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# CHALLENGES FOR AGRICULTURE IN POLAND RESULTING FROM THE IMPLEMENTATION OF THE STRATEGIC OBJECTIVES OF THE EUROPEAN GREEN DEAL

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ABSTRACT: The aim of the paper is to indicate the most important challenges for agriculture in Poland in the context of the implementation of the European Green Deal and the Polish Strategic Plan for the Common Agricultural Policy for the years 2023-2027. The primary tool used in the study was a comparative analysis of legal EU and Polish documents. This comparison was supplemented by an analysis of statistical data on agriculture in Poland, mainly covering 2005-2020, obtained from the Agricultural Census 2020, Statistics Poland, the National Centre for Emissions Management, the Agricultural and Food Commercial Quality Inspection and the European Medicines Agency. The results show that the Polish national targets for 2030 are significantly lower than the European ones but have been set, taking into account the feasibility of their implementation, which means that meeting each of the primary national targets in the agricultural sector will be very challenging.

KEYWORDS: European Green Deal, agriculture, climate change, Common Agricultural Policy, Poland

## Introduction

Agriculture is an economic sector necessary for the proper functioning of society. Thanks to it, we are provided with a basic need, i.e. food security. The development of civilisation caused huge changes in the field of agricultural production, which ensured relatively easy availability of food and thus facilitated the rapid growth of the human population. As societies, we have become accustomed to this situation. At the same time, despite significant changes in agriculture, this sector is still dependent on the natural environment and climatic conditions. This dependence is often overlooked in business activities.

In the era of rapid changes taking place in the natural environment, the conditions for the functioning of agriculture are changing. This is mainly due to climate change, but agriculture, through its activities, affects the natural environment by changing agricultural production conditions. In this way, we are dealing with a feedback loop, i.e. the interaction of agriculture and the natural environment. Agriculture, as a result of intensive production, changes the atmosphere, leading, i.a., to the degradation of the soil, the reduction of biodiversity and changes in water relations and climate, which in turn affects the conditions of agricultural production. This situation means that after years of dynamic development, there are periods of lower harvest, which, combined with growing consumption, means that food is more expensive, and access to it may again be difficult. The trend of degradation of the natural environment under the influence of agriculture is likely to continue in the coming years.

For more than three decades, the need to implement the principles of sustainable development, including the agricultural sector, has been pointed out. The United Nations' latest project, the 2030 Agenda, contains 17 global goals that should be achieved by 2030. Of these, in agriculture, the second objective is important, i.e. "Eliminate hunger, achieve food security and better nutrition, and promote sustainable agriculture" (United Nations, 2015). The goal presented in this way shows the direction of changes in which global agriculture should go.

The European Union's actions are part of the global 2030 Agenda, which is reflected in the European Green Deal strategy (European Commission, 2019) announced in December 2019. This document determines the direction of changes taking place at the Community level. One of these directions is a group of goals aimed at increasing care for the natural environment in the agricultural sector. The objectives in this area are described in detail in two complementary strategies, i.e. Farm to Fork (is part of the global 2030 Agenda, which is reflected in the European Green Deal strategy (European Commission, 2020a) and the Biodiversity Strategy (are part of the global

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2030 Agenda, which is reflected in the European Green Deal strategy (European Commission, 2020b). Important environmental objectives are linked to mitigating climate change, but new, more ambitious specific targets have not yet been introduced in this respect.

The adopted commitments are implemented into Polish national solutions in the field of agriculture and make it necessary to adapt to new requirements as far as possible. Such actions have been taken, and as a result, the European Commission approved Polish Strategic Plan for the Common Agricultural Policy for 2023-2027 in August 2022 (MRiRW, 2022). This document contains the goals that agriculture in Poland must achieve. The question, therefore, arises as to how different the national targets are, compared to those adopted by the European Union as a whole and why this difference arises. In addition, it is important to determine how large the gap is between the commitments made and the current situation in agriculture. Its indication will allow us to determine how much effort should be made from the perspective of 2030 and what the path of agriculture in Poland to sustainable development looks like.

This paper aims to indicate the most important challenges for agriculture in Poland in the context of the implementation of the strategic objectives of the European Green Deal and the Polish Strategic Plan for the Common Agricultural Policy for the years 2023-2027. The study was based on our empirical analysis and on a review of the available literature and documents of the European Union and Poland.

## An overview of the literature

The European Green Deal is the European Union's fundamental development strategy for this decade. For this reason, this strategy is often described in the scientific literature (i.a., Siddi, 2020; Lapiere & McDougall, 2021), popular science (e.g. Sachs, 2019) and journalism (e.g. Harvey & Rankin, 2020). This document, although in its nature is a part of the current path of sustainable development of Europe, in fact, even more strongly accepts the need to protect the environment and climate in the broadly understood economy compared to previous strategic documents.

The basic assumptions of the European Green Deal strategy and its importance are extensively explained by the European Commission on its website (European Commission, 2022). The aim is to build a modern, resource-efficient and competitive economy in the perspective of 2050 characterised by: climate neutrality, separation of economic growth from the use of natural resources, and care for residents. Achieving such a goal requires changing the philosophy of thinking about the economy and development. The objectives

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are to be achieved, i.a., through the circular economy and to cover a wide range of activities of EU residents. Revolutionary changes should lead to a reduction of pollutant emissions, creation of new jobs and economic growth, reduction of energy poverty, reduction of external energy dependence and improvement of health and quality of life. These objectives are to be achieved with the contribution of all member states of the European Union and various economic sectors. The assumed pro-environmental and pro-climate transformation of Europe, as planned, will be co-financed by the EU and supported by the scientific community. However, the noble strategic objectives enshrined in the European Green Deal concern only the area of the European Union, which assumes the ambitions of a leader in this area in terms of the whole globe (Communication, 2019; Wrzaszcz & Prandecki, 2020; Gradziuk et al., 2021).

Ambitious EU goals and the pace of achieving them are differently assessed in the literature. On the one hand, the European Green Deal is treated as a desirable and even necessary step (Bongart & Torres, 2021; Switch-2green, 2022; van Zeben, 2020), and on the other hand, heavily criticised, especially for the pace of change. The direction of change also meets with criticism (Tomson, 2021). The latter is particularly noticed in Polish journalism. This attitude of the Polish authorities is also noticed in the international press (The Economist, 2021). It results partly from national conditions, which make it very difficult for Poland to meet the requirements of the European Green Deal (Kancelaria Senatu, 2020). This is mainly due to the energy system, which is predominantly based on coal and causes high emissions of pollutants, including greenhouse gases. Difficulties with changing the energy mix mean Poland is treated as the main deceleration factor of change processes.

The European Green Deal strategy is a crucial document outlining the direction of economic development. At the same time, detailed strategic objectives for individual sectors are specified in subsequent strategic documents developed by the European Commission. One of the sectors that are particularly important in the context of the stabilisation of the natural environment and climate is agriculture. Its importance is determined by the use of agricultural land – its area and management method. Agricultural practices provided by farmers determine the state of the natural environment and climate, mainly due to the scale of emissions of gases of agricultural origin (Ahmed et al., 2020; Zegar, 2012).

The relations between agriculture and its surroundings – the environment and climate – are bidirectional. Agriculture absorbs components of the environment due to their productive importance, including water and soil. The quality of agricultural practices determines the environmental and climate pressures and further their importance in supra-local terms. A properly

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conducted agricultural economy is an integral part of the ecosystem, while incorrect farming contributes to its destabilisation. Therefore, sustainable economic development is impossible without sustainable development of agriculture, which, in addition to its economic and social significance, is also assigned a particular environmental and climatic significance (Sadłowski et al., 2021; Wrzaszcz & Prandecki, 2020; Zegar, 2012).

The objectives for the agricultural sector are set out in the strategy and further described and justified in specific documents, i.e. in Farm to Fork (European Commission, 2020a) and the Biodiversity Strategy (European Commission, 2020b). In addition, many provisions on combating and adapting to climate change are linked to agriculture. Although the "Fit for 55" package has not entered into force (The Greens/EFA, 2022), its assumptions are still being processed (European Council of European Union, 2022), and the overall target for 2030 is to be achieved, although it seems less and less likely.

Those mentioned above European thematic strategies point to the problem areas of European agriculture, which should be included in the national strategic plans, clarifying agricultural practices and administrative activities adequate to the scale of the problem occurring in a given country. This approach results from the legitimacy of eliminating specific environmental and climate problems, as well as the need for administrative efficiency – both in terms of environment, climate, as well as production and economy (Czyżewski et al., 2020; Prandecki et al., 2021).

The changes in the agricultural sector brought about by the European Green Deal are being analysed in detail. In most cases, it is indicated that the direction of change is correct. It should be emphasised that considerations related to climate problems dominate (Rivas et al., 2021), but other issues are also addressed, i.a., the importance of soil condition (Montanarella & Panagos, 2021; Heuser, 2022; Fayet et al., 2022).

The implementation of the European Green Deal in agriculture is also criticised (Purnhagen et al., 2021) as contradictory or hindering the implementation of sustainable development. In this regard, criticism concerns the financing of the Common Agriculture Policy as an instrument supporting harmful, intensive agricultural practices and the lack of promotion of a healthy diet (EEB, 2022).

In Poland, the problem of the European Green Deal is also widely discussed in the context of agriculture. In many articles, there were concerns about the shape of the obligations that Poland would assume and the scale of burdens on farms resulting from it. The answers to these questions are given by the Polish Strategic Plan for the Common Agricultural Policy for the years 2023-2027. It is worth emphasising that it is one of the first seven plans approved by the European Commission. In addition to Poland, European Commission approved plans for Denmark, Ireland, Spain, France, Portugal

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and Finland. In September 2022, Plans for Luxembourg and Austria were also approved. Polish comments after adopting the CAP Strategic Plan should be assessed as optimistic. They highlight the size of funds allocated to support agriculture and increase care for climate and environmental problems (Adamska, 2022; Molenda, 2022). However, these articles lack an assessment of the commitments negotiated and do not mention the anticipation of the effort that will have to be made by the agricultural sector to fulfil the commitments made.

## Research methods

The primary tool used in the study was an analysis of the literature and legal documents, in particular, a comparative analysis of the European Green Deal and Polish Strategic Plan for the Common Agricultural Policy for the years 2023-2027. Such a comparison was necessary to assess the European and Polish strategic objectives in the agricultural sector and to determine how far the national targets are from the European ones.

The above research has been supplemented by an analysis of available statistical data showing the situation in agriculture in Poland, basically concerning the years 2005-2020. The latest data on the agricultural sector, collected from the Agricultural Census 2020, were used. Such an assessment made it possible to determine how much effort awaits agriculture in Poland to achieve the set goals. For this purpose, statistical data from Statistics Poland, the National Centre for Emissions Management, the Agricultural and Food Commercial Quality Inspection, and the European Medicines Agency were used.

In addition, literature and legal documents analysis helped to identify the research gap and assess the discussed documents.

## Results of the research

Green strategic objectives for European agriculture were outlined in several strategy papers for the EU (European Commission, 2020a; European Commission, 2020b; European Commission, 2020c). The objectives for European agriculture relate to six main problem areas (European Commission, 2020; European Commission, 2020b). In each of these problem areas, several targets were established. According to the authors, the most important targets mentioned in the above-indicated documents are:

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1. Fertilization management. The Commission will act to:
   – reduce nutrient losses by at least 50% while ensuring no deterioration in soil fertility,
   – reduce fertiliser use by at least 20% by 2030.

   Short argumentation: The excess of nutrients in the environment is a major source of air, soil and water pollution, negatively impacting biodiversity and climate.
2. Pesticide management. The Commission will take actions to:
   – reduce by 50% the use and risk of chemical pesticides by 2030,
   – reduce by 50% the use of more hazardous pesticides by 2030.

   Short argumentation: The use of pesticides in agriculture contributes to the pollution of soil, water and air.
3. Use of antimicrobials. The Commission will take action to:
   – reduce by 50% the sales of antimicrobials for farmed animals and aquaculture by 2030.

   Short argumentation: Antimicrobial resistance linked to antimicrobials in animal and human health leads to an estimated 33,000 human deaths in the EU each year.
4. Development of organic farming. The Commission will:
   – boost the development of EU organic farming areas with the aim to achieve 25% of total farmland under organic farming by 2030.

   Short argumentation: Organic farming is an environmentally-friendly practice that needs further development.
5. Protecting biodiversity in agricultural areas. The Commission underlines:
   – need to bring back at least 10% of agricultural area under high-diversity landscape features. These include, among other things, buffer strips, rotational or non-rotational fallow land, hedges, non-productive trees, terrace walls, and ponds.

   Short argumentation: This help enhance carbon sequestration, prevent soil erosion and depletion, filter air and water, and support climate adaptation. In addition, more biodiversity often helps lead to more agricultural production.
6. Climate action. The Commission has not indicated a clear reduction target for agriculture in European Green Deal. Such a goal is to be indicated in the Fit for 55 packages, which have not yet been adopted. In the existing documents, the climate target is mentioned, but its description is not unambiguous. The actions are to be used to:
   – implement agricultural practices such as precision farming, organic farming, agroecology, agroforestry and stricter animal welfare standards.

   Short argumentation: These practices will not only contribute to the achievement of the primary goal of reducing greenhouse gas emissions but

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also to the implementation of sustainable methods of food production at all stages of its production.

These strategic objectives to be achieved by 2030 have been adopted for the entire European Union. This does not mean that the objectives are translated into the same dimension for each Member State. The involvement of individual member states in the implementation of EU objectives is indicated in the national strategic plans that are being developed for the years 2023-2027. "The strategic plans will need to reflect an increased level of ambition to reduce significantly the use and risk of chemical pesticides, as well as the use of fertilisers and antibiotics" (European Commission, 2019). The shape of the national strategic plans, including declarations on the contribution to the achievement of European objectives, results from many months of negotiations with the European Commission, based on the substantive justification of the proposed values to specific strategic objectives related to the European Green Deal. In accordance with the general principles adopted in the EU, adequate to the state of agriculture, its current direction of development and the possibility of involvement in the implementation of individual objectives, each member state has been obliged to determine its contribution to the EU objectives. For Poland, the Strategic Plan for the Common Agricultural Policy for 2023-2027 was approved by the European Commission on 31 August 2022, thus formalising the contribution of Poland to the common European interest in the agricultural sector (MRiRW, 2022) and thus in the individual strategic objectives.

The National Strategic Plan, in addition to the objectives to which we will aim, focuses on actions aimed at farmers, which should contribute to the achievement of environmental and climate goals, indicating specific indicators for measuring the achieved result, taking a specific time (year, period) as a starting point in measuring changes.

## Fertilisation – the context of Polish Strategic Plan for Common Agricultural Policy 2023-2027 and current statistics

The contribution of Poland to the reduction of fertilisation in the perspective of 2030 in the EU will be determined by the changes planned for the years 2023-2027 in the values of the following indicators adopted by the European Commission, namely (MRiRW, 2022):

- gross nitrogen balance in kilograms per hectare of utilised agricultural area (in relation to the values from the reference period 2012-2014),
- gross phosphorus balance in kilograms per hectare of utilised agricultural area (in relation to the value from the reference period, i.e. 2012-2014),

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- percentage of groundwater monitoring stations where nitrate concentrations exceed 50 mg/l (compared to the values from the reference period, i.e. 2012-2015).

Taking into account the previous research conducted by the Institute of Soil Science and Plant Cultivation State Research Institute and the planned launch of activities for farmers encouraging rationalisation of fertilisation of assumptions under the Strategic Plan for 2023-2027, in the perspective of 2030 compared to the reference period, it is expected:

- reduction of nitrogen doses in mineral fertilisers by approx. 10.1 kg N · $ha^{-1}$ UR, i.e. 12.8%, to the level of 68.6 kg N · $ha^{-1}$ UR,
- reduction of phosphorus doses in mineral fertilizers by 3.2 kg P2O5 · $ha^{-1}$ UR, by 12.6%, to 22.2 kg P2O5 · $ha^{-1}$ UR,
- increase in gross nitrogen consumption in natural fertilisers by 20% per ha UR, i.e. up to 43.2 kg · $ha^{-1}$,
- increase in the consumption of phosphorus in natural fertilisers by 22.9%, to the level of 19.3 kg P2O5 · $ha^{-1}$ UR,
- reduction of gross nitrogen balances by 0.7 kg · $ha^{-1}$ (i.e. by 1.5%), which should be at the level of about 47.1 kg N · $ha^{-1}$,
- reduction of the phosphorus balance below the level recorded in recent years, i.e. 2.5 kg P · $ha^{-1}$ UR, by approx. 0.1 kg P · $ha^{-1}$ UR, i.e. 1.5%.

Proposals for intervention under the strategic plan and regulatory frameworks should contribute to reducing nutrient losses and fertiliser consumption, namely:

- Eco-scheme – carbon agriculture and nutrient management in terms of practices:
  - development and adherence to a fertilisation plan,
  - mixing manure on arable land within 12 hours of application,
  - application of liquid natural fertilisers by methods other than splashing,
  - simplified cultivation systems,
  - winter intercrops/intracrop seedlings,
  - diversified crop structure.
- Ekoschemate – conducting plant production in the integrated plant production system,
- Organic farming,
- Investments in farms in the field of Renewable Energy Sources (RES) and improvement of energy efficiency,
- Creation of mid-field trees and establishment of agro-forest systems,
- Premiums for afforestation and tree cover and agroforestry systems,
- Agri-environment-climate commitments,
- Investments contributing to environmental and climate protection (places for storing natural fertilisers, equipment for processing natural fertil-

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isers, equipment for precise application of fertilisers / mixing fertilisers with soil),
- Support for demonstration (model) farms (in the field of knowledge transfer on low-carbon storage techniques and the use of natural fertilisers),
- Agricultural Consulting,
- Implementations carried out outside the strategic plan resulting from the implementation of the nitrate programme (Rozporządzenie, 2020); act on fertilisers and fertilisation (Obwieszczenie, 2021); development of agricultural biogas plants.

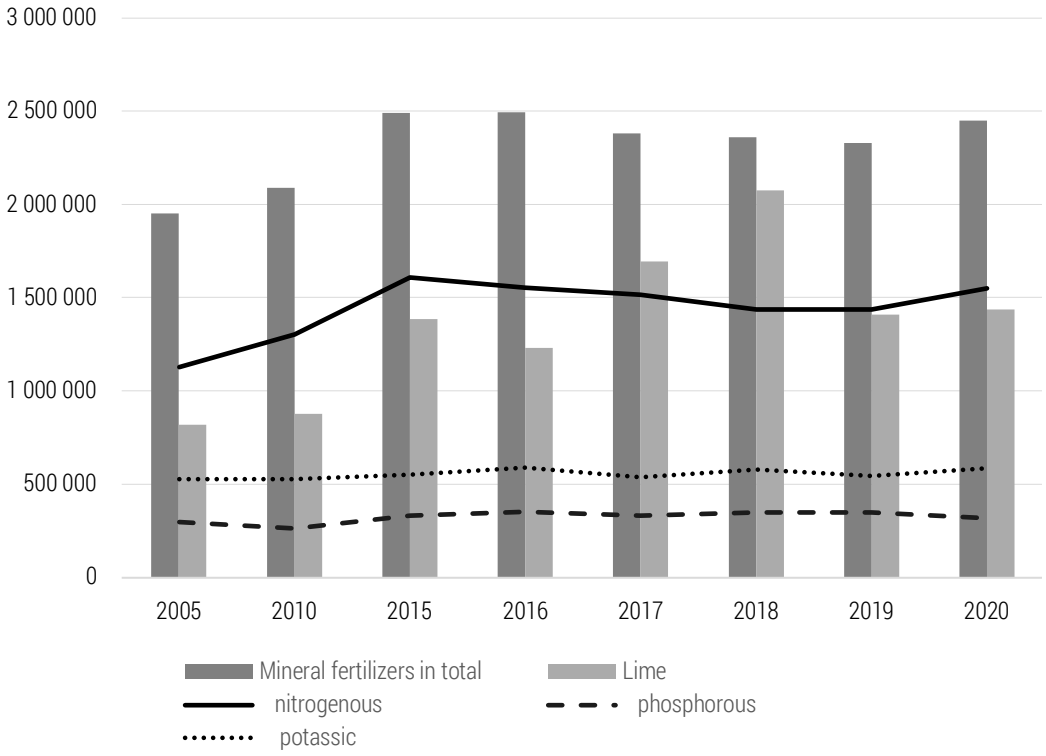


**Figure 1.** Sale of mineral fertilisers and lime in Poland [in terms of pure ingredients in tonnes]

Source: author's work based on GUS (2021b).

Taking into account the current statistics on fertiliser management in Poland, it is possible to outline the temporal intensity of fertilisation (Figure 1). Over the last dozen or so years, comparing extreme years, the turnover of

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mineral and calcium fertilisers has increased significantly. At that time, the number of mineral fertilisers sold increased by 1/4, but the biggest changes concerned nitrogen fertilisers, containing the main yield factor, nitrogen (increase by 37%, 2020/2005). In the case of phosphorus and potassic fertilisers, positive changes were at the level of several per cent. Given the need to regulate soil reactions, a critical agricultural practice is the use of calcium fertilisation. In this case, sales increased by more than 2/3 (2020/2005). However, the illustrated period is not homogeneous. The last 2 years have unfortunately been a time to limit the sale of liming agents.

Considering the indicators of monitoring changes in fertiliser management, the balance results of nitrogen and phosphorus are significant. As indicated by research based on detailed periodic surveys of fertiliser management, only a part of farms produces balance surpluses in this area (Figure 2).

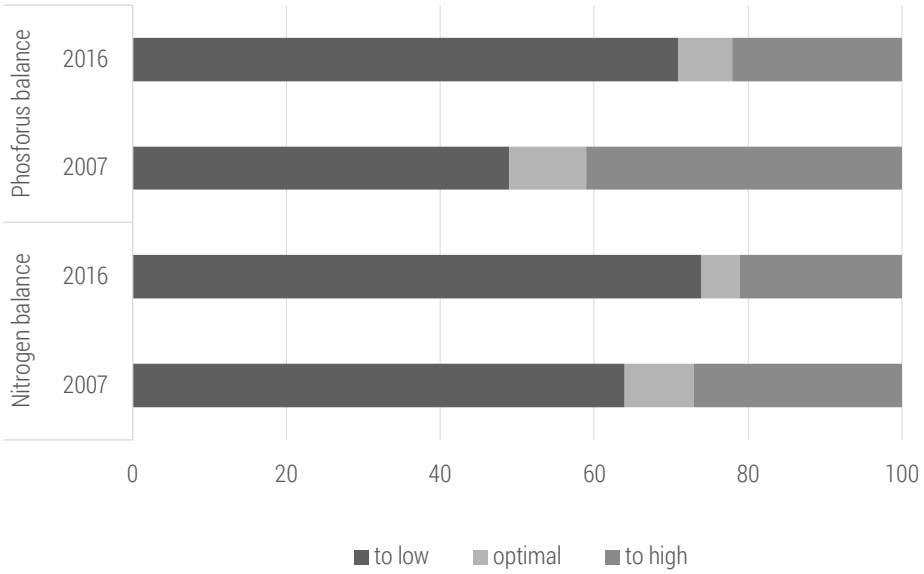


**Figure 2.** Individual farms structure based on the fertiliser balance [%]

Source: author's work based on Wrzaszcz and Kopiński (2019).

## Pesticides – the context of Polish Strategic Plan for Common Agricultural Policy 2023-2027 and current statistics

In the case of plant protection products, the following indicators were adopted to assess changes in agriculture in Poland in the context of the adopted strategic objectives in European strategies in the perspective of 2030 (the base period is 2015-2017) (MRiRW, 2022):

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- modified harmonised risk indicator HRI-1 – this indicator is based on data on sales of plant protection products,
- the rate of reduction of plant protection products containing active substances that are qualified for substitution.

The possibility of reducing the amount of plant protection products used (expressed in kg of active substance), as well as the scope of intervention planned in the strategic plan, is expected to limit it from approx. 3 to 9% by 2030. The recommended and possible level of plant protection products limitation was estimated by scientific institutions conducting research in this scope, e.g. The Institute of Agricultural and Food Economics – National Research Institute, The Institute of Plant Protection – National Research Institute, The Institute of Horticulture – National Research Institute (MRiRW, 2022). Taking into account the level of reduction of the HRI-1 index – that is the, one of the main indicators used to monitoring the progress in plant protection products – the aim of a decrease by 5 p.p. was assumed (comparing 2030/2019). The value of the HRI-1 index in 2019 was 85%, while the target value in the perspective of 2030 is 80%. However, the effectiveness of the HRI-1 index depends to a large extent on the withdrawal of acceptance of active substances used in plant protection products.

Key actions planned in the strategic plan contributing to the reduction in the use of plant protection products:

- eco-scheme – integrated agriculture,
- organic farming – the system eliminating chemical means of production in practice.

Based on the available, up-to-date statistics on the management of plant protection products in agriculture, a long-term upward trend in their sales is highlighted (Table 1). Comparing the years 2020/05, the total amount of plant protection products sold increased by more than 2/3. The peak took place in 2017, while recent years indicate a slight decrease in sales of selected ones. Depending on the type of these measures, the scale of changes varied. The key plant protection products are herbicides and fungicides.

The amount of active substance is a summary indicator informing about the activity of various plant protection products. In this respect, the last 5 years have been a period of stabilisation in the consumption of the active substance; however, comparing the values for extreme years, their use in the agricultural sector has increased by more than 50% (Figure 3).

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**Table 1.** Sales of plant protection products[a] in Poland [in commodity mass in tonnes] by harmonised classification of substances

| Plant Protection Products | 2005 | 2010 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2020/05 in % |
|---|---|---|---|---|---|---|---|---|---|
| Total | 41.135 | 51.613 | 67.298 | 68.106 | 71.446 | 65.335 | 68.907 | 69.849 | 70 |
| • insecticides | 1.917 | 2.945 | 4.687 | 4.569 | 5.440 | 5.451 | 8.267 | 3.413 | 78 |
| • fungicides | 9.915 | 12.867 | 18.268 | 18.253 | 17.429 | 19.744 | 17.858 | 22.710 | 129 |
| • herbicides | 24.455 | 30.228 | 38.799 | 39.544 | 43.030 | 35.864 | 36.185 | 38.910 | 59 |
| • plant growth regulators | 2.483 | 3.014 | 4.293 | 4.251 | 4.261 | 3.406 | 4.737 | 2.954 | 19 |
| • rodenticides | 249 | 147 | 56 | 46 | 1 | 1 | 131 | 176 | -29 |
| • others | 2.116 | 2.412 | 1.195 | 1.443 | 1.285 | 870 | 1.729 | 1.686 | -20 |

[a] Deliveries on the domestic market by producers and importers; from 2018 by holders of the authorisation of the Minister of Agriculture and Rural Development for the marketing of plant protection products.

Source: author's work based on GUS (2021b).

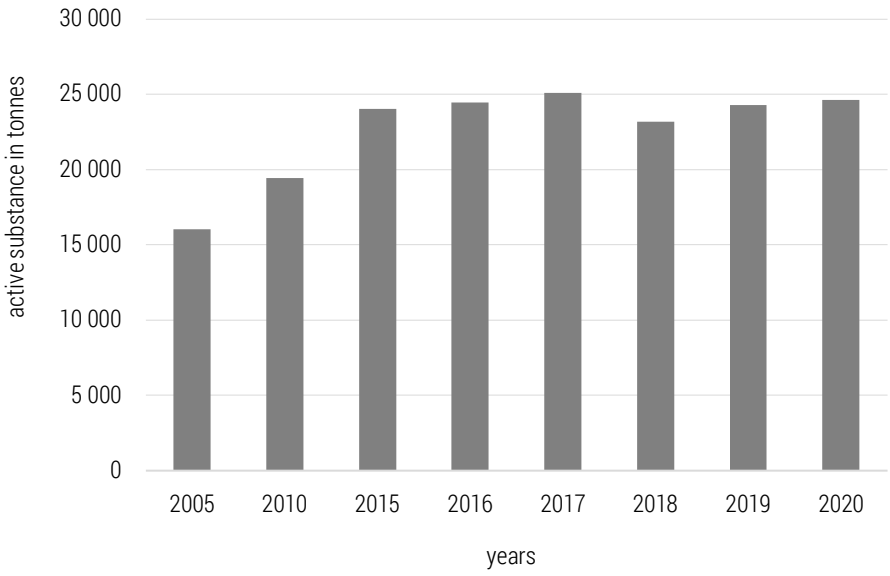


**Figure 3.** Sales of plant protection products in Poland [in active substance in tonnes]

Source: author's work based on GUS (2021a).

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## Use of antimicrobials – the context of Polish Strategic Plan for Common Agricultural Policy 2023-2027 and current statistics

A reduction in the use of antimicrobials in Poland is expected to be 10% up to 2030. This goal is to be achieved through a number of administrative actions aimed at ensuring animal welfare and broadly understood education of decision-makers in the agricultural sector. The actions positively assessed in the strategic plan by the European Commission, which are to contribute to reducing the use of antimicrobials, include (MRiRW, 2022):

- realization of the action: eco-scheme – animal welfare, which assumes the improvement of animal welfare, additionally translates into raising farmers' awareness of animal health,
- implementation of the action: investments – concerning the living conditions of animals, which concern m.in.:
  - the possibility of using paddocks or pasture (applies to cattle),
  - greater freedom of movement (in the case of pigs),
  - microclimate in livestock buildings, improving the health and comfort of animals.
- implementation of the action: investments to prevent the spread of African swine fever (ASF),
- introduction of higher standards in animal husbandry and breeding,
- development of cooperation between producers within the framework of food quality systems,
- conducting continuous training and advisory activities. Introduction of mandatory training for farmers on methods to reduce the use of antibiotics (intervention: occupational development of farmers) and on biosecurity methods and animal living conditions,
- national financial and legal tools implemented in three areas:
  - changes in the law – introduce a ban on the routine use of antibiotics,
  - introduction of digital solutions – electronic book of animal health (eBAH),
  - training for veterinarians.
- creating a website with a platform for knowledge and exchange of information for veterinarians and farmers,
- and the introduction of actions to increase consumers' knowledge of the products they buy,
- plan to introduce food passporting.

Statistics from the last few years indicate a positive trend in application veterinary antimicrobal agents (Figure 4). This tendency was accompanied by noticeable changes in the structure of antimicrobial use (Table 2). Microbials classified in the D category are in the majority, but the share of those antimicrobials decreased. Simultaneously, antimicrobials that act more

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intensively are becoming more and more popular (particularly those classified into categories C and B)[1].

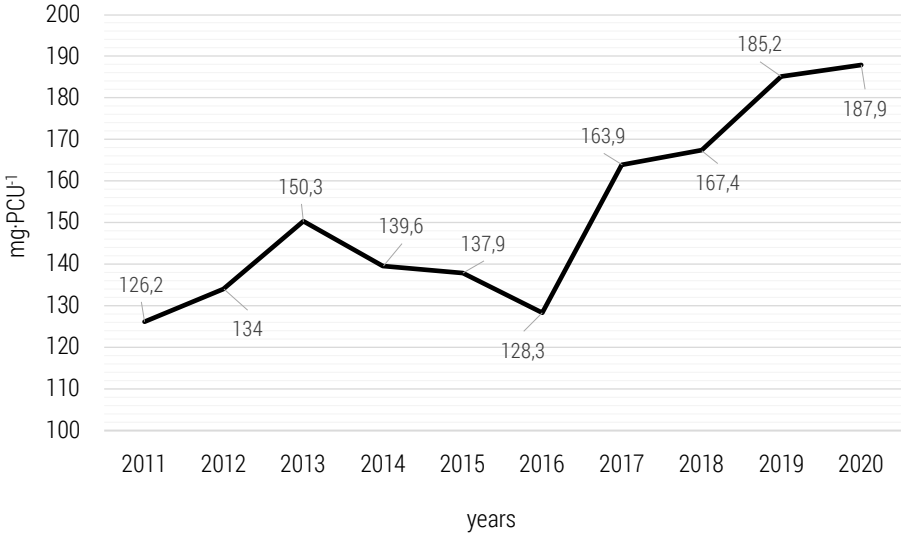


**Figure 4.** Annual sales of veterinary antimicrobial agents for food-producing species in Poland from 2011 to 2020 [in mg × $PCU^{-1}$]*

* Population correction unit (PCU) has been established as a denominator for the sales data (EMA, 2021).

Source: author's work based on EMA (2021).

**Table 2.** Veterinary antimicrobial use in Poland

| Specification | 2011 | 2018 | 2020 |
|---|---|---|---|
| Estimated PCU (in thousand tonnes) | 3.929 | 4.672 | 4.542 |
| Sale of veterinary antimicrobial agents (mg × $PCU^{-1}$) | 126.2 | 167.4 | 187.9 |
| Sale of 3rd- and 4th-generation cephalosporins (B category) (mg × $PCU^{-1}$) | 0.1 | 0.3 | 0.4 |
| Sale of fluoroquinolones (B category) (mg × $PCU^{-1}$) | 7.1 | 10.9 | 12.9 |
| Sale of polymyxins (B category) (mg × $PCU^{-1}$) | 4.1 | 7.4 | 9.1 |
| **Sales of the veterinary antimicrobial (% of mg/PCU in total):** | **2011** | **2018** | **2020** |
| Tetracyclines (D category), (% of mg × $PCU^{-1}$ in total) | 38.1 | 28.3 | 24.1 |
| Penicillins (D category), (% of mg × $PCU^{-1}$ in total) | 24.0 | 33.0 | 32.5 |
| Sulfonamides (D category), (% of mg × $PCU^{-1}$ in total) | 11.4 | 3.9 | 4.3 |

[1] According to antimicrobial classification, classes from A (meaning to avoid; they are contraindicated for use in food-producing animals) to D (to use wisely; if possible, these antibiotics should be used as a first-line treatment) were specified.

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| | | | |
|---|---|---|---|
| Macrolides (C category), (% of mg × $PCU^{-1}$ in total) | 5.4 | 12.1 | 13.2 |
| Fluoroquinolones (B category), (% of mg × $PCU^{-1}$ ) | 6 | 6.5 | 6.9 |
| Polymyxins (B category), (% of mg × $PCU^{-1}$ in total) | 3.5 | 4.4 | 4.8 |

Source: author's work based on Prandecki et al. (2021); EMA (2021).

## Development of organic farming – the context of Polish Strategic Plan for Common Agricultural Policy 2023-2027 and current statistics

According to the EU strategic documents for the 2030 perspective, the development of organic farming in the EU will be measured by the area covered by the organic management system (taking into account both the area during the conversion to this production system and the certified area – after the conversion period). Exactly the measure of this development will be the share of organic agricultural land (mentioned above) in the total agricultural land used. In the case of Poland, the proposed instruments should ultimately contribute to an increase in farmers' interest in organic farming. The adopted target for Poland is 7% of organic agricultural land in 2030 (MRiRW, 2022).

Planned interventions in the strategic plan and additional actions intended to support the development of organic farming:

- organic farming,
- eco-scheme – animal welfare,
- supporting the fight against varroa with medicinal products,
- improvement of infrastructure for planning and organisation of production,
- information, promotion and marketing activities;
- investments in agricultural holdings increasing competitiveness,
- development of small farms,
- developed cooperation within the value chain,
- premiums for young farmers,
- establishment and development of producer organisations and agricultural producer groups,
- promotion, information and marketing of food produced under quality schemes,
- support for participants in EU and national food quality schemes,
- cooperation of EIP Operational Groups,
- agricultural Advisory interventions.

In addition: Program for schools on organic products as part of school classes.

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These activities include support for the various stages of the organic food chain, i.e. agricultural production, processing, investment and education, and integration of decision-makers.

In the long term, there has indeed been an increase in organic agricultural area (Figure 5) – between 2020/2004, the total organic area increased by about six times. At that time, there were also periods of decline in organic agricultural land, primarily dictated by the change in the support rules for organic entities. Organic farming development in Poland is mainly determined by administrative support. The changes in subsidies to organic areas of agricultural land resulted in a decrease in farmers` interest in this production system, observed in the organic area fall after 2014 (Wrzaszcz, 2022).

Currently, the share of organic agricultural land area accounts for about 3.5% of the total agricultural land. In the structure of these areas, the most significant part currently falls on fodder crops and permanent grassland (Figure 6), although their production importance in the organic management system is decreasing.

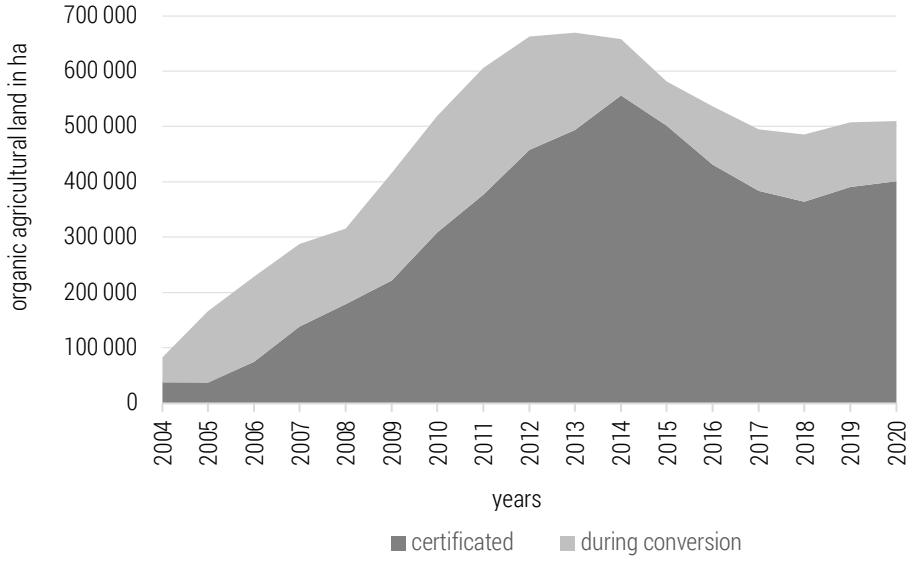


**Figure 5.** Organic Agricultural land (certificated and during conversion to organic production) in Poland in ha

Source: author's work based on GUS (2021b); IJHARS (2007); IJHARS (2009); IJHARS (2011); IJHARS (2013); IJHARS (2015); IJHARS (2017); IJHARS (2019); IJHARS (2021).

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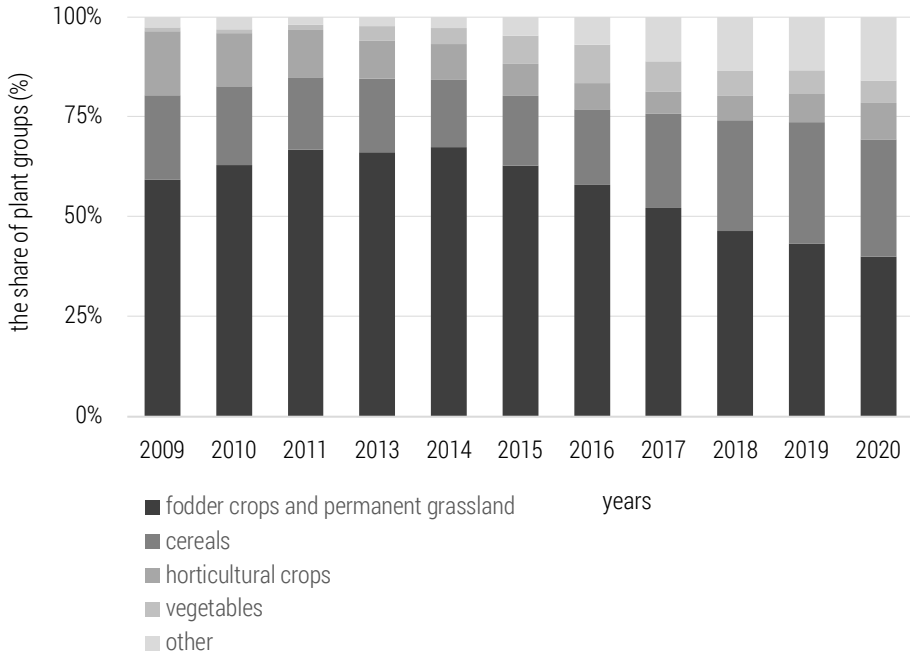


**Figure 6.** Structure of organic agricultural land use in Poland [%]

Source: author's work based on IJHARS (2007); IJHARS (2009); IJHARS (2011); IJHARS (2013); IJHARS (2015); IJHARS (2017); IJHARS (2019); IJHARS (2021).

## Protecting biodiversity in the agricultural area – the context of Polish Strategic Plan for Common Agricultural Policy 2023-2027 and current statistics

The biodiversity protection on agricultural land amounts to using part of the land for non-productive purposes. In the case of Poland, the EC has accepted a level of 4% of the agricultural land area (MRiRW, 2022).

The strategic plan and general regulation propose actions to preserve biodiversity, including:

- introduction of at least 4 % of the arable area of the holding for non-productive areas and facilities in the primary set of land,
- action: preservation of orchards of traditional varieties of fruit trees,
- legal regulations concerning the protection of diversity on arable land,
- investment activity: mid-field trees, agroforestry systems and support for the nurturing of these landscape elements.

In Poland, according to EU data, 2.3% of the agricultural area is occupied by landscape elements. The Agency of Restructuring and Modernization of Agriculture (ARMA) data on all farms indicated that the total area of landscape features in these farms is 3% of the total agricultural area, so-called

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ecological focus areas (EFA): fallow land, linear trees, mid-field groves, hedges, single trees, ponds, ditches, buffer strips and strips of land on the edges of forests (MRiRW, 2022).

The fragmented area structure of farms is conducive to preserving landscape elements, which are also a reservoir of nature. Despite the observed changes in the decreasing number of farms, which is accompanied by the process of land concentration, small farms still dominate in terms of land used (Figure 7). Currently, over 80% of farms have an area of up to 15 ha, which use 1/3 of the area of used agricultural land.

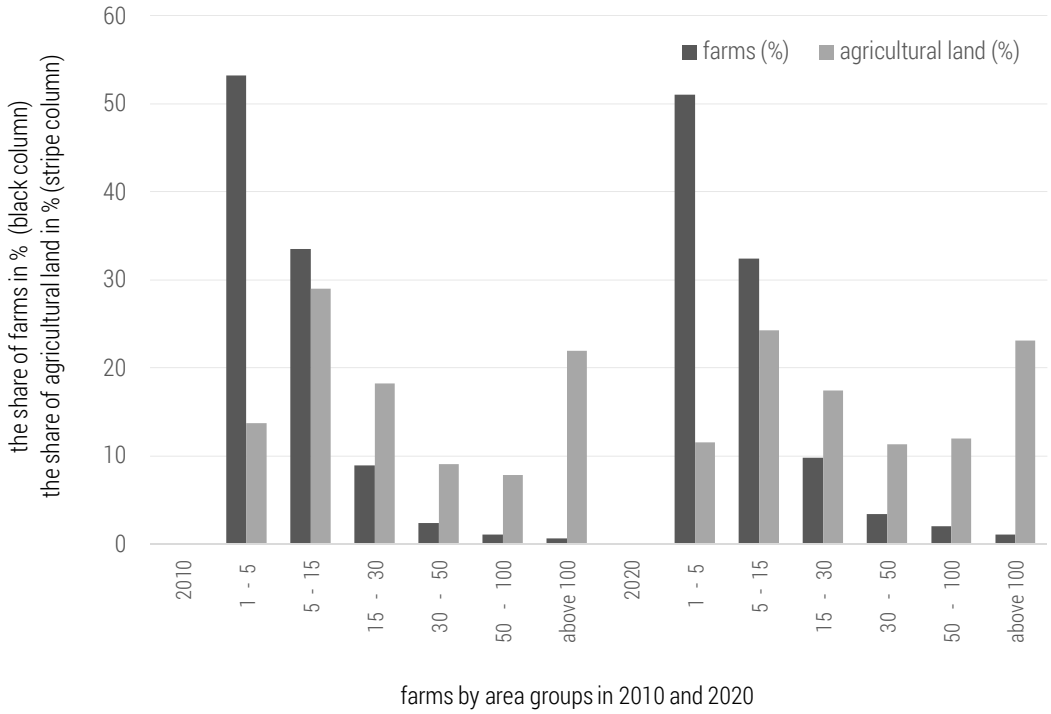


**Figure 7.** Structure of farms by agricultural land [%]

Source: author's work based on GUS (2022).

## Climate action – the context of Polish Strategic Plan for Common Agricultural Policy and current statistics

In accordance with the provisions of the Paris Agreement (United Nations, 2015), the European Union has decided to achieve climate neutrality by 2050 (European Commission, 2018). This target is reaffirmed in the European Green Deal, which also sets a target of at least 50% and potentially a 55% reduction in emissions compared to 1990 in 2030. A 55% reduction in emis-

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sions was assumed to require emission reductions in non-ETS sectors, i.e. not covered by emissions trading, of 40% compared to 2005. Changes in this area were to be adopted in the summer of 2020, but in practice, the relevant package has not yet been adopted. This means that Member States are meeting their current targets, i.e. a 30% reduction in emissions compared to 2005. In the case of Poland, this means a reduction of 7%, but it is worth noting that by 2020, Poland was entitled to a 14% increase in emissions in non-ETS sectors. Poland has partially benefited from this privilege (Table 3), which means that in practice, the reduction effort is much more significant than it results from the documents. The goal for agriculture in Poland is to reduce emissions below the level of 29,702.4 kt eq $CO_2$. This means an actual reduction of 13.44% compared to 2020 emissions.

Table 3. Greenhouse gas emissions in Poland in 2005 and 2020 [GHG kilotonnes converted to $CO_2$ equivalent]

| Specification | 2005 | 2020 | Change from 2005 in % |
|---|---|---|---|
| Polish GHG emission | 405 202.26 | 376 038.46 | -7.2% |
| Agriculture | 31 938.07 | 34 314.52 | +7.44% |

Source: author's work based on (Ministry of Climate and Environment, 2022).

However, the reduction targets described above are not included in the strategies related to EGD and agriculture. The EGD assumes that at least 40% of CAP funding should be linked to climate change, and the Farm to Fork Strategy (European Commission, 2020a) identifies practices to implement sustainable climate-friendly solutions. In the context of climate, the aim is to ensure that the food chain has a neutral or positive impact on the environment, i.a., by helping to mitigate and adapt to climate change.

In this spirit, the Polish Strategic Plan for the Common Agricultural Policy for the years 2023-2027 has also been drawn up. It does not indicate specific reduction targets but only indicators concerning the use of specific practices. Six specific objectives have been set. These are:

1. Reduction of greenhouse gas emissions from agriculture.
2. Adaptation of agriculture and forestry to climate change – reduction of weather and disease risks.
3. Increasing the absorption and storage of coal, i.a., as a result of afforestation of the weakest agricultural land.
4. Development of sustainable energy based on non-food uses of agricultural and forestry biomass.
5. Exploiting and developing alternative energy production opportunities.
6. Raising awareness of climate change mitigation and adaptation.

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Emission reduction is to be achieved through implementing mandatory requirements (the enhanced conditionality) and voluntary requirements included in the eco-schemes. The actions are taken to result from the requirements presented in the Farm to Fork Strategy (European Commission, 2020a) and are associated with reducing greenhouse gas emissions and maintaining carbon resources in the soil. Among the eco-schemas taking into account and admiring climate objectives, the most important should be considered Coal Agriculture and Nutrient Management, which implements such practices as winter catch crops/mid-crop seedlings, development and compliance with the fertilisation plan in the primary and liming variants, diversified crop structure, mixing manure on arable land within 12 hours of application, application of liquid natural fertilisers by methods other than splashing, simplified cultivation systems and mixing straw with soil.

An appropriate number of points has been assigned to each of the practices, and the condition for joining the eco-schemes is to obtain at least the number of points that corresponds to the equivalent of the points that the farmer would receive if at least 25% of the agricultural area of the highest-scoring practice were implemented.

In addition, in the context of climate, attention should be paid to eco-schemes:

- water retention on permanent grassland,
- actions for environmental protection and climate change mitigation (investment activities),
- protection of valuable habitats and endangered species in Natura 2000 sites,
- afforestation commitments from RDPs 2004-2006, RDPs 2007-2013, RDPs 2014-2020,
- organic farming,
- protection of valuable habitats and endangered species outside Natura 2000 sites,
- extensive use of meadows and pastures in Natura 2000 sites,
- preservation of orchards of traditional varieties of fruit trees,
- conservation of endangered plant genetic resources in agriculture,
- conservation of endangered animal genetic resources in agriculture,
- premiums for afforestation and trees and agroforestry systems,
- agri-environment-climate commitments implemented under the agri-environment-climate measure RDP 2014-2020. Package 4. Valuable habitats and endangered bird species in Natura 2000 sites,
- agri-environment-climate commitments implemented under the agri-environment-climate Measure of the Rural Development Programme for 2014-2020 (RDP 2014-2020). Package 5. Valuable habitats outside Natura 2000 sites,

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- agri-environment-climate commitments implemented under the agri-environment-climate Measure of the Rural Development Programme for 2014-2020 (RDP 2014-2020). Package 1. Sustainable agriculture,
- creation of mid-field trees,
- establishment of agroforestry systems,
- enhancing the biodiversity of private forests,
- investments in agricultural holdings in the field of RES and improving energy efficiency,
- investments contributing to environmental and climate protection,
- development of agricultural and forestry services (Financial instruments).

The multiplicity of climate-related eco-schemes shows the growing importance of this problem in agricultural policy. At the same time, it should be noted that many of the above-mentioned activities are related to adaptation to changing conditions and not to the reduction of greenhouse gases.

## Discussion – challenges for agriculture in Poland

The introduction of the European Green Deal at the end of 2019, and the core agricultural strategies, i.e. the Farm to Fork Strategy and the Biodiversity Strategy in mid-2020, triggered an international discussion on the legitimacy and feasibility of implementing these strategies in the EU and its countries (Wrzaszcz & Prandecki, 2020; Adamowicz, 2021; Prandecki et al., 2021; Ziętara & Mirkowska, 2021; Gargano et al., 2021; Blake, 2020; Matthews, 2021; Popescu et al., 2022). In view of the importance of agriculture in ensuring Europe's food security and its impact on the natural environment and climate, this discussion concerns the agricultural sector as well. While the legitimacy of the adopted strategic objectives for the EU is emphasised by many researchers, the scope and manner of involvement of Member States in achieving the EU objectives is a particularly difficult topic (Prandecki et al., 2021; Wrzaszcz, 2022).

For several months, negotiations between representatives of the Member States and the European Commission on the participation of individual countries in Community objectives have been ongoing. So far, in scientific studies, there has been information that EU objectives will be translated into national objectives in the same dimension (Adamowicz, 2021; Gradziuk et al., 2021; Ziętara & Mirkowska, 2021; Wrzaszcz & Prandecki, 2020). Since the end of August, when the first national strategic plans of selected Member States were accepted – including the plan for Poland and the other 6 Member States – documents informing about the strategic objectives adopted in a given country in the context of the European Green Deal have been in general circulation (MRiRW, 2022).

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Taking into account the strategic objectives adopted for agriculture in Poland against the background of the objectives for the EU in the perspective of 2030, they can be considered significantly lower compared to the targets for the EU. However, the adopted objectives should not be assessed as unambitious or insufficient, but adapted to Poland's agriculture specificity. The adopted figures in the Polish strategic plan resulted from the specificity of agriculture in Poland, its current development path and the possibility of introducing the expected changes.

Based on the empirical and literature analyses carried out, the strategic objectives for agriculture set out in the European Green Deal are appropriate and justified. Taking into account the substantive scope of individual strategic objectives, these challenges for the agricultural sector in Poland can be grouped as follows:

- reduction in fertilisation:
  - determination of the scale/reduction needs of fertilisation on holdings generating excessive nitrogen and phosphorus balance surpluses,
  - the inclusion in the balance of the fertiliser balance of all sources of entry and exit of nutrients into the soil,
  - taking into account the state of soil acidification, which determines the efficiency of the use of nutrients by plants,
  - taking into account the abundance of soils in nutrients according to the location of a particular agricultural holding,
  - popularisation of tools and information on the rationalisation of fertilisation in order to raise the awareness of decision-makers and improve agricultural practices.
- reduction for plant protection products:
  - the establishment of the scale/reduction needs of plant protection products in the case of holdings abusing these chemical plant protection products,
  - popularisation of tools and information on the rationalisation of the use of plant protection products in order to raise awareness among decision-makers and improve agricultural practices.
- reduction in antimicrobials:
  - restricting the use, in particular in the case of farms abusing these measures,
  - dissemination of tools and information on the rationalisation of the use of antimicrobials in order to raise awareness among decision-makers and improve agricultural practices.
- development of organic farming:
  - taking into account the current state of organic farming, the relative area of the organic agricultural area should be doubled over the next few years,

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  - stimulating, including through administrative bodies, the development of this production system in particularly predisposed areas, including those equal to landscape, tourist or natural values,
  - popularization of tools and information on the specifics of the organic production system in order to raise the awareness of decision-makers and improve agricultural practices,
  - the development of financially lucrative administrative tools to compensate and encourage conventional farmers to reorient their production towards sustainability.
- providing valuable elements in terms of landscape and biodiversity on agricultural land:
  - inventory of natural and landscape resources on agricultural land on various farms in terms of their size,
  - the maintenance of resources on holdings with areas of landscape and nature,
  - stimulating farmers who do not have valuable areas in their holding resources to separate part of the land for the development of nature.
- action to reduce climate change:
  - increasing the rationality of fertilisation,
  - increasing the use of carbon-retaining practices in soil,
  - reduction of emissions from agricultural sources.

In addition to the specific objectives, the achievement of which is a significant challenge, there are also general challenges related to the transformation of European agriculture towards further sustainable development (compare: Wrzaszcz & Prandecki, 2020):

- substantive – the adopted strategic objectives for the EU, as well as for Poland, are ambitious, thus increasing the risk of not achieving them,
- administrative and legal – it is necessary to adapt administrative institutions and other institutions functioning in the farmer's environment, as well as legal regulations at the European and national level, to develop internally coherent documents enabling monitoring of the results assumed in the adopted strategies and plans,
- social – encouraging the introduction of different practices for the sustainable development of agriculture, taking into account the different links of the food chain, by building awareness among consumers, producers, processors, and sellers, as well as the institutional environment of farmers, including advisers,
- financial – ambitious solutions involve adequate costs, both by public institutions and individual farmers,
- global – global challenges vs. European actions. The need to initiate global actions, including international cooperation, also taking into account the

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principles of trade in agri-food products produced with different absorption of environmental and climate resources,
- geopolitical – the current geopolitical situation related to the ongoing war in Ukraine forces a correction of European actions for both budgetary and economic reasons.

## Conclusions

The paper discusses the agricultural challenges in Poland in the context of strategic goals resulting from the European strategy – the European Green Deal. These objectives are located within the framework of the current documentation on the requirements faced by the agricultural sector in Poland. The presentation of selected common statistics relating to the main strategic areas made it possible to sketch the main trends and scale of key problems.

The study highlighted the need to transform agriculture towards further sustainability. This transformation has been ongoing in the EU since the beginning of the 90s of the XX century. Despite a number of EU policies and national programmes implemented over the past 30 years, environmental and climate pressures, including on agriculture, continue to increase. Due to the interconnected relations between the natural environment and human economic activity, it is necessary to continue the implementation of agricultural practices "at least" eliminating the negative impact of agricultural activity on the environment. The European Green Deal is another step towards the sustainable development of the European Union. In the coming years, further efforts to sustainable agriculture will be expected.

The contribution of Poland to the achievement of the objectives of the European Union is significantly lower than the values adopted for the entire EU, which results from the current development of agriculture in Poland and the possibility and legitimacy of the changes. Implementing most of the national strategic objectives adopted in the perspective of 2030 in the agricultural sector will involve a number of activities stimulating farmer activity (including administrative actions, compensating the economic effort undertaken, as well as legal actions – obliging to the basic scope of practices).

Further transformation of agriculture in Poland, although it is justified, is not easy. It is associated with a number of challenges of a general nature (including legal, organisational, social, financial, substantive, geopolitical, and global challenges) and specific challenges (challenges related to the management of chemical means of production in agriculture, as well as the preservation of valuable landscape elements, climate stabilisation and development of organic farming on agricultural land). With regard to the latter, the contribution to the achievement of the specific objectives of the European

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Green Deal should result from the activity of different groups of agricultural holdings in line with their organisation and the appropriateness of introducing the indicated agricultural practices for the environment and climate. The critical issue in this respect is determining which farms should make the most significant reduction and development effort in the context of the adopted strategic goals.

To sum up, the scope of challenges related to the implementation of the European Union and specific Member States, including Poland, is a multifaceted range. The success of success will depend on actions on many levels by different decision-makers of the agri-food chain.

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## The contribution of the authors

Both authors have equally participated in the preparation of this work. All aspects were discussed and shared between authors. Konrad Prandecki: conception – 50%, literature review – 50%, acquisition of data – 50%, analysis and interpretation of data – 50%. Wioletta Wrzaszcz: conception – 50%, literature review – 50%, acquisition of data – 50%, analysis and interpretation of data – 50%.

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