European Research Studies Journal
Volume XXV, Issue 3, 2022

pp. 130-144

Current Status and Trends of Sustainable Development of the Agro-food Sector Potential

Submitted 17/08/22, 1st revision 28/08/22, 2nd revision 15/09/22, accepted 15/10/22

Bartosz Mickiewicz[1], Efimenko Antonina[2], Volkova Ekaterina[3]

Abstract:

Purpose: *The main task of agro-industrial production at the present stage is the integrated and waste-free processing of agricultural raw materials and complete satisfaction of the needs of the population in a variety of products.*
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..*
Conclusions: *The agro-food sector is the most important component of the country's economy, ensuring food security and the quality of life of the population. The current state and trends in the development of the agro-food sector were considered. Over the study period, an assessment of the production and consumption volume of the main types of agricultural products and of agro-industrial companies activity efficiency was made.*
Practical implications: *The results of the performed analysis are necessary for assessing the level of food security and for the growth of exports of products, taking into account the trends and conditions for the functioning of the agro-food sector. The forecast of sustainable development of the agro-food sector potential of Belarus was substantiated. Development of agro-industrial production makes it possible to meet the needs of the population for food and increase its export.*
Originality/value: *The agro-food sector and its basic link – agriculture – are the backbone areas of the national economy, which ensure the food and national security of the country. Taking it into account, ensuring the sustainable development of agro-industrial production is one of the most important state priorities for the social and economic development of the Republic of Belarus.*

Keywords: *Agro-food sector, sustainable development, trends, current states, forecast, efficiency, export, potential.*

JEL Classification: *Q10, Q13, Q18.*
Paper type: *Research article.*

[1]*Professor, Doctor of Economics, West Pomeranian University of Technology in Szczecin, Faculty of Economics, bartosz.mickiewicz@zut.edu.pl;*
[2]*Prof. Doctor of Economics, Belarusian State University of Food and Chemical Technologies, Faculty of Economics, efimenko_ag@mail.ru;*
[3]*Associate Prof. Doctor of Economics, Belarusian State University of Food and Chemical Technologies, Faculty of Economics, kate_ag@mail.ru;*

1. Introduction

A distinctive feature of the development of the agricultural sector is that land is the main means of production. Compared to other means, the land does not wear out, and with rational use it improves quality parameters. Agricultural production is distributed into different climatic zones. In general, the final results largely depend not on the quantity and quality of the resources used, but on the specific conditions in which this production is carried out.

One of the important features of the agricultural sector development is that the created products take part in the further production process. In agriculture, seeds and planting material (grain, potatoes, etc.) are used as a means of production, feed, and a significant part of the livestock are used for the restoration and expansion of the herd. All this requires additional material resources for the construction of premises and industrial facilities (forage warehouses, storage facilities for seeds and planting material, etc.).

An important feature of the development of the agricultural sector is that here the working period does not coincide with the period of production. In agriculture, the period of production consists of the time when the process is carried out under the human labor influence (plowing the soil, tillage, sowing and planting, handling of plants, harvesting, etc.) and when it is carried out directly under the influence of natural factors (plant growth, harvest development, etc.).

The discrepancy between the period of production and the working period causes the seasonality of agricultural production, which has a significant impact on the organization of production, the efficient use of equipment, labor resources, and, ultimately, on the efficiency of activities in general. The noted features of the agricultural sector development require a comprehensive analysis, assessment of production organization, determination of the economic efficiency of production resources use.

The goal is to study the current state and develop predictive trends for the effective development of the agro-food sector potential.

2. Literature Review

At this stage, the agricultural production of Belarus has a high level of specialization in dairy and beef cattle breeding with a developed production of grain, rapeseed. There are over 1,380 different organizations engaged in the agricultural production in the agro-industrial complex (Agriculture of the Republic of Belarus: statistical collection. National Statistical Committee of the Republic of Belarus, 2021).

The total area of agricultural land as of January 1, 2021 amounted to 8283.9 thousand hectares, which is by 217.7 thousand hectares less than in 2018. In 2020, in

the structure of agricultural production by categories of farms, the largest share belonged to agricultural companies – 80.9%, which is higher by 1.8% compared to 2016; the share of household farms was lower by 3.6%. During the study period, there was an increase in the share of peasant (farm) households by 0.9%. In 2020, compared to 2016, in general, the production of agricultural products at farms of all categories increased by 47.8%, including agricultural companies – by 51.1%. During the study period, crop production in farms of all categories increased by 45.3%, including agricultural companies – by 31.1%. (Industry of the Republic of Belarus: stat. collection, 2021).

The effective development of the agro-industrial sector of the Republic of Belarus is inextricably linked with the growth rates of agricultural production. The growth rate of agricultural production at farms of all categories in 2019 compared to 2016 amounted to 33.1%, including crop products – 31.8% and livestock products – 34.3%. The growth rate of production in agricultural companies in 2019 compared to 2016 amounted to 34.2%, including crop products – 30.2% and livestock products – 36.4%. (Food security of the Republic of Belarus. Monitoring-2019, 2021).

The agriculture of Belarus is specialized in growing crops that are traditional for temperate latitudes. Plant growing is the leading branch of agricultural production. Grain crops predominate in crop production: mainly barley, rye, wheat, potatoes, fodder crops. Due to structural transformations and orientation towards renewable energy sources, the volume of legumes and oilseeds cultivation is expanding in the republic. Grain crops are cultivated in all regions and their share in the area of arable land ranges from 40 to 45%. The republic's demand for grain (taking into account the restoration of export potential) is 9–10 million tons. At the present stagethe grain industry is in close connection with the markets of other states and regions.

3. Research Methodology

Within the study, general scientific methods of analysis and synthesis, such as generalization, comparison, abstract-logical analysis, index method, etc. were used. The general methodological basis of the agricultural sector economy, as well as other sciences, is the dialectical method of knowledge, which obliges to consider all phenomena in development and in close interconnection. The use of this method excludes a one-sided approach to the analysis of economic phenomena occurring in the agricultural sector; a synergistic effect can be achieved through the integrated use of all factors, production conditions and risks. The information base for the study was the official data of the National Statistical Committee of the Republic of Belarus.

However, providing the population with food is a basic element of the economic and social security of the country. In 2020, according to the food security index, Belarus rose to the 23rd place among 113 countries, improving its position in the ranking by 13 places.

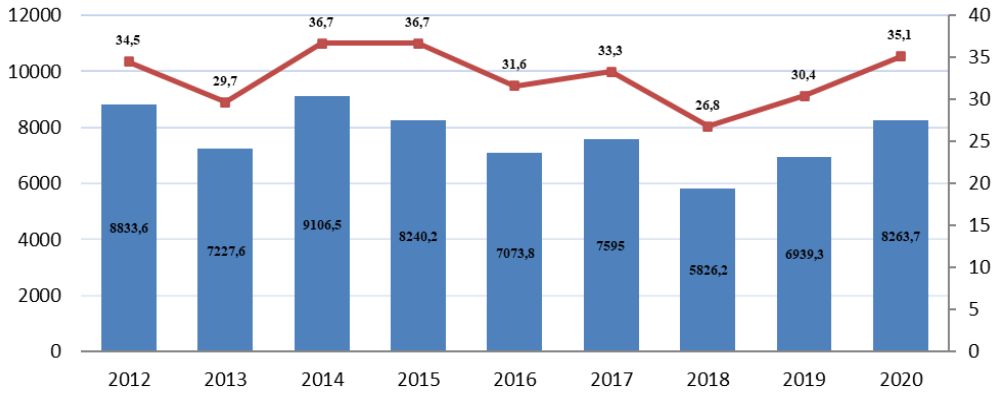
4. Results and Discussion

The analysis showed that the largest share in the overall structure of agricultural companies by organizational and legal forms in 2020 is taken by joint-stock companies – 45.8%, which is 10.9% less than in 2017, and unitary enterprises – 32.4%, which is 14.5% less than in 2017. During the study period, there was an increase in the number of limited liability companies – by 22.7%.

In 2020, compared to 2017, the overall yield of grain and leguminous crops increased by 5.4%, rye – by 11.4%, wheat – by 7.9%, barley – by 6.7%, flax fiber – by 10.8%, fruits and berries – by 71.2%. During the study period, the yield of leguminous crops decreased by 2.2%, potatoes – by 11.2%, vegetables – by 6.1% and sugar beet – by 3.6%. In 2020, compared to 2017, the gross harvest in general of grain and leguminous crops increased by 9.7%, rye – by 56.8%, wheat – by 8.7%, other crops – by 51.8%, flax fiber – by 14.3%, fruits and berries – by 67.4%. Over the study period, the gross harvest of leguminous crops decreased by 21.1%, potatoes – by 18.5%, vegetables – by 10.6% and sugar beet – by 19.6%.

Figure 1 shows the trend of the gross harvest and yield of grain and leguminous crops in agricultural companies.

Figure 1. *Trend of gross harvest and yield of grain and leguminous crops in agricultural companies.*

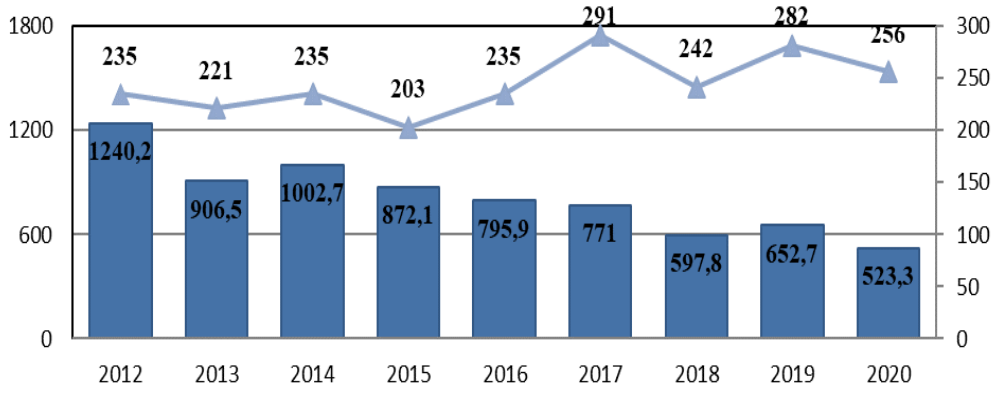


Source: *Own creation.*

Analysis of the data in Figure 1 showed that in 2020, compared to 2012, in agricultural companies, the gross harvest of grain and leguminous crops as a whole decreased by 6.5%, and the yield increased by 1.7%.

Figure 2 shows the trend of the gross harvest and yield of potato in agricultural companies.

Figure 2. *Trend of potato gross harvest and yield in agricultural companies.*

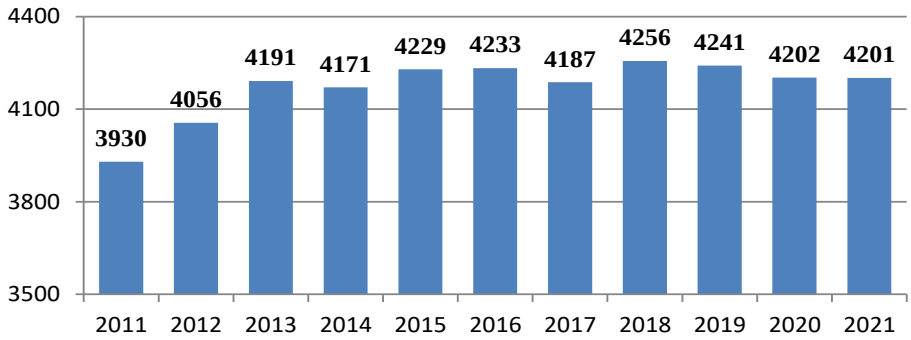


Source: *Own creation.*

An analysis of the data in Figure 2 showed that in 2020, compared to 2012, the gross potato harvest of agricultural companies decreased by 57.8%, while potato yield increased by 8.9%.

Figure 3 shows the trend of the number of cattle in agricultural companies.

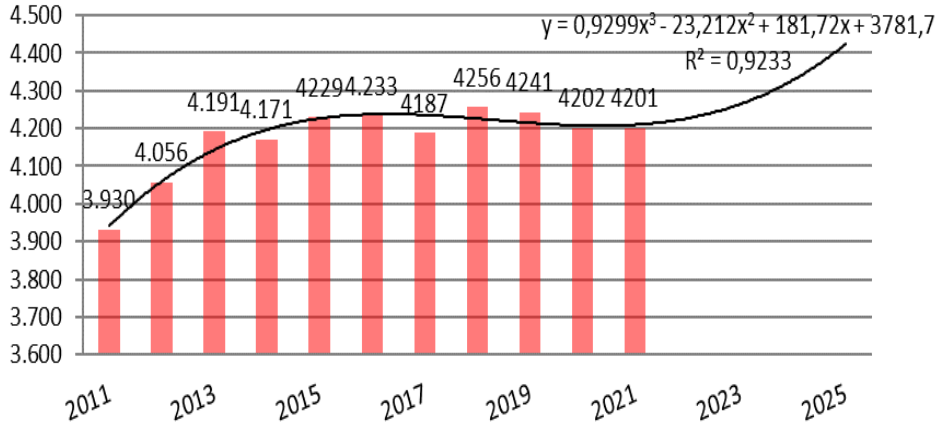
Figure 3. *Trend of the cattle number in agricultural companies, thousand of heads.*



Source: *Own creation.*

Analysis of the data in Figure 3 showed that in 2021, compared to 2011, in agricultural companies, the number of cattle increased by 6.9%. Let's make a forecast of the number of cattle in agricultural companies 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 = 0.9233) (Figure 4).

Figure 4. *Forecast of the number of cattle in agricultural companies, thousand of heads.*



Source: *Own creation.*

Using the equation obtained on the graph, we calculate the predicted value (Table 1).

Table 1. *Forecast of an increase in the number of cattle in agricultural companies.*

Description	2022	2023	2024	2025	Growth rate, 2025 / 2021, %
Production of cattle in agricultural companies, thousand tons	4227	4264	4328	4423	105.3

Source: *Own creation.*

The data in Table 1 showed that the growth rate of the number of cattle in agricultural companies by 2025 will be 5.3% compared to 2021. The trend of production of the main types of livestock products in farms of all categories of the Republic of Belarus is shown in Table 2.

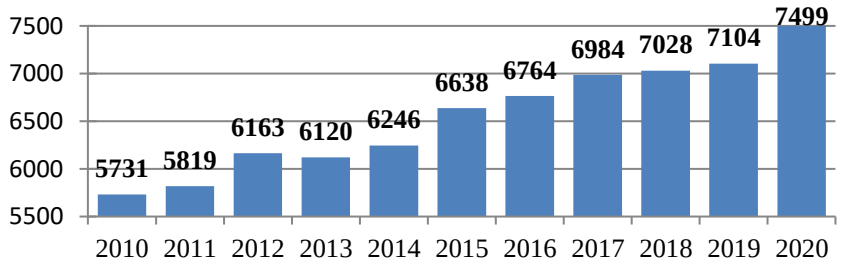
Table 2. *Trend of production of the main types of livestock products.*

Indicators	Years				Growth rate, 2020 / 2017, %
	2017	2018	2019	2020	
Livestock and poultry sales: - live weight, thousand tons	1676	1729	1725	1760	105.0
- slaughter weight	1208	1226	1240	1285	106.4
Milk production, thousand tons	7321	7345	7394	7765	106.1
Egg production, million pieces	3516	3363	3514	3495	99.4

Source: *Own creation.*

According to Table 2, it should be noted that in 2020, compared to 2017, sales of livestock and poultry increased in live weight – by 5%, while milk production increased by 6.1%. During the study period, egg production decreased by 0.6%. Figure 5 shows the trend of milk production in agricultural companies.

Figure 5. *Milk production trend in agricultural companies.*



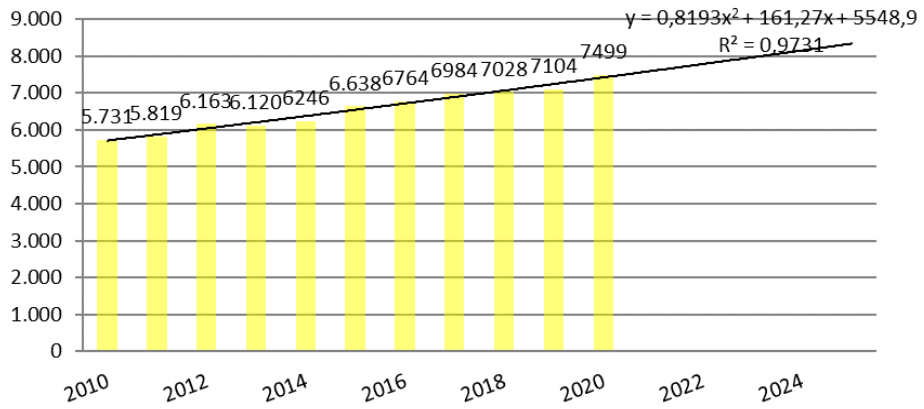
Source: *Own creation.*

Analysis of the data in Figure 5 showed that in 2020, compared to 2010, in agricultural companies, milk production increased by 30.8%.

5. Forecast for the Development of the Agri-food Sector

Let's make a forecast of milk production in agricultural companies until 2025. Let's construct a trend equation; for this purpose we chose a polynomial growth curve of the second degree, since it more accurately repeats the trend of the original time series (approximation reliability value = 0.9731) (Figure 6).

Figure 6. *Milk production forecast in agricultural companies, thousand tons.*



Source: *Own creation.*

Using the equation obtained on the graph, we calculated the predicted value (Table 3).

Table 3. *Forecast of milk production in agricultural companies.*

Description	2021	2022	2023	2024	2025	Growth rate, 2025 / 2021, %
Production of milk in agricultural companies, thousand tons	7602	7784	7967	8152	8338	109.7

Source: *Own creation.*

Calculations showed that the growth rate of milk production in agricultural companies in 2025 compared to 2021 will be 9.7%. Providing the population with food is a basic element of the economic and social security of the country. Analysis of agricultural production dynamics per capita shows a trend to its increase (Table 4).

Table 4*. Agricultural production per capital.*

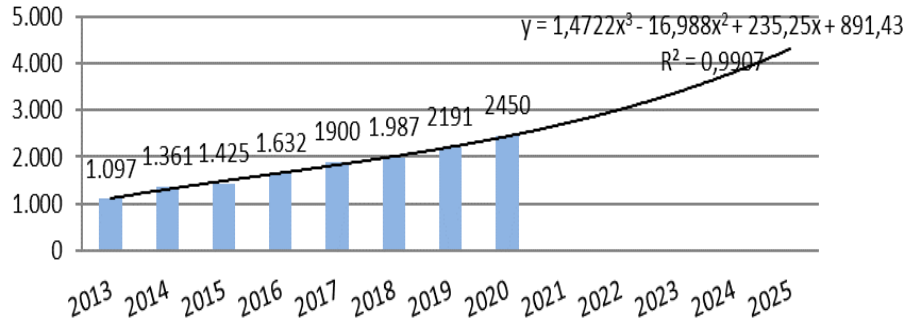
Indicators	Years					Growth rate, 2020 / 2016, %
	2016	2017	2018	2019	2020	
Agricultural production per capita, RUB	1632	1900	1987	2191	2450	150.1
Production of basic agricultural products per capita, kg:						
grain	785	842	649	778	935	119.1
potato	630	675	618	648	558	88.6
sugar beet	450	525	507	523	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.*

The data given in Table 4 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%.

Let's 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 7).

Figure 7. *Agricultural production forecast per capita, rubles per person.*



Source: *Own creation.*

Using the equation obtained on the graph, we calculate the predicted value (Table 5).

Table 5. *Forecast of agricultural production per capital*

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

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

Calculations showed that the growth rate of agricultural production per capita by 2025 will be 59.4% compared to 2021, which reflects the positive dynamics of the studied indicator. The key performance indicators of agricultural companies are given in Table 6.

Table 6. *Key performance indicators of agricultural companies.*

Indicators	2016	2017	2018	2019	2020	Growth rate, 2020 / 2016, %
Proceeds from the product sales, million RUB	9723.9	11038.7	11747.8	12919	14469.1	148.8
Cost of products sold, million RUB	8533.1	9231.5	10145.4	11139	12363.4	144.9
Profit from the product sales, million RUB	215.9	707.8	434.5	500.6	676.0	313.1
Profit before tax,	227.2	705.5	501.1	887.5	795.0	349.9

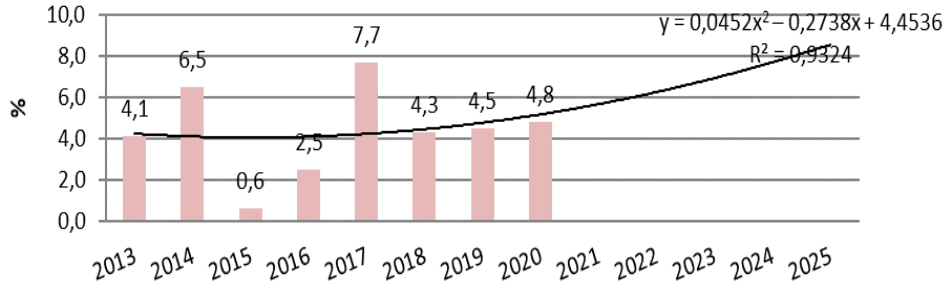
million RUB						
Net profit, million RUB	219.8	698.2	496.9	881.2	793.2	360.9
Products profitability, %	2.5	7.7	4.3	4.5	5.5	+2,2 p.p.
Return on sales, %	2.2	6.4	3.7	3.9	4.7	+2,1 p.p.

Source: *Own creation.*

Performed analysis of data given in Table 6 showed that there is an increase in the efficiency of agricultural companies during the study period: revenue from products sales increased by 48.8%, profit from product sales and profit before tax – 3 times, net profit – 3.6 times. The profitability of sold products increased by 2.2% and the return on sales – by 2.1%.

Let's make a forecast of the agricultural companies products profitability until 2025. Let's construct a trend equation; for this purpose we chose a polynomial growth curve of the second degree, since it more accurately repeats the trend of the original time series (approximation reliability value = 0.9324) (Figure 8).

Figure 8. *Products profitability forecast for agricultural companies.*



Source: *Own creation.*

Using the equation obtained on the graph, we calculate the predicted value (Table 7).

Table 7. *Forecast of growth in the profitability of agricultural companies, %.*

Description	2021	2022	2023	2024	2025	Growth rate, 2025 / 2021, %
Products profitability	5.65	6.24	6.85	7.65	8.5	+2.85

Source: *Own creation.*

Calculations showed that the profitability of agricultural products by 2025 will increase to 8.5%, which reflects the positive dynamics of the studied indicator.
The profitability of sold agricultural products is shown in Table 8.

Table 8. *Profitability trend of sold agricultural products.*

Indicators	2016	2017	2018	2019	2019/2016, +,-
Profitability of sold agricultural products	1.5	7.2	2.9	2.9	+1.4
plant growing products, including:	13.3	19.8	14.1	16.7	+3.4
- grain	8.9	16.5	14.3	19.7	+10.6
- potato	-26.2	-0.5	-0.7	-1.9	-24.3
- open ground vegetables	13.9	13.8	13.6	20.4	+6.5
- sugar beet	29.1	30.6	19.9	20.8	-8.3
- flax seeds	-37.3	-20.8	-15.1	-15.0	-22.3
- flax rotted straws	-41.9	-40.8	-42.4	-44.0	-2.1
livestock products, including meat:	-1.4	4.3	0.6	-0.1	+1.3
- cattle	-36.7	-35.8	-37.9	-42.9	-6.2
- pigs	-1.6	5.5	-4.1	-2.9	-1.3
- poultry	8.3	4.9	4.8	8.0	-0.3
milk	18.6	28.3	25.9	27.4	+8.8
eggs	16.2	8.1	4.5	3.7	-4.4

Source: *Own creation.*

Performed analysis of data in Table 8 showed that during 2016-2019 there was an increase in the profitability of sold agricultural products by 1.4%, including crop production – by 3.4% and livestock products – by 1.3%.

The analysis of the main performance indicators of companies by type of economic activity "production of food, beverages and tobacco products" showed that during the study period there was an increase in proceeds from sales by 41.8%, cost of products sold – by 43.3%, sales profit – by 30.5%. Net profit growth rate was 213.4%. The profitability of production decreased by 1.3%, the profitability of the final financial result increased by 4.8%, the growth rate of profitability of fixed assets amounted to 6%, capital productivity – 6.5%.

Further, the effectiveness of the functioning of the food market was assessed using the following indicators: food independence of the country, import-export balance of food products (Table 9).

The formula for calculating the import-export balance ratio is as follows:

$$K_{ИЭР} = \frac{Импорт, тыс.тонн.}{Экспорт, тыс.тонн.} \quad (1)$$

where K_{ieb} is an import and export balance ratio.

The food independence ratio is calculated as the ratio of the production volume to the consumption volume within the republic in physical units (Pilipuk, 2021).

Table 9. *Assessment of the food markets operation efficiency.*

Market	Ratio of									
	import and export balance					of food independence				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Meat and meat products	0.16	0.14	0.15	0.18	0.16	1.32	1.34	1.35	1.33	1.35
Milk and dairy products	0.04	0.02	0.01	0.02	0.02	2.33	2.31	2.35	2.41	2.56
Eggs and egg products	0.02	0.05	0.06	0.06	0.02	1.32	1.29	1.24	1.28	1.26
Vegetables, gourds and products of their processing	0.97	0.94	0.74	0.82	0.74	1.07	1.05	1.00	1.07	1.02
Potato and potato products	0.13	0.18	0.18	0.21	0.28	1.04	1.12	1.06	1.11	1.00

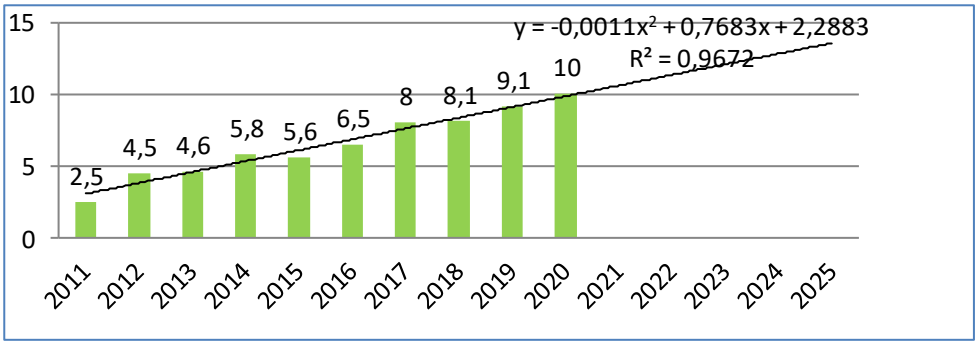
Source: *Own creation.*

For the balanced development of food markets, a safe level of reserves and funds has been established, which should be at least 15% in relation to the optimistic level of demand in accordance with the approved criteria and parameters of the Doctrine (About the Doctrine of National Food Security of the Republic of Belarus until 2030, 2022).

As a result of the study, an assessment was made of the effectiveness of the agricultural products and food export of Belarus, which showed that the basic products of exports are meat and meat products, milk and dairy products (their share in the total export of agricultural goods and food in 2019 was 58.9%). Subject to the achievement of the target agricultural production volumes and a favorable price environment in accordance with the State Program for 2016-2020 “Agricultural Business”, an increase in exports of food products and agricultural raw materials in 2025 by 21.3% compared to 2020 is forecasted (up to 7 billion USD) (Government Program for 2016–2020 “Agricultural Business”, 2022).

The sector of agriculture, forestry and fisheries in the total volume of gross value added of the Republic of Belarus in current prices is 8.1%. We make the forecast for the growth of gross domestic product (GDP) of the agro-food sector of the Republic of Belarus (Figure 9). We build a trend equation, for this purpose we choose a polynomial growth curve of the second degree, since it more accurately repeats the dynamics of the original time series (the approximation reliability value = 0.9672).

Figure 9. *GDP growth forecast for the agro-food sector of the Republic of Belarus.*



Source: *Own creation.*

Using the equation obtained on the graph, we calculate the predicted value of agro-food sector GDP (Table 11).

Table 11. *GDP forecast in agro-food sector.*

Description	Forecast value					Growth rate, % 2025 / 2020
	2021	2022	2023	2024	2025	
GDP in the agro-industrial complex, trillion RUB	10.6	11.3	12.1	12.8	13.5	127.9

Source: *Own creation.*

Calculations showed that the growth rate of GDP in the agro-food sector by 2025 will be 27.9% compared to 2021.

6. Conclusion

The agro-industrial sector is the most important component of the economy of the Republic of Belarus, aimed at ensuring the food security of the country. The current state of agriculture is determined by the results of the completed governmental program for the development of agricultural business in the Republic of Belarus for the period of 2016-2020. The food security of the Republic of Belarus is completely ensured.

On average, during 2014-2019 annual production of grain amounted to 7859.5 thousand tons, potatoes – 6107.2 thousand tons, vegetables – 1811.7 thousand tons, flax fiber – 43.0 thousand tons, sugar beet – 4517.8 thousand tons, rapeseed – 501.3 thousand tons. In recent years, a positive trend in the development of crop production has been the consistent improvement of crops, which ultimately allows to strengthen the material and technical base and technological discipline, and to

improve cultivation technology. The structure of the grain area has changed significantly due to an increase in the sowing of valuable and high-yielding crops – wheat, triticale and barley. However, one should take into account the agro-climatic and regional conditions of cultivation of individual crops.

In 2019, agricultural companies produced 7105 thousand tons of milk (113.8% by 2014), sold livestock and poultry for slaughter in live weight of 1640 thousand tons (114.2% by 2014), produced 2910 million eggs (101.7% by 2014). Achieving this level of production is ensured through the development and technical re-equipment of production facilities in the industry, compliance with technological regulations in the production of products. During 2016–2020, more than 400 dairy farms were built and renovated in the republic. In 2020, milk production in farms of all categories amounted to 7765 thousand tons, which is by 6.1% higher than in 2017. One of the most efficient production facilities in the agro-industrial complex has been created in the dairy industry.

The main directions of sustainable development and effective functioning of the companies are: rational combination of large, medium and small enterprises; formation of the optimal amount and structure of production, ensuring profitability and cost recovery; ensuring resource saving at all stages of production and sale of products.

The main measures aimed at sustainable development of the potential of the agro-food sector of Belarus are: improvement of economic regulation of product exports, taking into account international practice; development of modern sales structures in foreign markets; diversification of production and marketing in order to improve provision of domestic production with raw materials and food, expansion of the capacity of the national market and increase in products exports.

References:

About the Doctrine of National Food Security of the Republic of Belarus until 2030: Decree of the Council of Ministers of the Republic of Belarus dated December 15, 2017 No. 962 / National register of legal acts of the Republic of Belarus dated December 19, 2017 – No. 5/44566.

Agriculture of the Republic of Belarus: statistical collection. 2021. National Statistical Committee of the Republic of Belarus, (Electronic resource): https://www.belstat.gov.by.

Food security of the Republic of Belarus. Monitoring-2019: in the context of sustainable functioning of the agro-industrial complex / V.G. Gusakov (and others). Minsk: Institute of System Research in Agroindustrial Complex of NAS of Belarus, 295.

Government Program for 2016-2020 “Agricultural Business” // Decree of the Council of Ministers of the Republic of Belarus dd. March 11, 2016 No. 196 (Electronic source): https://www.mshp.gov.by/programm.

Industry of the Republic of Belarus: stat. collection (electronic resource). 2020, Minsk: National Statistical Committee of the Republic of Belarus, 51. Access mode: https://www.belstat.gov.by.

Pilipuk, A.V. 2021. Guidelines for improving organizational and economic relations in the agro-food sector of the Republic of Belarus: questions of theory and methodology / ed. by V. G. Gusakova – Minsk: Institute for System Research in the Agroindustrial Complex of the National Academy of Sciences of Belarus, 135.