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**POLISH FOREIGN TRADE OF AGRICULTURAL
AND FOOD PRODUCTS DURING THE COVID-19 PANDEMIC²**

Key words: pandemic COVID-19, agriculture, agri-food products, foreign trade, Poland

ABSTRACT. In the research on the impact of the COVID-19 pandemic on the economic situation in agriculture, the demand and supply channels are distinguished. They indicate how restrictions on economic activity translate into the volume and structure of production and the demand for agricultural products. The aim of the research was to identify and assess the impact of the COVID-19 pandemic on Polish agriculture through the transmission channel of foreign trade. The research period covered the years of 2017-2022. The primary research tool used was time series indicator analysis. During the pandemic, changes in foreign trade were limited only to short-term disruptions, which intensified in the first wave of COVID-19 (2020, second quarter). Trade in agri-food products turned out to be more resistant to shocks caused by the pandemic compared to trade in non-agricultural sectors. Therefore, disruptions on foreign markets did not significantly affect the production and economic situation of Polish agriculture. In the second quarter of 2020, the value of exports of agri-food goods decreased by 2.8% compared to the previous quarter. As it comes to other groups of goods, export values were lower by 7.2-40.1%. At the same time, the value of imports of agri-food goods was lower by 6.1% compared to the previous quarter. Imports of other goods collapsed much more severely as decrease in the value of imported goods ranged from 8.4 to 47.4%.

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INTRODUCTION

The COVID-19 pandemic has touched the whole world and had serious social and economic consequences. It was, undoubtedly, a test of stability and flexibility for the world economic system. Restrictions on economic activity that were introduced for sanitary reasons caused the world's GDP to decrease by 3.1% in 2020. However, this crisis was overcome quite quickly as in 2021 GDP increased by 6% [WB 2023]. A visible regularity indicated by macroeconomic data is that economically developed countries were hit the hardest by the crisis - their GDP decreased by 4.2% in 2020. The recession was much weaker in medium-developed countries, as the decline in production amounted to only 1.2%. However, the economies of the poorest countries responded only with economic stagnation and lack of real growth. One of the sectors of the economy that was affected by the COVID-19 pandemic was agriculture.

The issue of the impact of the pandemic on agriculture has been studied in many ways. In particular, attention should be drawn to the problem of the channels and mechanisms during the pandemic on the situation of income and production in agriculture. The most common are supply and demand channels which indicate how restrictions in economic activity translate into the volume and structure of production and the demand for agricultural products [Schmidhuber et al. 2020]. Demand channels primarily include the demand for agricultural products on the domestic and foreign markets. As research indicates, both in Poland and around the world, the demand shock occurred mainly in the first phase of the pandemic (H1 2020) and was related to the closure of the catering and hotel industries and export barriers [Hobbs 2020, Szajner 2020, Beckman, Countryman 2021, Gramza-Michałowska, Kulczyński 2021, Dudek, Śpiewak 2022]. As a result, there was also a decline in prices of agricultural products, especially live pigs and poultry [Mroczek 2020]. In turn, the supply channels impacts of the pandemic on agriculture are the availability and prices of production factors, including, above all, labour as well as domestic and imported investment outlays. As it turned out, the disruption of supply chains in the first phase of the pandemic did not have a significant impact on the economic results of farms. The economic situation of agriculture deteriorated only in the second year of the pandemic [Mikuła et al. 2022]. It was caused by a radical increase in the prices of energy and raw materials on world markets, as a result of which Polish agriculture was strongly affected by the increase in prices of means of production.

Among the supply and demand channels transmitting the effects of the pandemic on agriculture, foreign trade played an important role. The aim of the research was to identify and assess the impact of the COVID-19 pandemic on Polish agriculture through the transmission channel of foreign trade. Changes in trade in agri-food goods were analyzed against the other groups of goods. The achievement of the main objective required the

discussion of additional research problems, such as presenting the importance of the agricultural sector in Poland's international trade and identifying the mechanisms of the pandemic's impact on foreign trade and production of the agricultural sector.

RESEARCH MATERIAL AND METHODOLOGY

For the research on Poland's foreign trade, the data were applied according to the Standard International Trade Classification (SITC) used by the UN Department of Statistics (developed in 1950 and amended in 2007 as version 4). The value of foreign trade turnover was expressed in PLN. The transaction price in imports equals the price on franco Polish frontier or CIF Polish port, while the transaction price in exports equals the price fixed on franco Polish frontier or FOB Polish port. Prices in foreign currencies were converted into PLN according to the applicable foreign exchange rates.

Data on the commodity structure of imports and exports according to SITC are presented in the following categories:

- 1) agri-food products (include SITC sections "Food and live animals" and "Beverages and tobacco");
- 2) raw materials except fuels (include SITC sections "Inedible raw materials except fuels" and "Animal and vegetable oils, fats and waxes");
- 3) mineral fuels, lubricants and related materials (SITC section of the same name);
- 4) chemicals and related products (SITC section of the same name);
- 5) machines, devices and transport equipment (SITC section of the same name);
- 6) manufactured products (include the SITC sections "Manufactured goods classified chiefly by material", "Miscellaneous manufactured articles" and „Commodities and transactions not classified in the SITC”).

The source of the data are the publications of the Central Statistical Office (CSO): International Statistics Yearbook and Statistical Bulletin.

Data on the foreign trade turnover were analyzed using descriptive statistics methods. The basic research tool was time series indicator analysis. The pandemic in Poland lasted from March 2020 to June 2022. However, for cognitive reasons, to enable the presentation of pandemic phenomena in the background of previous years, the research period was extended and included 2017-2022.

RESEARCH RESULTS

The impact of global economic shocks on agriculture may vary depending on the sector's integration with world markets and global distribution chains. The degree of integration of agriculture with the world markets can be measured by the share of total exports and imports in GDP, as well as by the share of agri-food products in exports and imports. A large share of foreign trade may have a strong impact on the domestic economy in case of any external shocks. As statistical data indicate, in 2020, the ratio of total exports to GDP of the Polish economy was 53% [GUS 2022]. This proves that during the pandemic, the Polish economy was highly internationalized. This ratio has been increasing systematically since the beginning of the political transformation. In 1989, the value of Polish exports in relation to GDP was only 15%. A rapid increase in the value of exports occurred after Poland's accession to the European Union. In 2005, this share was 35%, and over the next 10 years it increased above 50%.

The second important aspect of the vulnerability of agriculture to global crises is the level of internationalization of the agri-food sector itself. According to the research, the share of exports in sold production of the food industry is estimated at 44% [Szczeplaniak et al. 2020]. This proves the large production potential of this sector, which significantly exceeds the needs of the domestic market. Another measure of the internationalization of the agri-food sector may be the share of agri-food products in international trade turnover. According to the data from the Central Statistical Office [GUS 2022], in 2021, in Poland, agri-food products amounted for 12.9% of the value of exports and 7.5% of the value of imports (Figure 1). Therefore, Poland can be included in the group of countries with medium importance of the agri-food sector. From the 46 analyzed countries³, the group of countries with the greatest importance of agri-food products in exports includes New Zealand, Argentina, Ukraine and Brazil. In these countries, agri-food products constitute over 20% of the export value, with New Zealand (63%) and Argentina (42%) clearly standing out in this respect. For comparison, in countries with the least importance of the agri-food sector, this share is around 1-3% and applies to countries such as Japan, South Korea, China, Finland and Switzerland. Countries with a similar share of the agri-food sector in exports (in the range of 11-15%) include: Lithuania, Cyprus, the Netherlands, Bulgaria, France, Poland, Croatia, South Africa and Portugal.

The fundamental role of the foreign trade is to expand specialization and the division of labor on an international scale. This is exemplified by the differences in the structure of exports and imports. Countries specializing in the export of agri-food goods, in which the share of agri-food products in exports was the highest, also had a small share of

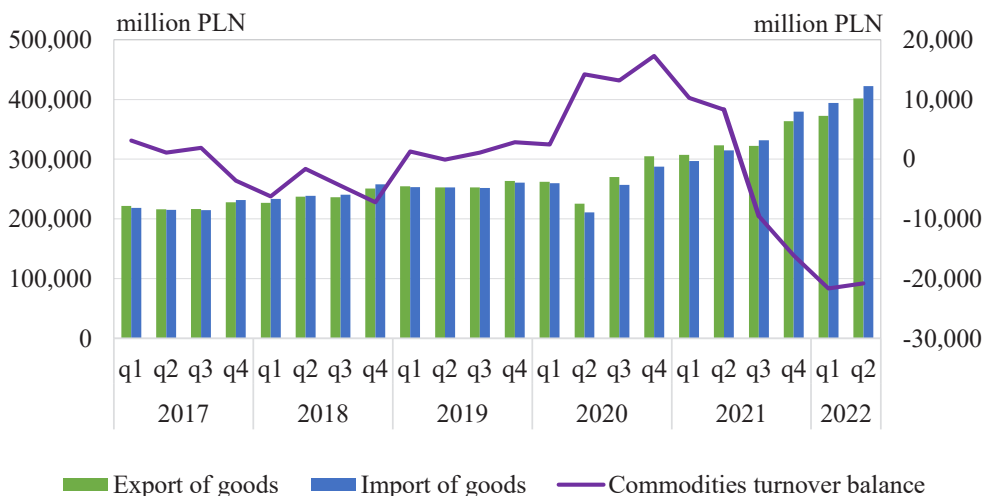
³ The group of analyzed countries includes 30 countries with the largest GDP in the world and the European Union countries, Ukraine and Belarus.

these goods in imports (Figure 1). In New Zealand, Argentina, Ukraine and Brazil, where the share of the food industry in exports was 20-63%, agri-food products accounted for 3% to 11% of the imports. India and Turkey were also countries with a large predominance of exports of agri-food products over imports. In these countries, exports exceeded imports several times. In Poland, the ratio of the share of exports to imports was 1.7. A similar rate was recorded for Belarus, Spain, Australia, South Africa, Mexico, Greece and Lithuania. All countries exporting agri-food products, given their strong dependence on global markets, were particularly exposed to the negative effects of the pandemic through demand channels. The collapse of foreign trade worsened the situation of domestic producers relatively more. In turn, the countries with the least importance of the food industry in exports (1-3%), i.e. Japan, South Korea, China, Finland and Switzerland, recorded a several times higher share of this industry in imports (4-9%). The greatest advantage of imports over exports concerned countries such as Great Britain, Sweden, Switzerland, Slovakia and Russia. In food-importing countries, the collapse of foreign trade affected domestic producers to a lesser extent, as the decline in demand for food on foreign markets was largely offset by the increasing importance of the internal market.



Figure 1. Share of agri-food products in exports and imports in 2021 (current prices)
Source: [GUS 2022]

In the years of 2017-2022, the value of Polish foreign trade showed increasing trends. The value of exports increased from 221.7 billion PLN in 2017 to 401.6 billion PLN in mid-2022. At the same time, the value of imports increased from 218.6 billion PLN to 422.4 billion PLN. The analysis of data on the foreign trade during the COVID-19 pandemic indicates that the turnover from trade was impacted by the restrictions imposed on the economy both domestically and internationally. Taking into account Polish foreign trade, it should be noted that the collapse in trade turnover was temporary and occurred only during the first wave of the pandemic. The introduction of the state of epidemic in Poland on March 20th, 2020 was associated with a number of restrictions in social and economic life. One of the actions of the Polish government was to implement restrictions on business activities, including the temporary closure of some industries. As Figure 2 indicates, as a result of these restrictions, in the second quarter of 2020, the value of Polish exports expressed in PLN decreased by 14%, and imports – by 19% [CSO 2017-2022]. However, already in the third quarter, the value of exports and imports increased significantly. Compared to the previous quarter, the increase in exports was 20% and in imports 22%. In the fourth quarter, the dynamics of exports and imports remained at the high level (13 and 12%, respectively), and since the beginning of 2021, turnover has stabilized. Starting from the fourth quarter of 2021, the value of trade turnover began to increase again.



q1, q2, q3, q4 – quarters

Figure 2. Total Polish foreign trade (left axis) and turnover balance (right axis)

Source: [GUS 2017-2022]

The analysis of trade turnover at constant prices is as follows. In the first year of the pandemic (2020), the value of exports did not change compared to the previous year, while the real value of imports decreased by 2%. This means that the sharp decline in trade turnover in the second quarter of this year was offset by an equally sharp increase in turnover in the second half of the year. In the second year of the pandemic, the dynamics of exports at constant prices amounted to 10% and imports to 13% [GUS 2022].

Changes in foreign trade during the pandemic showed great industry diversification (Table 1 and 2). It turns out that in the second quarter of 2020, which was particularly affected by economic restrictions, the export of agri-food products decreased only by less than 3% compared to the previous quarter. A slightly larger decline was recorded in imports. The value of imports decreased by over 6% during this quarter. However, the collapse of foreign trade mainly concerned mineral fuels, lubricants and related materials. The value of exports of these goods decreased by over 40% and imports by over 47% (Figure 3). The industry of machines, devices and transport equipment turned out to be the second most sensitive to the trade blockade – exports dropped by over 21% and imports by almost 24%. In case of industries producing raw materials (except fuels), manufactured products and chemicals and related products, the effects of the pandemic were slightly weaker and amounted to a decrease in exports by 7-11% and a decline in imports by 8-17% [GUS 2017-2022].

Table 1. Changes in Polish exports by product groups (previous quarter = 100)

Year	Quarter	Total	Agri-food products	Raw materials except fuels	Mineral fuels, lubricants and related materials	Chemicals and related products	Manufactured products	Machines, devices and transport equipment
2020	1.	-0.6	4.3	4.0	18.1	7.3	-2.0	-3.7
	2.	-14.1	-2.8	-8.8	-40.1	-7.2	-10.9	-21.4
	3.	20.0	5.9	10.3	12.3	10.4	19.0	31.1
	4.	12.8	5.3	10.7	15.6	5.7	10.5	19.4
2021	1.	0.8	-1.7	13.8	23.4	4.6	1.7	-1.7
	2.	5.3	2.8	12.3	16.1	8.9	6.3	3.3
	3.	-0.4	6.5	-3.0	20.3	3.1	3.0	-7.5
	4.	12.9	8.9	6.5	41.1	10.8	10.2	16.5

Source: own calculations based on CSO [GUS 2017-2022]

Table 2. Changes in Polish imports by product groups (previous quarter = 100)

Year	Quarter	Total	Agri-food products	Raw materials except fuels	Mineral fuels, lubricants and related materials	Chemicals and related products	Manufactured products	Machines, devices and transport equipment
2020	1.	-0.4	7.2	9.7	-15.3	11.8	2.5	-4.9
	2.	-18.7	-6.1	-17.3	-47.4	-8.4	-15.2	-23.7
	3.	21.8	0.6	17.7	46.8	4.1	24.5	32.0
	4.	11.8	9.2	5.2	-1.4	8.5	9.3	18.1
2021	1.	3.2	0.0	10.0	24.7	12.4	3.5	-3.7
	2.	6.1	1.1	11.3	-1.8	9.6	6.6	5.6
	3.	5.3	0.4	15.7	35.2	3.1	9.2	-3.1
	4.	14.5	18.7	-1.3	25.7	5.0	7.0	17.5

Source: own calculations based on CSO [2017-2022]

Overall, Polish agri-food exports did not suffer a major decrease during the period of the greatest restrictions. This was the result of the fact that food is a product of primary need and is characterized by relatively low income elasticity of demand [Ambroziak 2020]. It can even be noticed that after the period of the greatest restrictions introduced in the economy, difficulties in the transport of goods and changes in the structure of demand, Poland has strengthened its position as a net exporter of food. This was due to the situation on the global grain market, as well as the exchange rate of the Polish zloty, which was favorable for exporters [Bułkowska 2021]. The continuing competitive advantages are also important, including lower production costs compared to other developed countries, thanks to which the demand for Polish products increases domestically and abroad [Szczepaniak et al. 2020].

It is also worth noting that in case of all industries, including food, the declines in imports significantly exceeded the declines in exports. This mainly concerned agri-food products and raw materials, where the declines in imports were twice as high as in exports [GUS 2017-2022]. Uneven changes in exports and imports affected the balance of trade in goods. In the years of 2017-2019, the balance of total trade in goods was quite even (Figure 2). In the second quarter of 2020, there was a clear advantage of exports over imports amounting to 14.2 billion PLN, which constituted approximately 7% of the value

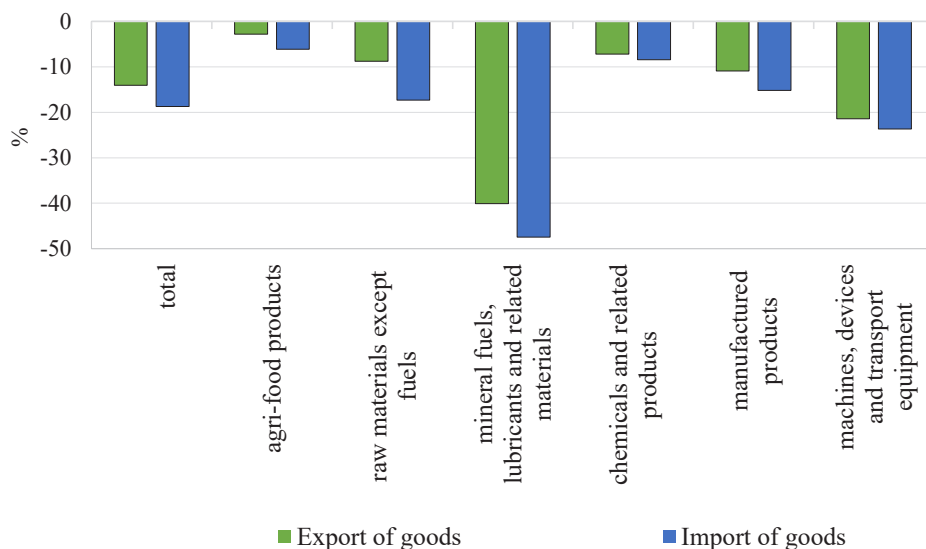


Figure 3. Changes in Polish exports and imports by product groups in the second quarter of 2020
Source: own calculations based on CSO [GUS 2017-2022]

of imports at that time. The positive balance continued until the second quarter of 2021, and then the total trade balance in goods was negative until the end of the pandemic. The balance of trade in agri-food products was different. In this industry, the value of exports constantly exceeded the value of imports. In the period before the pandemic, the surplus in trade in these goods amounted to 8-13 billion PLN, which constituted 50-60% of the value of imports. During the pandemic, a slight improvement in the trade balance has been observed. The export surplus has relatively increased and amounted to 60-70% of the import value.

Research conducted for Poland indicates high convergence with research results for various countries around the world. During the pandemic, similarities in changes in trade of agri-food products became visible at global and regional levels. In general, non-food goods have experienced relatively greater changes than food [Engemann, Jafari 2022]. Also, the scale and structure of changes in Polish trade are very similar to the perturbations observed in global trade. Studies conducted indicate that COVID-19 has reduced the overall trade in food products by approximately 5-10%. In non-agricultural trade, this effect was 2-3 times greater [Arita et al. 2022]. Another regularity is that the negative impact of the pandemic mainly concerned meat products, including seafood, and higher-value agri-food products. In case of basic goods (e.g. cereals, rice), a positive impact of the pandemic on the economic situation of producers was observed even in the longer term.

SUMMARY

1. International comparisons indicate that the share of agri-food products in Polish exports is at an average level of approximately 13%. At the same time, the export of these goods significantly exceeds the import, the share of which is 7.5%.
2. During the pandemic, changes in foreign trade were limited only to short-term disruptions, which intensified in the first wave of COVID-19 (2020, second quarter). Therefore, disruptions on foreign markets did not significantly affect the production and economic situation of Polish agriculture.
3. Trade in agri-food products turned out to be more resistant to shocks caused by the pandemic compared to trade in non-agricultural sectors. This was the result of the fact that food is a product of primary need, is characterized by relatively low income elasticity of demand, and restrictions imposed on economic activity concerned food and agriculture to a lesser extent than other industries.
4. In the second quarter of 2020, the value of exports of agri-food products decreased by 2.8% compared to the previous quarter. In case of other groups of goods, export values were lower by 7.2-40.1%.
5. At the same time, the value of imports of agri-food goods was lower by 6.1% compared to the previous quarter. Imports of other goods were disrupted much more severely, as declines in the value of imported goods ranged from 8.4 to 47.4%.
6. The pandemic hit the trade of products such as: mineral fuels, lubricants and related materials, as well as machines, devices and transport equipment the hardest. Decreases in the value of exports amounted to 21-40% and imports 24-47%.

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POLSKI HANDEL ZAGRANICZNY PRODUKTAMI ROLNO-SPOŻYWCZYMI W OKRESIE PANDEMII COVID-19

Słowa kluczowe: pandemia COVID-19, rolnictwo, produkty rolno-spożywcze,
handel zagraniczny, Polska

ABSTRAKT. W badaniach na wpływem pandemii COVID-19 na sytuację ekonomiczną rolnictwa wyróżnia się kanały popytowe i podażowe. Wskazują one, w jaki sposób ograniczenia w działalności gospodarczej przekładają się na wielkość i strukturę produkcji, a popyt na produkty rolne. Celem badań była identyfikacja i ocena wpływu pandemii COVID-19 na polskie rolnictwo przez kanał transmisji w postaci handlu zagranicznego. Okres badawczy obejmował lata 2017-2022. Podstawowym narzędziem badawczym była analiza wskaźnikowa szeregów czasowych. W czasie pandemii zmiany w handlu zagranicznym ograniczyły się tylko do krótkoterminowych zakłóceń, które nasiliły się w pierwszej fali COVID-19 (drugi kwartał 2020 rok). Handel produktami rolno-spożywczymi okazał się bardziej odporny na wstrząsy wywołane pandemią w porównaniu z handlem w sektorach pozarolniczych. Tym samym, zakłócenia na rynkach zagranicznych nie wpłynęły istotnie na sytuację produkcyjno-ekonomiczną polskiego rolnictwa. W drugim kwartale 2020 roku wartość eksportu towarów rolno-spożywczych zmniejszyła się o 2,8% w porównaniu do poprzedniego kwartału. W przypadku pozostałych grup towarów wartości eksportu były niższe o 7,2-40,1%. W tym samym okresie wartość importu towarów rolno-spożywczych była niższa o 6,1% w stosunku do poprzedniego kwartału. Import pozostałych towarów załamał się znacznie silniej, gdyż spadki wartości importowanych towarów wyniosły od 8,4 do 47,4%.

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