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POLISH CROP FARMS* AT THE BACKGROUND OF FARMS FROM SELECTED COUNTRIES

Abstract

The paper presents an assessment of organisation and economics of Polish crop farms, and their competitiveness has been defined against analogous farms from Hungary, the Czech Republic, Slovakia and Germany. The assessment of researched farms was made on the basis of the Polish FADN and Europe-wide FADN data of 2010-2012, bearing in mind economic size of farms expressed in EUR thousands of Standard Output (SO). The research used comparative method. Competitiveness of the researched farms was defined with the competitiveness ratio, which illustrates the relation between farm income and the sum of costs of using own factors of production (labour, land and capital).

Research results point to a growth in the share of crop farms in the general number of farms. In 2013, the share amounted to 53%. It was stated that there is a positive relation between the economic size of a farm and the UAA, and the share of rented land, and negative relation between the economic size of a farm and labour inputs and value of assets per 1 ha of UAA. It was stated that labour productivity and efficiency as well as land and labour productivity grow, along with an increase in the economic size of farms. The Polish crop farms in individual economic size classes showed, on many occasions, greater competitive capacity as regards analogous farms from the researched countries.

Keywords: economic size of a farm, production potential, production efficiency, competitiveness of farms.

* Crop farms correspond to the category of farms specialised in field crops as per the FADN typology (Farm Accountancy Data Network).

Introduction

Farms specialising in plant production, according to the FADN typology, cover two agricultural types: farms with field crops, specialising in cereals, oilseed and protein crops for seed (type 15) and farms specialising in various field crops (type 16). The figures given in the Table 1 show that farms specialising in plant production constitute a majority in the total number of farms. In 2002, the share of farms specialising in plant production amounted to 47% and in subsequent years it grew, reaching 53% in 2013. The group of crop farms was dominated by farms with field crops specialising in cereals, oilseed and leguminous plants (2002 – 78.3%, and in 2013 – 93.5%). Their number was stable around 700 thousand. The share and number of farms specialising in various field crops (type 16) dropped from 21.7% in 2002 to 6.5% in 2013. These changes give evidence to a trend to stronger specialisation processes of these farms. In the group of farms with field crops (type 15) there were changes in the size structure. The share of very small farms up to 1 ha of UAA dropped decidedly, while the share of farms of 1-20 ha of UAA, increased from 59.1% in 2002 to 90% in 2013. What also grew was the share of farms with the area of 20 ha and more – from 2.9% in 2002 to 6.8% in 2013. It is typical of them that they still often lack their own tractive force. In 2002, 73% of such farms lacked tractors, in 2013 – 45%. In 2013, these farms used 154.5 kg of NPK per ha of UAA – 14.5% more than the average in agriculture. Moreover, crop farms were characterised by vary low stocking density, which limited the achievement of a sustainable balance of organic substance in soil (Ziętara and Zieliński, 2015).

Bearing in mind the above, facts it is necessary to research the organisation and economics of crop farms to determine their competitiveness and direction of development, considering the aspect of their environment-friendliness. Meeting this condition guarantees maintaining or even increasing the production potential of land (Urban, 1984; Górny, 1991).

Table 1

Number of farms specialising in field crops (type 15) and in various crops (type 16) in 2002-2013 (thousand)

Specification	2002		2010		2013	
	Number of farms	%	Number of farms	%	Number of farms	%
Farms with field corps (type 15)	726.20	78.3	658.85	86.9	702.95	93.5
Farms with various crops (type 16)	202.20	21.7	98.60	13.1	49.20	6.5
Total for crop farms	928.4	100.0	757.46	100.0	752.15	100.0
Share of crop farms in the total number of farms (%)	47.0		52.0		53.0	
Structure of farms with field corps (type 15)						
Up to 1 ha	275.97	38.0	109.00	16.6	15.20	2.1
1-20 ha	429.66	59.1	515.76	78.3	639.49	90.0
20 ha and more	20.57	2.9	34.09	5.1	48.26	6.8
Average area of farms (ha of UAA)	4.60		7.10		9.50	
Share of farms without tractors (%)	73.30		53.20		45.90	
Level of mineral fertilisation in kg of NPK per ha of UAA	-		-		154.5	

Source: *Charakterystyka gospodarstw rolnych w 2013 r*. GUS 2014, pp. 372-386; *Zmiany zachodzące w gospodarstwach rolnych w latach 2002-2010*. PSR (joint paper ed. by W. Józwiak and W. Ziętara). GUS, Warszawa 2013, pp. 26-33.

Research objective, sources and methods

The research aims at assessment of organisation and economics of the Polish farms aimed at plant production, determination of the level of their competitiveness and directions of development covering two agricultural types according to the FADN typology:

– farms specialising in cereals, oilseed and protein crops for seed (type 15),
– farms specialising in various field crops (type 16).

The adopted research aim will be achieved by implementation of the following research tasks:

– assessment of the production potential of the Polish crop farms at the background of farms from selected countries,
– assessment of the level of production intensity and efficiency of the Polish farms at the background of farms from selected countries,
– determination of the competitive position of Polish crop farms and directions of their development at the background of farms from selected countries.

The research includes Polish crop farms covered by the system of the Polish FADN and European FADN in 2010-2012. For comparison, the research covers similar crop farms from Hungary, the Czech Republic, Slovakia and Germany. Nonprobability sampling was used for the selection of countries for the research. These are countries bordering on Poland and having similar climatic conditions. Assessment of the researched farms was done considering their economic size, by the value of Standard Output (SO)[1]. Six economic size classes were identified. In class I (with the value of SO < EUR 8 thousand) there were only Polish and Hungarian farms, in class II (EUR 8-25 thousand) additionally the Czech farms. In classes: III (EUR 25-50 thousand), IV (EUR 50-100 thousand), V (EUR 100-500 thousand) and VI (EUR 500 thousand and more) there were farms from all of the analysed countries. Class VI includes, apart from farms of natural persons, also farms of legal persons.

The research uses the comparative method applying the following groups of indices:

– production potential,
– organisation of production and farms,
– costs,
– productivity and efficiency (Ziętara and Zieliński, 2012).

The assessment of efficiency and competitiveness used the category of "management income". It was calculated by deducting costs of own factors of production (land, labour and capital) from the farm income. Table 2 gives the costs in the researched farms considering their economic size. The costs of land were assumed at the level of the lease rent executed by farms. Costs of own labour were estimated according to costs of hired labour, considering the economic size of farms. This level of costs of own labour constituted the basis for calculation of the parity income ratio A1, which represents a relation between farm income per family work unit (FWU)[2] and the payment for hired labour in farms of the same economic size. Table 2 also gives labour costs in the national economy, constituting the grounds for calculation of the parity income ratio A2, which is the relation between farm income per family work unit (FWU) and wage in the national economy. The A2 ratio forms grounds for determination of the competitive capacities of a farm. The cost of own capital were assumed based on interest rate of the 10-year Treasury bonds.

[1] SO – Standard Output in EUR thousand.

[2] FWU – Family Work Unit – unit of own labour inputs of a farmer and his/her family members equivalent to 2120 working hours per year.

Table 2

Costs of use of own factors of production at farms specialising in cereals, oilseed and protein crops for seed (type 15) and farms specialising in various field crops (type 16) in 2010-2012

Countries	Farm size in SO (EUR thousand) type 15/16					
	<8	8-25	25-50	50-100	100-500	500 and more
	Land costs (EUR/ha)					
Poland	50.97/56.24	61.32/65.12	55.01/67.52	54.67/80.03	86.10/100.67	75.90[a]/117.13[a]
Hungary	73.59/-	63.73/59.22	78.65/65.29	90.74/75.17	104.7/135.38	127.70/150.00
Czech Republic	-/-	76.09/-	57.95/-	67.87/72.15	69.81/96.19	76.51/89.21
Slovakia	-/-	-/-	61.01/-	67.43/-	78.27/56.96	57.75/48.35
Germany	-/-	-/-	204.11/245.43	217.40/289.98	218.33/324.45	296.53/283.85
	Labour costs in agriculture (EUR/hour)					
Poland	1.99/1.81	2.43/1.90	2.36/1.87	2.60/2.03	3.76/2.50	5.43[a]/4.64[a]
Hungary	2.00/-	2.53/2.26	2.83/2.23	3.08/3.06	3.90/3.14	5.18/4.94
Czech Republic	-/-	4.06/-	3.26/-	4.04/3.90	5.38/4.79	6.46/6.06
Slovakia	-/-	-/-	3.48/-	3.69/-	4.02/3.56	5.14/3.89
Germany	-/-	-/-	6.78/7.7	9.92/7.75	9.95/7.55	14.74/11.27
	Labour cost in the national economy (EUR/hour)			Capital cost by the 10-year bonds (%)		
Poland	4.70			5.57		
Hungary	4.48			7.60		
Czech Republic	5.41			3.41		
Slovakia	4.76			4.29		
Germany	18.73			2.28		

[a] Farms of legl persons.

Source: own calculations based on FADN, Central Statistical Office of Poland (GUS), National Bank of Poland, Hungarian Central Statistical Office, Czech Statistical Office, Statistical Office of the Slovak Republic, Statistisches Bundesamt, European Central Bank.

In order to specify competitiveness of the researched crop farms what was also used was the competitive ratio as per W. Kleinhanss (2015), according to the following formula:

$$Wk = \frac{Dzgr}{Kwz + Kwp + Kwk} \quad (1)$$

where:
Wk – competitive ratio,
Dzgr – farm income,
Kwz – alternative cost of own land,
Kwp – alternative cost of own labour,
Kwk – alternative cost of own capital.

The value of the competitive ratio *Wk*>=1 points to full coverage of costs of own factors of production, *Wk*<1 stands for partial coverage of the costs.

Following Kleinhanss, further *Wk* classification was assumed, which differentiated the classes as below:
Wk (-) – for negative Dzgr (*Wk*1),
0<*Wk*<1 – partial coverage of costs of own factors of production (*Wk*2),
1=*Wk*<2 – full coverage of costs of own factors of production (*Wk*3),
Wk>=2 – twofold or higher coverage of costs of own factors of production (*Wk*4).

The competitive ratio *Wk*4 indicates the full competitive capacity of a farm. This statement is convergent with the opinion of Biswanger, who states that an enterprise capable of development should achieve a profit rate at least two-times higher than the interest rate on loans (Biswanger, 2011).

Production potential of Polish crop farms at the background of farms from selected countries

Table 3 presents numbers characterising the production potential of researched farms. Utilised agricultural area (UAA) at researched farms, in both farming types, was positively correlated with the economic size (value r^2 >0.9). Polish, Hungarian and Czech and Slovak farms in type 15 had at their disposal a similar area in individual size classes – from 12.13 ha of UAA (Hungary) to 1646.39 ha of UAA (Slovakia). Definitely the lowest area was typical of German farms in classes III-VI. In type 16, there were similar regularities, but the farm area was smaller as compared to the former group. The greatest differences were noted for Polish farms – from 20% (classes I and VI) to 52% (class V), and for German farms in classes V and VI, in which it amounted, respectively, to: 50% and 62%. The share of leased land increased along with a growth in the economic size of all farms. At Polish farms of type 15 it was the lowest, ranging from 13.8% to 64.2%; at Hungarian farms it ranged from 28.5% to 96.1%; at Czech, Slovak and German farms in classes III-VI it exceeded 50%. The highest share of leased land, apart from Polish farms, was noted in classes V and VI – from 71% (Germany) to 96.1% (Hungary). In type 16 similar trends were observed, but the share of leased land was by several percentage points lower (Ziętara and Zieliński, 2015).

Labour inputs at all farms showed a downward trend along with a growth in the economic size. At Polish farms of type 15 they ranged from 8.9 to 1.75 AWU per 100 ha of UAA and were the highest among the analysed farms. The lowest labour inputs belonged to Hungarian farms, apart from classes V and VI, and German farms – respectively, 0.9 and 0.8 AWU per 100 ha of UAA. In type 16, the labour inputs were higher – at Polish, Czech and German farms by an average of ca. 75% and Slovak farms by 50%. Greater differences were noted in classes from III to V.

The share of own labour in total labour inputs also showed a downward trend along with a growth in farm economic size. In both types it was the highest for German farms, where in classes III-V it ranged from 97.9% to 66.2%. In class VI it amounted, respectively, to: 11.3% in type 15 and 16% in type 16, while at other farms of this class it did not exceed 2% (Ziętara and Zieliński, 2015).

Along with a growth in economic size, the value of assets per 1 ha of UAA also grew. At Polish farms in type 15, it amounted from EUR 7.4 thousand to EUR 2.3 thousand per ha of UAA and it was higher than for Hungarian, Czech and Slovak farms. Definitely higher, i.e. twice higher compared to other countries, was the value of assets at German farms. Similar trends were noted in type 16.

As for assets the share of fixed assets dominated, which dropped along with a growth in the farm economic size of both farm types. The highest share belonged to fixed assets at German farms (from 93% in class III to 68% in class VI), at Polish and Czech farms it was by several percentage points lower, while at Hungarian and Slovak farms it noted the lowest level – from 63% to 45%.

As for liabilities – equity dominated, also falling along with a growth in the farm economic size. At Polish farms it was similar in both types, in classes from I to V it ranged from 98% to 88%, in class VI it was at a lower level of, respectively: 68% in type 15 and 61% in type 16. At other farms, the share of equity in liabilities was similar (Ziętara and Zieliński, 2015).

Production organisation at researched crop farms at the background of farms from selected countries

Production organisation at researched farms was characterised with the use of the following ratios: share of cereals in UAA, stocking density in LU per 100 ha of UAA, share of plant production in total production, and share of other production in total production. Table 4 gives respective numbers.

Table 3

Production potential of researched crop farms (average values)

Countries	Economic size classes of farms (EUR thousand SO)											
	I (<8)		II (8-25)		III (25-50)		IV (50-100)		V (100-500)		VI (>=500)	
	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16
Utilised agricultural area (ha)												
Poland	12.71	9.97	23.39	15.22	59.38	34.23	109.57	67.41	318.57	153.18	1271.54	1001.62
Hungary	12.13	-	32.18	29.69	68.09	50.28	127.86	78.56	329.08	229.09	1412.58	1296.06
Czech Republic	-	-	17.70	-	53.50	-	110.68	68.21	324.47	176.45	1227.85	1119.06
Slovakia	-	-	-	-	59.50	-	116.75	-	339.93	238.44	1646.39	1317.75
Germany	-	-	-	-	40.38	36.63	75.70	63.77	219.29	110.75	1035.35	390.71
Total labour inputs (AWU per 100 ha of UAA)												
Poland	8.89	13.04	5.43	11.30	2.71	6.95	1.76	3.68	1.50	2.91	1.75	2.89
Hungary	3.54	-	1.83	3.31	1.48	4.39	1.30	3.17	1.39	2.26	1.45	2.72
Czech Republic	-	-	3.77	-	2.43	-	1.66	2.69	1.34	2.24	1.48	2.81
Slovakia	-	-	-	-	4.12	-	1.86	-	1.41	2.33	1.70	3.89
Germany	-	-	-	-	2.33	2.68	1.59	1.99	0.91	1.89	0.80	2.10
Value of assets (EUR thousand per ha of UAA)												
Poland	7.44	7.58	6.83	8.21	5.71	7.86	5.55	7.34	4.01	6.32	2.27	3.46
Hungary	3.91	-	3.09	3.35	2.68	2.91	2.44	3.02	2.24	2.99	1.72	2.02
Czech Republic	-	-	3.86	-	3.12	-	2.76	3.78	1.91	2.75	2.55	3.60
Slovakia	-	-	-	-	1.75	-	1.50	-	1.23	1.73	1.52	1.82
Germany	-	-	-	-	11.31	14.28	10.13	12.37	4.97	10.99	3.45	6.44
Share of fixed assets in assets (%)												
Poland	91.86	91.73	90.88	89.54	89.08	88.12	88.97	89.10	80.09	85.01	52.84	55.42
Hungary	59.48	-	62.81	64.32	63.07	66.70	66.26	57.27	64.34	65.81	45.16	54.52
Czech Republic	-	-	85.19	-	81.74	-	78.39	81.73	74.21	76.29	68.34	70.55
Slovakia	-	-	-	-	52.00	-	54.75	-	55.43	54.22	55.92	50.07
Germany	-	-	-	-	93.12	93.33	92.34	90.57	87.06	89.03	68.12	75.69

Source: European FADN.

Table 4

Production organisation of researched crop farms (average values)

Countries	Economic size classes of farms (EUR thousand SO)											
	I (<8)		II (8-25)		III (25-50)		IV (50-100)		V (100-500)		VI (>=500)	
	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16
Share of cereals in UAA (%)												
Poland	77.65	57.58	76.38	55.54	71.36	53.30	67.97	55.62	67.97	50.14	67.17	47.51
Hungary	72.93	-	66.62	31.34	64.24	35.52	64.37	44.88	64.37	52.39	64.97	51.48
Czech Republic	-	-	64.79	-	66.49	-	63.10	51.07	63.10	49.64	65.34	52.47
Slovakia	-	-	-	-	71.93	-	61.63	-	61.63	31.53	59.37	44.41
Germany	-	-	-	-	65.77	43.96	64.45	47.29	64.45	48.33	60.92	44.72
Stocking density (LU per 100 ha of UAA)												
Poland	4.48	11.63	4.13	12.86	3.82	14.80	3.06	12.34	2.21	9.39	5.23	9.66
Hungary	3.27	-	2.90	4.1	2.99	4.09	2.72	2.08	1.74	5.56	0.92	9.05
Czech Republic	-	-	5.42	-	6.42	-	5.46	10.60	3.59	6.65	5.13	16.15
Slovakia	-	-	-	-	2.60	-	2.39	-	1.98	6.25	7.58	13.73
Germany	-	-	-	-	3.93	3.90	4.04	4.97	3.64	7.82	4.53	14.41
Share of plant production in total production (%)												
Poland	93.29	85.81	94.59	91.17	94.84	91.93	94.47	91.52	94.47	93.49	92.98	91.53
Hungary	87.52	-	92.99	88.54	93.87	97.19	93.41	91.11	93.41	87.44	88.16	79.53
Czech Republic	-	-	90.68	-	92.56	-	93.03	90.74	93.03	90.00	86.87	83.07
Slovakia	-	-	-	-	61.06	-	79.14	-	79.14	67.76	81.75	76.29
Germany	-	-	-	-	81.31	73.37	84.55	82.40	84.55	86.96	87.85	84.08
Share of other production in total production (%)												
Poland	2.65	3.09	1.63	1.29	1.60	0.90	1.09	0.94	1.09	0.73	2.37	3.59
Hungary	9.06	-	3.83	5.52	3.31	0.53	5.03	7.67	5.03	9.79	10.88	13.54
Czech Republic	-	-	4.22	-	2.77	-	3.13	4.22	3.13	6.92	9.49	6.93
Slovakia	-	-	-	-	38.04	-	19.63	-	19.63	30.72	13.26	15.05
Germany	-	=	-	-	16.09	24.46	12.42	13.03	12.42	9.56	9.67	8.69

Source: European FADN.

In type 15 cereals were dominating, their level was the highest at Polish farms – ranging from 78% in class I to 67% in class VI. At other farms of the analysed countries, it was by several percentage points lower. In both types the share of cereals showed a downward trend along with a growth in the economic size. In type 16 the share of cereals in the UAA did not exceed 50%.

The stocking density in the analysed farms was very low, it did not go above 6 LU per 100 ha of UAA in type 15, while in type 16 – 16 LU per 100 ha of UAA. The lowest stoking density in both types marked Hungarian farms in class VI (type 15) it was at the level of only 0.9 LU per 100 ha of UAA. In the production structure – plant production dominated in both types in the range of 90--80%, showing a downward trend along with a growing economic size of farms. Slovak farms were an exception in class III, as their share of plant production in the total production amounted to 61%. The share of livestock production was marginal, it did not exceed 5%. The share of other production was more significant[3], mainly for Slovak and German farms of both types. For Slovak farms it ranged from 38% (class III) to 13% in class VI, while for German farms from 16% in class III to 9.7% in class VI.

Production intensity of Polish crop farms at the background of farms from selected countries

The production intensity level was determined by the size of total costs, direct costs and selected types of costs per 1 ha of UAA. Table 5 gives respective numbers. Total costs in EUR thousand per ha of UAA in type 15 in Polish and Hungarian farms were similar in respective economic size classes. They showed an upward trend along with an increase in economic size of farms. They ranged from EUR 0.67 thousand per ha in class I to EUR 1.1 thousand per ha of UAA in class VI. In the Czech and Slovak farms, they were ca. 20% higher in classes II-IV. In other two classes these differences were smaller – in class V they amounted to ca. 13% and in class VI below 3%. The highest level of production intensity was noted at the German farms. As regards Polish and Hungarian farms it was by ca. 120% higher in class III. The difference dropped in subsequent classes to 37% in class VI.

In type 16 similar trends were observed, but the level of costs was higher, especially in classes from IV to VI. A growth in total costs per 1 ha of UAA for crop farms of larger area deviated from the former regularity, according to which along with a growth in the farm area the level of production intensity dropped because of limited labour resources (Manteuffel, 1984). At crop farms, given the applied production technologies, labour stopped to be a limiting fac-

[3] According to the methodology of the Polish FADN, other production covers, e.g. rent for leased land ready for sowing, revenues from occasional transfer of forage area, forestry products, provision of services, equipment rental, interest on current assets necessary for day-to-day operation of a farm, revenues from rural tourism.

tor. Direct costs noted similar trends – they increased along with a growth in the economic size. Polish farms noted direct costs at a level higher than the Hungarian, Czech and Slovak farms, while lower than German farms. What should be noted is the relation between direct and total costs. Polish farms noted the share of direct costs at 40-50%, while other groups of farms noted a lower level, from 30% to 35%. The higher share of direct costs in total costs of the Polish farms should be assessed positively, since it points to lower burden of indirect costs, which most often are fixed costs. Among direct costs, costs of mineral fertilisers and plant protection products played the key role. The relation between costs of plant protection products and mineral fertilisers should be emphasised: it was similar in all farm groups and classes – ca. 40%.

The costs of external factors of production, covering the costs of hired labour, lease rent and interest rates on equity, were characterised by an upward trend along with a growing economic size in both farm types. What dominated were the costs of lease rent and costs of hired labour. Polish farms of the type 15 noted the costs of external factors of production at the level ranging from EUR 0.021 thousand in class I to EUR 0.380 thousand per ha of UAA in class VI, while type 16 noted higher levels in all farm groups – from EUR 0.23 thousand in class I to EUR 0.66 thousand per ha of UAA in class VI. These costs at Polish farms were higher than at Hungarian farms, but lower than at the remaining farms, especially German farms (by ca. 100%).

A significant role was played by costs of own factors of production: labour, land and capital. As per 1 ha of UAA in both types of farms these costs showed a downward trend along with increasing the economic size of farms. At Polish farms of type 15 it totalled from EUR 0.554 thousand in class I to EUR 0.078 thousand per ha of UAA in class VI, similarly as for Hungarian, Czech and Slovak farms. The highest costs of own factors of production belonged to German farms – from EUR 0.451 thousand in class III to EUR 0.109 thousand in class VI. They exceeded the costs at Polish farms by 71% in class III and by 40% in class VI. In type 16, similar trends were noted, but the costs were higher (at Polish farms by an average of 45%). In the remaining farms the differences amounted to ca. 20%.

Table 5

Production organisation of researched crop farms (average values)

Countries	Economic size classes of farms (EUR thousand SO)											
	I (<8)		II (8-25)		III (25-50)		IV (50-100)		V (100-500)		VI (>=500)	
	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16
Total costs (EUR thousand per ha of UAA)												
Poland	0.675	0.71	0.666	0.95	0.660	1.01	0.669	0.93	0.847	1.09	1.119	1.64
Hungary	0.657	-	0.568	0.55	0.618	0.85	0.662	0.92	0.849	1.23	1.047	1.59
Czech Republic	-	-	0.874	-	0.819	-	0.894	1.17	0.961	1.33	1.164	1.76
Slovakia	-	-	-	-	1.097	-	0.892	-	0.959	1.25	1.149	1.61
Germany	-	-	-	-	1.417	1.57	1.356	1.62	1.336	2.03	1.446	2.57
Direct costs (EUR thousand per ha of UAA)												
Poland	0.238	0.23	0.269	0.38	0.269	0.45	0.336	0.45	0.380	0.50	0.380	0.66
Hungary	0.207	-	0.210	0.21	0.210	0.32	0.241	0.34	0.277	0.41	0.277	0.54
Czech Republic	-	-	0.265	-	0.265	-	0.317	0.42	0.328	0.46	0.328	0.57
Slovakia	-	-	-	-	-	-	0.323	-	0.324	0.34	0.324	0.49
Germany	-	-	-	-	-	0.39	0.445	0.47	0.474	0.67	0.474	0.88
Costs of external factors of production (EUR thousand per ha of UAA)												
Poland	0.021	0.040	0.028	0.070	0.047	0.110	0.060	0.100	0.146	0.140	0.270	0.390
Hungary	0.025	-	0.035	0.050	0.062	0.160	0.097	0.170	0.195	0.260	0.307	0.460
Czech Republic	-	-	0.007	-	0.215	-	0.094	0.070	0.172	0.240	0.350	0.480
Slovakia	-	-	-	-	-	-	0.103	-	0.172	0.210	0.253	0.430
Germany	-	-	-	-	0.154	0.191	0.191	0.260	0.261	0.370	0.443	0.730
Costs of own factors of production (EUR thousand per ha of UAA)												
Poland	0.554	0.700	0.456	0.650	0.263	0.430	0.205	0.300	0.138	0.240	0.078	0.110
Hungary	0.273	-	0.242	0.270	0.213	0.250	0.182	0.230	0.145	0.200	0.099	0.110
Czech Republic	-	-	0.435	-	0.247	-	0.188	0.290	0.106	0.180	0.650	0.100
Slovakia	-	-	-	-	0.246	-	0.160	-	0.077	0.009	0.057	0.006
Germany	-	-	-	-	0.451	0.570	0.425	0.430	0.203	0.340	0.109	0.180

Source: European FADN.

Efficiency and competitiveness of Polish crop farms at the background of selected countries

The efficiency of analysed crop farms was assessed using the following indices: productivity and profitability of the factors of production. Table 6 contains respective numbers.

Productivity of land was determined by the value of production in EUR thousand per ha of UAA. In both types of farms in all groups, land productivity increased along with a growth in the economic size of farms. The highest characterised German farms in both types. In type 15, in the researched period, it amounted to an average of EUR 1.37 thousand per ha – by ca. 48% more than at Polish and Czech farms, and by 54% and 69% more than at Slovak and Hungarian farms. In type 16, land productivity in all groups of farms was higher than in type 15. At German farms it amounted to an average of EUR 2.11 thousand per ha of UAA and was by 52% higher than at Polish farms and by ca. 70% higher than at others.

The productivity of assets also grew along with an increase in the economic size of farms. The highest in both types was noted for Slovak farms – in type 15 it amounted to an average of 0.60, respectively, by ca. 186% and 150% more than at Polish and German farms. The difference as compared to Hungarian and Czech farms was lower, due to a lower value of assets per 1 ha of UAA, respectively: 82% and 71%. There were similar trends in type 16, but productivity of assets was higher than in type 15.

The productivity of current assets showed a variable growth trend. At Polish farms in both types in classes from I to IV it grew and in subsequent ones it dropped. The highest productivity of current assets in both types was showed by German and Czech farms, where in type 15 it amounted, respectively, to: 1.73 and 1.55, and in type 16, respectively, to: 1.66 and 1.71.

Along with a growth in the economic size of farms labour productivity also grew. In all classes, the highest labour productivity was achieved by German farms, where in type 15 it ranged from EUR 56.9 thousand to EUR 174.8 thousand per AWU, and in type 16 from EUR 60.1 thousand to EUR 128.7 thousand per ha of UAA. At Polish farms the labour productivity was over two times lower than at German farms and similar to that of other farms.

Land productivity of the Polish farms of both types showed an upward trend in classes from I to IV: in type 15 from EUR 0.36 thousand (class I) to EUR 0.52 thousand per ha of UAA (class IV), and in type 16 from EUR 0.43 thousand (class I) to EUR 0.61 thousand per ha (class IV). In the remaining classes it was lower. At Polish farms it was the highest in all classes, except for class VI in type 16, in which it amounted to EUR 0.14 thousand per ha of UAA (in this class the German farms reached productivity within the limits of EUR 0.50 thousand per ha of UAA).

Table 6

Productivity and profitability of factors of production of researched crop farms (average values)

Countries	Economic size classes of farms (EUR thousand SO)											
	I (<8)		II (8-25)		III (25-50)		IV (5-100)		V (100-500)		VI (>=500)	
	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16
Land productivity (EUR thousand per ha of UAA)												
Poland	0.77	0.78	0.81	1.24	0.87	1.39	0.93	1.27	1.02	1.40	1.18	1.54
Hungary	0.76	-	0.70	0.73	0.77	0.99	0.80	1.21	0.90	1.36	0.96	1.43
Czech Republic	-	-	0.88	-	0.87	-	0.90	1.39	0.93	1.40	1.04	1.61
Slovakia	-	-	-	-	0.95	-	0.80	-	0.89	0.93	0.94	1.46
Germany	-	-	-	-	1.33	1.62	1.39	1.77	1.38	2.37	1.40	2.70
Labour productivity (EUR thousand per AWU)												
Poland	8.69	6.06	14.91	10.99	32.05	20.02	52.64	34.58	67.56	48.17	67.22	53.13
Hungary	21.49	-	38.36	23.31	52.31	22.47	61.85	38.31	53.94	60.41	66.48	52.68
Czech Republic	-	-	23.53	-	35.90	-	54.33	52.99	69.84	58.73	70.31	57.32
Slovakia	-	-	-	-	23.13	-	42.99	-	63.11	39.85	55.18	37.59
Germany	-	-	-	-	56.87	60.14	87.20	89.34	152.64	126.06	174.83	128.75
Land profitability (EUR thousand per ha of UAA)												
Poland	0.36	0.43	0.43	0.61	0.49	0.69	0.52	0.61	0.43	0.61	0.31	0.14
Hungary	0.30	-	0.34	0.43	0.38	0.48	0.38	0.58	0.31	0.45	0.18	0.14
Czech Republic	-	-	0.26	-	0.30	-	0.26	0.48	0.23	0.48	0.13	0.18
Slovakia	-	-	-	-	0.06	-	0.10	-	0.12	-	0.03	0.12
Germany	-	-	-	-	0.22	0.43	0.36	0.53	0.38	0.53	0.28	0.50
Share of subsidies in farm income (%)												
Poland	78.59	88.32	68.24	60.48	57.20	47.78	54.63	50.03	62.61	45.64	82.36	332.67
Hungary	61.48	-	60.20	68.06	55.88	78.95	58.00	47.14	73.94	64.93	123.71	232.44
Czech Republic	-	-	76.28	-	66.60	-	77.97	52.42	93.37	69.97	159.80	141.52
Slovakia	-	-	-	-	2623.33	-	167.82	-	114.13	764.57	242.34	782.69
Germany	-	-	-	-	182.64	94.71	106.00	74.39	99.15	54.71	145.09	77.96

Source: European FADN.

Similar trends concerned also the productivity of assets, which increased at Polish farms in class 15 from 4.92% in class I to 13.55% in class VI. It type 16, it was at a similar level. Higher productivity of assets was achieved by Hungarian and Czech farms (Ziętara and Zieliński, 2015).

Productivity of own labour at Polish farms in type 15 increased from EUR 4.23 thousand in class I to EUR 107 thousand per FWU in class V, and in type 16 from EUR 3.41 thousand in class I to EUR 53.1 thousand per FWU in class V. Higher productivity of own labour in both types in these classes was reached by Hungarian farms and the highest in class VI. The lowest labour productivity was typical of Slovak farms, followed by Czech farms (Ziętara and Zieliński, 2015).

All types of subsidies were an important factor deciding on the level of income from a farm. Their share in income showed a downward trend in classes from I to V. At Polish farms it ranged from 88.3% in class I (type 16) to 45.6% in class V (type 16) and it was the lowest compared to the analysed farms. The highest share belonged to subsidies in class VI for German and Slovak farms (apart from the Polish farms in type 15 and German farms in type 16). The remaining farms would not survive without the subsidies. Their share in income exceeded 100%.

Productivity and profitability ratios of the factors of production of the researched farms do not suffice to fully assess their competitiveness, understood as their ability to develop. Table 7 presents numbers characterising the production potential of researched farms. It was determined using the following ratios: income parity A2, net investment rate, management income and competitive ratio.

From the numbers presented in Table 7 it follows that Polish and Czech farms in class III and higher economic size classes showed income parity A2 ratio at a level above 100%. Hungarian farms achieved parity income in all classes, Slovak in class V in type 15 and in type 16 only in class VI, while German farms in classes V and VI.

A positive value of the net investment rate characterised both types of Polish farms, starting from class III, Hungarian farms in class II, V and VI, and Czech farms in classes V and VI. The most difficult was the situation of Slovak farms, which showed positive net investment rate only in class III (type 15) and in class VI (type 15). German farms were characterised by a positive net investment rate in all classes (from III to VI).

Management income is the final measure of farming efficiency. Its positive value constitutes an important element of the competitive potential of farms. A positive value of management income was obtained by Polish, Hungarian and Czech farms in classes from III to VI in both types of farms and German farms in classes V and VI. Slovak farms achieved positive management income only in type 15 in class V and in type 16 in class VI.

Table 7

Competitive potential of researched crop farms (average values)

Countries	Economic size classes of farms (EUR thousand SO)											
	I (<8)		II (8-25)		III (25-50)		IV (50-100)		V (100-500)		VI (>=500)	
	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16	Type 15	Type 16
Income parity A2 (%)												
Poland	42.45	34.22	80.09	60.52	196.88	133.18	349.70	230.53	1074.37	532.72	-	9585.51.
Hungary	111.30	-	226.12	196.90	358.53	268.72	528.17	463.83	1172.26	1022.11	16067.70	7528.06
Czech Republic	-	-	61.55	-	115.79	-	172.33	180.31	415.38	345.63	4230.10	3726.13
Slovakia	-	-	-	-	23.29	-	78.29	-	325.23	43.01	1512.34	2998.81
Germany	-	-	-	-	24.78	42.91	61.40	77.68	158.33	158.33	781.95	357.64
Net investment rate (%)												
Poland	-151.82	-64.46	-.9.57	-25.19	57.72	50.16	126.33	101.63	145.25	80.81	107.51	94.12
Hungary	-155.81	-	23.04	62.59	18.38	-11.22	-0.53	-10.69	16.91	67.44	15.91	15.32
Czech Republic	-	-	-54.07	-	-18.33	-	15.18	-15.31	14.67	9.39	62.57	31.07
Slovakia	-	-	-	-	34.64	-	-26.28	-	-3.03	-6.07	16.73	-31.00
Germany	-	-	-	-	4.49	10.28	24.08	191.23	38.86	47.97	115.52	59.24
Management income (EUR thousand per farm)												
Poland	-2.39	-2.68	-0.69	-0.62	13.60	9.17	33.97	20.67	92.00	57.80	298.31	26.31
Hungary	0.31	-	-23.04	4.85	11.65	11.87	25.39	27.21	54.26	58.22	109.88	37.91
Czech Republic	-	-	-54.27	-	2.73	-	8.51	13.18	40.89	37.99	78.35	93.91
Slovakia	-	-	-	-	-11.14	-	-6.47	-	15.18	-17.46	-51.11	77.49
Germany	-	-	-	-	-9.16	-4.87	-4.54	6.31	38.47	43.78	178.99	126.56
Competitiveness ratio (times)												
Poland	0.66	0.62	0.94	0.94	1.87	1.63	2.51	2.02	2.89	2.60	3.94	1.23
Hungary	1.09	-	1.43	1.60	1.80	1.96	2.09	2.48	1.57	2.30	1.78	1.28
Czech Republic	-	-	0.61	-	1.21	-	1.41	1.67	1.34	2.20	1.98	1.85
Slovakia	-	-	-	-	0.23	-	0.65	-	0.70	0.24	0.45	2.00
Germany	-	-	-	-	0.49	0.76	0.86	1.23	1.44	2.17	2.58	2.80

Source: European FADN.

Farms capable of development are farms which obtain farm income at the parity level, have positive net investment rate and positive management income. Given these criteria it can be stated that capable of development were Polish farms in both types, Hungarian in type 15 in classes from III to VI and in type 16 in classes II, V, VI, Czech farms in type 15 in classes IV-VI and German farms in both types in classes V and VI.

Taking into account the values of the competitive ratio, farms capable of development are farms in which the value of *Wk*4>=2. This condition is met by Polish farms in classes IV-VI in type 15 and in type 16 in classes IV and V, Hungarian farms in class IV in type 15, while in type 16 – farms of classes IV and V. Among the Czech farms capable of development were farms in type 16 in class V. Slovak farms only in type 16 in class VI showed development capabilities, while German farms in type 15 (class VI) and in type 16 in classes V and VI.

Characteristics of crop farms capable of development by the value of the competitive ratio

Table 8 presents minimum sizes of crop farms capable of development and their characteristics according to the value of the competitive ratio. Farms in which the value *Wk*>=2 were considered as fully capable of development. This condition in the group of farms in type 15 was met by Polish and Hungarian farms in class IV and German farms in class VI. Minimum UAA of Polish and Hungarian farms amounted, respectively, to: 110 ha and 128 ha, while that of German ones – 1004 ha. The share of cereals in the UAA ranged from 63.5% (Hungary) to 68% (Poland). The production intensity level of Polish and Hungarian farms was similar – ca. EUR 0.66 thousand per ha, in German farms it was by 118% higher. Direct costs at Polish farms amounted to EUR 0.34 thousand per ha and was by 42% higher than at Hungarian farms.

The highest level of these costs (EUR 0.46 thousand per ha) was noted at German farms. It was by 35% higher than at Polish farms and by 92% higher than at Hungarian farms. At Polish farms the ratio of direct costs to total costs equalled 51%, hence it was much better than at Hungarian and German farms, where it amounted, respectively, to: 36% and 31%. Similar level of costs of own factors of production in the analysed farms ranged from EUR 0.18 thousand to EUR 0.21 thousand per ha. Differences were more pronounced in the external costs of factors of production. At German farms they amounted to EUR 0.443 thousand per ha and were 4.6 times higher than at Hungarian farms and 7.4 times higher than at Polish farms.

Table 8

Minimum economic size of farms specialising in plant production and capable of development

Countries	Characteristics of competitive farms – capable of development						
	Economic size class/Wk	UAA (ha)	Share of cereals in UAA (%)	Total costs (EUR thousand per ha)	Direct costs (EUR thousand per ha)	Costs of own factors of production (EUR thousand per ha)	Costs of external factors of production (EUR thousand per ha)
Cereal farms (type 15)							
Poland	IV/2.51	109.6	68.0	0.67	0.34	0.21	0.06
Hungary	IV/2.09	127.8	63.5	0.66	0.24	0.18	0.097
Czech Republic	-	-	-	-	-	-	-
Slovakia	-	-	-	-	-	-	-
Germany	VI/2.58	1004.2	64.4	1.45	0.46	0.18	0.443
Farms with various crops (type 16)							
Poland	IV/202	67.41	55.62	0.93	0.45	0.30	0.10
Hungary	IV/2.48	78.56	44.88	0.92	0.34	0.23	0.17
Czech Republic	V/2.20	176.45	49.64	1.33	0.46	0.18	0.24
Slovakia	VI/2.0	1317.75	44.41	1.61	0.49	0.06	0.43
Germany	V/2.17	110.75	48.33	2.03	0.67	0.34	0.37

Source: European FADN.

In the group of farms with various crops (type 16) farms capable of development were Polish and Hungarian farms in classes IV and V, Czech and German farms in class V and Slovak farms in class VI of economic size. Minimum UAA of Polish and Hungarian farms amounted, respectively, to: 67 ha and 78 ha, while that of Czech and German ones, respectively, to: 176 ha and 111 ha of UAA, and Slovak farms – 1318 ha of UAA. A relatively low share of cereals in the UAA structure ranged from 44% (Slovakia) to 56% (Poland). The production intensity level was differentiated, it was the lowest at Polish and Hungarian farms (ca. EUR 0.93 thousand per ha). It was the highest at German farms (EUR 2.03 thousand per ha) by 118% exceeding the level of Polish farms and, respectively, by 53% and 26%, the level of Czech and Slovak farms. The lowest direct costs belonged to Hungarian farms (EUR 0.34 thousand per ha). At Polish, Czech and Slovak farms these were similar – ca. EUR 0.47 thousand per ha. At the highest level were the costs at German farms (EUR 0.67 thousand per ha), ca. 43% higher than at Polish, Czech and Slovak farms. Significant

differences were in own costs of production factors. These costs were the lowest at Slovak farms (EUR 0.06 thousand per ha), while the highest at German farms (EUR 0.34 thousand per ha). The level of differentiation of external costs of production was lower at Slovak farms, where it was at EUR 0.43 thousand per ha, while at Polish farms – EUR 0.10 thousand per ha.

Conclusions

1. The intensifying growth, over the last several years, in the share of farms specialising in cereals, oilseed and leguminous plants (type 15) with the simultaneous drop in the share of farms with various crops (type 16) should be assessed negatively, given the risk of keeping a positive balance of organic matter in the soil.
2. Utilised agricultural area of crop farms was closely correlated with their economic size (ratio r^2>0.9). In type 16, it was smaller in all classes than in type 15: at Polish farms by 46% in classes from I to V, at Hungarian farms by 15%, Czech by 68%, Slovak by 30% and German by 37%. Differences in class VI were lower, apart from German farms, where the utilised agricultural area amounted to 391 ha of UAA and was by 62% lower than in type 15.
3. The researched crop farms used also leased land, whose share increased at farms of greater economic strength. In type 15, the lowest percentage of these agricultural areas belonged to the Polish farms ranging from 13.8% (class I) to 64% (class VI). At farms of other analysed countries in class VI it exceeded 90%. In type 16 the share of leased land was similar.
4. Labour inputs, expressed in the number of work units (AWU) per 100 ha of UAA, dropped along with growing economic size of farms. They were the highest in respective size classes in type 15 at Polish and Slovak farms – from 8.9 AWU (class I) to 1.75 AWU per 100 ha of UAA in class VI. The lowest labour inputs were noted at German farms, in class VI they amounted to 0.8 AWU per 100 ha of UAA. The level of labour inputs in type 16 was higher in all farm groups: at Hungarian and Slovak farms it was two times higher, at Polish and Czech farms it was higher, respectively, by: 85% and 71%, and at German farms – 54%.
5. In total labour inputs in classes from I to IV own labour dominated. Its highest share was noted for Polish and German farms – in class IV, respectively: 83% and 98%. In class VI the share of own labour in all farms, apart from the German ones, did not exceed 2%. In the latter it amounted to 11.3%. In type 16, the share in own labour was similar as in type 15.
6. The value of assets per 1 ha of UAA showed a downward trend along with a growth in the area of farms in both types. In type 15 at Polish farms it ranged from EUR 7.4 thousand in class I to EUR 2.3 thousand per UAA in class VI and it was higher than in the rest of farms, apart from the German ones, where it ranged from EUR 11.3 thousand in class III to EUR 3.4 thousand

per ha of UAA in class VI. In type 16, there were similar trends, but the value of assets was higher – at German farms by 47%, Polish by 28%, Czech and Slovak respectively, by 19% and 18%, and at Hungarian farms by 7%.

7. In assets in both types of farms, fixed assets played the key part, and in liabilities – equity. Both the share of fixed assets in assets and the share of equity in liabilities dropped along with a growth in farm size. In type 15, Polish and German farms used borrowed capital to the least, in the case of these farms the share of equity in liabilities was, respectively, 68% and 67%, and in type 16, respectively, 61% and 70%.
8. Production organisation in the researched cereal farms was dominated by cereal farming. Their share in UAA showed a downward trend along with a growth in the farm size. It was the highest for Polish farms (from 77.5% in class I to 67% in class VI), the lowest for German farms, where it ranged from 66% in class III to 61% in class VI. In type 16 the share of cereals was lower and for German, Slovak and partly Hungarian farms (classes II-IV) it did not exceed 50%. Other crops, dominated by oilseed, supplemented cereal production.
9. Stocking density was very low. In type 15 it amounted, on average, to ca. 3 LU per 100 ha of UAA, in type 16 it was slightly more ranging from 4 to 16 LU per 100 ha of UAA. Such a level of stocking density did not ensure minimum level of organic fertilisation[4].
10. In both types the production structure was dominated by plant production, in most of the farms exceeding 90%. Its share was slightly lower at Slovak farms, ranging from 61% in class III to 82% in class VI. Production organisation at larger farms (class V and VI) was more balanced and thus more environment-friendly.
11. Production intensity, determined by the amount of total costs in EUR thousand per ha of UAA increased along with a growth in the size of farms. In type 15 these costs ranged from EUR 0.67 thousand (class I) to EUR 1.44 thousand per ha of UAA (class VI), while in type 16 it ranged from EUR 0.7 thousand to EUR 2.6 thousand per ha. The highest production intensity level was at German farms.
12. The relationship of direct costs to total costs for Polish farms was 40-50%, while for other groups it was within the limits of 30-35%. Higher share of direct costs in total costs should be assessed as positive.
13. Costs of external factors (hired labour, rent and interest rate) per 1 ha of UAA also increased along with a growth in the economic size of farms. Similar trends concerned own costs of factors of production. The highest level of these costs was noted at German farms in both types of farms.

[4] Minimum level of organic fertilisation ensuring sustainability of organic substance balance in the soil is ca. 50 LU per 100 ha of UAA.

14. Land productivity was determined by the production value per 1 ha of UAA, at Polish farms it was higher in both types than in other farms, except for German ones. Labour productivity at Polish farms in classes I-IV was lower than at Hungarian farms, it was comparable with Czech and Slovak farms, but decidedly lower than at German farms. The difference was ca. 66%.
15. Polish farms achieved the highest profitability of land and assets in type 15, while in type 16 at German farms in classes V and VI. In both types the highest productivity of assets was noted at Hungarian farms. Profitability of own labour in both types of Polish farms was lower as compared to the Hungarian farms, but higher than at other farms.
16. Polish farms were the least dependent on subsidies, which was evidenced by the lowest share of subsidies in farm income in classes form I to V at both types of farms. Czech and Slovak farms noted the highest share of subsidies in income in type 15 – in class VI it was, respectively, 160% and 242%, while in type 16 at Polish, Hungarian and Slovak farms it amounted, respectively, to 223%, 232% and 783%.
17. Polish farms in type 15 showed competitive capability in classes from IV to VI, Hungarian farms in class IV, and German farms in class VI. In type 16 competitive capability was achieved by Polish and Hungarian farms in classes IV and V, Czech farms in class V, Slovak farms in class VI and German farms in classes V and VI.
18. The minimum area of Polish and Hungarian farms (type 15) capable of development amounted, respectively, to 107 ha of UAA and 128 ha of UAA and German as much as 1000 ha of UAA. Whereas the minimum area of farms with various crops (type 16) amounted, respectively, to: at Polish and Hungarian farms – 68 ha of UAA and 79 ha of UAA, Czech – 176 ha of UAA, German – 111 ha of UAA, and Slovak – as much as 1318 ha of UAA.

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POLSKIE GOSPODARSTWA ROŚLINNE NA TLE GOSPODARSTW WYBRANYCH KRAJÓW

Abstrakt

W opracowaniu przedstawiono ocenę organizacji i ekonomiki polskich gospodarstw nastawionych na produkcję roślinną oraz określono ich konkurencyjność w stosunku do analogicznych gospodarstw z Węgier, Czech, Słowacji i Niemiec. Oceny badanych gospodarstw dokonano na podstawie danych Polskiego FADN i FADN ogólnoeuropejskiego w latach 2010-2012, z uwzględnieniem wielkości ekonomicznej gospodarstw wyrażonej w tys. euro Standardowej Produkcji (SO). W badaniach posłużono się metodą porównawczą. Konkurencyjność badanych gospodarstw określono wskaźnikiem konkurencyjności, który obrazuje stosunek dochodu z gospodarstwa rolnego do sumy kosztów użycia własnych czynników produkcji (pracy, ziemi i kapitału).

Wyniki badań wskazują na wzrost udziału gospodarstw nastawionych na produkcję roślinną w ogólnej liczbie gospodarstw. W 2013 roku ten udział wynosił 53%. Stwierdzono dodatnią zależność między wielkością ekonomiczną gospodarstw a powierzchnią użytków rolnych i udziałem gruntów dzierżawionych oraz ujemną zależność między wielkością ekonomiczną gospodarstw a nakładami pracy i wartością aktywów w przeliczeniu na 1 ha użytków rolnych. Stwierdzono wzrost produktywności i wydajności pracy, a także dochodowości ziemi i pracy wraz ze zwiększaniem wielkości ekonomicznej gospodarstw. Polskie gospodarstwa nastawione na produkcję roślinną w poszczególnych klasach wielkości ekonomicznej wielokrotnie wykazały się większą zdolnością konkurencyjną w stosunku do analogicznych gospodarstw z badanych krajów.

Słowa kluczowe: wielkość ekonomiczna gospodarstw, potencjał produkcyjny, efektywność produkcji, konkurencyjność gospodarstw.

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