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COMPETITIVENESS OF POLISH ORGANIC FARMS OF DIFFERENT SIZES ACCORDING TO FADN DATA

Maria Jolanta Orłowska✉

UTP University of Life Science and Technology, Poland

ABSTRACT

The article analyses the productivity and competitiveness of Polish organic farms of different sizes, as well as their potential, production intensity and the costs. The analysis covers the period of 2013–2017. Information that was used in this study came from FADN farms and was included in the publications *Technical-economic parameters according to agricultural farm groups participating in the Polish FADN* from the years 2013–2017. Two methods were applied: a descriptive method with the use of tabulated summaries and a comparative method. In 2013–2017 the production potential, productivity and competitiveness of Polish ecological farms depended on their size. The largest farms with 50 ha of farmland turned out to be the most competitive, whereas those with 30–50 ha of farmland were found to be able to withstand competition. Farms that produce ecological products whose area is up to 30 ha were found uncompetitive despite subsidies.

Key words: area, productivity, competitiveness, production potential, organic farm, ecological crops, Poland
JEL codes: Q12, D2, D24, D3, D31, O1

INTRODUCTION

"Organic production is a general system of farm and food production management based on the most environment friendly practices, high level of biological diversity, natural resource protection, high standard of animal breeding and production consistent with the needs of some consumers whose preferences include manufacturing with the use of natural substances and processes" [Council Regulation (EC) No 834/2007]. A growing demand for ecological products caused a continuous increase in the number of organic farms in Poland, in 2004–2013. The situation changed in 2014, which was the beginning of a drop both in the number of organic farms and farmlands. In 2013–2017 the number of organic farms was: 26,598; 24,829; 22,277; 22,435 and 20,257 respectively, whereas the farmland area for organic products: 657,902; 580,730; 536,579 and 494,979 ha [Zdrojewska (Ed.) 2017]. The functioning of ecological farms depends on economic factors such as: economic profitability of production, its competitiveness as compared to conventional production and dependence of the farm on subsidies. Competitiveness of a farm is determined by its potential including the area of land, resources, finances and human resources. Competitiveness is a key factor for a farm to exist for a longer time. It provides a farm not only with the ability to keep functioning but also develop [Józwiak (Ed.) 2014, Nachtman 2015]. Competitiveness involves gaining an income that would allow the farm to cover current costs from its own resources and net costs of investments. Competing and remaining on the market makes it possible for a farm to provide an income higher than its own production input costs – if it is lower they can try to adjust to new farming conditions or stop the activity and use the resources in a different way [Kleinhanss 2015].

Maria Jolanta Orłowska https://orcid.org/0000-0003-3930-4346
✉orjol@utp.edu.pl

It was assumed that competitiveness of organic farms can be determined, among other ways, by the area of farmland used for organic crops. Therefore, the aim of the study was to assess productivity and competitiveness of Polish organic farms with different area size of farmland.

MATERIAL AND METHODS

Information obtained from organic farms which kept Polish FADN accounts, included in the publications *Technical-economic parameters according to groups of agricultural farms in 2013–2017*, was analysed. The analysis covered farms grouped according to area of farmland in ha: 5–10, 10–20, 20–30, 30–50 and over 50 ha. Farms up to 5 ha were not included due to the fact that they were subject to the Polish FADN only in 2013–2014. To provide assessment of farm potential the following information was used: agricultural land – AL (ha), total labour input per 100 ha AL (AWU), own labour share in overall labour expenditure (%), total assets (thousands PLN), overall capital (thousands PLN per 1 ha AL), index of technical devices measured by the value of machines and equipment in thousands PLN per employee (AWU). The analysis also included production costs measured by total costs per 1 ha AL (PLN) and costs involved in 1,000 PLN of production. Production efficiency of farms is expressed by productivity indices that refer production to the input of particular factors: farmland area, total input of labour and assets.

An index of competitiveness (*Wk*) was used for assessment of farm competitiveness. The value $Wk \geq 1$ means full coverage of own production costs with income, whereas, $Wk < 1$ means their partial coverage.

$$Wk = Dzgr / (Kwz + Kwp + Kwk)$$

where:
Dzgr – income from an agricultural farm,
Kwz – alternative cost of own land,
Kwp – alternative cost of own labour,
Kwk – alternative cost of own capital (without own land).

Following Kleinhanss [2015], a more detailed classification of competitiveness index was accepted, where:
- *Wk*1 – negative income from the farm,
- *Wk*2 ($0 \leq Wk < 1$) – partial coverage of own production factor costs,
- *Wk*3 ($1 \leq Wk < 2$) – full coverage of own production factor costs,
- *Wk*4 ($Wk \geq 2$) – double and greater coverage of own production factor costs.

If *Wk* value is in the interval $1 \leq 2$, farms are able to withstand competition, when it is $Wk \geq 2$, farms are fully competitive.

Competitiveness of the analysed organic farms was also viewed as their ability to develop, defined by the income from management, income parity and net investment rate. The share of subsidies in the income was analysed, as well. The following methods were applied: a descriptive method with the use of tabular summaries and a comparative method. Arithmetic means of the analysed features from 2013–2017 were used.

RESULTS AND DISCUSSION

Production potential of organic farms which are subject to the Polish FADN was related to their size. In 2013–2017, the area of farmland of a medium farm from the group of farms 5–10, 10–20, 20–30, 30–50 and over 50 ha, was respectively: 8.1, 14.6, 24.7, 39.1 and 91.6 ha AL (Table 1). Labour input per 100 ha AL of farms with larger area, largely based on hired workers, was lower than that of smaller farms using their own labour force. The value of technical devices was higher along with an increase in the farm size (Table 1). Labour inputs, decreasing along with an increase in the farm size, were compensated by an increase in technical devices. Along with an increase in the farm size the value of assets per farm was higher, whereas the capital per 1 ha of farmland decreased[1]. It was similar for farms of 20–30 and 30–50 ha (being respectively: 14.2 and 14.4 thousand PLN) – Table 1.

[1] The value of a farm capital covers values of: livestock, permanent crops, melioration equipment, buildings, machines and devices and working capital. It does not include sums or other rights that could be separated from the value of land [Bocian et al. 2017].

Table 1. Production potential of ecological farms with different area of farmland in 2013–2017

Specification	Farms according to area in ha				
	5–10	10–20	20–30	30–50	over 50
Total utilised agricultural area (ha)	8.1	14.6	24.7	39.1	91.6
Total labour input per 100 ha AL (AWU)	19.3	12.2	6.9	5.0	2.7
Share of own work in total work expenditure (%)	89.5	87.8	89.6	82.4	70.4
Total assets (thous. PLN)	384.6	506.0	781.3	1 233.3	2 088.3
Farm capital per 1 ha AL (thous. PLN)	23.8	16.9	14.2	14.4	8.9
Value of machines and devices per 1 AWU (thous. PLN)	28.9	39.8	60.1	89.1	128.8

Source: Author's own study based on [Goraj et al. 2015, 2016], Bocian et al. [2017, 2018, 2019].

Production of small organic farms was more intensive. Production intensity measured by total costs per 1 ha of farmland decreased along with an increase in the farm area. Another dependence was connected with costs borne for production worth 1,000 PLN. They were similar for farms 5–10 and 10–20 ha and 20–30 and 30–50 ha. The lowest costs were found for the largest farms (area above 50 ha), slightly higher costs were found for farms 5–10 and 10–20 ha, whereas farms whose costs were higher than the output value were farms of 20–30 and 30–50 ha. The farms differed in land productivity, labour and assets. The highest land productivity, that is, 6,216 and 4,016 PLN per 1 ha, was found for farms 5–10 ha and 10–20 ha, respectively. For farms above 20 ha it was much lower (for farms 20–30, 30–50 and 50 ha it was: 2,436; 2,565 and 2,800 PLN, respectively). Another dependence applied to labour productivity. Production per one full-time employed person increased along with an increase in the farm area. It was three times higher in the largest farms (area 50 ha), and more than three times higher in farms 5–30 ha, whereas in 30–50 ha farms it was almost twice higher. Productivity of assets was found to be the highest for the smallest and the largest farms. Amount of 1,000 PLN located in assets of 5–10 ha farms provided 131 PLN worth of production, whereas 123 PLN worth of production was provided by 50 ha farms. A slightly lower productivity of assets (116 PLN) was characteristic of farms with 20–30 ha, the lowest was found for farms with 20–30 and 30–50 ha of farmland (which was 77 and 82 PLN, respectively) – Table 2.

Table 2. Production intensity, production costs and efficiency of organic farms with different area of farmland in 2013–2017

Specification	Farms according to area in ha				
	5–10	10–20	20–30	30–50	over 50
Total costs per 1 ha of UAA (PLN)	5 244.0	3 432.3	2 557.9	2 677.9	2 337.3
Total costs per thous. PLN total output (PLN)	853.0	855.5	1 056.2	1 055.7	837.6
Total output per 1 ha UAA (PLN)	6 216	4 016	2 436	2 565	2 800
Total output per one full-time person (thous. PLN)	32.2	33.0	35.1	51.7	102.1
Total output for thous. PLN assets (PLN)	131	116	77	82	123

Source: Author's own study based on [Goraj et al. 2015, 2016], Bocian et al. [2017, 2018, 2019].

Developmental possibilities of organic farmlands seem to be dependent on the level of generated income and granted subsidies [Runowski 2009, Drygas et al. 2017]. In 2013–2017 organic farms whose production costs were the highest (20–30 and 30–50 ha) were characterized by the highest share of subsidies in the income; the lowest share was found for farms with 5–10 and 50 ha of farmland, whereas for farms with 10–20 ha it was slightly higher (the figure).

Organic farms with an area above 50 ha were found to be competitive (competitiveness index 2.1), whereas those whose area was 30–50 ha AL were found to be able to withstand competition (competitiveness index 1). Lower than one competitiveness index was characteristic of farms up to 30 ha, which indicates lack of competitiveness ability. Thus, farms smaller than 30 ha could not be considered to be potentially developmental in 2013–2017. "Competitiveness of farms can be understood as the ability to develop in specific economic conditions. It is measured by the following factors: income parity, income from management and net investment rate" [Mirkowska and Ziętara 2015, p. 51, Ziętara 2014, Sobierajewska and Ziętara 2017]. Ecological farms and farms with the ability to withstand competition had positive income from management, whereas it was negative for farms without competitive ability.

The level of own labour remuneration depended on the farm competitive ability. In farms able to withstand competition (30–50 ha AL) it was 1.5 times higher than the mean remuneration in the national economy, whereas in competitive farms (above 50 ha AL) it was 3.6 times. According to Miś and Zając [2017] "agricultural production by ecological methods in a region with farms of diversified areas causes an income growth and is farmers' source of income which contributes to improvement in their financial situation and living standards". However, the research carried out in 2013–2017 for ecological farms of different size, keeping accounts according to the Polish FADN, proves that among the farms which do not have a competitive ability, only those achieved their own labour remuneration whose area was 20–30 ha, whereas smaller farms did not even achieve parity remuneration of own work. Similar results were obtained by Nachtman [2015] from her research on ecological farms in 2010–2013. The results of the research also proved that ecological farms whose size was up to 30 ha of farmland achieved incomes that could not compensate even the costs of their own labour. Only farms above 30 ha could implement extended reproduction of their assets as, apart from other factors, development of farms depends on financial costs borne by them for reproduction, extension, and modernization of their assets [Józwiak 2012, Czubak and Sadowski 2014, Grzelak 2015, Sass 2017]. The surveys carried out in 2013–2017 also confirmed that competitive ecological farms and those able to withstand competition were characterized by a positive net investment rate, whereas it was negative for farms without competitiveness (Table 3).

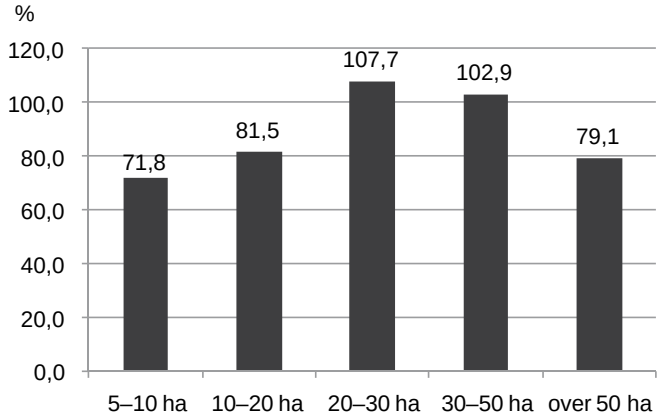

Fig. Share of subsidies in the income of organic farms with different area of farmland in 2013–2017

Source: Author's own study based on Goraj et al. [2015, 2016], Bocian et al. [2017, 2018, 2019].

Table 3. Competitiveness of ecological farms depending on size of their area in 2013–2017

Specification	Farms according to the size of area in ha				
	5–10	10–20	20–30	30–50	over 50
Competitiveness index	0.5	0.7	0.8	1.0	2.1
Competitive ability	lack of competitive ability			ability to withstand competition	competitive
Income from management and risk (PLN per farm)[a]	–26.20	–20.74	–14.40	3.04	104.40
Income parity[b]	0.6	0.8	1.0	1.5	3.6
Net investment rate[c]	–67.3	–26.5	–20.8	22.5	10.0

[a] Management income is the difference between farm income and the costs of using own production factors (labour, land and capital).

[b] Income parity is the ratio of farm income per unit of own work (FWU – family work unit = 2,120 hours of own work in a year) to the average wage in the national economy. The average net wage in the national economy based on the calculations of the Agricultural Accountancy Department of Institute of Agricultural and Food Economics – National Research Institute (Instytut Ekonomiki, Rolnictwa i Gospodarki Żywnościowej – Państwowy Instytut Badawczy – IERiGŻ-PIB) in 2013–2017 amounted to: 29,798; 30,915; 31,960; 33,135 and 34,743 PLN, respectively by area size.

[c] Net investment rate – net investment to depreciation ratio expressed in %.

Source: Author's own study based on Goraj et al. [2015, 2016], Bocian et al. [2017, 2018, 2019].

Nachtman and Żekało [2006] and Miś and Zając [2017] observed that small areas of farmland that belong to individual farms are an important factor limiting the possibilities of development of organic farming in Poland. The results of research show that competitiveness of farms depends on the production scale represented by the size of their area, and small farms cannot seek chances for success by switching to ecological production methods. Recently, ecological farming has undoubtedly been boosted by subsidies to ecological production. It is worth focusing on the largest organic farms. Subsidies to ecological farming encouraged the farm owners to switch to ecological production methods. A comparison of labour input of particular farms shows that the largest organic farms were characterized by low labour consumption caused by simplified organization of production. Thus, the results of the study confirm to some degree that organic farming subsidies after 2004 supported switching to production of goods which were not necessarily in demand by consumers. This shows that sometimes a system of subsidies can lead to development of an undesired situation.

CONCLUSIONS

The study has shown that in 2013–2017 the production potential, production efficiency and competitiveness of Polish agricultural farms depended on the size of their area.

1. The value of a farm's assets was higher along with an increase in the size of its area. The largest farms quite significantly based their activity on hired workers, whereas smaller farms used their own labour resources. Labour outlays decreasing with a growth in the farmland area were compensated by an increase in technical devices.
2. Production intensity decreased along with an increase in a farm's area size. Production costs exceeding its value were found for farms with area equal to 20–50 ha, whereas the lowest costs were reported for the largest farms, above 50 ha.
3. Labour efficiency increased along with an increase in the farm area size. Productivity of land and assets had a different course. The highest was characteristic of smaller area farms, whereas the lowest were found for the small farms whose area was 20–30 ha.

4. The largest farms with an area above 50 ha were found to be competitive, those whose area was 30–50 ha were found to be able to withstand competition. The analysis showed that farms smaller than 30 ha were not competitive, despite being provided with subsidies.
5. Management income of competitive farms and those able to withstand competition was positive, whereas it was negative for farms which did not have competitive ability. In competitive farms, own labour remuneration was 3.5 times higher than the average gross salary in the national economy, whereas it was 1.5 times higher in farms able to withstand competition. Among farms without competitive ability, own labour remuneration on the parity level was achieved by 20–30 ha farms, whereas the remaining farms did not even reach parity payment of own labour.
6. Net investment rate of competitive farms and those able to withstand competition was positive, whereas it was negative for farms without competitive ability.

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KONKURENCYJNOŚĆ POLSKICH GOSPODARSTW EKOLOGICZNYCH O RÓŻNEJ WIELKOŚCI OBSZAROWEJ W ŚWIETLE DANYCH FADN

STRESZCZENIE

Analizowano efektywność oraz konkurencyjności polskich gospodarstw ekologicznych o różnej wielkości obszarowej. Ocenie poddano także ich potencjał, intensywność oraz koszty produkcji. Badaniami objęto lata 2013–2017. Posłużono się informacjami z gospodarstw prowadzących rachunkowość Polski FADN, zawartymi w publikacjach *Parametry techniczno-ekonomiczne według grup gospodarstw rolnych uczestniczących w Polskim FADN* w latach 2013–2017. Zastosowano metody: opisową z wykorzystaniem zestawień tabelarycznych oraz porównawczą. W latach 2013–2017 potencjał produkcyjny, efektywność i konkurencyjność polskich gospodarstw ekologicznych uzależnione były od ich wielkości obszarowej. Gospodarstwami ekologicznymi konkurencyjnymi okazały się gospodarstwa obszarowo największe, powyżej 50 ha UR, zdolnymi zaś do konkurencji o powierzchni 30–50 ha UR. Gospodarstwa prowadzące produkcję ekologiczną na powierzchni do 30 ha UR pomimo uzyskiwanych dopłat nie miały zdolności konkurencyjnej.

Słowa kluczowe: wielkość obszarowa, efektywność, konkurencyjność, potencjał produkcyjny, gospodarstwo ekologiczne, uprawy ekologiczne, Polska