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THE ORGANIC PRODUCTION OF CEREALS IN THE E.U. COUNTRIES AND THE PROFITABILITY OF WINTER WHEAT AND WINTER RYE IN ORGANIC FARMS IN POLAND

Marcin ŻEKAŁO

Institute of Agricultural and Food Economics – National Research Institute, Swietokrzyska 20, 00-002 Warsaw, Poland, Email: Marcin.Zekalo@ierigz.waw.pl

Corresponding author: Marcin.Zekalo@ierigz.waw.pl

Abstract

The organic production of cereals is a one of main agricultural activity in organic farms in the European Union. That production is very difficult and requires a lot of producers experience and effort. Most of all, the organic production of cereals should meet the environmental goals, but also the economic goals of producers. The first aim of the study was to explore the condition of cereals organically produced in EU countries. Secondly, the profitability of winter wheat and winter rye production in organic farms was examined, based on accountancy data of Polish FADN and Agrokoszty system. Despite the weaker production results, the organic farms in Poland may be competitive with conventional farms (at the similar production level i.e. the cereal's growing area) due to lower direct costs incurred on the production and significant support by subsidies received.

Key words: *direct costs, organic cereals production, profitability, subsidies*

INTRODUCTION

The organic production sector in the European Union countries significantly increased and in 2016 occupied 11.9 million ha of the utilised agricultural area, which is almost doubled when compared to 5.7 million ha in 2002 [4]. The majority of the organic agricultural land was located in Spain, Italy, France, Germany (Fig. 1).

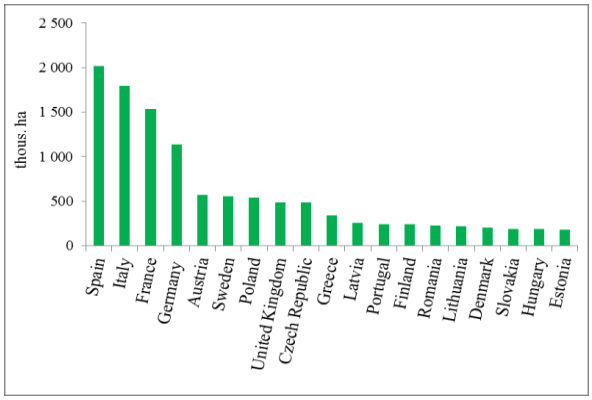

Fig. 1. The area of organic agricultural land in selected countries in EU in 2016
Source: EUROSTAT [4].

Among crops from organic farms in the EU28 countries, a significant share of the cereals production sector was observed. In 2016, the total cereals production accounted for 36.0% of the area of all arable land in organic farms in the EU28 countries. The largest producers of organic cereals were Italy, Germany, France and Spain. Among the area of cereals grown in organic farms in the EU28 countries as much as 38.6% was occupied by wheat, 17.6% - oats and spring cereals, 14.4% - barley and 7.9% - rye and winter crops. The largest producers of wheat from organic farms were Italy, France, Germany, Spain and Romania. On the other hand, the largest production of organic rye was in Germany, Poland, Denmark and Austria [4].

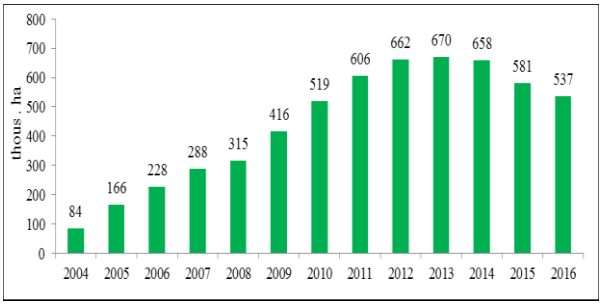

Fig. 2. Utilised agricultural area in organic farms in Poland in 2004-2016
Source: AFQI [1].

In Poland, according to the statistical data of Agricultural and Food Quality Inspection (AFQI) in 2016, the utilised agricultural area

where the organic production was conducted accounted for about 3.7% of the total utilised agricultural area. In 2016, it was 536,579 ha, decreased by 7.6% when compared to 2015 (Fig. 2).

It is worth noting that in the structure of the utilised agricultural area in certified organic farms a significant share of cereals was observed (Fig. 3). In 2016, cereal crops, with the area of 101,147 ha, accounted for 18.9% of the organic utilised agricultural area (in 2015, cereals occupied 101,436 ha i.e. 17.5% of the organic utilised agricultural area). The production of cereals produced in organic farms in 2016 was at the level of 173,030 tonnes and was higher by 17% than the year before with the production level of 147,830 tonnes [1].

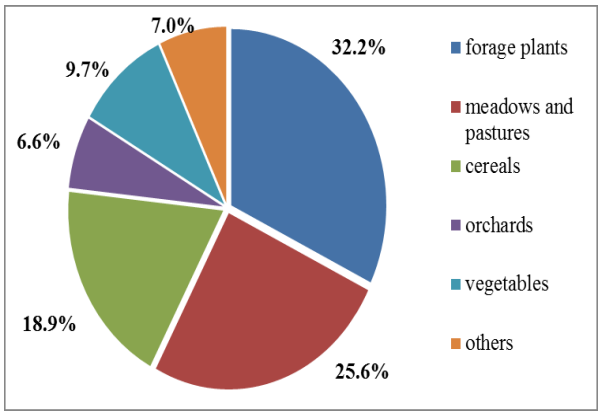

Fig. 3. The structure of the utilised agricultural area in certified organic farms in Poland in 2016
Source: AFQI [1].

It should also be noted that cereals produced in organic farms enjoyed the interest of organic processors in Poland. In 2016, 17.2% of all organic processing plants worked in the processing of cereal milling products industry (in 2015, it was even 23.8%). In 2016, the production volume (cereal milling) was 8.9 thousand tonnes and was higher by 66.3% than in 2015 [1].

For farmers managing the organic farm, from the economic point of view of importance is the economic result, i.e. income from the activity. In the case of the cereals production, an important role is played by the cereal yield level and the price which may be obtained for grain produced on the organic farm. In organic farms in Europe, taking into account the yield of arable crops, the level by 30-40% lower than the yield of the same crops on conventional farms was observed [7]. However, differences for individual arable crops may be significant, for example, the yield of wheat grown in organic farms may vary by 30-70% when compared to the conventional cultivation [3].

The diversification of the results also applies to the selling prices of agricultural products from organic farms which depend on the demand conditions for organic products in the country concerned as well as on the price level of conventional products. In the European Union countries, organic farmers receive price premiums for organic raw material within the price higher by 30-200% when compared to conventional raw materials, depending on the country and market sales channels [5]. Prices for organic cereal (for human nutrition) could be even doubled in comparison with conventional prices. For example, the prices of organic wheat reported from Austria and France are above 150% higher than conventional wheat. The higher price was also reported in Switzerland (about 50% higher) and in Denmark (30–40%) [3]. Due to high prices offered to organic products it may be concluded that high profits could be expected in organic arable farms relative to comparable conventional farms [6].

Farmers taking up activity in organic farming may also expect support in a form of subsidies for this sector, which significantly affect the level of income obtained from the agricultural activity. Taking into account subsidies from the agri-environmental programmes allows to compensate for the lower production results (poorer yields) in organic farms [3].

The main objective of the paper was to identify the basic factors of differences among the economic results, expressed by the level of profitability of the direct production of winter wheat and winter rye in organic and conventional farms. The thematic area of studies also includes the issues concerning the direct production costs and the role of support in a form of subsidies for the production of studies cereals in organic and conventional farms.

MATERIALS AND METHODS

The subject of the studies in organic and conventional farms were the results of the production of winter wheat and winter rye. The studies were carried out in individual farms located throughout the country. Organic and conventional farms for the studies were deliberately selected from a representative sample of farms which was in the field of observation of the Polish FADN (these are the entities which are economically stronger and achieve the higher level of production than individual farms in the country in general). The studies were carried out according to the methodology of the AGROKOSZTY system, as part of which data on the production level and incurred expenses and direct costs is collected.

This is the first income category (according to the gross margin calculation methodology) which is the difference between the production value and direct costs necessary for this production [2]. The calculation of gross margin for agricultural production activities is given as follows:

Production value
– Direct costs
= Gross margin without subsidies
+ Subsidies
= Gross margin.

On the other hand, gross margin without subsidies enables an assessment of the economic efficiency of producing individual agricultural products, depending on crop fluctuations, changes in product prices and prices of means of production. It also allows to assess the competitiveness of production, as it covers the production value obtained and specific direct costs incurred.

A set of indicators was also used to assess the analysed agricultural products, which determine the economic efficiency of their production:

• the unit direct cost – direct costs per unit of production,
• the profitability of production – gross margin without subsidies per unit of production,
• the profitability of labour inputs – gross margin without subsidies per 1 hour of total labour inputs, i.e. unpaid and paid,
• the cost competitiveness of production – share of direct costs in gross margin without subsidies,
• the direct profitability index – ratio of the total production value to direct costs, expressed in percentage terms.

The results of the studies are presented in a tabular and graphic manner, horizontal analysis was used by comparing the parameters of the analysed agricultural products in organic and conventional farms (farms with the similar production scale expressed by the cultivation area of winter wheat and winter rye). The results of the analysed agricultural products were presented, on average, for the study sample of organic and conventional farms.

RESULTS AND DISCUSSIONS

In 2016, in the AGROKOSZTY system the studies were carried out on winter wheat and winter rye grown, both in farms certified in organic farming as well as in conventional farms. Main specifications of surveyed groups of farms was presented in Table 1.

Table 1. Specification of surveyed groups of organic and conventional farms in 2016

Specification	Winter wheat on average in surveyed farms		Winter rye on average in surveyed farms	
	organic	conventional	organic	conventional
Number of surveyed farms	14	45	27	46
Utilised agricultural area [ha]	33.32	32.18	36.94	65.60
Crop area [ha]	4.44	6.03	8.31	10.00
Yield of grain [dt/ha]	29.4	49.6	18.9	38.9
Annual selling price [PLN/dt]	79.68	58.90	55.31	48.20

Source: Own calculation.

The studies show that, on average, in the study sample of organic farms cultivating winter wheat, the grain yield was 29.4 dt/ha and was by 40.7% lower than the average yield (49.6 dt/ha) in analysed conventional farms; the selling price of grain was PLN

79.68/dt and exceeded by 35.3% the average wheat buying-in price from conventional farms (PLN 58.90/dt). In the case of winter rye, the grain yield was 18.9 dt/ha and was thus lower by 51.4% than its level (38.9 dt/ha), on average, in conventional farms; the selling price of rye grain was PLN 55.31/dt and exceeded by 14.8% the average price of winter rye in the group of conventional farms (PLN 48.20/dt).

Table 2. The economic results achieved (per ha of cultivation) by surveyed groups of farms in 2016

Specification	Winter wheat on average in surveyed farms		Winter rye on average in surveyed farms	
	organic	conventional	organic	conventional
Total production value [PLN]	2,345	2,920	1,053	1,922
Total direct costs [PLN] in which:	400	1,178	146	753
Seeds	290	203	125	181
mineral fertilisers	75	672	6	460
organic fertilisers purchased	35	-	15	-
crop protection and growth regulators	-	303	-	112
Gross margin without subsidies [PLN]	1,945	1,742	908	1,169
Total subsidies [PLN]	1,657	869	1,682	877
Gross margin [PLN]	3,602	2,914	2,590	2,046
Total labour input [hour] in which:	9.1	9.2	5.8	7.2
unpaid labour input	8.9	8.9	5.7	6.9

Source: Own calculation.

The grain yield and its selling price determined the level of income (the value of the potentially commercial production) from the cultivation of analysed cereals. On average, in the study sample of organic farms, winter wheat producers obtained from 1 ha PLN 2,345, i.e. by 19.7% less than in the analysed group of conventional farms. On the other hand, from 1 ha of rye farmers in organic farms obtained PLN 1,053, i.e. by 45.2% less when compared to conventional farms. The production value is a major factor determining the amount of gross margin, however, the direct costs incurred are often of great importance. On average, in the analysed group of organic farms, the direct costs per 1 ha of wheat were PLN 400, and per 1 ha of rye – PLN 146. In the case of conventional farms, the higher direct costs were incurred – respectively, for wheat they were 2.9-fold and for winter rye - 5.2-fold (Table 2).

The major component of direct costs, for both cereals in question in organic farms, was the cost of seed material (Fig. 3). Its share of the direct cost structure (in total) incurred for the wheat cultivation was 72.4% and for rye - 85.3%. In the case of conventional farms, farmers incurred costs of seed materials lower by 30.0% for wheat and in for winter rye, those costs were higher by 44.8%. In the case of organic farms, the effect of other components of direct costs, i.e. purchased mineral and organic fertilisers was low. In the case of conventional farms, the costs of mineral fertilisers in total and of plant protection products and growth regulators were significant (Fig. 4).

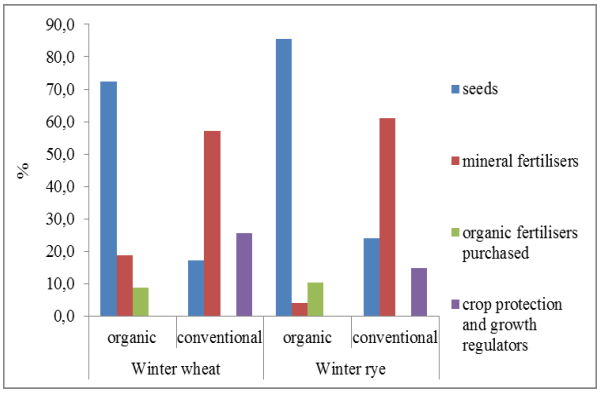

Fig. 4. The average structure of direct costs (per ha of cultivation) in surveyed groups of farms in 2016
Source: Own calculation.

Gross margin without subsidies in the group of organic farms from 1 ha of winter wheat was PLN 1,945, and of winter rye – PLN 908 (Table 2). This result in the case of winter wheat was higher by 11.7%, and for winter rye it was lower by 22.3% when compared to the results of conventional farms. Support for the income of winter wheat and winter rye production were subsidies. In 2016, for the cultivation of cereals the analysed farms could receive single area payment, greening payment, additional payment and for organic farms only – also organic payment.

Financial support per 1 ha of wheat and rye was similar – PLN 1,657 and 1,682, respectively, in the case of organic farms. Payments in conventional farms were lower, on average, by 47.6% for winter wheat and 47.9% for winter rye.

However, the impact of subsidies on the amount of gross margin was different, it was much higher in the case of rye (Fig. 5.)

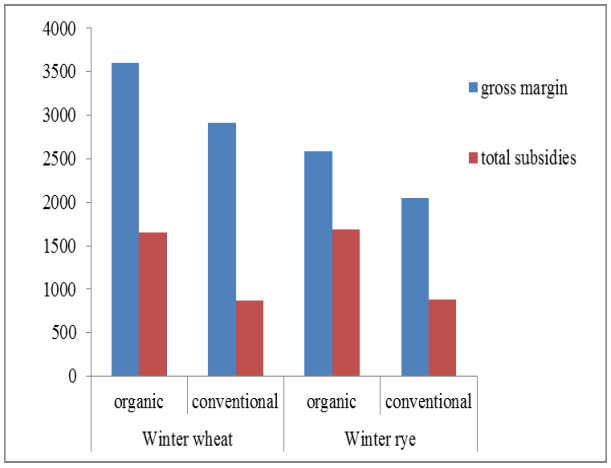

Fig. 5. The gross margin and total subsidies in surveyed farms in 2016
Source: Own determination.

This is evidenced by, inter alia, the share of subsidies in direct surplus with subsidies in group of surveyed organic farms, which amounted to 65.0% for winter rye, whereas in the case of winter wheat – 46.0%. A similar situation took place in relation to cereals in question in conventional farms, only the level of support was lower – 29.8% for winter wheat and 42.9% for winter rye.

For the assessment of the economic efficiency of the winter wheat and winter rye cultivation in organic farms, the direct profitability index (ratio of the production value to direct costs) was applied. On average, in the sample of farms cultivating wheat, this index was 586.2% and in the case of rye it was 720.0%. This high direct profitability index was mainly due to the very low direct costs incurred for the cultivation of these cereals. In the case of the direct profitability index in the group of conventional farms, the ratio of the production value to direct costs was significantly lower – 246.2% for wheat and 255.2% for winter rye.

Table 3. The economic efficiency indices of surveyed group of farms in 2016

Specification	Winter wheat on average in surveyed farms		Winter rye on average in surveyed farms	
	organic	conventional	organic	conventional
Share of direst costs in gross margin without subsidies [%]	20.6	67.6	16.1	60.7
Direct profitability index [%]	586	246	720	255
Direct costs / 1 dt grain [PLN]	13.59	23.75	7.75	19.36
Gross margin without subsidies / 1 dt grain [PLN]	66.09	34.90	48.07	29.93
Gross margin without subsidies / 1 h of total labour input [PLN]	213.10	188.24	156.64	162.94
Share of subsidies in gross margin [%]	46.0	29.8	65.0	42.9

Source: Own calculation.

For more detailed analysis of the economic results from the wheat and rye cultivation, a set of economic efficiency indices was calculated (Table 3). The calculations show that organic farms incurred significantly lower direct costs of producing 1 dt grain of wheat and rye than farmers in conventional farms. The profitability of the production of these cereals, indicated by gross margin without subsidies per 1 dt of grain, was also higher in organic farms – Table 3.

The results of the calculations indicate that labour inputs were used more effectively in organic farms in the winter wheat cultivation. This is evidenced by the higher labour profitability (PLN 213.10/hour, whereas for conventional farms – PLN 188.34/hour). In the case of winter rye, labour inputs were used more efficiently in conventional farms.

CONCLUSIONS

Due to focus selection of the sample of farms and the small study sample of organic farms, the results cannot be considered as a basis for far-reaching generalisation. The results of the

studies are mainly cognitive, they show the differences in the profitability of the winter wheat and winter rye cultivation in organic farms in relation to the production of these cereals in conventional farms.

The cereals production in organic farms in the EU28 countries is one of the important activities of the crop production. The level of this production in the EU countries is considerably varied, so are its market conditions regarding the obtained cereal yields and grain selling prices. Compared to the conventional cereals production, the cereal yield level is at the lower level, while higher selling prices are obtained for grain of these cereals, which is also confirmed by studies of the winter wheat and winter rye production in the Agrokoszty system in 2016. Summing up the results of these studies, it should be noted that the winter wheat and winter rye yields in organic farms were at the lower level (40.7%, on average, for winter wheat and 51.4% in the case of winter rye), while the selling price of grain was higher (on average, by 35.3% for winter wheat and 14.8% for winter rye) than, on average, in conventional farms with the similar production scale for these cereals.

It is important for organic farms that income from the winter wheat and winter rye production was significantly higher than direct costs incurred, which has been reflected in the high level of the direct profitability index. Direct costs of the winter wheat and winter rye production were significantly lower (mainly due to the low costs associated with low usage of fertilisers) than those for the production of these cereals in conventional farms.

The winter wheat and winter rye production both in organic and conventional farms allowed to obtain income in a form of gross margin without subsidies. After taking into account subsidies, operating income for the analysed cereals was higher in organic farms (for wheat by 23.6%, for winter rye by 26.6%) than in conventional farms. In this case, income of organic farmers is much more dependent on subsidies than the results of conventional farms. The share of subsidies in gross margin was high and amounted 46% for wheat and 65% for rye (for conventional farms this was, respectively, 29.8% and 42.9%).

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