
The Global Market for Potato and Potato Products in the Current and Forecast Period

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Abstract:

Purpose: The main task of the paper is to present the role and importance of potato in solving the world food problem, especially when it has become one of the most important food crops with high nutritional value and productivity.

Approach / Methodology / Design: Within the study, general scientific methods of analysis and synthesis, such as generalization, comparison, abstract-logical analysis, index method, etc. were used.

Findings: The potato agro-food sector is the most important component of the country's economy, ensuring food security and the quality of life of the population. Potato gives significantly more calories per hectare of land compared to other vegetable crops. Wheat and rice products were considered the most carbohydrate-containing foods in the world, an increasing number of countries have a tendency to switch to potato.

Practical implications: The results of the performed analysis are necessary for assessing the level of food security and for the growth of export of potato products in the world. One of the reasons for the growth of potato consumption is the development of the market for potato products (fries, chips, potato flour, potato starch, potato flakes and granules, dried potato puree, etc.), which are in demand in the consumer market.

Originality/value: The trends in the dynamics of potato production and consumption have been evaluated, and the forecast for the sustainable development of potato production in China has been made. The results of the analysis are necessary to assess the level of food safety and to develop a strategy that takes into account the current trends in the global potato market. Prospective directions for the sustainable development of the potato products market in the Republic of Belarus have been developed.

Keywords: Potato agro-food sector, sustainable development, production trends, current states and forecast of potato cultivation, efficiency, export and import.

JEL Classification: Q10, Q13, Q18.

Paper Type: Research article.

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1. Introduction

The potato is the world's third most important food crop and is regularly consumed by more than one billion people. Today, potato is grown on more than 20 million hectares in 150 countries, with a total world production of about 360 million tons. It also generates income for small- and medium-sized producers, is a source of healthy, low-fat, high-fiber carbohydrates, is rich in antioxidants and nutrients, and produces fewer greenhouse gas emissions than other major crops.

Potato makes a significant contribution to world history and global food security, with production expected to double in the next 10 years. According to FAO, Asia and Africa are the regions with the largest growth in potato production, while Europe and North America are showing its decline. Potato is an important source of food, jobs, and income in developing countries.

However, the growth of production will depend on the scientific organisation of production, including the quality of planted tubers and the availability of zoned potato varieties that are most resistant to specific climatic conditions.

The objective is to study the main trends of the dynamic development and forecast of the world potato market, elaboration of perspective directions of its sustainable development.

2. Materials and Methods

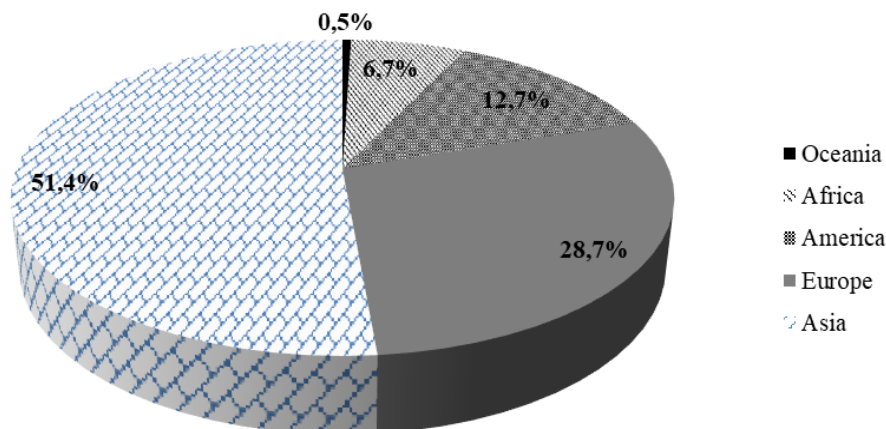
Within the study, general scientific methods of analysis and synthesis, generalisation, comparison, abstract-logical analysis, etc. were used. The information base of the study were the databases of the FAO, the International Monetary Fund, the Organisation for Economic Cooperation and Development, the European Union, and the U.S. Department of Agriculture.

3. Results and Discussion

The structure of global production of potato and potato products is shown in Figure 1. Analysis of the data in Figure 1 shows that more than half of potatoes and potato products are produced in Asia (51.4%), Europe 28.7%, America 12.7%, Africa 6.7% and Oceania 0.5%.

China is the world's largest potato producer with a production capacity of 99 million tons in 2020. India occupies the second place with 43.8 million tons, Russia is in the third place with 31.1 million tons, followed by Ukraine with 21.75 million tons, the USA with 19.99 million tons and Germany with 10.77 million tons. Bulgaria produced 127.18 thousand tons of potatoes in 2020.

Figure 1. Structure of world production of potato and potato products, %



Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The EU produced 55.3 million tons of potatoes. Germany is the largest producer, accounting for 21.2%, followed by Poland (16.4%), France (15.7%), the Netherlands (12.7%) and Belgium (7.2%). These five European countries account for almost 75% of all potato production in the EU. With a share of less than 1%, Bulgaria ranks 20th out of 25.

Global potato production in 2019 was 371 million tons (estimated at 140.5 billion USD), an increase of 2.1% over 2018. Total potato production for 2007–2019 increased by an average of 1.6% annually, and its value by about 3%. In 2019, the total area under potato cultivation worldwide was 18 million hectares, about the same as the previous year. In 2019, the global average potato yield was 21 tons/ha, which is higher by 1.6% compared to 2018 (Agriculture of the Republic of Belarus: statistical collection, 2021). The trend of gross world production of potato by countries is shown in Table 1.

Table 1. Trend of gross world production of potato, thousand tons

Countries	2016	2017	2018	2019	Growth rate, % 2019/2016
China	84,987	88,536	90,321	91,881	108.1
India	43,417	48,605	51,310	50,190	115.6
Ukraine	21,750	22,208	22,504	20,269	93.2
USA	20,426	20,453	20,422	19,182	93.9
Russia	22,463	21,708	22,395	22,075	98.3
France	6955	8547	7860	8560	123.1
Germany	10,772	11,720	8921	10,602	98.4
The	6534	7392	6025	6961	106.5

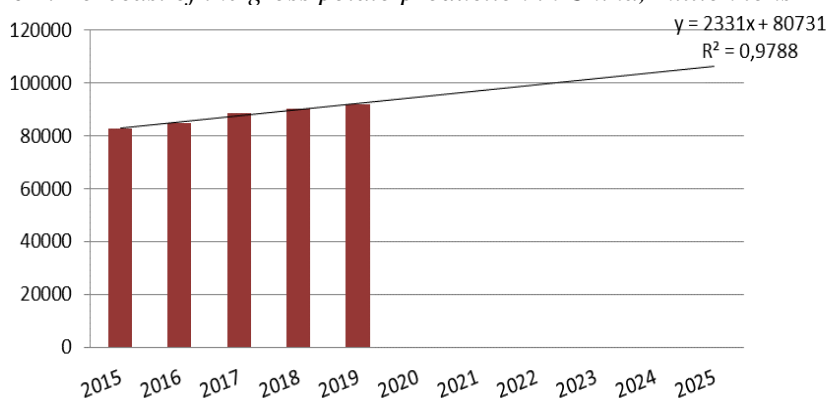
Netherlands					
Belarus	5984	6415	5865	6105	102.0
Poland	8872	9172	7312	6482	73.1
Great Britain	5395	6218	5060	5252	97.3

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The data presented in Table 1 show that the following countries experienced an increase in gross potato production in 2019 compared to 2016: China by 8.1%, India by 15.6%, France by 23.1%, the Netherlands by 6.5% and Belarus by 2%. During the study period, there was a decrease in potato gross production in Ukraine, the United States, Russia, Germany, Poland, and the United Kingdom.

We prepared a forecast of the potato gross production in China for the period up to 2025. We set up a trend equation; for this purpose, we chose a linear growth curve of the second degree, since it more accurately repeats the dynamics of the original time series (Figure 2).

Figure 2. Forecast of the gross potato production in China, million tons



Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

Using the equation obtained on the graph, we calculate the predicted value (Table 2).

Calculations showed that the growth rate of gross potato production by 2025 will increase by 9.6% compared to 2021, which reflects the positive dynamics of the studied indicator.

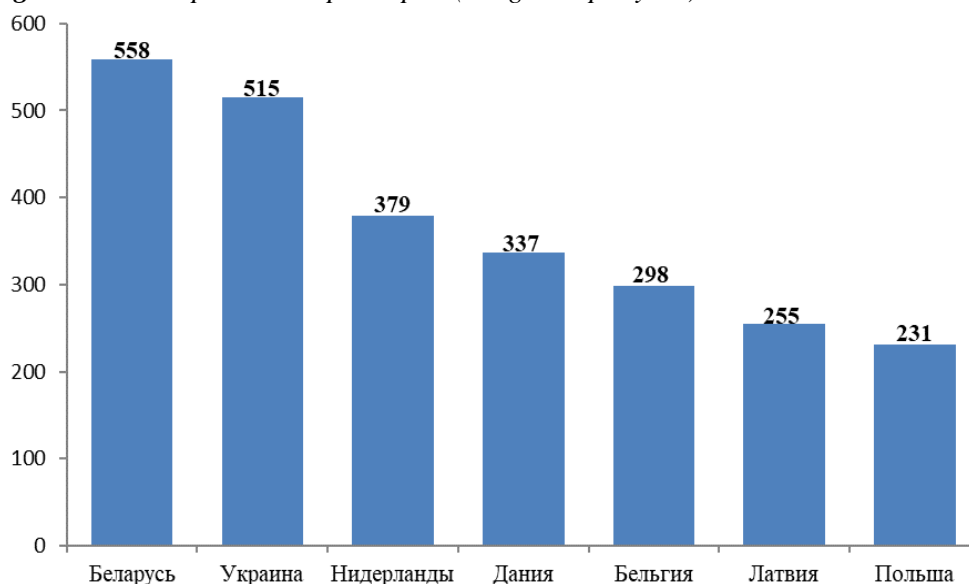
The countries with the highest per capita potato production in 2020 are Belarus (558 kg per capita), Ukraine (515 kg), the Netherlands (379 kg), and Denmark (337 kg) (Figure 3).

Table 2. Forecast of the gross potato production in China

Description	2021	2022	2023	2024	2025	Growth rate, 2025/2021, %
Gross potato production, thousand tons	97,048	99,379	101,710	104,041	106,372	109.6

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

Figure 3. Potato production per capita (kilograms per year)

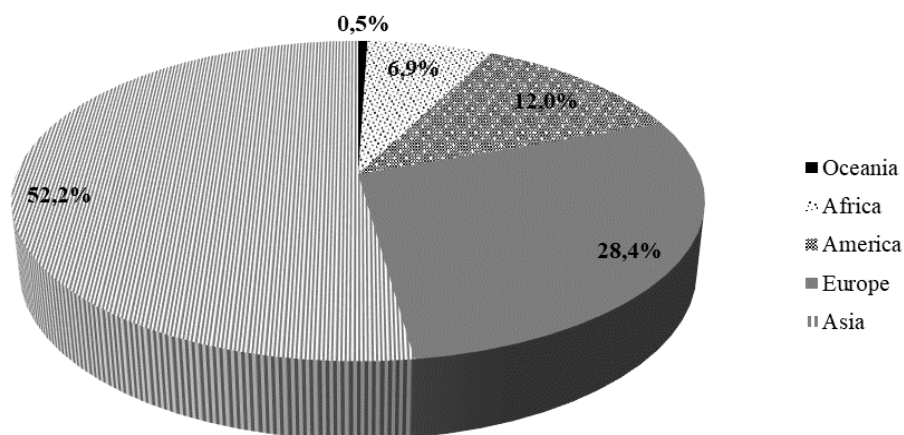


Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

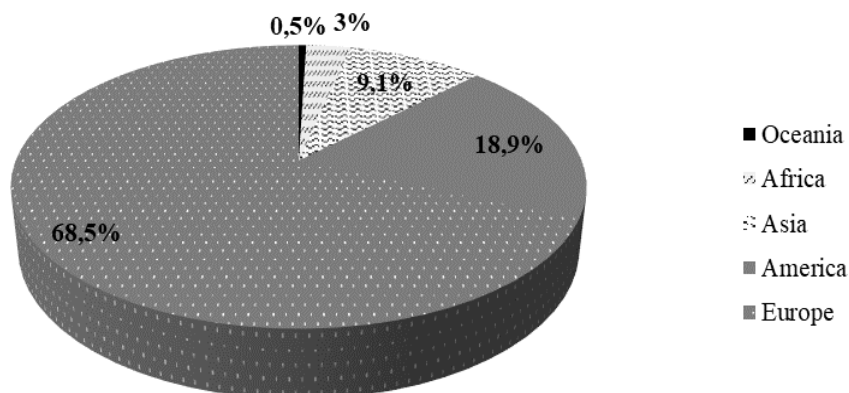
The structure of global consumption of potato and potato products is shown in Figure 4. Data in Figure 4 shows that more than half of potato and potato products are produced in Asia (52.2%), Europe (28.4%), America (12%), Africa (6.9%) and Oceania (0.5%).

Countries with high potato consumption in 2019 are: China (93 million tons), India (51 million tons) and Ukraine (23 million tons), which together accounted for 45% of total consumption. Russia, the United States, Germany, Bangladesh, Poland, the Netherlands, Canada, and Belarus together account for 23% of global potato consumption. In value terms, China is the world leader in potato consumption (52.3 billion USD), followed by India (10.5 billion USD).

The structure of global export of potato and potato products is shown in Figure 5.

Figure 4. Structure of world consumption of potato and potato products, %

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

Figure 5. Structure of global export of potato and potato products, %

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The data in Figure 5 show that the largest share of potato and potato products exports comes from Europe – 68.5%, America – 18.9%, Asia – 9.1%, Africa – 3%, and Oceania – 0.5%.

The following types of potato products are processed and manufactured in the EU, in addition to potato exports and trade: frozen potatoes (for frying), cooked potatoes

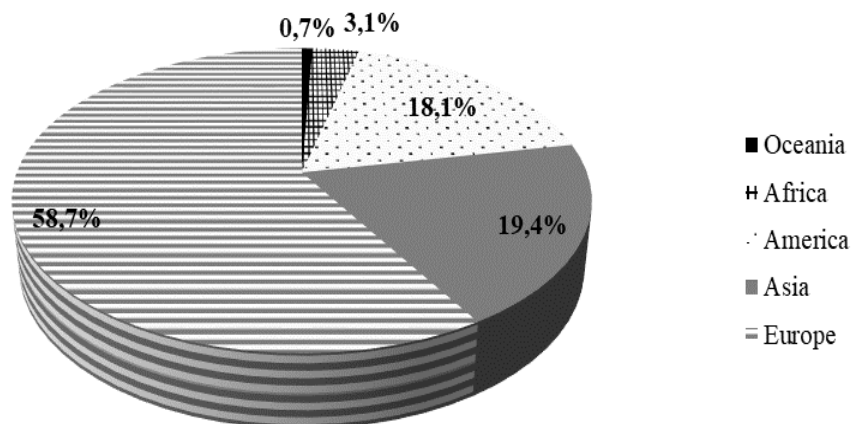
(chips), dried potatoes and potato starch. France (3.5 million tons), Germany (1.9 million tons), the Netherlands (1.8 million tons), Belgium (1 million tons), and Egypt (0.7 million tons) were the largest potato exporters in 2019, and the collective share of these countries reached 60% of total exports.

They are followed by Pakistan (625 thousand tons), USA (550 thousand tons), Canada (504 thousand tons), China (471 thousand tons), India (417 thousand tons), Spain (303 thousand tons) and Saudi Arabia (294 thousand tons). In value terms, the world's biggest potato exporting countries are France (812 million USD), the Netherlands (800 million USD) and Germany (440 million USD), which together accounted for 43% of world exports. These countries were followed by China, Egypt, the United States, Belgium, Canada, Spain, Pakistan, India and Saudi Arabia – 35% in the structure of world exports.

In the global potato market, prices were affected by production volume drop, pandemic, higher fuel and fertiliser prices, among other factors. In 2019, the average export price for the potato was 323 USD per ton, which is 4.1% higher than in 2018. During this period, China had high export prices (613 USD per ton), and Saudi Arabia had low export prices (170 USD per ton).

The structure of global import of potato and potato products is shown in Figure 6.

Figure 6. Structure of global import of potato and potato products, %



Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The data presented in Figure 6 show that the largest share of potato and potato products import belongs to Europe – 58.7%, Asia – 19.4%, America – 18.1%, Africa – 3.1%, and Oceania – 0.7%. The main potato importers are Belgium (3 million tons), the Netherlands (1.6 million tons) and Spain (0.9 million tons).

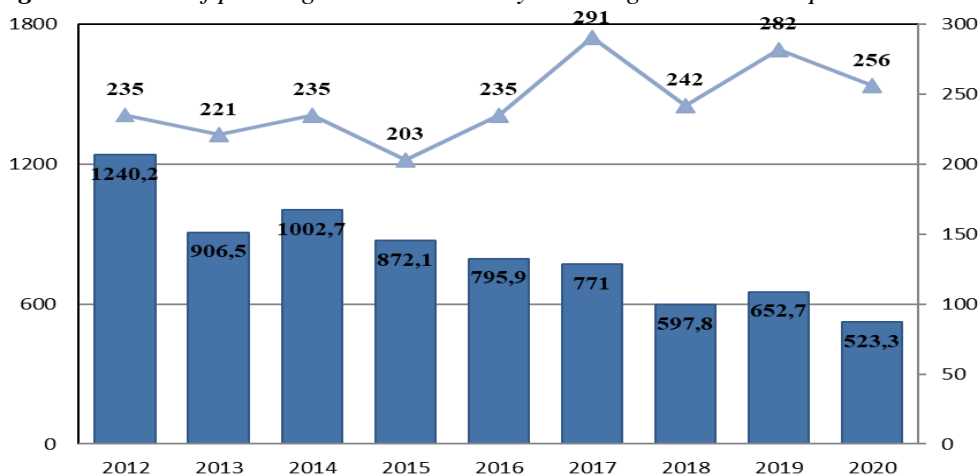
The study of potato and potato products market in the Republic of Belarus suggests that one of the ways to improve the effectiveness of the potato industry in the near future should consider the production of not only fresh potatoes, but also processed products, since these products are in high demand in the world food market (On the State Program “Agrarian Business” for 2021–2025).

For the development of crop production in the Republic of Belarus, including potato, the State Program “Agrarian business” for 2021–2025 includes potato production in the amount of 6 million tons in farms of all categories, including public sector – 1.2 million tons with an average yield of 305 cwt/ha, the planting areas are 38 thousand ha (Karpovich and Makutsenya, 2022).

It is no accident that the Republic of Belarus is called a potato country, since we are in first place in the world in terms of production of “the second bread” per capita – 558 kilograms, and we are also in the lead in terms of its consumption – 177. The nutritional value of potato is determined largely by a favorable balanced ratio of the most important nutrients in the tubers, as well as by the content of components such as vitamins, mineral elements, amino acids.

In 2020, in the structure of agricultural production potato production in agricultural organisations amounted to 10.7%, and in household farms – to 82%. Between 2012 and 2020, the area of potato crops in the Republic decreased by about two times. Figure 7 shows the trend of the gross harvest and yield of potato in the agricultural companies of the Republic of Belarus (Gusakov, 2020).

Figure 7. Trend of potato gross harvest and yield in agricultural companies



Note: Made according to the National Statistical Committee of the Republic of Belarus, the author's calculations

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

An analysis of the data in Figure 7 showed that in 2020, compared to 2012, the gross potato harvest of agricultural companies decreased by 57.8%, potato yield increased by 8.9%. The trend of agricultural production per capita is shown in Table 3.

Table 3. Agricultural production per capita

Indicators	Years					Growth rate, 2020 / 2016, %
	2016	2017	2018	2019	2020	
Agricultural production per capita, RUB	1632	1900	1987	2191	2450	150.1
Production of basic agricultural products per capita, kg:						
grain	785	842	649	778	935	119.1
potato	630	675	618	648	558	88.6
sugar beet	450	525	507	523	428	95.1
vegetables	199	206	184	197	187	93.7
livestock and poultry (in slaughter weight)	123	127	129	132	137	111.4
milk	751	771	774	785	828	104.5
eggs, pieces	380	370	355	373	373	98.1

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The data given in Table 3 show that agricultural production per capita in 2020 compared to 2016 increased by 50.1%. During the study period, grain production per capita increased by 19.1%, milk – by 4.5% and livestock and poultry (in slaughter weight) – by 11.4%. It should be noted that during this period there was a decrease in potato production per capita – by 11.4%.

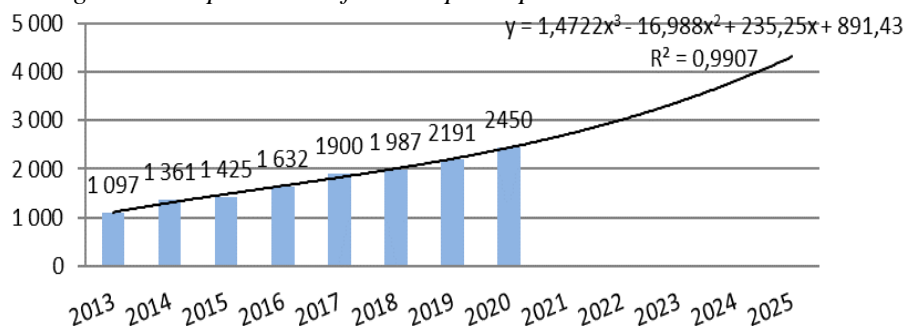
We make a forecast of the agricultural production per capita until 2025. Let's construct a trend equation; for this purpose, we chose a polynomial growth curve of the third degree, since it more accurately repeats the trend of the original time series (approximation reliability value = 0.9907) (Figure 8). Using the equation obtained on the graph, we calculate the predicted value (Table 4).

Calculations showed that the growth rate of agricultural production per capita by 2025 will be 59.4% compared to 2021, which reflects the positive trend of the studied indicator.

There are about 30 state-owned and privately owned companies in Belarus that process potato into starch and potato products. The main product items in foreign supplies of domestic potato products are potato starch and non-frozen potatoes, cooked or canned without the addition of vinegar. More than 8.6 thousand tons of potato starch were sold in foreign markets in 2020 (Yefimenko and Mitskevich, 2022).

The trends in exports of potato and potato products are shown in the Table 5.

Figure 8. Agricultural production forecast per capita



Note: Made according to the National Statistical Committee of the Republic of Belarus, the author's calculations.

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

Table 4. Forecast of agricultural production per capita

Description	2021	2022	2023	2024	2025	Growth rate, 2025 / 2021, %
Agricultural production per capita, RUB	2705.86	3017.13	3383.08	3820.83	4313.11	159.4

Note: Made according to the National Statistical Committee of the Republic of Belarus, the author's calculations.

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

Table 5. Potato and potato products export trends, thousand USD

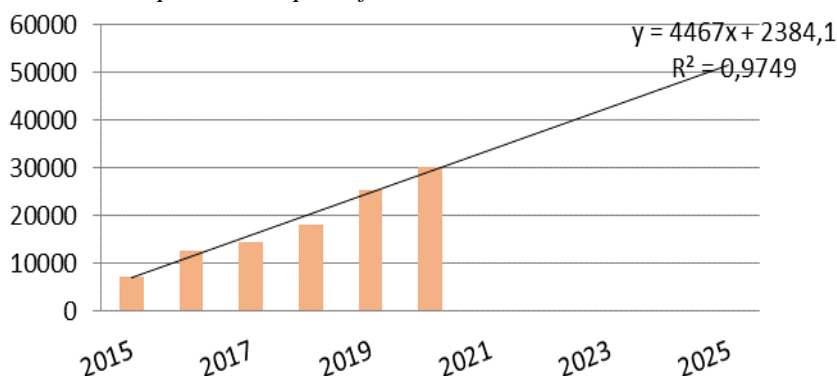
Products	2015	2016	2017	2018	2019	2020	Growth rate, % 2020 / 2015
Potato	54,210.4	33,592.8	65,776.4	53,109.2	57,385.7	45,264	83.5
Potato products	7201	12,688.2	14,557.9	18,212.5	25,251.2	30,201.5	419.4
Total	61,411.4	46,281	80,334.3	71,321.7	82,636.9	75,465.5	122.9

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The data presented in Table 5 show that exports of potato and potato products as a whole increased by 22.9% in value terms in 2020 compared to 2015.

Let's prepare a forecast of potato products export for the period up to 2025. Let's set up a trend equation; for this purpose, we chose a linear growth curve, since it more accurately repeats the dynamics of the original time series (Figure 9).

Figure 9. Potato products exports forecast, thousand USD



Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

Using the equation obtained on the graph, we calculated the predicted value (Table 6).

Table 6. Potato products export forecast

Description	2021	2022	2023	2024	2025	Growth rate, 2025/2021, %
Exports, thousand USD	33,653	38,120	42,587	47,054	51,521	153.1

Source: Own creation on the base of Agriculture of the Republic of Belarus: statistical collection 2021.

The calculations show that the growth rate of potato products exports in value terms by 2025 will be 53.1% compared to 2021. Thus, over the past 10 years, there has been a fivefold increase in exports of potato products, which positively affects the social and economic development of the country.

4. Conclusions

The main players in the global market for potato and potato products are the EU countries, North and South America, and China. At the same time, the EU countries act in this market as both exporters and importers. In many countries, there has been

an expansion in potato production and an increase in the consumption of potato products. Average annual consumption growth is projected on the level of 1.6%, which will lead to an increase in the volume of the market by 2030 up to about 440 million tons.

In the Republic of Belarus, as in many countries around the world, growing potatoes is one of the most important branches of crop production. For the population of the country, potato is the basis of its self-sufficiency in food.

The main ways to increase the efficiency of potato production are: introduction of zonal farming systems using resource-saving technologies; increasing soil fertility and rational use of agricultural land; increasing potato protection efficiency by improving its cultivation technology and optimising its phytosanitary status; using the most intensive varieties; applying elements of precision farming and mastering new resource-saving and knowledge-intensive production and processing technologies.

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