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AGRICULTURE IN THE PODLASKIE VOIVODESHIP AFTER 10 YEARS IN THE EU AT THE BACKGROUND OF POLAND*

Abstract

Transformation to a market economy in 1990 and accession to the European Union in 2004 had a big impact on the functioning of our agricultural sector and the organisation of farms in Poland, and in the Podlaskie Voivodeship.

The aim of the paper is to try to determine the organisation changes and processes of production concentration in Podlaskie agriculture on the background of Poland in 2002-2012. Use of agricultural production potential in Podlaskie is determined by environmental, economic and organisational conditions. Positive changes in Podlaskie region in the period of 2002-2012 include progressive specialisation in animal production, particularly in dairy cattle. In 2012, the share of livestock in commercial agricultural production was 89.3%, including 59.3% for milk production. The direction of these changes shows good use of adverse environmental conditions for agriculture in the region.

Introduction

In 2012, the Podlaskie Voivodeship (province) covering the area of 20,187 km^2 had the population of ca. 1,199.7 thousand people (Table 1). The Voivodeship represented 6.5% of the country's area and as much as 27.0% of the area of the eastern region, which – according to the Central Statistical Office (*Polish: Główny Urząd Statystyczny, GUS*) – includes also the Lubelskie, Podkarpackie and Świętokrzyskie Voivodeships. The population density in the region was over twice lower than the average for Poland (59 people per (km^2)$^{-1}$ UAA).

The share of agriculture, forestry and fisheries in the Podlaskie Voivodeship was 10.9% of the gross value added, while for Poland the index was almost three times lower – 4.0%. The share of industry in the gross value added was

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slightly lower than in Poland – 27.7%. In 2010, rural areas covered 95.5% of the Voivodeship (93.1% Poland). The above indices point to a typically agricultural character of the Voivodeship.

The Podlaskie Voivodeship has the sixth largest area in the country. Classified as a typically agricultural voivodeship, it is characterised by low production potential of agriculture stemming mainly from the worst natural conditions in Poland (Table 2). However, according to Krasowicz and Kopiński (2006), the level of using the potential – measured by the ratio of real crop production, in cereal units, to the potential cereal unit – is fairly high in the region (85%).

The paper attempts a multifaceted assessment of changes which took place in the agriculture of the region with relatively the most unfavourable natural conditions – from the perspective of agricultural production – in 2002-2012, including the period of Poland's accession to the European Union.

The paper's hypothesis assumes that the natural conditions define the production potential of agriculture, while the level of its use is determined mostly by organisational and economic conditions, which were changed under a considerable influence of, e.g., Poland's accession to the EU.

Table 1

The Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Total area (km^2)	20,180	20,187	312,685	312,679
Population (thousand people)	1,207.7	1,199.7	38,218.5	38,157.1
Population density $(km^2)^{-1}$	59.8	59.4	122.2	122.0
Registered unemployment rate (%)	15.1	14.7	18.0	13.4
Gross Domestic Product (GDP):				
- per capita (PLN thousand)	15.7	28.5[a]	20.4	39.7[a]
- relative (%)	77.0	71.8	100	
Share of agriculture, forestry and fisheries in value added (%)	6.0	10.9	3.1	4.0
Share of industry in value added (%)	24.8	27.7	29.7	33.6
Share of legally protected areas (%)	31.9	32.0	33.1	32.5

[a] PSR 2010 data.

Source: GUS data (Rocznik statystyczny województw 2002, 2013) and own calculations.

Materials and method

GUS statistics, characterising the different problems and properties of the Podlaskie Voivodeship against Poland in the analysed period, were the basic source of information for the paper. First of all, the compared indices concerned the years 2002 and 2012, and for selected data analyses covered their progress between the

aforementioned years. The research does not cover differences between groups of farms depending on, e.g., UAA, soil quality, economic size or type of farming. Moreover, it uses results of representative research by the Institute of Soil Science and Plant Cultivation – State Research Institute in Puławy (*Instytut Uprawy Nawożenia i Gleboznawstwa – Państwowy Instytut Badawczy, IUNG-PIB*) concerning assessment of natural conditions and changes in the organisation and intensity of agriculture, and also results of research conducted by the National Agrochemical Station (*Krajowa Stacja Chemiczno-Rolnicza, KSCHR*).

The basic data came from common agricultural censuses carried out in 2002 and 2010, and statistics of GUS for 2012. The scope of the presented analysis and level of its accuracy followed from availability of published statistics. In order to eliminate the volatility of some indices over time, the analysis covered averaged three-year data (2001-2003 and 2011-2013). Applying relative comparisons, data for the voivodeships were referred to relevant data for Poland. In addition, the researchers used analysis of the structure of selected properties and trend analysis of selected phenomenon.

Table 2

Agricultural acreage of the Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Total utilised agricultural area (thousand ha):	1,150	1,083	16,899	14,969
- including in good condition (thousand ha)	-	1,071	-	14,529
- share of UAA in good condition in total UAA (%)	-	98.8	-	97.1
- UAA in relatively good condition (%)	-	7.4	-	100
Structure of agricultural areas in good condition (%):				
- arable land	64.2	60.6	77.3	74.8
- orchards	0.4	0.5	1.6	2.5
- permanent grasslands	35.4	38.6	21.1	22.1
- other	0.0	0.3	0.0	0.6
Quality of the agricultural acreage according to IUNG-PIB (points):				
- overall index	55.0		66.6	
- quality and agricultural suitability of soils	41.0		49.5	
- agroclimate	7.5		9.9	
- relief	3.7		3.9	
- water relations	2.8		3.3	
Share of less-favoured areas (LFA) (%)	93.3		55.4	
Share of problem areas (% of gminas)	52		38	

Source: GUS data (Rocznik statystyczny rolnictwa 2003, 2013), papers by IUNG-PIB (Jadczyszyn J. 2009; Stuczyński T. et al. 2000, 2007).

Research results

Table 2 presents the basic elements characterising the agricultural acreage of the Podlaskie Voivodeship. It was marked by a higher share of utilised agricultural area (UAA) in the total area than country average amounting to 53.0%. In 2012, UAA in good condition (item introduced by GUS as of 2010 to the land use classification) accounted for as much as 98.8% of the total UAA and their relative share in the UAA of Poland amounted to 7.4%. The Voivodeship was characterised by a high share of permanent grasslands in the land use structure, which amounted to 38.6%, i.e. as much as by 16.5 percentage points higher than for Poland. It should be emphasised that the share of permanent grasslands against 2002 grew by 3.2%; in this case decisive was the impact of the growing stocking density (including cattle) per 100 ha of UAA (Table 8). But the share of arable lands decreased from 64.2% in 2002 to 60.6% in 2012.

Table 3

Factors of production and intensity of agriculture in the Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Total UAA (ha per capita^{-1})	0.95	0.90	0.44	0.39
Agricultural employees (persons per 100 ha^{-1} of UAA)	11.9	11.5	12.5	15.6
Value of gross fixed assets in agriculture and hunting (PLN per ha^{-1} of UAA)	5,901	7,758	6,554	8,740
Number of tractors (thousand units)	88	102[a]	1,365	1,444[a]
Number of tractors (units per 100 ha^{-1} of UAA)	7.7	9.5[a]	8.1	9.4[a]
Consumption of mineral fertilisers (kg per ha^{-1} of UAA)	81.5	97.7	93.8	130.4
Consumption of agricultural lime (kg of CaO per ha^{-1} of UAA)	57.9	12.4	92.5	41.0

[a] PSR 2010 data.

Source: GUS data (Rocznik statystyczny rolnictwa 2003, 2011, 2013; Środki... 2002-2014) and own calculations.

It should be noted that the research results of IUNG-PIB point to much worse natural conditions in the Voivodeship, assessed from the perspective of their suitability for agricultural production, than the country average (Table 2). This is evidenced by a fairly low index of valuation of agricultural acreage, measured in points (55.0 points), and its partial index characterising the quality and agricultural suitability of soils (41.0 points). This region is also marked by less favourable agroclimate and water relations, thereby making it less friendly to agricultural production. The large share of less-favoured areas (LFA), amounting to over 93% of UAA of the Voivodeship, also attests to unsuitable conditions for such production. Because of LFA in the region, the share of problem areas (selected on the basis of natural, anthropogenic and agrarian, and organisational

and spatial criteria that limit agricultural activity) is higher by 14 percentage points than the average share of such areas in Poland (Jadczyszyn J. 2009).

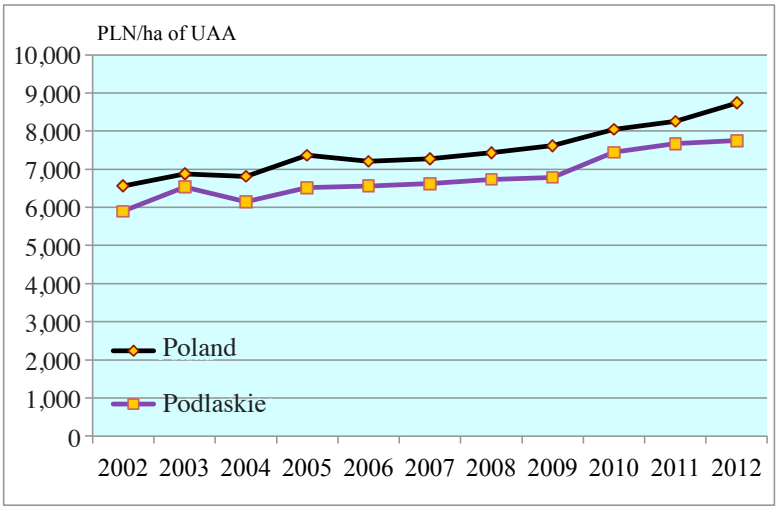

Fig. 1. Value of gross fixed assets in agriculture and hunting in the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013).

Table 3 presents the data on resources of the basic factors of production, i.e. land, labour and capital, and intensity of production as the level of consumption of mineral fertilisers in kg of NPK per ha of UAA. In 2014, the Podlaskie Voivodeship had a lower number of working people per 100 ha of UAA, and the utilised agricultural area per capita was over twice higher than the country average. This indicates a relatively low level of fragmentation of agricultural holdings and agrarian structure beneficial for development of agriculture. These interdependencies are also supported by the research of Kapusta (2014), who argues that along with an increase in the area of holdings, the labour resources per 100 ha of UAA dropped and labour productivity grew. According to Baer-Nawrocka and Poczta (2014), the data from the Agency for Restructuring and Modernisation of Agriculture provide reliable information on the land resources in good condition at farms of more than 1 ha of UAA. These resources, in the opinion of the authors, are the production potential of the Polish agriculture contained in the resources of agricultural land. Despite the fact that, in 2014, farms of the Podlaskie Voivodeship were characterised by lower, than the country average, value of gross fixed assets in agriculture and hunting, i.e. PLN 7,758 per ha of UAA (Table 3), they had a considerable capital in the form of tractors, machinery and buildings. Whereas according to Figure 1, both the Podlaskie Voivodeship and Poland were characterised by a similar growth dynamics of these values of assets in agriculture and hunting in the analysed decade (2002-2012). The level of provision with tractors is good. In line with the data from the National Agricultural

Census 2010 (*Powszechny Spis Rolny 2010*, *PSR*), the share of farms buying tractors after 2004, comparing to the total of farms pursuing agricultural production, was over two times higher in the Voivodeship than in the country, and the share of farms buying new tractors from all farms buying means of transport was 35%. Then 46% of the total of farms in the Podlaskie Voivodeship buying tractors after 2004 bought tractors of more than 60 kilowatts (kW), while the country average was 36%. In 2001-2012, Zając et al. (2014) observed a positive phenomenon of decreasing rate of supply of used tractors to the supply of new tractors. This index, amounting in 2002 to 156.9%, dropped in 2012 to 7.3%. After 2006 farmers most often bought tractors of 59-75 kW. This replacement of the machinery fleet of farms was largely possible due to the aid schemes of the Common Agricultural Policy of the EU used by farmers. Also according to Baer-Nawrocka and Poczta (2014), support to agriculture from the Common Agricultural Policy (CAP) contributed to modernisation of the production assets in agriculture. This support, as they claim, concerns mainly economically viable entities with considerable development potential (the measure "Modernisation of agricultural holdings" of RDP 2007-2013 benefited less than 1% of farms of up to 20 ha of UAA, while 14% of farms of more than 20 ha).

Table 4

Assessment of soil acidity in the Podlaskie Voivodeship against Poland in 2009-2012

Specification	Podlaskie	Poland
Share of the following soil pH (%):		
- strongly acid	23	16
- acid	35	28
- slightly acid	25	32
- neutral acid	13	16
- alkaline	4	8

Source: KSCHR data, according to GUS (Środki… 2013).

The consumption of mineral fertilisers in 2011-2013 in the Voivodeship was lower than the average for Poland. This trend continued in the Podlaskie Voivodeship throughout the analysed period (2002-2012), despite this the mineral fertilisation per pure component increased from ca. 80 kg of NPK per ha^{-1} of UAA in 2002 to ca. 100 kg of NPK per ha^{-1} of UAA in 2012 (Figure 2). For comparison, in the Dolnośląskie Voivodeship – characterised by intensive crop production – where in 2002 mineral fertilisation was at a similar level as in the Podlaskie Voivodeship, in 2004-2008 there was a strong growth in fertilisation up to ca. 170 kg of NPK per ha^{-1} of UAA, to reach, in 2012, a level higher than the average for Poland – ca. 150 kg of NPK per ha^{-1} of UAA. In the Dolnośląskie Voivodeship this was linked to a high share of wheat, maize, rapeseed and sugar beet in the cropping structure and, at the same time, very low stocking density per 100 ha of UAA.

The Podlaskie Voivodeship also noted a definitely lower consumption of agricultural lime than the total for Poland. This trend was evident throughout the analysed period (2002-2012). By 2005, lime fertilisation was within the limits of 60 kg of CaO per ha^{-1} of UAA, while after a sudden drop in 2006 it was only 10 kg of CaO per ha^{-1} of UAA, i.e. almost three times less than the country average (Figure 3). This phenomenon, in connection with a significant share (58%) of acid and strongly acid soils (Table 4) and a large share of soils (43%) where soil liming is essential and necessary (Table 5), is a condemnation of cultivation systems used by farmers.

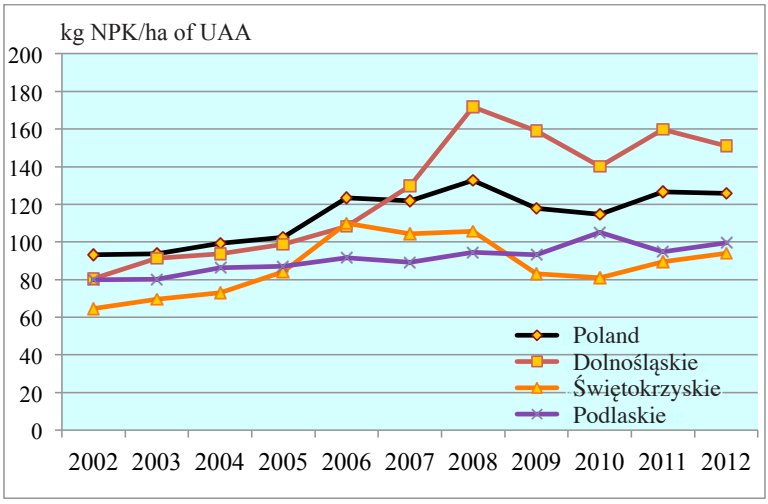

Fig. 2. Mineral fertilisation with NPK (pure component) in the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Środki… 2003-2013).

According to the IUNG-PIB research, the rather low level of mineral fertilisation per 100 ha of UAA and a high share of strongly acid and acid soils can largely limit the production potential of the region's agriculture. The higher than average for Poland share of soils with very low and low phosphorus and potassium content is another important limiting factor (Table 6).

The yields of cereals and conversion yields of the main crops measured in cereal units (cereal unit per ha^{-1}), which were produced by the farmers, show the level of using the agricultural acreage potential. In 2012, both cereal yield and conversion yield, in cereal units per ha^{-1}, were at a level definitely lower than the average values for the country (Table 7), except for the higher yield of rapeseed (in 2011-2013). Whereas the yield of meadow hay was above the average country level, this was linked to the dominating line of farms' specialisation in the region, i.e. dairy cattle rearing. This line of production forced the farmers to intensify production in permanent grasslands that constituted the basic forage area of farms dealing with milk production.

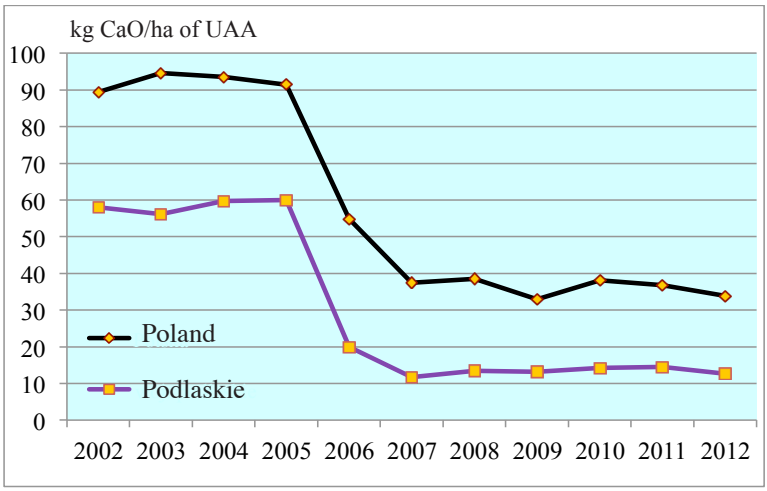

Fig. 3. Fertilisation with CaO (pure component) in the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Środki… 2003-2013).

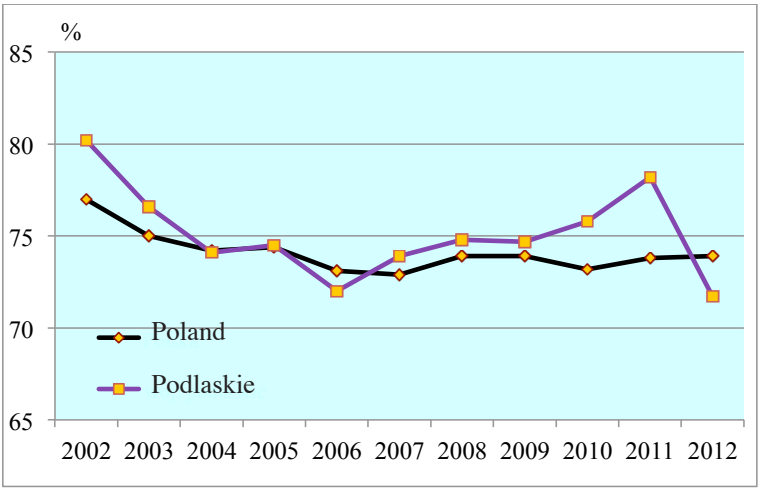

Fig. 4. Share of cereals in the cropping structure of the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013) and own calculations.

The cropping structure in the Voivodeship results from the natural conditions, organisational and economic conditions and a strong internal diversity of the region. In 2002-2012 (Figure 4), the share of cereals in the Podlaskie Voivodeship was similar as the total for Poland, but in the analysed period – because of developing livestock production – it dropped by 8.3% from the level of 80% in 2002 to a level slightly lower than the country average. In view of the soil and climatic conditions, cereal mixtures and oats are the most commonly cultivated

in the region (37.3%). Wheat – the basic marketable cereal – accounted for only 6.7% in the structure. The share of industrial plants, including rapeseed, was particularly low, which was definitely affected – apart from the soil quality – by increased risk of freezing which in the region is at the level of 20% (Kuś J. 2002). Given the dairy line of production of the vast part of commercial farms, there was a high share of fodder crops in the cropping structure in arable lands, including maize for green feed (14.2%). The change in the share of fodder crops in the cropping area in 2002-2012, which is clear in Figure 5, bears witness to the growth in the stocking density, especially of cattle. In 2012, the area of land set aside continued at a low level, which can be linked to the agriculture support system under the Common Agricultural System of the EU (direct payments) and wide use of UAA for fodder needs of farms. The changes in the share of fallow land in the Podlaskie Voivodeship against Poland in 2002-2012 attest to these mechanisms (Figure 6). Starting from 2003 there has been a rapid drop in the area of fallow lands. In 2007-2008, the share of fallow land in the Voivodeship, alike in Poland, reached a certain level of stability at ca. 1.6%; hence similar to that noted in 2012. According to Baer-Nawrocka and Poczta (2014), the increased share of land set aside and fallow land in the country in the period before Poland's accession to the EU was caused by the deteriorating economic situation of farms after transformation into market oriented economy.

Table 5

Soil liming needs in the Podlaskie Voivodeship in 2009-2012

Specification	Podlaskie (% of soils)
Essential	24
Necessary	19
Recommended	16
Limited	13
Unnecessary	28

Source: KSCHR data, according to GUS (Środki… 2013).

Table 6

Nutrient contents in the soil in the Podlaskie Voivodeship against Poland in 2009-2012

Specification	Podlaskie	Poland
Share of soils of very low and low content of (%):		
- phosphorus (P)	43	33
- potassium (K)	58	41
- magnesium (Mg)	23	30

Source: KSCHR data, according to GUS (Środki… 2013).

Table 7

Crop production in the Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Cropping area (thousand ha)	630	631	10,764	10,432
Cropping system (%):				
- cereals	80.2	71.7	77.1	73.8
including: wheat	8.9	6.7	22.4	19.9
cereal mixtures and oats	38.0	37.3	18.3	17.2
- potatoes	8.9	1.9	7.5	3.4
- industrial crops	1.5	1.4	7.0	9.1
including: rapeseed and agrimony	0.3	1.3	4.1	6.9
- fodder crops	8.3	24.3	5.2	10.8
including: maize for green feed	3.4	14.2	1.8	4.9
- other	1.1	0.6	3.2	2.9
Cultivation area of cereal mixtures (thousand ha)	184	190	1,365	1,278
Share of cultivation of cereal mixtures in the national area (%)	13.5	14.9	100	100
Cultivation area of maize for green feed (thousand ha)	22	90	196	508
Share of cultivation of maize for green feed in the national area (%)	11.2	17.7	100	100
Fallow land area (thousand ha)	99	19	2,302	440
Share of fallow land in UAA (%)	8.6	1.7	13.6	2.9
Average conversion yield (cereal unit per ha^{-1} of UAA)	24.1	30.8	31.8	37.0
Average cereal yield (tonnes per ha^{-1})	2.48	2.85	3.06	3.64
Average yield of meadow hay (tonnes per ha^{-1})	4.71	5.69	4.23	5.11
Average yield of potatoes (tonnes per ha^{-1})	17.7	20.1	17.8	22.7
Average yield of rapeseed (tonnes per ha^{-1})	2.0	2.9	2.1	2.6

Source: GUS data (Produkcja… 2002-2013; Rocznik statystyczny rolnictwa 2003, 2013; Użytkowanie… 2003, 2013) and own calculations.

The Podlaskie Voivodeship definitely stood out against the country as regards livestock production. This is evidenced by data in Table 8. A characteristic feature of the region against Poland in 2012 was higher stocking density in livestock units (LUs) per 1 ha of UAA (including cattle and dairy cows), and lower in pigs and poultry. The higher, than average for Poland, stocking density of cattle in the Voivodeship is typical throughout the 2002-2012 period (Figure 7). Since 2002, a slow growth in the stocking density of cattle has been noted – from 60 cows per 100 ha^{-1} of UAA to 85 cows per 100 ha^{-1} of UAA in 2012, but for Poland

the growth was less dynamic. Owing to specialisation, milk yield per cow was slightly higher than the average for Poland and production of slaughter cattle was lower by 111 kg per ha^{-1} of UAA. However, milk production per hectare of UAA reached a twice higher level (2,097 per l ha^{-1} of UAA). There is a considerable production concentration for dairy cattle, because in 2011 as much as 41.7% of dairy farms kept cow herds of more than 10 cows. In case of pigs, the production concentration level was definitely lower than the country average.

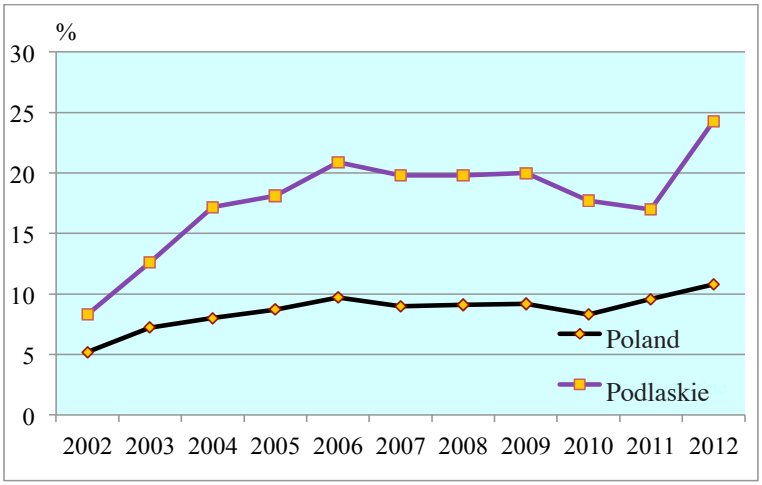

Fig. 5. Share of fodder crops in the cropping structure of the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013) and own calculations.

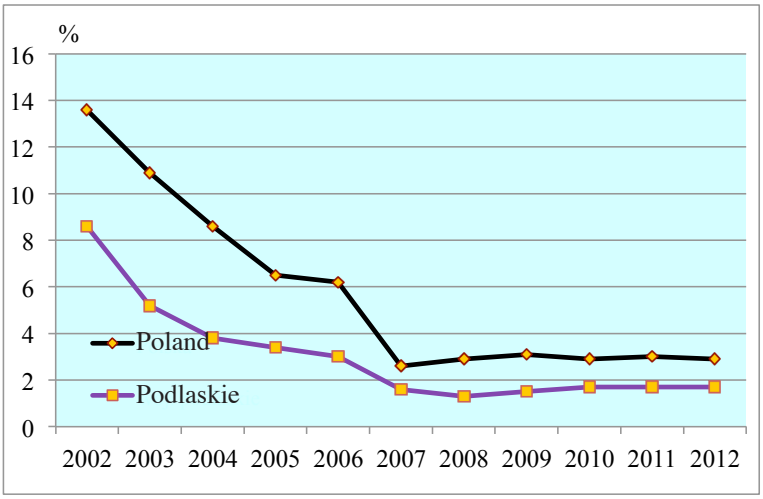

Fig. 6. Share of fallow land in UAA in the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013) and own calculations.

Considerable subordination of the crop production of farms to the needs of dairy cattle rearing is not translated into financial results in agriculture. In 2012, commercial production of the Voivodeship (in PLN per ha^{-1} of UAA) was lower than the country average (Table 9). But this specialisation is manifested in the structure of commercial production, where the share of livestock production amounted to as much as 89.3%, out of which 59.3% was the value of milk production. Also Roman (2014) points to the high growth in milk production in the Podlaskie Voivodeship in 2004-2012. According to her research, the index was the highest among all voivodeships and it amounted to 40.4%. The amount of purchased milk per 1 ha of UAA was in the region almost three times higher than the average in Poland. The share of live cattle in the structure of commercial production (8.5%) was high as well (higher by 3 percentage points than the country average). Whereas products of plant origin were considerably less important in the region. Their share was decidedly lower than the average for Poland. But this does not clearly mean that there are no commercial farms dealing with plant production in the analysed region.

The Podlaskie Voivodeship stands out as regards unfavourable natural conditions, measured by the index of valuation, but also as regards organisational and economic conditions exhibited by the average UAA per farm and their area structure (Table 10).

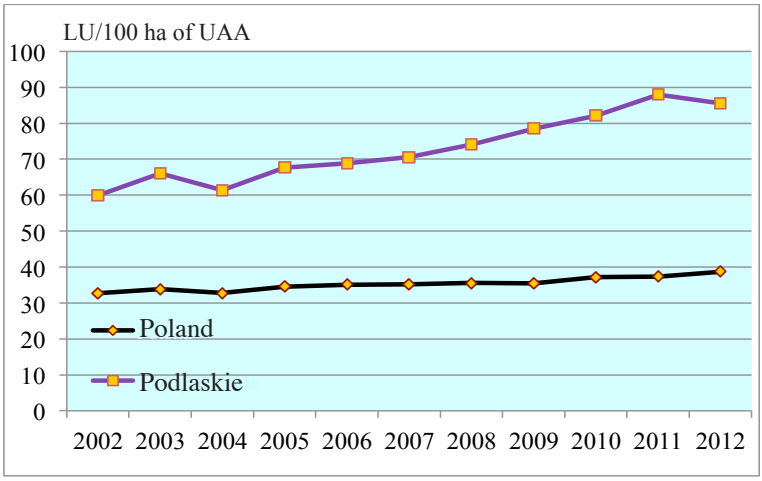

Fig. 7. Stocking density in the Podlaskie Voivodeship against Poland in 2002-2012
Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013).

Table 10 compares elements of the agrarian structure of the Voivodeship. What should be noted in particular is the average area of a farm (of more than 1 ha of UAA) which in the Podlaskie Voivodeship is greater than the country average. In 2012, the share of holdings with the area ranging from 1 to 2 ha was over twice lower in the region than in Poland, but farms of 10-50 ha of UAA, accounting for nearly 46%, dominated in the region. Also Baer-Nawrocka and

Poczta (2014) indicate a clear land concentration trend at farms of larger area. The share of farms of more than 50 ha of UAA, presented in Figure 8, attests to the fact that the growth dynamics of the share of the group of farms in 2002--2012 in case of the Podlaskie Voivodeship was greater than in the country.

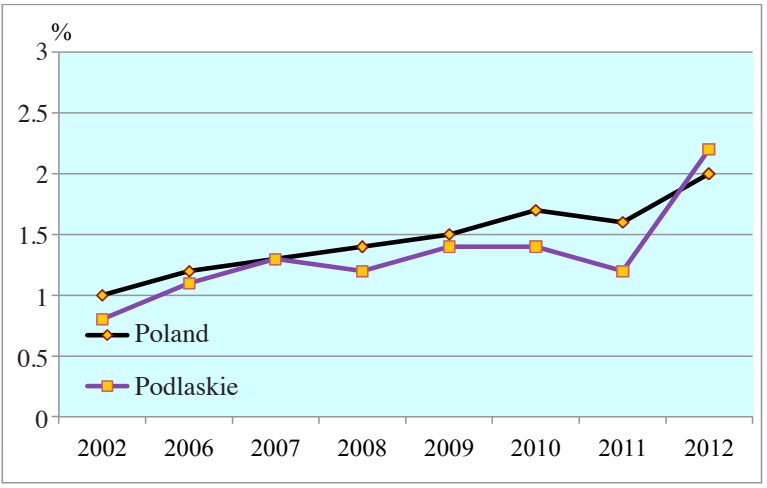

Fig. 8. Share of farms of > 50 ha of UAA in farms of > 1 ha of UAA in the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013) and own calculations.

Table 8

Livestock production in the Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Stocking density (physical units per 100 ha^{-1} of UAA):				
- cattle	59.9	85.6	32.7	38.6
including: cows	32.7	43.7	17.0	17.2
- pigs	80.2	34.2	110.2	77.4
- poultry	450	369	1,036	758
Stocking density (LU per ha^{-1} of UAA):	0.62	0.76	0.45	0.44
Milk yield (1 cow^{-1} per year^{-1})	3,580	4,914	3,902	4,845
Milk production (1 ha^{-1} of UAA)	1,165	2,097	682	822
Production of slaughter animals (kg per ha^{-1} of UAA)	221	242	259	353
Share of farms keeping more than 10 cows in the total number of dairy farms (%)	21.6	41.7[a]	6.3	20.1[a]
Share of farms keeping more than 50 pigs in the total number of pig farms (%)	5.9	6.0[a]	10.2	15.7[a]

[a] Refers to 2011.

Source: GUS data (Rocznik statystyczny rolnictwa 2003, 2013; Użytkowanie… 2003, 2013; Zwierzęta 2003, 2013) and own calculations.

Table 9

Commercial production of agriculture in the Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Total commercial production of agriculture (PLN per ha^{-1} of UAA)	1,992	4,429	2,136	5,008
Structure of commercial production of agriculture (%):				
- crop production	13.1	10.7	37.6	42.5
including: cereals	4.7	3.8	10.4	11.4
potatoes	2.6	1.9	3.5	4.3
industrial crops	1.8	0.7	5.9	5.4
vegetables	2.2	2.9	7.5	9.6
fruit	1.6	1.2	8.0	8.9
- livestock production	86.9	89.3	62.4	57.5
including: live cattle	6.0	8.5	4.1	5.5
live pigs	22.5	10.2	24.2	14.7
milk	45.6	59.3	17.9	19.0
Purchase of selected agricultural products:				
- cereals (kg per ha^{-1} of UAA)	120	128	417	566
- milk (1 ha^{-1} of UAA)	116	1,748	427	640
- slaughter animals (kg per ha^{-1} of UAA)	106	133	135	214

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013).

Table 10

Agrarian structure of the Podlaskie Voivodeship against Poland

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Number of farms of more than 1 ha of UAA (thousand)	100	80	1,956	1,456
Average area of farms (ha of UAA)	11.1	13.3	7.4	9.3
Share of farms from area groups in the number of farms of more than 1 ha of UAA (%):				
1-2 ha	13.3	8.2	26.4	19.7
2-5 ha	18.6	17.4	32.2	32.4
5-10 ha	24.6	26.3	21.8	24.0
10-50 ha	42.6	45.9	18.5	21.9
50 and more ha	0.8	2.2	1.0	2.0
Share of farms up to 10 ha in the number of farms of more than 1 ha of UAA (%)	56.5	51.9	80.4	76.1

Source: GUS data (Rocznik statystyczny rolnictwa 2003, 2013) and own calculations.

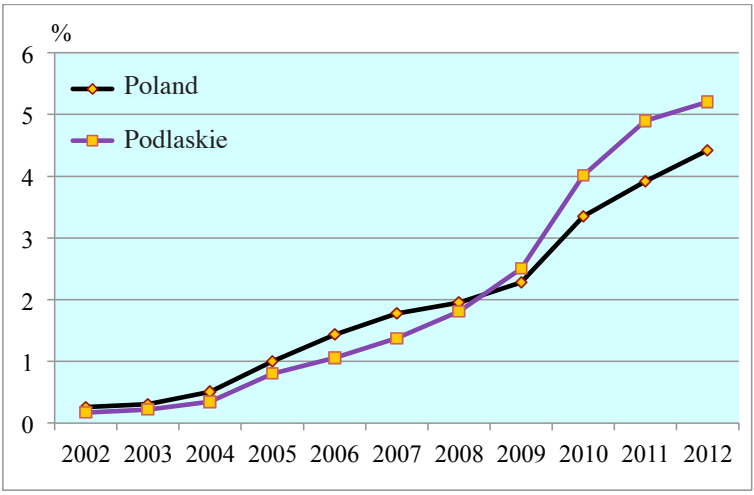

Fig. 9. Share of UAA in organic farms in the total UAA in the Podlaskie Voivodeship against Poland in 2002-2012

Source: GUS data (Rocznik statystyczny rolnictwa 2003-2013) and own calculations.

Table 11

Organic farms in the Podlaskie Voivodeship against Poland (2010)

Specification	Podlaskie		Poland	
	2002	2012	2002	2012
Number of organic farms	103	2,924	1,977	25,944
share in the country (%)	5.2	11.3	100	100
UAA per organic farm (ha)	2,012	56,367	43,828	661,688
share in the country (%)	4.6	8.5	100	100
Average area of an organic farm (ha per UAA)	19.53	19.28	22.17	25.50
UAA per organic farm holding a certificate (ha)	854	39,173	20,862	457,089
share in the country (%)	4.1	8.6	100	100

Source: GUS data (Rocznik statystyczny rolnictwa 2003, 2013) and own calculations.

Another specific feature of the Podlaskie Voivodeship in 2012 was high (11.3%) share of organic farms (Table 11). However, against the utilised agricultural area it was lower (8.5%), because the average area of an organic farm in the Voivodeship was lower than in the country – 19.28 ha of UAA. Although given the pursued line of production and obtained production results, these were farms of almost twice greater UAA than the average farms in the Voivodeship. The same production system is gaining in popularity in the Voivodeship, also at farms rearing dairy cattle, which is evidenced by Figure 9. In 2002, the share of UAA in organic farms in the total UAA in the Voivodeship was lower in the Podlaskie Voivodeship than in the country, but after a period of dynamic growth

in the analysed decade (in the Podlaskie Voivodeship especially starting from 2009) it increased by as much as 5 percentage points. The paper by Piwowar (2014) also supports the strong growth in the number of organic farms in Poland in 2004-2012, when – according to the author – the number of organic farms increased sevenfold and UAA used by them – eightfold. According to the author, the Podlaskie Voivodeship was characterised by the highest share of organic farms with UAA ranging from 10 to 20 ha of UAA (41.7%).

Conclusions

The presented analysis discusses the characteristics of agriculture in the Podlaskie Voivodeship against the average country results in 2002 and 2012, and in case of selected indices the analysis covered the trends observed. The presented comparisons in the analysed years showed that the use level of agricultural production potential in the Podlaskie Voivodeship is determined by natural conditions (index of valuation of agricultural acreage at the level of 55 points, share of LFA amounting to 93%), and organisational and economic conditions, such as: share of permanent grasslands in the land use structure amounting in 2012 to 39%, average size of a farm at the level of 13.3 ha of UAA, share of strongly acid and acid soils covering 58% of soils. What should be also noted are the positive changes, namely specialisation in livestock production in 2002-2012, in particular in dairy cattle rearing (share of livestock production in commercial production of agriculture amounting in 2012 to 89.3%, including 59.3% of milk share) and well-developed agri-food industry linked to the dominating line of production of farms in the region, which favours increased sales of processed products. The direction of the changes bears witness to good use of the difficult natural conditions of the territory significantly influencing the cropping structure. The presented analyses of research findings allow showing and explaining the cause and effect links typical of the region's agriculture. Therefore, they can be used as a basis to indicate prospective lines of actions in the area, which should, above all, include: improvement in the agrochemical status of soils (share of soils requiring liming amounts to over 59%; the share of soils of very low and low content of phosphorus (43%) and potassium (58%) is very high), improvement in the agricultural technology of plant cultivation (low consumption of industrial means of production), increase in the level of production intensification to an economically justified one (lower conversion yield than the country average – 30.8 cereal unit per ha^{-1} of UAA), further modernisation of the technical infrastructure of farms and speeding up activities aimed at improvement of the agrarian structure. It is also justified to support all types of initiatives and projects to implement the concept of sustainable development at different levels of management, and also changes lending a multifunctional character to agricultural areas, which allows adjustment of farms to the changing socio-economic conditions.

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key words: Podlaskie Voivodeship, production potential, agriculture, LFA, natural conditions, crop production, valuation of agricultural acreage, dairy cattle, commercial production, accession to the EU

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