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COMPETITIVENESS OF FARMS IN KUJAWSKO-POMORSKIE VOIVODESHIP DEPENDING ON THE DIRECTION AND SCALE OF PRODUCTION

Abstract

The Kujawsko-Pomorskie Voivodeship is characterised against others with a very high land price and intensity of use of resources from the Common Agricultural Policy programmes. To indicate the reasons for this situation, the assessment in this paper covered typical farms from the voivodeship which in 2010-2014 were covered by FADN monitoring. It was stated that the uniqueness of agriculture in the Kujawsko-Pomorskie Voivodeship consists in a relatively high share of perfectly functioning farms with medium- and large-scale production, whose owners took up cautious investment decisions. The share of such farms in the voivodeship was found to amount to 8.7% and the share of UAA owned by them – 55%, while similar ratios for the country were: 4.9% and 35.5%, respectively. Both these ratios had better values in Poland only in the Zachodniopomorskie Voivodeship.

Keywords: production direction, farm specialisation, production scale, efficiency and competitiveness of farms.

JEL codes: D24, O13, Q10, Q12, Q14.

Introduction

Agriculture in Poland is characterised by major regional differentiation. The highest level of agriculture development is noted in the following voivodeships: Kujawsko-Pomorskie, Wielkopolskie and Opolskie (Zegar, 2003). High position of agriculture in the Kujawsko-Pomorskie Voivodeship is evidenced by high demand for land and price of this factor of production. According to the data of the

Central Statistical Office (*Główny Urząd Statystyczny, GUS*) in the 2nd quarter of 2016 the price per hectare of arable land amounted to PLN 55 428 and was the highest in the country. The trend continues for a long time now. Apart from that, the highest intensity of use of resources from the Common Agricultural Policy programmes for modernisation of farms is typical for Kujawsko-Pomorskie and Wielkopolskie Voivodeships (Pietrzykowski and Wicki, 2011). The presented facts prove a very high position of agriculture in the Kujawsko-Pomorskie Voivodeship at the background of the national agriculture. Changes taking place in agriculture of this voivodeships are far ahead of other voivodeships and, as such, deserve attention.

The paper aims at characterisation of farms in Kujawsko-Pomorskie Voivodeship, emphasising the assessment of their competitiveness, depending on the production scale and specialisation level.

Material and method

The research covered farms in the Kujawsko-Pomorskie Voivodeships which continuously kept agricultural accounting under the Polish FADN between 2010 and 2014. The research focused on farms specialising in plant (field crop) production, pig breeding and milk production, which had above 60% share of leading production in total production structure. Farms for which it was not possible to separate a leading production direction, were classified as mixed production (multidirectional) farms. Groups of farms separated based on production direction were additionally divided depending on small, medium and large production scale[1]. Field crop and mixed farms were divided based on their utilised agricultural area (UAA), and pig and dairy farms – based on livestock units (LU) (Skarżyńska, 2011; Runowski, 1994).

For the research period (2010-2014), arithmetic means were calculated for respective characteristics which were then used in tabulation and dependency analysis. The scope of changes over these years was slight and characterised by low inflation. Thus, the calculated averages adequately reflect the level of characteristics.

[1] On the researched farms, there is a high degree of compliance between production scale and economic size of farms calculated by the Standard Output (SO) value, which comprehensively defines the potential of a farm. Economic size is preconditioned by the farm area, number of animals and also availability of and literacy in technologies complete with services environment (banks, consultancy, agricultural schools), therefore, the SO ratios for respective activities are different in different FADN regions. Small and medium-small farms are characterised by small production scale. Farms with medium-scale production (regardless of production direction) are medium-large farms. Then, large and very large farms (mixed) are large-scale farms, while dairy farms are medium-large.

Table 1

Breakdown of farms into groups depending on the production direction and scale

Production direction of a farm		Production scale		
		small	medium	large
Field crops	Number of farms	178	68	40
	Area in ha/UAA	up to 50	50-100	100 and more
Pig	Number of farms	27	37	28
	Pigs in LU (units)	up to 50	50-100	100 and more
Dairy	Number of farms	22	58	35
	Number of cows in a herd (units)	up to 15	15-30	30 and more
Mixed	Number of farms	307	77	24
	UAA	up to 50	50-100	100 and more

Source: own study.

The comparative method was the basic method used in the research. The comparisons refer to scale changes[2] and not to changes over time; hence, these are static studies of uniform groups of farms. The comparisons used ratios characterising the production potential (Table 2), production organisation (Table 3), costs (Table 4), and efficiency and competitiveness of farms (Tables 5 and 6). Analysis covered both productivity and profitability of factors of production and the level of farm income and income per own labour unit (FWU) as well as development capabilities of farms. Farms deemed capable of development are farms which obtain positive management income (Ziętara and Adamski, 2014; Józwiak and Mirkowska, 2009).

Competitiveness of researched farms (Wk) was determined as the quotient of farm income and sum of costs for using own factors of production: own labour, land and capital:

$$\mathbf{Wk = farm\ income / \sum\ costs\ of\ own\ factors\ of\ production}$$

The competitiveness ratio Wk>=1 points to at least full coverage of own costs of factors of production with income, while Wk<1 means their incomplete coverage. Further classification of the competitiveness ratio is as in Kleinhanss (2015), differentiating the following classes: for negative farm income (Wk1),

[2] In most general terms, scale (or volume) determines a single production process. There is, however, a difference between production scale and volume. Production volume is usually determined on the basis of the size of generated product or sum of incurred inputs. Production growth means a growth in volume, while scale grows in a pure form when all inputs increase proportionally. In Polish economic and agricultural literature, the terms of production scale and volume are used interchangeably (Kowalski, 1993).

0<=Wk<1 – partial coverage of costs of own factors of production (Wk2), 1<=Wk<2 – full coverage of costs of own factors of production (Wk3), Wk>=2 – double and more coverage of costs of own factors of production (Wk4). In line with the adopted method, farms capable of competition, are farms for which the Wk value is within the range of 1=<2, while competitive farms are farms for which the value is Wk>=2.

Management income was calculated by deducting from the farm income the costs of own factors of production (land, labour and equity). Both costs of own land and own labour were determined on the basis of the amount of rental fee and costs of hired labour incurred by the researched farms, taking into account the production direction and scale. The parity income A2 ratio was calculated, which is the relation between farm income per own labour unit (FWU) to remuneration in the national economy. The A2 ratio forms the grounds to establish the competitive ability of a farm (Ziętara and Zieliński, 2016). The cost of equity was adopted on the basis of interest on 10-year bonds of the State Treasury (5.57%).

Production potential, production organisation and farm costs depending on production direction and scale

The potential of the analysed farms differed depending on the production direction and scale. The production scale was correlated with farm area and the largest were field crop farms and mixed production farms. The latter – with large production scale – had the largest area, on average 415 hectares of UAA, while field crop farms – 238.7 hectares. But then, farms, where milk and pigmeat were the dominant production directions, were similar in terms of area regardless of production scale (Table 2), but much differed in terms of economic size and these differences grew along with an increase in production scale. Pig farms of large production scale were twice larger in terms of economic size than dairy farms, and larger than field crop farms, which used approx. 240 ha of UAA.

The area of farms was positively correlated with the share of leased land. For large-scale field crop and mixed farms this share amounted to approx. 50%, while for large-scale pig and dairy farms leased farms accounted for 25-28%. On large-scale field crop and mixed farms the share of own labour inputs was minor, especially at mixed farms – only 8%. The lowest total labour inputs per 100 ha of UAA were noted for large-scale field crop farms – 1.7 AWU/100 ha of UAA. Low labour inputs were compensated by higher value of machines and machinery per 1 AWU, i.e. technical employment infrastructure. Thus, on these farms live labour inputs were substituted with technical means of labour. The lowest value of machines and machinery per 1 AWU was typical for large-scale mixed farms – PLN 77.5 thousand per AWU. In this group of farms, both the value of machines and machinery per hectare and per 1 AWU were the lowest among all of the analysed farms. This could have many causes, e.g. their bet-

ter use because of large UAA, use of agricultural services, simplification of the set of machines and machinery resulting from the choice of crops of similar or identical production technology, etc.

Along with a growth in production scale the share of equity in debt capital dropped, which was linked to a growth in farm debt that was at a similar level regardless of production direction. For small-scale farms it was at the level of 5-6%, and for medium-scale – 6-11%. The highest level of debt was noted for large-scale field crop and mixed farms. In their case the debt assets amounted to 18% (Table 2).

Production organisation resulted from the adopted production direction. The analysed farms differed as regards the number of kept animals, stocking density per 100 ha of UAA and also the share of plant and animal production in the production structure. For field crop farms, animal production had a marginal share in the production structure, namely from 5% on large-scale farms to 12% on small-scale farms. On such farms cereal and oil plant production was dominant. Especially significant was the share of oil plants on large-scale field crop farms. In this group, the plant production was 95% of total production, including the share of cereals at 56%, and the share of oil plants at 28% (Table 3). Plant production scale was positively correlated with the share of oil plants in revenues.

For pig farms, the share of live pigs production in the production structure was from 65% in the group of farms with the smallest production scale to 75% on farms with large production scale. These farms differed in stocking density of pigs and the number of sold fattening pigs depending on the production scale. The stocking density of pigs on large-scale farms was over 350 livestock units (LUs) per 100 ha of UAA and was twice higher than on small-scale farms. In a year the former sold over 1200 fattening pigs[3], i.e. 6.6 times more than small-scale farms.

[3] The standard Polish FADN results lack information on the number of sold fattening pigs and the available data concern only production value of live pigs. Table 3 gives pig sales per fattening pigs. The value of sales was calculated from the production value of live pigs – SE225 (FADN Standard Results) divided by average value of a fattening pig in a given year (115 kg times average price in a year). The data on the number of sold fattening pigs are thus an approximate value, farms sell not only fattening pigs, but also culled primary herd, weaners or piglets.

Table 2

Production potential of farms depending on production scale

Specification	UoM	Production scale		
		small	medium	large
Field crop farms				
Utilised agricultural area	ha	28.12	68.13	238.73
Economic size in SO	EUR	24 615	55 538	157 498
Share of leased land	%	16.31	24.21	41.58
Total labour inputs per 100 ha of UAA	AWU	6.38	3.40	1.71
Share of own labour in total labour inputs	%	81.05	68.91	35.26
Values of fixed assets per hectare	PLN	37 087	35 834	20 010
Value of machines and machinery per AWU	PLN	88 177	235 586	269 846
Share of equity in debt capital	%	94.07	88.76	81.23
Pig farms				
Utilised agricultural area	ha	17.43	29.94	52.50
Economic size in SO	EUR	33 084	74 669	176 461
Share of leased land	%	11.58	17.36	25.72
Total labour inputs per 100 ha of UAA	AWU	9.51	6.49	4.63
Share of own labour in total labour inputs	%	99.12	94.38	75.98
Values of fixed assets per hectare	PLN	36 869	40 565	43 993
Value of machines and machinery per AWU	PLN	51 751	102 976	187 147
Share of equity in debt capital	%	93.62	94.40	88.74
Dairy farms				
Utilised agricultural area	ha	16.71	30.49	54.75
Economic size in SO	EUR	24 487	46 053	87 841
Share of leased land	%	11.32	22.57	28.49
Total labour inputs per 100 ha of UAA	AWU	10.74	6.48	4.86
Share of own labour in total labour inputs	%	97.03	95.91	80.41
Values of fixed assets per hectare	PLN	36 427	37 680	39 078
Value of machines and machinery per AWU	PLN	40 864	108 956	181 513
Share of equity in debt capital	%	96.97	91.10	85.96
Mixed farms				
Utilised agricultural area	ha	24.77	65.60	415.00
Economic size in SO	EUR	35 191	85 551	545 002
Share of leased land	%	16.92	28.92	55.43
Total labour inputs per 100 ha of UAA	AWU	7.20	3.49	3.86
Share of own labour in total labour inputs	%	94.02	84.73	8.09
Values of fixed assets per hectare	PLN	37 385	32 185	14 745
Value of machines and machinery per AWU	PLN	78 185	177 573	77 465
Share of equity in debt capital	%	94.45	89.01	82.20

Source: own study based on the Polish FADN data.

Farms specialising in milk production differed in stocking density, size of a herd of cows and other cattle. Large-scale farms kept on average approx. 44 cows and 27 units of other cattle, i.e. 3.8 times more than farms of the smallest scale. Stocking density of cattle was higher only by 17.2% (1.2 times), because larger cattle populations were kept on larger farms. Area of large-scale farms compared to small-scale farms was 3.3 times larger and the cattle population was 3.8 times higher. The growth in stocking density only slightly increased the growth in farm area. This dependence of almost proportional growth in cattle population on growth in farm area is linked to the need to ensure the production of roughages.

The last analysed group of farms was the group with multidirectional production. From the production structure it follows that the share of animal and plant production in the total production structure was similar and amounted to approx. 50%. These farms cultivated cereals, whose share in the UAA amounted to 50-60% and produced live pigs and milk. Those largest in terms of area – with UAA amounting to 415 hectares, annually sold over 1300 fattening pigs, kept 90 cows and 76 units of other cattle. But then, small- and medium-scale mixed farms aimed at cultivation of cereals and breeding of pigs (Table 3).

Production organisation and scale had a major impact on production costs. Table 4 presents the costs depending on the production direction and scale. The analysis covered total costs, direct costs and costs of external factors calculated per UAA hectare and per PLN 100 of production. Costs which have impact on the production scale are direct costs per hectare of UAA. The amount of these costs is the measure of production intensity (Manteuffel, 1979). Production intensity grew along with a growth in production scale. The only exception were field crop farms, where production intensity was at the same level, i.e. approx. PLN 2100 per ha of UAA. Moreover, production intensity on these farms was the lowest among the analysed production directions. Whereas the highest production intensity was noted for pig farms and it increased along with a growth in production scale. For large-scale farms direct costs per hectare were by 92% higher compared to small-scale farms. This was caused by a high share of feed from purchase whose share in the cost structure was 60-80%. However, the production intensity for mixed farms was low, especially for those of large production scale. This had an undeniable impact on land productivity.

Table 3

Farm production organisation depending on production scale

Specification	UoM	Production scale		
		small	medium	large
Field crop farms				
Pig population per 100 ha of UAA	LU	14.11	10.27	3.46
Cattle population per 100 ha of UAA	LU	5.28	4.45	2.25
Share of plant production value in total production	%	88.77	91.22	94.50
Share of cereal production value in total production	%	37.65	40.89	56.23
Share of oil plant production value in total production	%	15.10	17.62	28.04
Share of cereals in UAA	%	57.03	55.70	62.86
Pig farms				
Pig population per 100 ha of UAA[a]	LU	169.18	242.95	350.23
Cattle population per 100 ha of UAA	LU	4.65	3.70	1.76
Pig population	LU	29.82	72.73	183.87
Pig sales per fattening pigs	untis	188	480	1232
Share of animal production value in total production	%	65.20	69.58	75.94
Share of live pig production value in total production	%	65.02	69.58	75.94
Share of cereals in UAA	%	79.43	79.61	77.64
Dairy farms				
Cattle population per 100 ha of UAA	LU	110.63	120.71	129.65
Pig population per 100 ha of UAA	LU	10.77	7.03	2.69
Number of cows per farm	LU	10.86	21.89	44.41
Population of other cattle	LU	7.63	14.91	26.58
Share of animal production value in total production	%	72.03	80.05	86.03
Share of milk production value in total production	%	61.67	68.09	75.88
Share of cereals in UAA	%	39.83	36.73	32.54
Mixed farms				
Pig population per 100 ha of UAA	LU	70.93	73.19	48.99
Cattle population per 100 ha of UAA	LU	36.68	22.06	40.39
Number of cows	LU	2.65	5.37	91.75
Population of other cattle	LU	6.44	9.10	75.86
Pig population	LU	17.57	48.02	203.30
Pig sales per fattening pigs	untis	110	317	1362
Share of plant production value in total production	%	49.39	49.89	47.92
Share of animal production value in total production	%	49.82	49.65	51.14
Share of cereals in UAA	%	58.88	61.78	49.84

[a] Pigs on farms specialising in pig breeding were fed with feed from purchase, thus this ratio is of minor significance.

Source: own study based on the Polish FADN data.

A synthetic measure of costs are total costs per PLN 100 of production. Only on farms specialising in milk production costs thus calculated dropped along with a growth in production scale. For farms of large production scale, the total costs in 2010-2014 per PLN 100 of production amounted to PLN 71.40 and were lower by 8% against the small-scale farms. For other groups of farms, the growth in production scale resulted in growth of costs. Especially high growth in costs was noted for large-scale multidirectional farms. Costs incurred by them calculated per PLN 100 of production value amounted to PLN 103.67, which in turn followed from a major growth in costs of external factors. Multidirectional farms had the highest number of features typical for an enterprise, mainly: hired labour predominated in their labour inputs, they largely used loans and leased large areas of land. The costs of external factors of production amounted for these farms to PLN 23.03 per PLN 100 of production (they constituted 22.2% in total costs) and were the highest among the analysed farms. These costs have a fixed character, farms are not able to respond flexibly to changes in business cycle and have little possibilities to reduce such costs. Large-scale multidirectional farms had large share of animal production (they kept 168 cattle units, including over 90 cows) and annually sold 1300 of fattening pigs and used over 415 hectares of land. Between 2010 and 2014, these farms annually employed, on average, 15 workers (AWU), and their costs of hired labour amounted to PLN 676 thousand, i.e. PLN 19.72 per PLN 100 of production. High labour costs, interests on loan and rental fee had a major impact on incomes of these farms (Tables 4 and 5).

Farm efficiency and competitiveness depending on production direction and scale

The analysed farms differed with productivity of material factors of production – land, labour and capital. The highest productivity was achieved by pig farms, which concerned especially labour productivity. The case was similar for land productivity – but the reason for this phenomenon was mainly purchase of large quantities of feed for animals. The ratio correctly characterising land productivity of pig farms should be corrected with the value of the purchase[4]. Additionally, efficiency of use of factors of production increased along with a growth in production scale. The only exception was land productivity of field crop farms, where the production value per hectare on large-scale farms (of over 200 ha of UAA) was lower by 9% against small-scale farms. Particularly high production per hectare was achieved by large-scale pig farms (over PLN 16 thousand), which resulted from the aforementioned feed purchase for animals and short production cycle. Despite high production per hectare, incomes of these farms were similar to the incomes of dairy farms, where production per

[4] The land productivity ratio should be calculated as a relation of the net production value (production value reduced by costs of purchase of products of agricultural origin, i.e. feed, seeds, livestock for breeding, etc.) to UAA.

hectare was much lower, but also such were production costs. Large-scale pig farms obtained a comparable income to farms specialising in milk production. This income was reached at much (2.7-time) higher stocking density. This results from the price and cost relations on the market, which in the conditions of the same stocking density guaranteed higher income to farms specialised in milk production (Czyżewski and Smędzik-Ambroży, 2013).

Table 4

Farm production costs depending on production scale

Specification	UoM	Production scale		
		small	medium	large
Field crop farms				
Direct costs per ha of UAA	PLN	2 179	2 185	2 138
Total costs per PLN 100 of production value	PLN	76.77	79.66	83.01
including costs of: external factors	PLN	6.41	7.88	12.86
remunerations	PLN	3.48	2.99	6.73
Share of costs of external factors in total costs	%	8.35	9.90	15.49
Share of remunerations in total costs	%	4.53	3.75	8.11
Pig farms				
Direct costs per ha of UAA	PLN	5 521	7 544	10 582
Total costs per PLN 100 of production value	PLN	81.36	80.40	83.25
including costs of: external factors	PLN	1.94	1.74	3.18
remunerations	PLN	0.16	0.49	1.55
Share of costs of external factors in total costs	%	2.38	2.17	3.82
Share of remunerations in total costs	%	0.20	0.61	1.86
Dairy farms				
Direct costs per ha of UAA	PLN	2 412	3 205	4 344
Total costs per PLN 100 of production value	PLN	77.55	73.35	71.40
including costs of: external factors	PLN	2.08	3.25	4.37
remunerations	PLN	0.78	0.58	1.80
Share of costs of external factors in total costs	%	2.68	4.43	6.12
Share of remunerations in total costs	%	1.00	0.80	2.52
Mixed farms				
Direct costs per ha of UAA	PLN	3 425	3 702	3 985
Total costs per PLN 100 of production value	PLN	80.69	83.92	103.67
including costs of: external factors	PLN	3.39	5.29	23.03
remunerations	PLN	1.05	1.61	19.72
Share of costs of external factors in total costs	%	4.20	6.30	22.22
Share of remunerations in total costs	%	1.30	1.92	19.02

Source: own study based on the Polish FADN data.

Production profitability is measured with the relation of production value to incurred costs. For pig farms, this profitability was at a similar level regardless of production scale and amounted to approx. 120%. The highest and growing production profitability along with a growth in scale belonged to dairy farms, which is confirmed in a paper by Czyżewski and Smędzik-Ambroży (2013). But then, an increase in production scale caused a drop in profitability on field crop farms and mixed farms. The lowest profitability – 96.5%, was noted for large-scale mixed farms, where production costs exceeded production value. These farms achieved income only because of direct payments and the share of subsides in income amounted to 167.9%.

For all farms, incomes grew along with a growth in production scale (Table 5). Minor differences in farm incomes and incomes per full-time family worker (FWU) were noted between pig and dairy farms. Then, the greatest differences in income were noted for field crop farms and mixed farms. Large-scale field crop farms achieved the highest income among the analysed groups of farms – PLN 479 thousand. While large-scale mixed farms – much larger in terms of area than field crop farms (415 ha) – had lower income by 37%. The key reason for such situation was insufficient adjustment of production organisation to production potential. Major animal production (in 2010-2014 these farms kept, on average, 167.6 LUs of cattle and 203.3 LUs of pigs) required major inputs of hired labour resulting in high costs which, however, was not accompanied by sufficiently noteworthy land productivity. The value of production per hectare was by 20% lower compared to dairy farms, for instance. This was primarily caused by lower production intensity (Table 4). Despite good production results, economic effects were not the best. Large UAA, differentiated production structure, large scale of animal production and small own labour resources resulted in the need to employ additional workers. Unfortunately, employment growth and high labour costs failed to translate to a sufficient degree to economic effects. This could be caused by problems linked to supervision of hired workers. A similar phenomenon, though on a much smaller scale, was noted on large field crop farms.

Table 5

Farm efficiency depending on production scale

Specification	UoM	Production scale		
		small	medium	large
Field crop farms				
Farm income	PLN	72 656	170 462	478 909
Income per family full-time worker	PLN/FWU	49 914	106 593	198 123
Land profitability – income per ha of UAA	PLN	2 584	2 502	2 006
Land productivity – production value per ha of UAA	PLN	6 064	5 788	5 526
Production value per PLN 100 of total assets	PLN	14.61	14.47	22.49
Labour efficiency – production value per AWU	PLN	94 988	170 144	322 432
Production cost-effectiveness – (production/costs) x 100	%	130.26	125.54	120.47
Share of subsidies in farm income	%	47.40	50.87	53.98
Pig farms				
Farm income	PLN	50 549	109 520	209 765
Income per family full-time worker	PLN/FWU	30 783	59 608	113 866
Land profitability – income per ha of UAA	PLN	2 900	3 658	3 996
Land productivity – production value per ha of UAA[a]	PLN	9 678	12 535	16 825
Production per PLN 100 of total assets	PLN	23.06	26.88	32.83
Labour efficiency – production per AWU	PLN	101 800	193 021	363 524
Production cost-effectiveness – (production/costs) x 100	%	122.92	124.39	120.12
Share of subsidies in farm income	%	39.21	29.82	26.00
Dairy farms				
Farm income	PLN	42 877	97 437	224 122
Income per family full-time worker	PLN/FWU	24 625	51 437	104 721
Land profitability – income per ha of UAA	PLN	2 566	3 196	4 094
Land productivity – production per ha of UAA	PLN	6 149	7 889	10 417
Production per PLN 100 of total assets	PLN	14.94	18.56	23.55
Labour efficiency – production per AWU	PLN	57 271	121 821	214 225
Production cost-effectiveness – (production/costs) x 100	%	128.94	136.33	140.07
Share of subsidies in farm income	%	46.91	33.27	24.77
Mixed farms				
Farm income	PLN	63 227	150 895	302 030
Income per family full-time worker	PLN/FWU	37 724	79 152	190 277
Land profitability – income per ha of UAA	PLN	2 553	2 300	728
Land productivity – production per ha of UAA	PLN	7 137	7 109	8 263
Production per PLN 100 of total assets	PLN	16.81	19.43	39.13
Labour efficiency – production per AWU	PLN	99 166	203 769	214 297
Production cost-effectiveness – (production/costs) x 100	%	123.92	119.17	96.46
Share of subsidies in farm income	%	47.19	49.39	167.95

[a] This ratio should be interpreted with caution. It is clearly inflated, because farms specialising in pig breeding purchased large quantities of concentrate feed.

Source: own study based on the Polish FADN data.

Upon accession of Poland to the European Union, direct payments had a major impact on the incomes of Polish farms (Goraj, 2010; Józwiak, 2014). For the analysed farms, the share of payments was clearly differentiated. For pig and dairy farms the share of payments dropped along with a growth in production scale, for large-scale production farms it was within the range of 25-26%. Then, the share of payments for plant farms was higher and along with a growth in production scale it increased slightly – for large-scale farms it was at approx. 54%. For small- and medium-scale multidirectional farms the share of payments in income was close to the share of field crop farms (Table 5). Whereas large-scale farms reached income only because of payments.

Partial productivity and profitability ratios are not enough to fully assess the competitiveness of the researched farms understood as their ability to develop. The competitive potential of farms was determined using the following ratios: management income, competitiveness ratio (Wk), income parity A2, fixed assets increase ratio and value of net investments executed in 2010-2014. From the data presented in Table 6, it follows that the negative management income was reached by small-scale pig and dairy farms and large-scale multidirectional farms. Competitiveness ratio at Wk=>2, pointing to competitive ability, was achieved by large-scale dairy and plant farms. For large-scale mixed farms, however, the competitiveness ratio was at 0.98 which indicates incomplete coverage of own costs of factors of production. Despite this fact, these farms incurred major capital expenditures in 2010-2014 at the level of PLN 1134 thousand. These were higher only for field crop farms of large production scale (Table 6), thus, these are farms with development potential.

The competitiveness ratio for other farms was at 1=<2, meaning that they were capable to compete. The income parity A2 was achieved by all farms except for small-scale dairy farms. This means that the potential remuneration for farm labour in the researched period between 2010 and 2014 was higher than the remuneration in the national economy. Along with a growth in the production scale, the level of coverage of own labour costs grew – the highest A2 ratio was achieved by large-scale field crop farms. For these farms, income per own labour unit (FWU) was over two times higher than remuneration in the national economy (Table 6).

Table 6

Farm competitiveness depending on production scale

Specification	UoM	Production scale		
		small	medium	large
Field crop farms				
Management income	PLN/farm	13 141	72 236	274 722
Competitiveness ratio	times	1.22	1.74	2.43
Income parity A2	%	177.28	378.20	1 195.41
Fixed assets increase ratio	%	0.56	3.18	5.11
Net investments in 2010-2014	PLN/farm	54 269	453 105	1 381 703
Pig farms				
Management income	PLN/farm	-5 783	32 848	83 531
Competitiveness ratio	times	0.89	1.43	1.66
Income parity A2	%	100.63	212.23	404.20
Fixed assets increase ratio	%	0.70	0.75	2.15
Net investments in 2010-2014	PLN/farm	4 215	45 538	248 346
Dairy farms				
Management income	PLN/farm	-2 528	27 774	126 891
Competitiveness ratio	times	1.00	1.40	2.18
Income parity A2	%	88.05	182.71	391.80
Fixed assets increase ratio	%	-0.67	3.24	3.97
Net investments in 2010-2014	PLN/farm	-20 382	185 984	425 198
Mixed farms				
Management income	PLN/farm	7 121	51 470	-5 735
Competitiveness ratio	times	1.16	1.68	0.98
Income parity A2	%	134.20	277.06	828.20
Fixed assets increase ratio	%	0.72	2.26	3.71
Net investments in 2010-2014	PLN/farm	33 189	238 527	1 134 309

Source: own study based on the Polish FADN data.

Current incomes decide on the development of farms, but also the amount of capital expenditures incurred by farms for replacement, enlargement and modernisation of fixed assets (Czubak and Sadowski, 2014; Grzelak, 2015; Józwiak, 2012). Along with a growth in production scale the amount of capital expenditures grew. In 2010-2014, small-scale farms aimed at milk production had a negative value of net investments (dairy farms) or this value was at the level of simple reproduction (pig farms). It can be added that these were the smallest farms in terms of area (16 ha of UAA). A clear growth in capital expenditures

was noted only for large-scale farms. The highest capital expenditures were incurred by large-scale field crop and mixed farms and their expenses for this purpose exceeded PLN one million in 2010-2014. For large-scale field crop farms the increase in the value of fixed assets was the highest (growth by 5.11%). Large-scale dairy and pig farms had a similar area, but in 2010-2014 dairy farms executed net investments with the value of PLN 425 thousand, i.e. by 71% more than pig farms. On the basis of these two groups of farms it is clear that only 30-hectare farms created possibilities of development – positive management income and growth in the value of assets.

Conclusions

Based on literature, it is known that the Kujawsko-Pomorskie Voivodeship was distinguished in the first several years of this century at the background of other voivodeships with exceptionally high prices of arable land and very intensive use of funds from the Common Agricultural Policy programmes intended for modernisation of farms. This proves high level of agriculture development in this part of our country and its major dynamics. In order to indicate major reasons for this situation, the paper characterises typical farms from the Voivodeship, emphasising their efficiency and competitiveness. The Polish FADN monitoring results were used for the purpose, which cover farms continually conducting accounting between 2010 and 2014.

The analyses covered farms focused on plant production (field crop), pig breeding (pig), milk production (dairy) and multidirectional production (mixed), and each of these groups was divided into three subgroups differing by size. The formulated conclusions refer to weather and price conditions, and conditions determined by agricultural policy, mainly payment rates and their degression depending on farm size, which existed in the years covered by the research.

- It was stated that production efficiency (measured with total costs per value unit of obtained production) showed connections to three of the crucial fundaments of competitiveness of farms, i.e. type of reproduction of owned production property, scale of conducted agricultural production and size of parity income.
- The analysis showed the following major relations:
  - Farms of small production scale (field crop and mixed farms of medium UAA of less than 30 ha, pig farms of an average of approx. 30 LUs of this species and dairy farms with a herd of approx. 11 cows) were characterised by a similar to parity level of income of persons in a family working on the farm, drop or a slight increase in value of fixed assets and minor level of competitive ability or even lack thereof.
  - For medium-scale farms (field crop and mixed farms of medium UAA amounting to less than 70 ha, pig farms of an average of approx. 73 LUs of this species and dairy farms with a herd of approx. 22 cows) income of

persons in a family working on a farm was higher by 83-278% from the parity income. They were characterised by low level of extended reproduction of owned assets, and the level of competitiveness achieved by them may be termed as competitive ability.

– Large farms (field crop and mixed farms of large UAA amounting to at least 239 ha, pig farms of an average of approx. 184 LUs of this species and dairy farms with a herd of approx. 44 cows) were characterised by income of persons in a family working on a farm higher by at least 292% than parity income and relatively large level of extended reproduction of owned assets. Field crop and dairy farms were characterised by full competitive ability measured with competitiveness ratio. This assessment cannot be, however, referred to large pig farms and farms with mixed production.

- The level of competitiveness of pig farms, measured with competitiveness ratio, pointed to full competitiveness but also to competitive ability. Thus, it differed relatively little from the assessment referring to field crop and dairy farms. Especially significant disparity in the assessment of the competitiveness level of large farms with the use of competitiveness ratio was noted for mixed farms. Clearly over-parity level of farm income per own labour input unit and high level of reproduction of production assets proved their full competitiveness. In this case, the level of the ratio should be above "2" and it was slightly lower than one. The reason for this phenomenon most probably stemmed from employment structure. These farms were characterised by especially high share of hired labour inputs, i.e. approx. 92% in total assets of this production factor, while in three other groups of large farms the same ratio amounted at least to 65%. As a result one person from the family of the owner worked on a farm and, at the same time, supervised the work of several other hired workers. The supervisor had most probably some troubles with the task because of the large UAA and differentiated production structure. The production costs exceeded slightly the production value, thus the entire income of these farms had their source in direct payments. This income upon calculation into one full-time employee from farm owner's family was, however, high enough (it exceeded over eightfold parity income) to enable investments on a farm.
- Farms from all analysed groups benefited from foreign capital to a minor degree. The share of foreign capital in debt capital was at most approx. 19%.
- To sum up, it can be stated that the uniqueness of agriculture of the Kujawsko-Pomorskie Voivodeship in 2010-2014 resulted from the existence of large group of perfectly functioning farms of medium- and large-scale of production, whose owners took cautious investment decisions. Assuming that based on the conducted analyses these farms independently from production direction had 30 ha and more of UAA, their share in the Voivodeship in 2013 was estimated at 8.7% and the share of UAA owned by them at 55.0%, while on

the scale of the country similar results were, respectively, 4.9% and 35.5% (GUS..., 2014). Both these ratios were better than in the Kujawsko-Pomorskie Voivodeship only in the Zachodniopomorskie Voivodeship.

- From the above conclusions follow two more general ones:
  - The competitiveness ratio should be modified not to be inconsistent with other methods of assessing the level of competitiveness of farms.
  - For larger farms owned by natural persons there, most probably, is the issue of optimum farm size. Aiming at increase in production scale has its limits. The analyses made in the paper indicate that they may be marked by limited management possibilities.

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KONKURENCYJNOŚĆ GOSPODARSTW ROLNYCH W WOJEWÓDZTWIE KUJAWSKO-POMORSKIM W ZALEŻNOŚCI OD KIERUNKU I SKALI PRODUKCJI

Abstrakt

Województwo kujawsko-pomorskie wyróżnia się spośród innych wyjątkowo wysoką ceną ziemi i intensywnością wykorzystania środków z programów Wspólnej Polityki Rolnej na modernizację gospodarstw. W celu wskazania przyczyn tej sytuacji poddano ocenie typowe gospodarstwa rolne tego województwa, które w latach 2010-2014 objęte były monitoringiem Polskiego FADN. Stwierdzono, że wyjątkowość rolnictwa województwa kujawsko-pomorskiego polega na relatywnie dużym udziale doskonale funkcjonujących gospodarstw o średniej i dużej skali produkcji, których posiadacze ostrożnie podejmowali decyzje inwestycyjne. Ustalono, że udział takich gospodarstw w województwie wyniósł 8,7%, a udział posiadanych przez nie użytków rolnych 55%, podczas gdy w kraju analogiczne wskaźniki wynosiły odpowiednio 4,9% i 35,5%. Korzystniejszymi oboma wskaźnikami wyróżniało się w Polsce tylko województwo zachodni opomorskie.

Słowa kluczowe: kierunek produkcji, specjalizacja gospodarstw, skala produkcji, reprodukcja majątku, efektowność i konkurencyjność gospodarstw.

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