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Development Dynamics and Structural Changes in the Agriculture of Toyloq District, Samarkand Region

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Abstract: This article examines the role of Toyloq district in the agriculture of Samarkand region in 2010–2025 on the basis of statistical data on the production of ten food products. The district's share in regional output, growth rates relative to 2010, and a specialization coefficient were calculated. The results show a shift in the district's agricultural specialization from crop production toward livestock: between 2010 and 2025 its share of regional potato output fell from 24.4% to 12.8%, vegetables from 10.1% to 6.6% and grapes from 10.7% to 6.6%, whereas its share of meat rose from 6.5% to 12.4% and that of eggs from 2.5% to 5.1%. In 2025, potatoes and meat were the only products with a specialization coefficient above 1 (1.73 and 1.67). The sharpest structural change occurred in 2016–2019, and output of vegetables, grapes, melons and gourds, milk and eggs has not returned to its earlier peak levels. The statistical data do not explain the causes of these changes, which require separate study. The article outlines practical directions for developing the sector.

Keywords: Samarkand region; Toyloq district; agriculture; regional specialization; specialization coefficient; crop production; livestock; statistical analysis

Introduction

Agriculture is one of the key sectors of Uzbekistan's economy. It supplies the population with food and industry with raw materials and provides employment in rural areas. The country pays particular attention to modernizing the sector, using land and water resources efficiently, and increasing production. Samarkand region has well-developed arable farming, horticulture, viticulture, vegetable growing and livestock breeding, which makes it important to study the region's agricultural sector at the level of individual districts.

The aim of this article is to assess the role of Toyloq district in the agriculture of Samarkand region in 2010–2025 on the basis of production volumes of ten food products, and to outline directions for developing the sector. The study asks how the district's agricultural specialization has changed over time.

Background and Study Area

Toyloq district occupies a distinctive place in the agriculture of Samarkand region. The district covers about 280 km² [3] and in 2025 accounted for 7.4% of the region's agricultural, forestry and fishery output [2]. It is located close to the city of Samarkand, which gives it access to a large consumer market for perishable products such as vegetables, fruit, milk and meat and reduces transport costs. It is therefore worth examining, on the basis of statistical data, how the district's agricultural specialization has changed over time.

Methodology

The analysis uses a statistical table of production volumes (in tonnes) of ten food products — cereals, potatoes, vegetables, melons and gourds, fruit, grapes, meat, milk, eggs and fish — for Toyloq district and Samarkand region in 2010–2025 [1]. Three indicators were calculated: (1) the district's share in regional production (%); (2) the growth rate, defined as the 2025 volume divided by the 2010 volume (expressed as a multiple); and (3) the specialization coefficient, defined as the district's share in regional production of a product divided by the district's overall share in regional agricultural output

(7.4% in 2025). A coefficient above 1 indicates that the district specializes in the product more strongly than the region as a whole. Changes in shares are expressed in percentage points (pp). The analysis is descriptive: it identifies changes in volumes and shares but does not test their causes. All indicators were calculated by the author from the data in [1].

Results

Growth Rates Compared with the Region

The growth rates of the district and the region in 2010–2025 were compared first. The district developed much faster than the region in egg and meat production: egg output increased 4.80-fold (2.40-fold in the region) and meat output 3.59-fold (1.87-fold in the region). For all other products the district's growth was lower than the region's, and the difference is largest for potatoes (1.09-fold versus 2.07-fold) and vegetables (1.01-fold versus 1.55-fold). Fish production was not included in this comparison because its volume is very small. These differences are examined product by product below.

Crop Production

Among crop products, cereal output rose from 30.4 to 33.7 thousand tonnes (1.11-fold), while regional output grew 1.16-fold; as a result, the district's share declined slightly, from 3.8% to 3.6%. Potatoes remain the district's most important product: output increased from 90.7 to 98.4 thousand tonnes (1.09-fold) and reached its highest value in 2025. However, because regional potato production grew 2.07-fold, the district's share fell from 24.4% to 12.8%, a decline of 11.6 percentage points (pp). Thus, although potato output increased, the district's position within the region weakened.

The situation is different for vegetables, grapes, fruit, and melons and gourds. Vegetable output rose from 106.3 to 174.6 thousand tonnes in 2010–2014, reaching its peak in 2014, then fell to 92.0 thousand tonnes by 2019 and stood at 107.3 thousand tonnes in 2025. This is only 1.01 times the 2010 level (1.55 times in the region), so the district's share fell from 10.1% to 6.6%. Grapes show a similar pattern: output reached 62.9 thousand tonnes in 2014, dropped to 33.4 thousand tonnes in 2019 and amounted to 45.0 thousand tonnes in 2025, while the share declined from 10.7% to 6.6%. Fruit production grew from 20.1 to 30.4 thousand tonnes (1.51-fold) and peaked in 2025, but because regional growth was faster (1.79-fold), the share declined from 8.7% to 7.3%. Output of melons and gourds increased from 1.6 to 3.8 thousand tonnes but remained well below the 7.3 thousand tonnes recorded in 2014; its share in 2025 was 2.2%.

Livestock Production

In contrast to crop production, the district's share has increased in livestock products. Meat production grew from 11.6 to 41.7 thousand tonnes, and the district's share rose from 6.5% to 12.4% (by 5.9 pp). Egg output increased from 14.7 to 70.5 thousand tonnes, and the share rose from 2.5% to 5.1%. Milk production grew from 50.9 to 93.8 thousand tonnes (1.84-fold), but because regional growth was faster (1.99-fold), the share declined from 6.7% to 6.2%; milk output had reached 98.4 thousand tonnes in 2020. Fish farming is of little importance to the district: 104 tonnes were produced in 2025 and the district's share fell from 3.7% to 0.5%, while regional fish output increased 253.6-fold over the period.

Specialization in 2025

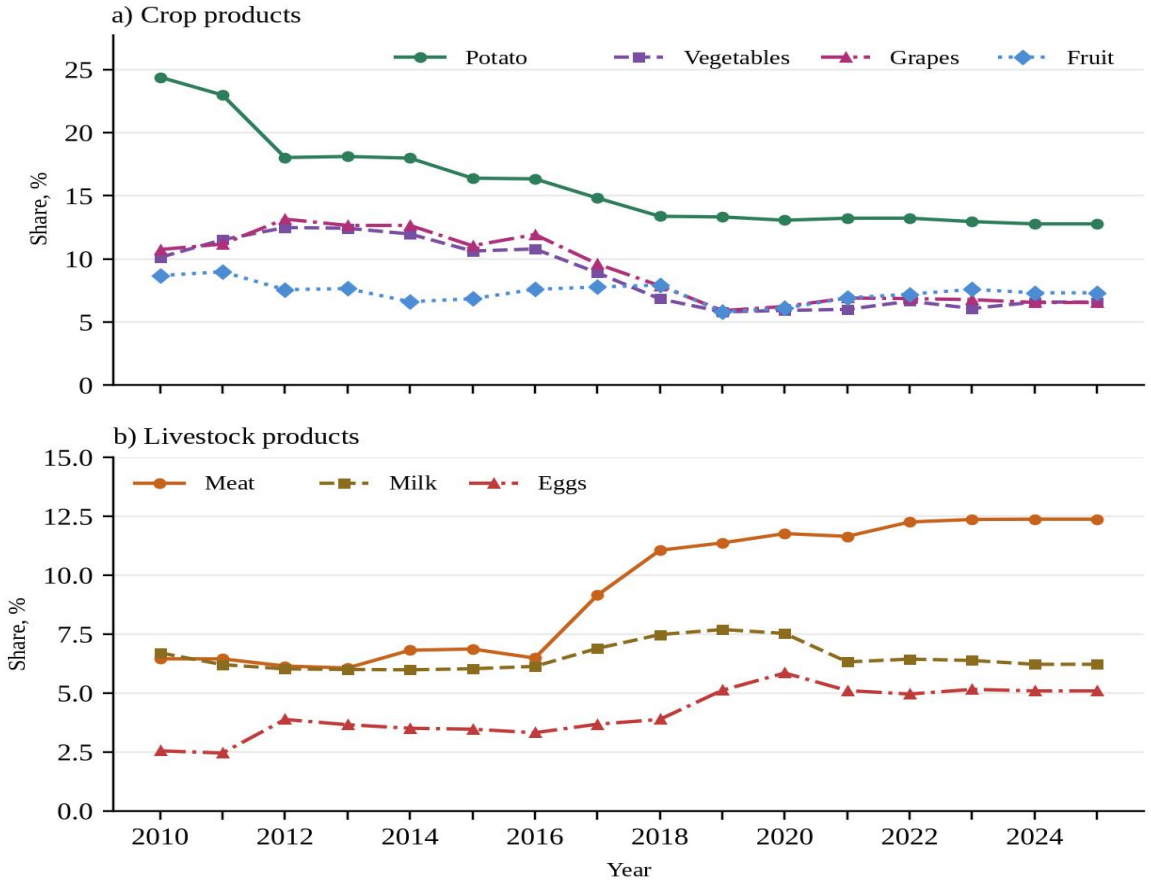
When the 2025 shares are compared across products, the district's share in regional output is highest for potatoes (12.8%) and meat (12.4%) and considerably exceeds its overall share (7.4%). Accordingly, the specialization coefficient for these two products is 1.73 and 1.67. For the other products the coefficient is below 1: 0.99 for fruit (almost equal to the overall share), 0.89 for vegetables and grapes, 0.84 for milk, 0.69 for eggs, 0.49 for cereals, 0.29 for melons and gourds, and 0.07 for fish. The district is thus specialized only in potatoes and meat, while fruit production is at the regional average.

Changes in Specialization over Time

Changes in specialization over time are shown in Figure 1. In crop production the district's share declined steadily: for potatoes, from 24.4% in 2010 to 13.4% in 2018, after which it stabilized at around 12.8%. The shares of vegetables and grapes peaked in 2012 (12.5% and 13.2%, respectively), fell to 5.8–5.9% in 2019 and have since remained at about 6–7%. In livestock production the trend is the opposite: the share of meat stayed at around 6–7% until 2016, jumped from 9.2% to 11.4% in 2017–2019 and has remained at 12.4% since 2023; the share of eggs increased from 3.9% to 5.9% in 2018–2020; and the share of milk reached 7.7% in 2019 and then declined to 6.2%.

Figure 1

Toyloq district's share in regional production, 2010–2025, %



Note. Source: author's calculations based on [1].

Figure 1 shows that the sharpest changes occurred in 2016–2019. During this period vegetable output in the district declined from 171.3 to 92.0 thousand tonnes (by about 46%), while meat output rose from 13.7 to 33.8 thousand tonnes, milk from 58.7 to 98.1 thousand tonnes and eggs from 26.7 to 69.4 thousand tonnes. This indicates a fundamental shift in the structure of the district's agriculture. The statistical data do not explain its causes; factors such as changes in the structure of cultivated areas and land use, the specialization of farms and market conditions need to be studied separately.

Peak Levels Compared with 2025

To summarize the results by product, Table 1 compares the highest recorded output of each product with its 2025 volume. For potatoes, fruit, meat and fish, 2025 is the peak year. Vegetables (61.5% of the peak), melons and gourds (51.7%) and grapes (71.5%) have not returned to their 2014

peaks, and cereal output in 2025 was 89.7% of its 2015 peak. For milk and eggs, the 2025 volume is about 5% below the 2020 peak.

Table 1

Peak output and 2025 output of products in Toyloq district

Product	Peak year	Peak volume, t	2025 volume, t	2025 as % of peak
Cereals	2015	37,577	33,704	89.7
Potatoes	2025	98,415	98,415	100.0
Vegetables	2014	174,584	107,339	61.5
Melons and gourds	2014	7,341	3,797	51.7
Fruit	2025	30,384	30,384	100.0
Grapes	2014	62,938	45,010	71.5
Meat	2025	41,695	41,695	100.0
Milk	2020	98,439	93,827	95.3
Eggs	2020	74,158	70,545	95.1
Fish	2025	104	104	100.0

Note. Source: author's calculations based on [1]. Volumes are in tonnes.

Discussion

Table 1 and the preceding analysis point to three main problems. First, output of vegetables, grapes and melons and gourds has not returned to its 2014 level, and the district's share in regional production has declined. Second, milk and egg production has not grown since 2020. Third, although potato output has increased, regional growth was faster, so the district's share fell from 24.4% to 12.8%. The following directions are suggested in response to these problems. They are based on the analysis of statistical data, and assessing their effectiveness requires further research.

Restoring vegetable, grape and melon production. Because output has declined in these sectors, it is advisable to introduce water-saving (drip) irrigation, to place crops according to soil and water availability, and to use high-yielding varieties.

Storage and processing. Because the volumes of potatoes, vegetables, fruit and grapes are large, expanding refrigerated storage and sorting and packing facilities would reduce post-harvest losses. The proximity of Samarkand also eases the marketing of produce.

Sustainable development of livestock production. To maintain the position reached in meat production and to raise milk and egg output above their 2020 levels, it is recommended to strengthen the fodder base, improve animal husbandry practices and enhance veterinary services.

Maintaining soil fertility. Crop rotation and the use of organic fertilizers help to preserve soil fertility.

The main limitation of the study is that it is based on production volumes alone. Without data on cultivated area, yields, livestock numbers and prices, the analysis can describe the structural shift but cannot establish its causes.

Conclusion

The study shows that Toyloq district plays an important role in the agriculture of Samarkand region: in 2025 the district accounted for 7.4% of the region's agricultural, forestry and fishery output.

In 2010–2025 the district's specialization shifted gradually from crop production to livestock: the shares of potatoes, vegetables and grapes declined, while those of meat and eggs increased. At present the district is specialized mainly in potato and meat production. For some products (vegetables, grapes, melons and gourds, milk and eggs) earlier peak levels have not yet been regained.

Introducing water-saving methods, expanding storage and processing capacity and strengthening the fodder base in livestock production would support the development of the sector. A detailed study of the causes of the observed changes in the future would help to justify these recommendations more precisely.

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