

REGIONAL DIFFERENTIATION OF THE USE OF PRODUCTION FACTORS IN THE POLISH AGRICULTURE

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Abstract: The competitive ability of agricultural farms depends on the efficiency of the utilization of production factors. The elaboration presents the differentiation of the production factors use in agricultural farms located in four regions within the framework of the FADN system. The period of farm investigation covers the years 2004-2006. The research deals with the accepted agricultural types of farms: field crops, milk and granivores. A relatively large differentiation of agricultural farms was observed between regions in respect of cropland area, economic size and current financial liquidity. The share of the debts in farms was not significant and remained at a relatively similar level in the regions analysed. The greatest differentiation between the regions concerned the yield of equity. Farms of „granivores” agricultural type, especially those situated in the Pomorze and Mazury regions, were characterized by the highest efficiency of the use of production factors and also by the economic power. The lowest efficiency of these factors appeared in arable farms.

Key words: production factors, European Size Unit, agricultural type, financial liquidity, debt level, earning power of land, return on assets and equity.

Abstract: Zdolność konkurencyjna gospodarstw rolniczych uzależniona jest od efektywności wykorzystania czynników wytwórczych. W opracowaniu określono zróżnicowanie efektywności wykorzystania czynników produkcji w gospodarstwach rolniczych w regionach wydzielonych w ramach systemu FADN. Dane empiryczne obejmują lata 2004-2006. Do badań przyjęto następujące typy rolnicze gospodarstw: uprawy polowe, krowy mleczne oraz zwierzęta ziarnożerne. Stwierdzono stosunkowo duże zróżnicowanie gospodarstw rolniczych między regionami pod względem powierzchni UR, wielkości ekonomicznej oraz bieżącej płynności finansowej. Zadłużenie gospodarstw było niewielkie i relatywnie zbliżone w wydzielonych regionach. Największe zróżnicowanie między regionami w tym zakresie dotyczyło rentowności kapitału własnego. Gospodarstwa o typie rolniczym „zwierzęta ziarnożerne”, zwłaszcza te położone w regionie Pomorze i Mazury, charakteryzowały się najwyższą efektywnością wykorzystania czynników wytwórczych oraz wielkością

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ekonomiczną. Najniższa efektywność tych czynników dotyczyła gospodarstw o typie „uprawy polowe”.

Słowa kluczowe: czynniki produkcji, wielkość ekonomiczna gospodarstwa, typ rolniczy gospodarstwa, płynność finansowa, zadłużenie, dochodowość ziemi, rentowność majątku i kapitału własnego.

1. Introduction

The improvement in sustainable agriculture development requires a creation of a dynamic agricultural system, which will be based on both, the regional division and performance of farms. At the farm level, insight is required in the way of farm management which affects the development, as well as soil fertility, food security and incomes. At the regional level, insight is required in interactions of agriculture and ecology and socio-economic aspects (Bontkes, Keulen 2003). The research concerning the development of rural agriculture is related with conditions being characteristic for given region, as well as Common Agricultural Policy being the determinant of changes in the agriculture (Munroe 2001).

While agriculture may be classified as multifunctional, commercial farms are most frequently forced to narrow their scope of specialization and increase their concentration of production, which contributes to the fact that they choose a one-sided form of functioning. In comparison, agricultural holdings that resort mostly to extra-agricultural sources of income tend to become multifunctional (Michna et al. 2005). Therefore, it seems that the decision on narrowing the specialization may be connected with the need to guarantee an easier control of the efficiency of the involved expenditures and the family farm income thus obtained³. This allows, moreover, for a tougher control of the usage of production factors in possession of the holding that shape the profitability rate of the agricultural activity conducted. The specialization and the concentration, as well as the technical progress, depend, to a large extent, on the relocation of land from weaker to developing holdings (Michna et al. 2005). This, in turn, is conditioned by the investment opportunities, which are dependent on the accessible capital. The financing structure of agricultural farms is dominated mostly by the equity capital. The enterprises with a negative equity are not characterized by a quick financial liquidity. It is noteworthy that that kind of liquidity remained at a safe level only in the enterprises with the highest share of equity (Wasilewski 2006).

The concept of efficiency is a tool for assessing the potential growth and productivity gains in agricultural sector. The measurement of efficiency is the most useful instrument in the assessment of sources allocated to farms, contributing to profit maximization at the particular level of technology (Sadoulet, de Janvry 1995). Land plays the most essential role in the agricultural production, while relations between the remaining factors are shaped only by the productivity thereof. Undoubtedly, the farm's own land resources belong to the category of the most stable production components. One may actually explain the importance of land with its indispensability in the process of agricultural production, which is connected with the degree of its correspondence and mobility to the production cycle. It is noteworthy that this analysis is, in fact, heavily dependent on the technical land armament, which allows for an assessment of the saturation of land with raw-materials or other materials in the agricultural farm. The combination of the land productivity analysis and the analysis of its technical armament lets farmers improve, the farming efficiency (Rojewski, Rychlik, Stańko 1987). While the participation of production factors increases along with the development of a farm, owing to some favourable conditions of farming, the resources, as well as the quality of labour and technical work stimulate the growth of land acreage (Bud-Gusaim 1988).

Depending on the farm's agricultural type, the usage of combinations of production factors is largely diversified and the location of the agricultural farm has a direct effect on the level of the generated income. In general, the agricultural type and cropland area diversify the level and structure of direct cost. This reflects also differences in the production intensification (Wasilewski 2007). Larger farms are mostly characterised by lower yield per area of land,

³ The result category of the income in FADN system.

whereas this difference decreases, which could be assessed as a positive tendency (Wasilewski 2005). The greater use of certain production factors lead, in general, to greater increases in production level than proportionate. When performing their activity, small farms rely on accessible sources and intensify the usage thereof and become more efficient. If larger farms are less efficient, then the land market redistributes their factor of production among farms which conduct more efficient agricultural activity.

The differences between small and large farms result from a risk aversion assumed by managers of agricultural holdings. In a changing economic environment, farmers find it more difficult to adjust production decisions to the changes taking place on the market (Munroe 2001).

The optimal farm size in each country depends on the relation between the capital and labour, as well as between the intensity and possibilities of production (Ali, Byerlee 1991). Significant differences were noticed between the regions in respect of farm efficiency, whereas no substantial regional variations in technical efficiency were found. Among crop-oriented farms, the most efficient were those the area of land of which amounted to 10 to 15 hectares, but the important determinant of efficiency and size of farm were both, farmers' experience and age (Munroe 2001).

Agricultural holdings are only a small subsystem in the global concept of agricultural development, which determines the surrounding differentiation in respect of cooperation between other entities, as well as the performance of sustainable development. The model researched based on FADN (Farm Accountancy Data Network) database captures the potential association between sustainable development and efficiency of farm. Both, the management and the structure of farms, explain the level of efficiency performance, determined by size of farms and received subsidies to the production. The correlation between capital productivity and efficiency of farm characterized by sustainable development was not noticed. The negative correlation between the efficiency and subsidies on investments in farms was recorded, which reflects wrong distribution of these sources. Subsidies did not increase the competitiveness of agriculture, therefore they should be awarded more cautiously and conditioned by certain features (income in the future – Passey et al. 2007).

The regional diversification of production factor usage is connected with specialization of agriculture production in the given regions of Poland. The diversification of farming conditions in the Polish agriculture results from the history of peasant farming, and the process of transformation into market economy in Poland, being the determinant of differences among individual regions. The agro-climatic conditions in Poland also affect the agrarian structure as well as soil fertility influencing the size of farms. The farms located in the southern part of Poland were characterized by a fragmented structure, which results from the land topography, which also influenced the variety of agricultural production in this area (Bański 1998). The agrarian structure in Poland is considered to be fragmented as well as inefficient. The consolidation of land in agricultural holdings could contribute to a long term economic viability of a small-scale agriculture (Adamowicz 1996). The relationship between rural conditions and farm level productivity should be investigated in consideration of significant differences observed in infrastructure, communication, particularly in transportation and environmental conditions (Antle 1984).

2. Materials and methods

The division into the agricultural regions in Poland has been introduced by the Institute of Agriculture and Food Economics – the National Research Institute in Warsaw (IAFE-NRI)⁴

⁴ The detailed task of the FADN was defined in law act dated 29th November 2000 on the use of and gathering the accounting data from agricultural holdings (J. of Laws of 2001, No 3, point 20) and in the Commission Regulation (EC) No 730/2004 of 19 April 2004 adapting Regulation (EEC) No 1859/82 concerning the selection of returning holdings for the purpose of determining incomes of agricultural holdings by reason of the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia to the European Union.

within the framework of the FADN⁵ system launched in 2002. The classification of farms that depends on their location in four divided regions has been established on the basis of research carried out by the Institutes of: Farming, Fertilization and Soil Science, Zootechnics, and Agriculture and Food Economics (NRI – Regionalizacja 2005). The basis of singling out the regions included, in fact, the classification of provinces in Poland and the output of the agricultural production per farm, the main aim behind the assumption being to comply with the amount of the Standard Gross Margin (SGM)⁶ in the given area.

The aim of this study is to determine the differentiation of efficiency of production factor usage in agricultural farms in separated regions, according to the Polish FADN system. The elaboration also deals with the financial liquidity and indebtedness.

The research has been conducted in individual agricultural farms which belong to FADN system and assemble the farming accountancy data collected by the IAFE-NRI. The field of FADN observation included holding farms, which significantly contributed to the creation of added value in the agriculture. Such farms are considered to be agricultural farms situated in the group which produced at least 90% of SGM value in the particular FADN region or country (Wyniki 2008). The procedure of selection of farms in the FADN system applies to layers establish in a group of farms according to three criteria: location in the region, economic size (ESU) and the agricultural type. The period of farm investigation covers the years 2004-2006. The research has been conducted across Poland, divided according to the assumptions of the FADN system into four regions: Pomorze and Mazury (PaM), Mazowsze and Podlasie (MaP), Małopolska and Pogórze (MaPog) and Wielkopolska and Śląsk (WaŚ).

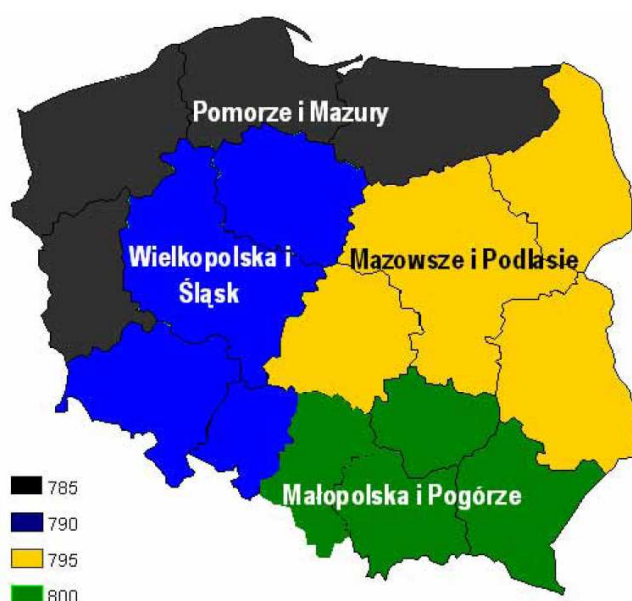


Fig 1. Polish regions according to FADN division

Source: *Wyniki standardowe uzyskane przez gospodarstwa rolne uczestniczące w Polskim FADN w 2006 roku*. Wydawnictwo IERiGŻ-PIB Warsaw 2007, p. 37, ISBN 978-83-60798-34-8.

The objects of the research have been determined on the basis of the criterion of location in the particular region⁷ and the agricultural type of production⁸. The FADN system distinguishes

⁵ The European system of collecting agricultural data from the individual agricultural holdings set up in 1965. The unique character of the FADN concerns gathering data which are known as sensitive, because they are describing the financial and economic situation of agricultural farms.

⁶ Standard Gross Margin (SGM) is the surplus of the value of output of the given activity over the value of direct costs in conditions of production, which are average for a given region. In order to eliminate the influence of changes in output (e.g. caused by bad weather) or the prices of products and means of production, the calculations cover average amounts taken from three years of the relevant period, on the basis of average annual data from the given region. For the very reason, the concept of gross margin was completed with the term „standard”, www.fadn.pl.

⁷ The size of agricultural holdings analysed according to macro-regions and the agricultural types assumed in the elaboration amounted to appropriately: 2004 – PaM region: 1338; MaP region: 4335; MaPog region: 1246, WaŚ

among eight main agricultural types: field crops, horticultural, wine, other permanent crops, milk, grazing livestock, granivores and the mixed type (crops & livestock). The farms in question concern the agricultural types which are characterized by unidirectional production: AB - field crops, F – milk, H – granivores⁹. The agricultural type of farms is established on the basis of the share of each activity in the sum of the SGM (Wynniki 2007).

3. Results

Table 1 outlines the information which concerns the cropland area (CA) of farms, the economic size, the debt ratio, the current financial liquidity and direct farming subsidies in agricultural farms of the four FADN regions (PaM, MaP, MaPog and WaŚ). The average CA of farms in the years analysed was diversified and amounted to 16,4 hectares in 2005 and 19,8 hectares in 2004. It is noteworthy that the largest farms in this range were located in PaM region (28-38 hectares of CA), while the smallest ones in the MaPog region (10-13 hectares of CA). This situation reflects the historical differences in agriculture development range and the possibilities of enlarging the land area of farms. In addition, only the MaP region observed the uniform tendency to a decrease in the average area of cropland in the period analysed, from 13,2 to 10,8 hectares of cropland area. The reason for such tendency leads to the conclusion that in this region farmers resigned from additional engagement of land which had low quality soil and their forestation (it concerns in particular Podlaskie province). Within the scope of the analyzed agricultural types, the AB type agricultural farms were characterised by the greatest cropland area (26,6 hectares CA in 2004). These farms were oriented mostly at corn growing farming, which is inseparably connected with ploughs. The lowest average cropland area was characteristic for farms of the F type (15,7-17 hectares CA), while those of the H type were characterised by area which was by 1 to 3 hectares of CA larger. The regions analyzed recorded relatively great differentiation between the agricultural types of farms analyzed and their cropland area. This relation referred especially to farms of the AB type which in 2004 were characterized by the greatest average cropland area in the PiM region (64,8 hectares of CA).

The European Size Unit is used to define the economic size of farms, which is established on the basis of the SGM. The average economic size of the farms analyzed amounted to 9,3-11,3 ESU. In the period 2004-2005, the highest economic size was characteristic for the farms from the WaŚ region (17,0 and 13,4 ESU, respectively), whereas in 2006, the domination in this respect was observed in the farms from the PaM region (16,9 ESU). The lowest economic size was characteristic for the farms from the MaPog region, and the difference in relation to the farms from the WaŚ region to PaM was significant. The farms located in the MaPog region were characterized by the lowest cropland area, which contributed also to a lower economic size unit. Decidedly the highest average economic size level in each year was characteristic for the farms of the H agricultural type (19-24,8 ESU). In this case, the production was partly separated from cropland area through the use of forage from purchase. The other two types of agricultural farms observed a similar average economic size, but generally lower (amounting 7,6-9,8 ESU) in relation to farms of the H type. The highest economic size of farms also appeared in that agricultural type in 2006 (59,6 ESU) in the PaM region. However, agricultural farms from the WaŚ region were dominated in this respect by the F agricultural type. In case of farms of AB agricultural type, the period analyzed observed a visible domination of farms from the PaM region. Definitely the lowest economic size was characteristic for the farms from the MaPog region, especially those of the AB and F types. Generally, it was caused by lower soil fertility and hard soil-environment conditions. Therefore, the possibilities of increasing the agriculture production were considerably limited. To sum up, it could be ascertained that relatively close relationship appeared between the cropland areas of farms with the economic size, in selected agricultural types. In larger farms, by the criterion of cropland surface, the economic size was

region: 3599; 2005: PaM region: 1532; MaP region: 4900; MaPog region: 1421; WaŚ region: 3935; 2006: PaM region: 1628, MaP region: 4900, MaPog region: 1461; WaŚ region: 3950.

⁸ The number of agricultural holdings assumed in FADN research by agricultural type is as follows: 2004: agricultural type AB - 2487, F – 722, H – 1444, all – 11251; 2005: agricultural type AB – 2603, F – 893, H – 1609, all – 11788; 2006: agricultural type AB - 2622, F – 877, H – 1761, all – 11939.

⁹ Principal types of farming in the chosen agricultural types: AB type – specialist cereals, oilseed and protein crops, general field cropping and mixed cropping; F type – specialist dairying and H type – specialist granivores.

also the highest; it reflects the substantial meaning of the land resources in the conducted activity.

The debt ratio has been calculated as a relationship between all liabilities and the value of assets. The average debt in the farms analyzed was comparatively low (8.9-10%). In general, the highest debt level appeared in farms from the PaM region, especially in 2006 (16.1%). Farms which were located in this region had the largest area and their investment needs as regards fixed assets were higher than in farms from the other regions. In farms from the MaPog region, the debt index was the lowest and revealed a decreasing tendency which dropped to 5.5% in 2006, which was brought about by limited possibilities of enlarging farm area and lower investment urgency. The most stable level of the average debts was observed in farms from the MaP region (about 8%). The highest share of the outside capital was observed in farms of the H type (13.5-16.2%), while in farms of the F type the debt level was the lowest (7.1-8.3%). The highest debts was recorded in farms of the H agricultural type in the PaM region, and amounted to 17% in 2005 and 23.5% in 2006. The managers of these farms successfully increase the area of farms as well as intensify granivores production, which requires introduction of special investments and financial processes supported by long-term preferential credits. In other regions, farms of this agricultural type observed the level of debts of a relatively similar size (9.9-14.4%). Farms of F type recorded particularly low debt level in the MaPog region, with decreasing tendency to 3.4% in 2006. In conclusion, it could be stated that the economically strongest farms were those of the PaM region. They recorded the greatest share of foreign capital used in financing the activity. It could contribute to additional efficiency advantages of these farms. The farms located in this region were characterised by growing trend as regards their activity, the results of which could be postponed in time in the view of a long production cycle in agriculture.

The current financial liquidity coefficient reflects the relationship between the current assets and short-term liabilities (cf. table 1). In the period analysed, this coefficient remained at a relatively high average level (5.4-6.2). In the MaPog region, current financial liquidity was the highest and characterized by growing tendency to 9.5 in 2006. The main reason for such situation was small scale of the activity of agricultural farms, which contributed to low level of short-term liabilities. Farmers whose agriculture holdings were located in this region did not record any liabilities of that category as at the balance sheet date. The agricultural farms from other regions did not observe explicit dependencies on the dynamic seizure, whereas the relatively high level of this coefficient was noticed in these farms from the WaŚ region (5.1-5.4). The highest average liquidity ratio analyzed was characteristic for farms of the F agricultural type, which was caused by the necessity of maintaining higher level of reserves, mostly of bulky and concentrates fodder. The difference in this respect in relation to the remaining types was comparatively significant. It referred mostly to the relation concerning farms of the H type, especially in 2006 (about 2.4), where production fodders could be purchased according to current needs, which resulted in a lower storage level. In case of AB and F agricultural types, the highest current financial liquidity was recorded in farms from the MaPog region. However, farms in the PaM region of mentioned type H in the years in question were characterised by the lowest amount of current financial liquidity coefficient (2.3-3.4). It could be ascertained that in these farms the financial over-liquidity in relation to the recommended optimum (the literature) (2.0) was comparatively the lowest. In this region, the coefficient analysed was also the lowest in other agricultural types. The highest level of the ratio was observed in 2005 in farms of the F type in the MaPog region (10.9). It means that the figure may reflect lack of development and failure to use the financial leverage effect. The managers of these farms apply a conservative financing strategy in their activity. A decrease in current financial liquidity not exceeding the optimum in this regard is a positive phenomenon. The positive trend in this respect was characteristic for farms from the WaŚ region of the AB and H agricultural types, which recorded a decrease in the current financial liquidity level. It could contribute to the improvement of the efficiency of these farms, because of tying up the financial resources into current assets was decreasing.

In general, the average level of direct farming subsidies per farm reached a higher level in 2006 in relation to the previous year (139.4%) (cf. table 1).

Region	AB agriculture type			F agriculture type			H agriculture type			\bar{X}^{10}		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
Cropland area (hectare)												
PaM	64,8	42,2	62,0	24,0	21,9	22,6	24,7	25,6	49,9	38,6	28,6 ¹¹	38,4
MaP	17,9	15,1	14,9	16,6	15,5	15,0	16,8	14,8	14,6	16,0	13,9	13,7
MaPog	17,9	14,1	13,9	11,1	10,7	11,9	12,2	11,0	10,9	13,2	10,7	10,8
WaŚ	35,0	28,3	32,7	19,1	17,0	16,8	22,5	17,1	16,9	25,3	20,1	22,0
\bar{X}	26,6	21,7	25,1	17,0	15,7	15,7	19,6	16,6	18,9	19,8	16,4	17,8
European Size Unit (ESU)												
PaM	17,3	10,8	15,3	11,1	9,6	10,3	29	24,4	59,6	16,2	11,9	16,9
MaP	7,2	5,9	6,3	9,1	8,3	7,9	19,8	15,1	15,6	9,3	7,8	7,9
MaPog	7,8	6,0	6,1	5,8	4,7	5,0	13,6	12,1	11,8	7,4	6,1	6,2
WaŚ	12,9	10,1	11,5	13	10,6	10,2	30,4	21,8	20,0	17	13,4	14,1
\bar{X}	9,8	7,6	8,7	9,3	8,1	7,9	24,8	19,0	21,6	11,3	9,3	10,1
Debt ratio (%)												
PaM	20,0	15,2	21,4	6,1	7,2	9,0	20,8	17,0	23,5	14,5	10,9	16,1
MaP	6,3	7,1	8,7	8,4	7,8	7,2	14,0	13,3	14,0	8,0	8,1	8,1
MaPog	8,2	5,0	5,5	4,3	3,5	3,4	12,4	14,4	9,9	7,0	6,4	5,5
WaŚ	13,9	13,2	15,7	10,6	7,9	8,8	14,2	11,9	11,5	12,4	10,6	11,9
\bar{X}	8,5	9,8	12,9	8,3	7,1	7,1	16,2	13,5	14,7	8,9	8,9	10,0
Current financial liquidity coefficient												
PaM	3,0	3,7	3,0	5,3	5,8	5,1	3,4	2,8	2,3	4,0	4,4	3,3
MaP	6,0	7,1	5,5	5,3	6,3	6,2	7,7	5,9	4,8	6,4	7,4	6,8
MaPog	7,2	8,9	8,8	8,5	10,9	10,1	5,7	5,8	5,5	8,0	8,7	9,5
WaŚ	4,7	4,2	3,9	4,6	6,3	4,7	6,3	6,1	5,6	5,2	5,4	5,1
\bar{X}	4,8	5,3	4,3	5,4	6,6	6,1	5,2	5,0	3,7	5,5	6,2	5,4
Direct farming subsidies (PLN per farm)												
PaM	- ¹²	8748	15814	-	3783	5990	-	5767	13284	-	5900	10065
MaP	-	2520	3488	-	2854	3795	-	2779	3615	-	2583	3362
MaPog	-	2383	3117	-	1724	2556	-	1752	3201	-	1683	2525
WaŚ	-	5282	7983	-	3450	4647	-	3785	4226	-	4018	5475
\bar{X}	-	3971	11448	-	2837	5632	-	3465	6794	-	3122	7475

Tab 1. The characteristic of the agriculture holding in regions division according to FADN systém

Source: Own elaboration based on the FADN-PL data.

The highest average direct subsidies were noticed in 2006 in the PaM region (10065 PLN), while in the farms from the MaPog region these subsidies amounted only to 2525 PLN, which resulted from considerable differences in the average area of farming land. The possibilities of financing the development of farms are significantly restricted and contribute to the fact that former economic differences remain between farms in particular regions. Among the agricultural types of farms analysed, the highest average level of farming direct subsidies was recorded in the AB type (amounting to 11448 PLN) in 2006, which was dictated by higher land area. In farms of this agriculture type, the highest subsidies were noticed in the PaM region, amounting to 15814 PLN in 2006. However, the lowest level of financial support with subsidies was recorded by farms from the MaPog region, especially those of F type (2556 PLN in 2006). Significant differences between the regions in respect of direct subsidies are related to land area, which contributes to higher financial diversification of farms, and derived advantages especially among larger farms. The financing of weaker farms in Poland results from market

¹⁰ The average number of the agricultural holdings in FADN system.

¹¹ The significant differences in the average land area in PaM region of the AB and H agriculture type resulted from annually Exchange of researched group of farms functioning in FADN system (around 10%), with maintaining the represent group according to agriculture types, economic size unit and regional location. It could happen that in 2005 from the researched group excluded these farms which had larger land area. This situation was explained in IAFE-NRI and did not ascertain any mistake in data.

¹² The lack of data concerning the direct farming subsidies was connected with a delay which was noticed in payment. That is way farmer's received subsidies for 2004 in 2005, after locking the previous accounting year. According to his the FADN date from 2004 does not consider direct forming subsidies.

mechanisms, which may be not prevented by farmers appropriately. That is why many farmers work also outside the farm in order to maintain stable income in the farm. Both, social and regional disparities are important consequences of their further development (Blazyca et al. 2001).

Table 2 outlines the land, assets and equity capital, rate of return in agricultural farms. The asset rate of return ratio has been counted as a relation between the income from the family-holding and the value of total assets. The farms analysed in the period 2004-2006 observed the profitable activity. However, it should be emphasised that in these farms, according to the FADN methodology, the own work of farmers and their families does not determine the costs (the system takes into account only cost from the temporary work)¹³. Additionally, in comparison to other non-agricultural trades, the calculation of the profit category will reveal the difference in this range. Also differences between small and large farms are the reason for disparities in labour costs. Small farms generally use own work, while larger farms employ additional workers in consideration of bigger scale of production. The labour as a production factor becomes cheaper and cheaper and more and more efficient input to agriculture production. Larger farms, which base on hired labour, recorded fluctuation of prices on the market which could result in a decrease in the level of production level in order to avoid the influence of price changes.

Region	AB agriculture type			F agriculture type			H agriculture type			\bar{X}		
	2004	2005	2006	2004	2005	2006	2004	2005	2006	2004	2005	2006
The return on assets (%)												
PaM	10,3	9,4	8,0	8,6	10,5	12,6	14,0	14,3	29,9	9,8	9,7	12,9
MaP	5,3	7,6	10,0	8,1	10,4	10,5	11,2	10,8	10,2	6,2	7,8	9,4
MaPog	8,2	7,0	10,7	7,7	7,9	11,7	10,7	10,8	10,8	7,1	6,4	9,5
WaŚ	7,4	7,7	10,2	9,0	11,4	12,1	12,9	11,5	9,7	9,1	8,7	9,5
\bar{X}	7,1	7,8	9,8	9,1	10,2	11,2	12,8	11,7	14,7	7,6	8,1	10,0
The land rate of return (thousand PLN per cropland area)												
PaM	0,8	0,7	0,6	1,0	1,4	1,8	3,8	3,7	5,9	1,0	1,1	1,4
MaP	1,1	1,1	1,5	1,5	2,0	2,1	3,2	2,6	2,4	1,3	1,4	1,8
MaPog	1,3	1,2	1,9	1,5	1,4	2,1	4,1	4,9	4,1	1,4	1,4	2,1
WaŚ	0,8	0,8	1,1	1,5	2,0	2,2	3,1	2,4	2,2	1,4	1,3	1,5
\bar{X}	1,2	0,9	1,1	1,5	1,8	2,1	3,4	2,8	3,4	1,5	1,3	1,6
The productivity of land (thousand PLN per cropland area)												
PaM	2,8	2,2	2,4	3,1	3,3	3,7	20,7	16,7	15,0	4,3	3,8	4,3
MaP	3,9	3,5	3,8	4,4	4,5	4,7	13,4	10,1	9,2	4,8	4,6	4,8
MaPog	4,3	4,3	4,8	4,4	3,8	3,9	21,2	25,1	20,2	5,6	6,0	6,1
WaŚ	3,5	3,0	3,2	5,0	4,9	4,8	14,2	9,5	9,4	5,9	5,1	5,2
\bar{X}	3,7	3,1	3,3	4,3	4,2	4,4	15,8	12,1	11,6	5,3	4,8	4,9
The return on equity (%)												
PaM	12,9	11,0	10,1	9,2	11,3	13,8	17,7	17,2	39,0	11,5	10,9	15,4
MaP	5,7	8,2	11,0	8,8	11,3	11,4	13,0	12,5	11,9	6,8	8,5	10,3
MaPog	9,0	7,3	11,4	8,0	8,2	12,1	12,2	12,6	12,0	7,6	6,8	10,0
WaŚ	8,6	8,8	12,1	10,0	12,4	13,3	15,0	13,0	11,0	10,4	9,7	10,8
\bar{X}	7,8	8,6	11,2	9,9	10,9	12,0	15,2	13,5	17,2	8,4	8,9	11,1

Tab 2. The land, assets and equity capital rate on return ratios

Source: Own elaboration based on the FADN-PL data.

The average return on asset in farms was characterized by the increasing tendency, to 10% in 2006. The level of this profitability could be assessed as sufficient, especially if the analysis includes long turnover of capital in the agriculture. In all years, in respect of the asset rate on return, the domination of farms from the PaM region was visible, especially in 2006 (12.9%). This year, farms from the remaining regions noticed the return on asset ratio at a relatively similar level (about 9.5%). The lowest average asset profitability was recorded in 2005 in farms

¹³ The research did not deal with the correction of obtained income by cost of own labour, which is connected with the limitation of article.

from the MaPog region (6.4%). The highest average efficiency of the use of assets was characteristic for the farms of the H agricultural type in which the coefficient analyzed remained at a level from 11.7 to 14.7%. However, the lowest index appeared in farms with the AB agricultural type. The highest efficiency of the use of assets was observed in the farms from the PaM region of the H agricultural type, especially in 2006 (29.9%). These farms were characterized with higher level of efficiency of the use of assets, which could be reached through the inflow from purchase of production resources. In case of farms of the F agricultural type, the lowest asset profitability was observed in the MaPog region, which was caused by weak soil fertility, especially permanent grassland. Most of the agricultural types and regions observed the growing tendency of the return on asset ratio, which could be assessed as a positive phenomenon. At the same time, farms with the highest asset profitability were characterized by the highest debt level. It could be ascertained as influence of the financial leverage exploited by the farms.

The land rate of return has been calculated as a relation between the income from family holdings and the cropland area. The use of land in the farms analysed was effective, which reflects the average land earning power amounting to PLN 1.3-1.6 thousand per one CA hectare. The lowest size of the coefficient was recorded in farms of the PaM region, however it remained at a relatively stable level (PLN 1-1.4 thousand per one CA hectare). This situation reflects lack of possibility to reach satisfactory level of production factors saturation together with each hectare at the same level as the previous one. It contributes to a decrease in land resources efficiency. In general, the highest earning power of land was characteristic for the farms from the MaPog region, especially in 2006 (PLN 2.1 thousand per one CA hectare). One of the reasons for such relationship could be the smallest surface cropland area in these farms. It could be ascertained definitely that the highest average land earning power was characteristic for farms of the H agricultural type (PLN 2.8-3.4 thousand per one CA hectare), whereas in the AB type, this coefficient was about three times lower. As regards farms classified to the H type, a part of their income effect was generated irrespectively of land resources, by the purchase of production inputs (mainly concrete fodders). The highest land earning power was recorded in farms of the H type in the MaPog region (PLN 4.1-4.9 thousand per one hectare), while the lowest appeared in farms of the AB type in PaM (with decreasing tendency) and WaŚ regions.

The coefficient which presents the land productivity has been calculated as a relation between the production value and the CA of the farm. The average size of this coefficient in the years in question remained at a relatively similar level, and amounted to PLN 4.8-5.3 thousand per one CA hectare. In general, the highest land productivity average was characteristic for the farms from the MaPog region (except for the year 2004) – at the level of PLN 6 thousand per one CA hectare. However, only farms from this region observed also the growing tendency in the formation of the land productivity coefficient. In recapitulation, one could state that the lowest level of analysed coefficient was observed in the farms from the PaM region, especially in 2005 (PLN 3.8 thousand per one CA hectare). In all years analyzed, the highest average level of land productivity was characteristic for the farms of the H agricultural type, though with the decreasing tendency. The lowest land productivity appeared in farms of the AB type (PLN 3.1-3.7 thousand per one CA hectare). In all years considered, decidedly the highest average land productivity was characteristic for the farms from the MaPog region of the H type (PLN 21.2-25.1 thousand per one CA hectare). Farms which are ranked in this group of agricultural type in most of the investigated years recorded the lowest coefficient in the MaP region, whereas the difference in relation to farms from the WaŚ region was not so significant. Decidedly the lowest land productivity appeared in farms of the AB type in the PaM region (PLN 2.2-2.8 thousand per one CA hectare), whereas the difference in relation to the remaining regions was not so meaningful. One of the causes of such dependencies was the fact that farms are enlarged by purchasing of low quality land, which contributes to a decrease in productivity of land. The highest coefficient was observed in farms of this agricultural type from the MaPog region (PLN 4.3-4.8 thousand per one CA hectare).

The return on equity capital ratio has been calculated as a relation between the income from the family-holding and the value of the owner's equity (cf. table 2). The use of equity capital in the farms analyzed was effective, and was characterised by growing tendency amounting to 8.4% in 2004 and 11.1% in 2006. The efficiency of the equity capital could be assed as relatively low

in comparison to other non-agricultural trades. However, after taking into account the long turnover of the capital in the agriculture, it could be ascertained that the level of the coefficient is comparatively satisfying. It seems that in all years, the highest average return on equity appeared in farms from the PaM region (10.9-15.4%). In general, the lowest level of the coefficient analyzed was recorded in farms from the MaPog region (6.8 and 10% in 2005 and 2006, respectively), where the return on equity was visible with the domination of farms of the H agriculture type. Consequently, it may be concluded that the highest return on equity ratio was characteristic for the farms of the H type in the PaM region, especially in 2006 – amounting to 39%. The farms of that agricultural type in other regions did not observe significant differences. As regards yield from equity, farms of F and AB types were visibly dominated by those from PaM and WaŚ regions.

4. Conclusions

The elaboration presents the dependencies between the efficiency of the use of production factors in agricultural farms and location in FADN regions. The research also deals with the qualification of the current financial liquidity and the level of debts. The conducted research has helped to formulate the following conclusions:

1. The average area of a cropland in farms, in comparison to the average for all individual farms in Poland, was about 2.5 times higher. It creates the possibility of generating higher earnings from the agricultural farm. The characteristic feature in this respect was connected with significant differences between regions in which the farms were situated. In this respect, also the domination of farms from the PaM region was visible, while in the MaPog region the average area of cropland was about 3 times lower. The greatest farms in terms of area were those of the AB type (field crops), however the highest economic power was reflected in farms of the H type (granivores), especially in the PaM region. The managers of these farms have the greatest possibilities to intensify production according to risk limit. The average economic size of farms with the AB and F types was 2,5 times lower. As a result, it could be the reason for the possibility of conducting the activity in farms of the H type of the production, e.g. pigs, irrespectively of the possessed cropland resources, through the purchase of concentrate fodders.
2. The average debt ratio in farms was relatively low and did not exceed 10%. The highest debt was observed in farms from the PaM region, however it did not exceed 16.1%. The managers of farms adopted a more conservative strategy of financing, which did not contribute to a profitable use of the positive effect of the financial leverage. The highest share of debts in capital was recorded in farms from the PaM region of the H agricultural type (granivores). Potential possibilities of generating economic advantages from conducting activity in this group of farms are the biggest. In this region, also the highest debt level in farms of the AB type (field crops) was observed. The low debt ratio which appeared in farms exerted influence on higher current liquidity ratio and amounted, on average, to 5-6. It significantly exceeded the level determined as optimum (2.0). The characteristic feature of agricultural holdings was that the differences observed between the regions were comparatively significant. The highest liquidity ratio was noticed in farms from the MaPog region, while in the PaM region it was even 2-3 times lower. As a result, it could reflect the financial over-liquidity. It should be also considered as important that in agricultural farms we include the turnover herd of animals to the reserve, which increases the coefficient analyzed. Between the agricultural types of farms analyzed no explicit dependencies in the formation of the current financial liquidity level were observed. The highest amount of this coefficient was characteristic for farms of the F type (milk).
3. Farms recorded efficient usage of the assets, land and equity capital. The average return on assets and equity capital grew more dynamic in the period analysed, however the highest ratios were noticed in the farms from the PaM region. It could be a reflection of the effective engagement of foreign capital, through the effect of the financial leverage which was used by managers in farms located in this region. Agriculture holdings from the MaPog region recorded the lowest debt level in the group in question and the highest current liquidity ratio, the efficiency of the assets and return on equity. It is

noteworthy that these farms chose the conservative strategy of financing (self-preservation) their activity in the years in question. It could be assumed as effective, but only at a relatively low level. The highest return on assets and equity capital appeared in farms of the H agricultural type (granivores). Farms of the field crops agricultural type (AB) were characterised by the lowest profitability ratios. Quite similar relations were recorded in case of earning power and the land productivity, where the differences between the regions in this respect were not so significant in relation to profitability level of assets and equity capital.

4. In the researched farms, a relatively essential regional differentiation within the scope of the cropland area, the economic size, the level of debts, the current financial liquidity and the efficiency of production factors usage was observed. The fact of the necessity of creating a selective farming policy could be the conclusion, especially in case of subsidies which are divided according to the activity of agricultural farms by direct surcharges. The usage of similar financial tools has a role of supporting the activity of all agricultural farms. Without taking into account the factors, such as: location, agricultural type and cropland area, this policy will, to a great extent, contribute to the differentiation of the efficiency of the use of production factors in individual regions of Poland.

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