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## **Changes in Polish agriculture in the period 2002-2010 in the light of Central Statistical Office census data**

**Abstract.** According to the latest National Agricultural Census 2010, in comparison with the previous one of 2002, the number of farms decreased by almost one fourth but is still very big, which results from a large number of small farms. For this reason, more than half of land resources belong to small and medium-sized farms. This translates into the efficiency of land, labour and capital in agriculture. It has impact on the competitiveness of our agriculture, because large and very large farms are more competitive in terms of bargaining power on the agri-food market. In the period between censuses, the number of people working in agriculture increased, which is a consequence of the difficult situation on the labour market, especially in rural areas. The excessive labour resources in agriculture hamper the change of farm size structure. Advantageous changes obtained during this period are the improvement of agricultural equipment of farms and an increase in the scale of production of each of the products produced on farms, which undoubtedly improves the competitiveness of our farms.

**Key words:** agriculture, production resources in agriculture, farm production scale, competitiveness of farms

### **Introduction**

Changes that took place in Polish agriculture in the years before as well as after the accession to the European Union led to substantial changes in this sector of the economy. The introduction of the Common Agricultural Policy softened the negative effects of the unequal pace of changes in the prices of agricultural products and of the means of agricultural production. There was an increase in farmer income and an increase in the percentage of farms capable of competing with farms in other European Union countries [Józwiak, Mirkowska 2011]. Despite advantageous changes in our agriculture as well as in the agriculture of other countries that joined the European Union, the differences between the situation in agriculture and rural areas of particular member states will not disappear. Quite the contrary, the competitiveness capability of countries with strong farms will be rising, and the competitiveness capability of countries with small farms will be decreasing [Michna 2011]. Thus, countries with fragmented agriculture must strive to create strong farms able to sustain the production potential and to develop farms.

The article aims to present the changes that took place in Polish agriculture in the period 2002-2010 based on the outcomes of the National Agricultural Censuses conducted by the Central Statistical Office in 2002 and 2010.

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## Production resources

### Land resources

Production resources in agriculture are the factors of production utilised in production processes on farms, i.e. land, labour and capital. A land resource is the quantity of land utilised for agriculture, thus it is the acreage of agricultural land for good agriculture. The labour resource is the number of people able to work in agriculture. And capital refers to tangible assets used as farm equipment and working assets used in the production processes. Production resources in agriculture are located in particular farms and the efficiency of land as well as labour and capital depends mainly on the size of a farm. In a particular state's agriculture as a whole, the efficiency of resource management depends mainly on the farm size structure.

A problem with the farm size structure occurs in agriculture when the share of small farms in the total number of farms is too high, they do not generate income sufficient for a farmer and his family to make a living, and when a small farm whose main income source is outside agriculture concentrates too many land resources that are not efficiently utilised and it hampers the growth of market-oriented farms [Zegar 2009]. Undoubtedly, such a situation occurs in Polish agriculture. Although the number of farms is continually decreasing, there are still too many farms. And small farms are prevailing.

According to the latest National Agricultural Census 2010, the total number of farms was 2,278 thousand. In comparison with the former census in 2002, the number of farms decreased by 656 thousand, i.e. by 22.4%. The biggest decrease was observed in the number of the smallest farms covering the area of up to 1 ha and from 1 to 5 ha of agricultural land (AL), where the number of farms decreased by 26.8% and 24.8% respectively. The number of farms covering 5-10 and 10-20 ha of AL decreased by 17.6% and 16.1% respectively (Table 1). The number of farms covering 20-50 ha of AL rose slightly (by 0.8%) while the number of large farms covering the area of 50 ha and more increased considerably (by 34.4%). This is undoubtedly an advantageous change in the number of farms in particular size groups, especially in the context of improving resource management efficiency and farm competitiveness.

Table 1. Number of farms with respect to agricultural land acreage in 2002 and 2010 [thousands]

Year	Total	Size of the agricultural land area [ha]					
		up to 1	1-5	5-10	10-20	20-50	above 50
2002	2 933	977	1 147	427	267	96	20
2010	2 278	715	863	352	224	97	27

Source: [Raport z wyników... 2011].

However, the number of farms in our agriculture is still big and even very big in comparison with other EU countries, which results from the large number of small farms. In 2010, the number of farms involved in agricultural activities in Poland (1,891 thousand farms)<sup>2</sup> constituted 12.5% of the total number of farms involved in agricultural activities in

<sup>2</sup> The existence of farms that are not involved in agricultural activities, i.e. inactive ones, is the curiosity of Polish agriculture. They are most often small farms covering up to 1 ha of AL.

the EU countries. There were more farms than in Poland only in Romania and Italy (31.9% and 13.5% respectively). In other EU countries, there were definitely fewer farms (Fig. 1).

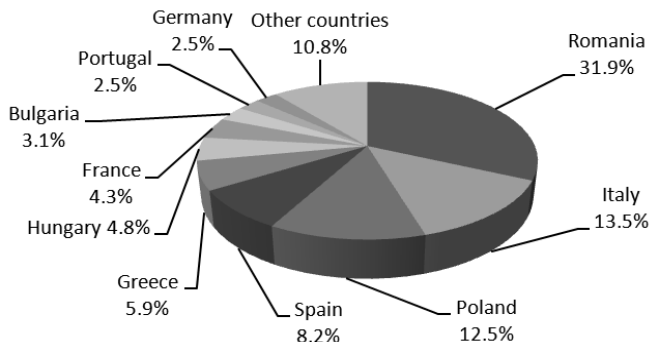


Figure 1. Share of the number of farms in particular countries in the total number of farms in the EU in 2010  
Source: [Poczta et al... 2013].

Having many small farms in Poland translates into the structure of farm size. In 2010, the smallest farms covering up to 5 ha of AL constituted 70% of all the farms, and farms covering more than 20 ha – only a little more than 5% (Fig. 2). Because of that, over 15% of land resources in our agriculture belong to small farms covering up to 5 ha (Fig. 3). In the EU countries where the structure of farm size is the most advantageous – Denmark, Ireland and Germany – the share of the smallest farms does not exceed 10% and these farms possess not more than 1% of agricultural land in a given country. At the same time, large farms in these countries, covering more than 50 ha of AL, use more than half of land resources in a given country (80.3%, 50.9% and 76.8% respectively). The countries where large farms use most land resources are Slovakia, the Czech Republic and Great Britain – about 90% of land resources in those countries [Poczta et al. 2013]. In Poland, large farms covering more than 50 ha of AL use less than 30% of agricultural land acreage.

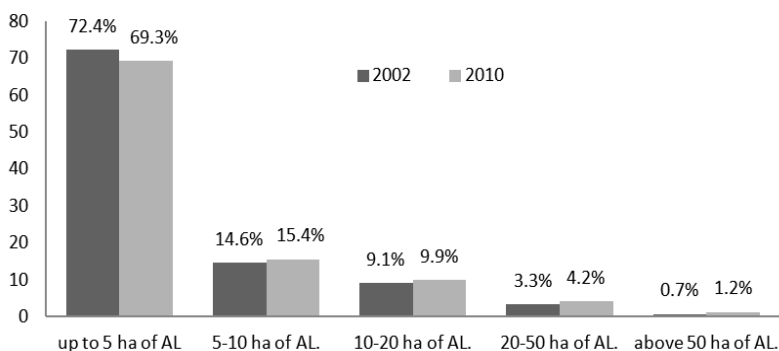


Figure 2. Farm structure with regard to the acreage of agricultural land in 2002 and 2010  
Source: [Raport z wyników... 2011].

As farm size structure results in the percentage of land resources owned by small, medium sized and big farms, more than half of the land resources in our country (51.8%)

within the total acreage of agricultural land (15,503 thousand ha) are owned by small and medium sized farms (up to 20 ha of AL). This translates into the efficiency of land, labour and capital resources management in agriculture. It has impact on the competitiveness of our agriculture because large and very large farms are more competitive with regard to their bargaining power on the agro-food market. Vegetable farms, orchards and highly specialised poultry and pig farms are an exception. The research shows that farms covering more than 20 ha of AL are competitive and capable of sustaining their production potential and developing [Dzun 2011]. That is why the development and improvement of the competitiveness of Polish agriculture depends on changes to the structure of farm size.

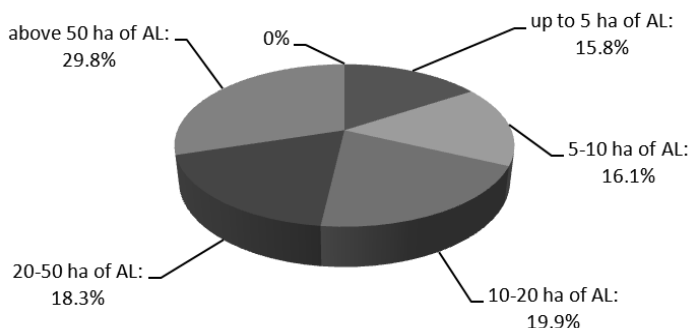


Figure 3. Structure of agricultural land acreage owned by farms with different size in 2010

Source: [Użytkowanie gruntów... 2011].

The census data show that the structure of farm size and the structure of agricultural land owned by farms of different size are changing. As a result, the average acreage of agricultural land per farm in 2010 increased by over 1 ha, i.e. 18% and was 6.82 ha of AL in comparison with 5.76 ha of AL in 2002. However, in comparison with other EU countries, an average farm in Poland is one of the smallest. For example, the acreage of agricultural land per farm in the Czech Republic was 152.4 ha, in Slovakia 77.5 ha, in Great Britain 70.8 ha, in Denmark 59.7 ha, in Germany 55.8 ha and in France 53.9 ha. In such countries as the Czech Republic, Slovakia, Lithuania, Latvia, Estonia or Hungary before the political transformation, state-owned farms and agricultural cooperatives used agricultural land. As a result of changes in the political system, de-collectivisation processes and privatisation, new ownership structures developed in agriculture. In the Czech Republic and Slovakia large area farms were maintained to some extent, but the owners or users changed [Poczta et al. 2013]. That is why the average land resource size of a farm in these countries is bigger.

In Western European countries, the development of industry was the driving force behind the change of the farm size structure in agriculture. Its fast development created work places and was the reason for the outflow of workforce from agriculture. The shrinking workforce was replaced by technical measures [Staňko 1991]. The introduction of more and more modern and expensive technical measures is generally possible in farms that are bigger in size and that is why there was a fast growth in the number of large and very large farms in those countries. The changes took place very quickly because appropriate agricultural policy supported them. It included subsidising investment in

enlargement, provision of equipment and modernisation of farms. In Poland, despite the economic development and outflow of labour force from agriculture to other sectors of the economy and the support of agricultural development<sup>3</sup>, there are still big labour resources in agriculture. This means there is much farming fragmentation and that a big percentage of the population is living from agriculture.

## Labour resources

For centuries, the size of farms in each country has determined the manpower resources located in agriculture. According to the National Agricultural Census in 2010, 4,537 thousand people were worked in Polish agriculture, including 4,495 thousand on farms owned by individual farmers and 42 thousand in holdings of legal persons and organisational units without legal personality. In comparison with the former census of 2002, the number of people working in our agriculture increased by 179 thousand people, i.e. 4% (Table 2), although the number of farms in that period decreased (Table 1). Due to that, the number of farmers – farm users and their spouses – decreased. The number of people employed on farms, i.e. permanent employees, did not change (88 thousand in 2002 and 2010). However, the number of other family members contributing labour to their family farms rose from 981 thousand in 2002 to 1,517 thousand in 2010, i.e. by 55%. It results from the situation on the labour market, namely a high level of unemployment, especially in rural areas.

Table 2. Number of people working on farms in 2002 and 2010 [thousands]

Year	Total	Farms owned by individual farmers				Farms owned by juridical persons
		users	spouses	other family members	permanent employees	
2002	4358	2165	1114	981	42	46
2010	4537	1854	1078	1517	46	42

Source: [Raport z wyników... 2011].

In 2010, the employment rate in rural areas was three times lower than in the urban areas – out of 1000 inhabitants of rural areas it accounted for 100 workers, while in the urban areas, 303 workers [Obszary wiejskie... 2013]. The situation in the labour market has been clearly reflected in both the structure of the population working only or mainly on family-owned farms as well as in the structure of the population contributing any work to farms during a year.

The census data show that the biggest group of all the people working in agriculture were farm users and their family members working only on their farm – 2,847.2 thousand (64%). People working mainly on their own farms and additionally somewhere else constituted a relatively small group – only 134.2 thousand (3%). And people working mainly outside their farms but constituted their farms' collectivity accounted for 1,468.2

<sup>3</sup> Historical conditions and a substantially different political and economic situation, including a lack of comparable financial possibilities of supporting the development of agriculture in Poland, created different conditions for the development of agriculture in our country in comparison with Western European countries.

thousand (33%) [Pracujący... 2012]. Thus, most people working in our fragmented agriculture work only on their farms. This translates into poor utilisation of labour resources that are located in this part of the economy.

In 2010, about 46% of farmers and their family members working on family-owned farms worked not longer than 530 hours per year. This means that almost a half of family labour force worked for less than a quarter of full-time (2,120 hours of work per year). Only about one fifth of the people working in agriculture worked full-time and more [Pracujący... 2012]. Thus, the census data clearly depict the size of excessive labour resources in our agriculture. The consequences of that situation include the inhibition of the transformation of the area structure of farms in the direction of enlarging farms and the further development of agriculture, which in the era of strengthening processes of globalisation and international trade liberalisation becomes particularly important.

## **Capital resources**

Capital resources in agriculture are tangible and working assets used in the production processes. Tangible assets constitute farms equipped with buildings, machinery and other facilities. Working assets are materials that are processed in the course of production. The National Agricultural Censuses gather information about means of production used on farms involved in agricultural activities. The information refers to the number of basic means of transport and machines used in the production processes as well as the use of fertilizers and pesticides.

The 2002-2010 changes in the farm size structure, technical progress, economic conditions for agricultural production and the process of farm modernisation connected with the accession of Poland to the European Union, including the support for our agriculture within the Common Agricultural Policy, had impact on the amount of tangible assets that farms are equipped with.

In 2010, more than half of the farms involved in agricultural activities were equipped with tractors (53.7%). In comparison with 2002, the number of tractor rose by 9.5% (Table 3). The increase in the number of tractors was observed on small, medium sized and big farms, however, the biggest growth was noticed on the farms covering the area above 20 ha of AL (by 24.3%), especially those covering the area of 50-100 ha of AL (by 52.2%), followed by farms covering the area of up to 5 ha of AL (by 11.7%), despite a substantial decrease in the number of small farms in the period (by ca. 25%).

In the period between the two censuses, there was a considerable growth in the number of combine harvesters (by 23.6%), round balers (by 34.7%) and soil cultivation aggregates (by 82%). Soil cultivation aggregates, as multi-function machines, allow for efficient combination of agricultural operations and a reduction of vehicle mileage. On the other hand, the downward trend in the acreage of sugar beet and potato cultivation and a decrease in the number of farms growing them caused a reduction of beet and potato harvesters (by 14.2% and 1.7% respectively). At the same time, a considerable growth in the acreage of orchards caused a clear increase in the number of sprayers for orchards (by 14.0%). In addition, there was an increase in the number of field sprayers (by 5.1%), broadcast spreaders of fertilizers and lime (by 7.0%) and grapple loaders (by 16.0%). Thus, the compared data of 2002 and 2010 clearly show the increase in agricultural equipment

possessed by farms, which to a large extent reflects the effects of the EU countries' policy in the field of agriculture modernisation.

Table 3. Selected types of equipment owned by farms involved in agricultural activities in 2002 and 2010

Equipment	2002	2010	2002=100%
Tractors	1 338 720	1 466 334	109.5
Combine harvesters	123 119	152 140	123.6
Potato harvesters	81 288	79 885	98.3
Beet harvesters	32 449	27 829	85.8
Round balers	147 147	198 239	134.7
Soil cultivation aggregates	283 647	767 587	270.6
Broadcast spreaders of fertilizers and lime	537 925	575 452	107.0
Grapple loaders	208 556	241 948	116.0
Collecting trailers	95 752	96 298	100.6
Trail sprayers for fields	471 688	495 742	105.1
Trail sprayers for orchards	45 464	51 836	114.0

Source: [Środki produkcji... 2011].

In 2010, for the first time ever, the National Agricultural Census gathered information about the amount of mineral fertilizers (nitrogen, phosphates, potassium and compound fertilizers), agricultural lime and organic fertilizers of animal source. The obtained data show that 72.9% of farms used mineral fertilizers, lime and organic fertilizers. The most popular mineral fertilizers were nitrogen and compound fertilizers. Respectively, 83.0% and 53.0% of farms using fertilizers used them. Organic fertilizers were used by 64% of those farms. The share of farms using phosphorites, potassium and agricultural lime in the total number of farms using fertilizers was much lower and constituted about 12-13%.

The level of fertilizer usage in Poland in general meets the environmental requirements and is lower than the average in the EU countries [Zegar et al. 2013]. But the level of agricultural lime usage in our country is dramatically low and contributes to the rise of acidity and the growth of the share of acidic or very acidic soil in the total soil acreage. This share exceeds 50% [Krasowicz 2009], which is why half of the area requires liming. Excessive soil acidity worsens its productivity.

The census results in the field of pesticide usage show that in 2010 over half of the farms involved in agricultural activities used them (58.4%). Herbicides were commonly used. Most farms also used insecticides, fungicides and seed protection.

## Farm production scale

Undoubtedly, Polish agriculture is characterized by excessively fragmented farm area structure and the structure of agricultural land in the hands of individual farm area groups, and these limits include the scale of production of individual products, i.e. the size of the production of various products produced on farms [Manteuffel 1984]. In the era of globalisation and liberalisation of international trade in food products and resources, market powers inevitably lead to increased competitiveness, which exacts an increase in farm

competitiveness. That is why it is difficult to match a fragmented structure of farms with the requirements of competitiveness, because competition exacts an increase in the scale of production [Zegar 2009].

As the census data show, with the extension of farm size and an increase in the number of large farms and a decrease in the number of small ones, the scale of production of particular products on farms is also growing. At the same time, the number of farms involved in a given production is falling, i.e. a concentration of production on a large scale on a smaller number of farms is taking place. In the case of products for which the demand remains at more or less the same level, the total scale of production, i.e. acreage of the given crop or head of the given livestock, is decreasing because larger scale production is in general more efficient.

In plant production in 2010 in comparison with 2002, there was a decrease in the total acreage of sown land by 3.1%, and an increase in an average acreage of sown land from 5.36 ha to 7.2 ha, i.e. by 1.84 ha, or by 34.3% [Uprawy rolne... 2011]. The decrease occurred in the acreage of all basic crops except seed corn, rapeseed and agrimony. The acreage of rapeseed and agrimony cultivation increased by 115% due to growing demand in the biofuel sector for seed as raw material for the production of esters – bio-components added to diesel fuel [Rosiak 2014]. There was an increase in the average acreage of all agricultural crop cultivation.

In comparison with 2002, in 2010 there was also a substantial increase in the acreage of orchards – by 38.1%, but the number of orchard farms decreased by 10.2%. As a result, the average orchard area increased from 0.86 ha to 1.31 ha, i.e. by 0.45 ha, or by 52%. The average area of fruit tree plantations increased from 0.79 ha to 1.35 ha, i.e. by 0.56 ha, or by 71% [Uprawy ogrodnicze... 2012]. The share of fruit tree plantations in the total acreage of orchards is dominating (71.3%). The rest of the area is covered in fruit shrubs (24.3%) and tree and shrub nurseries (4.4%). Their average acreage also increased.

As far as the animal production in 2010 is concerned, in comparison with 2002, the total head of cattle increased by 4.3%, which resulted from the increase in the head of beef cattle because after the accession of Poland to the EU, the price of beef cattle fit for slaughter and their production profitability rose. The head of milk cattle decreased by 7.5% in the same period. At the same time, the total number of cattle farms decreased, which resulted in a substantial increase in the average head of cattle per farm – by 43.6% [Zwierzęta gospodarskie... 2011]. Milk production during this period remained at a similar level, which is the result of increased productivity production on a larger scale.

Big fluctuation of pig production profitability in the examined period made many pig farmers give up this production or reduce its size. In consequence, the number of head of pigs fell by 18% and the average head of pigs per farm rose by 46%. The situation in poultry husbandry was similar: the total head of poultry decreased (by over 10%) with the simultaneous increase in concentration of production of particular species.

## **Conclusions**

The development and improvement of the competitiveness of Polish agriculture are connected with the change in farm size structure. According to the results of the National Agricultural Census 2010, in comparison with the previous one of 2002, the total number of farms decreased by nearly one fourth. The biggest decrease was observed in the number of



the smallest farms while the number of large farms covering more than 50 ha of AL increased substantially. It is undoubtedly an advantageous change. However, the number of farms in our agriculture is still too big in comparison with other European Union countries, which results from a large number of small farms. For this reason, more than half of land resources belong to small and medium-sized farms. This translates into the efficiency of land, labour and capital in agriculture. It has impact on the competitiveness of our agriculture, because large and very large farms are more competitive in terms of bargaining power on the agricultural-food market. An inhibitory factor to changes in the structure of farms in our country is an excess of labour resources in the agricultural sector. In the period between censuses, the number of people working in agriculture rose, which is a consequence of the difficult situation on the labour market, especially in rural areas. Advantageous changes obtained during this period is improvement in the agricultural equipment of farms and an increase in the scale of production of each of the products produced on farms, which undoubtedly improves the competitiveness of our farms.

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