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THE DIVERSIFICATION OF THE ECONOMIC SITUATION OF THE EU COUNTRIES' FARMS (BASED ON FADN)

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Abstract. The aim of the paper was to present the economic situation of farms in the countries of the EU at two different moments in time, and to attempt to assess changes in their situations in the considered period. Analyses were carried out on the basis of FADN data. The object of the study was the economic situation, including production potential, production and economic results and financial indicators. Based on selected characteristics, cluster analysis was performed for 2004 and 2013 and the economic situations of created typological groups was presented. It was found that in both the given years agriculture in the EU countries can be divided into several types. In the studied decade, convergence in the economic situation of farms in the EU was observed. Most Czech, Estonian, and Latvian entities benefited from this process.

Key words: economic situation, farms, FADN, cluster analysis

INTRODUCTION

The economic situation of farms in the EU countries has been shaped by many different factors operating in conjunction. Apart from natural conditions, they also include historical reasons. Structural changes, which took a different course in the eastern and western parts of Europe, frequently led to concentration of production and the emergence of larger farms. In Central and Eastern Europe (CEE), this usually resulted from the imposed process of collectivisation, whereas the changes in Western Europe were necessitated by increased competitiveness and market demands (Poczta et al., 2008). Such changes could not have been without effect on the economic situation of the farms in the countries affected by the aforementioned processes. Furthermore, each EU expansion causes not only an increase in its geographical scope, but also a greater diversification of agriculture within the European Union.

Covering new member states by the Common Agricultural Policy is certainly reflected in the economic situation of farms in their territories (in the most obvious way, by having an impact on their income, above all through direct payments[1]). In the context of the great importance attached to the broadly defined cohesion policy in the EU and many years of presence of some CEE countries within the Union structures, it might be interesting to find out whether and how it has affected their position relative to the remaining EU member states. Hence, the purpose of this article is to determine the economic situation of farms in European Union countries at two different points in time and to attempt to evaluate the changes of that situation in the period investigated.

The data available in the FADN database were used for this purpose. The analyses were performed for two years: 2004 and 2013. The states excluded from the investigation were Malta and Cyprus (due to the minor significance of agriculture in these countries), and also

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[1] Cf. e.g. Runowski (2014), Nowak and Domańska (2014), Baer-Nawrocka (2015).

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Bulgaria, Romania and Croatia (because of the unavailability of data for 2004). The object of the study was the economic situation, which is a multi-dimensional phenomenon. To take into account this complexity, the article offers a synthetic presentation of the economic situation of farms. As suggested by Kisielińska and Stańko (2009) and Kisielińska (2009), whose studies include numerous examples of the application of multidimensional techniques in agricultural economics, very few analyses have been performed so far in connection with the broadly defined economic situation of agricultural entities, including production potential, production and economic performance and financial indicators. This is the approach taken to resolve the problem presented here.

The simple characteristics considered here are indicators that show the input resources, their structure and mutual relationships as well as features that define the organisation of production or the production and economic performance, along with financial indicators relating to financial capacity, financial support and debt service capacity, efficiency and profitability. The variables selected for substantive reasons were subjected to statistical verification (by excluding characteristics that displayed low variability or excessive correlation)[2] and standardisation. Based on the set of simple characteristics selected this way[3], cluster analysis was carried out[4] for the years 2004 and 2013.

RESEARCH FINDINGS

The results of the clustering performed for 2004 are presented in the form of a dendrogram in Figure 1. On the basis of the characteristics included in analysis, four typological groups were obtained. Table 1 presents the selected characteristics illustrating the economic situation of farms in the resulting clusters.

The first typological group consists of farms in the Benelux countries, Denmark, Sweden, Germany, France and Great Britain. These entities were well equipped in factors of production, particularly land and assets. On average, there was 75 ha UAA per farm (more than half of which was rented land) and EUR 780,000 of assets (the highest value among the clusters) in 2004. These entities were characterised by a very high supply of land and labour with fixed assets and a very large supply of labour with UAA. These relationships between the factors of production, along with a high intensity of production measured by the current and fixed assets inputs per ha[5], resulted in the highest labour and land productivity. These farms were also the top-performing ones in terms of production (the yield of wheat was nearly 76 dt/ha). As regards financial indicators, it is noteworthy that these entities showed the highest tendency to incur debt among all the clusters. The average debt ratio was 30%, a large proportion of which (nearly 78%) consisted of long-term liabilities. Despite the best results in absolute terms (EUR 26,600 on average) and the aforementioned labour productivity, this typological group showed low profitability ratios[6].

Another cluster (II) consisted of three Visegrad Group countries (i.e. the Czech Republic, Slovakia and Hungary) and two Baltic States (Estonia and Latvia). The average UAA in the farms of these countries was the largest among all the typological groups (nearly 210 ha)[7]. The considerable land resources were accompanied by high labour inputs, more than 65% of which was paid labour. It is also noteworthy that the value of assets, significant by comparison with the other clusters, was disproportionately low in relation to the other factors of production. As a result, the supply of land with fixed assets was the lowest among the typological groups identified and several times lower than the EU average. These relationships between the factors of production contributed to the low intensity of production, as expressed by

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[2] Characteristics with a coefficient of variation below 30% were excluded (according to Wysocki and Lira (2005), coefficient of variation ≥ 30% indicates a high or very high variation), as well as those with a correlation coefficient above 0.5 (according to Wysocki and Lira (2005), correlation coefficient < 0.5 indicates a weak dependence or its absence).

[3] Eventually, the typology was based on the characteristics written in bold in Tables 1 and 2.

[4] The clustering procedure was based on a hierarchical method – agglomerative technique. The distances between the new clusters formed from the combined objects were determined by Ward's method, and the clusters were formed on the basis of the Euclidean distance (Stanisz, 2007).

[5] Total intermediate consumption was assumed as current assets inputs, and depreciation – as fixed assets inputs.

[6] They were calculated using the category of income reduced by own labour costs estimated on the basis of paid labour costs.

[7] The high figure was partly due to the average UAA in Slovakia of more than 600 ha, but the average for this group excluding Slovakia is still very high (more than 110 ha).
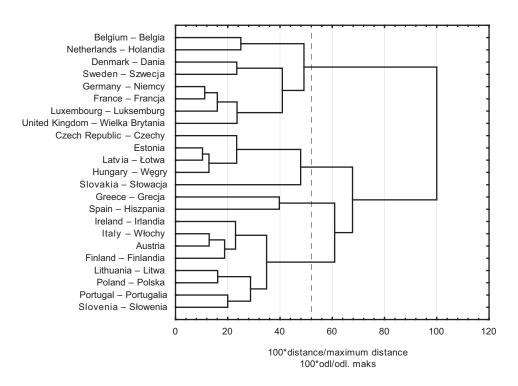
Fig. 1. Typology of EU countries' farms according to their economic situation in 2004
Source: own elaboration based on FADN (n.d.).
Rys. 1. Typologia gospodarstw rolnych krajów UE ze względu na ich sytuację ekonomiczną
w 2004 roku
Źródło: opracowanie własne na podstawie FADN (b.d.).

fixed and current assets inputs per ha. Although the entities in question had an average debt ratio, the structure of debt was remarkable, with no less than 40% short-term liabilities. Although these units boasted high profitability indices, far exceeding the EU average, it should be stressed that they also earned the lowest income per farm (merely EUR 9,800) and, as a result, had a very low profitability of own labour. Overall labour productivity and land productivity were also unsatisfactory.

Cluster III included the farms of two Mediterranean countries: Greece and Spain. These units were the smallest of all the groups identified in terms of resources of production factors (particularly the Greek farms). They were characterised by a small supply of labour with UAA (slightly less than 14 ha), which could be explained by the high share of permanent crops, which are usually very labour-intensive, in the structure of these farms. At the same time, the supply of land with fixed assets remained relatively high – in excess of the EU average. The current and fixed assets inputs per ha were

slightly lower than the EU average – ca. EUR 815 and EUR 209, respectively. These units used their resources efficiently, achieving a relatively high land and labour productivity and a farm net income of nearly EUR 19,000. Compared to other clusters, a particularly impressive indicator was the profitability of own labour, close to the level achieved by cluster I. Good results in absolute terms were accompanied by the highest profitability among all the groups. The farms in question also excelled in terms of other financial indicators, having an extremely high liquidity level and low debt ratio.

The last cluster (IV) consisted of the entities in Ireland, Italy, Austria, Finland, Portugal and three countries of Central and East Europe, i.e. Lithuania, Poland and Slovenia. The farms in this group can be described as average, achieving results close to the mean EU levels in many categories, neither particularly high nor low. This applied e.g. to the supply of factors of production and the relationships between them. What is noteworthy, is the lowest share of third party production factors

Table 1. Selected data concerning economic situation of EU countries' farms in 2004 according to the typological groups
Tabela 1. Wybrane dane dotyczące sytuacji ekonomicznej gospodarstw rolnych krajów UE w 2004 roku według grup typologicznych

Wyszczególnienie Details	Typological group – Grupa typologiczna				UE-25 EU-25
	I	II	III	IV	
1	2	3	4	5	6
Total UAA (ha) Powierzchnia UR (ha)	75.3	209.8	20.8	27.1	35.1
Total labour input (AWU) Nakłady pracy ogółem (AWU)	2.0	7.8	1.5	1.6	1.7
Total assets (thous. EUR) Wartość aktywów ogółem (tys. euro)	783.8	497.6	148.0	230.8	276.6
Share of rented UAA (%) Udział dodzierżawionych UR (%)	54.7	70.6	36.7	32.7	51.6
Share of paid labour input (%) Udział pracy najemnej (%)	29.2	65.7	21.1	11.6	24.1
Supply of labour with UAA (ha/AWU) Powierzchnia UR na pełnozatrudnionego (ha/AWU)	39.4	27.4	13.8	17.6	20.4
Supply of labour with fixed asstes (thous. EUR/AWU) Techniczne uzbrojenie pracy (tys. euro/AWU)	332.5	40.1	75.4	140.8	133.9
Supply of land with fixed asstes (thous. EUR/ha) Techniczne uzbrojenie ziemi (tys. euro/ha)	11.8	1.5	7.2	8.4	6.6
Yield of wheat (dt/ha) Plon pszenicy (dt/ha)	75.7	43.8	32.9	51.1	66.0
Current assets inputs per ha (EUR/ha) Nakłady środków obrotowych na ha (euro/ha)	1 870.6	541.8	814.5	803.9	996.2
Fixed assets inputs per ha (EUR/ha) Nakłady środków trwałych na ha (euro/ha)	448.8	90.0	209.3	284.6	240.2
Farm Net Value Added per Annual Work Unit (thous. EUR/AWU) Wartość dodana netto na osobę pełnozatrudnioną (tys. euro/AWU)	30.3	6.6	15.6	11.3	16.1
Farm Net Income per Family Work Unit (thous. EUR/FWU) Dochód z rodzinnego gospodarstwa rolnego na osobę pełnozatrudnioną rodziny (tys. euro/FWU)	18.2	7.4	16.7	10.3	13.7
Land productivity (thous. EUR/ha) Produktywność ziemi (tys. euro/ha)	3.0	0.8	2.0	1.4	1.7
Productivity of fixed assets inputs Produktywność nakładów środków trwałych	6.5	8.8	13.6	5.6	7.2
Current ratio Płynność bieżąca	18.3	5.2	73.6	25.1	4.4
Quick ratio Płynność podwyższona	6.8	3.3	63.2	7.7	2.9

Table 1 cont. – Tabela 1 cd.

1	2	3	4	5	6
Debt ratio (%) Zadłużenie (%)	30.1	19.5	1.6	7.9	15.0
Structure of debt (%) Struktura zadłużenia (%)	22.1	40.0	21.8	23.7	25.3
Lending capacity Zdolność kredytowa	0.1	0.6	9.1	0.9	0.2
Profitability (%) Rentowność (%)	–2.2	8.3	43.6	4.1	2.7
Profitability of sales (%) Rentowność sprzedaży (%)	–3.6	9.8	28.3	3.4	2.5
Profitability of assets (%) Rentowność aktywów (%)	–0.6	3.7	6.3	1.0	0.5
Profitability of equity (%) Rentowność kapitału własnego (%)	–1.2	4.9	6.4	1.0	0.6
Farm Net Income (thous. EUR) Dochód z rodzinnego gospodarstwa rolnego (tys. euro)	26.6	9.8	18.9	13.6	17.9

I – Belgium, Netherlands, Denmark, Sweden, Germany, France, Luxembourg, United Kingdom, II – Czech Republic, Estonia, Latvia, Hungary, Slovakia, III – Greece, Spain, IV – Ireland, Italy, Austria, Finland, Lithuania, Poland, Portugal, Slovenia.
Source: own elaboration based on FADN (n.d.).
I – Belgia, Holandia, Dania, Szwecja, Niemcy, Francja, Luksemburg, Wielka Brytania, II – Czechy, Estonia, Łotwa, Węgry, Słowacja, III – Grecja, Hiszpania, IV – Irlandia, Włochy, Austria, Finlandia, Litwa, Polska, Portugalia, Słowenia.
Źródło: opracowanie własne na podstawie FADN (b.d.).

among the clusters analysed (the share of rented arable land and paid labour was 33% and slightly less than 12%, respectively). These farms were characterised by a low intensity of production and above-average profitability ratios. However, good profitability was accompanied by a low farm net income of EUR 13,600, which is below the EU average. Similarly, low values were observed also in the productivity of production factors, particularly of fixed assets inputs, where the productivity was the lowest of all clusters.

The same simple characteristics as for 2004 were also used in the classification by Ward's method for 2013. This time, five clusters were obtained, shown in the dendrogram in Figure 2. The quantities reflecting the economic situation of farms were calculated again for the typological groups identified (Table 2).

Cluster I included farms from the same countries as in 2004 except Sweden, France and Luxembourg, a new member of this group being the Czech farms. As in 2004, the farms in this group were characterised by a good production potential, both in terms of the resources of production factors and the relationships between them. They also boasted the highest intensity of production and best results in terms of the farm net income and productivity of all the factors of production among the clusters analysed. What is noteworthy, due to the change in the cluster composition[8], as well as changes over time, these farms achieved above-zero profitability ratios.

In 2013 cluster II was made up of Greek and Spanish units, which constituted typological group III in 2004, along with the farms in Hungary, Lithuania and Portugal. The situation of these entities is similar to that in cluster III of 2004 – they were smaller units with a low value of assets and relatively limited supply of labour and land with assets. Comparatively low fixed and current assets inputs per ha were accompanied by the smallest yield of wheat of all the groups

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[8] Particularly because of the exclusion of Sweden, which was classified into a different group, and the inclusion of the Czech Republic.
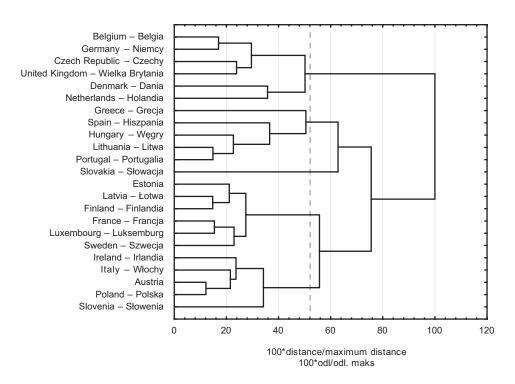
Fig. 2. Typology of EU countries' farms according to their economic situation in 2013
Source: own elaboration based on FADN (n.d.).
Rys. 2. Typologia gospodarstw rolnych krajów UE ze względu na ich sytuację ekonomiczną w 2013 roku
Źródło: opracowanie własne na podstawie FADN (b.d.).

Table 2. Selected data concerning economic situation of EU countries' farms in 2013 according to the typological groups
Tabela 2. Wybrane dane dotyczące sytuacji ekonomicznej gospodarstw rolnych krajów UE w 2013 roku według grup typologicznych

Wyszczególnienie Details	Typological group – Grupa typologiczna					UE-28 EU-28
	I	II	III	IV	V	
1	2	3	4	5	6	7
Total UAA (ha) Powierzchnia UR (ha)	111.1	33.9	594.8	86.6	26.0	32.8
Total labour input (AWU) Nakłady pracy ogółem (AWU)	3.0	1.5	15.5	1.8	1.4	1.5
Total assets (thous. EUR) Wartość aktywów ogółem (tys. euro)	1535.5	154.2	1068.1	556.7	426.8	320.8
Share of rented UAA (%) Udział dodzierżawionych UR (%)	55.4	46.0	94.5	56.1	30.7	53.8
Share of paid labour input (%) Udział pracy najemnej (%)	48.0	28.0	93.8	30.6	11.0	24.7

Table 2 cont. – Tabela 2 cd.

1	2	3	4	5	6	7
Supply of labour with UAA (ha/AWU) Powierzchnia UR na pełnozatrudnionego (ha/AWU)	39.8	22.0	38.4	49.7	19.3	21.3
Supply of labour with fixed asstes (thous. EUR/AWU) Techniczne uzbrojenie pracy (tys. euro/AWU)	565.8	81.1	37.1	265.1	281.4	165.9
Supply of land with fixed asstes (thous. EUR/ha) Techniczne uzbrojenie ziemi (tys. euro/ha)	18.9	4.7	1.0	5.3	14.0	7.8
Yield of wheat (dt/ha) Plon pszenicy (dt/ha)	77.3	36.1	46.4	51.6	58.3	59.7
Current assets inputs per ha (EUR/ha) Nakłady środków obrotowych na ha (euro/ha)	3 277.9	840.4	835.6	1 301.4	1 342.7	1 341.3
Fixed assets inputs per ha (EUR/ha) Nakłady środków trwałych na ha (euro/ha)	557.9	181.6	155.0	340.4	421.7	279.6
Farm Net Value Added per Annual Work Unit (thous. EUR/AWU) Wartość dodana netto na osobę pełnozatrudnioną (tys. euro/AWU)	47.8	14.1	11.4	25.4	15.4	18.1
Farm Net Income per Family Work Unit (thous. EUR/FWU) Dochód z rodzinnego gospodarstwa rolnego na osobę pełnozatrudnioną rodziny (tys. euro/FWU)	44.6	16.0	–9.0	18.8	14.3	15.4
Land productivity (thous. EUR/ha) Produktywność ziemi (tys. euro/ha)	5.1	1.4	1.0	1.7	2.2	2.1
Productivity of fixed assets inputs Produktywność nakładów środków trwałych	9.0	9.1	6.6	5.7	5.9	7.7
Current ratio – Płynność bieżąca	15.6	28.2	4.9	4.3	365.4	6.0
Quick ratio – Płynność podwyższona	5.7	22.4	3.5	2.8	307.4	4.4
Debt ratio (%) – Zadłużenie (%)	28.5	7.4	15.9	30.9	4.4	14.9
Structure of debt (%) – Struktura zadłużenia (%)	20.2	44.0	59.5	24.7	14.6	22.7
Lending capacity – Zdolność kredytowa	0.2	5.0	0.4	0.2	1.2	0.2
Profitability (%) – Rentowność (%)	7.3	17.3	–2.4	–1.8	–2.5	1.5
Profitability of sales (%) – Rentowność sprzedaży (%)	7.4	15.7	–3.6	–2.8	–6.1	1.4
Profitability of assets (%) – Rentowność aktywów (%)	2.0	4.1	–1.8	–0.4	–0.4	0.3
Profitability of equity (%) Rentowność kapitału własnego (%)	2.8	4.5	–2.1	–0.6	–0.4	0.3
Farm Net Income (thous. EUR) Dochód z rodzinnego gospodarstwa rolnego (tys. euro)	55.7	15.4	–8.7	22.9	16.8	17.9

I – Belgium, Germany, Czech Republic, United Kingdom, Denmark, Netherlands, II – Greece, Spain, Hungary, Lithuania, Portugal, III – Slovakia, IV – Estonia, Latvia, Finland, France, Luxembourg, Sweden, V – Ireland, Italy, Austria, Poland, Slovenia.
Source: own elaboration based on FADN (n.d.).

I – Belgia, Niemcy, Czechy, Wielka Brytania, Dania, Holandia, II – Grecja, Hiszpania, Węgry, Litwa, Portugalia, III – Słowacja, IV – Estonia, Łotwa, Finlandia, Francja, Luksemburg, Szwecja, V – Irlandia, Włochy, Austria, Polska, Słowenia.
Źródło: opracowanie własne na podstawie FADN (b.d.).

(slightly above 36 dt/ha in 2013). The farm net income as well as land and labour productivity were close to the EU average. Low fixed assets inputs level resulted in their highest productivity (9.1 in 2013). Very high values were also observed with respect to profitability ratios.

In some respects, farms of cluster II were similar to those in group III, but in view of the considerable UAA, high labour input, predominance of third party factors of production and negative income and, consequently, below-zero profitability ratios, the single-item cluster containing Slovakian units was identified in 2013.

The classification for 2013 also yielded one new typological group (IV) consisting of the farms of three countries that represented three different clusters in 2004. The group included Estonia, Latvia, Finland, France, Luxembourg and Sweden. The farms of these countries were characterised by an above-average production potential, average intensity of production, with an income and productivity of labour higher than the EU average. What set this group apart from the others was a high debt ratio of nearly 31%.

The cluster analysis for 2013 also produced a different composition of the last group (V), because Finnish, Lithuanian and Portuguese farms were classified into other clusters. Despite the composition differences, the situation of the entities within this group bears a close resemblance to the circumstances of the same cluster in 2004. They included entities with a smaller area, a low supply of labour with land but a relatively high supply of labour with fixed assets. These farms achieved labour productivity and income slightly below the EU average values. Their extremely high liquidity was due to the very low value of short-term liabilities in Italy in 2013[9]. The only indicator that showed a decline compared to 2004 was the profitability of these farms.

SUMMARY

On the basis of analyses, several types of agriculture were identified within the EU in both years investigated. First, there are countries with large farms characterised by a high production intensity as well as a high productivity and economic efficiency. Then there are countries with average-sized farms of average production intensity and performance. The next group includes countries with rather small family farms of average production intensity or of extensive nature of production and relatively low financial results. The last group consists of countries with large but extensive farms with poor financial results. In 2004 the economic situation of farms in so-called "new" member states was generally worse than in the EU-15 countries, although they often achieved better financial results. This was due to such factors as differences in labour costs and the operation of the rule of diminishing marginal productivity. While in 2004 the entities of CEE countries were present in only half of the clusters identified, in 2013 they had their "representative" in each of the typological groups. This could lead to the conclusion that the convergence process took place in the decade investigated with respect to the economic situation of farms in the EU. Analysing the situation of farms in the CEE countries – not over time but in comparison with the farms of the "old" member states – we could say that the Czech, Estonian and Latvian entities have benefited the most from the process, changing their places in the classifications. Meanwhile, Slovakian farms clearly stood out from the general trend. The changes observed are quite slow and do not take place in all areas, so caution and further research is necessary before definite conclusions can be drawn.

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[9] The mean current ratio calculated with the exclusion of Italy was 44.9 and the quick ratio was 5.2.

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ZRÓŻNICOWANIE SYTUACJI EKONOMICZNEJ GOSPODARSTW ROLNYCH KRAJÓW UE (NA PODSTAWIE FADN)

Streszczenie. Celem artykułu jest przedstawienie sytuacji ekonomicznej gospodarstw rolnych krajów UE w dwóch różnych momentach czasowych oraz próba oceny zmian tej sytuacji w badanym okresie. Analizy przeprowadzono na podstawie danych FADN. Przedmiotem badań była sytuacja ekonomiczna, obejmująca potencjał wytwórczy, wyniki produkcyjne i ekonomiczne oraz wskaźniki finansowe. Na podstawie wybranych cech wykonano analizę skupień dla lat 2004 i 2013 oraz przedstawiono sytuację ekonomiczną utworzonych grup typologicznych. Stwierdzono, że w obu badanych latach w krajach UE można wyróżnić kilka typów rolnictwa. W badanym dziesięcioleciu zaobserwowano proces konwergencji w zakresie sytuacji ekonomicznej gospodarstw rolnych w UE, a na procesie tym najbardziej skorzystały podmioty czeskie, a także estońskie i łotewskie.

Słowa kluczowe: sytuacja ekonomiczna, gospodarstwa rolne, FADN, analiza skupień