

LEVEL OF EQUIPMENT WITH THE MACHINERY PARK AND ACTIVITIES RELATED TO SUPPORTING ECOLOGICAL FARMS WITH THE EU FUNDS*

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Summary. The paper presents analysis of equipment with the machinery park in 30 ecological farms. Area of arable land was accepted as a grouping variable. Activities related to integration of our country with the European Union constituted the second aspect of the paper. In order to fully realize the accepted objective of the paper, replacement value of the machinery park, which was at the average 16.44 thousand PLN ha^{-1} AL, was calculated. Quantitative machinery equipment proved that each examined farm possessed inter alia one tractor and a farm trailer as a transport mean. Characteristics of tractors proved that they were at the average 16 years old and their average power was of 5.91 kW ha^{-1} AL. 24 out of 30 responders, declared that they additionally used available subsidies within structural funds both pre-accession and after integration with the EU.

Key words: ecological farm, machinery park, area groups, agricultural information, EU funds

Introduction

Ecological farming means "...the system of farming, which activates natural environment production mechanisms through application of natural means, technologically non-processed, at the same time ensures durable soil fertility and animal health as well as high biological quality of agricultural products..." [Sołtysiak 1995]. Present and future development of agricultural farming is strictly connected with its competitiveness towards other agricultural systems. Streamlining of activities in agriculture, consisting in inter alia, the best use of the used equipment in agricultural production, also requires the knowledge on

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the shaping factors of the machinery and the tractors exploitation process in a farm, which significantly influences efficiency of farming [Kocira, Parafiniuk 2006; Sikora 2009; Sławiński 2008]. From the moment of joining the EU, Poland has had opportunity to obtain funds from the EU means for purchase of machines and farm devices within modernization activities of farms. For many farms it is an opportunity to improve a mechanisation degree of agricultural production, to increase acreage and consequently to improve competing abilities on the national market. However, to do so, farmers should rationally decide on the costs of purchase and also pay attention to economic efficiency of managing. In conditions of progressing liberalization of agricultural politics and common budget support of agricultural incomes, assessment of relation between efficiency and competitiveness is considerably hindered [Kulawik 2007]. Higher time consumption and lower production efficiency in an ecological farm does not encourage to turn to this production method despite growing market demand for ecologic food.

Poland has very good natural and social conditions for ecological farming development. Superior participation of family agricultural farms, usually of multi-directional production, which can easily transform into food producing farms with ecological methods, is a very significant factor for their development. Moreover, low environmental pollution, a low level of use of chemical crop boosting substances, a multi-directional character of production of agricultural farms and high resources of free and considerably cheap work force in agriculture, influences development of ecological production in Poland. Except for the above factors, which influence development of ecological food production, an economic aspect is also significant. Presently, it mainly consists in various forms of the EU funds; this aspect is emphasised by many authors [Chudy-Hyski 2002; Kowalski et al. 2012; Kowalski 2008; Szeląg-Sikora, Kowalski 2011]. Ecological farming similarly to other agricultural production systems requires scientific research to be carried out, which will support its development.

Main purpose of the paper is determination of the equipment level of the researched farms in the machinery park and analysis of the EU funds which are used by the producers of ecological food. Research took a form of guided survey carried out directly with an owner or a farm manager based on the previously prepared questionnaire.

Research and calculations methodology

Total power of tractors, self-driving machines which are owned by a farm and other devices which have their own energy source, calculated into an area unit of AL was accepted as total *power installed in a farm* [PZ] [Kowalski et al. 2002] according to the following formula:

$$PZ = \sum P_n \cdot S^{-1} \quad [\text{kW} \cdot \text{ha}^{-1} \text{AL}], \quad (1)$$

where:

- P_n – nominal power of tractors, self-driving machines and the remaining devices [kW],
- S – surface area of AL used in a farm [ha AL].

Quantity equipment in the machinery park [item farm⁻¹] was presented in the form of a list of the basic machines used in particular technological processes both in plant and animal production.

Age and a period of using farm tractors in the researched farms [in years]. A period from the production date was accepted as the age of tractors, while a period of using a particular machine in the researched farm was accepted as the use period. The second index was accepted for assessment due to a considerable scale of secondary turnover in acquiring machines by farmers.

Gross replacement value of the machinery park [thousand PLN ha⁻¹ AL]. A current value of new machines or of similar operational properties, which were fully efficient were accepted without including their degree of physical and economic wear [Kowalski et al. 2002].

The research was carried out in Małopolskie voivodeship in 30 randomly selected ecological farms. The smallest of them was 2.5 ha and the biggest was 58 ha. While the average area was 17.76 ha. For realisation of the assumed purpose, farms were divided in regard to the area of arable land (AL) into five groups:

- Group I is a farm of the area within 1.0 to 5 ha AL (8 farms),
- Group II is a farm of the area within 5.1 to 10 ha AL (7 farms),
- Group III is a farm of the area within 10.1 to 15 ha AL (6 farms),
- Group IV is a farm of the area within 10.1 to 20 ha AL (5 farms),
- Grupa V is a farm of the area above 20 ha (4 farms),

Results and discussion

Data concerning structure of using the land and livestock were presented in table 1. The biggest area among the researched farms was intended for agricultural land, they constituted at the average 49%. In case of agricultural land, at the average 62% were intended for grain cultivation, 18.7% for root vegetables. The remaining vegetables constituted 17.5%, fodder crops only 1.8%. The following constituted the remaining part of AL: 30.2% grassland and 20.8% orchards and plantations.

Table 1. Area of arable land and livestock in the researched farms according to the area groups
Tabela 1. Powierzchnia użytków rolnych oraz obsada inwentarza żywego w badanych gospodarstwach wg grup obszarowych

Farms					
Average	including area [ha]:				
	1.0–5.0	5.1–10.0 h	10.1–15.0 h	15.1–20.0 h	surface area 20 h
Arable land [ha]					
11.56	3.71	7.03	13.09	17.01	26.05
Livestock [LSU ha ⁻¹ UR]					
0.39	0.25	0.29	0.67	0.42	0.25

Source: author's own study

Average livestock in farms per 1 ha of AL was 0.39 LSU. Within animal species, cattle dominated (93.9%). Pigs constituted 4.6% and poultry 1.5%.

Data included in table 2 proves that number of delivery trucks in the researched farms was at the average of 0.53 item farm⁻¹. The highest number of these vehicles occurred in the third group farms, of the area within 10.1 ha – 15.0 ha, where it was at the average of 0.67 item farm⁻¹. While the lowest number occurred in facilities of the area above 20 ha. Presence of such a big number of cars in the researched facilities results indirectly from the ecological production system, in which distribution of commodity production for markets frequently takes place by means of own transport means. Considerable production diversity resulting from no particular production orientation (frequently only one mixed production occurs) is a reason for production of small product batches. Therefore, farmers cannot rely on recipients (e.g. wholesalers) that will be interested in purchasing directly at a farm. Therefore, there is a frequent need to supply clients directly with produce on their own. In the researched farms, the number of tractors was at the average of 1.87 item farm⁻¹. The third group farms (10.1–15.0 ha AL) possessed the biggest number of tractors (similarly as in case of cars) – 2.83 item farm⁻¹. The number of combine harvesters was at the average of 0.2 item farm⁻¹. The fourth group farms (15.1–20.0 ha AL) possessed the biggest number of these machines – 0.6 item farm⁻¹. The list presented in table 2 shows that these machines along with other combine harvesters occur mainly in farms of the last three groups. The number of the remaining machines, per a statistical farm is highly varied. Generally, it must be stated that except for a small number of groups (ploughs, sprayers, mowers) these are the numbers which prove a low level of mechanisation.

Table 2. Equipment of a farm with a machinery park [item farm⁻¹] and their gross replacement value [thousand PLN ha⁻¹ AL].

Tabela 2. Wyposażenie gospodarstw w park maszynowy [szt. gosp.⁻¹] oraz ich wartość odtworzeniowa brutto [tys. PLN ha⁻¹ UR]

Specification	Average	Area of the farm [ha AL]:				
		1.0–5.0	5.1–10.0	10.1–15.0	15.1–20.0	above 20
Number of machines						
Farm tractors	1.87	0.88	1.43	2.83	2.60	2.25
Delivery trucks	0.53	0.38	0.57	0.67	0.60	0.50
Side cars	1.10	0.25	0.71	1.67	1.80	1.75
Ploughs	0.77	0.38	0.57	0.83	1.40	1.00
Cultivation aggregates	0.33	0.25	0.29	0.50	0.40	0.25
Manure spreaders	0.43	0.38	0.14	0.50	0.60	0.75
Fertilizer distributors	0.57	0.25	0.71	0.83	0.60	0.50
Grain drills	0.47	0.13	0.43	0.50	1.00	0.50
Single-seed drill	0.13	-	-	0.33	0.40	-
Automatic planting machines	0.30	0.25	-	0.50	0.60	0.25
Sprayers	0.80	1.00	1.00	0.67	0.60	0.50
Rotational mowers	0.57	0.25	0.43	0.67	0.80	1.00
Chuff-cutters	-	-	-	-	-	-
Collecting presses	0.27	0.13	-	0.50	0.40	0.50
Potato diggers	0.17	0.50	-	-	0.20	-

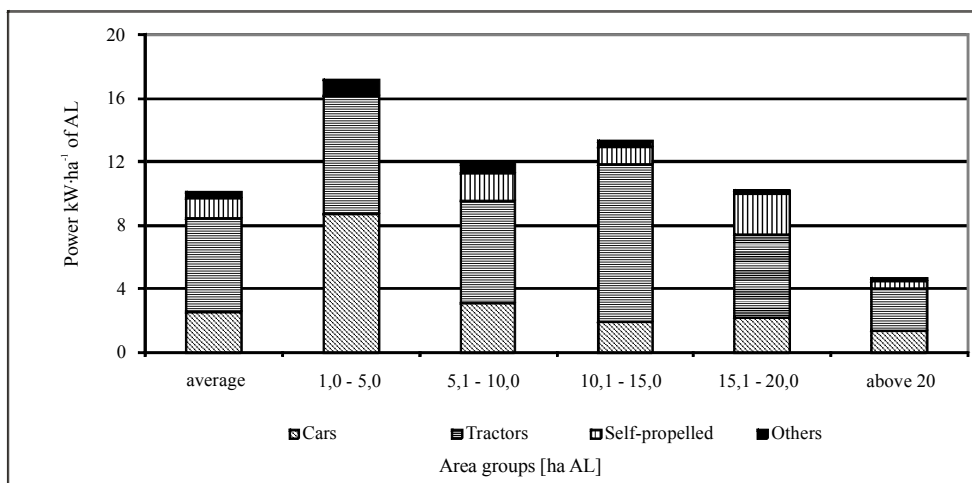
Level of equipment...

Specification	Average	Area of the farm [ha AL]:				
		1.0–5.0	5.1–10.0	10.1–15.0	15.1–20.0	above 20
Number of machines						
Potato harvesters	0.23	-	-	0.50	0.60	0.25
Combine harvesters	0.20	-	0.14	0.17	0.60	0.25
Beetroot harvesters		-	-	-	-	-
Milking machines	0.13	-	0.14	0.33	-	0.25
Coolers and cool storages	0.10	-	-	0.33	-	0.25
Gross replacement value						
Total	16.44	24.56	20.14	21.84	16.97	7.90

Source: author's own study

Replacement value of the machinery park in the researched farms was at the average of 16.44 thousand. PLN ha^{-1} AL. However, it is noticeable that along with the increase of the area, the value of this index decreases. In the group of farms of the smallest area, the value of technical infrastructure was 24.56 thousand PLN ha^{-1} AL while in the group of farms of the biggest areas it was above three times higher and reached 7.90 thousand PLN ha^{-1} AL.

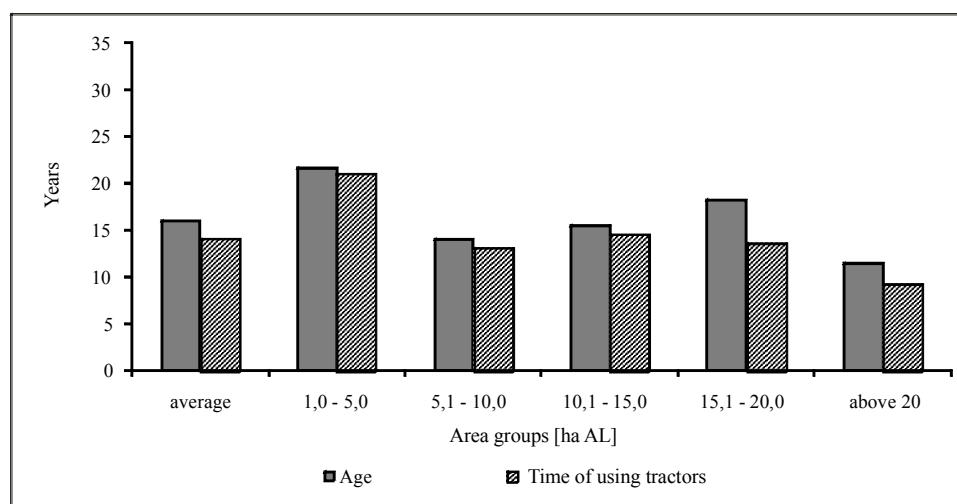
Saturation of the machinery park with the power installed in reference to the area of one hectare was at the average on the level of approx. 16 kW and almost was proportionally decreasing along with the increase of the arable land area (fig.1). For comparison, two border values of this index differed in groups as much as approx. 12 kW ha^{-1} AL. When analysing the structure of the power installed in the group of smaller farms (from the range 1.0–5.0 ha) a significant share of the power installed in cars is reported (approx. 9 kW ha^{-1} AL). In farms belonging to this group, vegetables dominated in the the structure of crops. Therefore, delivery trucks were used mainly for transportation of yields to markets (collection points, marketplaces, etc.).



Source: author's own study

Fig. 1. Level of the power installed in the machinery park
Rys. 1. Poziom mocy zainstalowanej w parku maszynowym

Farm tractors, average age of which in the researched facilities was 16 years and the average age of use (from the moment of purchase) was approx. 15 years, are the basic element of the machinery park (fig.2). Age of tractors was varied within the accepted groups. However, it did not come up to the same level as the age of use in any of groups. Moreover, it should be emphasised that except for farms of the first area group, the minimum of two tractors were included in the equipment of farms, while age of one of them did not exceed 6 years and the equipment was purchased from the EU funds.



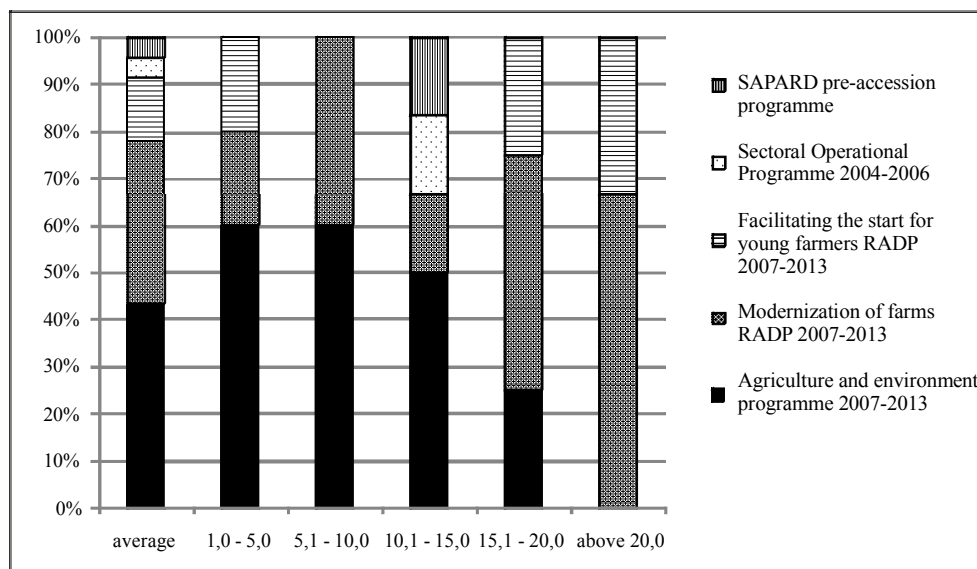
Source: author's own study

Fig. 2. Age and a period of purchase of farm tractors
Rys. 2. Wiek i okres zakupu ciągników rolniczych

Out of 30 researched farms, 23 used the structural funds (fig. 3). The biggest number of farms (43.5%) benefited from "Environmental management scheme" [Environmental Management Scheme (on-line) 2011] (not including ecological farming packet, a beneficiary of which were all respondents). 34.8% of them used the measure "modernization of farms" [Modernization..(on-line)2011]. The measure „Facilitating start for young farmers” was at the third place – 13% of farms [Facilitating start ...(on-line) 2011]. The above mentioned three measures were carried out within the current accession period (2007-2013) within the Rural Areas Development Programme. Not many respondents – at the average 4.3% of farms benefited from the Sectoral Operational Programme in the first accession period (2004-2006) and pre-accession programme SAPARD (fig. 3).

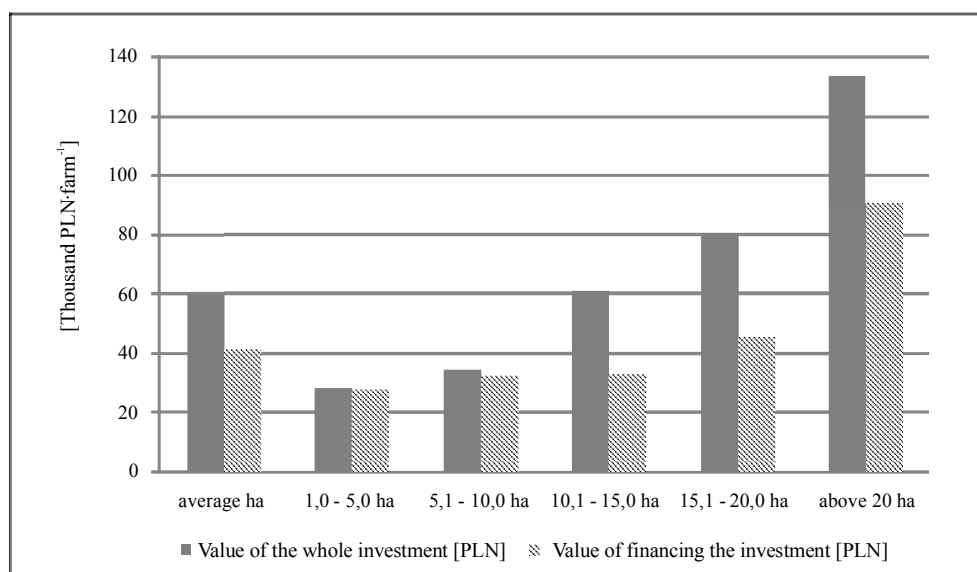
Value of subsidies for investment in the researched farms was at the average of 68.8%. Incurring the investment with the EU means was the highest in the first and the second group, and was respectively 98.6% and 94.1%. These were mainly farms, where funds within operation "Facilitating the start for young farmers" was obtained; at the same time 100% of premium might have constituted the value of the investment. In the fifth group, the EU provided investment subsidies in 67.5% and in the third and the fourth group it was respectively 53.7% and 56.8% (fig. 4).

Level of equipment...



Source: author's own study

Fig. 3. Structural funds, from which farmers benefited
Rys. 3. Fundusze strukturalne, z których korzystali rolnicy



Source: author's own study

Fig. 4. The level of the investments, which were carried out [thousand PLN]
Rys. 4. Poziom zrealizowanych inwestycji [tys. PLN]

Conclusions

The obtained results clearly prove that farmers who run ecological farms, very eagerly benefited from various types of the EU funds for production and investment in fixed means. 24 out of 30 responders included in the research, declared that, except for subventions for ecological farming and direct payments, they actively used available subsidies within structural funds both pre-accession as well as after integration with the EU. The obtained financial means constituted a significant input into investments which were carried out. However, the level of the obtained subventions was varied and generally it was increasing with the increase of the area of arable land of a farm. In the group of the smallest farms, this value was 27.6 thousand PLN·farm⁻¹, and in the group of the biggest farms – 90 thousand PLN·farm⁻¹; for the whole population it was at the average of 41 thousand PLN·farm⁻¹ (at the total average value of investment on the level of 59.6 thousand PLN·farm⁻¹). A properly selected machinery park in regard of quality and quantity is significant in agricultural production, including ecological production. Accurate decisions concerning investing in tractors and farm machines enable the use of economically effective production technologies and obtaining agricultural products of high quality. Quantity equipment of the researched facilities with the machinery park allows to state that it gives an opportunity to perform majority of field works with the use of machines with maintaining required agrotechnical limits of time. However, one may notice that along with the increase of the farm area, quantity and quality equipment with technical devices improves considerably. Each of the researched farms owned inter alia, one tractor and one farm side car as a transportation mean. Characteristics of tractors proved that they were at the average 16 years old and of the average power of 5.91 kW·ha⁻¹AL.

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POZIOM WYPOSAŻENIA W PARK MASZYNOWY ORAZ DZIAŁANIA ZWIĄZANE ZE WSPOMAGANIEM FUNDUSZAMI UNIJNYMI GOSPODARSTW EKOLOGICZNYCH

Streszczenie. W pracy przeprowadzono analizę wyposażenia w park maszynowy 30 gospodarstw ekologicznych. Jako zmienną grupującą przyjęto powierzchnię użytków rolnych. Drugim aspektem pracy były działania gospodarstw związane z integracją naszego kraju z Unią Europejską. Aby w pełni zrealizować przyjęty cel pracy, obliczono m.in. wartość odtworzeniową parku maszynowego, która średnio dla całej grupy wyniosła 16,44 tys. PLN ha^{-1} UR. Zamieszczone ilościowe wyposażenie w maszyny wykazało, że każde badane gospodarstwo posiadało min. jeden ciągnik oraz przyczepę rolniczą jako środek transportowy. Charakterystyka ciągników wykazała, że miały one średnio 16 lat oraz średnią moc 5,91 kW ha^{-1} UR. Spośród 30 respondentów 24 zadeklarowało, że dodatkowo aktywnie korzystało z dostępnych dopłat w ramach funduszy strukturalnych zarówno tych przedakcesyjnych, jak i po integracji z UE.

Słowa kluczowe: gospodarstwo ekologiczne, park maszynowy, grupy obszarowe, informacja rolnicza, fundusze unijne

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