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**THE ECONOMIC AND PRODUCTION-RELATED SITUATION  
OF POLISH AGRICULTURE OVER THE PERIOD  
FROM 2015-2021<sup>2</sup>**

Key words: agriculture, production, income, COVID-19, Poland

**ABSTRACT.** The aim of the study was to assess the economic and production-related situation of Polish agriculture during the COVID-19 pandemic. The analysis covered the years 2015-2021, i.e. in addition to the years of the pandemic's occurrence in Poland (2020-2021), the research period included 5 earlier years, in order to identify possible changes during the pandemic. In order to attain the objective, the data from the Economic Accounts for Agriculture – EAA, published by Eurostat, was used. A library query and secondary data from the Eurostat database were employed. Over the years 2015-2021, the value and quantity of agricultural production in Poland increased. In the first year of the pandemic, the value of production increased nominally by 13.7%, and by 8% in real terms. This growth mainly stemmed from the increase in the volume of plant production. The second year of the pandemic brought a slight decrease in the production volume – by 0.8%. It resulted primarily from yield deterioration. The time of the pandemic was characterized by considerable changes in agricultural income. Unfavourable price changes in 2021, related to a large increase in costs, caused the income from agriculture rise in the first year of the pandemic, but over the second year of COVID-19, the income situation deteriorated significantly. Worse farming conditions related mainly to an increase in the cost of loans and the prices of production means may have a significant impact on the food security of the Polish society.

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## INTRODUCTION

The COVID-19 pandemic spread rapidly around the world and brought about many negative consequences, threatening food security, agriculture and food systems [Deaton, Deaton 2020, Mikuła 2022]. However, the impact of the pandemic on the agriculture and food sector was different than in other sectors. The restrictions imposed on the economy did not generally apply to the agricultural sector as it was considered to be a basic service and, consequently, this sector continued its activity during the pandemic [Weersink et al. 2021]. However, the pandemic has caused some disruptions in the agricultural sector, which may have long-term consequences. The research to date indicates that the severity of the pandemic's outcome varies according to the region of the world, the level of the food market development, the wealth of societies, the type of links in the system and the response of public institutions influencing its operation [OECD 2020]. Yet, the serious negative consequences are felt the most by the most vulnerable [Stephens et al. 2020].

The scholars claim that COVID-19 triggered a crisis that has an economic [Nicola et al. 2020], social [Blofield et al. 2020], and political dimension [Van der Ploeg 2020]. According to some researchers, the impact of the crisis reduced environmental pressure in a short period of time, leading mainly to a slowdown in economic growth in labour-intensive sectors such as agriculture and services [S. Aday, M. Aday 2020].

At the same time, the researchers emphasize that as a result of the pandemic, food systems will not operate in accordance with the principles existing so far [Darnhofer 2020, OECD 2021]. This situation will be used by public authorities to create transformational policies aimed at building more sustainable food systems. This will also allow for sustaining and developing innovations in the food system occurring during the pandemic [Hobbs 2020].

## STUDY MATERIAL AND METHODOLOGY

The aim of the study was to assess the economic and production-related situation of Polish agriculture during the COVID-19 pandemic. The analysis also included the years before the pandemic (2015-2019), in order to identify possible changes occurring during the pandemic. Therefore, the period subject to research covered the years 2015-2021. In order to attain the objective, the data from the Economic Accounts for Agriculture – EAA [Regulation (EC) No 138/2004], published by Eurostat, was used. One of the main objectives of these accounts is to monitor agricultural incomes defined in the categories of: gross and net value added and net income of agricultural entrepreneurs. The value of the global production can be characterised as the sum of the output of all units in this type of activity (excluding the output for the purposes of indirect consumption within the same unit) together with the output used as indirect consumption within the same

unit, provided that this output refers to two different primary activities. The global output is valued at the basic price. The basic price is the price received by a producer from a purchaser for a unit of produced goods or a service minus all payable taxes on products plus all subsidies on products due to the unit as a consequence of its production or sale. Intermediate consumption includes the value of all goods and services used as an input in the production process excluding fixed assets, the consumption of which is recorded as depreciation of fixed assets. The subsequent analysed values were calculated according to the formula:

$$\begin{aligned} \text{GLOBAL OUTPUT} - \text{INTERMEDIATE CONSUMPTION} = \\ \text{GROSS VALUE ADDED} - \text{DEPRECIATION} = \text{NET VALUE ADDED} \end{aligned}$$

The income from factors of production is calculated by deducting other taxes on production from the value added in basic prices and by adding other subsidies on production. The last analysed category, the income of an agricultural entrepreneur, can be defined as a measure of the remuneration level of unpaid labour resources, invested capital, and property leases. The objective was achieved on the basis of a library query and secondary data from Eurostat and Statistics Poland.

The research is intended to fill the gap regarding the economic and production-related assessment of the situation of Polish agriculture during the two years of the COVID-19 pandemic in Poland. The extension of the analysis by the years preceding the pandemic is meant to show the scale of changes caused by the pandemic. The existing analyses terminated by the year 2020 and the effects of the pandemic may be felt in the longer term.

## RESEARCH RESULTS

According to the estimate of the Economic Accounts for Agriculture (EAA), the global agricultural production over the years 2015-2020 at current base prices displayed a growing tendency. In 2018 alone, the value of production decreased by 0.9%, which resulted mainly from the decline in the value of plant production by 4.5%. The value of animal production increased by 2% during that year. In the remaining years, the changes reached the level of 4-7%. The largest annual increase in production value, 7.8%, occurred in 2017. During the pandemic, the rate of production value growth was 5.3% in 2020 and 7% in 2021. Apart from the aforementioned 2018, the value of plant production rose steadily, and the largest increase, by 13.7%, occurred in 2020. The next year of the pandemic brought a rise in the value of plant production by 7.5% and this value reached PLN 61.7 billion. In contrast, the value of animal production kept increasing systematically until the first year of the pandemic, when it dropped by 1.9%. The following year was marked by a 6.3% rise in the value of this production to PLN 60.5 billion (Figure 1).

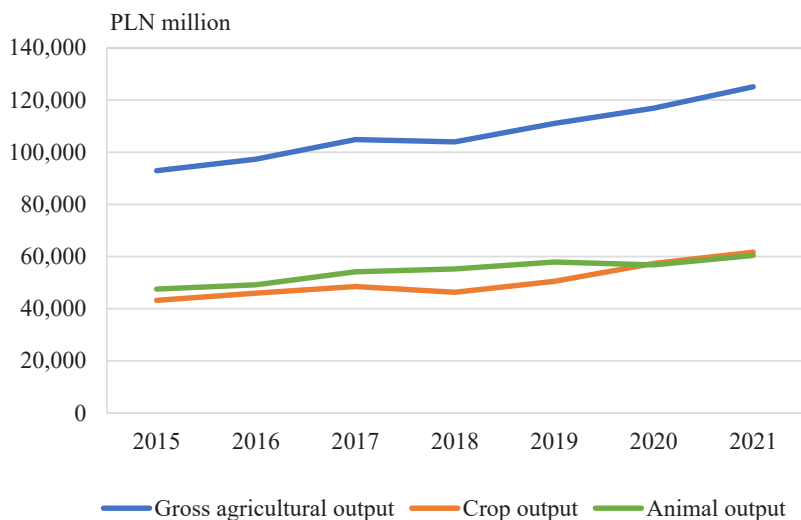


Figure 1. The value of gross agricultural output in Poland in 2015-2021 (current prices)

Source: own calculations based on [Eurostat 2022a]

Considering the prices from the previous year, the value of agricultural production fluctuated significantly over the years 2015-2021 (Figure 2). The most notable changes in the value of production were observed in the first year of the pandemic in Poland, i.e., in 2020. The annual real increase in production value was 8%. This growth was mainly due to the rise in the value of plant production (by 16.6%), while animal production remained at a similar level (increase by 0.7%). These results confirm the outcome of analyses around the world. The first year of the pandemic brought an increase in agricultural production worldwide [Beckman, Countryman 2021]. Admittedly, there were countries in which production rate declined in 2020. This particularly concerned the labour-intensive sectors such as harvesting and processing, in which there occurred serious disruptions in the food supply chain due to labour shortages [Richards, Rickard 2020]. Some farmers had to face limited demand from the catering services sector, others experienced increased demand, and there also appeared tension and strenuous effort at all levels of the food supply chain [Parks et al. 2020]. Subsequently, the next year of the pandemic outbreak brought a real decrease in the value of production by 0.8%, which stemmed mainly from a decline in the value of plant production (by -1.7%), while the value of animal production slightly increased (by 0.3%) (Figure 2). The analysis of the area and yields of the main crops in Poland in 2021 [GUS 2022] allows for determining that the main reason for the decrease in the level of plant production was bad weather conditions, because the crop yields

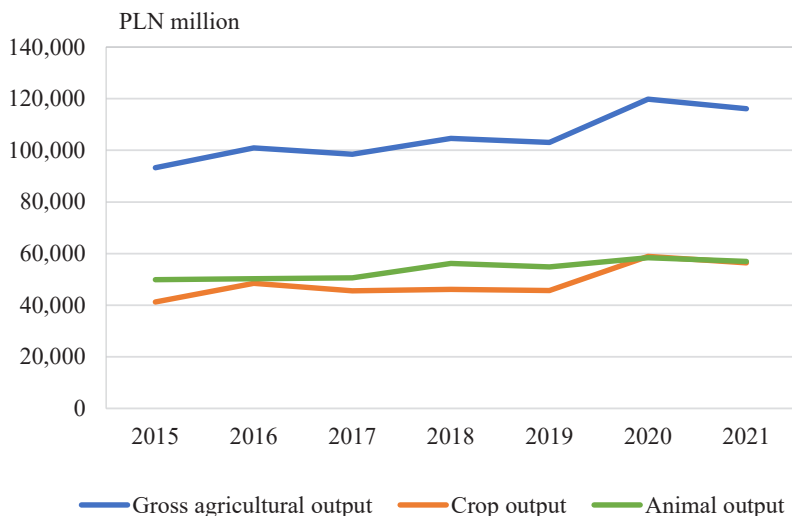


Figure 2. The value of agricultural production in Poland in 2015-2021 (prices from the previous year)

Source: own calculations based on [Eurostat 2022b]

decreased, and not the cultivation area. Therefore, the decrease in the level of agricultural production should not be treated as a result of the pandemic.

Over the years 2020-2021, an increase in the share of plant production in the global value was observed. Over the years 2015-2018, this share did not exceed 47.3%, with an average value of 46%, and in the last two years subject to the analysis, this rate exceeded 49%. At the same time, as a result of the increase in the share of plant production in global production, a decrease in the share of animal production occurred, which amounted to 48.6% in 2020, compared to 52.2% in 2019 and 48.3% in 2021.

According to the EAA accounts, the increase in the value of agricultural production was also accompanied by an increase in the value of intermediate consumption. This value steadily increased since 2017, however, the last year of the analysis and at the same time the second year of the COVID-19 pandemic in Poland brought the largest annual increase in the value of intermediate consumption – by 21.5%. This variable shows the amount of chemicals, fuels, seeds, etc. consumed in agricultural production. Analyses show that the level of intermediate consumption has a significant impact on labour productivity in agriculture [Sapolaite, Balezentis 2021]. However, taking into account the prices of the previous period, the value of intermediate consumption decreased by 1.6% (Figure 3). This means that in 2021, it was the costs and not the volume of intermediate outlays in agricultural production that increased significantly.

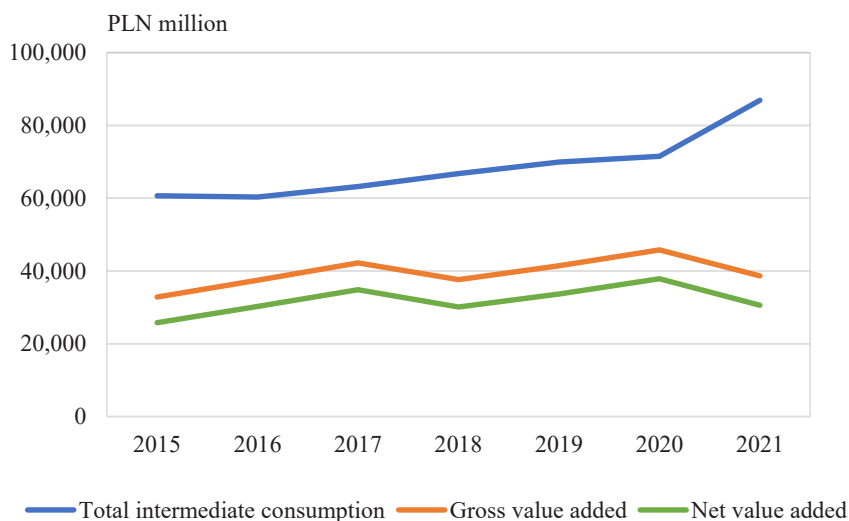


Figure 3. Value of intermediate consumption, gross and net value added of agriculture in Poland in 2015-2021 (current prices)

Source: as Figure 1

The value added in agriculture, both gross and net, steadily increased over the years 2015-2020, with the exception of 2018, which brought a decrease in gross value added by 11% and in net value added by 13.8%, respectively. The last year of the analysis, due to the much faster growth rate of intermediate consumption than the growth rate of production value, was characterized by a decrease in gross value added expressed in current prices by 15.5% and in net value added – by 19.2%.

Based on the dynamics of changes in the actual level of agricultural production, intermediate consumption, gross and net value added in Poland over the period of 2015-2021, it can be concluded that after a significant increase in 2020, production remained at a similar level in 2021 as in the previous year. The level of intermediate consumption, following an increasing trend from 2016, exhibited a slight decrease. The level of gross and net value added increased significantly in 2020 and remained unchanged in 2021. Therefore, it can be stated that during the COVID-19 pandemic, agricultural production increased in the first year of its duration, remained at a similar level in 2021, but unfavourable price changes, related to a significant increase in costs, caused the income situation of people working in agriculture to deteriorate significantly in the second year of the pandemic.

Analysing the income from factors of production at current prices, a very similar trend can be observed as in the case of gross and net value added. In the first year of the pandemic,

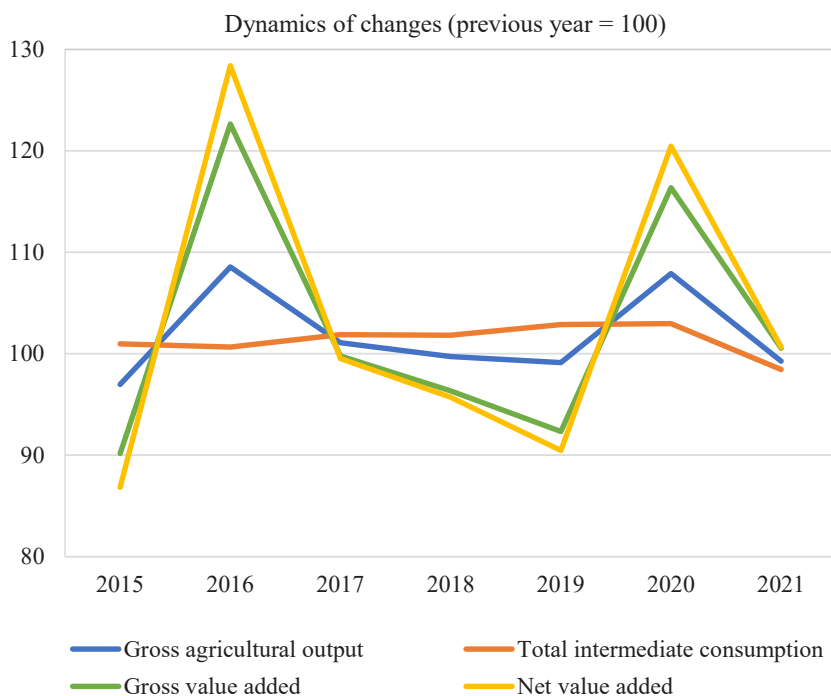


Figure 4. Dynamics of changes in the level of agricultural global production, intermediate consumption, gross and net value added in Poland in 2015-2021 (previous year = 100)

Source: own calculations based on [Eurostat 2022a, 2022b]

this income increased by 8.3% compared to 2019, while in 2021 it decreased by 17.2% (Figure 5). The income of an agricultural entrepreneur, which constitutes a measure of the remuneration level of unpaid labour resources, capital invested and lease payments on the basis of ownership in 2021, decreased by PLN 9,717 million, i.e., by 21.1% compared to the previous year and reached a level slightly higher than the level in 2016. Such a situation may have long-term effects on the further development of agriculture in Poland.

Converting the achieved income into total labour inputs involved in agricultural production, it can be stated that over the years 2015-2017, income increased, then in 2018 it decreased by 4.5%, and the next two years brought an increase in income by 8.6% in 2019 and by as much as 27.1% in 2020. The second year of the COVID-19 pandemic in Poland brought a 17.2% decrease in income (Figure 5).

The results of the analysis coincide with the results of the economic situation survey in Polish agriculture. Periodic changes occurred during the pandemic. The financial results (income situation) and moods of domestic agricultural producers deteriorated in the second quarter of 2020, i.e., at the time of the first blockade and the introduction of

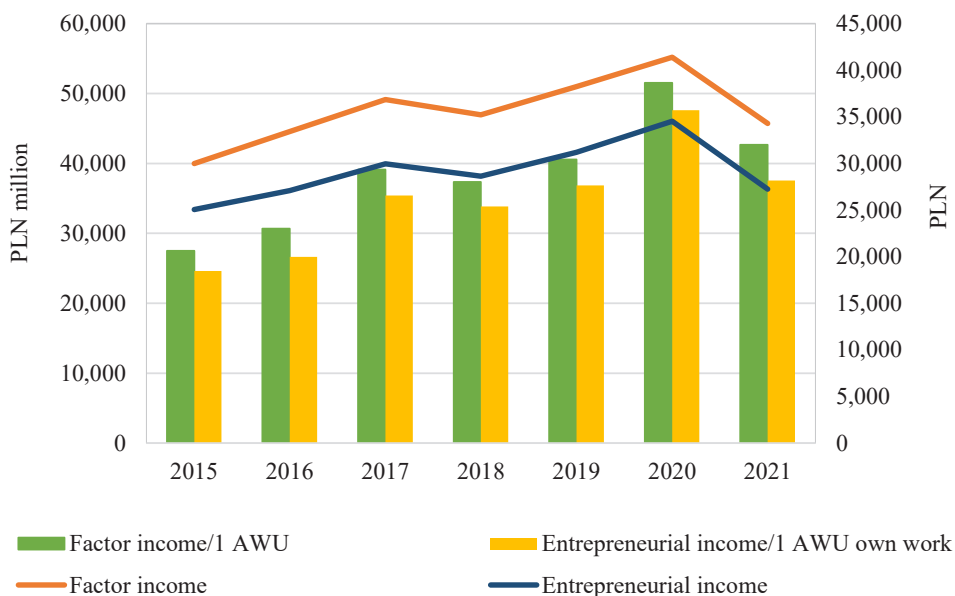


Figure 5. Factor income (left axis, PLN million), entrepreneurial income (left axis), factor income per 1 AWU (right axis, PLN) and entrepreneurial income per 1 AWU own work (right axis) in agriculture in Poland in 2015-2021

Source: own calculations based on [Eurostat 2022a, Eurostat 2022c]

governmental restrictions in the economy. In this quarter, the demand for agricultural raw materials and food products (mainly from the HoReCa sector) decreased significantly, as did the declining wage dynamics in relation to retail food prices. At that time, the dynamics of international agri-food trade also significantly slowed down due to the restrictions on the movement of goods between various countries. The prices of agricultural products dropped. The sector recorded an improvement in the economic situation and recovered some of its losses in the following quarter. This was the result of completed transactions, suspended due to the pandemic, cleared international trade channels and inflow of workers from neighbouring countries, relaxation of previously imposed economic restrictions and, to the smallest extent, the launch of indirect and direct support for agricultural producers by public authorities [Dudek, Śpiewak 2022]. The debt value of individual farmers has decreased, which could indicate a willingness to adapt to the increased uncertainty of farming conditions [Daniłowska 2022]. The year 2022 brought typical changes in the economic situation of the agricultural sector. The first and last quarters were characterized by a decrease in agricultural revenues typical for these periods. Importantly, the financial situation, in the opinion of farmers, deteriorated significantly. The dynamic increase in the prices of the means of production for agriculture and the rising costs of servicing loans in



the conditions of inflation contributed to a drastic decrease in expenditure on the purchase of the working means of production. In turn, the rising prices of fixed assets, construction materials and construction and assembly services, as well as the increase in interest rates on loans brought about an investment collapse in farming [Szajner, Walczyk 2021].

## SUMMARY

The value of global agricultural production in Poland at current prices increased over the years 2015-20. The real level of production over the years 2015-2021 indicated an increasing trend. The level of agricultural production fluctuated throughout the period analysed. In the first year of the pandemic there was an increase in production, mainly crop production, while the following year was characterised by a decrease. The likely factor shaping the fluctuations in production was therefore weather conditions rather than the occurrence of the pandemic.

During the analysed years, the current value of intermediate consumption increased. The largest increase was observed in the last year subject to analysis. However, when analysing the real values, it can be stated that the increase in the value of intermediate consumption in 2021 was mainly due to higher prices, as the real value of intermediate expenditures slightly decreased in 2021. This was reflected in agricultural value added, which, after a significant increase in 2020, decreased in the second year of the pandemic.

The consequence of the increase in the costs of indirect consumption being faster than the increase in the value of production in 2021 was a decrease in agricultural income. While in the first year of the pandemic, both income from factors of production and income of the agricultural contractor increased, the second year of the pandemic saw them drop considerably. The income situation in agriculture varied depending on the type of raw material. In the first year of the pandemic in Poland, the prices of plant products, especially cereals, increased significantly due to major changes in demand on the world market. In contrast, the prices of animal products decreased, mainly due to the occurrence of animal diseases, i.e. African swine fever (ASF) and avian influenza (HPAI). This situation has significantly reduced foreign demand for livestock production. The year 2021 brought a recovery in agricultural markets, but increasing cost pressures, as well as still lower demand in the food service sector than before the pandemic, brought a deterioration in the agricultural income situation, varying by product.

The deteriorating economic conditions, including, above all, the rising energy prices caused by Russia's aggression against Ukraine, as well as the rising costs of loans, significantly reducing their availability, may contribute to a significant deterioration of the financial situation of Polish farms, which may have an impact on the availability of food and food security to Polish families.

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## EKONOMICZNO-PRODUKCYJNA SYTUACJA POLSKIEGO ROLNICTWA W LATACH 2015-2021

Słowa kluczowe: rolnictwo, produkcja, dochody, COVID-19, Polska

### ABSTRAKT

Celem opracowania jest ocena ekonomiczno-produkcyjnej sytuacji polskiego rolnictwa w czasie pandemii COVID-19. Analiza dotyczyła lat 2015-2021, czyli obejmowała 5 lat przed pandemią i 2 lata trwania pandemii w Polsce (2020-2021), co pozwoliło na identyfikację ewentualnych zmian w czasie pandemii. Do zrealizowania celu wykorzystano dane Rachunków Ekonomicznych dla Rolnictwa – RER, publikowane przez Eurostat. Wykorzystano kwerendę biblioteczną oraz dane wtórne z bazy Eurostat. W latach 2015-2021 wartość i wielkość produkcji rolnej w Polsce wzrosła. W pierwszym roku pandemii wartość produkcji zwiększyła się nominalnie o 13,7%, a realnie o 8%. Wzrost ten wynikał przede wszystkim ze wzrostu wielkości produkcji roślinnej. Drugi rok pandemii przyniósł niewielki spadek wielkości produkcji – o 0,8%. Wynikał on głównie z pogorszenia plonowania roślin uprawnych. Okres pandemii charakteryzował się dużymi zmianami dochodów w rolnictwie. Niekorzystne zmiany cen w 2021 roku, związane z dużym wzrostem kosztów, spowodowały, że dochody w rolnictwie w pierwszym roku trwania pandemii wzrosły, jednak w drugim roku trwania COVID-19 sytuacja dochodowa znacznie się pogorszyła. Gorsze warunki gospodarowania, związane przede wszystkim ze wzrostem kosztów kredytów oraz cen środków do produkcji, mogą mieć znaczący wpływ na bezpieczeństwo żywnościowe polskiego społeczeństwa.

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