

Sugar beet production in the Republic of Kazakhstan

Producción de remolacha azucarera en la República de Kazajstán

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RESUMO:

This article presents an analysis of sugar beet production and its structure in the Republic of Kazakhstan, characterizing each stage in its development and substantiating its economic importance. The indicators of sugar beet production and their dynamics are given. The article considers a number of factors that affect the yield of sugar beet as well as the efficiency of sugar beet production in agricultural enterprises in the Republic of Kazakhstan over different periods. The authors also evaluate the consumption of sugar per capita produced from domestic and imported raw materials. Currently, the amount of sugar produced is not sufficient to meet the needs of the population; therefore, Kazakhstan is dependent on imported raw materials. The authors also analyze the share of sugar produced from raw sugar and beets and present measures of state support for the cultivation of sugar beet and its processing.

Key words: sugar beet production, food security, food self-sufficiency, domestic production

ABSTRACT:

Este artículo presenta un análisis de la producción de remolacha azucarera y su estructura en la República de Kazajstán, caracterizando cada etapa de su desarrollo y confirmando su importancia económica. Se dan los indicadores de la producción de remolacha azucarera y su dinámica. El artículo considera una serie de factores que afectan el rendimiento de la remolacha azucarera, así como la eficiencia de la producción de remolacha azucarera en las empresas agrícolas en la República de Kazajstán en diferentes períodos. Los autores también evalúan el consumo de azúcar per cápita producido a partir de materias primas nacionales e importadas. Actualmente, la cantidad de azúcar producida no es suficiente para satisfacer las necesidades de la población; Por lo tanto, Kazajstán depende de materias primas importadas. Los autores también analizan la proporción de azúcar producida a partir de azúcar en bruto y remolacha y presentan medidas de apoyo estatal para el cultivo de remolacha azucarera y su procesamiento.

Palabras clave: producción de remolacha azucarera, seguridad alimentaria, autosuficiencia alimentaria, producción nacional

The President of the Republic of Kazakhstan N.A. Nazarbayev in his Address to the People of Kazakhstan "Through Crisis to Renewal and Development" noted that ensuring the country's food security is the most important issue, which needs to be addressed (Address of the President of the Republic of Kazakhstan Nursultan Nazarbayev to the People of Kazakhstan "Through Crisis to Renewal and Development", 2009). He once again emphasized the need to develop the country's own food market in the light of the following Address to the People of Kazakhstan: "The demand for food will increase in the world every year. And we should not miss such an opportunity" (Address of the President of the Republic of Kazakhstan Nursultan Nazarbayev to the People of Kazakhstan "Socio-Economic Modernization as Main Vector of Development of Kazakhstan", 2012). Moreover, an increase in the volume of world food production is projected to reduce by three times in the coming period. According to researchers of the food market, in the 1980s, the average annual increase in the volume of world food production was 30 million tons, in the following 20 years – 12 million tons, and in the period up to 2030, the volume of growth is projected to decrease to 9 million tons (Akhmetova, 2009).

Currently, the problem of food security, which is based on food self-sufficiency, is very acute for the Republic of Kazakhstan. The recommended threshold level of self-sufficiency is that 80% of the consumed products must be of domestic production, its decline has a disruptive effect on the industry and at the level of 40.0% there is complete import dependence.

Among the five main food products, sugar has a priority and strategic importance due to its energy value. It provides 16-20% of a person's daily caloric needs. Consumers of sugar are not only citizens of the republic, but also various branches of the national economy: confectionery, baking, horticultural, canning, chemical, pharmaceutical and liquor. Throughout the world, sugar is included in food baskets, which help access the standard of living of different segments of the population. The special role of this product lies in the fact that it ensures the country's food security. Therefore, sugar is produced even in those places where it is not profitable to produce it, due to the low yield of sugar beet. The governments of these states do not refuse to produce sugar using their own raw materials and replace it with imported products even under the favorable conditions of the world market.

Sugar is one of the necessary food products. Sugar production in the country is carried out mainly from two types of plants – sugar cane and sugar beet. In the southern region of the country, natural conditions allow growing sugar beet, which is the only domestic raw material used for sugar production.

Beet is a moderate climate plant. It is found in the wild condition along the shores of the Mediterranean Sea. As a plant, it belongs to the extensive botanical family of the *Chenopodiaceae* (goosefoot), which includes quinoa, spinach and some other plants. Beet began to be sown about 3 thousand years ago. It was cultivated mainly as a salad plant, i.e. the leaves were used, not the roots. After a long time, it was possible to grow beets with a fleshy root, which became the most valuable part of the plant. Sugar beet was grown by long-term selection from food beet having a conical root form, white skin and pulp. It differs from food beet in a large root weight, higher sugar content and a coarser pulp. Sugar beet is a two-year plant. In the first year, seeds give rise to fleshy roots and leaves without flowers and seeds. In the second year, the overwintered and subsequent spring beetroots give leaves and flower stems 1.5-2.0 m high with flowers and seeds. Sugar is produced from beet only in the first year of development (factory or industrial beet) (Vostokov and Lepeshkin, 2001).

The economic importance of sugar beet is limited not only to the production of sugar. When it is processed for sugar, such waste products as pulp, molasses, tops and defecation mud are obtained. With the proper organization of crop tending and sugar beet harvesting, in Kazakhstan it is possible to ensure the growth of 300 q/ha and more of root crop yield with a sugar content of 15%, which at a 10-11% factory sugar yield will provide 3.0-3.3 tons of pure sugar per 1 ha. The harvesting of the tops at a 300 q/ha root crop yield under irrigation conditions will be 50% or 150 q/ha. The tops are very valuable for livestock. 100 kg of the tops contain 1.5-1.7 kg of digested protein. By harvesting protein and fodder units, the tops of 1 ha of beet crops can yield as much as 1 ha of clover. The tops contain 5-6% of sugar as well as fats, vitamins, calcium, phosphorus, iron, copper, zinc, etc., which increase their fodder merits. The tops are fed to the cattle in a fresh or silageed form. 1 q of the tops contains 18 fodder units. In this case, the yield of fodder is 27 q/ha of fodder units, which is equivalent to the same number of oats or barley. In some cases, the tops may not be collected or fed to the cattle, in this case, they are scattered around the field as a fertilizer to maintain and increase soil fertility (The program of revival of the sugar industry of agriculture in the Zhambyl region "Sugar", 2001).

The yield of pulp when processing root crops is 70-80% of their total volume. At a 300 q/ha root crop yield, 210-240 q of pulp containing 7-8% of fodder units or 15.0 q of fodder units will be obtained. Pulp is a valuable food for livestock, almost equal to concentrated fodders.

Molasses is a by-product of refining beets obtained after removing crystallized sugar from the solution. The molasses yield is 4% or 12 q, which contain 8.4 q of fodder units at the rate of 70% (The program of revival of the sugar industry of agriculture in the Zhambyl region "Sugar", 2001). Molasses is the raw material for the production of lactic, citric and glutamic acids, food yeast, alcohol, glycerin, pectin glue and fodder.

In addition, the next by-product is defecation mud, which is widely used on farms. Defecation mud is a valuable fertilizer, containing lime, necessary for deoxidation of soils. Its application to beet in the norm of 16-25 tons/ha increases the yield of root crops by 2.5-3.5 tons/ha (The program of revival of the sugar industry., 2001).

Beet tailings and beet breakage are obtained during beet harvesting and when transporting it to sugar beet points. Beet tailings and beet breakage during mechanized harvesting, loading and laying of beets in the kagats constitute approximately 3.0% to the total weight of the whole beet. They contain 8-12%

(on average 10%) of sugar. Usually, these wastes are used for livestock feeding.

In general, the total yield of by-products of sugar beet from 1 ha only is more than 50 q of fodder units, which is equivalent to a yield from 3 ha of cereals. In the case of accounting for the cost of all products (main and by-products) of one hectare of sugar beet, it is equivalent to 20 hectares of grain crops (The program of revival of the sugar industry., 2001).

Thus, sugar beet is an economically advantageous crop in agriculture, and the directions of its use are very diverse. Sugar beet plays the role of sugar, fodder for livestock as well as fertilizer for maintaining soil fertility. With proper care, it successfully competes with crops and potatoes.

In Kazakhstan, for the first time, sugar beet was planted in the 90s of the 19th century, but beet cultivation for various reasons did not take root. In subsequent years, sugar beet cultivation in Kazakhstan begins to develop rapidly: not only beets but also beet seeds for beet-growing farms are grown. In 1936 all the farms of the republic were provided with seeds. In 1937 the average yield of beet farms reached a record - 451 q/ha. Before the beginning of the Great Patriotic War, the area of crops reached 14,500 hectares, the yield was 246 q/ha, and the gross yield was 357,000 tons. The republic's sugar industry fully provided for the population's needs for sugar and exported it to Siberia and the republics of Central Asia (Skugorev, 2003).

The next stage in the development of sugar beet production in the Republic of Kazakhstan fell on the Great Patriotic War. The government of the USSR set up a large sugar beet base in order to compensate for the losses of sugar beet production in Ukraine and Russia as well as to provide the army and the country with sugar. As a result of the measures taken, the area of beet sowing increased from 14,500 ha in 1941 to 46,400 ha in 1942, which made it possible to increase the gross yield by 2.5 times, thus increasing the production capacity of sugar factories and deepening the specialization of sugar beet farms.

After the war was ended, a new decision was made to reduce the beet crop in the republic, and in 1946 the area under cultivation for this crop was 18,000 ha. This decision was due to the need to create better organizational and technical conditions for beet cultivation, contributing to the effective use of land and water resources, by raising the level of agricultural technology, mechanizing production and reconstructing the country's irrigation system.

All the assigned tasks of sugar beet production during this period of time were fulfilled: specialized state farms were organized and existing irrigation networks were reconstructed. As a result, the beet crop areas again began to increase, new beet processing factories were built, and the production capacities of existing factories were expanded. In the middle of the 70s, the cultivation of sugar beet involved not only 145 collective farms and 58 state farms in Almaty and Zhambyl regions, but also the rural residents of South Kazakhstan, Kyzylorda, East Kazakhstan and Semipalatinsk regions. In the Republic of Kazakhstan, there were eight sugar factories with a total capacity of 22,500 tons per day. The operation duration of sugar factories on domestic raw materials was 125-150 days, and in some years, it reached 180 or more.

However, in the 80s on many farms of Kazakhstan the yield of sugar beet was reduced due to the impoverishment of the soil, the excessive phosphorus content and acute potassium deficiency, the non-observance of crop rotations, the low quality of seeds, the violation of cultivation technology, the low wages of sugar beet growers, etc. Therefore, on May 4, 1988, the Decree of the State Agroindustrial Committee of the Kazakh SSR adopted the "Comprehensive Program for Sugar Beet Cultivation and Sugar Production for the Period until 1995". This program was designed to improve the industry, i.e. to reduce beet crops to 40,000 hectares, to ensure a gross yield of up to 1,200 tons, to completely eliminate repeated crops, to master crop rotations, to apply fertilizers, and to strictly adhere to cultivation technology (Resolution No. 6 - COM of 4 May 1988).

In the first years after the adoption of the program, work on introducing beet crop rotations was somewhat intensified. Despite the decision taken to optimize the acreage in the early 90s, namely in 1990, crop areas were grown, yields were high and solid volumes of manufactured products were observed. The certain growth of crop areas was due not only to the activities of the adopted "Comprehensive Program", but also to the introduction of a new form of relationship between sugar beet producers and processors on tolling terms in 1989. Tolling mutual payments were made between sugar beet processors and agricultural producers of finished sugar products due to limited financial resources.

However, not all the measures envisaged for the improvement of sugar beet farming were fully implemented, and despite the growth of crop areas, the yield of this crop began to decline, which had an impact on the gross yield of sugar beet (Table 1).

Table 1. Indicators of sugar beet production in the Republic of Kazakhstan for 1990-1994

Years	Crop area, thousand ha	Yield, q/ha	Production, thousand tons
1990	43,6	239	1043,7
1991	45,6	159	673,8
1992	85,1	150	1160,1
1993	68,6	123	842,7
1994	56,2	77	432,7

*Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

During this period, crop areas increased from 43.6 thousand ha in 1990 to 85.1 thousand ha in 1992. Then there was a decline to 56.2 thousand ha in 1994. During this period, the yield of beet reduced from 239 q/ha to 77 q/ha (Figure 1).

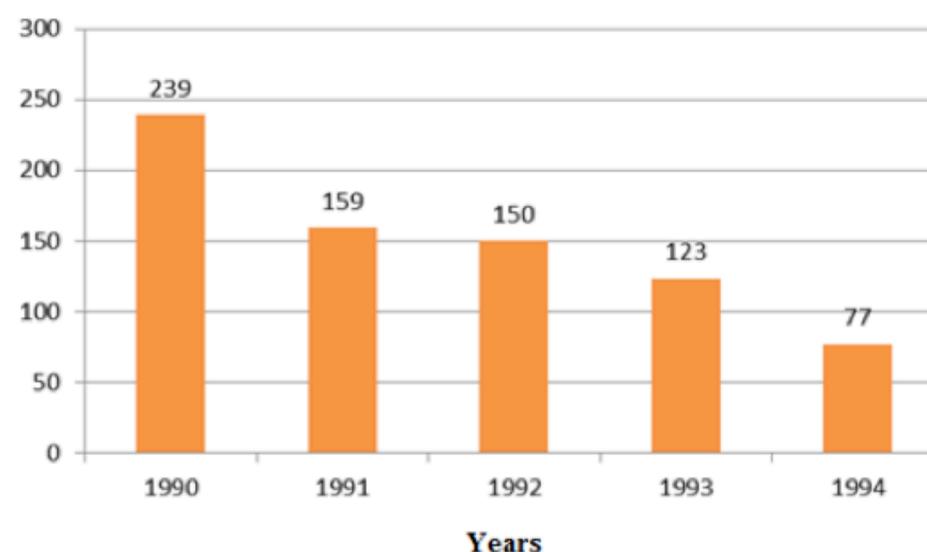


Figure 1. Sugar beet yield, q/ha

Due to lower yields, the volume of the gross yield of beet also decreased from 1043.7 to 432.7 thousand tons. A large number of factors affected the decline in the yield of sugar beet. This included natural and climatic conditions, the availability of agricultural equipment in economic entities, the possibility of

purchasing mineral fertilizers, fuels and lubricants, a seed fund, the availability of qualified personnel, etc.

Therefore, during this period the average age of the stock of tractors and combines in the Republic of Kazakhstan was 13-14 years with a standard operating life of 7-10 years. The coefficient of technical readiness, available equipment did not exceed 0.7, and the load per unit of equipment exceeded the standard by 1.2-1.6 times. In general, the wear and tear of the machine and tractor fleet was 80% and required a complete replacement. From 1994 to 1999, agriculture practically did not receive new equipment (Resolution No. 6 - COM of 4 May 1988).

The yield of sugar beet is also greatly affected by crop rotations. Crop rotations contribute to the control of pests, diseases and weeds as well as the accumulation of moisture and nutrients in the soil. The correct alternation of crops usually within four years between beet crops makes it possible to increase output from a unit area and reduce its cost. However, during this period beets were sown in a haphazard manner and in most cases without observance of crop rotations. In this case, the practice of permanent sugar beet cultivation for three years reduces its yield by 60-90 q/ha, and during eight years - by 270-360 q/ha (Myrzaliyev, 1986).

In order to obtain a high yield, there is a need for a constant restoration of soil fertility, which is impossible without the introduction of mineral and organic fertilizers (Karnichenko and Pasov, 2001; Sladkikh and Karasev, 2002). For sugar beet, depending on preceding crops and soil type, it is necessary to introduce nitrogen fertilizers (ammonium nitrate or urea) in the amount of 100-120 kg/ha, phosphorus fertilizers (ammonium phosphate, nitroammophos, superphosphate) - 50-60 kg/ha, and potash fertilizers (potassium sulfate) - 100-150 kg/ha. Therefore, according to the research of Zhambyl Agricultural Experimental Station, for the sugar beet yield in the Zhambyl region in the amount of 450-500 q/ha with the corresponding yield of tops, it is necessary to add the following doses of mineral fertilizers for serozem soils with a low NPK supply: 200-220 kg/ha of nitrogen, 180-190 kg/ha of phosphorus, and 110-120 kg/ha of potassium. In the case of an average NPK supply, it is recommended to add 200-220 kg/ha of nitrogen, 150-170 kg/ha of phosphorus, and 80-90 kg/ha of potassium. With a high NPK supply, it is necessary to add 200-220 kg/ha of nitrogen, 150-170 kg/ha of phosphorus, and 60-70 kg/ha of potassium (Nalivayko, 2002). In turn, the introduction of 40 tons of manure per 1 ha of crop area provides 127 to 206 q/ha of additional beet yield, depending on soil types.

In these years, there is a reduction in not only crop areas under which fertilizers were introduced, but also in their quantity per hectare. In 1995, 1 ha of sugar beet crops were supplied with mineral fertilizers (per 100% of nutrients) – 36 kg, organic fertilizers - 0.5 kg, which is much lower than the normative doses of fertilizers (Kovalev, 1997).

The next factor in the growth of crop yields of 30-50% is precisely the share of varieties and the quality of seeds. The Taldykorgan's Branch of the V.R. Williams Scientific and Research Institute of Agriculture of the Republic of Kazakhstan and "Kamkorlyk" LLP in the Almaty region produced elite sugar beet seeds, but in small quantities, due to the weak material and technical base. Economic entities mainly planted their fields with substandard seeds of this crop.

The next stage in the development of sugar beet production was marked by the transition of the administrative-command system to the market system of the economy, connected primarily with the reform of relations to property. The state adopted a number of laws and various regulatory and legislative acts, where the fundamentals of property reform and the main ways of their realization were determined (Law of the Republic of Kazakhstan "On the Peculiarities of Privatization...", 1992; Decree of the President of the Republic of Kazakhstan "On Urgent Measures for Privatization of the Property of State Procurement...", 1992; The Program of Denationalization and Privatization of State Property., 1991; Decree of the President of the Republic of Kazakhstan "On the National Program of Denationalization and Privatization...", 1993; Changes and additions to the current Law "On the Peculiarities of Privatization...", 1993).

The denationalization of the agrarian sector was carried out in the context of wholesale inflation and rising prices, which sharply worsened the economic condition of agricultural producers. Instead of the dissolved collective and state farms, various types of agricultural enterprises and peasant (farm) businesses were formed. As of April 1, 1997, there were 51,885 economic entities operating in the country's agriculture, including 47,393 peasant farms, 991 business associations, 2,614 production teams, 399 joint-stock companies, 120 various associations, 95 state enterprises, and 273 enterprises, whose status did not match the Civil Code (collective enterprises, collective farms and others) (Bimendiyeva, 1998). Among all economic entities, peasant (farm) businesses occupied the largest share – 91.3%.

It should be noted that almost all peasant (farm) businesses had a weak material and technical base, and the lack of funds did not allow them to fully comply with modern technologies for growing sugar beet. Naturally, this affected the production of beets.

Consider the changes in this industry over the next ten years 1995-2004 (Table 2).

Table 2. Indicators of sugar beet production in the Republic of Kazakhstan for 1995-2004

Years	Crop area, thousand ha	Yield, q/ha	Production, thousand tons
1995	40,8	91	371
1996	32,4	105	141
1997	13,5	116	128
1998	17,6	143	225
1999	19,0	177	294
2000	22,5	154	272,7
2001	19,9	173	283
2002	19,8	207	372,2
2003	22,2	210	423,6
2004	22,3	197	397,8

*Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

During the considered period, sugar beet farms experienced a very difficult and complex period. Thus, the analysis of the economy of sugar beet production in the Republic of Kazakhstan for 1995-2004 showed that beet crop areas decreased from 40.8 to 22.3 thousand ha or by 45.7%. However, the yield of beet here increased from 91.0 to 197 q/ha and, accordingly, the gross yield increased from 371 to 397.8 thousand tons. At the same time, it should be noted that during this period there were sharp changes in crop areas, crop yields and gross harvest. Since 1998, the Republic of Kazakhstan has been showing a tendency for a relative increase in crop areas from 17,600 ha to 22,300 ha in 2004, in yields – from 143 q/ha to 197 q/ha in 2004, which in turn affected the growth of the production of this crop from 225.0 to 397.8 thousand tons or by 76.8%. It should be noted that the sharpest changes during this period involved crop areas (Figure 2).

If in 1990 the production of sugar beets was carried out only by state and collective farms, then, since 1995, along with these enterprises, other farms have started to produce sugar beets, namely, agricultural enterprises, peasant farms and households.

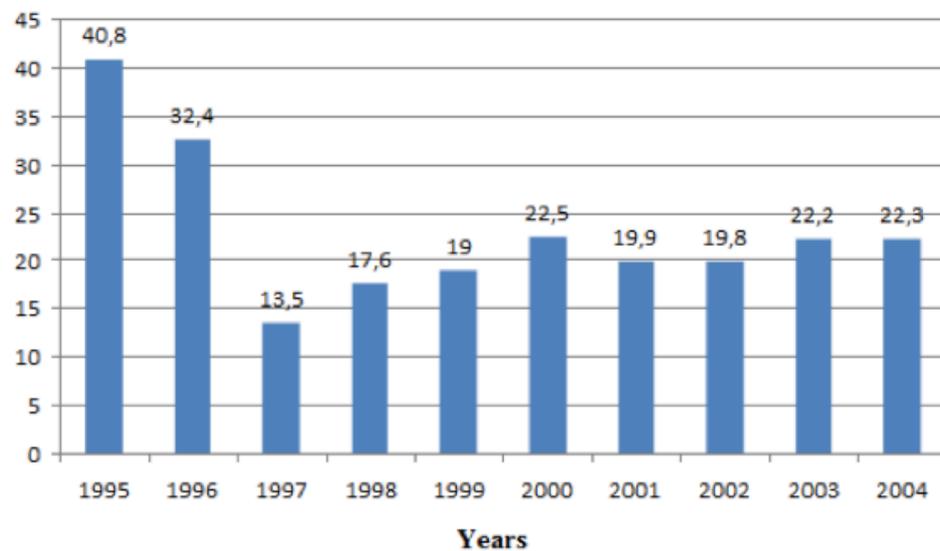


Figure 2. Sugar beet crop areas, thousand ha

In 1995, agricultural enterprises accounted for 89.7% of crop area, peasant farms – for 10%, households – for 0.3%. In 2000, when the country observed an expansion of sugar beet crops to 22.5 thousand ha, there was a change in this share in favor of peasant farms. The share of peasant farms accounted for 52% of cultivated crop area, agricultural enterprises – for 39.6% and households – for 8.4%. This ratio persisted in 2002, when the share of peasant farms accounted for 63.1% of crop area, agricultural enterprises – for 29.8%, and households – for 7.1%. In 2003, the share of peasant farms increased even further to 64.9% of those engaged in sugar beet cultivation, and the share of agricultural enterprises grew to 31.0%. This trend persisted in 2004: 68.6% of peasant farms, 26.0% of agricultural enterprises, and 5.4% of households. Thus, during this period, among all the country's agro-formations, a steady growth of crop areas under sugar beets was peculiar to peasant farms – 1.4 times, and to households – 3.0 times, compared with 1997, when there was a sharp reduction in the acreage for this crop.

It should be noted that during this period there was a decrease in the efficiency of sugar beet production in the republic, which is estimated by the sugar content of root crops, the prime cost of 1 ton of sold products, the selling price in the domestic market per 1 ton, the profitability of production and the production of sugar beet per capita (Table 3).

Table 3. Efficiency of sugar beet production in agricultural enterprises in the Republic of Kazakhstan for 1995-2004

Years	Prime cost of 1 ton of sold products, tenge	Selling price in the domestic market per 1 ton, tenge	Level of profitability from the sale of products, %	Production of sugar beet per capita, kg
1995	3600	2934	-18,5	23,7
1996	7560	4991	-58,3	22,0
1997	5970	2991	-49,9	8,4
1998	4120	3041	-26,2	15,0
1999	2490	2542	2,1	19,7
2000	5280	4400	-20,0	18,4
2001	4150	4059	-2,2	19,1
2002	4370	4563	4,4	25,0
2003	3660	4077	11,4	28,5
2004	3080	2932	-4,8	26,6

*Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Table 3 shows that the high costs of growing sugar beet at current sales prices make it low-profit or loss-making. Therefore, in the considered period sugar beet production was profitable only in 1999, 2002 and 2003. In 1998, i.e. at the end of reforms in agriculture, losses from sugar beet sales in agricultural enterprises only reached 28.4 million tons, and a loss ratio was 26.2%. During this period, the quality of sugar beet also decreased. The lowest sugar content of root crops was 13.43% and the highest – 14.7%. The production of sugar beet per capita increased from 23.7 to 26.6 kg, or by 12.2%.

In the next decade, the indicators of beet farms also continued to decline (Table 4).

Table 4. Indicators of sugar beet production in the Republic of Kazakhstan for 2005-2014

Years	Crop area, thousand ha	Yield, q/ha	Production, thousand tons
2005	17,5	209,2	310,8
2006	14,4	240,8	339
2007	13,7	248,9	309,4
2008	13,1	201,3	130,2
2009	10,6	182,9	181,3

2010	11,2	174,3	152,0
2011	18,2	188,2	200,4
2012	11,8	168,2	151,6
2013	2,7	267,7	64,6
2014	1,2	240,6	23,9

*Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

Therefore, crop area decreased from 17.5 to 1.2 thousand ha, or by 16.3 thousand ha. Despite a certain increase in the yield of sugar beet, its gross yield reduced from 310.8 to 23.9 thousand tons, or by 13.4 times.

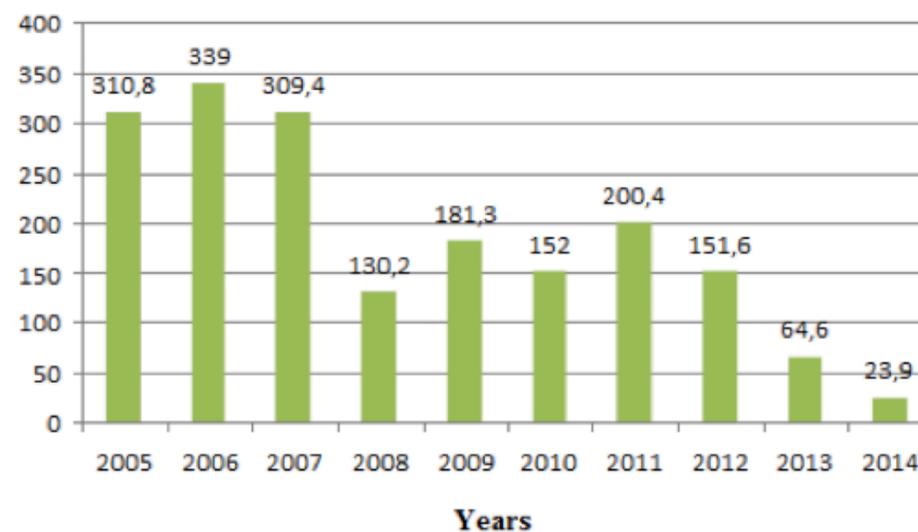


Figure 3. Gross yield of sugar beet, thousand tons

During this period, the production of sugar beet was mainly carried out by peasant farms. In 2005, the gross yield of sugar beet by agricultural enterprises was 26.9% of the total volume, the share of peasant farms was 68.9% and that of households – 4.2%. In 2014, peasant farms also accounted for the largest share in the gross yield of sugar beet. During this period, the efficiency of production of this crop also desired better. The cost of producing 1 ton of sugar beet exceeded the purchase prices for which it was accepted by processing enterprises. During this period, the production of this crop was also unprofitable. The production of sugar beet per capita decreased from 20.42 kg in 2005 to 1.37 kg in 2014.

Thus, the same reasons as in the previous decade influenced the decline in the acreage, the yield of sugar beet and, on this basis, the decline in the production of this crop. These reasons included the violation of the sugar beet cultivation technology, the lack of qualified personnel, the poor quality of seeds, the weak material and technical base of most peasant farms, the insufficient application of mineral and organic fertilizers, the failure to observe crop rotations, the lack of financial resources to purchase the necessary fuels and lubricants for spring field and harvest works and, most importantly, the transition of most sugar factories of the republic to the processing of sugar cane.

All this was against the backdrop of various programs, adopted to revive the sugar beet industry, and active subsidization of the given technical culture by the Government of the country. The subsidization of sugar beet was carried out for a hectare of its sowing, the purchase of mineral fertilizers, herbicides and other fertilizers, the reduction of water costs for irrigation, the development of seed production, the reduction in the cost of fuels and lubricants and other goods and materials, the reduction in the cost of cultivation of this crop in greenhouses as well as the compensation for the interest rate on leasing of agricultural equipment and support in the field of insurance. For example, in the Zhambyl region in 2014, the sugar beet subsidy per hectare was 30,000 tenge, and with the use of drip irrigation - 50,000 tenge.

Thus, the activities of beet farms during the period from 1990 to 2014 are characterized by the following negative trends:

- reduction of crop area by 36.3 times;
- reduction of the yield and gross harvest of this crop by 43.7 times;
- reduction of the sugar content of root crops and sugar yield;
- large expenditures on the cultivation of sugar beet, which, in turn, contributes to loss-making or low profitability of production;
- low purchase prices of sugar beet within 5-6 tenge.

This situation was due to the following reasons:

- absence and insufficient amount of financial resources, especially in spring field and harvest work;
- physical and moral deterioration of agricultural machinery, which does not allow performing all operations for cultivating and harvesting crops with minimal losses. In this case, up to 40% of the crop losses are observed;
- severe conditions for the acquisition of equipment in leasing;
- backwardness of agricultural technologies for improving soil fertility and protecting the land from the negative consequences of the production process;
- a sharp increase in prices of mineral fertilizers and plant protection products;
- small production (an average area of farms – about 9 ha), which does not allow for effective irrigation, the full use of mechanization means and chemicals; complicates the introduction of crop rotations, the absence of which depletes the land;
- deficiency of qualified agronomists, livestock specialists, machine operators and other specialists.

In the first years of Kazakhstan's independence, 8 factories were engaged in the production of sugar. They were built and commissioned in Soviet times. The capacity of all operating factories for processing sugar beets was 22,500 tons, and the capacity for processing raw sugar by these factories was 3,200 tons per day. Currently, six sugar factories since 2011 have been owned by the only sugar producer "Central Asian Sugar Corporation" LLP (CASC). Four of them – Taraz, Koksus, Eskeldinsky and Merkensky – are still working, and the enterprises of Alakol and Burunda sugar factories closed down. Since 2008, two factories – Aksu-Sheker and Investment Management LTD (Chui Sugar Factory) – have stopped working. The capacities of sugar factories have also undergone significant changes.

The dynamics of production and the structure of sugar as a whole in the Republic of Kazakhstan are shown in Table 5. The table shows that during the base year, sugar production in the republic was 319.1 thousand tons, including 87.8 thousand tons of sugar and 231.3 thousand tons of raw sugar produced from sugar beet. However, in 2014 sugar production increased to the level of 345.3 thousand tons, including 3.9 thousand tons of sugar and 341.4 thousand tons of raw sugar from beet only. Thus, in the country, the share of sugar from imported raw materials increased by 26.4% and reached 98.9% of the total. In

turn, the share of sugar from beet reduced from 27.5 to 1.1% (Figure 4, 5).

Table 5. Dynamics of indicators of the sugar industry in Kazakhstan

Indicators	Years													Change rate, in % or (+, -)
	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
1. Production of sugar, thousand tons, including	319,1	96,6	279,7	528,8	472,3	369,1	476,7	356,0	341,1	250,4	148,9	328,1	345,3	108,2
- from sugar beet	87,8	29,6	21	27,3	34,0	27,1	17,9	22,6	19,6	25,5	16,6	5,8	3,9	4,4
- from raw sugar	231,3	67,0	258,7	501,5	438,3	342,0	458,8	333,4	321,5	224,9	132,3	322,3	341,4	147,6
2. The share of produced sugar, %	100	100	100	100	100	100	100	100	100	100	100	100	100	-
- from sugar beet	27,5	30,6	7,5	5,2	7,2	7,3	3,8	6,3	5,7	10,2	11,2	1,8	1,1	- 26,4
- from raw sugar	72,5	69,4	92,5	94,8	92,8	92,7	96,2	93,7	94,3	89,8	88,8	98,2	98,9	+26,4
3. Production of white sugar, per capita kg, including	19,0	5,8	18,8	34,7	30,7	23,7	29,8	22,0	20,7	15,0	8,8	19,1	19,8	104,2
- from sugar beet	5,2	1,8	1,4	1,8	2,2	1,7	1,1	1,4	1,2	1,5	1,0	0,3	0,2	3,8
- from raw sugar	13,7	4,0	17,4	32,9	28,5	22,0	28,7	20,6	19,5	13,5	7,8	18,8	19,6	143,1

*Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

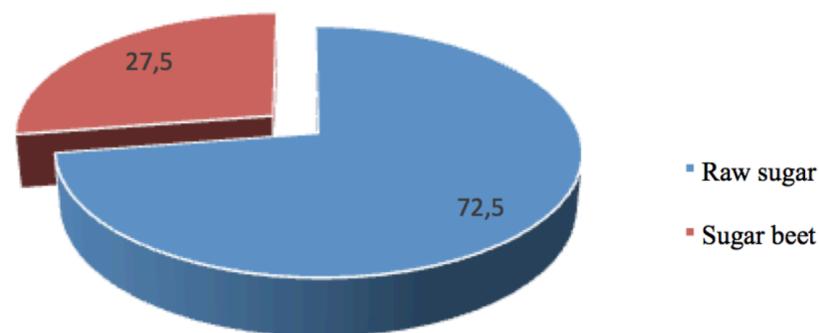


Figure 4. The share of sugar produced from raw sugar and beets in 1990, %

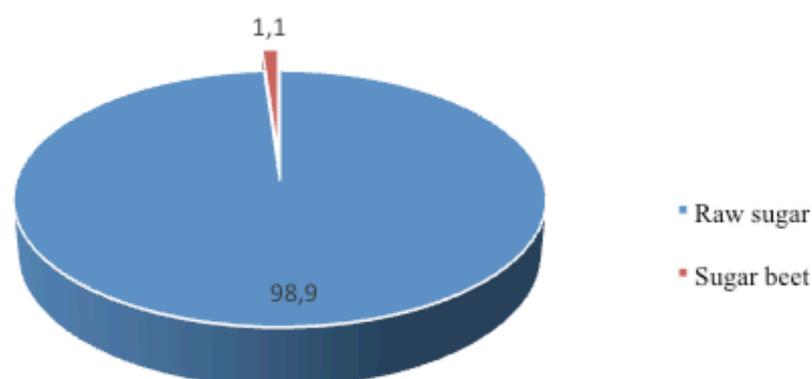


Figure 5. The share of sugar produced from raw sugar and beets in 2014, %

In general, the production of sugar per capita in the republic increased by 0.8 kg, or 4.2%, while the production of sugar from sugar beet decreased by

96.2% compared to the base period, and from raw sugar – increased by 43.1%. This characterizes Kazakhstan's dependence on imported raw materials. Currently, the amount of sugar produced is not sufficient to meet the needs of the population for this product. According to the Association of Beet and Sugar Producers of Kazakhstan, the annual consumption of sugar in the republic is 450-500 thousand tons, which is respectively provided by imported white sugar from the countries of the Customs Union and other countries (Table 6). The maximum volume of sugar consumption in the country was in 2005, then it fell to the level of 401.6 thousand tons in 2009 and since 2012 it has been growing again to the level of 472.6 thousand tons. Despite the existing increase in consumed sugar over the considered period, the volume of sugar consumed decreased by 15.7%. This, in turn, had an impact on sugar consumption per capita. This figure in the country has decreased from 33.6 to 27.2 kg, or 18.7%. In addition, there is a decrease in such an indicator as the consumption of imported white sugar from 14.7 to 7.5 kg. It should be noted that along with the consumption of sugar from domestic raw materials, the highest share falls on sugar from imported raw materials and imported sugar (Figure 6, 7).

Table 6. Dynamics of indicators of the sugar industry in Kazakhstan

Indicators	Years													Change rate, in %
	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
1. Consumption of sugar, thous. tons	565,0	300,2	312,0	920,3	510,4	483,8	580,6	401,6	572,4	487,0	390,0	475,0	476,2	84,3
2. Consumption of sugar per capita, kg including	33,6	18,1	21,0	60,5	33,1	33,1	36,3	24,8	34,8	29,2	23,1	26,7	27,3	81,3
- import of white sugar	14,7	12,3	2,2	25,8	2,4	9,4	6,5	2,8	14,1	14,2	14,3	7,6	7,5	51,0
3. Import of white sugar, thous. tons	245,4	197,8	161,6	593,8	77,5	148,2	65,6	57,9	106,6	183,7	267,0	107,8	164,8	67,2
4. Export of white sugar, thous. tons	-	10,1	7,8	142,7	71,2	33,3	17,2	2,3	13,2	6,6	2,2	14,3	2,5	by 1995 24,8
4. Average retail prices of sugar, tenge	-	55	80,0	92,0	106,0	106,0	120,0	170,0	191,0	158,0	152,0	146	172	by 1995 312,7

*Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan

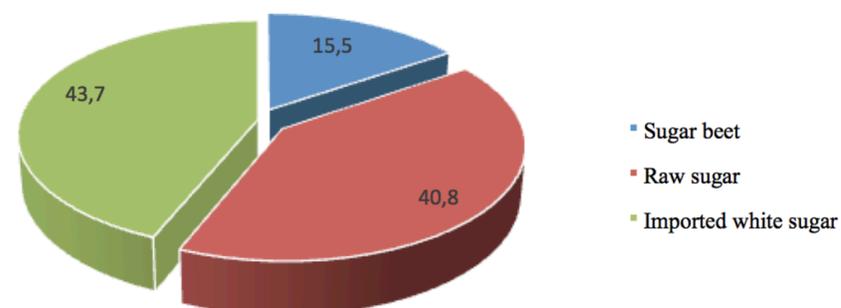


Figure 6. Consumption of sugar per capita in 1990

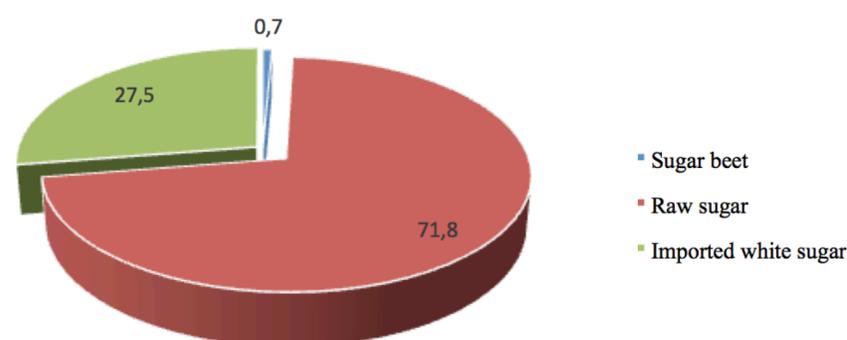


Figure 7. Consumption of sugar per capita in 2014

In 1990, the consumption of sugar per capita from domestic raw materials was 15.5%, from raw materials - 40.8% and imports of white sugar – 43.7%, i.e. the total share of imports was 84.5%, then in 2014 it increased by 14.8% and reached the level of 99.3%.

During the considered period, Kazakhstan imported white sugar annually. Basically, sugar is imported from Russia, Belarus, Ukraine, Romania, Poland, Azerbaijan, etc. In 2015, the main supplier of white sugar to the country was Moldova, which imported 32.1 thousand tons or 33.4% of the total imported white sugar, then Belarus - 18.8 thousand tons or 19.6%, Poland - 15 thousand tons or 15.6% and the Czech Republic - 11.6 thousand tons or 12.1%.

Domestic sugar is exported mainly to Kyrgyzstan, Tajikistan, Uzbekistan, China, Mongolia, etc. The volume of exported sugar is insignificant, except for its value in 2005. The share of exports in total sugar produced varies from 27.0% in 2005 to 0.6% in 2009.

The use of expensive foreign raw sugar, despite the zero duties and high expenses for its delivery, led to an increase in wholesale and retail prices of sugar in the republic, which in 2009-2010 reached a maximum of 190-200 tenge per one kilogram of sugar. In addition, the cost of sugar is significantly influenced by domestic producers of sugar, in which more than 50% of existing equipment requires modernization. The high price of sugar is also affected by the value-

added tax. In Kazakhstan, it is 12.0%, in Russia - 10.0%. Furthermore, there are high bank interest and energy costs. Subsequently, in 2011-2012, in connection with a decrease in the share of expensive imported raw sugar and an increase in the volumes of cheap sugar from the countries of the Customs Union, retail prices of sugar were reduced in the republic to 140-150 tenge. In 2014, the average price of sugar in the country was 172 tenge/kg. According to experts, it is not the limit of its growth. The report of the International Sugar Organization noted that Kazakhstan by 2020 will still need import supplies of sugar from the countries of the world market, as far as domestic production will not be able to satisfy the internal need.

The government of the country took and is taking a number of measures to revive sugar beet, to supply domestic raw materials to processing enterprises and, on this basis, to achieve the country's self-provision with sugar of domestic production. For this purpose, the relevant program documents and regulations have been developed and adopted, providing for the development of this branch of the economy (Master plan "Development of the Processing Industry...", 2013; Decree No. 575 of the Government of the Republic of Kazakhstan of May 29, 2014).

Master plan for the development of the processing industry provides for the modernization and reconstruction of sugar factories, providing them with working capital. For this, the following mechanisms will be applied until 2020:

- investment subsidies for equipment and machinery in the amount of 30% of the total project cost; 460 thousand tenge will be allocated;
- subsidization of the interest rate for loan and/or leasing for the acquisition of necessary equipment and machinery, replenishment of working capital up to 7% per annum with a loan term of up to 7 years (an average rate for 7 years – 24.5%). The total amount of allocated funds is 4613909.5 thousand tenge;
- subsidization of the costs of sugar factories for the purchase of sugar beet for the production of white sugar in the amount of 8,133,000 tenge;
- financial rehabilitation of enterprises will be carried out through restructuring, refinancing of credit/creditor obligations of borrowers used to replenish working capital and purchase fixed assets, including construction and installation works, as well as leasing obligations (purchase of agricultural and special equipment, technological equipment) in the form of subsidizing interest rates. The total amount is 784 thousand tenge (Master plan "Development of the Processing Industry...", 2013).

During the considered period, agricultural producers of sugar beet also have the following government support measures:

1. Subsidies for carrying out spring field and harvest works in the amount of 50% following the results of the sowing company per 1 ha and 50% per 1 ton of sugar beet sold or commissioned for processing to the sugar factory;
2. Subsidization of seed examination;
3. Subsidization of the cheapening of the cost of elite seeds to 40%;
4. Reduction in the cost of fertilizers and herbicides to 50% (domestic) and up to 30% (imported);
5. Subsidization of the interest rate on leasing of agricultural machinery (to 7% of 14%);
6. Subsidization of the cheapening of irrigation water from 20% to 90% (depending on the method of irrigation);
7. Concessional lending for the creation and modernization of production facilities, leasing of agricultural machinery and replenishment of working capital through subsidiaries of Holding KazAgro JSC (Analytical review of the sugar market, 2014).

It should be noted that in 2014 there was a "hectare subsidy" for priority crops of plant growing, including sugar beet, but in 2016 it was abolished as inefficient, which did not provide a corresponding increase in the gross volume of crop production.

Thus, the implementation of the above measures of state support for the cultivation of sugar beet and its processing will allow the republic to revive the production of domestic sugar.

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