sciendo
DOI: 10.1515/agriceng-2019-0013

ISNN 2083-1587; e-ISNN 2449-5999
2019,Vol. 23,No.2, pp.25-32
Agricultural Engineering
www.wir.ptir.org

INVESTMENT OPPORTUNITIES IN ECOLOGICAL FARMS WITH VARIOUS PRODUCTION BRANCHES

Urszula Malaga-Toboła*

Department of Production Organization, Logistics and Applied Computer Science, University of Agriculture in Krakow, Poland, Urszula.Malaga-Tobola@ur.krakow.pl, ORCID 0000-0001-7918-8699

* *Corresponding author: e-mail: urszula.malaga-tobola@ur.krakow.pl*

ARTICLE INFO

Article history:
Received: May 2019
Received in the revised form: June 2019
Accepted: June 2019

Key words:
organic farms,
economic effectiveness,
investments,
production branch

ABSTRACT

Development investment capacity of farms depends on their potential and scale of production, and thus its revenue, which determines the scale of investment purchases. Most specialized farms have growth potential. Farmers take great interest in modernization and investing in new technologies, machinery and agricultural land, as confirmed by market analysis. Literature references offer information regarding the needs and investment opportunities of territorially diversified farms running conventional production, however the aim of the work is to determine the investment possibilities of organic farms with various production branches. The research included 50 farms certified as ecological producers. In order to answer the question which type of business has the greatest development potential, the examined facilities were divided into branch groups.

INTRODUCTION

Modernization of farms, rationalization of production structure and modernization of agricultural production processes offer a chance to improve the economic and financial condition of promising farms. This is possible provided that they adjust the directions of production to the resources and factors of production, i.e. land, labor, means and subjects of work, and in particular, the level of management (Sawa, 2012a). Specialization of farms also affects differences in the use of production factors in farms in Poland (Zawadzka et al., 2013).

In order for a farm to grow, it must invest. This involves the need to obtain enough revenue (Sawa, 2012b; Wójcicki and Kurek, 2012), the level of which affects the economic strength of the farms, determining the farm's investment capacity (Malaga-Toboła, 2013; Malaga-Toboła et al., 2015). Investment decisions must largely take into account the need of constant improvement of techniques and technologies of agricultural production. This is possible by establishing the branch and specialization of production. Technological information modernization indexes can support the optimization of the machine park and replacement of tractors, as can specialized software (Cupiał et al., 2015a,b). First and foremost, farmers should invest in technical means that guarantee high quality and high price of commodity production, which determines the production branch. Therefore, the research objective was

to determine the investment possibilities of organic farms, depending on the production branch.

MATERIAL AND METHODS

The research was conducted in the form of a directed interview with the owners of 50 organic farms located in southern Poland. All facilities own a certificate of ecological production. For the purpose of comparative analysis, the farms were divided into specialization groups: vegetable, fruit, plant, dairy, livestock and mixed production. The production branch was determined based on the majority share of production activities that contribute to the total value of the farm's standard direct surplus. Farms in which the share of one type of production exceeded 2/3 of the total standard value of the direct surplus was called specialized. On the other hand, farms in which none of the branches of production exceed 1/3 of the value of the surplus were classified as mixed farms. From among the analyzed facilities, 18 were focused on dairy production, 11 were engaged in general plant production, 6 specialized in vegetable and 6 in livestock production. The smallest number of facilities ran mixed and fruit production, 5 and 4 respectively.

Investment opportunities (Mi) of farms are understood as their financial expense capacity, supplemented with the sum of depreciation write-offs. In the researched farms, these expenses were estimated based on the methodology given by Wójcicki (2014).

$$Mi = Am + Ab + Ir + (Wb - Wp) \quad (1)$$

where:

Am – Depreciation of technical means
Ab – Depreciation of buildings and facilities
Ir – Development investments
Wb – Gross balance income of the farmer's family
Wp – Parity pay

The size of investments in farms is determined by their net agricultural revenue, which, after deducting the parity payment, remains at the farmer's disposal. The revenue has been calculated based on the methodology of the Institute of Agricultural Economics and Food Economy. The basis for its calculation is the value of gross final production (Pk_b), estimated based on market prices, as well as the level of production costs.

Gross final production is the amount that can be sold, consumed by the farmer, used as remuneration in kind, or be accumulated on the farm (Szeląg-Sikora et al., 2015a). On the other hand, the production costs are the sum of direct means of production, raw materials and consumables, depreciation of fixed assets, services and other financial charges.

Results

Factors most significantly impacting the increase of the farm's investment capacity are both its area of agricultural land and livestock density. By increasing the area and population size, the value of both assets and commercial production is increased. As a result, this leads to an increase in revenues, and thus the amount of investment funds available. The average

area of agricultural land in the researched farms was 12.66 ha. Depending on the branch group, it ranged from 3.45 ha in fruit farms to 20.06 ha in dairy farms (Table 1). It was also on these farms that the lowest (1.06 LSU) and the largest (13.99 LSU) herd populations were recorded. On the other hand, the average was 8.42 LSU, which in relation to the area of agricultural land gave the density at 0.60 LSU·ha^{-1}, i.e. much lower than the maximum density allowable for organic farms. According to Nęczyńska (2014), this increasing phenomenon of abandonment of animal husbandry, mainly due to the lack of profitability, is quite disturbing, due to the importance of animals on organic farms. Their presence is not only a way to improve soil fertility, but also leads to sustainable development through rational management of nutrients (Kwiatkowski et al., 2013).

Table 1.
Organization of agricultural production

Specification	Production branch						
	vegetable	fruit	plant	dairy	livestock	mixed	average
Arable land (ha)	7.00	1.91	6.50	6.43	2.97	4.84	5.48
including:							
cereals	2.06	0.90	3.64	1.48	1.76	2.31	2.09
roots	0.62	0.03	0.28	0.23	0.11	0.12	0.24
fodders	0.82	0.88	1.48	4.67	0.99	2.27	2.48
vegetables	3.50	0.11	0.30	0.04	0.12	0.14	0.50
herbs	–	–	0.80	–	–	–	0.17
Permanent grasslands (ha)	1.34	1.54	7.30	13.64	1.91	3.18	7.18
Agricultural land (ha)	8.34	3.45	13.80	20.06	4.88	8.03	12.66
Livestock density (LSU·ha^{-1})	0.86	0.19	0.69	0.67	0.32	0.45	0.60

Organization of field production, measured by the structure of land and sow structure, is also an important factor affecting the investment capacity. On average, permanent grasslands dominated in the studied farms, accounting for 57% (Table 1). Their share is justified, considering the fact that the herd structure was definitely dominated by cattle. Grasslands are the source of the cheapest fodder and the nutritional baseline in extensive farming. It should also be emphasized that with the increase of their share in the structure of land use, the investment capacity of organic farms should increase. However, taking into account the branch of the conducted activity, the prevailing area of meadows and pastures in the land use structure occurred only in dairy (68%) and plant (53%) production farms. In the other target groups, the majority of agricultural land was arable lands, ranging from 55% in fruit farms to 84% in vegetable plants.

On average, fodder crops and cereals predominated in the structure of crops, accounting for 45 and 38%, respectively. These two groups of plants dominate in all branch groups except vegetable farms, where 50% of the arable land was occupied by vegetable production. In the remaining groups, the share of both vegetables and root crops did not exceed 10%. This structure is typical for Polish farms, in which more than half of the roughage is obtained from fodder plants, and the rest from permanent grassland. From the point of view of a small livestock density, however, this is an improper organization of production, as Jończyk (2014) also points out in his research.

The investment possibilities of farms are directly related to the value and the level of use of technical resources owned, and result from depreciation write-offs. These depend on the depreciation period, which can be shortened by a well-chosen, economically justified and rationally used machine park. Therefore, the average annual replacement investment of the farm should be equivalent to the annual depreciation of fixed mechanization and energy assets, as well as buildings and structures (Wójcicki and Rudeńska, 2013).

Table 2.
Replacement value and depreciation of machines and buildings (PLN thousand·ha^{-1})

Production branch	Replacement value of machines	Machine depreciation	Replacement value of buildings	Depreciation of buildings
vegetable	44.00	2.08	12.07	0.21
fruit	52.71	2.09	31.14	0.55
plant	47.36	2.18	7.52	0.13
dairy	30.06	1.38	6.12	0.11
livestock	37.80	2.18	17.16	0.31
mixed	25.87	1.35	17.04	0.29
average	35.83	1.68	8.80	0.16

The average replacement value of machines in the surveyed farms was 35.830·ha^{-1} and of buildings 8.800·ha^{-1} (Table 2). The value of technical means ranged from PLN 25,870·ha^{-1} in mixed production farms, to PLN 52,710·ha^{-1} in fruit farms. It was also there that the highest reconstruction value of buildings was recorded, at PLN 31,140·ha^{-1}, as well as their highest amortization, at PLN 550·ha^{-1}. These results justify the character of fruit production, which, with a small area of arable land, must have expensive specialist equipment for cultivating and maintaining orchards and fruit storages. It should be noted that, by reducing labor inputs, mechanization of production processes contributes to the increase of agricultural revenue, thus also determining the potential investment capacity (Szeląg-Sikora et al., 2015b).

Depreciation is cost, which defines the volume of consumption of a given fixed asset, which is the result of its use in the production process. The average depreciation costs of machines amounted to PLN 1,680·ha^{-1} and of buildings, PLN 160·ha^{-1}. Among the surveyed farms, two groups can be selected in which the volume of machine depreciation is very similar, i.e. vegetable, fruit, plant and livestock farms (PLN 2,120·ha^{-1} on average), as well as

dairy and mixed farms (PLN 1,360·ha^{-1}). In contrast, in the case of building depreciation, clearly lower than in other groups, it was recorded in the dairy and plant farms.

The average value of gross final production, per household, was PLN 86,922,000, while per hectare of arable land, PLN 6,860. According to Brodzińska, the area of arable lands should determine the commercial and profit potential of farms (2014). Therefore, in relation to the area of arable land, the largest value of gross final production was obtained in fruit and vegetable farms, where it was at PLN 19,060 and PLN 15,850·ha^{-1} (Fig. 1). These farms run typical commercial activities. Therefore, the high unit value of production obtained by these two groups came from the sale of relatively expensive fruit and vegetables, as compared to other agricultural produce. A relatively high value of gross final production, PLN 10,270·ha^{-1}, was also noted in the livestock farms. It should be noted that the value of final production, in addition to commercial production, was largely influenced by EU subsidies. Owners of the surveyed farms benefited from the financial support offered to them by the EU, in the form of payments available for agricultural producers, i.e. the single area payment, supplementary payment and various agri-environmental program packages. The smallest farms obtained the largest subsidies per area of arable land.

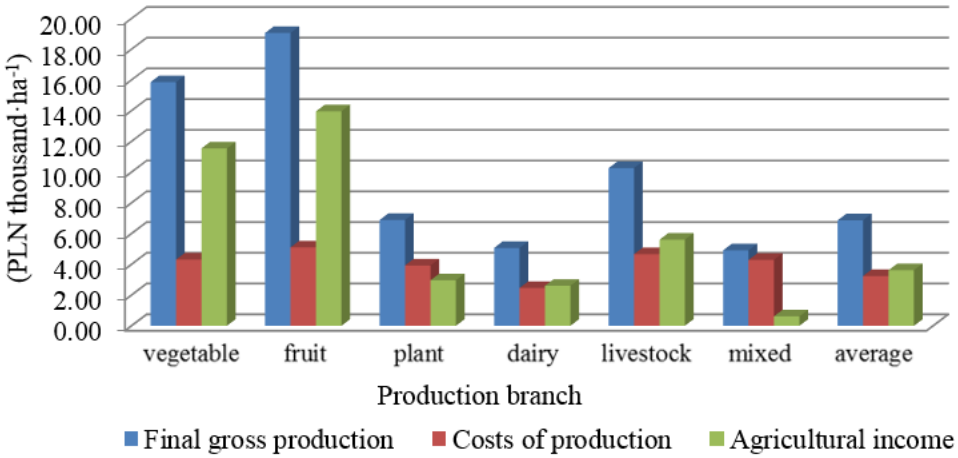

Figure 1. Gross unit final production, production costs and agricultural revenue

Wasąg (2010) emphasizes that the increase in the competitiveness of Polish agriculture is generally associated with higher consumption of production means, modernization of the machine park and adaptation of the production space to new agrotechnical requirements. Farmers incurred production expenditures of PLN 3,240·ha^{-1} on average (Figure 1). Unit costs decreased along with the increase in the farming area, therefore the facilities with the least spending were those with the largest area, i.e dairy farms, PLN 2,460·ha^{-1}. Their costs were twice as low as in the case of the smallest farms, i.e. fruit farms, at 5,100·ha^{-1}. Other production branch groups expended approx. 4,000·ha^{-1}. Due to the ecological character of the business and the necessity to use natural means of production, the costs incurred were

mainly related to the purchase of seed, at times lime, as well as a small amount of concentrate feed and feed additives.

In turn, the largest costs of the farm were incurred for fuel, spare parts for tractors and machines, as well as the materials necessary for the renovation of buildings. A slightly less amount was spent on other energy carriers, and the least on consumables. Agricultural revenue related to the unit area of the field was recorded at PLN 3,620·ha^{-1} on average (Figure 1). In the branch groups, it was similar to the volume of final production, i.e. the highest was in fruit and vegetable farms, where it amounted to PLN 13,960 and PLN 11,540·ha^{-1} on average. A relatively high revenue, as compared to other groups, was still noted in livestock farms, PLN 5,610·ha^{-1}. Farms specializing in plant and dairy production reached a revenue at a similar level, i.e. PLN 2,960·ha^{-1} and PLN 2,600·ha^{-1}. On the other hand, definitely a negative result, i.e. only PL 620·ha^{-1}, was obtained in mixed production farms. Thus, it can be stated with Zegar (2012) that the specialization of production is related to an increase in its intensity level.

The results obtained in the surveyed farms indicate that the factor that determines the level of potential investment opportunities is the branch of production, apart from the area of agricultural land available. Fruit and vegetable farms, i.e. the ones with the largest revenue, can invest the most. Investment opportunities in these two major groups are at PLN 13,950 and 12,090·ha^{-1}, respectively (Fig. 2). Therefore, the groups can invest on average three times the financial resources available to farms with a different production branch. These facilities achieved the greatest effectiveness of the invested material inputs, i.e. a high unit value of gross final production, and as a result, the highest productivity of the means of production. Similar observations regarding the close relationship between the specialization of farms, the area of agricultural land, and the amount of earned revenue were also formulated by Zawadzka (2012).

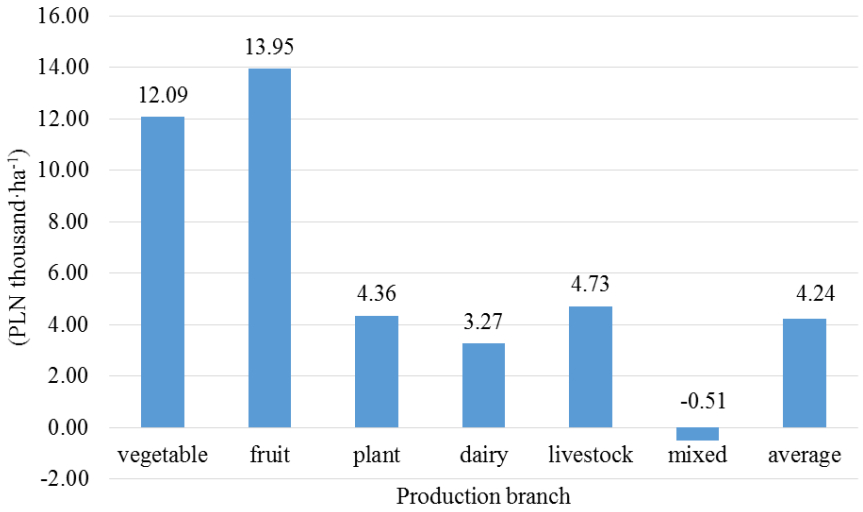

Figure 2. Potential investment opportunities in the researched farms (PLN thousand·ha^{-1})

Other target groups can allocate from PLN 3,270 to 4,730·ha^{-1} for investments, except mixed production facilities that are unable to develop due to insufficient revenues.

Conclusion

Polish organic farms are slightly lagging in technology, and are excessively fragmented. Thus, investments are very important for them, as they reflect the farms' development prospects.

The largest value of gross final production per 1 hectare of arable land was recorded in fruit and vegetable farms. It was more than twice as big as in other major branch groups, which results from the typically commercial nature of these facilities. The high unit value of gross final production influenced the highest revenue obtained in these groups, i.e. PLN 13,960 and 11,540·ha^{-1} for fruit and vegetable farms, respectively. It should be noted that the highest revenue was also several times higher than in the other major groups. Please note that fruit farms were also those incurring the largest production costs, PLN 5,100·ha^{-1}. For comparison, the least disbursing were farms specializing in dairy production, i.e. 2,460·ha^{-1}.

The analysis showed that the largest potential investment opportunities per area of agricultural land are in fruit and vegetable farms, PLN 13,950 and 12,090·ha^{-1}, respectively. On the other hand, other branch groups can invest significantly less in development, i.e. approx. PLN 4,000·ha^{-1}. On the other hand, very low revenue obtained in mixed production farms hinders the investment development of these facilities.

References

Brodzińska, K. (2014). Rolnictwo ekologiczne – tendencje i kierunki zmian. *Zeszyty Naukowe Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie, Problemy Rolnictwa Światowego, 14,* 3, 27-36.

Cupiał, M., Kobuszewski, M., Szelag-Sikora, A., Niemiec, M. (2015a). Analysis of mechanical investment in Malopolska province using index of technological modernization ITM, In: Huyghebaert, B., Lorencowicz, E., Uziak, J. (Eds), *Farm Machinery And Processes Management In Sustainable Agriculture*, 70-73.

Cupiał, M., Szelag-Sikora, A., Niemiec, M. (2015b). Optimisation of the machinery park with the use of Otr-7 Software in context of sustainable agriculture, In: Huyghebaert, B., Lorencowicz, E., Uziak, J. (Eds), *Farm Machinery And Processes Management In Sustainable Agriculture*, 64-69.

Jończyk, K. (2014). Rozwój rolnictwa ekologicznego w Polsce. *Zeszyty Naukowe WSEI, Series: Ekonomia, 8*(1), 129-140.

Kwiatkowski, C.A., Harasim, E., Maziarz, P. (2013). Gospodarstwa ekologiczne w strategii zrównoważonego rozwoju rolnictwa. Studia i Raporty IUNG-PIBb, 32(6).

Malaga-Tobola, U., Tabor, S., Kocira, S. (2015). Productivity Of Resources And Investments At Selected Ecological Farms. *Agriculture And Agricultural Science Procedia/7th International Scientific Symposium On Farm Machinery And Processes Management In Sustainable Agriculture*, 158-164

Malaga-Toboła, U. (2013). *Modernization possibilities of technical equipment in mountainous ecological milk farms.* Agricultural Engineering, Krakow. ISBN 978-83-935020-8-0.

Nęczyńska, E. (2014). Doświadczenia organizacyjne polskiego FADN i zmiany w rolnictwie po akcesji do UE. Makroregion Małopolska i Pogórze. Prezentacja na warsztatach szkoleniowych polskiego FADN. 18.09.2014

Sawa, J. (2012a). Opis procesów produkcji gospodarstwa jako warunek ich modernizacji. *Problemy Inżynierii Rolniczej, 3*, 15-24.

Sawa J. (2012b). Opis Procesów Produkcji Gospodarstwa jako warunek ich modernizacji, *Problemy Inżynierii Rolniczej, 3,* 15–24.

Szelag-Sikora, A., Cupiał, M., Niemiec, M. (2015a). Productivity of farms in the aspect of various activity forms. In: Huyghebaert, B., Lorencowicz, E., Uziak, J. (Eds), *Farm Machinery And Processes Management In Sustainable Agriculture*, 94-98.

Szelag-Sikora, A., Cupiał, M., Niemiec, M. (2015b). Intensity and labour consumption of integrated production in horticultural farms. In: Huyghebaert, B., Lorencowicz, E., Uziak, J. (Eds), *Farm Machinery And Processes Management In Sustainable Agriculture*, 249-254.

Wasąg, Z. (2010). Efektywność wykorzystania środków UE przez gospodarstwa rolne na przykładzie wybranych programów. *Inżynieria Rolnicza, 3*(121), 231-236.

Wójcicki, Z. (2014). Analiza potrzeb i możliwości inwestycyjnych gospodarstw rodzinnych. *Problemy Inżynierii Rolniczej, 1*(83), 5–20.

Wójcicki, Z., Kurek, J. (2012). *Technologiczna i ekologiczna modernizacja wybranych gospodarstw rodzinnych, Cz. VI, Wyniki badań i wdrożeń projektu rozwojowego.* Falenty–Warszawa, Wydaw. ITP. ISBN 978-83-62416-34-9, 148.

Wójcicki, Z., Rudeńska, B. (2013). Działalność inwestycyjna w badanych gospodarstwach rodzinnych. *Problemy Inżynierii Rolniczej, 3*(81), 5–16.

Zawadzka, D., Strzelecka, A., Szafraniec-Siluta E. (2013). Znaczenie dopłat do działalności operacyjnej w tworzeniu dochodu rodzinnego gospodarstwa rolnego w Polsce. *Roczniki Naukowe SERiA XV (3)*, 396-401.

Zegar, J. (2012). *Współczesne wyzwania rolnictwa.* Wydawnictwo Naukowe PWN, Warszawa. ISBN 9788301168247.

MOŻLIWOŚCI INWESTYCYJNE W GOSPODARSTWACH EKOLOGICZNYCH O RÓŻNYM KIERUNKU PRODUKCJI

Streszczenie. Zdolność gospodarstw rolniczych do inwestowania w rozwój zależy od potencjału produkcyjnego i skali produkcji, tym samym od uzyskiwanego dochodu, który decyduje o wielkości zakupów inwestycyjnych. Większość gospodarstw specjalistycznych jest potencjalnie rozwojowa i wykazuje duże zainteresowanie modernizacją i inwestowaniem w nowe technologie, park maszynowy oraz grunty rolne, co potwierdzają analizy rynku. W literaturze można znaleźć informacje na temat potrzeb i możliwości inwestycyjnych gospodarstw zróżnicowanych obszarowo, prowadzących konwencjonalną działalność produkcyjną, natomiast celem niniejszej pracy jest określenie możliwości inwestycyjnych gospodarstw ekologicznych, różniących się kierunkiem produkcji. Badaniami objęto 50 gospodarstw rolnych posiadających certyfikat potwierdzający ekologiczny charakter prowadzonej działalności. Chcąc odpowiedzieć na pytanie, który rodzaj prowadzonej działalności ma największy potencjał rozwojowy, badane obiekty podzielono na grupy kierunkowe.

Key words: organic farms, economic effectiveness, investments, kierunek produkcji