foreign trade in Turkmenistan and more specifically trade in agri-food products.

The fifth chapter describes the agricultural policy framework in Turkmenistan, including existing output and input price regulation, investment and trade policy.

The final chapter includes a number of conclusions and recommendations with respect to the investment climate and potential market development opportunities.

EXECUTIVE SUMMARY

An economy driven by the energy sector, but with a strong prevalence of agricultural labour. In 2008, the Turkmen gross domestic product (GDP) per capita was USD 3 918[1], closer to the level of other energy-based economies such as Azerbaijan and Kazakhstan than the GDP per capita of Turkmenistan's agrarian neighbours. Turkmenistan's agricultural sector represents only 19 percent of the country's GDP; but the country has a high share of rural population (58 percent) and agricultural labour (48 percent of the total labour force). Moreover, as Turkmenistan, like other Central Asian economies, has been unable to generate sufficient jobs outside of agriculture, rural population and agricultural employment have increased.

Harsh natural conditions for agricultural production. Agricultural land accounts for more than 80 percent of Turkmenistan's total territory. However, Turkmenistan is an arid country and most of its agricultural land is desert pasture with very little cultivable land. Its agriculture is highly dependent on irrigation. In fact, Turkmenistan is the only Central Asian country where the irrigated area in 2007 to 2008 was substantially above the 1990 level.

Uncertainties surrounding the extent of agricultural recovery. All Commonwealth of Independent State (CIS) countries experienced a decline in agricultural production during the early 1990s. At the end of the 1990s, however, this transitional decline was followed by a phase of recovery. In the case of Turkmenistan, the extent of this recovery is difficult to assess due to the uncertainties associated with national production statistics, which conflict with independent sources.

Crop production under strong state control. Unlike other CIS countries, Turkmenistan has almost no large agricultural enterprises engaged in primary production. The large structures of the Soviet period were transformed into peasant associations consisting of individual leaseholders. Peasant associations are subjected to state orders, however: they are obliged to sell their output and buy their inputs through state channels. This is particularly true for crop production, which is heavily controlled by the state, while the livestock sector operates on a more private basis.

1 The World Bank.

A sharp increase in livestock production. Prior to 1990, Turkmenistan's agriculture was characterized by a relatively high share of crop production as opposed to a correspondingly low share of livestock production. After 1992, in contrast with what happened in most CIS countries, the contribution of livestock production to national output grew. Milk production grew very sharply from 436 000 tonnes in 1990 to 2 100 000 tonnes in 2007, partly due to a significant improvement in milk productivity: yields rose from pre-1998 levels of 1 300 kg per cow to 2 000 kg per cow in 2006 to 2007. In that same period of time, meat production tripled.

The remaining importance of cotton production. During the Soviet Union, Turkmenistan's agriculture was characterized by the monoculture of cotton. The country ranked second after Uzbekistan in cotton production among the six cotton republics of the Former Soviet Union. The situation began to change rapidly after 1990, when the government started to stimulate wheat production in order to achieve a higher degree of national food self-sufficiency. However, despite this relative decline of cotton production, Turkmenistan remains a significant cotton producer in the region.

A limited horticultural production. Turkmenistan produces few vegetables, in part because of its arid climate but mainly due to the competition with staple crops for cultivatable land. The country produces about 620 thousand tonnes of vegetables (compared to more than 6 million tonnes in Uzbekistan[2]) and scarce quantities of fruits (150 thousand tonnes as compared to 2.2 million tonnes in Uzbekistan) although melons and grapes are more common with a production of respectively 254 and 222 thousand tonnes in 2008.

Little value added in the food chain. The food processing industry in Turkmenistan accounts for 9 to 10 percent of GDP, with cotton fibre adding another 1 to 2 percent of GDP (data for 2000 to 2007). Since the general production decline of the early 1990s, only the production of bread products and flour, processed fruits and vegetables and non-alcoholic beverages has increased significantly compared to pre-reform levels of output. The output of the meat and dairy industry is still much less than during the pre-reform period. With the background of rapidly increasing livestock production, this means that the livestock sector has a predominantly subsistence nature.

2 Sources: FAOSTAT for Uzbekistan and National Institute of State Statistics and Information for Turkmenistan.

Dualistic agricultural policies. The agricultural policy of Turkmenistan reflects the duality of the political and economic system in the country. On the one hand, the state tightly controls some so-called strategic sectors, while it has a more permissive approach to private business in other sectors. Four agricultural subsectors have been almost unreformed since Soviet times: grain, cotton, rice and sugar beets. For these four crops, almost all measures from the Soviet arsenal are still applied today: mandatory state deliveries, state fixed prices, state supply of main inputs at discounted prices and concessional state lending.

Agricultural associations with ambiguous roles. The food industry is subject to state licensing, and this has an impact on the development of the sector. Another feature of Turkmenistan's industrial policy, which applies to the food industry, is the mandatory syndication of companies: all the enterprises of a branch of the industry are united in a union or association. The main task of these associations is to implement state policies rather than lobby the interests of their members with the state. Agricultural associations consider themselves governmental bodies and are often established in former Soviet ministries and agencies.

The emergence of small-scale food processors. Although the food processing companies of the pre-Soviet period were not privatized during the transition period, private processors–predominantly small-scale–have emerged in most sectors of the food processing industry including meat, dairy, vegetable canning, and bakery. While flour and other milled products appear to be controlled by a virtual monopoly of state processors, the share of private processing ranges from 30 to 50 percent for meat and dairy products, and from 80 to 90 percent for bread and canned vegetables.

The negative protection of agricultural production. The Turkmen farmers who produce under state orders receive input subsidies but they also receive low prices for their production. Altogether, their income would be higher if they were paid at world market prices and received no subsidies. Estimates show that farmers are implicitly taxed in Turkmenistan. The nominal protection rate, calculated on the basis of market exchange rates for wheat and cotton, is strongly negative, although improving. It increased from -86 to -27 percent between 2005 and 2009 from for wheat and from -60 to -37 percent for cotton.

Agricultural reforms still to be introduced. Turkmenistan's current agricultural policy is characterized by the fact that the country has not implemented the economic reforms that were adopted to various extents in other transition countries. Over recent years, the political will for reforms and a more market-oriented economy has been emerging. However, most analysts agree that these reforms will be slow and the elimination of the distortions of the economic policy conducted with extreme dirigisme by the previous government will require a long period of time. Despite the many declarations of reform by the current leadership, the overall economic environment in Turkmenistan remains highly restrictive and lacks many of the institutions that would be required to support a market economy. Although the private sector is important for some agricultural products, the state sector still heavily dominates the production and processing of four strategic commodities (cotton, wheat, sugar beets and rice). Moreover, there are few institutions supporting the private sector. There are no private commercial banks in Turkmenistan as all banks are state-owned and the availability of credit for entrepreneurial activities outside of the state order system is limited, as banks are not adapted to working with small businesses.

Limited agricultural trade with the rest of the world. Turkmenistan does not belong to any existing international or regional multilateral trade system. It is also the only country of the Former Soviet Union that has not applied for membership in the World Trade Organization (WTO). Foreign trade is de facto controlled by the state through the obligation to register all wholesale and export-import contracts with the State Raw Material and Commodity Exchange. As a result, the Turkmenistan economy is relatively isolated.

An emerging trend of net agri-food imports. However, Turkmenistan has maintained a positive trade balance for many years, and its trade surplus has grown since the early 2000s. Mineral fuels, in particular natural gas, are by far the dominant export and a major source of export revenues. Cotton lint is the distant second item, accounting for a mere 2 percent of export revenues. In global agricultural trade, Turkmenistan plays an insignificant role and its cotton accounts for only 3 percent of global production. Turkmenistan had a positive agri-food trade balance in 2004-2007. However, owing to the surge in global food prices in 2007-2008, the country became a net importer in 2008. Kazakhstan, the Russian Federation and Ukraine are the main exporters of food and agricultural products to Turkmenistan, supplying

mostly wheat, flour, beverages, confectionary products, tobacco and sugar. Turkey has been by far the most important export destination for Turkmen cotton, hides and wool products in the last five years.

Highly centralized decisions for foreign investment. Large foreign investments including investments in the food industry can be implemented only after the personal decision of the President of the Republic. The President also allocates plots of land for green field investment. In the last 15 years, there has been no allocation of land for the food industry but the new President recently endorsed the construction of 48 new food enterprises, mainly dairy, fruit and vegetable processing companies. Foreign investors can bid, but their chances to win are usually determined by agreements between Turkmenistan and other countries. So far, foreign investors have been attracted mainly by the following sectors: wholesale and retail, manufacturing, construction, agriculture, forestry and services.

Lack of sector and company information to inform investment decisions. While there may be opportunities, constraints for investment in Turkmenistan's agri-food sector are many. First, accurate information on the various subsectors and on the financial performance of individual enterprises is not publicly available, which make investment decision-making extremely difficult, even compared to other CIS countries. At the sector level, the information gathered for this review was obtained in the face of great difficulties, exceeding those encountered in other CIS countries

Uncertain ownership and contractual rights. There is only limited information on the state of basic institutions in Turkmenistan and it is unclear how the situation is with respect to ownership rights, and the security of these rights, and contract enforcement, which are crucial issues for both domestic and foreign investors. It appears that some decisions are still being taken on an ad hoc basis (e.g. the sudden confiscation of land from daikhan farms based on farm performance, despite the strong growth of the private sector), which implies risk and uncertainty.

Supporting agri-food small and medium-sized enterprises (SMEs) in selected sectors. The above limitations clearly restrict the potential scope of EBRD operations in Turkmenistan's agri-food sector. Without a more supportive legal environment, equity participation on a large scale would be risky. Less risky would be loans to private

SMEs involved in the baking, meat processing, fruit and vegetables processing and dairy sectors. Investments in private SMEs in the confectionary sector, beverages (e.g. juices) and retail food stores could also offer reasonably good prospects given the projected growth in Turkmen consumers' incomes. Within this limited window of operations, retail food stores are less risky as they are less exposed to state regulations and small scale agriculture. By contrast, for food processing SMEs, there are two main risk factors that can impact operations: the influence of state regulations and the dependence on small scale agricultural suppliers.

Encouraging policy reforms. In addition, it could be useful for the EBRD to engage in policy discussions with the government of Turkmenistan to promote less state control and allow market institutions to develop, which would eventually result in more private investment. The Turkmen Government could be encouraged to remove regulations that specifically discourage investment. In the agri-food sector for example, it would be advisable to shift from GOST standards to more modern standards compatible with a market economy and the principles of the WTO international trading system, or else to allow the establishment of marketing cooperatives.

Agricultural production

Importance of the agricultural sector

Turkmenistan is a Central Asian country with a land surface of 491 200 km^2 and it is the fourth largest country among the CIS after the Russian Federation, Kazakhstan and Ukraine. Although a large proportion of the land surface is considered to be agricultural land, only 4 percent of this agricultural land (1.7 million hectares [ha]) is cultivable, compared to 60 percent to 80 percent in the Russian Federation and Ukraine or about 25 percent in the other Central Asian countries. The remaining 96 percent of agricultural land in Turkmenistan is desert pasture.

Turkmenistan has a population of about five million people, which is comparable to the populations in Armenia, Georgia and Azerbaijan. Nearly 60 percent of the population lives in rural areas compared to less than one-third in the Russian Federation and Ukraine. The effective population density in Turkmenistan is high: there are 0.5 ha of arable land per rural resident compared to 2 to 3 ha in Ukraine and the Russian Federation (Table 1.1).

Map of Turkmenistan

Source: United Nations Department of Peacekeeping Operations, Cartographic Section (January 2004).

In Turkmenistan, the agricultural sector is still a prominent economic sector with a high share of the rural population (58 percent) and a high share of agricultural labour in the total labour force (48 percent) (Table 1.2). During transition, agricultural labour tended to increase in the Central Asian countries, while it generally decreased in the European countries. This trend is closely correlated with rural population growth and more general population growth.[1] The strong positive correlation between agricultural labour and total population is a reflection of the fact that in general the Central Asian economies have been unable to generate enough jobs outside agriculture to attract new entrants into the non-agricultural labour force.

The agricultural sector represents only 19 percent of GDP in Turkmenistan. This is significantly lower than in the other agrarian Central Asian countries, mainly due to its energy-based economy (oil and gas exports). The Turkmen GDP per capita was USD 3 918 in 2008, which puts it closer to the other energy-based economies, such as Azerbaijan and Kazakhstan, than to its agrarian neighbours.

Overall, the Central Asian countries are highly agrarian (Table 1.2). The four Central Asian countries, excluding Kazakhstan, are at the top of the agrarian ranking, followed by the three Transcaucasian states (Armenia, Georgia, Azerbaijan) and Moldova. Kazakhstan is close to the bottom of the agrarian ranking, although its agrarian index is still substantially higher than the indexes in the Russian Federation, Ukraine or Belarus. In general, economies with a high agrarian index have a lower GDP per capita, but the presence of natural resources in Turkmenistan makes the country an exception.

Land tenure and farm structure

Land tenure

Turkmenistan's agricultural transition has been marked by very slow and gradual reforms that are intended to achieve a limited degree of market orientation while maintaining strong involvement of the state in major policies.

1 Over the past decade there has been rapid population growth in Turkmenistan. The population grew at a rate of 4 percent per year between 1990 and 2000, but between 2000 and 2008 the growth rate slowed down to 0.6 percent. In the coming years, the population is projected to rise from 5.6 million in 2008 to 6.4 million in 2015 (annual average growth rate of 1.8 percent) (see Annex 1.1. for detailed data).

Table 1.1. Selected characteristics of Central Asian countries with the Russian Federation and Ukraine for comparison*

	Country area, thousand km²	Ag land in use, million ha	Population, million	Population density, per km²	Arable land per rural resident, ha	Arable land, % of ag land	Irrigated, % of arable[a]
Turkmenistan	491	40.5	5.4[b]	13.2	0.5[b]	4	106
Uzbekistan	449	17.2	27.6	57.9	0.2[c]	24	100
Kyrgyzstan	200	4.5	5.3	25.5	0.4	28	79
Tajikistan	143	4.0	7.4	47.6	0.2	21	81
Kazakhstan	2 725	85.5	15.8	5.5	3.1	27	7
Russian Federation	17 075	190.9	141.9	8.4	3.0	60	5
Ukraine	604	36.6	46.0	78.0	2.1	84	8

*The data are for 2008, except where indicated otherwise: a1990; b2007; c2005; d2006.
Source: All countries except Turkmenistan and Uzbekistan from CIS Interstate Statistical Committee (2009); Turkmenistan and Uzbekistan data for population, land, and GDP from national statistics.

Table 1.2. The agrarian profile of CIS countries (2007-2008 data)

	Share of rural population (2008)	Share of agriculture in employment (2007)	Share of agriculture in GDP (2008)	Agrarian Index*	GDP per capita, constant 2000 USD (2008)**
Tajikistan	73.7	66.5	21.8	54.0	245
Kyrgyzstan	65.4	34.5	25.8	41.9	375
Turkmenistan	58.0	48.4	18.9	41.8	1705
Uzbekistan	63.9	27.9	23.2	38.3	840
Georgia	47.4	53.4	8.9	36.6	1252
Moldova	58.6	32.7	8.9	33.4	578
Armenia	36.0	46.0	15.8	32.6	1520
Azerbaijan	48.2	38.6	5.7	30.9	2132
Kazakhstan	46.8	31.0	5.2	27.7	2378
Ukraine	31.8	16.7	6.8	18.4	1156
Belarus	26.1	10.6	8.4	15.0	2483
Russian Federation	26.9	10.6	4.1	13.9	3074

*An ad hoc "agrarian index" is calculated as the simple arithmetic average of the three dimensions of a country's agrarian profile; **Per capita GDP from World Bank (2008).
Source: Interstate Statistical Committee of the CIS - CISSTAT (2009).

In terms of land reform and farm restructuring, reforms have mainly focused on two aspects: the distribution of land to individual farms and restructuring of the large farms inherited from the Soviet period. A chronology of presidential decrees and laws concerned with land reform is given in Annex 1.2. The central features of Turkmenistan's reforms have been:

(i) Liberalization of state control over household plots and an augmentation of land allocated to these households;
(ii) An aborted experiment of increasing and then sharply decreasing land allotted to "private" daikhan (or peasant) farms;
(iii) Restructuring of traditional large farms into "peasant associations" that lease state-owned land to farmers while maintaining state provision of inputs and state procurement of agricultural output.

These changes led to the creation of three groups of agricultural producers: traditional household plots, daikhan farms and peasant associations. Table 1.3 summarizes the main characteristics of these three groups of producers.

In general, household plots and daikhan farms are considered to be private farms, while peasant associations (and the land cultivated by the leaseholders in these associations) are considered to be the collective sector. However, it is important to keep in mind that there is an unclear line between the collective and the private sector in Turkmenistan.

Unlike the other CIS, Turkmenistan has almost no large agricultural enterprises engaged in primary production. These large enterprises are transformed in peasant associations consisting of individual leaseholders. Peasant associations, however, are subject to state orders and are obliged to sell their output and buy their inputs through state channels.

In general, the leaseholders have almost no decisive power on what they produce, which seeds they use, when they harvest, etc. As such they cannot be seen as voluntary associations of smallholders who work together in order to reach economies of scale nor as collective farms similar to the farms that existed during the Soviet period.

Table 1.3. Main characteristics of the three groups of agricultural producers in Turkmenistan

	Households	Daikhan farms	Leaseholders
Land ownership	Privately owned	Long-term lease from the state	Lease from the peasant association
Land quality	Arable	Arable + unirrigated desert	Arable
Farm size	0.5-1 ha	20-50 ha	3-10 ha
Crop mix	Horticulture, some grain	Grain, cotton, some horticulture	Grain, cotton, some horticulture
Livestock	Yes	Very little	In household plots only
Orientation	Semi-subsistence	Commercial	Commercial
State orders	None	None; "voluntary" for strategic commodities	Obligatory for strategic commodities; none for other
Sales arrangements	Market	State channels (direct), market for surplus and non-strategic product	State channels (through peasant association), market for non-strategic products
Farm inputs, services	Market	State channels (direct), market	State channels (through association), market

Farm structure

Agricultural producers, which comprise peasant associations with their leaseholders, household plots, daikhan farms and other producers, control nearly 70 percent of Turkmenistan land area (Table 1.4). This includes almost all cultivable land (94 percent) and a large share of pasture land (78 percent). About 20 percent of the land is in the state reserve, and the remaining 10 percent is managed by non-agricultural users. The state reserve in 2002 was two-thirds pasture land, one-third non-agricultural land and only a negligible amount of cultivable land, which makes it unsuitable for potential land redistribution.

Table 1.5 shows the tenure structure of cultivated land in Turkmenistan in 2008. The share of land cultivated by peasant associations is 94 percent, of which the majority are associations of leaseholders (92 percent), while collectively cultivated land represents only 2 percent. The private sector (household plots and daikhan farms) represents only 6 percent of the cultivated land in 2008.

Table 1.4. Structure of total land use in Turkmenistan (in %)

	1998	1999	2000	2005	2007	2008
Total land in use, '000 ha	49 403	49 403	49 121	49 121	49 121	49 121
Agricultural producers	69.9	69.8	70.2	68.9	68.5	68.1
Associations*	68.6	68.6	69.0	67.2	67.0	66.8
Other producers**	1.0	1.0	0.9	1.6	1.5	1.2
Daikhan farms	0.2	0.2	0.2	0.1	0.0	0.1
State reserve	19.7	19.7	20.0	20.5	20.7	21.0
Non-agricultural users	10.5	10.5	9.8	10.6	10.8	10.9

** Land allocated to leaseholders, land in household plots, and land in joint use; ** Subsidiary farms maintained by various ministries, experimental stations, teaching farms, state enterprises. Since 2004 includes also "shareholder companies" or "joint stock companies" as a new organizational form.*
Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Table 1.5. Structure of land tenure in Turkmenistan in 2008 (% of cultivated land)

Peasant associations	Leaseholders in associations	Collective cultivation	Individual sector
94	92	2	6

Source: National Institute of State Statistics and Information of Turkmenistan (2009).

Land in individual use: household plots and daikhan farms. During the Soviet period the private sector was represented by household plots, which in total controlled about 40 000 hectares, of which 75 percent was irrigated land. The decision in April 1991 to augment the land allocated to household plots increased the total area cultivated by the private sector from about 50 000 hectares in 1990 to 125 000 hectares in 1995 and then more gradually to 135 000 hectares in 2007 (Figure 1.1, Annex 1.3). In relative terms, the household plots doubled their share of cultivable land from 3 percent in 1990 to a steady 6 percent since 1992.

A new private sector component began to emerge alongside household plots in 1993 (Figure 1.1, Annex 1.3). These were daikhan farms established by enterprising individuals outside the collectivist framework. Land was allocated to daikhan farms without payment, as a grant, but it was mainly unirrigated and uncultivable land such that

daikhan farms were forced to reclaim desert land at their own expense. The poor quality of land in daikhkan farms is illustrated by the following comparison with land in household plots: in 1993–1995 cultivable land in daikhan farms was only 30 to 40 percent of the holdings, compared to 80 percent in household plots.

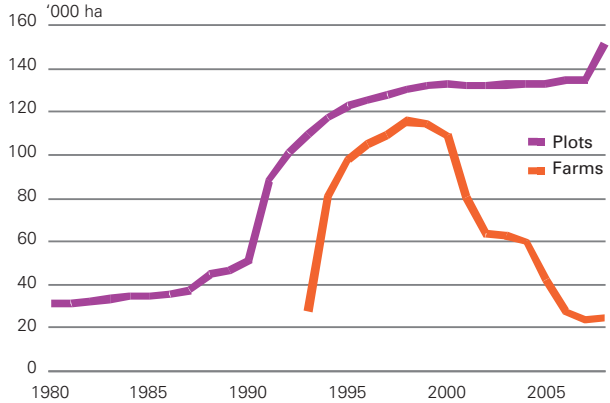
Despite the physical obstacles and the marginal quality of land allocated to daikhan farms, individuals began to apply in increasing numbers for an independent plot of land outside the collective framework. The number of daikhan farms rose from zero in 1992 to 7 000 in 2000-2001. The land allocated to daikhan farms rose from zero in 1992 to 100 000 hectares in 1995 and peaked at 116 100 hectares in 1998, the year when the private sector (daikhan farms and household plots combined) reached nearly 10 percent of all cultivable land in Turkmenistan.

Since 1998, the daikhan farms have lost 80 percent of their holdings (dropping to 25 300 hectares in 2 450 farms in 2008) as the authorities began to enforce the legal provisions that made land grants conditional on satisfactory farming performance (land cannot be uncultivated for more than two years). As a result, the share of the private sector (household plots and daikhan farms combined) decreased from 10 to 7 percent of cultivable land in 2006 (Figure 1.2). It then rebounded to 9 percent due to an increase in the allocation of land to household plots.

Land in collective use: peasant associations. Today peasant associations control nearly 95 percent of cultivated land in Turkmenistan (sown areas plus land under vineyards and orchards). Between 1997 and 2007, the peasant associations had three main roles. First, they were "guardians" or "administrators" of state-owned agricultural land that was distributed to leaseholders. Second, they became the municipal authority responsible for maintaining rural infrastructure in the villages. In return, they received a payment from the leaseholders (percentage of production revenue). Third, they were the conduit for transmitting state orders to the leaseholders and enforcing compliance.

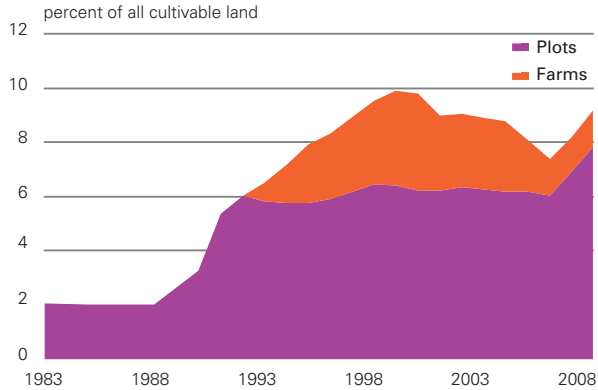
Until 2007, the parastatal agro-service providers signed supply and marketing contracts for strategic commodities directly with more than 100 000 leaseholders and Daikhan Bank, a central agricultural bank with a wide network of 55 branches in all district centres and 400 offices in all peasant associations. As of mid-2007 the system was streamlined by stipulating two-level contracting arrangements. The peasant association concluded lease contracts with its members.

Figure 1.1. Land in household plots and daikhan farms, 1980-2008 ('000 hectares)



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Figure 1.2. Structure of cultivable land in household plots and daikhan farms, %



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

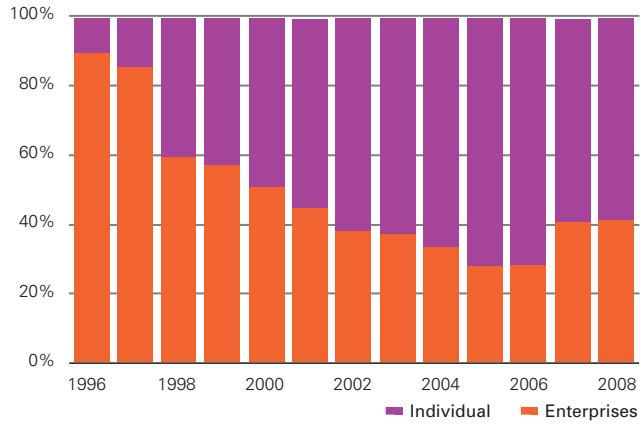
These contracts included production targets based on the state orders received by the association and the resource base of each leaseholder, guaranteed provision of inputs in appropriate quantities, and stipulated payment (at fixed state prices) for deliveries of farm products to the association. The association in turn signed agreements with agro-service providers and Daikhan Bank, which ensures financing through the association's bank account, delivery of inputs to the association and collection of farm products from the association. The association interfaces with the leaseholders, distributes credit, cash and inputs, and collects their output.

As indicated before, the large leaseholder sector cannot be regarded as a full-fledged extension of the private sector because leaseholders continue to be subject to state orders and are tied by restrictive links to state-controlled service providers. As such, Turkmenistan's leaseholder agriculture, while close in many attributes to family farming, occupies an intermediate position in the spectrum between private and corporate farms.

The role of the private sector in crop production. Increased allocation of land to the private sector—first through augmentation of household plots in 1992 and subsequently through creation of independent daikhan farms—has naturally resulted in a significant increase of the private sector's share in crop production. Figure 1.3. shows that the aggregate value of crops produced in the private sector increased from about 10 percent of total Gross Agricultural Output (GAO) in 1996 to 60 percent in 2007.

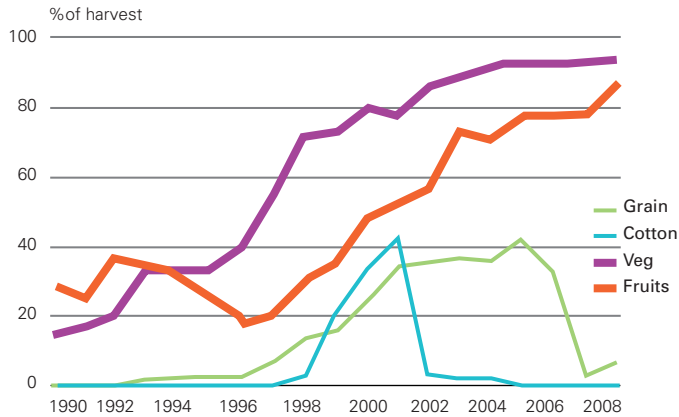
Vegetables and fruit, including potatoes and melons, were the traditional crops produced by household plots during the Soviet times. The share of vegetables produced by the private sector increased from less than 20 percent in 1990 to nearly 95 percent today (Figure 1.4). In terms of the production of fruit and grapes, household and daikhan farms produce more than 80 percent of the output, up from 20 percent to 30 percent in the early 1990s (Figure 1.4).

Figure 1.3. Crop production by farm type, 1996-2008



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Figure 1.4. Share of the private sector in the production of main crops 1990-2008



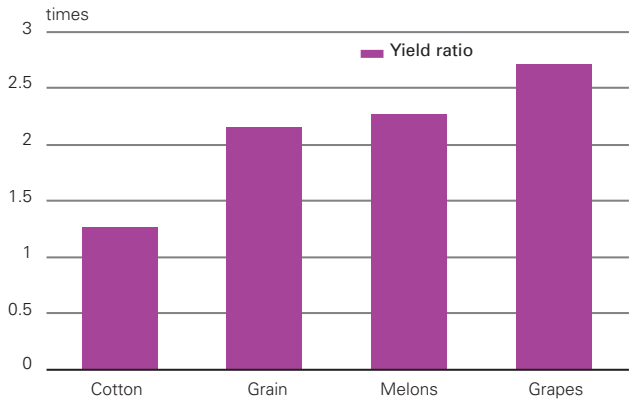
Source: National Institute of State Statistics and Information of Turkmenistan (various years).

The creation of daikhan farms in the mid-1990s led to an increase in the grain and cotton production by the private sector. Official statistics indicate that by the early 2000s the private sector was producing one-third of Turkmenistan's wheat and cotton (Figure 1.4). Yet these figures have been drastically revised downward and today the share of private grain and cotton production is negligible, down from 40 percent in 2001-2005. It is unclear to what extent the rapid decline in the number of daikhan farms played a role in explaining these dramatic changes or whether unreliable statistics are at the origin of these changes.

In general, the private sector achieves higher yields than the peasant associations (see Annex 1.4 for detailed data). Figure 1.5 shows the average yield ratios between private farms and peasant associations for the main crops. For grain, melons, and grapes private farms achieve average yields that are more than double the yields achieved in peasant associations.

The role of the private sector in livestock production. Since 1997, the share of the private sector in livestock production has stabilized at around 90 to 95 percent of total livestock output and 90 percent of the livestock herd (Table 1.6 and Figure 1.6).

Figure 1.5. Ratio of crop yields achieved by private farms to yields in peasant associations (averages for 1997-2008)



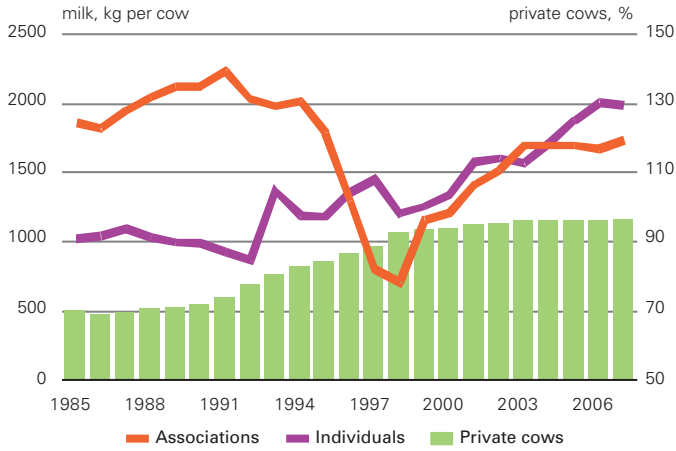
Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Table 1.6. Share of private sector in livestock production 1980-2001 (average percent for selected sub periods)

	1980-1991	1992-1996	1997-2007
Meat	43	61	89
Milk	55	75	96
Eggs	33	58	96

Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Figure 1.6. Milk yields in farms of different types (kg per cow per year) and share of cows in private farms (percent), 1985-2007.



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Until the early 1990s, milk yields achieved by collective farms were twice the milk yields in individual farms (household plots at that time). Thus, yields in collective farms averaged around 2 000 kg per cow per year, compared with 1 000 kg per cow per year for household plots (Figure 1.6). The situation began to change after 1992-1993, when augmentation of household plots resulted in a substantial increase of the livestock herd and especially the number of cows kept by rural families. The improved feed base on larger plots led to an increase in milk productivity, which rose from 1 000 kg per cow to around 2 000 kg per cow in 2007. The milk productivity in the peasant associations was less than 1 000 kg per cow between 1994 and 1998, a drop of 50 percent.

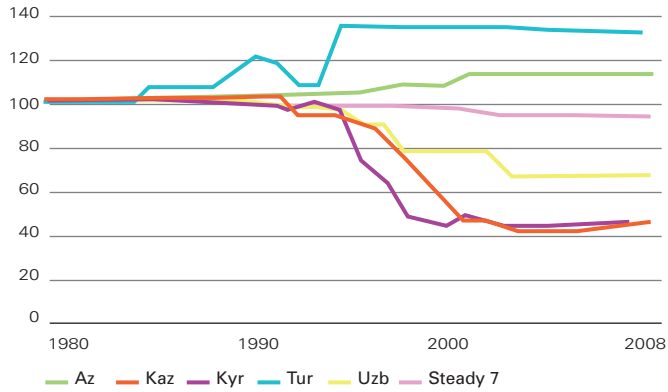
Agricultural input use: land, labour and water

Agricultural land

Arable land accounts for more than 80 percent of Turkmenistan's total territory. However, Turkmenistan is a desert country. Most of its arable land is desert pasture, with very little cultivable land (see detailed data in Annex 1.5). Owing to an expansion of the irrigation network, the share of cultivable land excluding pasture has been increasing over the past decades, from 1.5 percent of agricultural land in the 1960s to 4 percent in the 1990s and 2000s. The remaining 96 percent of agricultural land is pasture land.

Turkmenistan is the only Central Asian country where the irrigated area in 2007-2008 is substantially above the 1990 level. The irrigation efforts in Turkmenistan persisted after its independence and stopped in 1994, producing a one-time boost in irrigated area followed by stability at a new increased level. Three of the five Central Asian countries – Kazakhstan, Kyrgyzstan and Uzbekistan – displayed dramatic decreases in cultivated land after 1990, presumably due partly to the abandonment of unproductive or inaccessible pastures (Figure 1.7) to the increase in energy costs, and the abandonment of irrigated lands. Tajikistan, as well as a group of six other CIS countries (Armenia and Georgia in the Transcaucasus, The Russian Federation, Ukraine, Moldova, and Belarus in the European CIS), are characterized by stability of agricultural land since 1990.

Figure 1.7. Evolution of agricultural land in CIS 1980-2008



Source: Interstate Statistical Committee of the CIS - CISSTAT (2009).

Agricultural employment

Agricultural employment increased substantially from 600 000 people in 1990 to almost 1 million people in the recent years – or an increase of nearly 70 percent. The share of agricultural employment in total employment has remained stable at about 50 percent since the end of the 1990s (after having steadily increased from 40 percent in 1980). Detailed data for agricultural labour in Turkmenistan up to 2007 are given in Annex 1.6.

Water resources and irrigation

The main source of water for Turkmenistan is the Amu Darya and most of its flow is withdrawn by Turkmenistan and Uzbekistan along their common border. Turkmenistan diverts more than 30 percent of the total flow of Amu Darya for its use, mainly through the Karakum Canal. Turkmenistan's total water intake includes 26 billion cubic metres (cu.m) of surface runoff plus 0.5 billion cu. m from underground sources.

Agriculture in Turkmenistan is totally dependent on irrigation as all cultivable land is irrigated. The total irrigated area more than tripled in 30 years, increasing from 0.5 million hectares in 1965 to 1.7 million hectares in 1994 and remained stable afterwards (Figure 1.7 and Table 1.7). The irrigated area increased at a higher rate than the gross water intake. During the same period there were also improvements in terms of reduction of system losses. Between 1970 and 2004, water availability for agricultural needs increased only by 70 percent such that water use per hectare of irrigated land dropped by one half from 15 000 cu.m in 1970 to 7 500 cu.m in 2004.

Water reaches the agricultural producer through a complex system of primary canals to draw water from the rivers, secondary canals to distribute water to large farming units/peasant associations across the country, and tertiary canals to distribute water to farmers within the large units. In the end, the fields are furrow-irrigated with water from tertiary canals delivered through fairly primitive ditches. The entire system is open air and the canals are generally unlined.

The irrigation infrastructure is very widespread, however, its technical condition has been deteriorating for some time. Evaporation and filtration are the main sources of losses in the system, which may reach 70 percent of water intake because of the open-air system. Moreover, in the case of large-scale irrigation, there should be

Table 1.7. Availability and use of water resources in agricultural sector

Parameter	Turkmenistan			Uzbekistan			Iran, Islamic Republic of		
	1993-1997	1998-2002	2003-2007	1993-1997	1998-2002	2003-2007	1993-1997	1998-2002	2003-2007
Arable land (1000 ha)	1 630	1 780	1 850	4 475	4 484	4 300	16 502	16 029	16 869
Permanent crops (1000 ha)	65	65	63	365	343	340	1 330	1 415	1 680
Cultivated area (1000 ha)	1 695	1 845	1 913	4 840	4 827	4 640	17 832	17 444	18 549
Average precipitation in depth (mm/yr)	161	161	161	206	206	206	228	228	228
Area equipped for full control irrigation by surface water (1000 ha)	1 700			4 007			3 625		3 078
Percent of area equipped for full control irrigation irrigated by surface water (%)	98			95			50		38
Total harvested irrigated crop area (1000 ha)	1 794			4 309			7 264		8 593
Harvested irrigated crop area as percent of area equipped for full control irrigation (%)	103			102			100		106
Total grain production irrigated (%)	100			62			61		
Area salinized by irrigation (1000 ha)	652			2 141			2 100		
Percent of area equipped for full control irrigation salinized (%)	37			51			29		

Source: FAO 2010.

collectors and other drainage facilities in place to remove excess water from the soil as otherwise the soil may become waterlogged due to a rising water table and its salinity may increase to levels detrimental to crop growing. The recommended density of collector-drainage canals is 45 meters per hectare, whereas the actual density in Turkmenistan is 19 meters per hectare, or 43 percent of the norm. The inadequacy of the collector-drainage network is reflected in severe deterioration of soil quality. In 14 percent of the irrigated land the water table has risen

above the critical level, 24 percent suffers from inadequate drainage, and 90-95 percent[2] of the irrigated land is salinized.

A recent approach to dispose irrigation from drainage water is the creation of the artificial Turkmen Lake in the middle of the Karakum Desert. Starting in 2009, the lake is being filled through two new collectors that divert up to 10 cubic km of saline drainage water, previously discharged into Amu Darya. The stated objective is that the lake's capacity will eventually reach 150 cubic km and provide a huge reservoir of water that will be recycled for irrigation after partial desalination treatment. However, field experience unfortunately shows the inflow is much lower than originally expected and that that irrigation with brackish or partially saline water is an environmentally bad solution, as under conditions of massive irrigation even low-salinity water gradually deposits a large amount of salt in the soil, leading to dramatic reduction of yields.

In addition to concerns with respect to the quality of the irrigation infrastructure, there are also concerns regarding the efficient use of water at the farm level. Water is exclusively owned by the state, which is entrusted with ensuring delivery and maintaining water quality. There are no volume charges for water and farmers are only required to pay 3 percent of their gross product to state-controlled irrigation agencies as a contribution to general maintenance and technical upkeep of water delivery systems: this payment is collected by the peasant association. The government absorbs the cost of water as part of its policy to control both input and product prices. As a result farmers have no financial incentive to use water efficiently.

Efficiency of water use can be improved by reducing losses in the irrigation system and by adopting water-efficient irrigation technologies such as drip irrigation, subsoil irrigation, sprinkling and others. Conventional water conservation methods designed to reduce losses include lining the canals with seepage-blocking materials and using pipes instead of furrow irrigation. More efficient water irrigation would allow Turkmenistan to increase its irrigated area and could lead to a potential reduction of system losses from 30 percent to 15 percent, increasing agricultural production by at least 30 percent.

2 National Environmental Action Plan of Turkmenistan (2002).

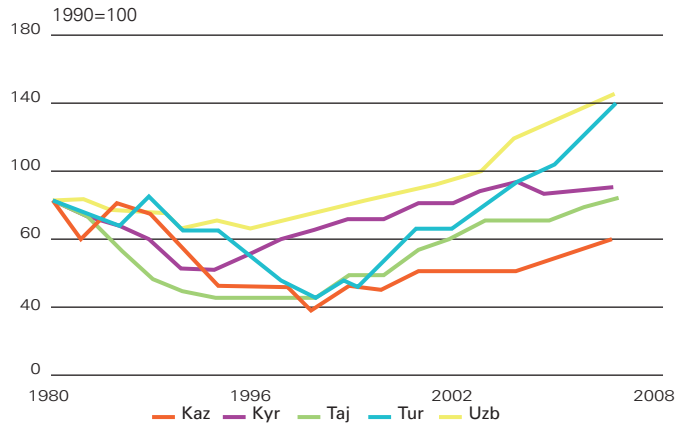
Agricultural production

All CIS countries experienced a decline in agricultural production during the early 1990s. This initial decline was attributable to the disintegration of the traditional Soviet production system. At the end of the 1990s, however, the transitional decline switched to recovery as the cumulative effects of market reforms became clear. The pattern of decline and recovery in agriculture for the five Central Asian countries is shown in Figure 1.8. The recovery in different Central Asian countries began at different times. In three of the five cases, Kazakhstan, Tajikistan, and Turkmenistan, the turnaround from decline to recovery came in 1998. In Kyrgyzstan and Uzbekistan, the turnaround came earlier, in 1995 and 1996, respectively. Uzbekistan and Turkmenistan in particular showed extraordinary growth.

However, we have to make a cautionary note to this recovery. For Turkmenistan, the growth estimates are based on national production statistics and these are not free from suspicions of manipulation. While it is tempting to attribute the observed growth in Turkmenistan to the effect of ongoing reforms, the truth may be less encouraging.

Prior to 1990, Uzbekistan, Turkmenistan and Tajikistan were characterized by a relatively high share of crop production and a correspondingly low

Figure 1.8. GAO in Central Asian countries, 1990-2007 (percent of 1990)



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

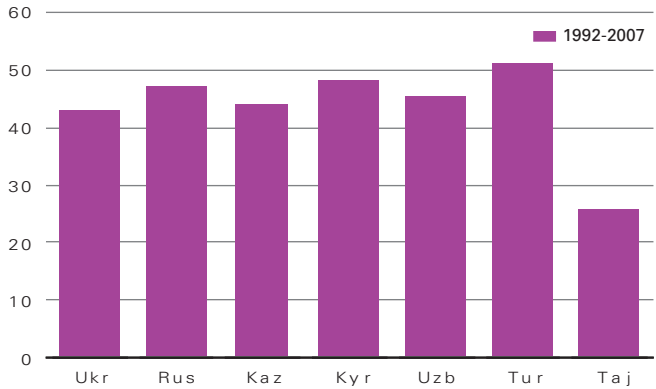
share of livestock production in their national product mix. Livestock production for these three countries accounted for slightly over 30 percent of gross agricultural output during the 1980s, whereas in the two other Central Asian Countries, Kazakhstan and Kyrgyzstan, as well as in the Russian Federation and Ukraine livestock production represented on average 55 to 60 percent of the total agricultural production.

After 1992, we observe a distinct convergence of the product mix in all countries (except Tajikistan; Figure 1.9): livestock production in Uzbekistan and Turkmenistan accounted for 45 percent-50 percent of agricultural output between 1992 and 2007, a percentage that is very close to the share of livestock in Kazakhstan, Kyrgyzstan, the Russian Federation and Ukraine. The relative increase in the importance of livestock in Turkmenistan and Uzbekistan since 1992 can be attributed to the growing role of individual farms as the rapidly growing private sector concentrated on livestock production, while extensive crops remained in the stagnating large-scale associations.

Crop production

Changes in cropping patterns. During the Soviet times, Turkmenistan was a cotton monoculture, ranking second after Uzbekistan in cotton production among the six cotton republics of the Former Soviet Union. Cotton accounted for more than 50 percent of the sown area. Another

Figure 1.9. Share of livestock production in GAO in Central Asia, with Ukraine and the Russian Federation shown for comparison (averages for 1992-2007)



1980-1995 constant 1983 rubles (CIS14); 92-07 current prices except Taj, Ukr

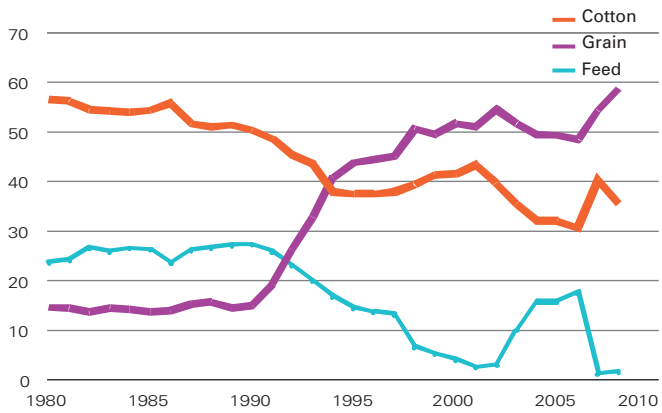
Source: Interstate Statistical Committee of the CIS - CISSTAT (2009).

30 percent was planted with feed crops, which played an important role in crop rotation. Grain, mainly wheat, was grown on 15 percent of the cropped area.

The situation began to change rapidly after 1990 when the government stimulated wheat production in order to achieve a high degree of self-sufficiency. The area under cereals (mainly wheat) increased from 15 percent in 1990 to 50 percent in 1998 and it continued to grow to 60 percent of total sown area in 2008 (Figure 1.10). The increase in the share of grain area between 1990 and 2002 came at the expense of a relative reduction in cotton cropping, which dropped further from 51 percent in 1990 to less than 40 percent after 2002, but mainly due to a sharp contraction of the area under feed crops, which dropped dramatically from 27 percent in 1990 to less than 1 percent in 2008.

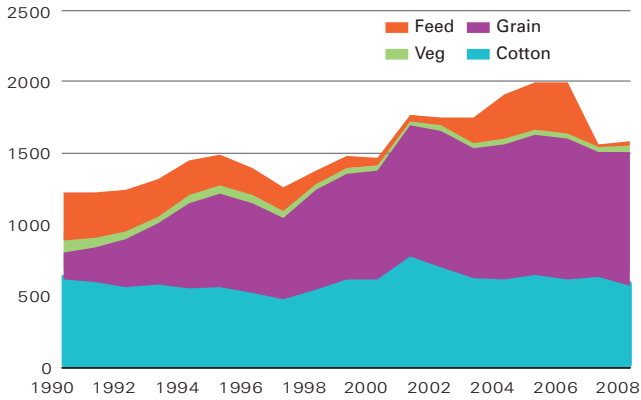
Despite the decline in the relative importance of cotton production, the actual area planted with cotton declined only temporarily in 1990-1997 owing to an expansion of the irrigated land. Today it is back to the 1990 level of 600 000 hectares, compared to 500 000 hectares in 1980. The area grown with grain increased from 130 000 hectares in 1980 to 190 000 hectares in 1990 and then skyrocketed to 1 million hectares in 2005-2006: a five-fold increase in 15 years, followed by a small contraction in 2007-2008 (Figure 1.11) (see Annex 1.7 for detailed data).

Figure 1.10. Share of area sown to cotton, grain, and feed crops 1980-2008 (% of total sown area)



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Figure 1.11. Structure of sown area 1990-2008 ('000 ha)



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Note that in 2002, statistics reported a substantial increase in the feed area from 50 000 hectares to 350 000 hectares in 2006 (Figure 1.11). Data from 2007-2008, however, show a reduction of the feed area to virtually zero, presumably because of a data revision in the Department of Statistics. Therefore, it is not clear to what extent the data correspond to the reality, especially for feed crop production.

Despite the decline in relative importance of cotton production, Turkmenistan remains a major cotton producer in the region. Cotton production accounts for 30 to 40 percent of total cropped land in Turkmenistan, Uzbekistan and Tajikistan. In terms of grain (primarily wheat) production, Turkmenistan has more than 50 percent of its cropped area in grain, compared to 40 percent of the cropped area in Uzbekistan and Tajikistan (Table 1.8).

Interestingly, the shift from cotton monoculture to diversified wheat–cotton agriculture may have contributed to the stabilization of water use (and water intake) during the last decade despite the continued increase of irrigated areas, as wheat uses 40 percent less water per hectare than cotton.

Crop production and productivity. Production volumes of cotton and grain remained fairly static during the 1980s, as did the land sown with these crops. Cotton harvests fluctuated around 1.2 million tonnes,

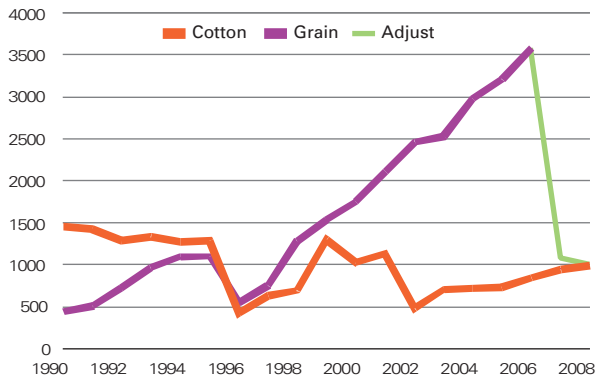
Table 1.8. Cropping patterns across Central Asia (averages for 2001-2008), %

Country	Grain	Cotton	Other technical crops	Horticultural crops	Feed crops	Total cropped
Turkmenistan	52.4	36.3	0.5	2.2	8.6	100.0
Uzbekistan	43.9	39.9	1.4	6.2	8.5	100.0
Tajikistan	44.8	29.4	5.4	7.9	12.5	100.0
Kyrgyzstan	56.2	–	12.6	10.7	20.5	100.0
Kazakhstan	80.0	–	4.8	1.7	13.5	100.0

Source: Interstate Statistical Committee of the CIS - CISSTAT (2009).

while grain production stayed around 350 000 tonnes. However, in the beginning of the 1990s, grain production soared from 400 000 tonnes in 1989-1990 to 1.1 million tonnes in 1994-1995, and continued to climb with some fluctuations to 3.5 million tonnes in 2006 (Figure 1.12, black curve). Grain production increased seven-fold between 1990 and 2006, outstripping the five-fold increase in sown area from 200 000 hectares in 1990 to 1 million hectares in 2006, surpassing Ukrainian (highest yields in the CIS region) and even Canadian grain yields (Figure 1.12, black curve). This raises serious doubts on the validity of the production and productivity data. For a detailed discussion of Turkmenistan's wheat yields in a comparative perspective see Annex 1.8.

Figure 1.12. Cotton and grain production according to national statistics 1990-2008 ('000 tonnes)

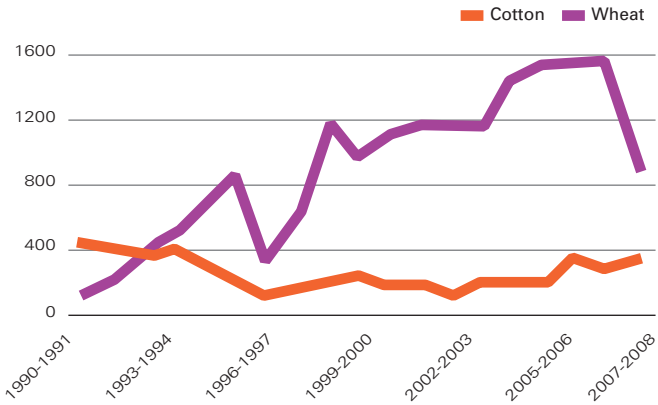


* Note the sharp adjustment of grain production in 2007-2008
Source: National Institute of State Statistics and Information of Turkmenistan (various years).

In fact, it may indicate that there was "pripiska", practice from Soviet times of inflating reported numbers to meet the declared targets and thus satisfy the political leadership. However, if we refer to independent sources, production numbers of these staples are two, even four times less (Figure 1.13). The lack of confidence in grain statistics between 1998 and 2006 is strengthened by the huge downward adjustment published in the agricultural yearbook of Turkmenistan for 2006-2007. The 2007 downward adjustments are shown in Figures 1.12 and 1.14 by thin lines emphasizing the 2006-2007 discontinuity in the grain series.

Cotton production is found to be far more stable than grain production. The cotton harvest peaked in 1990 at an all-time high of nearly 1.5 million tonnes with yields of 2.3 tonne/ha (Figure 1.12 and Figure 1.14). Cotton output declined somewhat between 1990 and 1995 in direct response to the reduction of the area sown with cotton. The six years of stability came to an abrupt end in 1996, when cotton harvests collapsed to 435 000 tonnes (down from 1.3 million tonne the year before) and also cotton yields dramatically declined. Cotton yields never returned to the steady pre-1996 levels of 2.3 tonne/ha, staying below 1.5 tonne/ha (see Annex 1.9 for detailed data)

Figure 1.13. Cotton and grain production trends according to independent sources 1990-2008 (thousand tonnes)

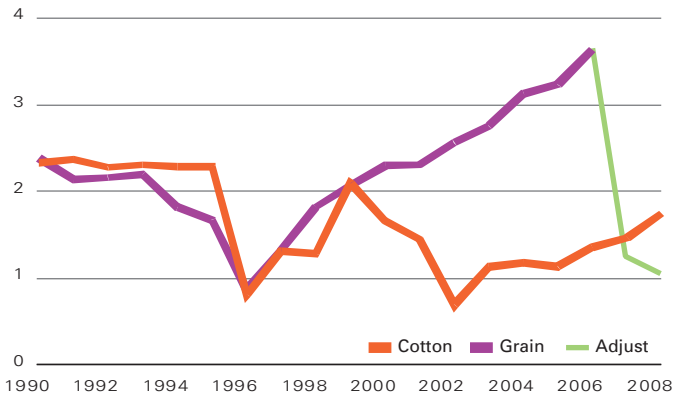


Source: USDA FAS.

Turkmenistan's cotton yields are not only decreasing over time, but they are also very low compared to other cotton-producing countries (Table 1.9). The yields of cotton lint achieved by Middle East countries, Egypt, and Mexico are around three times higher than the yields in Turkmenistan; the yields in the United States and Uzbekistan are double those of the Turkmen yields; and only the South Asian countries (India, Afghanistan, Bangladesh, Pakistan) and Azerbaijan report yields are equivalent to those of Turkmenistan.

Despite the decline in cotton production compared to the Soviet period, Turkmenistan is a major cotton producer in the region, together with Uzbekistan and Tajikistan. Uzbekistan contributes to 64 percent of the CIS cotton production, Turkmenistan to 15 percent and Tajikistan to 9 percent (Table 1.10). Cotton production in the other Central Asian countries is only marginal. In contrast, the importance of the Turkmen grain production in the region remains low and Kyrgyzstan, Tajikistan and Turkmenistan combined produce less than 20 percent of all grains in Central Asia, while Kazakhstan and Uzbekistan produce 59 percent and 23 percent of all Central Asian grain production respectively. Grain production in Turkmenistan satisfies approximately 65 percent of the domestic consumption.

Figure 1.14. Cotton and grain yields 1990-2008 (tonne/ha)



*Note the sharp downward adjustment of yields in response to the adjustment of production in 2007-2008.
Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Table 1.9. Cotton and wheat yields: comparison of Turkmenistan with selected countries

Cotton producing countries	Cotton (lint yields on a relative scale)	Wheat producing countries	Wheat, tonne/ha (2000-2005 averages)
Middle East	3.2	EU-15	5.81
Mexico	2.9	Eastern Europe	3.45
Egypt	2.6	USA	2.77
USA	2.1	Turkmenistan	2.75
Uzbekistan	2.0	Developed Africa	2.45
Tajikistan	1.4	Canada	2.28
South Asia	1.1	CIS	1.87
Azerbaijan	1.0	Sub-Saharan Africa	1.62
Turkmenistan	1.0		

Source: Cotton lint yields from ICAC (2002); wheat yields from FAOSTAT (2010).

Table 1.10. Cotton and grain production in Central Asia (percent, averages for 2001-2008)

Country	Grain	Cotton
Turkmenistan	9.1	15.4
Uzbekistan	22.6	65.1
Tajikistan	3.1	9.2
Kyrgyzstan	6.3	2.1
Kazakhstan	58.9	8.2

Source: Interstate Statistical Committee of the CIS - CISSTAT (2009).

Livestock production

Livestock Inventories and Ownership Structure. Livestock in Turkmenistan is primarily sheep, cattle, and poultry. There have always been very few pigs in this Muslim country, and their number virtually dropped to zero in recent years as livestock production shifted mainly to the household level.

Prior to 1990, the number of animals showed a steady increase over time at roughly the same rate for all species (20 to 30 percent increase in headcount between 1980-1990). Between 1990 and 1997,

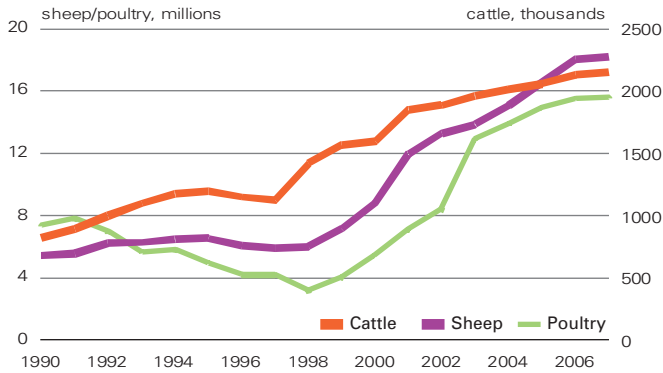
we witness a divergent trend: the cattle herd continued to grow, the number of sheep stagnated, while the poultry flocks shrank by 50 percent (Figure 1.15; for detailed data see Annex 1.10). A major turnaround came in 1997-1998, when the populations of all three livestock species boomed: the number of sheep bottomed out at 6 million in 1997 and then more than tripled to 18 million in 2007; growth of the cattle herd accelerated and even doubled from 1.1 million in 1997 to 2.2 million in 2007; and the biggest surprise came in the poultry subsector, where a sharp decline was reversed and the number of birds returned to the 1990 level in 2002. By 2007 the number of birds was more than double of the 1990 level. Aggregating the different species of animals into standard head (with one head of cattle equivalent to 10 sheep and 100 birds), we find that, due to rapid growth after 1997, the livestock herd in 2007 was almost four times larger than in 1980 and nearly three times larger than in 1997.

The rapid growth in livestock after 1997 is entirely attributable to the private sector. The cattle herd in the private sector more than doubled from 900 000 heads in 1997 to 2 000 000 heads in 2007. On the other hand, the collective and leased cattle in associations showed a continuous decline during the past decade. Overall, the private herd in standard heads increased by a factor of six between 1990 and 2007, while the number of animals in the state sector shrank to 50 percent of the 1990 level.

Prior to 1990, the collective and state farms accounted for 60 percent of the number of animals, whereas household plots owned 40 percent (Figure 1.16). The ownership structure began to change at an accelerating rate after 1990, and in 1998 the private sector (mainly household plots, but also daikhan farms) controlled 80 percent of all animals in the country. The relative growth of the private sector slowed down after 1998 but by 2007 it had reached 90 percent of the livestock herd.

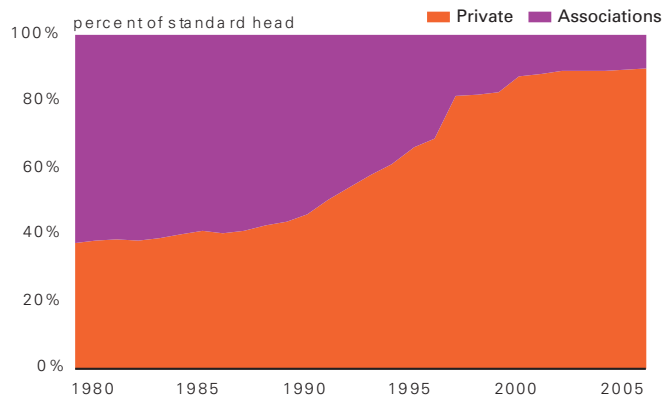
Two policy factors appear to be responsible for the marked increase in livestock production after 1997. First, the government abolished the limits on the number of animals and poultry that households were allowed to keep. Second, the government exempted meat and milk production from state orders and permitted livestock products to be sold freely at market prices.

Figure 1.15. Livestock headcount by species 1990-2007



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Figure 1.16. Changing ownership structure of the livestock herd by farm type 1980-2007 (%)



Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Livestock production and productivity. Livestock production has registered impressive growth since 1990. The production of milk grew almost by a factor of five from 436 000 tonnes in 1990 to 2 100 000 tonnes in 2007, and the production of meat tripled in the same period (from 103 000 tonnes to 300 000 tonnes). Table 1.11 presents the production data for selected years. The detailed meat and milk production series are given in Annex 1.11.

The growth in physical output did not always match the growth of the livestock resource base and we observe significant divergences in the productivity of milk and meat. Up to 1998 the growth in the physical milk supply generally matched the increase of the cow herd such that milk yields stagnated at 1 300 kg/cow. Since 1998, however, milk output has been growing faster than the number of cows, suggesting significant improvements in milk productivity. Between 1998 and 2007 milk output increased by more than 170 percent while the number of cows grew by only 60 percent. Milk yields accordingly rose from the pre-1998 level of 1 300 kg per cow to 2 000 kg per cow in 2006-2007. The gains in meat production, on the other hand, lagged behind the increase in herd size for most of the past decade. In recent years, however, we have also observed a steady improvement in meat yield.

Table 1.11. Livestock Subsector: herd and production in 1990-2007

	Cattle[a]	Sheep[a]	Livestock herd[b]	Meat[c]	Milk[d]	Milk yield[e]
1990	829	5 481	1 451	103	436	1 315
1995	1 199	6 574	1 906	110	727	1 283
2000	1 602	8 835	2 540	150	989	1 340
2005	2 065	16 598	3 874	263	1868	1 879
2007	2 158	18 275	4 142	294	2069	1 984

a thousand head, b thousand standard head, c thousand tonne (slaughter weight), d thousand ton, e kg per cow per year, calculated as the ratio of milk production to total number of cows.
Source: National Institute of State Statistics and Information of Turkmenistan (various years).

Agricultural productivity. Productivity is calculated as the ratio of output to inputs used in the production of the output. Standard productivity measures are the partial productivity of land and the partial productivity of labour. Since GAO growth exceeded the growth of land resources and lagged behind the growth of agricultural labour, partial productivity of land increased between 1990 and 2007 (by 17 percent), while partial productivity of labour decreased during this period (by 11 percent).

However, one should be careful interpreting these results as the rapid growth of gross agricultural output is suspicious. Therefore, it is most likely that the growth in overall productivity is overestimated.

Agri-food markets and services

This chapter analyzes agricultural output and input markets in Turkmenistan. The first section compares the size of the state and private sector in terms of agricultural output. The second section analyzes the state system of parastatal input and service provision.

The role of the state and private sector in input and output markets

The state sector controls the production of four strategic crops — cotton, wheat, sugar beets and rice — plus a small share of the livestock production in peasant associations and other agricultural enterprises, much of it owned by the vertically integrated state livestock organization, Turkmenmallary. The rest of the agricultural production in Turkmenistan is produced in the private sector (household plots and daikhan farms) (Table 2.1). The value of commodities produced in the state sector in Turkmenistan is relatively small with only 24 percent of total GAO, 41 percent of crop and 11 percent of livestock production.

Sales of agricultural commodities in Turkmenistan are differentiated into the state and the private sector, but the size of these sectors is unknown a substantial share of the production, as in the private sector, is for own consumption. Leaseholders operating in the state sector are obligated to deliver all their production to parastatal procurement organizations so that the marketed production in the state sector does not differ from the production.

In order to obtain an estimate of the own consumption in the private sector, we use an estimate of on-farm consumption which is equal to the consumption norm from the Soviet Union recommended by the Turkmen Ministry of Agriculture (MoA). Using these consumption norms most likely results in an overestimation of the actual on-farm consumption and hence an underestimation of the marketed

production from the private sector. Table 2.2 contains estimates of marketed production for the private sector. In 2006-2008 the average marketed portion was about 42 percent for vegetables, melons, potatoes and grapes and 32 percent for milk, beef and veal and eggs.

The value of production from the private sector in 2007 is reduced in accordance with this adjustment. Applying the "marketed portion" for privately produced commodities—about 42 percent for crops and 32 percent for livestock products— to "other crops" and "livestock" products from daikhan and household farms in Table 2.1, we can derive values of marketed production for the private sector (Table 2.3). According to Table 2.3 the private sector provides 52 percent of total marketed GAO, 37 percent of the value of marketed crops and 72 percent of the value of marketed livestock products.

Table 2.1. The state and private agricultural production sectors of Turkmenistan, in 2007 (billion manats, % total)

2007

	Total	State Sector	Daikhan and household farms	Total	State Sector	Daikhan and household farms
Total GAO	31 900	7 694	24 206	100	24	76
1. Crops	13 841	5 732	8 109	100	41	59
a. Four strategic crops*	5 302	5 284	18			
Cotton	4 386	4 386	0			
Wheat	689	677	13			
Rice**	195	190	5			
Sugar beets***	32	32	0			
b. Other crops	8 539	448	8 091			
2. Livestock	18 059	1 962	16 097	100	11	89

*Values for cotton, wheat, rice and sugar beets include a discount factor of 15 percent to allow for variations in quality.; **Uses 2009 state procurement price for rice; ***Estimated using 2007 cost of production for sugar.
Source: Based on Stanchin (2010a), Tables 7, 23, 24.

Table 2.2. Estimate of marketed production of the private sector, 2006-2008

Agricultural production	Average annual consumption norm per person, kg per year	2006-2008			
		Production, 1000 tonnes	Food use, per year, 1000 tonnes	Estimated marketed, 1000 tonnes	Marketed portion (%)
Vegetables	86	573.2	253.8	319.4	56
Melons	43	233.0	127.0	106.0	46
Potatoes	46	239.1	135.8	103.3	43
Fruits	52	134.0	153.5	0.0	0
Grapes	25.5	224.3	75.3	149.0	66
Milk	370	1 999.0	1 092.2	9.6.8	45
Beef and veal	78	264.1	230.2	33.8	13
Eggs, mln pieces	183	847.6	540.2	307.4	36

Source: Based on Stanchin (2010a), Table 26.

Table 2.3. Estimated value of marketed agricultural production in Turkmenistan in 2007 (billion manats, % total)

	Total	State sector	Daikhan and household farms	Total	State sector	Daikhan and household farms
Total GAO	16 197	7 694	8 503	100	48	52
1. Crops	9 164	5 732	3 432	100	63	37
a. Four strategic crops	5 302	5 284	18			
Cotton	4 386	4 386	0			
Wheat	690	677	13			
Rice**	195	190	5			
Sugar beets***	32	32	0			
b. Other crops	3 862	448	3 414			
2. Livestock	7 033	1 962	5 071	100	28	72

*Value includes a discount factor of 15 percent to allow for variations in quality; **Uses 2009 state procurement price for rice; ***Estimated using 2007 cost of production for sugar; ****Daikhan and household farm production is reduced to net out production for self consumption.
Source: Estimated from Stanchin (2010a), Tables 7, 23 24, 26.

Output and input markets in the state sector

The agricultural reforms of 1996-1997 removed the managerial authority from the MoA and the kolkhoz system to a new system of parastatal service and procurement organizations.[3] Furthermore, the scope of state agriculture was narrowed to the production of only three strategic crops (cotton, wheat and rice). In 2000 sugar beets were added to the list of state order crops. State orders for meat and milk were dropped, and private trade was developed for non-state order crops.

The essence of the centralized state planning system ("goszakaz" or state orders) for production of the four strategic crops is that planning, input and service delivery, as well as procurement for the four strategic crops is carried out on the basis of Presidential Decrees and government resolutions. Neither peasant associations nor their leaseholders make decisions on the production of these crops. Input and service delivery for these crops is provided by the Ministry of Water Economy, Daikhanbank and five parastatal service organizations for agriculture. These organizations make up the State Agricultural Joint Stock Company of Turkmenistan formed in 2004 by Presidential Decree. The parastatal organizations are responsible for delivering a standard package of inputs to each leaseholder calculated on a per hectare basis and collecting a standard expected output based on a standard yield. Information on each of these organizations and their role in the state planning system can be found in Annex 2.

The state order system utilizes the vast majority of land resources in Turkmenistan. In 2008 state production of wheat and cotton represented 89 percent of total sown land in Turkmenistan and even 92 percent of the total cultivable area (Table 2.4).

3 Until 1997 the Ministry of Agriculture was the central institution for the organization and management of agriculture. As a result of the 1997 reforms the functions of the Ministry of Agriculture were severely restricted. Its system of local offices was transferred to regional (velayat) and district (etrap) level administrations, and responsibilities for the management, financing and servicing of farms were transferred to the new parastatal input service and procurement-based organizations.

Table 2.4. Sown area of government order crops

	2005	2006	2007	2008	2009*
Total sown area, '000 ha	2 002.4	2 015.5	1 588.1	1 596.6	1 705.5
Including, for government order	1 634.9	1 604.0	1 513.6	1 515.0	1 511.8
Wheat	952.7	946.5	832.9	905.6	950.0
Cotton	644.6	623.2	642.7	570.4	545.0
Rice	31.5	22.2	22.1	27.9	18.0
Sugar beets	6.1	12.5	15.9	11.1	15.0

*Turkmen Government directive for 2009.
Source: Stanchin (2010a), p. 5.

Food processing

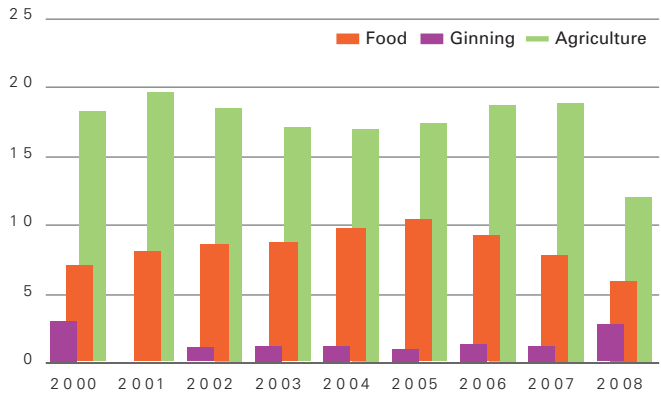
This chapter analyzes the food processing industry in Turkmenistan. First, we discuss the role of agri-food processing in the overall economy and its performance. We discuss in detail the main processing sectors: vegetable oil, flour milling and bread baking, meat and dairy industry, and vegetable and fruit canning. Second, we discuss the relative importance of state and private food processors. Finally, we discuss two case-studies of important supply chains in Turkmenistan in more detail: flour milling and baking and dairy.

Importance and structure of the food processing industry

Importance of the food processing industry

The food processing industry in Turkmenistan accounts for 9 to 10 percent of GDP, with cotton fibre (a component of the light industry) adding another 1 to 2 percent of GDP over the years (data for 2000-2007). The share of agri-food processing in GDP is thus about half the share of primary agriculture (Figure 3.1).

Figure 3.1. Share of agriculture and agri-food processing in GDP, %



*Data for ginning in 2001 are missing.
Source: Stanchin (2010b), Tables 1, 8.

Data on the aggregate value of food processing in constant prices are available only for the early years of independence (Statistical Yearbooks of Turkmenistan, 1996; CIS Interstate Statistical Committee of the CIS - CISSTAT 14, 2009). These data reveal a sharp decline in the food processing industry in the early 1990s. By 1996 the food processing industry had dropped to 70 percent of the 1990 level. There are indications of stabilization and possible recovery in 1996-1998 (the last years for which aggregate value data are available from the CIS statistical source), so that the general behaviour of food processing in the 1990s was similar to the behaviour of the primary agricultural production where, after a sharp decline in the beginning of 1990s, there was renewed growth after 1998 (see Chapter 1).

In the absence of aggregated data on the food industry, we consider the disaggregated growth of the main food processing products in physical quantities (Table 3.2). Between 2000 and 2008, processing output increased substantially for vegetable oil, canned fruits and vegetables, and especially non-alcoholic beverages. Meat processing and flour production remained essentially flat while dairy output declined sharply. The production of bread and baked products increased impressively over time despite the constancy of domestic flour production, presumably augmented by flour imports. Table 3.3 gives the growth in food processing expressed per capita.

In May 2010, the National Program of Socio-economic Development of Turkmenistan 2011-2030 was adopted to improve the food security of the Turkmen population. In this plan there is a substantial increase in both the primary agricultural production and the processing industry envisaged (Table 3.4 and 3.5). These projections estimate that the growth of the agri-food processing industry will exceed population growth such that there is high per capita growth of the agri-food processing industry. In order to achieve this growth, it is foreseen that in the period 2010-2015 state investments in the agri-food processing industry will be tripled compared to the period 2005-2009 (Table 3.6). However, despite these planned investments, it is unclear to what extent these data are credible and especially for meat, dairy and flour milling the projected growth is much higher than the growth achieved in the past decade.

In May 2010, the National Program of Socio-economic Development of Turkmenistan 2011-2030 was adopted to improve the food security of the Turkmen population. In this plan there is a substantial increase

Table 3.2. Growth in food processing for main products 1990-2000 and 2000-2008*

	1990	2000	2008	1990-2000 change, %	2000-2008 change, %
Ginned cotton fibre	350.0	235.1	297.5	-33	27
Vegetable (cotton-seed) oil	104.3	48.5	74.2	-53	53
Meat products	41.1	31.1	29.9	-24	-4
Dairy products (excl. butter)	129.4	116.5	93.3	-10	-20
Butter	4.5	3.9	2.6	-13	-33
Canned fruits and vegetables	68.5	148.2	246.8	116	67
Bread and baked products	154.1	691.5	849.2	349	23
Flour	449	545.5	562.0	21	3
Non-alcoholic beverages	5 199	5 162	11 444	-1	122

*In '000 tonnes, except canned fruits and vegetables (million st. cans) and non-alcoholic beverages ('000 dekalitres).
Source: Stanchin (2010b), Table 12; ginned cotton fibre from Table 9 (1990 estimated at 25 percent of cotton harvest).

Table 3.3. Growth in per capita production of processed foods 1990-2000 and 2000-2008*

	1990	2000	2008	1990-2000 change, %	2000-2008 change, %
Vegetable (cotton-seed) oil	28.8	9	13.1	-69	46
Meat products (incl. sausage)	16.2	6.5	6.1	-60	-6
Dairy products (excl. butter)	35.6	21.7	16.5	-39	-24
Butter	1.2	0.7	0.5	-42	-29
Canned fruits and vegetables	3.6	27.6	43.7	667	58
Bread and baked products	42.5	128.8	150.5	203	17
Flour	124	101.6	99.6	-18	-2
Non-alcoholic beverages	1.4	1	2	-29	100

*In kg, except canned fruits and vegetables (standard cans) and non-alcoholic beverages (dekalitres).
Source: Stanchin (2010b), Table 13.

in both the primary agricultural production and the processing industry envisaged (Table 3.4 and 3.5). These projections estimate that the growth of the agri-food processing industry will exceed population growth such that there is high per capita growth of the agri-food processing industry. In order to achieve this growth, it is foreseen that in the period 2010-2015 state investments in the agri-food processing industry will be tripled compared to the period 2005-2009 (Table 3.6). However, despite these planned investments, it is unclear to what extent these data are credible and especially for meat, dairy and flour milling the projected growth is much higher than the growth achieved in the past decade.

Importance of different subsectors

Meat and dairy processing accounts for over 15 percent of the food industry, while flour and other milled products represent only 6 percent (Table 3.7). The remaining 80 percent represent a mixed category of food products that includes vegetable oil, confectionary products, non-alcoholic beverages, etc. (no breakdown available).

Cotton sector. As the result of an increase in cotton yields, the cotton harvest has grown since 2002 (see Chapter 1). This has naturally led to growth in cotton ginning, cotton seed production and cotton-seed oil production, which together represents nearly the total vegetable oil production in Turkmenistan (Figure 3.2).

All cotton is ginned into fibre, which is then exported to the world market. A small portion of cotton seeds extracted during ginning (about 15 percent on average) is retained by the purchasing agencies for next season's sowing, and the remaining 85 percent is processed into vegetable oil, which is then sold to consumers either by the processors or by the farmers who receive a share of the oil as additional payment in kind for their cotton. All cotton gins and oil pressing plants are state owned.

Flour milling and bread products. All wheat is consumed domestically, and about 70 percent of the wheat production is milled into flour; another 20 percent is used as seeds for next year's sowing and around 10 percent is fed to animals (averages for 2007-2009). Flour production has remained essentially flat at a level of 550 000 tonnes since 2000 (Table 3.8), up from about 450 000 tonnes in the decade 1990-1999. The stability of flour production is inconsistent with the reported increases in wheat production (see Chapter 1). As indicated before, however, these data on the evolution of wheat production seem unreliable.

Table 3.4. Projections for primary food production and food processing 2009-2030

a) Livestock products and fruits and vegetables

Year	Meat[2]		Milk		Vegetables/fruits		
	Produced	Processed	Produced	Processed	Produced	Canned, million stand. cans	Raw material used in canning [3]
2009	295.0	29.9	2 145.9	96.3	814.1	247.6	56.8
2010	308.6	35.2	2 205.5	117.0	894.2	278.9	64.0
2011	314.6	36.2	2 261.4	127.4	932.9	290.4	66.6
2012	324.2	36.9	2 314.3	131.5	978.3	297.0	68.1
2013	333.9	38.5	2 370.2	135.6	1 016.2	305.8	70.2
2014	343.2	39.3	2 408.8	139.7	1 064.4	315.4	72.4
2015	351.7	40.4	2 492.6	154.0	1 110.8	322.8	74.1
2020	391.0	44.9	2 662.7	191.4	1 163.3	380.7	87.4
2025	419.1	46.5	2 832.9	202.8	1 215.9	395.7	90.8
2030	450.3	48.3	3 056.7	215.6	1 289.9	408.6	93.8

b) Grain

Year	Milling and baking					
	Wheat	Flour	Wheat milled to flour[4]	Bread and macaroni production	Flour required[5]	Flour shortage
2009	1 231.4	555.7	794.7	878.1	569.8	-14.1
2010	1 600.0	573.9	820.7	904.4	586.5	-12.6
2011	1 625.0	633.2	905.5	962.2	624.6	8.6
2012	1 639.0	660.6	944.7	1 071.2	695.4	-34.8
2013	1 654.0	691.6	989.0	1 085.4	705.0	-13.4
2014	1 669.1	709.0	1 013.9	1 113.5	723.5	-14.5
2015	1 685.1	750.3	1 072.9	1 178.3	765.6	-15.3
2020	1 810.2	849.1	1 214.2			
2025	1 849.0	872.7	1 248.0			
2030	1 896.2	895.7	1 280.9			

(1) All quantities in thousand tonnes, except canned vegetables and fruits (million standard cans);
(2) Meat in carcass weight; production converted to carcass weight as 0.547 slaughter weight;
(3)Each standard can contains 353 grams and 65 percent of this weight is vegetable or fruit content;
(4) 1.43 kg of wheat yields 1 kg of flour;
(5) Calculated assuming that 1 kg of flour produces 1.55 kg bread or 1 kg of macaroni products.

Source: Stanchin (2010b), Tables 26, 28 29, 33, 43.

Table 3.5. State investments in food processing industry 2005-2015 (millions USD)

Sector	2005-2009	2010-2015
Meat and dairy processing	106	400
Grain milling	124.4	203.8
Fruit and vegetable canning	n.a.	8.0
Total for food industry	224.4	611.8

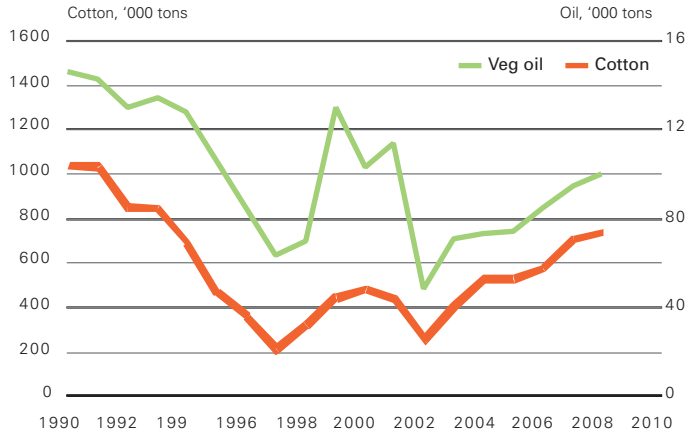
Source: Based on Stanchin (2010b).

Table 3.6. Structure of food industry by product sector (percent of gross sectoral product)

	2004	2005	2006	2007	2008
Meat and dairy	15.3	16.7	15.6	15.5	15.2
Flour, milled products	7.5	6.7	6.4	5.4	6.2
Other food products	77.3	76.6	78.0	79.1	78.6
Total	100	100	100	100	100

Source: Stanchin (2010b), Table 8 based on Statistical Yearbooks of Turkmenistan, (various years).

Figure 3.2. Vegetable oil production and cotton harvests 1990-2008



Source: Stanchin (2010b); data for 1991-1999 from Statistical Yearbooks of Turkmenistan (various years).

Table 3.7. Domestic flour: production and requirements to support actual bread quantities ('000 tonnes)

Year	Domestic flour production	Bread and bread products	Macaroni products	Confectionery products	Flour requirements*	Domestic flour excess (+) or shortage (-)
2000	545.5	691.5	10.9	16.4	460.3	85.2
2001	560.6	728.0	12.1	19.3	485.6	75.0
2002	533.3	955.4	11.5	22.6	632.4	-99.1
2003	502.8	1 049.5	9.1	24.5	691.1	-188.3
2004	501.7	1 097.7	7.4	26.7	720.9	-219.2
2005	542.7	1 127.6	6.9	27.8	740.0	-197.2
2006	533.8	1 003.3	6.8	27.5	659.6	-125.8
2007	505.1	959.9	8.2	28.3	633.1	-128.0
2008	562.0	849.2	9.3	30.2	563.2	-1.2
2009	555.7	868.7	9.4	27.4	575.3	-19.6

*Calculated assuming 1.55 kg of flour per 1 kg of bread, 1 kg of flour per 1 kg of macaroni products, and 0.2 kg of flour per 1 kg of confectionery products.
Source: Stanchin (2010b), Tables 12, 29.

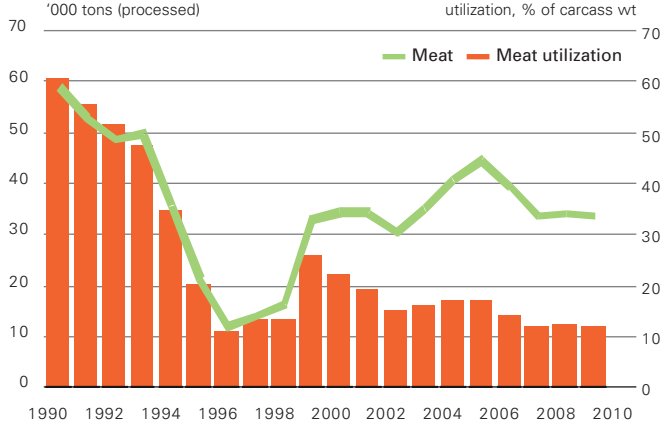
Bread and bread products, on the other hand, grew impressively between 2000 and 2009, and the supply of bread per capita increased despite the fast population growth. Bread production rose by more than 60 percent between 2000 and 2005 but began to decline after 2005 (Table 3.8). This is probably the reason behind the sporadic bread shortages that appeared in the press during the last years of President Niyazov's regime (Punda, 2010b). During the beginning of the 2000s, domestic flour production was insufficient to support bread production and a substantial share of the flour consumption was imported. When bread production declined in 2007-2009, flour imports also declined (Table 3.8).

Meat and dairy processing. Both meat and dairy processing declined sharply during the early years of transition from 1990-1996, recovered, and have remained fairly stable since 1996 (for dairy) and 1999 (for meat) (Figures 3.3, 3.4). The decline and recovery in meat and dairy may also be due to a change in statistical reporting, which in the earlier years may have included only the formal (i.e. state) sector.

While dairy and meat processing remained stable since 1996 and 1999, the supply of both raw milk and meat steadily increased such that the

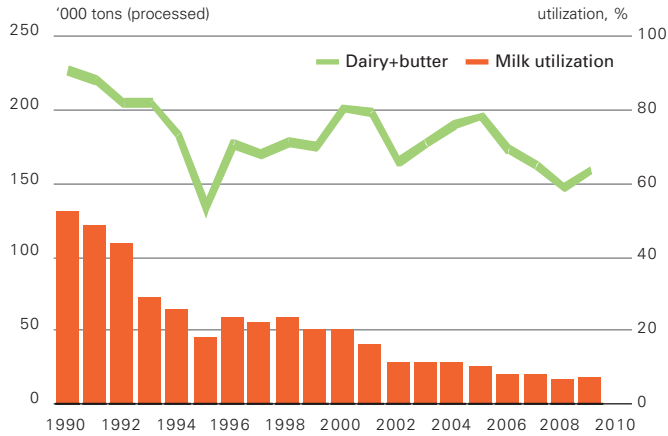
shares of meat and raw milk utilized in processing kept decreasing between 1990 and 2009 (Figures 3.3, 3.4). The dairy supply chain is discussed in more detail in section 3.3.2.

Figure 3.3. Meat processing volumes and rate of utilization of domestic meat production 1990-2009



Processed meat includes sausage and canned meat (in carcass weight equivalents).
Source: Stanchin (2010b); 1991-1999 from Statistical Yearbooks of Turkmenistan (various years).

Figure 3.4. Dairy processing output and rate of utilization of domestic raw milk production 1990-2009

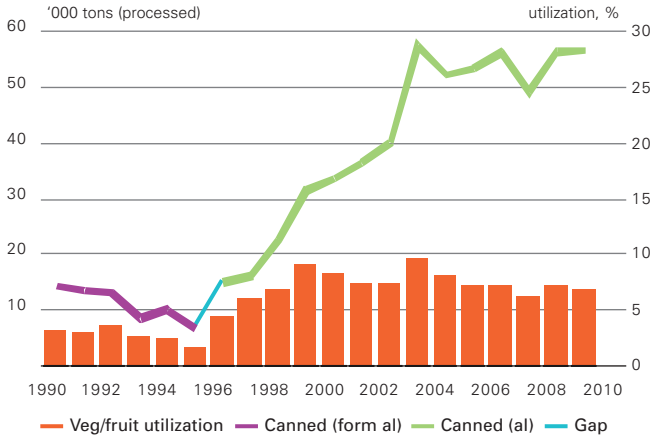


Source: Stanchin (2010b); 1991-1999 from Statistical Yearbooks of Turkmenistan (various years).

Fruit and vegetable processing. Fruit and vegetable processing is essentially limited to canning. Although juice processing capacity exists, fruit and tomato juices are produced on a very limited scale (under the brand name "Serdar" established in 2000) and supermarkets usually have only imported juices, mainly from Turkey and Ukraine. Frozen fruits and vegetables are not produced at all.

Fruit and vegetable canning is the main activity in Turkmenistan's canning industry. Meat and fish canning has largely disappeared, dropping from 26 million standard cans in 1990 to a mere 2 million in 2008 (equivalent to a drop from 9 300 tonnes to less than 1 000 tonnes). Fruit and vegetable canning, on the other hand, registered rapid growth since 1996; however, the growth stabilized after 2003 at a level of about 50 000-60 000 tonnes of processed fruits and vegetables, up from 30 000-40 000 tonnes in the early 2000s and 15 000 tonnes in 1996. The growth in the canning industry was driven by supply expansion and the share of fruit and vegetable production utilized in the processing industry remained fairly stable at 5 to 10 percent since 2000 (Figure 3.5).

Figure 3.5. Volume of fruits and vegetables processed by the canning industry and rate of utilization of domestic raw materials 1990-2009



1990-1995 state sector only; 1996-2008 includes also private (non-formal) processing.
Source: Stanchin (2010b), 1991-1999 from Statistical Yearbooks of Turkmenistan (various years).

Role of the state and private sector in food processing

All food processing companies were state owned in 1990 and have not been privatized during transition. Yet private processors (usually small-scale) emerged in all sectors of the food processing industry including meat, dairy, vegetable canning, milling and bread baking. Table 3.9 shows the number of processors by ownership type in the main sectors of the food processing industry. The information is probably fairly reliable for state processing plants and plants operated by the state-controlled consumer cooperative system. Nevertheless, it is unreliable with respect to private processing plants as it only lists the formally registered legal bodies.

In the absence of explicit statistics, the share of private processing can be estimated by taking the difference between the total output of the processing industry and the reported output for state processors (both variables are published in official statistics). Figure 3.6 shows the corresponding estimates for the shares of state and private processing in major product categories (averages for 2005-2009). Except for flour

Table 3.8. Structure of food processing industry by ownership (2009)

	Number of processing plants	State ownership	Consumer cooperation and parastatals	Private
Meat	43	7	18	18
Dairy*	36	18	7	11
Milling	20	14	2	4
Bread baking	257	12	235	10
Macaroni	36	1	34	1
Confectionery	62	4	49	9
Fruit and vegetable canning	34	8	24	2
Total quantity	488	64	369	55
Total %	100	13	76	11

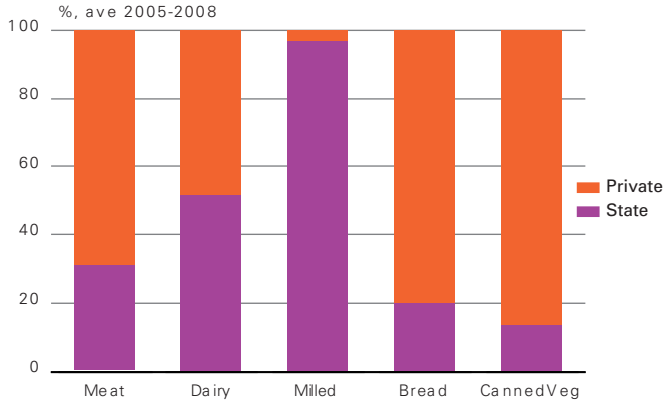
*For a list of large state-owned dairies in Turkmenistan see Punda (2010a).
Source: Stanchin (2010b), Table 12.

and other milled products, which appears to be a virtual monopoly of state processors, the share of private processing ranges from 30 to 50 percent for meat and dairy products to 80 to 90 percent for bread baking and canned vegetables. The private sector was traditionally strong in bread baking and fruit and vegetable processing: even back in the 1990s households produced up to 60 percent of bread and processed fruit and vegetables.

Although private processing dominates bread baking, canned vegetables, meat, and even dairy, it is noteworthy that the share of state processing has been steadily increasing between 2005 and 2009 (Table 3.10). The trend is even noticeable for bread and canned vegetables where overall the role of the state sector has been minor. In these two product categories the share of the state sector increased from 16 percent to 23 percent for bread baking and doubled from 8 percent to 16 percent for vegetable canning.

The agri-food processing industry obtains its raw material mainly from the domestic market. The production in household plots and daikhan farms (basically meat, milk, fruits and vegetables) is free from

Figure 3.6. Shares of state and private processors in Turkmenistan's agri-food processing, averages for 2005-2009



Milled includes flour, groats, macaroni; dairy excludes butter (100 percent state).
Source: Stanchin (2010b), Tables 18, 29, 43.

Table 3.9. Shares of state and private processing for main products 2005-2009

	Meat		Dairy		Flour and milled products		Bread		Canned vegetables	
	State	Private	State	Private	State	Private	State	Private	State	Private
2005	24	77	41	59	94	6	16	85	8	92
2006	28	72	48	52	97	3	18	82	13	87
2007	34	66	53	47	98	2	19	81	16	84
2008	35	65	60	40	98	2	23	77	15	85
2009	35	65	57	43	99	2	23	77	16	84
Ave.	31	69	52	48	97	3	20	80	14	86

Source: Stanchin (2010b), Tables 18, 29, 43.

state orders and, unlike leaseholder output, it is distributed through a variety of marketing and processing channels. Only a small portion of production in the individual sector reaches the processing industry, whether state or private (Table 3.11). In general, private producers sell a part of their production to state processors, which are more accessible to Turkmen farmers. In some cases, however, they also sell to private processors. There is no data on the share sold to private and state processing companies.

Overall, a substantial share of the private output is consumed in the household (Table 3.11), one part is sold directly to consumers in local markets and another portion undergoes "home processing". Rural households process milk into home-made cottage cheese, sour cream, and butter; they process meat into home-made sausage and smoked meat; they pickle vegetables and make them into salads; they process fruits and berries into jams and jars of compotes. They even bake home-made bread and biscuits, either from commercial or home-milled flour. These home-made products are traded on local unorganized markets.

The primary agricultural output produced in the state sector (i.e. by the leaseholders in peasant associations) is almost exclusively destined for state processing companies. In general, though, the output of state producers is insufficient to supply the needs of the processing industry in raw materials, especially for meat, dairy and more recently for fruit and vegetables as well. In livestock production, where private producers—household plots and daikhan

farms—maintain a dominant position, the total production of the state sector is sufficient to supply less than 40 percent of the processors' requirements for raw milk and less than 60 percent of the requirements for animal carcasses (Table 3.12).[4]

To ensure supply of raw materials from a multitude of small farms, the processing industry should adjust the structure of its collection channels so that it matches the fragmented production structure. Dairy and vegetable processing cannot operate without setting up adequate arrangements for collecting raw materials from small individual farms, including household plots. The decrease in dairy and meat processing, which occurs despite the continued increase in output of raw milk and meat at the farm level, is probably a symptom of the inadequate collection and delivery arrangements between the processing industry and small producers.

Table 3.10. Balance of uses of main commodities 2008

	Production, '000 tonnes(1)	Total marketed, % (2)	Sold to processing, %(3)	Sold to consumers, %(4)	Consumed on farm(5)
Cotton (2009)	1 050	100	100	0	0
Cotton seed (oil pressing)	558	n.a.	85	15 percent for seed	
Wheat	815.8	n.a.	70	20 percent for seed, 10 percent for animal feed	
Meat (incl. sausage)	282.8	16	12	4	84
Milk (incl. butter)	2065	45	7	38	55
Vegetables and fruits (excl. melons, grapes)	770.7	62	11	51	38

Sources: based on Stanchin (2010b) (columns 1, 3) and Stanchin (2010a), Table 26 (column 5); column 4 calculated by difference.

4 These numbers are overestimates as they assume that the state producers sell their entire output of meat and raw milk to processors, whereas in reality some of their output may be sold directly to consumers in local markets.

Table 3.11. Sufficiency of raw materials from the state sector for food processing requirements

Year	Milk from state sector	Dairy products (incl. butter)	Share of state production in processing	Meat from state producers, carcass wt	Meat and meat products	Share of state production in processing	Veg. and fruits from state producers	Canned fruits and veg	Share of state production in processing
2000	51.5	201.5	26	17.1	34.6	49	101.9	52.3	195
2001	54.3	199.2	27	17.6	34.5	51	132.9	56.4	236
2002	61.2	165.5	37	17.7	30.7	58	105.7	61.8	171
2003	63.1	177.6	36	18.2	35.2	52	85.7	88.7	97
2004	63.0	190.4	33	19.4	40.7	48	84.2	80.6	104
2005	63.4	196.4	32	21.0	44.7	47	76.9	82.4	93
2006	62.3	173.8	36	23.3	39.7	59	78.3	87.1	90
2007	60.6	163.1	37	23.4	34.0	69	79.4	76.0	104
2008	60.2	148.5	41	20.6	34.4	60	59.3	87.1	68
2009	62.2	159.4	39	20.5	33.9	60	61.1	87.4	70

Source: based on Stanchin (2010b), various tables.

Case studies of two supply chains: flour and dairy

Wheat flour supply chain[5]

Turkmenistan produces mostly soft winter wheat, which is primarily used in production of bread and local pasta products, as there is no local production of durum varieties. Four out of five provinces (except Balkan) grow wheat and have roughly the same (25 percent) contribution to total domestic wheat output (816 thousand tonnes in 2008).

Almost the entire wheat supply chain, from farming to milling, is shaped by the National Food Security Policy. The sector is exclusively under state ownership, with procurement, storage, and milling stages under the control of Turkmengallaonumleri, the grain sector parastatal association. The sector is heavily subsidized by the state and lacks competition and market mechanisms. In upstream processing stages, such as the production of bread and macaroni, the private companies play a more prominent role and, at this stage in the supply chain, the sector is more profitable. Figure 3.7 presents a schematic representation of the organization of the wheat-to-bread supply chain.

5 This section is based on Punda (2010b).

Figure 3.7. Schematic description of the wheat-to-bread supply chain

Source: interviews during the mission, imports data – USDA FAS.

Elevators. Elevator facilities are often co-located with flour mills and may also provide cleaning, inspection, and quality blending functions. After the collapse of the Soviet Union, the country had no silo (elevator) facilities and only a few mills. As such, Turkmenistan was seriously lacking grain storage facilities until recently. Since 2008 the country has launched a major expansion of its storage facilities.

Milling. About 80 percent of harvested wheat goes toward production of flour with only a limited quantity used for seeding and other purposes. In 2008 national flour production reached 500 000 tonnes. The primary product is wheat flour for baking, while the main by-product is bran (about 22 percent of output).

Half of milling facilities in the country are of medium size (200 tonnes/day). The government has made significant investments in the milling sector by adopting the latest technology (Buller and Petkus equipment) and progressively increasing flour milling capacity; and since Turkmenistan's independence, nine milling facilities of 350 tonnes/day capacity have been put into operation.

Processing into bread and macaroni products. There are nine large wholesale bakeries in the country. One of the biggest companies is Ashkhabad churyok, with a daily capacity of 140-150 tonnes. The pasta industry started operating only in 1994. Out of total flour production, 15 percent-20 percent (75 000-100 000 tonnes) are processed into macaroni products. This activity is under state control (95 percent). Products include macaroni, bran, and semolina. In addition to the state sector, there is also a substantial private sector, specialized in bread baking.

Investments in the milling and bread industry. Cumulative investments in the milling industry between 2005 and 2009 reached USD 124.4 million, all financed with state funds. An additional USD 203.8 million is planned to be invested through Turkmengallaonumleri, the grain sector parastatal, up to 2012. Box 1 lists the planned investment projects until 2012.

New elevators and mills are being constructed in each province: a grain elevator with a capacity of 50 000 tonnes was put into operation in Ruhubelent Etrap in Dashoguz Velayat; another two were built by IKR Babolna (Hungary) in Ahal Velayat: a 30 000 tonne elevator in Kaahka Etrap and a 50 000 tonne elevator in Altyn Asyr; and an

elevator with capacity of 50 000 tonnes in Yoloten Etrap, Mary Velayat. Under this programme, Turkmengallaonumleri plans to achieve a total of 350 000 tonnes of storage capacity and 1 320 tonnes per day for milling capacity.

Constraints for grain sector development. A major constraint for the development of the grain sector is the state control of production. Leaseholders in the peasant associations have no control on which seeds they will use, when they will plant them, the fertilizer and pest control agents they will use, when they will harvest etc. In addition, the input and output prices are determined by the government and while inputs are subsidized, state procurement prices for agricultural output are below international prices, such that in fact producers are subjected to net taxation (see Chapter 5). Furthermore, the poor quality of the raw material produced is a constraint for the development of the grain sector.

Dairy supply chain[6]

The stock of cattle in Turkmenistan is about 2.2 million head (2009) of which 1.04 million (or 47 percent) are milking cows. Half of Turkmenistan's cattle is concentrated in Dashoguz Province in the north, owing to better fodder availability. More than 90 percent of the livestock herd is in the private sector (see Figure 1.16) and overall the state plays

6 This section is based on Punda (2010a).

Box 1. Investments plans of Turkmengallaonumleri up to 2012

A diversified mill complex in Rukhabat district, Akhal velayat, capacity 80 000 tonne. The complex will include:

- A grain elevator with 100 000 tonne capacity;
- A bakery with capacity of 40 tonne/shift;
- A plant for macaroni products (48 tonne/shift);
- A plant for manufacturing of polypropylene bags (18 million bags a year).

Six grain elevators in Akhal, Balkan, Dashoguz, and Lebap with 30-50 tonne capacity.

Four mills in Balkan, Dashoguz, Lebap, and Mary with milling capacity of 50 000-80 000 tonnes and grain elevator capacity for 50 000-100 000 tonnes.

Nine industrial bakeries in medium and small towns across the country with capacities from 2 500 to 14 000 tonnes of bread and baked products.

Source: Stanchin (2010b).

a marginal role in livestock production. Dairy farming has emerged as an important source of income and employment in rural areas, especially for the hundreds of thousands of small household farms.

Raw milk production. The country's milk output in 2008 reached 2.1 million tonnes with an average of 3.2 percent fat content in summer and 4.5 percent in winter. Raw milk production has more than doubled since 2000, due to a combination of increases in headcount and milk yields. Milk yields remain low, however: Turkmen farmers obtain 1 980 kg of milk (or 2 040 litre) per cow per year on average, compared with 4 050 kg in Ukraine and 4 510 kg in Belarus (FAOSTAT, 2010).

Two factors are responsible for low milk yields in Turkmenistan: (i) inadequate production of feed crops, which cover less than 3 percent of the sown area (see Figure 1.11) and (ii) poor genetics of the local breeds (maximum genetic potential 4 000 kg per cow per year), which represent 70 percent of the country's stock. Feed production is very low because private farms are not allowed to produce fodder on irrigated land and alfalfa is only grown on non-irrigated lands (4 to 5 harvests per year). Hay output could be significantly increased if private farmers were allowed to make their own planting decisions. In terms of the genetic material, there is also heterogeneity between state and private farms. Recently some large state-owned dairy farms began importing genetic material of Holstein cattle and French Montbéliard for their breeding programs. Imported cattle is often crossed with local breeds to achieve higher milk yields and the share of these animals is at present about 12 percent. The private sector mainly uses local breeds.

Overall, productivity is particularly low in the private sector as only the few state cattle farms tend to use genetic material of highly productive dairy breeds in their breeding programmes and have their own land for fodder production.

In addition to low productivity, the quality of the raw milk is relatively low as almost all small farmers practice hand milking. The average quality corresponds to II class milk according to Turkmen Standards, which means that 1 millilitre of milk contains 0.5-4 million bacteria. Large farms with automated or semi-automated milking equipment manage to have less than 0.5 million bacteria per ml (I class milk). Quality issues are aggravated by lack of refrigeration facilities.

As a result, raw milk production in Turkmenistan has a marginal profitability, mainly because of low productivity (Table 3.13).

Dairy production. About 30 to 40 percent of milk is consumed as whole milk. The remaining 60 to 70 percent (about 1.2-1.5 million tonnes) undergoes further processing into fermented milk products, such as kefir (probiotic fermented milk drink originated in the North Caucasus), sour cream, curds, and ryazhenka (baked fermented milk). The country produces about 3 000 tonnes of butter and 1 600 tonnes of cheese.

Dairy processors include a number of small companies as well as a few large ones, such as "Altyn Halka" (a dairy and meat state-owned vertical company), "Salkyn" (private producer of ice cream), and "Pinerci" (private cheese maker). There is no production of yogurts or baby food because of poor bacteriological quality of raw milk. Confectionary producers are also entirely dependent on imports for their ingredients (e.g., milk powder and condensed milk). The market for packaged milk is yet to be discovered as local consumers often buy raw milk directly from farmers.

Underdeveloped transport and storage infrastructure is not only a handicap for milk supply but also a problem for dairy processors as they have difficulties in moving their products to the consumer. Some processors ship their products to the capital by air paying 1.5 manat/kg in transport costs (almost 10 percent of retail price).

Nevertheless, in contrast with raw milk production that appears to be just breaking even (see Table 3.13), fermented milk products generate about 15 percent margin, while cheese making appears to be very profitable with margins at almost 30 percent of milk costs (Table 3.14). Sales of by-products like butter and good prices for cheese contribute to this satisfactory result.

Foreign trade of dairy products. Turkmenistan is a net importer of dairy products, sourcing over 95 percent of its domestic consumption from abroad. As there are no duties on dairy products, imports almost tripled since 2006 based on exporter data and reached nearly USD 13 million in 2009. Half of imported dairy products is sweetened condensed milk or cream, one-quarter is cheese, and the rest is distributed between yogurt and buttermilk (16 percent) and various whey and butter spreads. Imports of dairy products are likely to continue increasing, as consumers will demand more variety and the consumption of traditional dairy products will grow.

Table 3.12. Estimated gross margin for a private dairy farm, in Turkmen manat

A. Revenue (per cow per year)	3 518
Milk production, litres per cow per year	3 082
On-farm milk consumption (feeding calves and human consumption), estimated at 6 percent of production	193
Milk sold, litres per cow per year	2 889
Average milk price, manat/litre	1.07
Revenue from milk sales, manat per cow per year	3 092
Revenue from sale of one live calf in the market, manat per year	426
B. Production costs (per cow per year)	3 044
Total feed costs per cow per year	2 192
Labour (3 workers live-in cost per 1 milking cow), per year, manat	601.4
Insemination, manat per year	28.4
Vet, vitamins, misc., manat per year	142
Misc. and overhead, manat per year	80
C. Investment	
Cost of one cow, manat	4 260
Cow productive life, lactations	8
Cow value at the end of 8 lactations (meat), manat	927
Interest rate, %	8
Cow cost to be depreciated over 8 lactations, manat	3 333
Cow cost depreciated over 1 lactation/year incl. interest, manat	450
D. Total cost (B + C)	3 494
E. Margins	
Total revenue less feed costs, manat per year per cow	1 326
Total revenue less feed costs in percent of feed costs	60
Margin (total revenue less total cost), manat over total costs	24
Margin, % of total costs	1

Note: An assumption was made that a household of 4 people consumes 0.2 litres of milk a day and a calf consumes another 260 litres per year. The calculation was made based on data gathered during field interviews in May 2010 (private farm, 10 dairy cows).
Source: Punda (2010a).

Table 3.13. Estimated gross margin in private cheese production

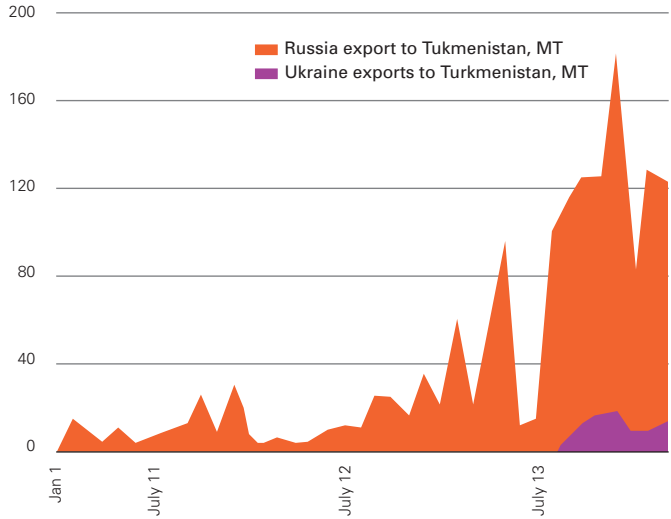
	Value (per kg)	Base fat, %
Production conversion factors:		
Milk received, litres per day	800	3.8
Butter skimmed before cheese making to reach base fat for cheese, kg	4.3	75
Butter extracted from buttermilk left after cheese production (0.15% fat separated from 0.2% of the fat remaining after cheese production), kg/day	1.6	75
Milk fat content which goes into cheese production		3.4
Cheese production, kg per day (from 800 litres)	**54**	**47**
Butter production, kg per day (4.3 kg + 1.6 kg)	**5.9**	**0.05**
Revenue:		
Price of 1 kg of butter, manat	13	
Revenue from butter sale, manat/day	98	
Price of cheese, manat/kg	14	
Revenue from cheese sale, manat/day	763	
Revenues from cheese and butter, manat/day	861	
Production costs:		
EXW Cheese Plant milk price, manat	0.84	
Raw milk purchase expenses, manat	672	
Gross margin		
manat/day	189	
% of raw milk purchase cost	28	

Note: The calculation was made based on data gathered during field interviews in May 2010 (private enterprise, 100 kg of cheese a day).
Source: Punda (2010a).

In volume terms, the Russian Federation is the largest exporter of cheese and curd to Turkmenistan, followed by Ukraine (Figure 3.8). Overall, the Russian Federation and Ukraine supply mainly lower-priced cheeses which reflects low purchasing power in Turkmenistan (Figure 3.9).

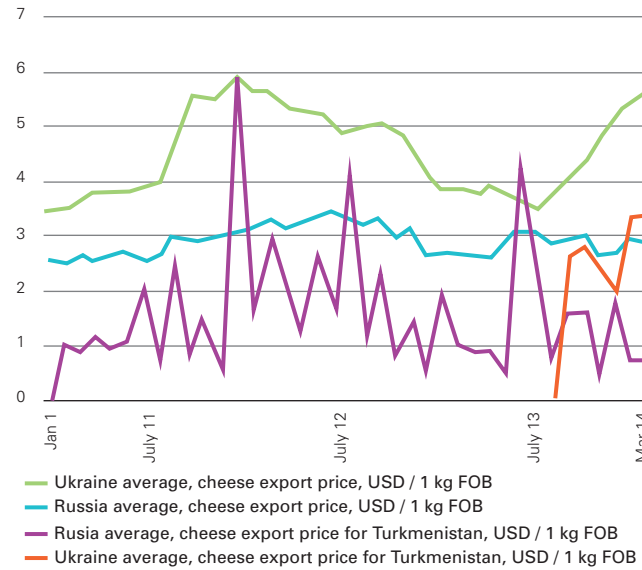
Investments in the livestock sector. Turkmenmallary, the parastatal association in charge of the livestock sector, is planning to invest in new capacity in 2010 (200 tonnes meat, 180 tonnes meat products). Livestock development also includes investment in new livestock

Figure 3.8. Dynamics of Cheese and Curd (HS 0406) exports to Turkmenistan



Source: Global Trade Atlas®.

Figure 3.9. Average export prices of Cheese and Curd (HS 0406)



Source: Global Trade Atlas®.

complexes in Mary, Dashoguz, and Balkan. The planned investment projects are summarized in Box 2 and their cost is expected to be approximately USD 400 million.

The government adopted an investment plan foresees that ten new, large cattle farms will be across the country by the year 2012. This intervention will increase the cattle stock by more than 15 000 heads (dairy and meat types), translating into an increase of 4 500 tonne in annual milk output and 6 400 tonnes of additional dairy products per year.

Constraints of dairy sector development. Limited production of feed crops and poor genetic potential of the local dairy herd are the main constraints for livestock sector development at the farm level. Limited feed production will become even more critical when ten new large state farms enter into operation. Increased nutrient requirements of highly productive dairy breeds will require more land for feed production. Local specialists also need to gain experience in dealing with highly productive dairy cattle at the large state farms. Newly introduced breeds may lack natural resistance to ticks (Acariformes) common in this area.

On the processing side, poor milk quality and the absence of proper refrigeration facilities limit dairy development and product mobility.

Box 2. Investment plans of the Food Industry Association

2009-2010
Reconstruction of meat processing plants in Balkan (1 tonne/shift, no change in capacity) and Dashogus (7.5 tonnes/shift, no change in capacity)
Construction of a new meat processing plant in Mary (50 tonnes meat products per year, 0.2 tonnes/shift)
Reconstruction of two dairies in Balkan (2 tonnes/shift) and Dashoguz (10 tonnes/shift)
Construction of a new dairy in Dashoguz (200 tonnes of dairy products a year, 0.5 tonnes/shift)

2011-2015
Construction of two meat processing plants in Mary (0.75 tonnes/shift) and Lebap (1.4 tonnes/shift)
Capacity upgrading and expansion of a dairy in Mary (10 tonnes/shift)
Construction of two new dairies in Lebap (each 1.4 tonnes/shift)

Source: Stanchin (2010b).

Trade of agri-food products

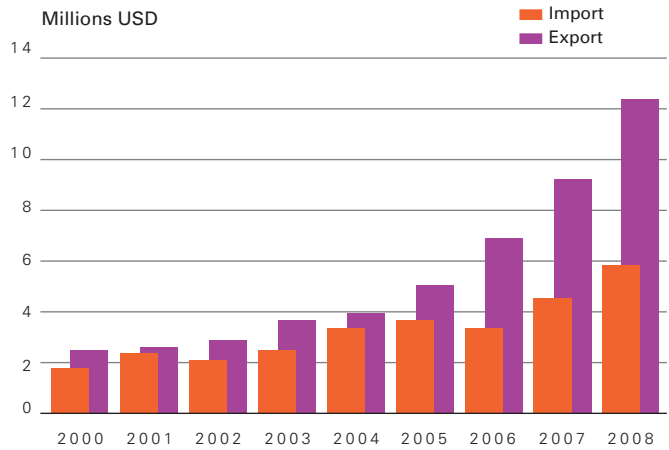
General trade

Turkmenistan has maintained a positive trade balance for many years and the trade surplus has grown since the early 2000s (Figure 4.1).

The Russian Federation, Turkey and China have been the leading exporters to Turkmenistan in the past three years. From 2006 to 2008 these three countries accounted for 39 percent of total imports to Turkmenistan. The Russian Federation, Iran and Italy have been the main importers of Turkmen products for the years 2006-2008. These trade partners accounted for 81 percent of exports from Turkmenistan. Overall, Turkmenistan exports around 50 percent of its products to CIS countries and 50 percent to other areas of the world (Table 4.1).

Mineral fuels, mostly natural gas, are by far the dominant export item and the major source of export revenues for Turkmenistan (Table 4.2). Cotton lint is a distant second, accounting for a mere 2 percent of export revenues.

Figure 4.1. Foreign Trade of Turkmenistan, 2000-2008



Source: Stanchin (2010b), p. 70.

Table 4.1. Distribution of value of Turkmen exports and imports by country and region (%), 2004-2008

		2004	2005	2006	2007	2008
Exports	Russian Federation	7	5	47	49	50
	Iran	21	18	18	19	23
	Italy	13	14	15	11	12
	CIS	44	44	50	52	56
	Non CIS	56	56	50	48	44
Imports	Russian Federation	15	11	10	11	16
	China	4	5	7	10	14
	Turkey	9	10	20	18	11
	CIS	34	28	23	22	29
	Non CIS	66	72	77	78	71

Sources: Stanchin (2010b), table 52.

Table 4.2. Structure of Turkmenistan exports and imports, 2008

Exports	Value (millions of USD)	%	Imports	Value (millions of USD)	%
Total export	11 944.7	100.0	Total import	5 707.2	100
Natural gas	6 677.2	55.9	Food products, incl. alcohol, tobacco	524.2	9.2
Cotton lint	212.9	1.8	Chemical products	382.1	6.7
Oil products	2 678.3	22.4	Plastic and products	220.9	3.9
Oil	1 534.8	12.8	Construction materials	187.9	3.3
Electricity	58.7	0.5	Non-precious metals and metal products	1 247.7	21.9
Cotton cloth	59.0	0.5	Machines, equipment, mechanisms	1 584.0	27.8
Carpets	0.5	0.0	Transport	593.3	10.4
Other	723.3	6.1	Other	967.1	16.9

Source: State Committee of Statistics of Turkmenistan (2009), pp. 104-05.

The structure of imports to Turkmenistan is more diverse than that of exports. Machinery, machines and equipment, non-precious metal products and transportation form the large part of Turkmenistan imports. Agricultural and food products, including alcohol and tobacco, make up about 9 percent of total imports.

Agricultural Trade[7]

Turkmenistan plays an insignificant role in global agricultural trade. In the case of cotton, Turkmenistan's most important agricultural crop, the country accounts for about 1 percent of world cotton production and 3 percent of global trade after the most recent growth in production and trade shares in 2005-2008 (Figure 4.2). The share in trade of other agri-food products is even less significant.

The relative importance of agri-food exports has declined in recent years due to significant increase in mineral fuel exports. The share of agri-food exports in total export gradually decreased from 6 percent in 2004 to 3 percent in 2008 (Prikhodko (2010), p.7). In contrast, the share of food imports in the country's total imports increased from 7 percent

Figure 4.2. Turkmen cotton production and exports in the world (%)

Source: USDA/FAS (2004-2010).

7 Due to the lack of detailed trade statistics on food and agricultural trade, the assessment of agri-food trade in this section was largely done using information reported by Turkmenistan's main trading partners through the International Merchandise Trade Statistics of the United Nations Statistics.

to 9 percent during the same period. This increase, however, can be largely attributed to substantial wheat imports and high international prices in 2007-2008.

Turkmenistan maintained a positive trade balance in agri-food products in 2004-2007; however, due to the surge in global food prices in 2007-2008, the country became a net importer in 2008 (Figure 4.3).

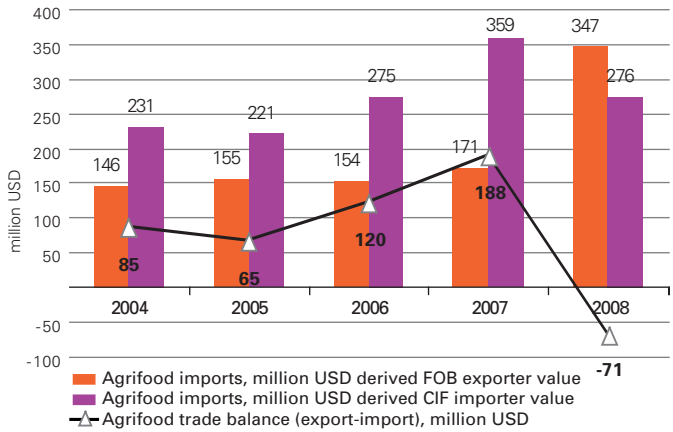
Agri-food imports

Kazakhstan, the Russian Federation and Ukraine are the main exporters of food and agricultural products (mostly wheat, flour, beverages, confectionary products, tobacco and sugar) to Turkmenistan, accounting for 74 percent of all food export sales to Turkmenistan in 2008 (Table 4.3). The dominance of these three and the other CIS countries can be explained by geographic proximity, historical ties, existence of the free-trade agreements and intergovernmental agreements.

Agri-food exports

Turkey has been far the most important export destination for the Turkmen cotton, hides and wool products in the last five years. The Russian Federation, Pakistan and China follow as other major importers (Table 4.4).

Figure 4.3. Turkmenistan trade balance in agri-food products in 2004-2008



Note: these numbers were derived from trade data provided by Turkmenistan's trading partners. This explains the difference with export and import numbers provided in Table 4.3 and 4.4.
Source: author's calculations based on UN Comtrade data.

Table 4.3. Leading exporters of food and agricultural products to Turkmenistan, million USD, Freight on board (FOB) exporter value

Reporter	Main products	2004	2005	2006	2007	2008	Change 2008 as compared with 2004, %	2008 share, %
Kazakhstan	Cereals, flour, tobacco	3	5	7	52	156	5 575%	45%
Russian Federation	Beverages, cocoa prep, tobacco	19	27	27	38	58	199%	17%
Ukraine	Beverages, cocoa prep, sugar	16	21	19	25	44	165%	13%
Turkey	Starch, veg fat, cocoa prep	17	17	17	20	30	79%	9%
Azerbaijan	Fat, beverages, sugar	0	0	1	5	11	3 220%	3%
China	Tea, flour, veg preparations	2	3	2	3	6	244%	2%
United Arab Emirates	Coffee/tea, meat, sugar	7	8	2	5	6	-22%	2%
Belgium	Cocoa, misc., veg preparations	1	1	1	3	4	318%	1%
USA	Meat, misc. preparations	1	0	1	0	4	355%	1%
Others not listed		79	74	78	22	27	-65%	8%
Export Total		146	155	154	171	347	137%	100%

Source: UN Comtrade, exporter derived information.

Table 4.4. Leading importers of food and agricultural products from Turkmenistan, million USD, Cost, insurance and freight (CIF) importer value

Reporter	Main products	2004	2005	2006	2007	2008	Change 2008 as compared with 2004, %	2008 share, %
Turkey	Cotton, raw hides, wool	118	99	147	180	129	9%	47%
Russian Federation	Cotton, fruits & nuts, wool	25	30	27	31	36	46%	13%
Pakistan	Cotton, dairy & honey, hides	6	10	8	10	25	298%	9%
China	Cotton, vegetable extracts	10	17	9	22	25	154%	9%
Egypt	Cotton, fruit & nuts	-	-	1	3	19		7%
India	Cotton, oilseeds & feed, wool	8	12	9	4	9	4%	3%
United Arab Emirates	Cotton, fruit, plants and trees	7	6	5	4	5	-28%	2%
USA	Cotton, oilseeds & feed	3	2	1	3	4	23%	1%
Italy	Cotton, veg. extracts, preparations of meat/fish	12	5	6	6	4	-70%	1%
Others not listed		42	41	61	96	20	-53%	7%
Import Total		231	221	275	359	276	19%	100%

Source: UN Comtrade, importer derived information.

Agri-food policy

Policy framework

General policy framework

The general policy context in Turkmenistan is characterized by that fact that the country has not implemented the economic reforms that have been implemented by the other transition countries in the region, although the extent to which economic reforms are implemented differs among the different countries in the region. In fact, according to the German Ministry of Foreign Affairs, the economic strategy of Turkmenistan is still determined by the principles of a centrally planned economy. The President of Turkmenistan Gurbanguly Berdimuhamedow admitted that "objective economic data witness that Turkmenistan is still standing at the threshold of a real market economy"[8]. Overall, state involvement in the economy is very high and the share of the private sector is small.9 Land privatization is incomplete and redistribution of the national income through social subsidies is almost at the same level as in the USSR era.[10,11]

In the last few years, however, the political will to implement reforms towards a more market oriented economy has became clear and a number of new, market oriented laws have been approved. First, the licensing legislation was changed and, although most economic activities remained subjected to licensing, the list of activities subjected to licensing was cut down to 44. The monopoly power of the ministries and other governmental bodies in licensing was consequently reduced.

8 www.turkmenistan.ru, 18/03/2008.

9 www.turkmenistan.ru, 18/03/2008. USCS estimates the share of private business in Turkmenistan is 25 percent. "Doing Business in Turkmenistan: 2009 Country Commercial Guide for US Companies" (USCS 2009); Russian Federation Ministry of Foreign Affairs' estimate is 40 percent. Y. Aronskiy, "The role of the private sector in modernization of economies: case of Turkmenistan". (2009).

10 Land Code of Turkmenistan envisages allocation of land plots into private ownership only for the individual house construction and subsidiary farming.

11 Since 1993 the Turkmen citizens receive the following, free of charge (within set norms): gas, power, and water; since 1994,salt; since 2007, sewage. Y. Aronskiy, "The role of the private sector in modernization of economies: case of Turkmenistan". (2009).

Second, foreign investors were allowed to acquire property, set up new companies with 100 percent equities in foreign ownership and buy acting Turkmenistan companies.[12] Furthermore, the President stated that Turkmenistan should adopt the international standards of accounting which will facilitate the functioning of foreign companies in the country.

Third, a new law on state support of SMEs was adopted that lifted certain administrative barriers. In addition, a mechanism of privilege budget lending for private investment projects was launched and the Union of Enterprises and Entrepreneurs was established.

Fourth, there have been steps forward towards the liberalization of the currency market and exchange rates were unified. In particular, for the first time economic agents became eligible to exchange manats and make transfers in hard currency in the state-owned banks.[13] At the beginning of 2009 the national currency was denominated and the exchange rate was set at 2.85 manat per USD.

Finally, customs procedures were simplified, the number of tariff lines reduced and import duties decreased.

Despite these reforms, experts agree that the reform process is slow and the elimination of the existing disruptions laid by the extreme dirigisme of the previous government will require a long period of time.

Agricultural policy framework

Agricultural policy in Turkmenistan reflects the general, economic policy and is characterized by a dual structure: state control over the production of so-called strategic commodities, and a relative, unorganized private sector that produces other commodities (see also Chapter 1 and Chapter 2).

Central planning is still intact for the four strategic crops of grain, cotton, rice and sugar beet. After the break-up of the USSR many territories of the region including Turkmenistan supported the production of certain staple crops, in particular cereals and sugar. Until now, self sufficiency motives and budget surpluses allowed

12 The previous law did not allow the foreign companies to acquire property in the Republic in any other way than setting up the joint ventures with state-owned companies.

13 Interfax, 28.1.2008.

Turkmenistan to prolong this policy.[14]. Almost all measures from the Soviet arsenal are still applied today in Turkmenistan: mandatory state deliveries, state fixed prices and state supply of major inputs. The different steps in the state controlled production system are described in Box 3. In contrast, relatively little is known about the organization of the input and output markets in the private sector, which provides about half of the total agricultural production, mainly livestock and fruit and vegetable production.

The experience of the centrally planned economy showed that strategic products are placed in the centre of the agricultural policy and subjected to mandatory reporting, which leads to substantial over-reporting (see Chapter 2).[15] For example, despite official data reporting a significant growth in grain production from 1990/91 to 1995/96, many experts reported that in 1996 there was a severe grain deficit in the country and the government had to purchase flour in Iran under urgent circumstances.[16]

The food industry is subjected to state licensing.[17] Around 10-15 percent of food industry is owned by the state, but in some sectors state involvement is much higher, such as milling and pasta production, where the state sector represents approximately 95 percent of the production; or in the processing of cotton, which is a state monopoly. Large foreign investments, including investments in the food industry can be implemented exclusively after the personal decision of the President of the Republic. The President also allocates plots for green field investments. In the last 15 years there was no allocation of land for the food industry, but recently the President has endorsed the construction of 48 new food enterprises, mainly dairy and fruit and vegetable processing companies.

14 In 1997 household expenditures for bread and sugar comprised more than 30 percent of total expenditures. Mkrytichyan, L.M., Haliepesova, A., Ataev, D., 1999. "Agricultural policy reforms and food self-sufficiency in Turkmenistan."

15 For instance, in 2009 the official newspaper Neutral Turkmenistan reported wheat yield in one region as 10.3 tonnes per hectare, which is improbable in this climatic zone. For comparison, the highest world national average wheat yield is below 80 tonnes per hectare (FAOSTAT). Under the Turkmen Research Institute of Grain, the adopted variety of wheat in the experimental settings show only 5-6 tonnes per hectare (based on interviews during thee mission).

16 e.g. http://www.ca-c.org/journal/09-1997/st_07_dgabiev.shtml.

17 Law on Licensing of Selected Economic Activities, Art. 20.

All companies are united in unions and associations. These unions and associations are self-financed and collect member fees.[18] Unlike in market economies, however, their major task is not to lobby for the interests of their members in front of the state, but their major task is to implement state policy in the sector. Hence, agricultural associations are considered governmental bodies and often are established on the base of the former Soviet ministries and agencies (e.g. the grain Products Association "Turkmengallaonumleri" was set on the base of the Grain Products Department in the MoA). Other examples include the Association of Livestock Breeders, State Cotton Consortium and the Agricultural Services Association.[19]

18 For example, the previously mentioned Association of Food Industry collects two percent of revenues of its members.

19 Annex to Presidential Decree from 12.09.2008 10014 On Enhancing of Supply meat, milk, eggs, and fish products to the Turkmenistan population.

Box 3. Steps in the central planning production and processing process

Step 1: State planning:
Each year Ministries, government agencies and regional administrations concerned with agriculture submit their suggestions, programs and requirements to the Ministry of Economy of Turkmenistan for the preparation of an annual State Program for the Development of Agriculture. The Ministry, the National Institute for State Statistics and Information of Turkmenistan and the Institute for Strategic Planning and Economic Development of Turkmenistan prepare a draft Program for the Development of Agriculture to present to the government. The Program is then approved for implementation by the President of Turkmenistan.

Step 2: Government planning targets issued in resolutions and decrees:
The government then issues decrees and resolutions that assign the tasks of input provision to the state organizations servicing agriculture:

- The Land Resources Service is directed to allot land for the sowing plan;
- The parastatal vertically integrated organizations supply seeds, fertilizer, plant protection agents and other inputs to peasant associations according to state set norms specifying inputs to be delivered on a per ha basis;
- The Ministry of Water Economy is directed to supply water to peasant associations in accordance with state norms according to each crop;
- The Velayat administrations (Khiakimalikam velayatov) are informed of basic plan targets, expected yields and sowing targets for the four strategic crops;
- Velayat administrations then hand down production, sown area and expected yield targets to the administrations, which break the plan down by peasant association.

Step 3: Production process
The production process begins with two sets of contracts: Each peasant association signs contracts with the parastatal vertically integrated organizations, Ministries and

In parallel with general economic reform, agricultural policy in Turkmenistan has changed since 2007. As a result, the Strategic Program of Transformations in Agriculture was published in 2007 and two new laws, which consolidated rights and obligations of daikhan associations and made membership in daikhan associations voluntary, were adopted. At the same time the government increased the procurement prices for grain in order to raise producers' interest to cultivate cereals.

Overall, the effects of these measures are limited. First, the abolishment of mandatory membership in daikhan associations is not expected to lead to the collapse of these associations because major inputs, including privileged loans, are allocated through such associations. In accordance with data of Daikhanbank, the major lender for daikhan associations, the number of independent farmers

Box 3, cont.

Daikhanbank for input and service delivery, sowing, procurement and finance to cover their production targets. Then, each peasant association signs contracts with individual leaseholders for land, supply of inputs and services and finance.[1] The peasant association provides leaseholders with a standard package of various inputs such as seeds, mineral fertilizers, plant protection agents and water. The inputs are supplied at state set prices, which may be below market prices. State organizations then carry out sowing, defoliation, application of mineral fertilizers and plant protection, harvesting, transportation of the crop to the processor and storage.

The function of the leaseholder in the production process is to carry out manual tasks during the production process, such as weeding his plot, manual administration of plant protection agents and fertilizer, and manual harvesting, if required. Overall, the leaseholder has little room to influence the production process. He is powerless to affect the quality of the seeds, time of sowing, administration of plant protection and fertilizer, and the time of harvesting.

After the harvest the leaseholder receives a document indicating the quantity harvested. The harvest is then sold at the state set procurement price. Afterwards, the net income of the leaseholder is calculated. Payment of the net profit (if any) used to be paid, at best, after one year. However, since 2008 the government pays the net profit of the leaseholder within 2 to 3 months after the harvest.

Step 4: Processing and sales of the final product

Agricultural commodities procured by the state procurement organization are delivered to state storage facilities and then moved to processors as capacity becomes available. Commodities are then processed at state processing facilities and the final products are sold domestically or exported through the state commodities exchange.

1 Until 2007, the service organizations needed to sign contracts with the individual leaseholders, which resulted in the division of cotton production into more than 2 million contracts, for example.

increased immediately after 2007 but later fell to almost zero by 2009.[20] Second, experience of central planning shows that in a non-market environments, prices do not work as production incentives.[21] Under preserved state production targets, lack of land property rights and state controlled price ratios, a price increase should not necessarily lead to production growth as was indicated by one official from the MoA: "In the last two years procurement prices increased two times but this was barely reflected in the grain production volume".[22]

A major problem of the sectors' transformation is the high level of syndication in agriculture and food industry. Years of perestroika proved that the system in which syndicates and governmental bodies are financially independent is a solid foundation for rent-seeking activity of officials and managers, which impedes changes of the existing system.

Sources of financing of state support to agriculture

The budget system in Turkmenistan includes central and municipal budgets, but in general agriculture is financed exclusively from the central budget.[23] In addition to financing from the central budget, the agricultural sector is also supported by the Stabilization Fund and National exchange reserve, the Central Bank resources and revenues of other sectors of the national economy (through cross-subsidizing).

Overall, the financing of state support to the Turkmen agricultural sector is non-transparent as the major financial state law, "Law on budget", does not contain the distribution of the state expenditures by sectors of the national economy and therefore it is not possible to estimate the share of public expenditures on the agricultural sector. Moreover, the existing data on public expenditures from the different public sources are contradicting.
In terms of agricultural investments, the agricultural budget is

20 Daikhanbank data.

21 e.g. Eu.Serova. Russia's Agri-Food Sector: State of the Art. In the book: Russia's Agri-Food Sector: Towards Truly Functioning Markets. Boston/Dordrecht/London: Kluwer Academic Publishers. pp.81-107.

22 http://www.easttime.ru/news/1/2/1104.html.

23 The central budget has two levels. The first level budget consists of taxes and non-tax revenues. The second level budget consists of the budgets of the Ministries and other governmental bodies, which have their own revenues and cover their expenditures from these revenues. The Ministry of Finance controls these budgets. The budget of the first level amounts to around 20-22 percent of the GDP, while the budgets of the second level represents 40-60 percent of the GDP.

directed towards three main pillars: (i) maintenance and construction of state owned irrigation channels; (ii) environment protection; and (iii) horse breeding.[24]

Besides budget funding for the agricultural investment projects, the state also allocates privileged budget loans as well as loans from the national exchange reserve.[25,26] The Daikhanbank (founded on the base of the former Soviet Agropromank) lends to farms and agricultural enterprises cultivating one of the four strategic crops under a 5 percent annual interest (for a duration of 1 to 10 years). Interest rates on seasonal loans for the production of the strategic crops were even lower, provided at a symbolic interest rate of 1 percent for a one year duration. In fact, since officially reported inflation in Turkmenistan in the recent years makes up to 10-12 percent a year[27], the real interest rate for agricultural investments in Turkmenistan may even be negative.

In addition, there is still periodical debt write-offs in the agricultural sector at the expense of the resources of the Central Bank in Turkmenistan. Recent write-offs were done under governmental decree.

Furthermore, the state also provides inputs at privileged prices or even free of charge. For example, the agricultural sector and the food industry use water free of charge, pay only a symbolic price for power and receive subsidies for fertilizer and services. The source of these subsidies is not clear, however: partially it can be cross-sector subsidization, at the expense of the gas sector, for example, or it can be partially covered by the national budget (for instance at expense of outlay irrigation).

Finally, the last important direction of state support to agriculture is tax exemption for the different players in the supply chain. Agricultural producers are exempted from taxes, but there are tax exemptions in the food industry. As a result, the entire agri-food

24 Ministry of Economy data.

25 Ibid.

26 According to the data of the National Central Bank total lending amount to the economy in 2008 was 1.2 billion manat of which 900 million (75 percent) was directed towards the agricultural sector (Ministry of Finance).

27 USCS: Doing Business in Turkmenistan: 2009 Country Commercial Guide for US Companies.

sector in Turkmenistan is exempted from taxes including the VAT, which is 15 percent in Turkmenistan.[28,29]

Recently the President announced the establishment of a Stabilization Fund paid for by recent budget surpluses. This Fund will be used to finance of the priority national programs at an interest rate of 3 to 4 percent per year. Today this fund amounts to 3 billon manat (Ministry of Finance data). The agriculture and food industries will be eligible to get loans from this Fund as well.[30, 31]

Price regulation

Output prices

The four strategic crops are procured by the state at fixed prices, whereas the farm-gate prices of other products are in general not fixed. Overall, state procurement prices are below market prices. For instance in 2009, procurement prices for wheat in Turkmenistan were fixed at USD 112 per tonne[32], while at the same time wheat prices in neighbouring Kazakhstan were at USD 178 per tonne.[33] In 2007-08, the period of grain prices spiked in the world market while procurement wheat prices in Turkmenistan were below the 2009 prices.

The price gap for cotton is even more striking. In 2007, a tonne of middle-fibre cotton was procured for 5 200 thousand manat, or a little above USD 360, a tonne of fine-fibre cotton was procured for 7 500 thousand manat, or more than USD 525.[34] At the same time the state concern Turkmenpagta was selling cotton at the state commodity exchange at a price of USD 1200-1800 depending on quality and type.[35]

28 Ministry of Finance.

29 Yury Aronsky. "Role of business in modernization of the New Independent States economies: opportunities for cooperation (Turkmenistan)".

30 In general the tax burden in Turkmenistan is very small, especially for SMEs (2 percent of gross income). http://turkmenistan.gov.tm/_rus/2008/12/24/stabilizacionnyjj_fond_turkmenistana_v_celjakh_ustojjchivogo_rosta_jekonomiki_i_blagopoluchija_ljudejj.html.

31 Ministry of Finance.

32 http://www.zol.ru/z-news/showlinks.php?id=42931 http://www.easttime.ru/news/1/2/1104.html.

33 http://k-vedomosti.ru/newsshow.php?&NId=53639&Page=6&CMonth=1&CYear=2010.

34 Ibid.

35 http://www.exchange.gov.tm/.

Wholesale prices are regulated by the State, which fixes the margins for all processing enterprises. Retail prices are also controlled by the state. There is a list of socially important staple crops (different kinds of bread, flour, sugar and vegetable oil) for which retail prices are fixed by the state. A big share of the retail outlets are owned state and the municipalities control prices on the town markets and private retail outlets.[36,37] The price gap between the fixed retail prices and procurement prices is offset to the processors (like it used to be done in the USSR). For example, since 2007, the members of the association Turkmengallaonumleri get a subsidy of 281.16 thousand manat (a bit less than USD 50) per tonne of produced and sold flour.[38] Export and import prices are also regulated by the state through the state commodity exchange.

Input prices

As in several other transition countries, input subsidies prevailed in the Turkmen agricultural sector and the producers of the four strategic crops receive inputs (machinery, fertilizer and pesticides) at approximately half the market price.

The daikhan associations conduct a contract on the production and delivery of a crop to the corresponding association or union (e.g. for grain it is Turkmengallaonumleri). From the side of the state such a contract is signed by five counterparts: the procurement organization, which agrees to procure the contracted output at a fixed price and to deliver a corresponding amount of seeds and herbicides; and the associations providing water for irrigation, fertilizers and technical services. Overall, the associations get subsidies for approximately 50 percent of actual input prices.[39]

Although the aforesaid mechanism is only valid for the four strategic crops, the other producers and processors get subsidies for basic inputs as well. Water, fuel and lubricants and power are supplied to all agricultural producers and processors at negligibly low prices and the association Turkmenobakhyzmat provides services at privileged prices to all agricultural producers. In the livestock sector, the government provides six kinds of vaccination free of charge.[40]

36 Data of Ashgabat city council.

37 For the purposes of confidentiality the name of company is not published, but information was obtained during the mission.

38 http://tm.product.ru/arcmain_det.asp?ID=52985.

39 Data of Associations Turkmengallaonumleri and Turkmenkhimia.

40 Data of Association Turkmenmaooary, obtained during the mission.

Agricultural input suppliers also receive their inputs from the state at privileged prices. For example, the fertilizer manufactures of the association Turkmenkhimia pay privileged price for gas and Turkmenbakhyzmat gets a major share of the imported machinery for free or pays a lower price (in any case 50 percent of the actual price is subsidized by state).[41]

Finally, the food industry pays low prices for gas, water and power. For example, a confectionary factory paid USD 1.5 for 1 000 cu. m of gas in 2009 while in October 2009 the price for 1 cub m of gas in Moscow was USD 80, and in the United States of America it was USD 70.[42]

Net taxation of producers

Farmers in Turkmenistan who produce under state orders receive input subsidies, but receive a low procurement price for their output such that their income is lower than what they would have if they were paid world market prices and received no subsidies. The net income losses from the state order system are often referred to as "implicit taxes" on agricultural producers. Lerman and Brooks (2001) showed that state procurement prices at less than market levels for cotton led to a tax on producers ranging from 44 to 74 percent of the total value of their output for the period 1996-1998 (Table 5.1). For wheat, low procurement prices led to an implicit tax of between 44 and 70 percent of the total value of wheat output. However, these calculations take into account only the "tax" due to low procurement prices without accounting for the input subsidies offered to agricultural producers.

Lerman and Brooks (2001) showed that even if state subsidies are taken into account producers of cotton and wheat still pay net tax equal to 3 percent of GDP in 1997 and 11 percent in 1998 (Table 5.2).

In addition to differences in input and output prices, one should also take into account the overvalued exchange rate (Pastor and Van Rooden, 2000) (Table 5.3). Until 2008 the Government of Turkmenistan maintained an official exchange rate that considerably overestimated the value of the manat *vis-à-vis* convertible currencies such as the USD.

41 Turkmenbakhyzmat provides provide technical services for crop producers and is self-financed as members of Daikhan associations pay a fee (determined by the state) for the services the association provides. Since recently also private producers can buy machinery and get the same subsidy as the association. The difference between import and state-fixed prices for machinery, fertilizers, and chemicals is compensated by the budget. (Data of Association Turkmenbakhyzmat obtained during the mission).

42 Data of Company Khazar, obtained during the mission.

For instance, in 1999 the official exchange rate was 5 200 manats per USD while on the parallel market the exchange rate was approximately 9 000 manats per USD. Thus, the USD was worth nearly double of what was offered at the official exchange rate. Pastor and Van Rooden (2000) pointed out that if the parallel market exchange rate is used, taxation through the price gap is actually far larger than was estimated by Lerman and Brooks (Table 5.3, line 1).

Table 5.1. Implicit taxes (subsidies) on agricultural producers of cotton through state procurement prices (using official exchange rate)

	Cotton			Wheat		
	1996	1997	1998	1996	1997	1998
1. Production, '000 tonnes	435	632	700	556	760	1 200
2. Value of output at state procurement prices, mln. manat	195 750	632 000	700 000	159 920	346 000	588 000
3. Value of output at international prices, mln. manat*	765 160	1 133 000	2 030 000	529 520	613 240	1 358 100
4. The price gap between value of output at state procurement prices and international prices (line 2-line 3), mln. manat**	-569 410	-50 000	-1 330 000	-369 600	-267 240	-770 100
5. Nominal protection rate***	-74%	-44%	-65%	-70%	-44%	-57%

*Calculated at the official exchange rate for each year.
**This indicates a tax if negative, a subsidy if positive.
***The nominal protection rate is a measure of the total implicit tax as a percent of the value of the commodity output at international (market) prices. It is calculated as [(line 2-line 3)/line 3]*100.
Source: Based on Lerman and Brooks (2001), p. 10.

Table 5.2. Net resource transfers in agriculture (using official exchange rate)

	1997	1998
1. Taxation through price gap, billion manats	768	2 100
2. Direct input subsidies, billion mantas	275	300
3. Irrigation subsidies, billion mantas	229	235
4. Net transfer out of agriculture -(1-2-3), billion mantas	-264	-1 565
5. % of GDP	3	11

Source: Lerman and Brooks (2001), p. 11.

Table 5.3. Turkmenistan: estimated transfers to and from agriculture in 1999

	Wheat	Cotton	Total
1. Production ('000 tonnes)	1 500	1 300	2 800
2. Value of output at international prices at market exchange rate of 9 000 manat per USD	1 917	3 978	5 895
3. Value of output at international prices at official exchange rate of 5 200 manat per USD	1 108	2 298	3 406
4. Value of output at procurement prices	600	1 300	1 900
5. Difference between 2 and 4	1 317	2 678	3 995
– Accounting for overvalued exchange rate	809	1 680	2 489
6. Subsidies			
-- For seeds, fertilizer, credit, machinery services	436	394	830
-- For irrigation			285
7. Net transfer out of agriculture (2-4-6)			2 880
a. % of GDP			15.1
b. Accounting for overvalued exchange rate (2-3)			2 489
c. % of GDP			13.0

Source: Pastor and van Rooden (2000), p. 12.

For this report new estimates have been made of the value of transfers from agricultural producers to the state as a result of the state procurement system for the period 2005-2009. Table 5.4 (cotton) and Table 5.5 (wheat) illustrate the tax on producers resulting from below market procurement prices for these two commodities. The value of production using state procurement prices is compared with the value of production evaluated at international market prices such that the difference is the "tax" on producers due to the "price gap" between market and state prices. In order to show the role of the overvalued exchange rate, we compare the price gap under two scenarios.

The first scenario uses the official exchange rate to convert the USD value of production at international market prices to manats. The official exchange rate is not a market rate, but a state set rate that overvalues the manat. During the period from 2005 to 2009 the official and parallel market exchange rates differed by nearly a factor of five before the establishment of a floating exchange rate with partial convertibility in 2008, effectively ending the dual exchange rate regime. Thus, the value of production at international market prices using the official exchange rate underestimates the price gap using international market and state procurement prices.

Table 5.4. Implicit taxation of cotton producers through state procurement prices

	2005	2006	2007	2008	2009*
1. Cotton production, '000 tonnes	738	852	950	1 002	1 050
2. Value of output at state procurement prices, bln. manat	3 576	3 822	5 160	5 386	5 690
3. Value of output at international prices, at official exchange rate, bln. manat*	1 633	1 846	2 101	8 315	8 968
4. Value of output at international prices, at market exchange rate, bln. Manat*	8 838	10 021	11 126	8 315	8 968
5. The price gap between value of output at state procurement prices and international prices using market exchange rate (line 2-line 4), bln. manat**	-5 262	-6 199	-5 966	-2 928	-3 278
5a. % due to exchange rate***	137%	132%	151%	---	---
6. Nominal protection rate using market exchange rate****	-60%	-62%	-54%	-35%	-37%

Source: Pastor and van Rooden (2000), p. 12.

Table 5.5. Implicit taxation of wheat producers through state procurement prices

	2005	2006	2007	2008	2009*
1. Wheat production, '000 tonnes	3 111	3 515	1 014	816	1 500
2. Value of output in domestic prices, bln. Manats	1 033	1 406	811	653	2 025
3. Value of output at international prices, at official exchange rate, bln. manat*	1 563	2 188	1 144	1 676	2 768
4. Value of output at international prices, at market exchange rate, bln. manat*	7 213	10 099	5 169	1 676	2 768
5.The price gap between value of output at state procurement prices and international prices using market exchange rate (line 2-line 4), bln. manat**	-6 181	-8 930	-4 358	-1 024	-743
5a. % due to exchange rate***	91%	91%	92%	----	----
6. Nominal protection rate using market exchange rate****	-86%	-86%	-84%	-61%	-27%

*2009 figures are listed in undenominated manats in order to make this column more comparable to the preceding columns; **Indicates a tax if negative, a subsidy if positive; ***A value of over 100 percent indicates that the price gap was positive (indicating a subsidy) when using the official exchange rate; ****The nominal protection rate is a measure of the total implicit tax as a percent of the value of the commodity output at international (market) prices. It is calculated as [(line 2-line 4)/line 4]*100.

The second scenario uses the market exchange rate to convert the USD value of production at international market prices to manats. This presumably correctly evaluates the price gap using international market and state procurement prices.

A comparison of the two tables leads to two main conclusions. First, over the course of the five years covered cotton farmers received between 40 and 60 percent of the revenue they could have in the absence of state controls. Wheat farmers received between 15 and 70 percent of the revenue they could have in the absence of state controls. Second, comparing the nominal protection rates for the two commodities over time, it is clear that taxation of producers seems to have become less severe in Turkmenistan for both crops over the past five years, particularly since the elimination of the dual exchange rate system.

These estimates of the tax on producers due to the state procurement system should be corrected for the input subsidies that

Table 5.6. Turkmenistan: estimated transfers to and from agriculture

	2005	2006	2007	2008	2009*
1. Taxation through price gap, billion manat**	-11 443	-14 892	-10 324	-3 952	-4 021
Cotton	-5 262	-6 199	-5 966	-2 928	-3 278
Wheat	-6 181	-8 693	-4 358	-1 024	-743
2. Direct input subsidies, billion manats	683	669	861	1 202	3 399
Cotton	365	353	583	900	860
Wheat	318	316	278	303	2 539
3. Irrigation subsidies, billion manat***	362	317	88	175	235
4. Net transfer from agricultural producers (1+2+3), billion manat****	-11 122	-14 540	-9 551	-2 924	-857
5. % of GAO****	-51	-54	-30	-8	nd
6. % of GDP****	-12	-13	-7	-1	-0.35

*2009 figures are listed in undenominated manats in order to make this column more comparable to the preceding columns; **From Tables 3.9 and 3.10, line 5; ***2009 value is an estimate based on average value 2005-2008; ****Negative value indicates a tax, positive a subsidy. Nd indicates that no data is available.
Sources: Line 2: Cotton derived from Stanchin (2010a), Table 7 (line 8), Stanchin (2010b), Table 7.1 (line 1), Table 17 (line 1). Wheat derived from Stanchin (2010b), Table 4 (line 1), Table 7.2 (line 1); Line 3: Irrigation subsidies from Stanchin (2010b), Table 7.4. Line 5: GAO from Stanchin (2010a), Table 23; Line 6: GDP from IMF (2010).

farmers receive from the state (Table 5.6). This adjustment is quite small compared to the previous price gap calculation and does not affect the calculations profoundly.

For the years 2005 to 2009 producers of cotton and wheat were taxed by the state procurement system, though taxation declined in the last few years because of the abolishment of the non-market exchange rate.

Investment policy

The Turkmen Government supports agricultural investments in two ways: first, by providing direct investment subsidies and second, by providing credit programmes, where investors can lend money at preferential interest rates. These programmes will be discussed in the first two sections. Then we will discuss the Turkmen policy concerning foreign investments.

Direct investment subsidies

All large investments in Turkmenistan, including both state and private investments in the agricultural sector, can be implemented only after approval by the President of the Republic. Together with permission for investment the investor receives a plot of land as well as subsidies, privileges and other eligible support.

The most revealing example of the state investment program in agriculture is the rural development program, which will be analyzed in section 5.6. However, there is also state support for private investment in the agricultural sector and the most recent example of this is the construction of the poultry producing and processing company, Gush Toplumy, belonging to the chairman of the Union of Enterprises and Entrepreneurs. In June 2007 the President signed a decree, which provides substantial financial support to this private company. The company got 30 ha near the capital city and was attributed a preferential loan. In addition, another two ha of land in two veloyats were allocated for feed production. Finally, the company was exempted of all customs duties until the end of the construction and of all taxes for poultry meat and products until 2010.[43]

43 www.turkmenistan.ru, 17.9.2008.

Credit programmes

Credit programmes are provided by Daikhanbank, one of five state-owned banks in Turkmenistan, which is the major lending company in the agricultural sector that was established on the base of the republican branch of the Soviet Agroprombank.[44] The share of agriculture in Daikhanbank's portfolio is 90 percent.[45] The sustainability of the bank which has such a big share in agriculture is secured by its state status.[46]

By now there are several credit programs in agriculture. For strategic crops seasonal credit is provided at 1 percent of interest rate per year and since 2008 all agricultural producers can get privileged credit for one to ten years at 5 percent of interest.[47] Privileged credit norms are calculated for 1 hectare for each crop and they are redefined periodically. In order to ensure repayment of the loans, the daikhan associations are recommended to set the special guarantee funds formed with assignments of the producers (2 to 7 percent of producers' revenues).[48]

Besides a credit program, Daikhanbank has its own leasing program. The leasing company of the Bank purchases machinery (mainly tractors from Belarus) and rents them out to daikhan associations. The initial instalment equals 10 to 30 percent of the machinery unit cost and units are rented out for three to five years with equal annual instalments at an interest rate of 5 to 10 percent per year.[49] Overall, the leasing conditions are not very different from other countries of the region.[50] The Union of Enterprises and Entrepreneurs recognizes that leasing legislation in Turkmenistan is underdeveloped and needs to be substantially reformed.[51]

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44 Initially it was established as a joint- stock company, but later the shares belonging to private investors were bought out by the state. Besides lending of agricultural producers this bank also keeps pension accounts of rural pupation.

45 Data of Daikanbank, obtained during the mission.

46 For comparison, share of agriculture in credit portfolio of DGbank (German specialized agricultural bank) makes 15 percent, and of Rabobank and CreditAgricol around 20 percent in each.

47 Data of Central Bank of Turkmenistan and Daikanbank, obtained during the mission.

48 Data of Daikanbank, obtained during the mission.

49 Ibid.

50 For comparison, the terms of state leasing programs in Kazakhstan, the Russian Federation, and Ukraine: Source: National policies to support the mechanization and technical modernization of agriculture in Kazakhstan, the Russian Federation and Ukraine, FAO.

51 Data of Union of Enterprises and Entrepreneurs, obtained during the mission.

Finally, there exists also a program of preferential credit (5 percent of interest) for investment business projects by private entrepreneurs, which are selected by a special committee. The loans can be provided both in manat and in hard currency. Hard currency loans are dedicated for import of equipment which is not manufactured in Turkmenistan. These loans are provided for the period up to ten years.[52] The food industry already benefited before from such a credit program and it is expected that from 2010 on the interest rate will be reduced to 2 percent.[53]

Foreign investment

Foreign investments are determined based on tenders, but they can also be determined by intergovernmental agreements between Turkmenistan and other countries. The sectors of the national economy to which foreign investment are attracted are: wholesale and retail trade, manufacturing industry, construction, agriculture, hunting, forestry and services. Foreign investment in the agricultural sector is concentrated mainly in the grain and cotton processing industry, the food industry, and the textile, silk and carpet industry.

The German Unionmatex GmbH builds in Turkmenistan milling complexes with a total investment cost of 1 444 million euro. The largest milling complex has an investment cost of 56.8 million euro (elevator with capacity of 100 thousand tonnes, mill for 80 thousand Lourdes a year, processing facilities for 40 tonnes of bread products and 48 thousand pasta a day, 18 million of polypropylene bags a year and a modern retail centre) will be built near Ashgabat. The second largest milling complex has a cost of 28.1 million euro and will be built in Turkmenabat. The remaining three complexes have an investment cost of 19.7 million euro each and will be built in three provinces.

The joint stock company IKR Babolna (Hungary) won the tender for construction of elevators, with a total investment cost of USD 31.6 million. The Turkish Polimeks Insaat Tahhut we Sanai Tijaret A.S. designed and built a vegetable oil plant near Ashgabat with a processing capacity of 300 tonnes of cotton seeds per day, an investment of USD 67.9 million. Recently, the association of the Food Industry announced a tender for the construction of three processing plants: a tomato canning factory and two oil extracting factories.

52 O. Sounova. "Lending to small and medium enterprises." Mimeo and data of Central Bank of Turkmenistan.

53 Association of Food Industries, Bereketli company and Sut dairy plant.

Trade policy

Overall, Turkmenistan is poorly integrated in the international markets. There are several reasons for this. First, both internal wholesale trade and foreign trade is highly controlled through a number of means. Annex 3.1 contains a list of legislative documents that constitute the legal basis for state regulation of national and foreign trade. The main means of regulation of foreign trade in Turkmenistan falls into the following broad categories: state procurement, trading and licensing, import and export tariffs (tariff barriers to trade), sanitary and phytosanitary measures (the SPS measures) and technical barriers to trade (TBTs). Second, Turkmenistan is not a partner in any existing international or regional multilateral trade system.

State regulation of national and foreign trade

State procurement, trading and licensing. The first means of control is through the State Commodities and Raw Materials Exchange (See Stanchin, 2010b, pp. 53-55). All wholesale and foreign trade contracts are required to be registered and processed through this exchange. The charter of the Exchange defines the procedures of registering and processing purchases and sales, the type of transactions permitted, the informational requirements for all transactions, the procedure for price quotations and the method for deriving an orientation price for frequently traded goods, accounting procedures for entering transactions into buyer and seller accounts, procedures for avoiding large price fluctuations, cartels and other price distorting mechanisms.[54] The contract registration procedure includes an assessment of the contract price (i.e. customs valuation). All import contracts must be registered before goods are delivered to Turkmenistan. Any physical or legal person, state or private, can trade on the State Commodities and Raw Materials Exchange. However, there are considerable bureaucratic barriers to registering contracts on the exchange such that small individual farms do not often deal on the exchange.

In addition to the State Exchange, the Turkmen Government uses licensing to control production and trade for a number of products. Registration with the Ministry of Economy and Development for all juridical and physical persons engaged in foreign trade was obligatory until 2009. The August 2009 Law of Turkmenistan "On state support

54 The functions of the State Exchange are listed in the law "On the Commodity and Raw Materials Exchange".

for small and medium entrepreneurship" exempted small and medium business from obligatory registration related to foreign trade.

Production licenses are currently required for 44 types of activity in Turkmenistan, of which six relate to agriculture. The same organizations also issue import licences for the products under their responsibility. The Association of Livestock joint stock companies, Turkmenmallary, grants licenses for the domestic and foreign sale of karakul sheep in addition to licensing trade in breeding animals. The MoA grants licenses for seed selection and imports. The Association of Food Industry of Turkmenistan grants licenses for activities in the area of production and sales of food and feed. Trade in fishery products, alcoholic beverages, spirits, and tobacco products is also subject to licensing.

Tariff barriers to trade. Turkmenistan uses both export and import tariffs to regulate trade. In the presence of effective direct controls over foreign trade described above, tariff policies are relatively unimportant as a tool for regulating trade in Turkmenistan.

Exports of 12 product categories, including tobacco, alcohol, fresh vegetables and melons (July-August period only) are exempt from export taxes. On the contrary, nitrogen fertilizers, wheat, wheat flour, rice, ice cream and other products are currently subject to various export tariffs (duties).

Eight product groups, including cereals, flour, meat, eggs, butter and some other products are not subject to any import tariffs or quantitative import restrictions in Turkmenistan. At the same time Turkmenistan imposes import tariffs on honey, grapes, cotton oil, processed meat products, mineral water and other food products. Ice cream faces both import (USD 0.5/1 kg) and export (USD 0.2/1 kg) tariffs. The lists of goods subject to import and export tariffs/duties and their rates, as well as products that are exempt from import and export duties, are provided in Annex 3.2. The extent of tariff cover of different products is not excessive; therefore, it is not clear what import and export tariffs are applicable to the products not explicitly mentioned in Annex 3.2.

Effective tariff cannot be estimated because different lots of traded commodities are imported under different terms. The Turkmen private business does not consider customs duties excessive[55], however

55 Information obtained from the interviews with a number of the managers of private companies.

trade regulation together with the internal barriers for entrance to food market can form a rather high effective tariff.

According to the Law of Turkmenistan "On state support for small and medium entrepreneurship" (2009), all SMEs are freed from payment of any tariffs (Stanchin (2010b), p. 57).

SPS and Technical Measures. Import of cattle, sheep, goats, camels and pigs requires a permit from the Cabinet of Ministers[56]. Specific regulations based on which the import permits are granted (e.g. the list of quarantine pests) were not available at the time of report writing. The MoA of Turkmenistan, through its Plant Protection and Quarantine and Veterinary Services, is responsible for animal and plant health while most aspects related to human health and safety fall under the responsibility of the State Sanitary and Epidemiological Service of the Ministry of Health of Turkmenistan.

Membership in international organizations and conventions

Turkmenistan is not a partner of any existing international or regional multilateral trade system. It is also the only country of the Former Soviet Union that has not applied for membership in the WTO. Although none of Turkmenistan neighbours is currently a member, all neighbouring countries and major trading partners are in the process of WTO accession.

The country is a member of FAO, which hosts the International Plant Protection Convention Secretariat and provides support to the Codex Alimentarius Commission. However Turkmenistan is neither a signatory party to the International Plant Protection Convention or a member of the Codex Alimentarius Commission, both key entities for WTO trade issues. among all international organizations and treaties governing human, animal and plant health issues in the international trade, Turkmenistan is a member of only one: the World Organisation for Animal Health (OIE), which is the international standard setting institution for animal health and related trade measures. The country is represented in this organization by the Chief Veterinary Officer of the Ministry of Agriculture and Food. The country is a correspondent member of the International Organisation for Standardization (ISO), although it does not participate in any technical committee.

56 Prikhodko (2010), p. 17.

Rural development

Rural development became a priority for agricultural policy makers in Turkmenistan under the new President. In 2007 a National Program of President on Enhancing of Living Standards of Population in the Villages and Settlements was adopted. The Program consists of three stages: 2008–2010, 2011–2015, and 2016–2020 and budget of 72.5 trillion manat (USD 25.4 billion or per year 20 percent of the national budget).[57] The program aims income growth and increased rural employment as well as improvement of living conditions on the countryside.[58]

57 President's National Programme for livelihoods improvement in rural areas till 2020.
58 Ibid.

Conclusions and implications for the EBRD

Ambitious GDP and food processing projections are a sign that there may be opportunities for EBRD assistance in Turkmen food processing in the next ten years (Table 6.1). One of the key challenges is to ensure the growth of a downstream processing, distribution and retail sales sector so that the sector expands by adding value to primary production. As economic production moves up the value chain, the result is more and higher paying employment leading to growing per capita incomes. At the same time, expanding the processing and retail sectors requires a constant supply of high quality raw materials and improved access of processing companies to raw materials, which in the case of meat, dairy and fruits and vegetables, are mainly produced by small household farms.

Institutional limitations for investment

While there may be opportunities, the constraints for investment in Turkmen agri-food processing are numerous. First, accurate information on the sector and on the financial state and performance of individual enterprises is not publicly available in Turkmenistan. Investor decision-making is extremely difficult and limited in such an environment. On the sector level, the information for this review was gathered in the face of great difficulties exceeding those in other CIS countries, including Belarus and Uzbekistan. The first meeting of the research team with officials of the National Institute of Statistics and Information yielded no information on the sector. On the level of the enterprise, information on the financial state of companies is currently available only on an ad hoc anecdotal basis through interviews and only through the good will of the company. Financial information on companies in Turkmenistan has traditionally been considered as an instrument of state monitoring, primarily for tax collection and undisclosed statistical purposes, and a resource to which access was restricted. Likewise, audits are associated more with tax compliance than with an independent financial statement

Table 6.1. 2030 programme growth projections (annual average growth)

	2011-2015	2016-2020	2021-2025	2026-2030
Main economic indicators				
GDP growth	9.50	8.30	6.00	4.90
GDP growth per capita, USD	7.52	8.08	4.56	3.71
GDP per capita, USD (actual value in end year)	$21 700	$32 000	$40 000	$48 000
Average monthly wages, manats	13.19	14.39	14.89	13.41
Average monthly wages, manats (actual value in end year)	1 340	2 625	5 255	9 860
Private dominated agri-food sector				
Meat produced	2.65	2.14	1.40	1.45
Meat processed	2.79	2.13	0.70	0.76
Milk produced	2.48	1.33	1.25	1.53
Milk processed	5.65	4.44	1.16	1.23
Veg/fruits produced	4.43	0.93	0.89	1.19
Veg/fruits processed	2.97	3.36	0.77	0.65
State dominated agri-food sector				
Wheat produced	1.04	1.44	0.43	0.51
Flour produced	5.51	2.50	0.55	0.52
Wheat milled to flour	5.51	2.51	0.55	0.52
Bread and macaroni production	5.43			

Source: 2030 programme (2009).

check performed by qualified professionals to lend credibility to the financial information provided to the marketplace. Though a new law requires all enterprises, organizations and institutions in Turkmenistan to adopt international standards of accounting and auditing over a one year period starting 1 January 2013, it is not clear that the notion of published, standardized, general purpose financial statements as a public good will be established.[59]

Second, despite numerous mentions of reform by the leadership, the overall economic environment in Turkmenistan is dirigiste, highly restrictive and lacks many of the institutions that support a market economy. Although the private sector is important for some commodities, the state sector still dominates the production and processing of the four strategic commodities.

59 Central Asian Newswire (2011).

Moreover, there are only limited institutions supporting the private sector. There are no private commercial banks in Turkmenistan, only state banks, and the availability of credits for entrepreneurial activity outside of the state order system is quite limited because banks are not adapted to servicing small businesses. There are no private accounting companies, only a state audit bureau within the Ministry of the Economy. Tax legislation is ill-adapted to a market economy. There is no stock market, nor is there a currency exchange. Though a State Raw Material and Commodity Exchange functions in Turkmenistan, its chief purpose is more one of control rather than encouraging foreign and wholesale trade. All wholesale and foreign trade contracts are required to be registered and processed through this exchange. And while any legal or physical person can sell on the exchange as long as it registers, the registration process is usually a cumbersome process, involving approval from various agencies.

Third, there is only limited information on state of basic institutions in Turkmenistan and it is unclear what the situation is with respect to ownership rights, the security of these rights, and contract enforcement, which are crucial issues for both domestic and foreign investors. It seems that some decisions are been taken at hoc (e.g. sudden confiscation of land from the daikhan farms based on farm performance despite strong growth of the private sector), which implies risks and uncertainties.

Fourth, foreign trade of the country is effectively controlled by the state through the requirement of registration of every wholesale and export-import contract on the State Raw Material and Commodity Exchange. Thus, the Turkmenistan economy is relatively isolated. Exports are dominated by gas, oil and oil products, with virtually no manufactured goods. While domestic incomes are set to increase rapidly over the next 20 years the Turkmen domestic market is small compared with the Russian Federation and Ukraine.

The above limitations narrow the potential scope of EBRD operations in Turkmenistan. Without a more supportive legal environment for accounting information for companies, equity participation on a large scale would be risky. Perhaps the situation will change after 1 January 2014 when enterprises in Turkmenistan are supposed to complete the transition to international standards, but for now large scale equity participation in companies is difficult. Moreover, processing companies of strategic commodities (cotton, milling, vegetable oil) are state-owned. These companies are difficult for EBRD investment.

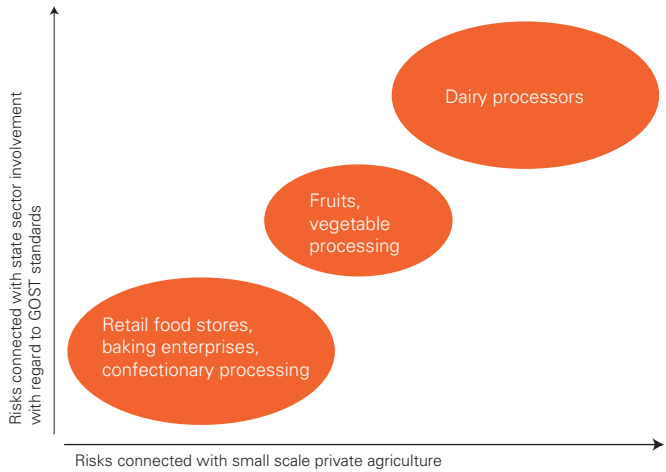
Hence, the most likely recipients of investment in Turkmenistan are private SMEs in livestock production and meat and dairy processing, baking, fruit and vegetables production and processing. In addition to processors in non-strategic agri-food sectors, investment in private SMEs in the confectionary sector, beverages (such as juice) and retail food stores would be warranted given the projected growth in Turkmen income.

Since there are no private banks, it is not possible to extend loans through local banks using a credit line. And since there are likewise no equity funds, this option is also ruled out. Limited direct loans from the EBRD to private SMEs introducing technical assistance seem to be the most likely modality for investment in the Turkmen private sector at this time.

Investment in non-strategic sectors

The concerns of the previous section imply that one of the main areas of investment in the Turkmen agri-food sector that may be of interest to the EBRD are loans to private SMEs in non-strategic areas and food retail chains. Within this group it seems that retail food stores would have the least risks associated with state regulation and exposure to small scale agriculture, while for SME food processors these are the two main risk factors that may impact their operations (Figure 6.1).

Figure 6.1: Two types of risk for SME investments in the Turkmen agri-food sector



Influence of state regulation

Agriculture and food industry are the national priorities for which the state aims to attract to state and private investments, mainly in the grain and cotton food chains, carpet, silk and textile industries and processing of fruits and vegetables. Overall, the government seeks no financial resources but rather technological knowledge transfer. State support is established to secure these investments and to reduce sovereign risks. Private investors in Turkmenistan have access to privileged credit with very low interest, sometimes negative interest in real terms. Foreign investments are possible only after presidential permission.

A major concern of investing under conditions of distorted economic proportions in Turkmenistan is the risk of inefficient technology, especially in non-competitive sectors. Therefore investment decisions should be designed in shadow prices as many of the sectors and enterprises can appear inefficient in a real economic environment.

Even in non-strategic areas of the agri-food sector there are risks associated with exposure to state regulation and competition from subsidized state processors. Figure 6.1 provides a schematic visualization of these risks. For instance, all food processors are subject to state GOST standards, which are not well adapted to the operation of a market economy. It may be argued that the difficulties of GOST standards are most acutely felt in more innovative production and packaging sectors since GOST standards are highly prescriptive and mandatory, specifying the materials, processes, analytic methods and techniques, and final product characteristics including packaging for all processed products. In baking, juice and confectionary production the exposure to GOST seems to be less, since production in these sectors is not so innovative. However, the processing of fresh fruits and vegetables into jams, juices and canned foods seems to involve a greater exposure to GOST standards, stifling innovation in products for the market and packaging. In the dairy and meat processing sectors GOST standards become more intrusive, since they stipulate the permissible ingredients, processes and final product characteristics in a sector that tends to be more innovative, producing various types of yogurt, kefir, cheese, sausages and other processed foods.

Although the risks with respect to state involvement associated with GOST standards are considered to be relatively low in the baking, confectionary and retail industries, there are other risks with respect to state involvement as in general, these sectors depend

for their procurement of several of their inputs on the state sector. For example, the baking and confectionary industries depend on the supply of raw material, respectively flour and sugar, from the state sector; or on imports, which are also controlled by the state sector. Hence, these processing companies are also strongly dependent on the state sector for the supply of their raw material.

Finally, private food processing plants in Turkmenistan face strong competition from the state sector and it will be difficult for private processing companies to compete with state owned processing companies which can operate with a loss thanks to subsidies. Moreover, the investment plans of the Food Industry Association should be taken into account when making loans to food processors, because the planned construction and reconstruction of processors is likely to use subsidized credits from the state banking system, which may offer better terms than the EBRD.

Dependence on small scale private agriculture

Food processing companies face difficulties with obtaining a constant supply of raw materials. Baking and confectionary enterprises work with already processed inputs such as flour, sugar and chocolate powder, which can be easily obtained and stored. However, ensuring a constant supply of fresh fruits and vegetables, milk or animal carcasses presents problems both for procurement and for storage. Lending to SME meat processing plants, fruit and vegetable plants and dairies will require technical assistance to processors not only in international accounting standards, but also with respect to developing methods for ensuring a secure and constant supply of raw materials from private farms. This may take the form of farm assistance programs, which could include training quality and food safety issues at the farm level, assistance in setting up of milk collection points, advisory services for animal nutrition and agronomic advice. The direct and indirect effects of farm assistance programmes can lead to improved input access, productivity, product quality, and market access for small farms. These programmes have been an engine of productivity growth in the agri-food supply chains, supporting productivity growth from primary agriculture to marketing to consolidation, processing and distribution.

However, there are numerous challenges to applying this approach in Turkmenistan. First, there is a far larger state sector than in the other CIS countries, which has preserved state input supply and

procurement. The degree of state dominance of this sector would seem to prohibit the establishment of private standards and farm assistance. Second, state controls over production and trade for all but SMEs seem to be widespread. All wholesale and foreign trade contracts are required to be registered and processed through the State Commodity and Raw Materials Exchange. Third, there is currently no facilitating legislation for marketing cooperatives in Turkmenistan, a significant drawback for the collection and organization of the supply chain for agricultural raw materials.

Overall, these challenges make investments by the EBRD in the agri-food industry risky, although the potential turnover could be relatively high given the expected population and real GDP per capita growth. Nevertheless, it could be useful for the EBRD to enter a policy dialogue with the government of Turkmenistan to persuade them to reduce state control and to allow market institutions to develop, which would potentially attract private investors. Further, the Turkmen Government could remove regulatory issues specific to the agri-food sector that discourage investment. For example, it would be recommended to make the transition from GOST standards to more modern standards compatible with a market economy and the principles of the WTO international trading system, or to allow the establishment of marketing cooperatives.

ANNEXES

Annex 1.1. Population and rural population in Turkmenistan since 1914

Year	Total population	Rural population	
	'000 people	'000 people	percent
1914	1 042	925	88.8
1925	1 007	882	87.6
1927	998	861	86.3
1939	1 252	836	66.8
1940	1 302	843	64.7
1941	1 336	860	64.4
1950	1 197	764	63.8
1959	1 516	816	53.8
1960	1 564	840	53.7
1961	1 623	860	53.0
1966	1 917	993	51.8
1967	1 966	996	50.7
1970	2 159	1 125	52.1
1971	2 218	1 159	52.3
1972	2 292	1 191	52.0
1973	2 360	1 223	51.8
1974	2 430	1 248	51.4
1975	2 506	1 283	51.2
1976	2 555	1 326	51.9
1977	2 621	1 364	52.0
1978	2 688	1 398	52.0
1979	2 759	1 436	52.0
1980	2 831	1 497	52.9
1981	2 898	1 541	53.2
1982	2 970	1 592	53.6
1983	3 041	1 639	53.9
1984	3 115	1 687	54.1
1985	3 185	1 727	54.2
1986	3 264	1 776	54.4

Year	Total population	Rural population	
	'000 people	'000 people	percent
1987	3 353	1 823	54.4
1988	3 437	1 874	54.5
1989	3 523	1 932	54.8
1990	3 611	1 985	55.0
1991	3 818	2 085	54.6
1992	3 970	2 179	54.9
1993	4 124	2 277	55.2
1994	4 288	2 359	55.0
1995	4 435	2 453	55.3
1996	4 528	2 519	55.6
1997	4 606	2 580	56.0
1998	4 681	2 639	56.4
1999	4 738	2 669	56.3
2000	4 790	2 702	56.4
2001	4 934	2 794	56.6
2006	5 323	3 077	57.8
2007	5 402	3 133	58.0

Sources: 1914-1989 from Statistical Yearbooks of Turkmen SSR, Ashgabat (various years); 1990-2000 from Interstate Statistical Committee of the CIS - CISSTAT; 2001-2007 from Statistical Book of Turkmenistan 2006, Ashgabat (revised series; no revised data available at this stage for 2002-2005).

Annex 1.2. Legislation on land reform and farm restructuring in Turkmenistan

1990 October	Land Code of the Turkmen SSR (amended May 1991) [sweeping prohibition on all transactions in land]; Law on Leasing and Lease Relations
1991 April	President's letter to local councils of People's Deputies and heads of ministries and authorities "On augmentation of areas for household plots and collective gardens from inefficiently utilized lands"
1991 May	Amendment of the Land Code reflecting the program for augmentation of household plots
1992 May	Constitution of Turkmenistan (article 9: private ownership of land)
1993 February	Presidential decree "On right of ownership and use of land in Turkmenistan"; Regulations on Allocation of Land Use in Private Ownership and Long-Term Leasing to Citizens of Turkmenistan [land may be allocated in private ownership to household plots and private (daikhan) farms]
1993 May	Presidential decree "On increasing economic motivation for increased production and improved quality of agricultural products" [sets maximum deductions for lease payments as a percentage of leasehold production]
1993 October	Law on Ownership [land may be privately owned by individuals subject to the provisions of the Land Code]
1994 March	Presidential decree "On restructuring of kolkhozes, sovkhozes, and other agricultural enterprises in Turkmenistan"; Law on Peasant (Daikhan) Farms
1994 May	Presidential decree "On implementation of reforms in agriculture of Turkmenistan" [directs competent authorities to start implementation; sets producer subsidies]
1995 June	Presidential decree "On creation of peasant associations (daikhan birleshikleri)"; Law on Peasant Associations
1995 September	Standard regulations on peasant association
1995 December	President's program "On deepening of market reforms and socio-economic development of Turkmenistan in 1996"; Presidential decree "On additional measures for reforming peasant associations in 1996" [directives for implementation of June 1995 reforms]
1996 June	Presidential decree "On additional measures for stimulating agricultural production" [daikhan farmers exempted from state orders]
1996 December	Law on Allocation of Land in Ownership to Citizens for Commercial Farming Presidential decree "On additional measures for implementation of economic reforms in agriculture" [leasehold converted to private ownership after 2-year probation; establishment of specialized farm-service providers]
1997 January	Presidential decree "On increasing economic incentives for agricultural production" [lease payment set at 20 percent of contracted production; sweeping tax exemption for agricultural producers]
1997 July	Directive on normative allotment of leased land per worker (varying by commodity)
1998 March	Presidential decree on subsidized credit to producers delivering on state orders
1998 July	Civil Code
1998 August	Presidential decree on subsidized rates of mechanical field works [50 percent cost subsidy to cotton and wheat production on state orders]
1999 January	Presidential decree "On privatization of agricultural, agro-industrial, and construction enterprises in the agro-industrial complex"

1999 February	Presidential decree "On improvement of lease relations in agriculture"
2000 August	Presidential decree "On some measures regularizing land relations in Turkmenistan" [new organizational responsibilities for allotment of land]
2000 September	Presidential decree "On creation of Land Resource Service in the Ministry of Agriculture" [responsible for land monitoring, cadastre, registration, titling]
2001 August-December	Presidential decrees on the sowing of wheat, cotton, and rice in 2002 [state orders made optional for leaseholders; entitlement to subsidies conditional on acceptance of state orders]
2002 April	Presidential decree "On improving the mechanism of income distribution from cotton production" [ginning byproducts belong to producers]
2004 November	Water Code
2004 November	Land Code [incorporates private land ownership without any transfer rights, subleasing of state land by peasant associations but not by daikhan farms]
2005 January	Presidential decree "On measures for implementation of the Land Code"
2005 January	Presidential decrees (7040 and 7082) on transformation of three leading daikhan associations into joint-stock companies in response to leaseholders' request [increased operating independence and improved incentives]
2007 March	Law on Daikhan Associations
2007 March	Law on Daikhan Farm
2007 April	Presidential decrees (8496 and 8553) on development of a state program to ensure a high level of social and living conditions of rural and urban population [legislation with rural development impacts]
2008 January	Presidential decree on streamlining of market transactions and establishment of "Ak altyn" as an organization for procurement and sale of cotton

Annex 1.3. Land in household plots and daikhan farms 1980-2008 (thousand ha) and share of cultivable land in their holdings (%)*

	Total holdings, '000 ha		Share of cultivable land in holdings, %	
	Household plots	Daikhan farms	Household plots	Daikhan farms
1980-89 (average)	37			
1990	51.8		72.4	
1991	88.3		76.9	
1992	101.4		77.4	
1993	109.8	28.3	77.3	39.6
1994	117.7	81.4	77.0	28.6
1995	123.2	98.5	77.1	36.4
1996	126.0	105.5	77.4	38.7
1997	128.7	109.6	77.7	43.0
1998	131.1	116.1	77.8	44.4
1999	132.7	115.0	77.6	51.2
2000	133.0	109.7	77.7	55.6
2001	132.8	81.1	78.3	60.0
2002	132.9	64.2	82.2	71.7
2003	133.0	63.2		72.3
2004	133.1	60.3	81.5	75.0
2005	133.4	43.1	82.1	79.4
2006	134.9	28.0		88.9
2007	135.0	24.0	80.7	81.7
2008	152.4	25.3	80.1	81.8

*Excludes gardens.

Source: Pre-1990 data from CISSTAT interstate statistical committee of the CIS - CISSTAT; post-1990 from statistical yearbooks of Turkmenistan.

Annex 1.4. Structure of land by main components in Turkmenistan 1980-2008 ('000 ha)

Year	Total land*	Agricultural land	Arable land	Fallow	Land under perennials	Cultivable land
1980	32 969	30 352.6	879.5	153.4	51.8	1 084.7
1981	33 041	30 393.3	890.1	149	56.3	1 095.4
1982	33 022.4	30 359.6	946.9	124.2	62.7	1 133.8
1983	33 058.8	30 388.1	986.4	112.3	66.7	1 165.4
1984	33 471.3	30 828.7	1 009.1	107.1	68.4	1 184.6
1985	34 608.5	31 777.3	1 029.4	93.4	72.7	1 195.5
1986	34 695.5	31 742.1	1 110.7	79.4	73	1 263.1
1987	34 801.7	31 916.6	1 154.4	88.8	69.8	1 313
1988	35 163.8	32 289.4	1 186.5	83.9	70.6	1 341
1989	35 838	33 831.2	1 193.3	89.6	70.4	1 353.3
1990	37 970.5	35 770.7	1 177.5	90.1	70.3	1 337.9
1991	49 403	40 886	1 287	14	59.6	1 360.6
1992	49 403	40 518	1 329	21.2	56.1	1 406.3
1993	49 403	40 561	1 489.5	15.9	53.5	1 558.9
1994	49 403	40 555	1 599.6	11.2	53.9	1 664.7
1995	49 403	40 534	1 622.2	11.2	52.3	1 685.7
1996	49 403	40 536	1 629.1	15.1	51.8	1 696
1997	49 403	40 527	1 637	14.7	49.9	1 701.6
1998	49 121	40 215	1 602.8	60.7	46.6	1 710.1
1999	49 121	40 201	1 623.4	104.1	45.3	1 772.8
2000	49 121	40 202	1 642.7	50.7	44.4	1 737.8
2001	49 121	40 208	1 658.2	62.1	41.6	1 761.9
2002	49 121	40 204	1 675.3	64.7	40.7	1 780.7
2003	49 121	40 197	1 693	62.7	40.4	1 796.1
2004	49 121	39 966	1 714.7	12.7	33.1	1 760.5
2005	49 121	39 937	1 733.9	12.6	32.7	1 779.2
2006	49 121	39 934	1 777.8	13.4	32	1 823.2
2007	49 121	39 927	1 535.5	154.5	30.6	1 720.6
2008	49 121	39 920	1 525.7	155.5	30.1	1 711.3

*1980-1990: total land used by farms; 1991-2008: total land in Turkmenistan.

** Cultivable land is sum of arable land, fallow, and land under perennials

Pastures	Other land	Share of cultivable land in agricultural land, %	
		Incl. fallow	Excl. fallow
29 267.9	2 616.4	3.6	3.1
29 297.9	2 647.7	3.6	3.1
29 225.8	2 662.8	3.7	3.3
29 222.7	2 670.7	3.8	3.5
29 644.1	2 642.6	3.8	3.5
30 581.8	2 831.2	3.8	3.5
30 479	2 953.4	4.0	3.7
30 603.6	2 885.1	4.1	3.8
30 948.4	2 874.4	4.2	3.9
32 477.9	2 006.8	4.0	3.7
34 432.8	2 199.8	3.7	3.5
39 525.3	8 517.1	3.3	3.3
39 111.2	8 885.5	3.5	3.4
39 001.7	8 842.4	3.8	3.8
38 890.7	8 847.6	4.1	4.1
38 848.4	8 868.9	4.2	4.1
38 840	8 867	4.2	4.1
38 825.4	8 876	4.2	4.2
38 504.9	8 905.9	4.3	4.1
38 428.2	8 919.9	4.4	4.2
38 464.3	8 918.8	4.3	4.2
38 445.7	8 913.3	4.4	4.2
38 423.4	8 916.8	4.4	4.3
38 400.9	8 923.9	4.5	4.3
38 205.6	9 154.8	4.4	4.4
38 157.3	9 184.4	4.5	4.4
38 110.3	9 187.4	4.6	4.5
38 206.4	9 193.9	4.3	3.9
38 208.6	9 201	4.3	3.9

Source: 1980-1990 from CIS statistical database (CIS 2009-14); 1991-2008 from statistical yearbooks of Turkmenistan.

Annex 1.5. Yields of main crop products: state and private sector 1997-2008

	Cotton		Grain		Melons		Grapes	
	State	Private	State	Private	State	Private	State	Private
1997	1.32	n.a.	1.30	1.71	6.46	8.04	6.30	5.60
1998	1.29	1.92	1.73	2.91	6.90	12.24	6.20	7.21
1999	2.10	2.89	1.95	3.17	11.54	12.71	6.58	8.06
2000	1.67	3.05	2.05	3.47	17.33	16.74	7.24	9.76
2001	1.48	2.59	1.91	3.70	8.04	20.52	7.46	11.94
2002	0.70	0.81	2.13	4.09	12.45	28.00	7.15	11.97
2003	1.17	0.62	2.35	5.13	11.57	27.89	4.60	13.92
2004	1.20	0.94	2.49	5.71	15.47	28.94	7.39	19.32
2005	1.14	--	2.39	6.55	11.32	32.37	6.98	21.15
2006	1.37	--	2.98	7.10	9.54	34.52	7.46	27.34
2007	1.48	--	1.23	3.69	10.47	35.74	7.57	28.53
2008	1.76	--	1.01	3.15	8.69	27.25	3.11	26.69

Source: Agriculture of Turkmenistan (various years).

Annex 1.6. Agricultural labour and gross agricultural output in Turkmenistan 1990-2007

Year	Number of employed in the economy, thousands	Number of employed in agriculture, thousands	Agriculturally employed, % of 1990	GAO, % of 1990
1990	1 476	617.1	100.0	100.0
1991	1 527	646.1	104.7	96.0
1992	1 578	695.7	112.7	87.4
1993	1 628	711.4	115.3	101.3
1994	1 692	740.9	120.1	83.1
1995	1 749	785.2	127.2	83.9
1996	1 780	811.8	131.6	66.3
1997	1 816	844.4	136.8	53.5
1998	1 839	887.5	143.8	49.3
1999	1 852	877.6	142.2	53.8
2000	1 908	908.0	147.1	64.4
2001	1 947	943.0	152.7	81.6
2002	2 013	980.0	158.8	86.7
2003	2 065	1 016.0	164.6	97.6
2004	2 110	1 025.5	166.1	110.8
2005	2 120	1 034.6	167.6	119.7
2006	2 129.2	1 032.7	167.3	134.9
2007	2 160.8	1 045.8	169.4	150.8

Source: Ministry of Agriculture of Turkmenistan (various years).

Year	Cotton	Grain	Potatoes, vegetables, melons	Feed crops	Total cropped	Cropping pattern, %			
						Cotton	Grain	Vegetables	Feed crops
1980	508	132	40	213	896	56.7	14.8	4.4	23.8
1985	560	143	48	272	1 028	54.5	13.9	4.7	26.4
1990	623	187	78	338	1 231	50.7	15.2	6.4	27.1
1991	602	240	67	322	1 235	48.8	19.4	5.4	26.0
1992	567	335	57	291	1 248	45.5	26.5	4.6	23.3
1993	579	435	43	266	1 324	43.7	32.9	3.2	20.1
1994	557	598	56	248	1 461	38.1	40.9	3.8	17.0
1995	563	657	53	220	1 494	37.7	44.0	3.5	14.7
1996	530	628	51	194	1 405	37.7	44.7	3.6	13.8
1997	482	573	42	168	1 266	38.1	45.2	3.3	13.3
1998	548	705	36	94	1 387	39.5	50.9	2.6	6.8
1999	621	743	38	79	1 493	41.6	49.8	2.5	5.3
2000	619	770	34	63	1 484	41.7	51.2	2.3	4.2
2001	779	915	34	48	1 786	43.6	51.2	1.9	2.7
2002	701	962	35	58	1 759	39.8	54.7	2.0	3.3
2003	627	914	35	179	1 759	35.7	51.9	2.0	10.2
2004	618	950	36	306	1 915	32.2	49.6	1.9	16.0
2005	645	991	39	321	2 002	32.2	49.5	1.9	16.0
2006	623	982	41	356	2 016	30.9	48.7	2.0	17.7
2007	643	866	42	22	1 588	40.5	54.5	2.6	1.4
2008	570	942	46	27	1 597	35.7	59.0	2.9	1.7

Source: Pre-1990 from Interstate Statistical Committee of the CIS - CISSTAT; post-1990 from Agriculture of Turkmenistan (various years).

Annex 1.8. The puzzle of grain yields

The behaviour of grain yields in Turkmenistan between 1998 and 2006 is totally at variance with the yield patterns observed for other CIS countries. Taken since 1980, grain yields in CIS fluctuated year to year, but generally did not show pronounced trends either up or down. Ukraine, with its exceptionally fertile soil, consistently achieved the highest yields in CIS (median of 2.6. tonnes/ha between 1980 and 2008, a record that Ukraine shared with Moldova and, somewhat surprisingly, Kyrgyzstan). On the other hand, Kazakhstan was always at the bottom of the yield ranking, presumably due to the low quality of its semi-desert cropland, achieving median yields of 1.0 tonne/ha. The Russian Federation generally fell in the middle, with median yields of 1.6 tonnes/ha (the country showed a moderate upward trend from about 1.3 tonnes/ha in the early 1980s to about 2.0 tonnes/ha since 2005). Ukraine at the top and Kazakhstan at the bottom defined a band of median grain yields for CIS countries ranging from 1.0 tonne/ha to 2.6 tonnes/ha (Figure A1.1).

Up to 1993, Turkmenistan's grain yields fit within the upper part of the CIS band, between the Russian Federation and Ukraine; between 1993 and 1998 Turkmenistan's grain yields collapsed owing to a combination of sown area increases and production declines; and then in 1998 the yields began to rise rapidly to levels above 3 tonnes/ha, overtaking Ukraine by a wide margin (Figure A1.1). A look at the curve for Turkmenistan in Figure A1.1 (thick black curve) clearly suggests that the reported yields for this country between 1998 and 2006 are totally out of line compared to the rest of CIS.

Another view of the curious behaviour of grain yields in Turkmenistan since 1998 is obtained by a comparison with FAOSTAT data for Europe and other regions (Table A1.1). In 1998 the yields in Turkmenistan were 1.8 tonnes/ha, compared with 3.3 tonnes/ha for Europe in aggregate; by 2006 Turkmenistan's reported yields had closed the gap with Europe, reaching 3.6 tonnes/ha compared with Europe's 3.4 tonnes/ha. It is hard to believe that between 1998 and 2006 Turkmenistan, with its severely constrained water and fertilizer resources, experienced the kind of technological progress that was necessary to close the persistent gap with European yields and overtake the relatively more advanced countries of Central Eastern Europe.

Table A1.1. Grain yields in Turkmenistan and selected regions 1998-2006 (tonnes/ha)

Year	Europe	Turkmenistan	Central Eastern Europe	Central Asia
1998	3.3	1.8	2.0	0.9
1999	3.3	2.1	2.1	1.5
2000	3.2	2.3	1.9	1.2
2001	3.4	2.3	2.5	1.5
2002	3.5	2.6	2.5	1.5
2003	3.2	2.8	2.1	1.5
2004	3.8	3.1	2.7	1.3
2005	3.5	3.2	2.5	1.5
2006	3.4	3.6	2.4	1.6

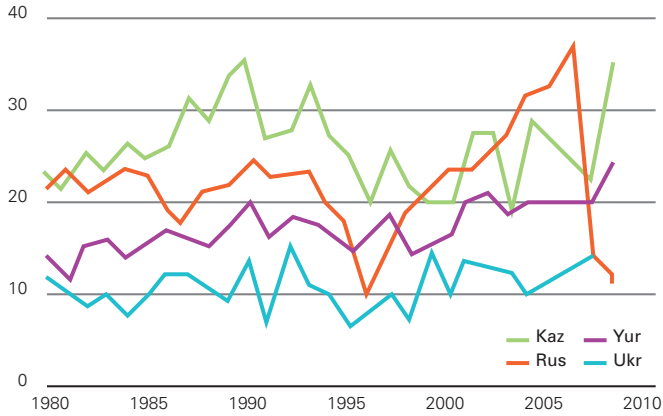
Source: FAOSTAT online statistical database.

During the 15-year period 1980-1994 the grain yields in Turkmenistan were relatively stable, with median value of 2 tonnes/ha (see Figure A1.1). After a brief collapse in 1995-1997, the yields returned to the steady-state level of 2 tonnes/ha in 1998 and continued growing rapidly for the next seven years, until 2006. The abnormally high yields during 1998-2006 are a reflection of suspiciously high grain harvest during this period.

To correct the abnormality, we accepted the reported sown area as given and re-estimated the grain harvest assuming yields close to the steady-state value: 2.0 tonnes/ha and as an alternative 1.5 tonnes/ha. The grain harvest re-estimated on the basis of these yields is shown by the two thick curves in Figure A1.2: the light gray curve is calculated using a yield of 2.0 tonnes/ha and it extends at a level close to 2 million tonnes of grain; the dark gray curve is calculated using a yield of 1.5 tonne/ha and it extends at a level of about 1.5 million tonnes. Up to 1998 both curves coincide with the reported harvest (thin black curve), whereas after 1998 they provide a substantial smoothing of the reported harvest, which in this period is represented by the sharply triangular thin curve. In the absence of large technological progress in Turkmen agriculture it is reasonable to assume that the yields remained relatively stable at the levels used, and the probable grain harvest in 1998-2006 was between 1.5 million tonnes and 2 million tonnes, instead of rising steeply to 3.5 million tonnes. Our calculations are intended to correct the reported grain harvest during the period 1998-2006, as they are not necessarily valid

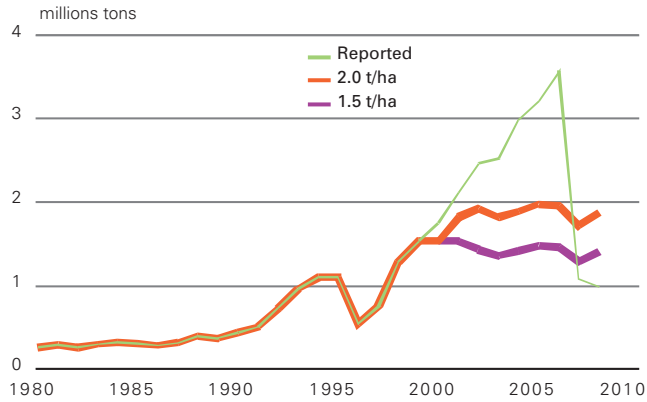
for the two most recent years 2007-2008. Additional information is needed on the actual method by which the grain harvest for 2007-2008 (around 1 million tonnes) was scaled down by the statistical bodies in Turkmenistan.

Figure A1.1. Long-term pattern of grain yields 1980-2008: Turkmenistan and CIS



Source: Interstate Statistical Committee of the CIS - CISSTAT (2009).

Figure A1.2. Turkmenistan: Adjusted estimates for the grain harvest



Adjusted estimates for the grain harvest in Turkmenistan re-estimated at two yield levels: 2.0 tonnes/ha (thick gray curve) and 1.5 tonnes/ha (thick black curve); the thin curve shows the reported grain harvest; all three curves overlap between 1980 and 1998.

Annex 1.9. Cotton and grain: harvests and yields 1980-2008

	Production, thousand tonnes		Yield, tonne/ha	
Year	Cotton	Grain	Cotton	Grain
1980	1 192	271	2.35	2.05
1985	1 288	316	2.30	2.22
1990	1 457	449	2.34	2.40
1991	1 433	517	2.38	2.15
1992	1 300	737	2.29	2.20
1993	1 341	974	2.32	2.24
1994	1 283	1 106	2.30	1.85
1995	1 294	1 109	2.30	1.69
1996	435	556	0.82	0.89
1997	635	760	1.32	1.33
1998	705	1 290	1.29	1.83
1999	1 304	1 544	2.10	2.08
2000	1 031	1 759	1.67	2.28
2001	1 137	2 122	1.46	2.32
2002	490	2 471	0.70	2.57
2003	714	2 535	1.14	2.77
2004	733	2 987	1.19	3.14
2005	738	3 218	1.14	3.25
2006	852	3 580	1.37	3.65
2007	950	1 086	1.48	1.25
2008	1 002	1 000	1.76	1.06

Source: Pre-1990 from Interstate Statistical Committee of the CIS - CISSTAT; post-1990 from Agriculture of Turkmenistan, State Statistics Committee (various years).

Annex 1.10. Livestock numbers 1980-2007

	All farms				Peasant associations				Private sector			
	Cattle	Cows	Sheep	Poultry	Cattle	Cows	Sheep	Poultry	Cattle	Cows	Sheep	Poultry
1980	626	233	4483	5 277	325	75	3 410	3 578	302	158	1 074	1 699
1981	652	241	4 492	5 721	335	76	3 406	3 752	317	165	1 086	1 969
1982	672	244	4 460	6 323	344	77	3 375	4 023	329	167	1 086	2 300
1983	698	255	4 561	6 043	357	78	3 451	4 400	341	176	1 110	1 643
1984	709	259	4 495	5 785	360	78	3 360	4 264	349	181	1 135	1 521
1985	738	273	4 740	6 808	367	81	3 454	5 137	371	192	1 286	1 670
1986	776	289	4 816	6 847	381	90	3 452	5 099	395	200	1 365	1 747
1987	774	297	4 865	7 365	382	89	3 539	5 235	393	208	1 326	2 131
1988	799	308	5 269	7 778	387	90	3 788	5 580	412	217	1 481	2 197
1989	820	319	5 399	7 926	384	92	3 807	5 385	436	227	1 592	2 541
1990	829	331	5 481	7 390	376	93	3 831	4 891	453	238	1 650	2 499
1991	899	360	5 599	7 791	378	93	3 823	6 337	521	267	1 777	1 454
1992	1 004	416	6 265	6 965	386	93	4 089	4 004	618	323	2 176	2 960
1993	1 104	478	6 313	5 641	379	92	3 994	3 426	726	386	2 319	2 215
1994	1 181	534	6 503	5 783	369	92	3 947	2 500	813	443	2 556	3 283
1995	1 199	567	6 574	4 991	340	88	3 796	1 533	859	479	2 778	3 459
1996	1 155	557	6 138	4 237	265	73	3 340	665	890	484	2 798	3 572
1997	1 128	546	5 957	4 235	223	62	3 137	544	905	484	2 820	3 691
1998	1 424	651	6 052	3 156	147	46	2 239	336	1 277	605	3 813	2 820
1999	1 572	698	7 201	4 034	155	42	2 535	533	1 417	656	4 666	3 501
2000	1 602	738	8 835	5 451	150	42	2 801	577	1 452	696	6 034	4 874
2001	1 853	794	12 001	7 150	131	38	2 426	269	1 722	756	9 575	6 881
2002	1 890	871	13 320	8 417	122	40	2 484	194	1 768	831	10 836	8 223
2003	1 970	967	13 904	12 907	120	37	2 504	176	1 850	930	11 400	12 731
2004	2 018	974	15 133	13 875	119	37	2 664	164	1 899	937	12 469	13 711
2005	2 065	994	16 598	14 939	119	37	2 919	140	1 946	957	13 679	14 799
2006	2 134	1 025	18 101	15 537	119	37	3 013	94	2 015	988	15 088	15 443
2007	2 158	1 043	18 275	15 596	113	35	2 931	62	2 045	1 008	15 344	15 534

Source: Pre-1990 data from Interstate Statistical Committee of the CIS - CISSTAT; post-1990 data from statistical yearbooks of Turkmenistan.

Annex 1.11. Livestock subsector: herd and production in 1990-2007

	Cattle[a]	Sheep[a]	Livestock herd[b]	Meat[c]	Milk[d]	Milk yield[e]
1990	829	5 481	1 451	103	436	1 315
1991	899	5 599	1 537	100	458	1 272
1992	1 004	6 265	1 700	98	471	1 132
1993	1 104	6 313	1 792	110	711	1 491
1994	1 181	6 503	1 889	107	716	1 340
1995	1 199	6 574	1 906	110	727	1 283
1996	1 155	6 138	1 811	111	755	1 355
1997	1 128	5 957	1 766	110	755	1 383
1998	1 424	6 052	2 061	129	766	1 177
1999	1 572	7 201	2 332	130	878	1 258
2000	1 602	8 835	2 540	150	989	1 340
2001	1 853	12 001	3 125	166	1 250	1 574
2002	1 890	13 320	3 306	193	1 398	1 605
2003	1 970	13 904	3 490	209	1 529	1 581
2004	2 018	15 133	3 670	233	1 679	1 724
2005	2 065	16 598	3 874	263	1 868	1 879
2006	2 134	18 101	4 100	282	2 047	1 997
2007	2 158	18 275	4 142	294	2 069	1 984

a thousand head, b thousand standard head, c thousand tonne (slaughter weight), d thousand ton, e kg per cow per year, calculated as the ratio of milk production to total number of cows.
Source: Agriculture of Turkmenistan (various years).

Annex 2. Organizations servicing the state agricultural sector in Turkmenistan

Ministry of Agriculture

Analytic, coordination and methodological work with the main goal of implementing economic reforms in agriculture. Until 1997 the Ministry was the central institution for the organization and management of agriculture. As a result of the 1997 reforms, the functions of the Ministry of Agriculture were severely restricted.[1] Its system of local offices was transferred to regional (velayat) and district (etrap) level administrations, and responsibilities for the management, financing, and servicing of farms were transferred to the new input service and procurement-based organizations. With this loss of authority and functions the staff of the Ministry was reduced to a minimum.

Ministry of Water Economy

The state organ responsible for the regulation, use and protection of water resources in Turkmenistan. In the scope of its responsibilities and the breadth of its control, the Ministry has changed very little from Soviet times. The Ministry is responsible for[2]:

- Approval of country-wide, system-wide, velayat and etrap level and farm-level water use plans;
- Organization, control and regulation of water use and protection;
- Formulation and approval of plans for water use and protection;
- Organization of water monitoring;
- Organization of water cadastre and water balances;
- State monitoring of water use;
- Water metering;
- Filing complaints and leading investigations on compensation as a result of violation of water laws;
- Planning, exploration, scientific and design works connected with use and protection of water resources;
- Formulation of land reclamation measures;
- State ecological assessments of construction and reconstruction of water facilities and construction;
- Approval and issue of permits for specialized water use;
- International cooperation in the area of water issues.

1 Law of Turkmenistan, 30.12.1996; Presidential Decree of Turkmenistan, 20.12.1996; Presidential Decree of Turkmenistan, 23.12.1996; Presidential Decree of Turkmenistan, 14.01.1997.

2 Water Code of Turkmenistan (2008), article 7.

The Ministry has offices at the state level, as well as in each velayat and etrap. As in Soviet times, management of water use is executed by the Ministry in close consultations with local administrations. Thus, water use is often dictated by local administrations, which can lead to water use imbalances and violation of technical norms.

Annual state decrees on sowing of state order crops always include a specific point ordering the Ministry of Water Resources to ensure water supplies according to technical norms for each crop per hectare of sown land.

Beginning in 1997 contracts for annual irrigation water supply for state order crops were made with each individual leaseholder through etrap departments of irrigation. Thus, the number of contracts signed each year was more than 400 thousand. Monitoring and enforcement of such contracts quickly exceeded the capabilities of even this huge organization. After the 2007 reforms[3], the Ministry began signing contracts with directors of peasant associations rather than with leaseholders, thereby reducing the paperwork and monitoring burden by nearly 1 000 times.

Association Turkmengallaonumleri (for grain and bread products)

Monopolistic state association charged with production planning, procurement and processing of grain formed in 1996. Members of the association are all grain storage facilities, elevators, processing facilities, bakeries, macaroni manufacturers, as well as the grain seed research institute. Today the association has 46 enterprises, 28 of which are bakeries. Turkmengallaonumleri mills process both domestic and imported wheat.

From the time of its founding to 2007 the association concluded contracts with each individual leaseholder. After the issue of the new Law on peasant associations in 2007 Turkmengalloaonumleri concludes contracts with directors of peasant associations.

Turkmengallaonumleri does not provide input services to producers. Each year a Presidential Decree for production of wheat and rice indicates the obligations of Turkmengallaonumleri towards grain producers. For instance, the Presidential Decree of 26.07.2007 no. 8859 "on production of wheat in 2008 in Turkmenistan" specified a production target of 1.6 million tonnes and sown area of 880 thousand ha. Turkmengallaonumleri was directed to provide for an elite and super elite seed fund (fond semian vysshei reproduktsii) of 202.4 thousand tonnes for fulfilment of the following plan:

3 At the Khalk maslaxaty session of 30.03.2007 in the city of Mary the priorities of the agricultural sector were reconsidered and peasant associations were placed at the centre of contracting, acting as a medium between state service and procurement organizations and leaseholders. After 2007 all state order contracts were signed with directors of peasant associations rather than with leaseholders. The directors in turn signed contracts with each leaseholder.

Table A2.1 Sown area, production and seed requirements for the 2008 wheat crop in Turkmenistan (per Presidential Decree)

Velayat	Sown area 1 000 ha	Production 1 000 tonnes	Seed requirements 1 000 tonnes
Akhal	250	450	57.5
Balkan	80	120	18.4
Dashoguz	180	300	41.4
Lebap	170	350	39.1
Mari	200	380	6.0
Turkmenistan total	880	1 600	202.4

State procurement prices per tonne of wheat and rice are also established through a Presidential Decree, as well as costs per ha for inputs and services provided by other organizations for wheat and rice production.

Association Turkmenmallary (livestock and livestock products)

Vertically integrated association of livestock joint stock companies formed in 1996. Turkmenmallary was formed along with the other branch-based vertically integrated associations designed to improve management and technology of livestock production.

Turkmenmallary not only manages the state livestock sector. It also organizes production of its constituent livestock farms, as well as livestock breeding, veterinary services, maintenance of pasture watering stations, pasture rotation and rehabilitation, livestock processing and sales through its own retail outlets, as well as export. The members of Turkmenmallary are:

- 86 livestock peasant associations, including 23 breeding farms (14 for karakul sheep, 4 for cattle and 5 for camels);
- Livestock and veterinary institute ;
- Cattle and poultry veterinary association;
- Production association for pasture irrigation repair of watering stations "Turkmenorimeidansuvylylandyrysh";
- Hide processing factory;
- Karakul sheep wool processing factory.

In 2009 the member agricultural enterprises of Turkmenmallary held 9.8 million ha of total land, including 9.6 million ha of pastures and 51.4 thousand ha of arable land where they raised grain (22.9 thousand ha), cotton (6.9 thousand ha), feed corn (0.6 thousand ha) and Lucerne (2.4 thousand ha). This is nearly one quarter of agricultural land in Turkmenistan.

Despite its vast resources, Turkmenmallary holds a small fraction of total livestock inventories in Turkmenistan and produces only an insignificant portion of livestock products. On 1 January 2009 the agricultural enterprises in Turkmenmallary held 10 percent of sheep and goat inventories, 2.4 percent of cattle and 12 percent of camels. In 2009 Turkmenmallary produced only 30 percent of the value of livestock products produced in the state sector. This was a mere 3.5 percent of total livestock production.

Turkmenmallary offers veterinary services to its member enterprises, other state enterprises and individual farms on a fee-for-service basis, except for vaccinations for the 6 most dangerous diseases which are free. These services are dispensed from offices in each velayat and etrap, as well as from veterinarians in each member peasant association. The association "Turkmenorimeidansuvylylandyrysh" irrigates pastures, repairs and constructs pasture watering facilities on a cost recovery basis as well.

Association Turkmenkhimiia

State association for production, trade and sales of fertilizer and plant protection agents formed in 2007. Turkmenkhimiia took over these functions from Turkmenobakhyzmat, which carried out these functions from 1996/97 to 2007. The association has nine production facilities for chemical agents and mineral fertilizers (three enterprises), a chemical research institute and a firm for services connected with sales of mineral fertilizers ("Dokhunkhimiia").

Dokhunkhimiia has an extensive network of sales and distribution outlets, with storage facilities for fertilizer, plant protection agents, defoliants, poisons throughout the country. The distribution of chemical agents including fertilizers proceeds each year in accordance with Presidential Decrees on state orders that specify crop areas for four strategic crops and per hectare norms for each. For instance, the table below shows norms for distribution of fertilizers in various years according to Presidential Decrees for the four strategic crops. Prices of fertilizers and other chemical agents are also set by government resolution each year.

Table A2.2 Norms for fertilizer applications prescribed by the Presidential Decree for sowing agricultural commodities for state orders, kg/ha

Crop	Cotton	Wheat	Rice	Sugar beets
Year	2009	2008	2008	2008
Turkmen Presidential Decree	15.01.2009 No. 10167	26.07.2007 No. 8859	29.04.2008 No. 9785	15.05.2008 No. 9824
N	500	500		450
P	200	200	200	600
K			300	

N=nitrogen; P=phosphorus; K=potassium.

Association Turkmenobahyzmat (Association of joint stock companies for production services for agriculture)

State association for delivery of machinery services, including sowing, harvesting, repair and other services formed in 1996/97. The main mission of Turkmenobahyzmat is to supply machine services to peasant associations for the four strategic state order crops at prices set by Presidential Decree each year.

Acquisition of new agricultural machinery for Turkmenobahyzmat is financed through the state budget and funds set aside by the state association. All purchases are set by Presidential Decree, and during the period 2002-2009 the President issued 33 decrees for purchase of agricultural machinery for a total sum of USD 753.6 million.

The organization of Turkmenobahyzmat illustrates the essential significance of the 1996/97 reforms for agricultural enterprises in Turkmenistan. According to the new legislation of that period peasant associations were transformed from collectives into state enterprises. This allowed the state to confiscate overnight without compensation all agricultural machinery and implements, technical personnel, mechanics and even storage and repair facilities held by agricultural enterprises and to transfer them to a state organ, Turkmenobahyzmat. Of course, the physical location of agricultural machinery and implements, as well as employees and facilities did not change. However, the legal basis and the management of these resources were transferred to the state. This was the first and fundamental step in agricultural policy that made agricultural enterprises totally dependent upon the state for their existence.

In addition to all on-farm agricultural machinery, personnel and storage and repair facilities, Turkmenobahyzmat also received six off-farm machinery repair and spare parts manufacturing facilities. In addition, Turkmenobahyzmat acquired central repair facilities in each etrap. At the present Turkmenobahyzmat has 84 enterprises with a total of 14.3 thousand employees.

State Concern Turkmenpagta

The State Concern Turkmenpagta is a specialized vertically integrated structure for the input supply, procurement, processing and sale of cotton. Turkmenpagta supplies seed material to producers, procures raw cotton from them at state set prices, processes the cotton and sells it both domestically and abroad.

Through its various divisions and subsidiaries Turkmenpagta carries out each step along the cotton value chain from education and training of personnel, to production and supply of seeding materials, to control over grower production technology and quality, to procurement, transport, processing, servicing of processing facilities, construction of new and repair of existing facilities to marketing of finished product.

Turkmenpagta works with producers in the following way. The quantity of cotton seeds per sown ha and their price, as well as the production target and price of cotton, are set by government resolution each year. Turkmenpagta is directed to supply peasant associations with the quantity of seed material corresponding to the number of hectares sown multiplied by the per ha norm. The peasant association then incurs a debt for the seeding material. When the harvest is procured the procurement and sales division of Turkmenpagta, "Ak altyn," receives a loan from the State Commercial Bank Daikhanbank at the below market rate of 1 percent per year in order to settle accounts with producers. It then delivers the raw cotton to state processors. After processing Ak altyn sells the processed cotton through the state raw materials exchange to both domestic and foreign buyers. After the processed cotton is sold, Ak altyn settles accounts with Daikhanbank.

All cotton processing facilities are under state ownership with a capacity to process over two million tonnes of raw cotton per year. This is approximately double the actual processing needs of Turkmenistan. In 2007-08 state processors milled about one million tonnes of raw cotton, so that the sector worked at about half of capacity.

Most of current processing capacity in Turkmenistan is quite inefficient, still using Soviet technology. For this reason, Turkmenistan has continued to add capacity during independence (1991-2010), including two mills built by the American firm Continental Eagle with the latest technology.[4]

Daikhanbank

State Commercial Bank of Turkmenistan Daikhanbank is the state agricultural bank formed in 1996. The main purpose of the bank is to finance the state order system for agriculture in Turkmenistan. The bank works exclusively on the basis of government decisions: the size of loans, interest rates and credit issue are all implemented on the basis of government orders. As a rule, Daikhanbank interest rates do not exceed 2 percent per year. Daikhanbank absorbed a number of specialized banks operating in the agricultural sector such as Gallabank, Pagtabank and Malarbank. The bank is half owned by the Turkmen-Turkish Bank and 50 percent of shares are owned by shareholders.

In accordance with state policy to minimize the decision-making role of peasant associations, from 1996 to 2007 Daikhanbank worked directly with leaseholders. For this purpose Daikhanbank had a branch in each peasant association, and each leaseholder in the state order system had an account with Daikhanbank that showed debits and credits for each growing season. Information on debits and credits for state order crops were compiled on the basis of reports from input suppliers such as Turkmenobahyzmat, Turkmenpagta, Turkmengallaonumleri, Turkmendokun-khimiia (subsidiary of Turkmenkhimiia),

4 In Turkmenkala etrap, Maryiskii velayat in 1995 with a processing capacity of 30 thousand tonnes of raw cotton and in Rukhabat etrap, Axal'skii velayat with a capacity of 90 thousand tonnes.

Turkmenmallary and the State raw materials exchange. Daikhanbank presented financial data on each leaseholder and on each peasant association to the peasant association director, the economic and statistics sections of the etrap administration.

At the beginning of the sowing season each leaseholder would receive a credit to pay for sowing from which he would be charged for seed material, plant protection agents, fertilizer, water and other inputs, as well as an account service charge. Since all inputs and their prices are supplied in strict compliance with state norms on a per ha basis, the credit can be calculated on the basis of the planned sown area. The leaseholder put up his own property as collateral for the credit. At the end of the season the leaseholder's account would be credited with the proceeds from the sale of his crop minus his debt.

From 2007 Daikhanbank stopped working directly with leaseholders and worked only with peasant associations. Currently Daikhanbank has 55 branches in each etrap centre and 400 sections in peasant associations with a total of 2400 employees.

Annex 3.1. Legislative basis for state regulation of national and foreign trade

Law	Date
On foreign economic activity in Turkmenistan	April 1993
On investment activity in Turkmenistan	April 1993
On foreign concessions	October 1993
On currency regulation	October 1993
On the Chamber of Commerce	October 1993
On certification of products and services	October 1993
On the Commodity and Raw materials exchange	September 1994
On food security	June 2000
On trade	July 2002
Tax code	November 2005, revised June 2008
On foreign investments	March 2008
On coal resources	August 2008
On invention and industrial samples	November 2008
On trademarks, service standards and geographical indications of source	November 2008
Merchant Fleet Code	November 2008
On quality and safety of food	April 2009
Sanitary code	November 2009
On the organization of licensing in Turkmenistan (Presidential Decree no. 10281)	February 2009

Source: Stanchin (2010b), pp. 63-67.

Annex 3.2. Turkmenistan import tariffs

From Annex 1 to the Resolution No. 9925 by the President of Turkmenistan, dated 27 July 2008

List of goods imported into Turkmenistan for which import duties have been established, and the list of such duties

N	Turkmen TNVed code	Description	Import Duty, USD/Unit or percent of customs value
1.	0409	Bee honey	$1/1 kg
2.	0511 99 801	Silk worm eggs, (except that imported directly by the Ministry of Textile Industry of Turkmenistan)	$0,5/1 kg
3.	0805 50, from 0806	Fresh grapes	$0,5/1 kg
4.	from 1512, from 1516	Cotton oil	$1/1 kg
5.	1601 00	Sausages and meat products, products made of ground meat and liver, food products prepared on the base of thereof	$0,5 /1 kg
6.	1704 10	Chewing gum, sweetened and unsweetened	$2/1 kg
7.	20	Processed for products made from vegetables, fruits, nuts or other plants	$0,15 /1 kg
8.	from 2001 or 2002	Tomato paste	$0,3/1 kg
9.	2105 00	Ice cream or other products of food ice containing cocoa or without	$0,5/1 kg
10.	from 2201 10	Mineral water, carbonated	$0,4/1 l
11.	2201 10 110 2202	Non-carbonated mineral water, Carbonated mineral water and other non-alcoholic drinks containing sugar or other sweeteners with the exception of fruit and vegetables mentioned under HS 2009 heading	$0,2/1 l
12.	2501 00 310 2501 00 91	Technical salt used in production of other products Salt for human consumption	$1/1 kg

Source: Prikhodko (2010), p. 25.

Annex 3.2 (continued) Turkmenistan export tariffs

From Annex 2 to the Resolution No. 9925 by the President of Turkmenistan, dated 27 July 2008

List of goods exported from Turkmenistan which are subject to export duties and payments

N	Turkmen TNVed code	Description	Duty, USD/Unit
1.	from 31 3102 21 000 from 3103 10	Ammonium nitrate*, Ammonium Sulfate*, Superphosphate fertilizers (except those exported by the State Company Turkmenkhimia)	$25 per 1 tonne
2.	from 5701, from 5702	Carpets and carpet products, hand-made (except those certified by the Ministry of Textile Industry of Turkmenistan and State Shareholding Company Turkmenkhaly	$20 per sq. meter
3.	from 0106	Turkmen Shepherd Dog (with permission from the Ministry of Nature Protection of Turkmenistan)	$300 per one animal
4.	.....	.....	.....
5.	1001	Wheat: food and seed	per 1 tonne: $800, $700
6.	from 1101 00	Wheat Flour 1st 2nd 3rd grade and dietary grade	per 1 tonne $800 $700 $600 $500
7.	1902	Pasta	$800 per 1 tonne
8.	1006	Rice	$800 per 1 tonne
9.	2105 00	Ice cream	$0,2 per 1 kg

Source: Prikhodko (2010), p. 26.

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