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Wheat production in Turkmenistan: Reality and expectations

by

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4.6 Wheat production in Turkmenistan: Reality and expectations

Ivan Stanchin and Zvi Lerman[1]

Abstract

In the Soviet period, Turkmenistan specialized in cotton production. When the dissolution of the Soviet Union in 1991 led to a breakdown of agricultural trade links between the former Soviet republics, Turkmenistan could no longer rely on assured supplies of wheat in exchange for its cotton, and the food security situation deteriorated. The government launched the *Zerno (Grain) Program* in 1991 to resolve emerging difficulties with wheat supply. The measures undertaken between 1991 and 2013 within the framework of this program included reorganization of the government control system for agriculture, transformation of farming structure, and implementation of land and water reform. Massive investments amounting to US$5.5 billion were made in opening up virgin lands for cultivation, development of new infrastructure for grain processing, and purchase of new farm machinery.

The special attention to the grain sector led to rapid expansion of wheat production. Traditionally a wheat importer, Turkmenistan started exporting wheat in 2010. Forecasts by local experts show that, despite a population increase of about 30% during the next 15 years, Turkmenistan will be able to maintain wheat exports at the current level of 400,000 tons annually.

Keywords: wheat, food security, sown areas, harvest, cropping structure, investments, export, import

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Turkmenistan is a large Central Asian country, fourth in land area among the CIS countries, after Russia, Kazakhstan, and Ukraine. The country's area of 491,200 square km is just a little smaller than that of Spain (504,700 square km) or France (547,000 square km). Turkmenistan extends 650 km from north to south and 1,100 km from east to west. It borders on Kazakhstan in the north, on Uzbekistan in the north and north-east, Iran in the south, and Afghanistan in the south-east. Turkmenistan's western border is the Caspian Sea. The total length of its borders is 14,300 km. Amudaria (or Amu Darya), one of the largest rivers in Central Asia, flows through Turkmenistan for 1,200 km of its total 1,437 km. Some 80% of Turkmenistan's territory is an arid lowland – the Karakum desert. Turkmenistan's remoteness from oceans, generally low elevations above sea level, and southern location are the main factors responsible for its hot and arid continental climate. The natural-climatic conditions in Turkmenistan are on the whole favourable for growing various cereals, but only with irrigation. Wheat and rice are the main food crops.

Wheat and cotton production: long-term view

Analysis of agricultural production in Turkmenistan during the last 100 years shows that two crops – cotton and wheat – vary in anti-phase and their shares of sown area fluctuate over time (**Figure 4.6.1**).

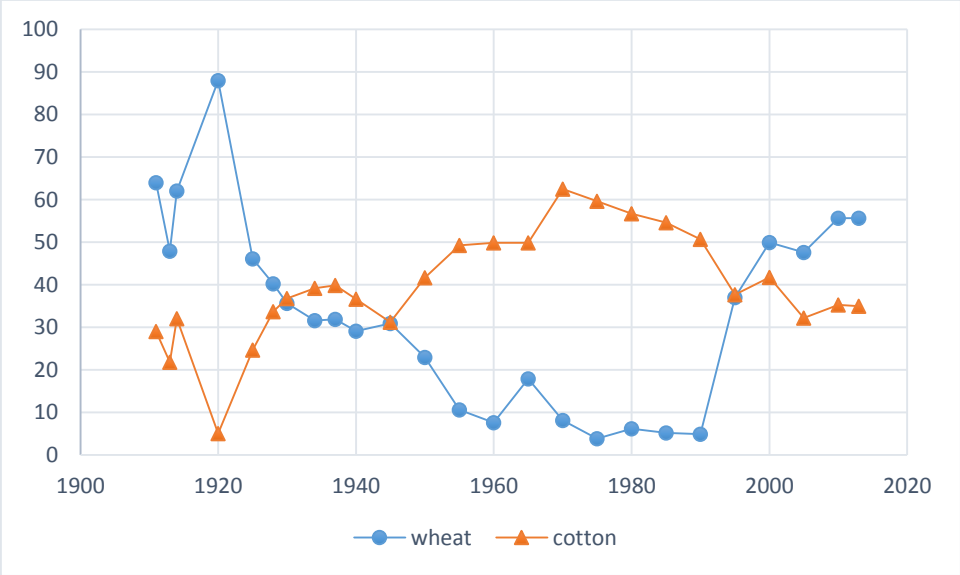

Figure 4.6.1. Shares of wheat and cotton in sown area in Turkmenistan, 1911-2013

Cotton for industrial uses began to be produced in Turkmenistan only at the end of the 1880s. Areas sown in cotton were expanded to supply sufficient raw material to Russian textile industry. The low-grade local variety was replaced with better and more costly American and Egyptian varieties, as well as long-staple cotton. Cotton areas and production grew steadily. During 1889-1916 the area in cotton increased hundred-fold and in the Trans-Caspian Region (the part of today's Turkmenistan within the administrative borders of Mary, Akhal, and Balkan velayats) cotton replaced wheat as the dominant crop. Cotton was in fact responsible for the commercialization of Trans-Caspian agriculture, and already in 1911 cotton accounted for 29% of sown area.

Analysis of cotton and wheat cropping patterns during the last 100 years (**Figure 4.6.1**) shows that the share of cotton in sown areas decreased during between 1914 and 1920 (WWI and the Russian Civil War) and also between 1940 and 1945 (WWII). The wars disrupted the economic relations between agricultural producers in Turkmenistan and cotton buyers in Russia, while imports of grain in exchange for cotton practically ceased. Food shortages in wartime encouraged substitution of wheat for cotton, with corresponding increase in wheat areas (**Figure 4.6.1**).

Another phase of increasing share of wheat in sown area starts in the 1990s, when Turkmenistan became an independent state. The disruption of economic relations among the former Soviet republics created difficulties with wheat supply and led to a worsening food-security situation, as in wartime. The government implemented measures that dramatically increased the area in wheat (from 60,000 ha in 1990 to 860,000 ha in 2013), while moderately reducing the area in cotton (**Figure 4.6.1, Table 4.6.1**).

Table 4.6.1. Structure of sown land in Turkmenistan 1960-2013

Year	Total sown area, '000 ha	Wheat, '000 ha	Cotton, '000 ha	Structure of sown area, %	
				Wheat	Cotton
1960	445.6	33,7	222.2	8	50
1970	636	52	397	8	62
1980	895	55	508	6	57
1990	1231	60	623	5	51
2000	1484	741	619	50	41
2005	2002	953	644	48	32
2013	1600	860	550	54	34

In retrospect, we see that wheat areas increase in periods when food supply difficulties arise due to disruption of regional economic relations and foreign trade links. Food supply difficulties are compensated as a rule by an increase in domestic food production, and primarily production of wheat on enlarged sown areas. Once the economic and trade relations settle back to normal, the area sown in wheat is reduced and cotton areas are increased again. This was indeed the pattern in the two wartime periods (1914-1920 and 1940-1945), which present complete "increase–decrease" cycles lasting 5-10 years. In mid-1940s, after WWII, cotton became the dominant crop. Its dominance persisted for 50 years, and it is only in the mid-1990s that the share of wheat again exceeded the share of area sown in cotton. The current phase of increasing wheat share has now lasted for almost a quarter of a century, but so far, we do not observe a return to cotton dominance and a corresponding decrease in wheat areas. Areas sown in wheat have stabilized at 860,000 ha annually, with cotton stable at 550,000 ha.[2]

[2] The relative stability of cotton and wheat area harvested indicates that areas of strategic crops are determined by government planning, not by price incentives. Cotton procurement prices were raised between 2007 and 2009 from below those of wheat (per ha) to 3-4 times above that of wheat. In a market economy, such a change would cause a substantial increase in sown area of cotton area at the expense of wheat, while in Turkmenistan the portions of these two crops in overall harvested area remained constant (see **Figure 4.6.1**).

Agricultural reform in the context of wheat policy

What is the future path of wheat production in Turkmenistan? In the early 1990s Turkmenistan's first president, Saparmurat Niyazov, initiated the *Zerno (Grain) Program* with the intent of achieving food security through complete self-sufficiency in wheat production.[3] In general, all measures for development, restructuring, institutional, managerial and other reforms in the country were motivated by the task of achieving food security and were thus assigned to the *Zerno* program.

Wheat production became a top-priority government tool for resolving the food security problem and the government of Turkmenistan designated wheat as a strategic commodity – one of the major agricultural crops in the country. Wheat was protected by high customs barriers and its export required government licenses. Changes in wheat/cotton areas were determined by government fiat, not by producers' response to market signals.

The entire farming system was restructured. The government assumed the role of buyer and production regulator. The production functions were entrusted to leaseholders operating intra-farm leasehold plots. Presidential decrees specified each year the areas for wheat production and the target harvest in each region. All aspects related with wheat production were decided by the government. This included choice of biological varieties, supply of seeds, land, water, fertilizers and herbicides, technical services, bank credits, cost of inputs and services, and ultimately the procurement prices.

The development of the grain sector required substantial capital investments. Land areas in wheat increased substantially, leading to larger production; networks of grain processing enterprises were established. Most of the investments came from the government and the share of private initiative in this development was minuscule.[4] To this day, the flour and bread industry is completely dominated by the state, with hardly any private initiative – domestic or foreign.

The investments in the *Zerno* program between 1992 and 2013 amounted to US$ 5.5 billion. Most of this amount went to agriculture – 40% to development and rehabilitation of land and 47% to purchase of farm machinery (**Table 4.6.2**). The remaining 13% was used for construction of grain storage capacities, flourmills, and bakeries. The investments brought large areas of virgin land into irrigated cultivation and helped rehabilitate deteriorating irrigation networks.[5] Purchase of farm

[3] In 1999 the National Presidential Program "Strategy of social-economic change in Turkmenistan to 2010" adopted in 1999 stipulated that wheat production should achieve 4 million tons by 2010, a 10-fold increase from the 1992 level. This was an incredibly ambitious target, given that it would imply a doubling of wheat yields in 10 years, without envisaging appropriate investment in agricultural R&D.

[4] At the beginning of 2009, the milling industry had 14 state-owned enterprises and only two private enterprises – both mini-mills. Of 257 bakeries at that time, only three were small privately owned bakeries and one was owned by foreign investors. Of the 40 enterprises in the macaroni sector, only one was a small private enterprise (EBRD-FAO, 2012).

[5] Government investments increased the irrigated area by 473,100 ha, from 1,369,200 ha in 1990 to 1,842,300 in 2013. This was achieved at a cost of US$ 4,560 per additional hectare. The expanding irrigation has kept up with population growth, both roughly tripling between 1965 and 2007, and thus ensured generally adequate food supply per capita. However, it inevitably has had serious environmental implications manifested in increased soil salinity and rising groundwater table. Budgetary constraints have prevented the government from ensuring adequate maintenance of the expanding irrigation system.

machinery was essential for effective cultivation of new lands and storage capacities were needed to accommodate increased quantities of grain. Eight large elevators with total capacity of 360,000 tons were constructed with government investment. The new elevators created 352 jobs.

Table 4.6.2. Investments in the *Zerno* program 1992-2013, million US$

Use of investments	1992-1999	2000-2008	2009-2013	Total	Structure
Development and rehabilitation of land	1100	500	600	2200	40%
Purchase of grain combines, tractors, other machinery	700	960	900	2560	47%
Construction of flourmills, storage capacities, bakeries	300	140	280	720	13%
Total	2100	1600	1780	5480	100%

Areas sown in wheat increased faster than total irrigated area. Furthermore, the expansion of irrigation stopped in 1994, after three decades of rapid growth since 1965, while the wheat area continued growing unabated (**Figure 4.6.2**). This was the outcome of the high priority assigned by the government to the development of the grain sector since 1991. Back in 1990, wheat occupied 60,000 ha and 4.4% of irrigated land; during 1991-2013, the area in wheat grew explosively, reaching 860,000 ha and 46.7% of irrigated land (**Table 4.6.3, Figure 4.6.2**).

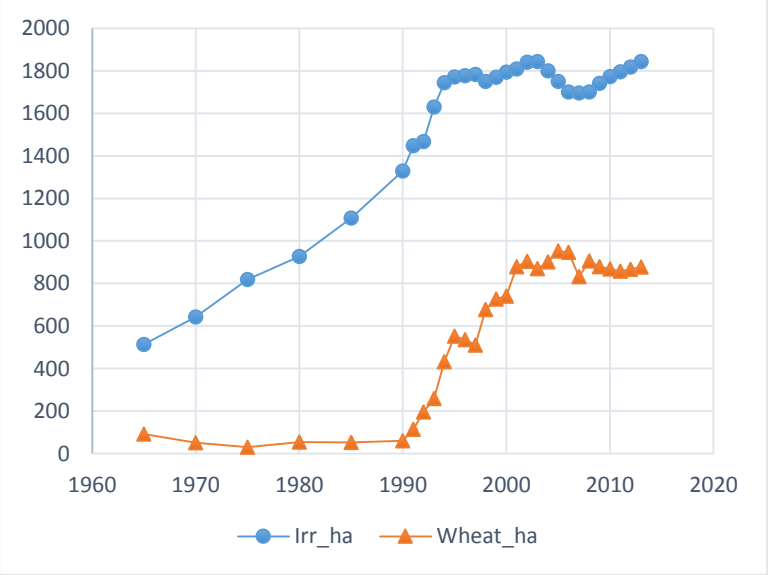

Figure 4.6.2. Irrigated area and area sown in wheat in Turkmenistan 1965-2013 (‘000 ha)

Table 4.6.3. Growth of irrigated land and wheat area in Turkmenistan 1990-2013

Years (as of January 1)	Irrigated land		Area in wheat	
	‘000 ha	% of 1990	‘000 ha	% of irrigated area
1990	1369.2	100.0	60.0	4.4
1995	1768.5	129.2	552.2	31.2
2000	1792.2	130.9	741.0	41.3
2007	1695.5	127.6	832.9	49.1
2010	1772.2	129.4	860.0	48.5
2011	1794.9	131.1	860.0	47.9
2012	1817.5	132.7	860.0	47.3
2013	1842.3	134.6	860.0	46.7

The emphasis on the grain sector radically altered the use structure of irrigated land. In 1990, cotton dominated with 45% of the irrigated land, while wheat occupied only 5% (the remaining 50% were in other crops and perennials). By 2013, on the other hand, wheat had gained dominance. The area in wheat could be expanded due to the expansion of irrigated land (by 473,100 ha), the contraction of areas in cotton (by 73,400 ha), and the contraction of area in all other crops, especially feed crops (253,500 ha). **Table 4.6.4** shows the transformation of irrigated land use between 1990 and 2013.

The expansion of irrigated area made it possible to increase the area sown in grain, and in particular wheat. The wheat area increased from 60,000 hectares in 1990 to nearly 900,000 hectares in 2013 (**Table 4.6.3, Figure 4.6.3**, orange curve). Wheat production also showed an upward response to area changes, but official statistics grossly exaggerated wheat production figures after 1998 in an attempt to demonstrate the success of President Niyazov's grain policy (**Figure 4.6.3**, grey curve).[6] Wheat production numbers were artificially inflated from 1.2 million tons in 1998 to 3.5 million tons in 2006, while the sown area increased by only 35% (from 700,000 hectares to 950,000 hectares). In the absence of any investments in R&D infrastructure and the total collapse of the scientific institutions in Turkmenistan during Niyazov's tenure, such technological change was simply impossible.

Table 4.6.4. Changing use of irrigated land in Turkmenistan in 1990-2013

	1990		1990-2013 (+, –)	2013	
	'000 ha	%	'000 ha	'000 ha	%
Irrigated land – total area	1369.2	100	+473.1	1842.3	100
Wheat	60.0	5	+800.0	860.0	47
Cotton	623.4	45	–73.4	550.0	30
Other crops and perennials	685.8	50	–253.5	432.3	23

The new president (Kurbanguli Berdymukhamedov) ordered in 2007 to clean up the wheat production statistics (as well as the grossly inflated population numbers) and bring them down to sane levels (Berdymukhamedov 2009a, b). The adjustment in 2007 reduced the official wheat production figures from 3.5 million to just 1 million, effectively rolling wheat volumes back to below the 1998 level. Since 2007, the official wheat production increased from 1 million tons to 1.6 million tons in 2013. All through the period of Niyazov inflated statistics, USDA PSD continued to publish its own estimates of wheat production, based on reasonable yield figures. The USDA estimates are shown by the blue curve in **Figure 4.6.3**, which effectively truncates the "Niyazov pyramid" in 1998-2007 and closely matches the official statistics since 2008.[7]

[6] Gaps between the optimistic grain production statistics and the true situation on the ground became apparent back in 2006, during the last months before Niyazov's death. Press reports in May 2006 focused attention on shortages of flour and bread in the country and Niyazov was reported saying that "in 2007, there won't be enough bread for everyone" (EurasiaNet 2006)

[7] USDA PSD online (https://apps.fas.usda.gov/psdonline/) is accessible to the public. Turkmen official statistics are not, but many can be found in EBRD-FAO (2012).

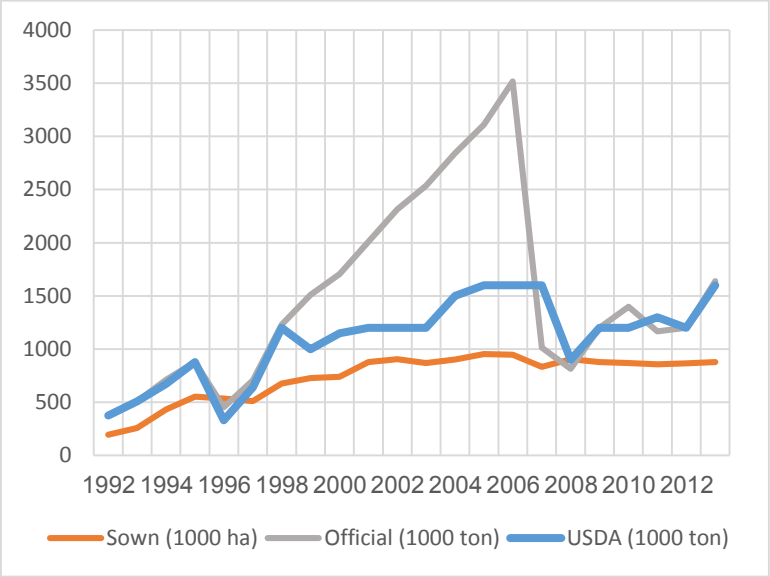

Figure 4.6.3. Wheat production and area sown in wheat in Turkmenistan, 1992-2013: orange curve – what area, official statistics (‘000 ha); grey curve – wheat production, official statistics (‘000 ton); blue curve – wheat production, USDA PSD data (‘000 ton).

Wheat yields

During the years of the “Niyazov pyramid” (1998-2007), the reported wheat production increased much faster than the wheat area (compare grey and orange curves in **Figure 4.6.3**). This affected the reported wheat yields, which are determined as wheat production (in tons) divided by wheat area (in hectares). The result is reflected in **Figure 4.6.4**, where official wheat yields (solid green curve) practically replicate the “Niyazov pyramid” in wheat production (see **Figure 4.6.3**, grey curve). The fabricated grain yields increased to 3.7 ton/ha in 2006, rising to 1.5 times the 1990-2002 levels of 2.5 ton/ha and astonishingly surpassing East European and U.S. wheat yields (3.45 and 2.77 tons/ha respectively; averages for 2000-2005 from FAOSTAT; see **Table 4.6.5**).

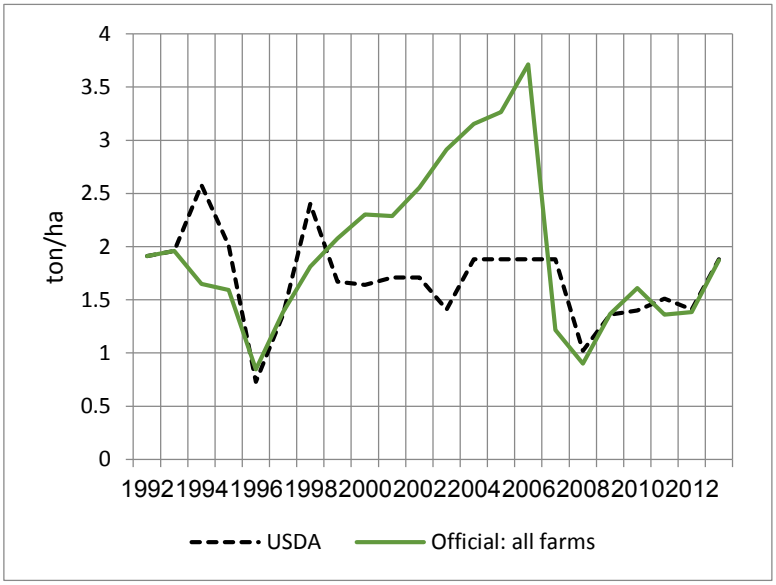

Figure 4.6.4. Turkmenistan: wheat yields by sector, 1992-2013 (official figures and USDA estimates). Source: USDA PSD and Turkmenistan statistical yearbooks.

In **Figure 4.6.4**, the green (official wheat yields) and black (USDA yield estimates) lines are separated by a wide gap for the years of production differences, 1998-2007, whereas for 1992-1998, the differences are small and after 2008, the two curves are virtually identical. The incredibly high

yields in official data combined with the abrupt decline in 2007, as well as similar changes observed in other series (the population data, for example) provide a substantial argument in favor of applying the USDA estimates of production and yields to truncate the "Niyazov pyramid" (**Figures 4.6.3 and 4.6.4**).

Table 4.6.5. Wheat yields: comparison of Turkmenistan with selected countries

Wheat producing countries	Wheat, ton/ha (2000-2005 averages)
EU-15	5.81
Eastern Europe	3.45
USA	2.77
Developed Africa	2.45
Canada	2.28
NIS	1.87
Sub-Saharan Africa	1.62
Turkmenistan (2007-13)	**1.51**

Source: Cotton lint yields from *Cotton: World Statistics*, Bulletin of the International Cotton Advisory Committee (September 2002); wheat yields for Turkmenistan from USDA and official yearbooks; all other countries from FAOSTAT.

After the post-Niyazov adjustment, the wheat yields dropped to 1.5 tons/ha, the second lowest among the countries selected in **Figure 4.6.5**. Kazakhstan's wheat yields are even lower, at about 1.1 tons/ ha, but then all wheat in Kazakhstan is rain-fed, whereas Turkmenistan grows wheat under irrigation. Shortage of fertilizers and chemicals during the transition and the collapse of the R&D and extension services in independent Turkmenistan are among the factors responsible for such low yields.

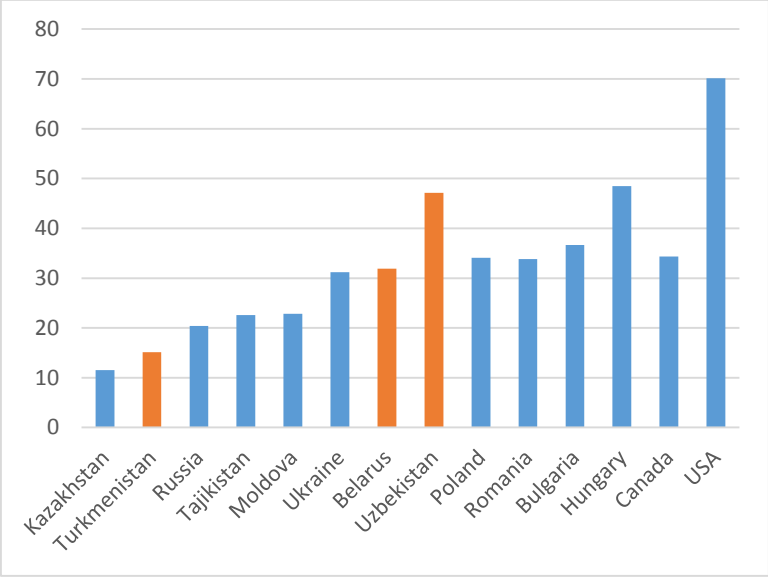

Figure 4.6.5. Grain yields in former Soviet republics, Eastern Europe, and North America: averages for 2007-2013 (Turkmenistan), 2009-2012 (other former Soviet republics), 2009-2011 (rest of the world). Source: see **Table 4.6.5**.

Wheat and cotton returns

Because of the hot climate, the wheat grown in Turkmenistan is low in gluten (with the exception of wheat from the northernmost regions of the Dashoguz Velayat). It is primarily suitable as animal feed, which was priced in Russian markets at a steady US$ 100-110 per ton before 2010, rising to US$ 140 per ton in in recent years (Veneta Ltd 2014). The total volume of wheat production during 1991-2013 (after correcting for statistical exaggerations in 2004-2006) was 21,500 ton, or 11,700 ton less than the official numbers. Valued at an average price of US$ 125 per ton, this sets the cumulative value of wheat produced between 1991 and 2013 at US$ 2.7 billion, whereas the capital investment in the grain sector during the same period reached US$ 5.5 billion (see **Table 4.6.2**). Directing these funds to wheat imports, Turkmenistan could have imported double the quantity that it produced domestically.

Table 4.6.6. Returns per hectare for cotton and wheat 2007-2013, in local currency and in US$

	2007	2008	2009	2010	2011	2012	2013
Cotton							
1. Sown area, '000 ha	642.7	570.4	545.0	550.2	556.4	550.8	550.6
2.Yield, ton/ha	1.48	1.76	1.77	2.34	1.97	2.24	2.17
3. Cotton production, '000 ton	949.8	1001.8	966.2	1286.3	1096.5	1234.9	1194.0
4. Value of raw cotton at state procurement prices, million manat	1032.0	1077.3	1039.2	1372.1	1174.7	1317.4	1271.1
5. Value of output per hectare, manat/ha	1605.7	1888.7	1906.8	2493.8	2111.3	2391.8	2308.6
6. Converted to US$*	219.5	378.0	364.6	481.4	412.2	462.2	446.0
7.Value of output, US$/ha	341.6	662.7	669.0	874.7	740.8	839.2	810.0
8. Employed in production, thou.	292.1	285.2	272.5	275.1	278.2	275.4	275.3
Wheat							
1. Sown area, '000 ha	832.9	905.6	878.5	868.6	857.8	867.0	877.0
2.Yield, ton/ha	1.22	0.90	1.40	1.61	1.36	1.38	1.87
3. Wheat production, '000 ton	1013.6	815.7	1231.4	1400.0	1168.2	1200.1	1640.5
4. Value of wheat at average state procurement prices, million manat	162.2	130.5	332.5	560.0	467.3	480.0	656.2
5. Value of output per hectare, manat/ha	194.5	144.1	378.5	155.1	544.8	553.6	748.2
6. Converted to US$*	56.9	45.8	116.7	196.5	164.0	168.4	230.2
7.Value of output, US$/ha	41.4	50.6	132.8	54.4	191.2	194.2	262.5
8. Employed in production, thou.	166.6	181.1	175.7	173.7	171.6	173.4	175.4

*Conversion to US$ done using official exchange rates (4.70 manat/US$ for 2007 and 2.85 manat/US$ for 2008-2013).
Source: Authors' calculations based on official statistics. Cotton and wheat prices from Presidential Decrees (2007, 2008, 2009).

It is thus clear that the policy of ensuring self-sufficiency in wheat by increasing domestic production, and certainly wheat exports, were a loss-making endeavour. Based on the data for 2007-2013 (**Table 4.6.6**), the obvious conclusion is that wheat production under Turkmenistan's conditions is economically inefficient. The area in wheat in 2013 was 1.6 times greater than the area in cotton, whereas the value of wheat produced was only 55% of the value of cotton.

The return per hectare from wheat was consistently much lower than the return per hectare from cotton over the period 2007-2013 (see lines 5 and 7 for cotton and wheat in **Table 4.6.6**). The wheat returns averaged a mere 20% of cotton returns during the entire period. Other studies also establish

that the profitability of wheat production is substantially lower than the profitability of vegetables or grapes, as well as cotton (Stanchin 2014). **Figure 4.6.6** shows the gap in returns per hectare between wheat and cotton in terms of US dollars; the picture in local currency (manat per hectare) is essentially the same (see **Table 4.6.6**, line 5). Furthermore, wheat, unlike cotton, is not a labor-intensive crop and it is much less attractive as a creator of jobs for rural people: wheat production employed about 175,000 workers compared with cotton's 280,000 (averages for 2009-2013, see **Table 4.6.6**). This suggests that wheat production in Turkmenistan is not economically efficient, and the whole issue of domestic wheat production is mainly motivated by political considerations.

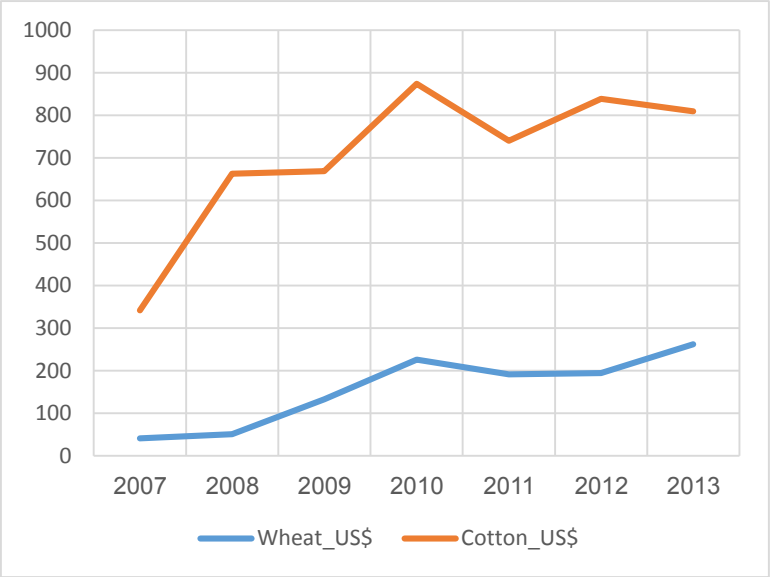

Figure 4.6.6. Return in US$ per hectare of sown area from cotton and wheat, 2007-2013. Data from **Table 4.6.6**.

Wheat exports

Despite the lower returns and the smaller job-creation opportunities, there has been no change in the policies developed in line with the *Zerno* program in the early 1990s. Wheat areas continue to dominate the cropping structure (see **Figure 4.6.1**). The President of Turkmenistan, Gurbanguly Berdymukhamedov, announced at the government meeting broadcast on state television on 25 February 2011, that in 2010 Turkmenistan had achieved for the first time in its history a realistic possibility of exporting wheat to the world market. Turkmenistan thus joined the club of food-wheat exporters.

Turkmenistan started exporting food grain in 2010. Of the total 2010 gross harvest of 1.4 million ton, 150,000 ton of wheat were exported through the state-controlled commodity exchange (another 30,000 were sold domestically through the exchange). No exports were initially attempted in 2011 due concerns about the effect of drought in that year, but in 2012 the Turkmengalloanumleri State Grain Association was allowed to export 300,000 tons of wheat from the 2011 stocks that exceeded domestic consumption needs.

In 2010, Turkmenistan adopted the *National Program of Socio-Economic Development of Turkmenistan for 2011-2030*. The program envisages systematic increase of wheat production up to 1.9 million tons in 2030, accompanied by steady increases in potential exports (**Table 4.6.7**).

Table 4.6.7. Projected wheat production in Turkmenistan 2010-2030, '000 tons

Years	Production		Flour produced	Wheat used for domestic consumption			Export potential
	Planned	Actual		Milling	Seeds	Total	
2010	1600	1400	573.9	820	198	1018	382
2011	1625	1168	633.2	905	198	1103	65
2012	1639	1200	660.6	944	198	1142	58
2013	1654	1640	691.6	988	198	1186	454
2014	1669		709.0	1013	198	1211	458
2015	1685		750.3	1072	198	1270	415
2020	1810		849.1	1213	198	1411	399
2025	1849		872.7	1247	198	1445	404
2030	1896		895.7	1280	198	1478	418

Source: National Program 2011-2030 (2010), statistical yearbooks, and authors' calculations.

The program anticipates an increase of 29.5% in flour production from domestic wheat during 2013-2030. The population is estimated to increase by 29.5% in this period. Taking the flour production projections for 2013-2030 as optimal normative demand (about 110 kg/year per capita), we estimated the volume of wheat required for domestic consumption as flour (**Table 4.6.7**). In addition, 198,000 of wheat were reserved annually for seed. If the projections set by the national program are attained, Turkmenistan should be able to export about 400,000 of wheat annually after 2013, regardless of economic efficiency considerations.

Conclusion

Food security considerations acquired special significance in independent Turkmenistan, when supply chains with other former Soviet republics had collapsed. Policy measures to increase wheat production announced in the early 1990s led to rapid expansion of sown areas from 60,000 ha in 1991 to 860,000 ha in 2013, with production volumes rising from 133,800 tons to 1.6 million tons during the same period. However, wheat production in Turkmenistan is much less profitable than the production of cotton (and vegetables or grapes). The government wheat expansion policy was obviously not guided by economic considerations: the main driving force was the political desire to maintain independence in decision-making.

Turkmenistan's wheat production and export are small compared to those in Kazakhstan, Russia, and Ukraine. And yet, the fact that this traditional wheat importer has reached self-sufficiency and started exporting is a major achievement in itself. World experience shows that domestic production is the best guarantor of food security. This is particularly clear in a political environment prone to sanctions and counter-sanctions. Our study of wheat production in Turkmenistan shows that considerations of accumulating national wealth through efficient exploitation of natural resources are secondary to political considerations and international relations.

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