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REGIONAL SPECIALISATION OF STARCH POTATO FARMS IN POLAND

Introduction

The main industrial use of potatoes is in the production of starch. Starch and its modifications are used as components in the manufacture of many products. Approx. 55% of the starch production and its derivatives are used in various branches of the food industry. The widespread use of starch in the food industry (e.g., dairy, meat, confectionery and fruit and vegetable sectors) is due to its thickening and texturising properties. Approx. The paper industry consumes 15% of production, about 10% by the pharmaceutical and cosmetics industry and about 5% by the textile industry. In addition, starch products are used in the mining, metallurgical and chemical industries, the production of plastics and biodegradable packaging, and drilling (Zgórska 2010). Nowacki (2015) estimates that the starch industry consumes about 750,000 t of potatoes annually.

Potatoes that provide the raw material for starch production are referred to as starch potatoes. According to Nowacki (2013), the limitation for the production of starch from potatoes is the possibility of obtaining it from price-competitive alternative raw materials, such as corn or tapioca. This author also points out that starch potatoes are the second most productive raw material in spirit production after sugar beet (120-125 l of spirit can be obtained from 1 tonne of starch potatoes). However, their relatively high price and troublesome storage and warehousing are barriers to broader use in distilling, mainly using waste potatoes (Nowacki 2013; Nowacki 2015).

According to Nowacki (2015), the polarisation of potato production in Poland has been progressing for many years: on the one hand, there is a concentration of production of potatoes for packing, food processing or starch, and on the other hand, the scale of cultivation in small farms growing potatoes for self-supply is decreasing.

Objective, subject matter and method of research

The study aims to identify spatial diversification of starch potato crops in agricultural land at the voivodship level and inter-regional diversification of the size fraction of farms cultivating starch potatoes in Poland. Thus, the research problem is a regional specialisation of agricultural holdings in starch potato production in Poland.

The research used data from CSO publications (2018a; 2018b) - among others, data on the number of submitted applications for the single area payment/payment for the area of starch potato crops and the area of agricultural land/starch potato crops declared in these applications, referring to 2017. This data can successfully establish the spatial distribution of starch potato production in Poland, even though a certain part of agricultural land is held by entities that do not apply for direct payments and are therefore not included in these statistics. However, it is unlikely that starch potatoes are grown on this land, or if they are, they are of marginal importance.

Declaring agricultural land on which agricultural activity is carried out for direct payments is common due to the high level of support compared to the income generated from the sale of agricultural products. In the case of starch potato crops, the unit level of support in 2017 was generally at least PLN 1,934.34/ha, consisting of the single area payment (PLN 461.55/ha¹), the cost for agricultural practices beneficial for the environment and climate (PLN 309.77/ha²) and the payment for the area of starch potato crops (PLN 1,163.02/ha³). Moreover, in the case of farms exceeding 3 ha, the unit level of support was higher due to the application of the redistribution payment, the rate of which amounted to 177.02 PLN/ha⁴, while it should be emphasised that the redistribution payment is entitled - according to the principle set out in Article 14 of the Act... (2015) - not to the area of specific crops, but the number of hectares included in the holding, contained in the range (3; 30]. Irrespective of this, if a so-called young farmer owned the holding, the applicant was also entitled to payment for young farmers, the rate of which was equal to 214.82 PLN/ha⁵, but in the case of this form of support - according to Article 13 of the Act... (2015) - an area limit of 50 ha is applicable. According to the Announcement... (2018) - the average income from work in individual agricultural holdings from 1 conversion ha, which income

¹ This rate is set out in the Regulation of the Minister of Agriculture and Rural Development of 9 October 2017 on the single area payment rate for 2017. (Journal of Laws, item 1887).

² This rate is set out in the Regulation of the Minister of Agriculture and Rural Development of 9 October 2017 on the rate of greening payment for 2017. (Journal of Laws, item 1894).

³ This rate is set out in the Regulation of the Minister of Agriculture and Rural Development of 9 October 2017 on the rates of crop area-related payments for 2017. (Journal of Laws, item 1893).

⁴ This rate is set out in the Regulation of the Minister of Agriculture and Rural Development of 9 October 2017 on the rate of the additional payment for 2017. (Journal of Laws, item 1895).

⁵ This rate is set out in the Regulation of the Minister of Agriculture and Rural Development of 9 October 2017 on the rate of payment for a young farmer for 2017. (Journal of Laws, item 1890).

is calculated taking into account the income from direct payments, amounted in 2017 to PLN 3,399.00. Thus, it can be assumed that in the case of starch potato crops, the income from direct payments accounted on average for at least 57% of the revenue obtained from the unit area of cultivation.

In this context, it should be added that some entities carrying out agricultural activities are not beneficiaries of the direct support system due to the so-called minimum requirements for receiving payments (See Sadłowski 2017). Suppose these entities abandon their applications for payments. In that case, both they and the crops they grow will not be included in the data collected by the Agency for Restructuring and Modernisation of Agriculture in connection with the processing of applications for direct payments, which are published in an aggregated form by the CSO. Nevertheless, it is unlikely that in this particular group of producers, starch potato cultivation is significant, i.e. an agricultural product that is not produced for the holding's own needs, but constitutes commercial production - is a raw material for industrial starch production. The rationality of this direction of production requires its development on a certain scale - it is necessary to produce starch potatoes in relatively large quantities to deliver appropriate batches to processing plants profitably. In the case of farms below the so-called area threshold, i.e. farms with less than 1 ha of utilised agricultural land⁶, this may be very difficult. For the same reasons, it is doubtful that significant starch potato production will develop on agricultural parcels of less than 0.1 ha, which - under Article 8(1)(3) of the Act... (2015) - cannot be covered by direct support.

Another issue to bear in mind, when using the data declared in the payment claims to assess the degree of concentration of cultivation of a given crop and the popularity of a given line of production in particular regions, is the possible discrepancy between the area declared in the payment claims and the area accepted for payment. However, this discrepancy is negligible since the applicant faces penalties for incorrect declarations. Moreover, possible differences occur only in one direction (the area approved for payment may possibly be smaller than the area declared in the application), and it may be assumed that they are evenly distributed in all voivodships. It is similar to the discrepancy between the number of applicants and the number of beneficiaries.

⁶ The minimum requirement for receiving payments in the form of an area threshold is established in Article 7(1)(2) of the Law... (2015). However, pursuant to Article 10(3) of the Regulation... (2013), European Union Member States that have opted to apply an area threshold and at the same time grant so-called production-related support in animal production sectors - for farmers applying for animal payments not meeting the area requirement - are obliged to apply a quota requirement. Therefore, Article 7(2)(2) of the Law... (2015) establishes a quota threshold. Consequently, if the total amount of direct payments (not including the so-called transitional national support) to be granted to a given farmer applying for animal support is at least the PLN equivalent of EUR 200, the farmer meets the minimum requirements for receiving payments.

Bearing in mind the above argumentation, it can be stated that the use of the data referred to in the second paragraph of this part of the study, in order to identify regional specialisation of agricultural holdings in starch potato production in Poland, is legitimate.

In the research, the results of which are presented in this article, two indicators were used: the indicator calculated as the ratio of the area of starch potato cultivation to the total area of agricultural land, and the indicator calculated as the ratio of the number of starch potato growers to the total number of farms. A region has high regional specialisation when its branch structure of agricultural production differs from the national average (Tłuczak 2019). The dispersion of these indices' values calculated for individual provinces reflects regional differences in the involvement of resources in the production of starch potatoes, giving some orientation about the importance of this crop as a production direction for agricultural producers in individual regions. The value of the indicator calculated for a given region higher than the value of this indicator calculated for the country proves regional specialisation in manufacturing an agricultural product. The higher the value of the indicator, the greater the degree of specialisation. A cartogram was used to visualise the results.

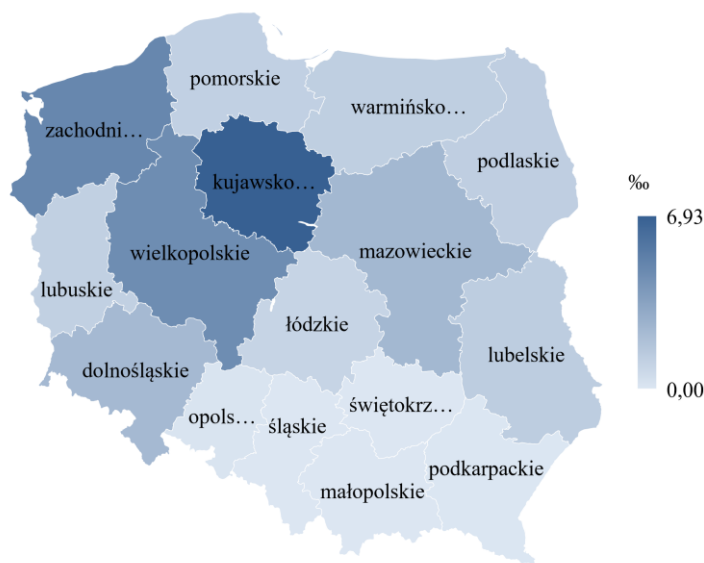
Test results

In 2017, the area of potato crops in Poland amounted to 329.3 thousand ha (CSO 2018a), of which about 32.5 thousand ha (CSO 2018b), i.e. less than 10%, were starch potatoes. More than 80% of the total starch potato cultivation area consisted of crops located in 5 provinces: Wielkopolskie (24.6%), Kujawsko-Pomorskie (22.2%), Mazowieckie (13.9%), Zachodniopomorskie (13.1%) and Dolnośląskie (6.4%). Less than 4.6 thousand farms in Poland cultivated starch potatoes, of which almost 50% were located in Wielkopolskie (26.2%) and Kujawsko-Pomorskie (23.1%). The average area of starch potato crops was 7.1 ha.

However, at the beginning of the 2010s, the area under starch potato cultivation amounted to ca. 25 thousand ha, and the number of growers was less than 5 thousand (Dzwonkowski 2012). Over the last few years, therefore, there has been a concentration of production - a smaller number of farmers, by about 0.4 thousand, cultivate an area larger by about 7.5 thousand hectares. Consequently, the average starch potato cultivation area increased by about 2 ha.

The highest share of starch potato crops in the total agricultural area (6.9‰) was characteristic for the Kujawsko-Pomorskie Province. The second place was occupied by Zachodniopomorskie Province (4.9‰), and the third place by Wielkopolskie Province (4.6‰). In the Mazowieckie and Dolnośląskie voivodships, this indicator was similar to the whole country's value (2.3‰). In the Lubelskie, Podlaskie and Warmińsko-Mazurskie Voivodships the share of starch potato crops in the total agricultural area was equal to 1.2-1.3‰, and in the

Lubuskie, Pomorskie and Łódzkie Voivodships it oscillated around 1%. In the remaining voivodships starch potato cultivation was marginal (Opolskie, Podkarpackie, Świętokrzyskie and Śląskie voivodships) or non-existent (Małopolskie voivodship). These data were visualised in the cartogram presented in Figure 1.



Obsługiwane przez usługę Bing
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Figure 1 Share of starch potato area in the agricultural area by province (2017)
Source: Own elaboration based on (CSO 2018b)

The cartogram presenting the inter-regional variation of the share of starch potato farms in the total number of agricultural holdings looks almost identical (Figure 2). Also in this respect, in 2017 the Kujawsko-Pomorskie (16.9%), Zachodniopomorskie (11.7%) and Wielkopolskie (10.1%) voivodeships, as well as the Dolnośląskie (4.6%) voivodeship, were the leaders. A higher value than the national one was also achieved in the Warmian-Masurian voivodship (3.7%) and the Podlaskie voivodship (3.6%), and slightly lower than the national one - in the Mazowieckie voivodship (3.3%). Pomorskie and Lubuskie voivodships the share of starch potato farms in the total number of farms was 2.8‰ and 2.5‰

respectively. A share exceeding 1‰ was also noted in Lubelskie (1.7‰) and Łódzkie (1.3‰). In other voivodships, this share was negligible (Opolskie, Świętokrzyskie, Śląskie, Podkarpackie) or equal to zero (Małopolskie).

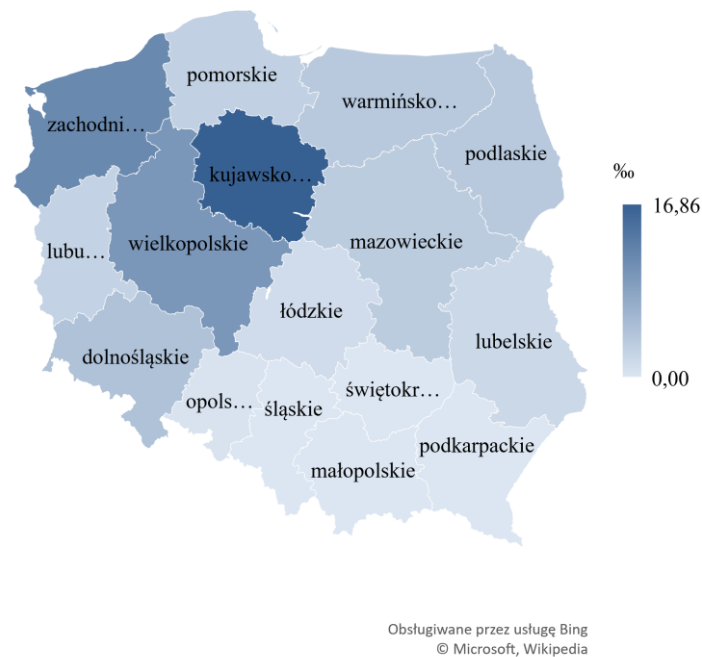


Figure 2: Share of starch potato growers in the total number of farms by province (2017)

Source: Own elaboration based on (CSO 2018b)

The cartograms presented above illustrate the relative "density" of starch potato cultivators (Figure 1) and growers (Figure 2), but they ignore the production intensity, i.e. the yields obtained. Although the CSO publishes data on potato yields, the presented statistics do not include starch potatoes. According to Dzwonkowski (2012), the average yield of starch potatoes in Poland is much higher than the average yield of potatoes in general, which means that starch potato cultivation is more intensive.

Summary

The analysis carried out allows the following conclusions relating to 2017 to be drawn:

1. Starch potato production is unevenly distributed across the country; there is a strong regional specialisation in the cultivation of this crop.
2. Both in terms of the share of starch potato cultivation area in the total agricultural area and the share of starch potato growers in the total number of farms, the Kujawsko-Pomorskie Province is leading.
3. Apart from the Kujawsko-Pomorskie Voivodship, starch potato cultivation plays a major role in the Zachodniopomorskie and Wielkopolskie Voivodships.
4. Almost half of starch potato growers operate in Wielkopolskie and Kujawsko-Pomorskie Voivodships. At the same time, almost half of the starch potato cultivation area is located in these voivodships.
5. Even in voivodships with the strongest concentration of starch potato crops, the share of the area under these plants in the total agricultural area does not exceed 1%, and the share of starch potato growers in the total number of farmers does not exceed 2%.
6. In the provinces of south-eastern Poland (Świętokrzyskie, Opolskie, Śląskie, Małopolskie and Podkarpackie), potatoes for supplying the starch industry are not grown in general or in trace amounts.

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Summary

Starchy potatoes are produced to supply the starch industry, which is quite important economically. This study aimed to identify the differences in spatial distribution of starchy potato crops across cultivated land in different provinces and recognise the interregional differentiation in the fraction of farms growing starch potatoes in Poland. The study refers to 2017, and the data were obtained from Statistics Poland. It was used mathematical methods to calculate two indices for measuring the degree of regional involvement in starchy potato production. The spatial distribution of starchy potato production is illustrated on a choropleth map. It was established, among other things, that the production of starchy potatoes is unevenly distributed among the regions and some regions are highly specialised in such production. The cultivation of starchy potatoes was the most significant in the Kujawsko-Pomorskie, Zachodniopomorskie and Wielkopolskie Regions. Nearly half of the growers and starchy potato crops come from two regions, Wielkopolskie and Kujawsko-Pomorskie. Potatoes for the starch industry are not grown or in small amounts in Poland's south-east areas.

Keywords: spatial distribution of agricultural production, production specialisation of agricultural farms

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