



INSTITUTE OF AGRICULTURAL  
AND FOOD ECONOMICS  
NATIONAL RESEARCH INSTITUTE

***Socio-economic  
characteristics  
of highly commercial  
family farms  
(changes in 2000-2005)***

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***Bożena Karwat-Woźniak***



THE ECONOMIC AND SOCIAL CONDITIONS  
OF THE DEVELOPMENT OF THE POLISH FOOD  
ECONOMY FOLLOWING POLAND'S ACCESSION  
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*Highly commercial farms in peasant farming*

The aim of the study was to determine and assess changes in socio-economic  
characteristics of highly commercial farms under conditions of increasing  
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## Introduction

One effect of changes in agriculture under conditions of increasing competition has been a growing polarisation trend, particularly reflected in economic activity of agricultural holdings. On the one hand, there has been a rapid rise in the number of entities<sup>1</sup> only used for subsistence or semi-subsistence production of agricultural products. As a result, in 2005 market inactive units nearly accounted for half of the total number of family farms [18]. On the other hand, coping with competition in the free market involves efforts to increase the concentration of production, in order to obtain a strong position in the agricultural market and fair income from work on the family farm<sup>2</sup>. Farming is increasingly seen as a full-time occupation [19], which is reflected in the formation of highly commercial family farms, capable of coping with competitive pressure in international agricultural markets [8].

The production potential and growth prospects of a farm are determined by a number of very diverse factors including not only tangible production assets or the location relative to outlets and the supply market, but also not easily quantifiable aspects such as personal traits of individuals engaged in a given undertaking, particularly of the managers and decision-makers (qualifications, management and marketing skills, risk taking, perceptiveness, quick decision making etc.) [24]. Furthermore, especially in the case of a private agricultural holding, the family situation of the farmer should also be taken in consideration. Irrespective of the development of main functions of the farm and changes in farming priorities, the relation between the family and the farm has never been completely broken as the fundamental rules such as the form of taking over the holding or the nature of employment have remained unchanged [16].

A family farm may only play a prominent role in economic activity of members of the farming family when it provides, among other things, a level of income ensuring acceptable living conditions. It means that the size and structure of its production potential must generate output providing fair income, i.e. the level of income ensuring appropriate living conditions and farm development. The threshold of socially acceptable income is not a constant value, it tends to rise as the level of the country's economic development

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<sup>1</sup> In the paper, the terms “farms”, “entities” and “units” are used interchangeably.

<sup>2</sup> Despite certain conceptual differences, throughout the paper the terms “family farms”, “private farms” and “peasant farms” are used interchangeably.

increases, due to greater expectations with regard to living standards which may also vary between regions.

The capability to obtain fair income and to maintain a strong market position under growing competitive pressure usually involves a gradual increase in the scale of production and improving farming efficiency. Basically, it requires continuing and comprehensive changes in the production potential of agricultural holdings, even in the case of those producing on a sufficiently large scale, namely highly commercial units. Such developments are reflected both in economic and production parameters of those entities and in changes in the socio-demographic structure of the population concerned.

The paper is aimed to describe changes in the features of agricultural holdings of more than 1.00 ha of agricultural land as well as in the characteristics of the population in question. Furthermore, the analysis only covered the groups whose agricultural income was at least comparable to average earnings from non-agricultural activities. The level of commercial production specified above was at least twice as high as sales per market-oriented farm in the surveyed group. Family farms satisfying this criterion were defined as highly commercial units [4,8].

Highly commercial entities were selected from a group of agricultural holdings constituting a fixed sample for IAFE-NRI surveys. Each time, it accounted for approx. 1/500 of the total number of private farms, and included all holdings located in the 76 surveyed villages. The villages were specially selected to represent different regions of Poland, whereas the area of the surveyed units reflected the actual area structure of all family farms, both at the national and macroregional level [14]. It should be also emphasised that in family farming, which prevails in Polish agriculture, the size of a holding remains closely related to the level of production assets [21], characteristics of farmers and members of farming families, as well as to the priorities of agricultural activities. Therefore, it may be presumed that the surveyed group reflects actual socio-economic structures of Polish agriculture.

The total number of surveyed holdings was 3,927 in 2000 and 3,705 in 2005.

Such completed questionnaires provide very detailed and diverse information on family farms, and particularly on their area and technical equipment, the scale of production, market and investment activity as well as on financing sources. They also contain data on demographic characteristics, the educational level and working life of farm managers and of their family members.



A relatively large sample, a wide range of information collected as well as the application of the same survey method for the continuity and comparability of data enabled comprehensive analyses of long-term developments in family farming. Furthermore, on account of the panel character of the survey, it was possible to determine trends and rates of observed changes. Representative sampling with regard to the size of family farms allowed reliable description of the processes in question.

The empirical data used in the analysis each time concerned the relevant marketing year or year-end figures. These were 1999/2000 and 2004/2005, in the paper referred to as the years 2000 and 2005 respectively. It should be also emphasised that information concerning investment activity and area changes covered events between particular surveys, i.e. the four-year period of 1996-2000 and the five-year period of 2000-2005.

As it has already been mentioned, the holdings selected from the whole surveyed sample included units whose commercial production provided agricultural income per full-time worker at least at the level of average earnings from non-agricultural activities. The number of such farms was as follows: 436 (11.1% of the surveyed holdings) in 2000, and 446 (i.e. 12.0% of the whole sample) in 2005. Therefore, in the five-year period of 2000-2005 the number of highly commercial farms was relatively stable. At the same time, it should be added that at an early stage of transition in Poland, i.e. in 1992, highly commercial entities accounted for 6.4% of the total number of the surveyed family farms.

The paper was aimed to analyse the effects of integration of Poland's economy and agriculture into the European Union structures on economic and production performance of highly commercial farms, as well as on socio-demographic characteristics of the population concerned, particularly farm managers and members of farming families mainly engaged in agricultural activities.

## **1. The economic characteristics of highly commercial farms**

### **1.1. The size and area structure of highly commercial farms**

One important determinant of the economic potential of a farm is the area of cultivated land as it represents a major factor affecting various economic and production relations in agricultural holdings [9]. Even though at present

technological development of production processes in agriculture and widely available know-how reduced the importance of the area of agricultural land and its effect on the production and economic performance of individual farms [23], whereas agricultural land is increasingly becoming the environment and space of agricultural production rather than merely a production factor [25], in Polish agriculture the farm size continues to largely determine not only the scale [13] and commercial character of production [11], but also agricultural income [26]. Furthermore, attaining a reasonable concentration of agricultural land is desirable for economic as well as environmental reasons [12]. In environmental terms, both too large and too small holdings may prove dysfunctional.

**Table 1. Highly commercial farms by size**

Year	Size group (ha of agricultural land)						
	1-5	5-10	10-15	15-20	20-30	30-50	50 or more
	Figures in a row add up to 100						
2000	10.0	13.8	18.3	14.9	22.7	13.9	6.4
2005	4.7	11.4	11.0	18.4	24.2	19.1	11.2

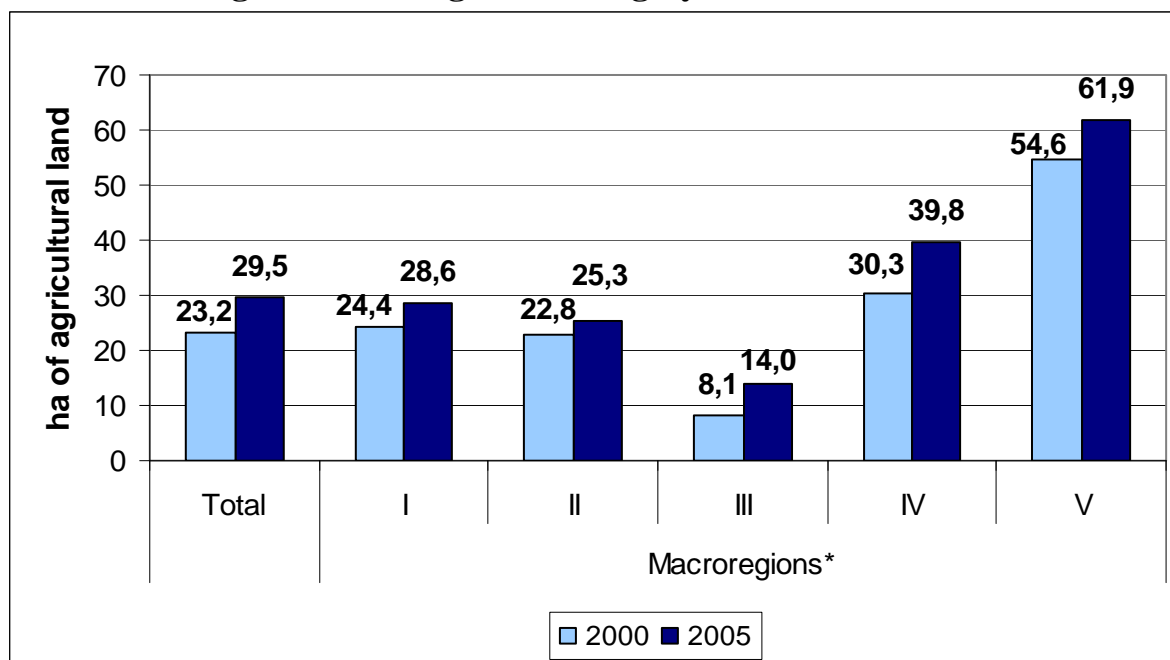
*Source: 2000 and 2005 IAFE-NRI surveys.*

According to the IAFE-NRI surveys, highly commercial family farms significantly varied in the area of agricultural land<sup>3</sup>. Although the group included entities considerably different in size, relatively large holdings accounted for a major share in each survey. In 2000-2005, there was another increase in the proportion of relatively large units. In the period in question, the share of highly commercial farms of 20 ha of agricultural land or more went up from slightly over 43% to 55%. As regards the largest holdings, i.e. those of 50 ha of agricultural land or more, such changes were even faster. In 2005, over 11% of highly commercial farms had 50 ha of agricultural land or more, whereas in 2000 the respective proportion only slightly exceeded 6%. At the same time, there were fewer farms of up to 15 ha of agricultural land among highly commercial units. In the period in question, the share of this size class in the group of highly commercial holdings dropped from 42% to 27%. The most dramatic fall was observed with regard to the smallest entities, i.e. those of up to 5 ha of agricultural land, whose share decreased by half between 2000 and 2005 (from 10% to 5%). At the same time, it should be emphasised that the downward trend was particularly strong in the five-year period in question as in 1992-2000

<sup>3</sup> The size of the smallest surveyed unit classified as a highly commercial farm was 1.02 ha of agricultural land, whereas that of the largest – 498.2 ha of agricultural land.

the corresponding share went down from 13% to 10%, which was mostly observed in the four-year period of 1992-1996.

**Figure 1. Average size of highly commercial farms**



\* *Macroregions: I – Central-Western (the Kujawsko-Pomorskie and Wielkopolskie voivodships); II – Central-Eastern (the Łódzkie, Mazowieckie, Lubelskie and Podlaskie voivodships); III – South-Eastern (the Świętokrzyskie, Małopolskie, Podkarpackie and Śląskie voivodships); IV – South-Western (the Opolskie, Lubuskie and Dolnośląskie voivodships); V – Northern (the Zachodniopomorskie, Pomorskie and Warmińsko-Mazurskie voivodships).*

*Source: 2000 and 2005 IAFE-NRI surveys.*

The above-mentioned processes brought about a rise in the average size of highly commercial entities (Figure 1). Between 2000 and 2005, the area of agricultural land per highly commercial farm went up from 23.2 to 29.5 ha, i.e. by 27%. It was a relatively sharp increase as in 1996-2000 the average size of highly commercial holdings grew from 20.8 to 23.2 ha of agricultural land, i.e. by a mere 12%.

As a result of increased concentration of agricultural land in the group of highly commercial farms after 2000, the gap between the size of highly commercial units and that of other market-oriented holdings significantly widened. In 2000, the area of agricultural land per highly commercial farm was 2.5 times higher than the respective figure for all units selling agricultural products, whereas it was nearly three times higher in 2005.

More rapid land concentration observed in the group of highly commercial farms in 2000-2005 was reflected both in a growing number of

farmers expanding their farms and in the area of agricultural land involved. In the period in question, each year an average of almost 9% of highly commercial units increased the area of cultivated land, by an average of 10.9 ha. Between 1992 and 2000, a rise in the size was found in an average of ca. 7% of highly commercial farms annually, by an average of 8.1 ha of agricultural land. It should be also stressed that it was extremely rare for highly commercial entities to reduce their size, and only by a limited area. In 2000-2005, as in previous periods, such changes were observed in a mere 2% of highly commercial units a year, mostly on account of events such as inheritance and family property distribution, the discontinuation of unfavourable leases or the optimisation of land configuration. It should be also noted that in highly commercial units a reduced size was increasingly related to an active approach to land configuration, and less frequently resulted from reasons beyond the farmers' control<sup>4</sup>.

According to the analyses conducted, private transactions continued to play the most important role in increasing the size of highly commercial farms. In 2000-2005, contracts between natural persons (farmers) accounted for more than 85% of all transactions aimed to increase farm size in this group of holdings. Private transactions represented approx. 73% of the total area increase, of which 39% was leased, ca. 26% was purchased, whereas a mere 8% was transferred between family members.

**Table 2. Sources and forms of area increases in highly commercial farms**

Period	Percentage share of land:				
	purchased from		leased from		transferred between family members
	natural persons	legal persons	natural persons	legal persons	
Figures in a row add up to 100					
1996-2000	25.6	26.4	30.9	11.9	5.2
2000-2005	25.6	14.7	39.1	12.8	7.8

*Source: 2000 and 2005 IAFE-NRI surveys.*

It was definitely less frequent for farmers from highly commercial units to transact with legal persons. Such contracts only accounted for 15% of all transactions aimed at farm enlargement, but they concerned 27% of agricultural land transferred with a view to increasing the size of highly commercial farms.

<sup>4</sup> According to the surveys, in 2000-2005 approx. 33% of reductions in the size of highly commercial farms were of incidental nature but only concerned 12% of total reductions, whereas in the four-year period of 1992-1996 the respective indicators were 65% and 49%.

According to the surveys, even though market transactions remained the predominant form of acquiring agricultural land for increasing the size of highly commercial entities, certain changes were observed with regard to the source of land (Table 2). In 1996-2000, approx. 52% of the total area of land increases was purchased, whereas in 2000-2005 the respective share was ca. 12 percentage points lower, slightly exceeding 40%. It mostly resulted from reduced sales of land by the Agricultural Property Agency as the area of land for agricultural use in the Stock of the State Treasury showed a decrease [17]. In the period in question, the share of agricultural land purchased by users of highly commercial farms from the State Treasury Stock dropped from 26% to 15%.

As regards leased land, it gained in importance in the expansion of highly commercial entities. In 1996-2000, less than 43% of total area increases represented leased land, but in 2000-2005 this proportion approximated 52%. It stemmed from a marked rise in the area of leases between neighbours (from 31% to 39%), whereas the area of land leased from the Agricultural Property Agency remained virtually unchanged, at approx. 12-13%.

The process of land concentration in highly commercial farms was rather widespread, although varying in intensity between macroregions. Regional differences in such developments concerning the area structure of highly commercial entities have been observed for years, but certain changes were noted after 2000. Those were mostly reflected in rapid concentration of land in highly commercial holdings in regions which had witnessed relatively limited intensity of such processes between 1992 and 2000, particularly in the South-Eastern macroregion. In this macroregion, in 2000-2005 the area of agricultural land per highly commercial farm increased from 8.1 to 14.0 ha, i.e. by 73%, whereas the corresponding rate for the period of 1992-2000 was a mere 13%. This process almost exclusively concerned private property.

The increased concentration of land in highly commercial located in the South-Eastern macroregion should be attributed to specific features of agriculture in this part of Poland. In comparison with other areas, this macroregion is characterised by significant land fragmentation and a widespread pattern of part-time farming (combining farm work with non-agricultural employment) mostly engaged in subsistence production. Poland's accession to the European Union encouraged such farmers to reduce farm size or even to discontinue farming and wind up the holdings. It stemmed not only from increasingly difficult market requirements, but also from more job opportunities outside agriculture, with prospects for relatively stable income. The land of such agricultural holdings was taken over, mainly under contracts of lease, by economically viable farms, i.e. highly commercial units. For this group of entities

the maintaining of a competitive position in the market involved increasing the scale of agricultural activities, which stimulated growth in the area under crops. Furthermore, it should be added that in the five-year period in question it was the only macroregion where the share of highly commercial holdings in family farming showed a decline (from 8% to 7%). The group of farms which lost their competitive position between 2000 and 2005 mainly included small units (1 to 3 ha of agricultural land) which had been unable to increase farm size, whereas further growth in agricultural production involved greater area of cultivated land rather than more intensive production.

In 2000-2005, the most significant slowdown of land concentration in the group of highly commercial farms was observed in regions traditionally characterised by considerable concentration of agricultural land, namely in the Northern macroregion, where the average size of a highly commercial farm went up from 54.6 to 61.9 ha of agricultural land, i.e. by 13%. It should be also added that in this macroregion the rate of land concentration in highly commercial units was nearly one-fifth of the figure recorded in 1996-2000 when the area of agricultural land per highly commercial holding rose from 33.7 to 54.6 ha, i.e. by 62%. It resulted in reduced regional differences in the size of highly commercial farms. In 1992, the ratio of the largest and the smallest average highly commercial farm (in the Northern and South-Eastern macroregions respectively) was 4:1, over the following eight years it increased to 7:1 in 2000, but in 2005 the corresponding ratio was only 5:1, thus approximating the figure noted thirteen years before. Reduced differences stemmed from limited opportunities to increase the farm size in the Northern macroregion through the purchase of land from the Agricultural Property Agency, the main source of new land. The Stock of the State Treasury accounted for more than 80% of growth in the area of agricultural land in highly commercial units in the Northern macroregion.

In 2000-2005, the slowest land concentration in highly commercial entities was noted in the Central-Eastern macroregion. In the period in question, the average size of such holdings only went up from 22.8 to 25.3 ha of agricultural land, i.e. less than 11%. It was ca. one-third of the rate recorded in 1996-2000 when the area of agricultural land per highly commercial farm increased from 17.5 to 22.8 ha, i.e. by 30%.

The slowdown in land concentration in highly commercial holdings located in the Central-Eastern macroregion observed between 2000 and 2005 should be attributed to the downward trend of winding-up of local family

farms<sup>5</sup>. For years, agricultural land from units reducing or discontinuing agricultural production had been the main source of new land for economically strong, even if relatively few highly commercial units. In the five-year period of 2000-2005, as in previous years, peasant land accounted for approx. 75% of the increase in the area of agricultural land in this group of entities.

## **1.2. Equipment of highly commercial farm with selected technical production assets**

Farm buildings, tractors and machinery represent a major component of the production potential and fixed assets of agricultural holdings. The possession of modern machinery and technical equipment enables the application of advanced technologies which not only reduce the inconvenience of agricultural work, but also increase labour productivity as well as the scale and quality of production. Furthermore, technical equipment of farms determines efficient use of other production factors, which further contributes to improving overall farming efficiency. Therefore, it should be recognised that under conditions of growing competition the level of equipment with technical production assets increasingly affects the market position and income from farm work. It was confirmed by changes observed in the scale and quality of technical equipment of highly commercial units.

### **1.2.1. Tractors and agricultural machinery**

In the period in question, as a result of relatively significant investment in tractors<sup>6</sup>, in the group of highly commercial farms there was a rise in the share of entities with more than one tractor (from 65% to 73%). Therefore, the number of tractors per 100 highly commercial holdings showed an increase (from 188 in 2000 to 214 after five years, i.e. nearly by 14%).

The improved tractive force in highly commercial farms was a widespread development, although there were rather rare cases of a reduction in the number of tractors owned. Between 2000 and 2005, it could only be observed in highly commercial units of 5 to 10 ha of agricultural land. In this group, the number of

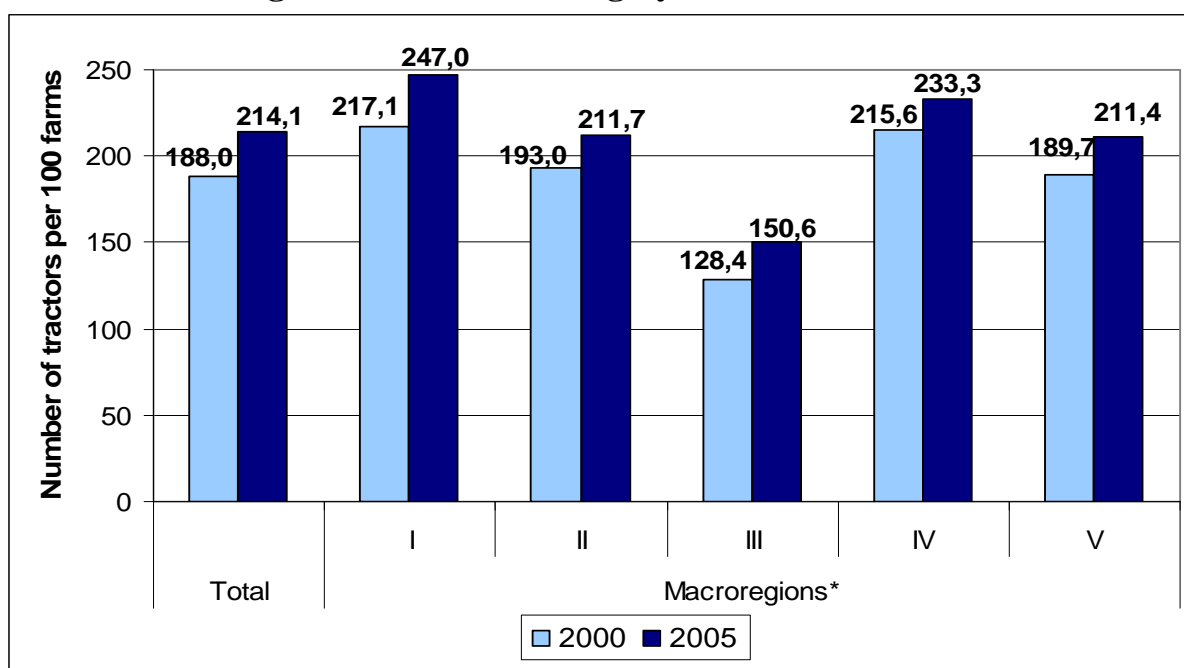
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<sup>5</sup> According to the surveys, in the Central-Eastern macroregion there were 1.9% fewer farms every year in the period of 2000-2005, whereas in 1996-2000 the corresponding annual rate was 2.8%.

<sup>6</sup> In 2000-2005, more than 21% of users of highly commercial farms purchased at least one tractor.

tractors per 100 holdings fell by approx. 4%. As regards other size groups, highly commercial entities increased their possession of tractors, with the most robust growth observed in holdings of 1 to 5 ha of agricultural land. In this size group, the average number of tractors in highly commercial farms went up by 19%. At the same time, the least significant growth in the number of tractors was found in highly commercial units of 20 to 30 ha of agricultural land. In this case, the number of tractors per 100 highly commercial farms rose by 2%.

**Figure 2. Tractors in highly commercial farms**



\* *Macroregions and the voivodships covered as in Figure 1.*

*Source: 2000 and 2005 IAFE-NRI surveys.*

As regards the regional breakdown, in 2005 in all the macroregions the number of tractors per 100 highly commercial units markedly exceeded the corresponding figure noted five years before, and the growth rate ranged from approx. 8% (in the South-Western macroregion) to more than 17% (in the South-Eastern macroregion). It should be pointed out, however, that tractive force in the group of agricultural holdings in question continued to vary significantly between regions. In 2005, as in previous years, the highest number of tractors was found in highly commercial entities in the Central-Western macroregion (247 per 100 farms). At the same time, the lowest number of tractors was recorded in highly commercial units located in the South-Eastern macroregion (fewer than 151 per 100 farms).

Investment in tractors mostly involved the purchase of new and relatively powerful machinery. As a result, every tenth tractor in the whole group of highly



commercial farms had a horsepower of 110 HP or more, and was up to four years old. It should be also emphasised that purchases of tractors observed in highly commercial farms in 2000-2005 were related to rather intensive land concentration in this group of holdings. Consequently, between 2000 and 2005 agricultural land per tractor increased from 12.3 to 13.8 ha, i.e. by 12%, which reflected increasingly efficient use of production factors.

In the analysed five-year period, 56% of highly commercial farms purchased machinery, with an average of 2.4 items. Presumably, it was not only relatively significant investment, but also markedly greater than in 1996-2000. It was reflected, among other things, in the difference in the number of items of machinery purchased in each of the periods in question. If we would compare the two periods in terms of the average number of machines purchased by farmers from highly commercial holdings investing in agricultural machinery and equipment, the figure was nearly 85% higher in 2000-2005 than in 1996-2000 when the statistical highly commercial unit purchased an average of 1.3 items of machinery. At the same time, it should be added that in both periods in question the number of farms investing in mechanisation was practically the same.

It should be also pointed out that new machinery accounted for at least three-fourths of technical equipment purchased after 2000. It contributed to an improvement in the structure by service life. In the whole surveyed group of highly commercial holdings, the share of machinery of up to 10 years of operation increased from 29% to 39%.

Farmers from highly commercial units were mostly interested in modern and highly efficient machinery. Decisions to invest in machinery and equipment were primarily aimed at comprehensive mechanisation of farm work. For instance, in the period in question there was an increase in the share of highly commercial holdings with the following types of machinery: harvesters (from 52% to 60%), machine units (from 30% to 48%) and sprinklers (from 1% to 4%).

Due to the variety of machinery necessary to produce specific agricultural raw materials, it is difficult to assess the degree of farm mechanisation on the basis of one composite measure. In order to enable comparability and to take account of mechanisation comprehensiveness, the group of highly commercial entities were broken down into three categories, on the basis of the number and type of machines owned.

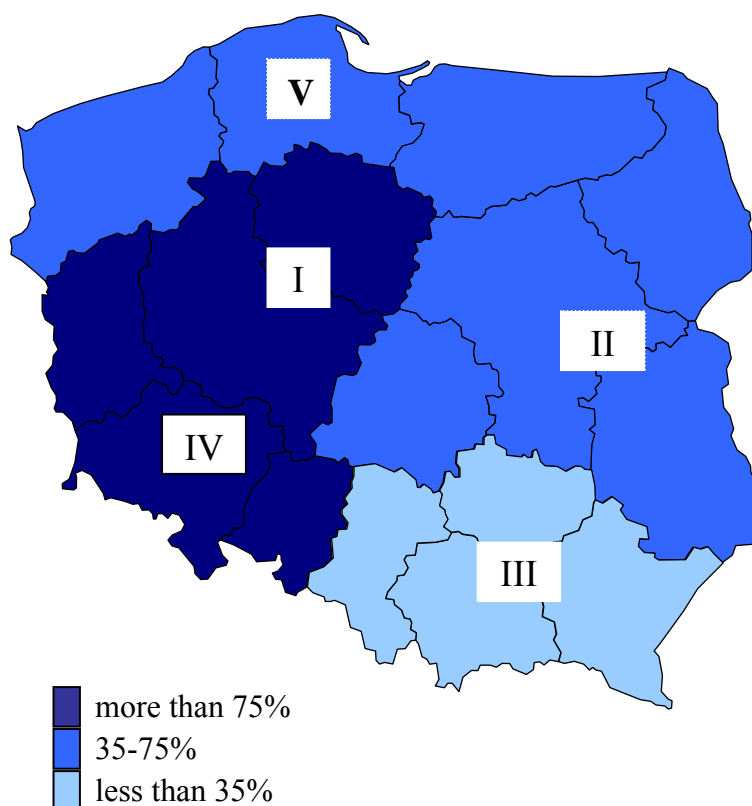
Machinery for crop production was divided into four groups depending on the function: **I – vehicles** (self-loading trailers, delivery vans and lorries); **II – machinery for fertilising and plant protection** (manure loaders and spreaders,

mineral fertiliser and lime distributors, tractor sprayers); **III – machinery for cultivation** (grain drills, single-seed drills, potato and seedling planters); **IV – machinery for harvesting** (combine harvesters for: cereals, potatoes, beet etc., chaff-cutters and forage harvesters, pick-up balers and trailers, bale wrappers, threshers, binders, rotary mowers, sickle bar mowers, potato spinners and elevator diggers, potato sorters, root toppers and diggers).

The category of farms considered to be **well** equipped with machinery included units with a total of more than 10 machines from each of the above-mentioned groups. **Average** equipment was regarded as a total of 5 to 10 machines from at least three machinery groups, whereas the mechanisation of farms with up to 4 items of machinery from two groups was defined as **poor**.

According to data on the possession of agricultural machinery, the years 2000-2005 witnessed significant improvement in the mechanisation of crop production in highly commercial holdings. In the period in question, the share of well-equipped highly commercial entities went up from 22% to 59%, i.e. more than 2.5 times.

**Map 1. Regional distribution of well-equipped highly commercial farms**



\* *Macroregions and the voivodships covered as in Figure 1.*  
*Source: 2000 and 2005 IAFE-NRI surveys.*

In general, highly commercial farms rather significantly improved the degree of mechanisation of crop production. This is also confirmed by an analysis of the mechanisation of the whole process of producing specific crops. Between 2000 and 2005, the share of highly commercial units with a set of machinery ensuring full mechanisation of the technological process showed an increase in the following types of production:

- potatoes: from 35% to 72%;
- sugar beet: from 53% to 75%;
- hay and silage: from 64% to 82%;
- cereals, grain maize and rape: from 62% to 64%.

In 2000-2005, the improvement in technical equipment of highly commercial farms was a widespread development, although it varied between regions. The most significant advancement was observed in the south and west of Poland. Particularly sharp, more than fourfold growth (from 18% to 76%) in the share of well-equipped highly commercial holdings was found in the South-Western macroregion. Such considerable improvement should be attributed to relatively significant availability of rather inexpensive agricultural machinery, used but in good working order, imported from Poland's western neighbouring countries on a large scale. As a consequence, in 2005 highly commercial farms in the South-Western macroregion ranked among those with the highest level of technical equipment for the production process in Poland. Nevertheless, well-equipped highly commercial units continued to concentrate in the Central-Western macroregion, with a 83% share in 2005.

It is worth emphasising that in the five-year period of 2000-2005 the South-Eastern macroregion saw an exceptional rise in the share of well-equipped highly commercial farms, significantly above the national average (from 9% to 27%, a threefold increase). However, in 2005, as five years before, the macroregion was still characterised by the lowest proportion of well-equipped highly commercial units. As regards the rest of Poland, the growth in the share of well-mechanised highly commercial entities was slightly below the national average. Between 2000 and 2005, the share of such holdings went up from 18% to 41% in the Northern macroregion, and from 26% to 56% in the Central-Western macroregion.

### **1.2.2. The stock and quality of farm buildings in highly commercial entities**

The comparison of farm buildings owned by highly commercial units in 2000 and 2005 demonstrated a reduction in the stock. It should be interpreted as

adjustment of farm buildings to production activities and technologies applied by specific farms. As a result, there was a decrease in the share of highly commercial farms owning the following: livestock buildings – from 95% to 85%, barns – from 90% to 81%, tunnels and greenhouses – from 26% to 22%. At the same time, the number of entities with garages and sheds remained unchanged as in both 2000 and 2005 such buildings were found in more than 85% of highly commercial farms.

Another important factor to be taken into account in an analysis of changes in the stock of farm buildings in highly commercial entities is their suitability for specific agricultural activities and current output. As it has already been emphasised, the years 2000-2005 witnessed significant adjustment efforts in this respect. In the period in question, such measures were undertaken by an average of nearly 12% of highly commercial farms annually. However, only some highly commercial units managed to attain this goal. In 2005, only slightly above 55% of highly commercial entities had the stock of farm buildings fully adapted to their needs, a higher share than five years before when the corresponding figure was approx. 51%.

**Table 3. Adaptation of farm buildings to production needs of highly commercial entities**

Type of farm buildings	Percentage share of highly commercial farms			
	in 2000		in 2005	
	with the stock of buildings as compared to the needs			
	insufficient	excessive	insufficient	excessive
- livestock buildings	21.8	16.8	34.7	6.3
- barns	11.6	9.6	16.1	2.2
- garages and sheds	17.7	1.3	16.8	2.6
- specialised buildings	25.0	3.3	12.0	-

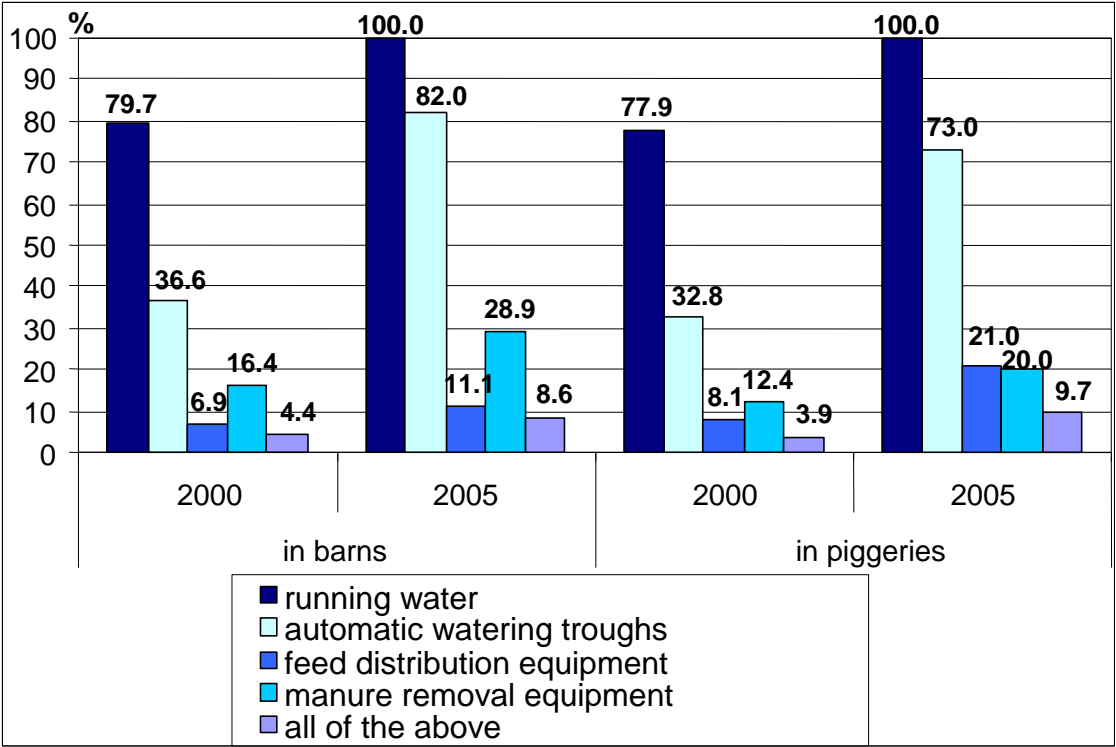
*Source: 2000 and 2005 IAFE-NRI surveys.*

The shortcomings of the stock of farm buildings depended on the type of buildings owned (Table 3). As regards livestock buildings, not only was the difference between actual stock and current needs the largest, but also the gap even slightly widened. In 2000-2005, the share of holdings reporting unsuitability of livestock buildings for the type or scale of animal production increased from 39% to 41%. With regard to other farm buildings, the proportion of farms declaring stock insufficient for agricultural activities was not only markedly lower than in the case of livestock buildings, but even

showed a certain downward trend. Between 2000 and 2005, the share of farms with inadequate stock fell from 21% to approx. 18% in the case of barns, and from 28% to 12% for specialised buildings. At the same time, insufficient stock of garages and sheds continued to be indicated by 19% of highly commercial farms.

Furthermore, due to relatively high investment activity with regard to the stock of farm buildings, the technical condition of farm buildings and structure also showed a marked improvement. According to the surveyed farmers, the technical condition of buildings used in agricultural activities in 2005 was evaluated as good in 75%, whereas it was assessed as poor in a mere 2% of units. In 2000 the respective proportions were 66% and 3%.

**Figure 3. Equipment of farm buildings in highly commercial entities with machinery for animal production\***



\* 100 = all farms with commercial animal production corresponding to the type of buildings owned.

The modernity of the stock of farm buildings is mostly reflected in their technical equipment ensuring mechanisation. Between 2000 and 2005, highly commercial holdings showed relatively significant improvement in terms of machinery and equipment for animal production. Nevertheless, the application of more advanced technological solutions continues to be found in a rather limited group of entities. One example may be the share of farms using feed

distribution equipment in barns and piggeries (the surveyed entities were mainly engaged in the production of milk, pigs and cattle for slaughter). In 2000-2005, the proportion of farms with such equipment increased from 7% to 11% in the case of barns, and from 8% to 21% with regard to piggeries. At the same time, the share of highly commercial units using manure removal equipment in barns went up from 16% to 29%, whereas in the case of piggeries it rose from 12% to 20%.

The watering of animals was relatively well mechanised in 2000. But only in 2005 all the surveyed farms met a basic requirement for modern production equipment, i.e. running water in livestock buildings. Five years before, the share of such entities was 80% in the case of barns and 78% for piggeries. At the same time, there was a sharp growth in the number of automatic watering troughs. As a result, in 2005 such equipment was found in 82% of barns and 73% of piggeries. The corresponding figures for 2000 were 37% and 33% respectively.

The most comprehensive mechanisation characterised the process of milk production. In 2005, in the group of highly commercial farms all milk producers had milking machines as well as equipment for proper milk cooling and storage<sup>7</sup>. Such technical solutions were slightly less frequent in 2000. Although by then all milk suppliers used milking machines, only 85% had equipment for full mechanisation of milking, cooling and storage.

The effectiveness of technical equipment increases with the number of mechanised production stages. Any shortcomings in this respect significantly reduce productivity and economic efficiency of solutions applied. Therefore, investment in the stock of farm buildings in highly commercial entities was largely focused on improving the technical equipment of livestock buildings, particularly in terms of comprehensive mechanisation of production<sup>8</sup>. In the five-year period of 2000-2005, approx. 20% of highly commercial holdings invested in solutions aimed to improve the standard of equipment in livestock buildings. In 75% of those such projects were oriented towards increasing the comprehensiveness of mechanisation of animal production. However, despite relatively significant efforts in this respect, such equipment was still rather rare in the surveyed group of farms. In 2005, fully mechanised animal production systems were found in 9% of barns and 10% of piggeries. They were significantly more frequent than five years before as in 2000 the proportion of comprehensively mechanised barns and piggeries was approx. 4% each.

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<sup>7</sup> Within this group, 4% of farms had milking parlours, and 68% used milk coolers and tanks.

<sup>8</sup> In the case of barns in dairy farms, it also concerned milking, milk cooling and storage.

Presumably, the degree of animal production mechanisation in the surveyed group of highly commercial holdings will show buoyant growth since in the period of 2005-2010 25% of highly commercial entities engaged in cattle or pig farming planned investment in technical equipment of livestock buildings. The attainment of such goals would result in a rise in the number of fully mechanised barns and piggeries by approx. 140% and 19%, respectively, between 2005 and 2010. Consequently, full mechanisation of animal production process would concern ca. 24% of barns and 12% of piggeries.

### **1.3. Market activity of highly commercial farms**

Highly commercial farms are characterised by extremely high market activity and formal market relations. The group is distinguished not only by large-scale commercial production, but also by significant adaptability to ever increasing market requirements while actively shaping market needs [3, 22]. Satisfying the demand for agricultural products mostly involves adjusting the product range as well as improving production quality and competitiveness. In order to achieve those goals, highly commercial farms need stable market relations, and the production profile should be largely simplified and specialised [9]. This was also reflected in the survey and confirmed in analyses.

#### **1.3.1. The simplification of the production profiles of highly commercial farms**

Under market conditions, the competitive position of a farm may be strengthened through the reduction of the product range offered. According to the analyses conducted, such situations mostly concerned highly commercial units. Broken down by type of sold agricultural products<sup>9</sup>, an average of three out of the thirteen types of products were sold by a highly commercial unit. The simplification of the product range was also reflected in an increasing share of holdings specialising in either crop or animal production. In the period in question, in the group of highly commercial entities the share of farms selling exclusively crop production went up from 24% to 25%, whereas the corresponding figure for animal production rose from less than 10% to 28%.

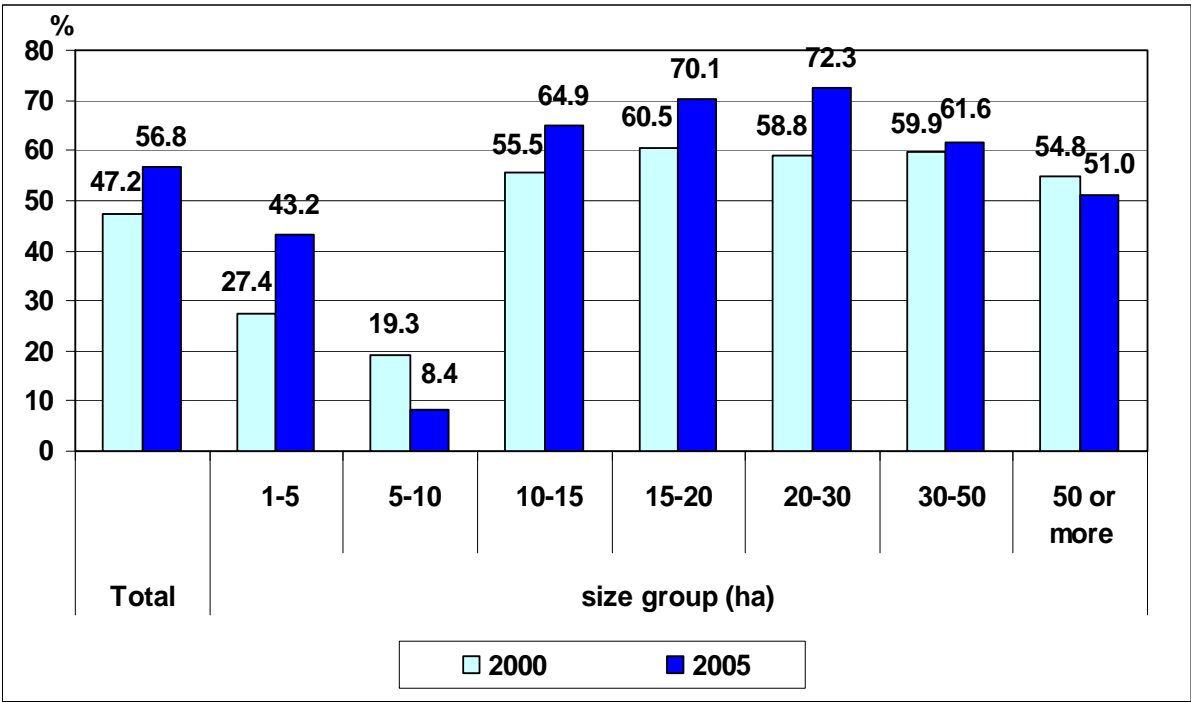
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<sup>9</sup> Products sold by farms were divided into the following groups: cereals, potatoes, industrial crops, seed crops, field vegetables, fruit, mushrooms, crops grown under protection, horses, pigs, cattle and milk, poultry for slaughter and eggs, sheep for slaughter and wool, other (apiculture products, fur-bearing animals, herbs, goats, ostriches etc.).

Farmers' efforts to simplify the product range of highly commercial units mostly resulted in a fall in the share of producers selling specific types of agricultural raw materials. Between 2000 and 2005, the group of highly commercial entities experienced a decline in the proportion of units engaged in commercial production of the following: potatoes (from 41% to 18%), vegetables (from 31% to 22%), industrial crops (from 45% to 37%), cattle for slaughter and milk (from 64% to 57%), fattening pigs (from 58% to 49%), fruit (from 21% to 16%). The share of farms offering greenhouse and seed products, horses, poultry and other products (herbs, fur-bearing animals, goats and ostriches) remained practically unchanged, at approx. 2% each.

The reduction in the number of commercial products by highly commercial farms was a widespread trend, observed regardless of farm size or location.

**Figure 4. Changes in the share of sold animal production in total market output by highly commercial farms**



Source: 2000 and 2005 IAFE-NRI surveys.

The processes observed in market activity of highly commercial farms between 2000 and 2005 also concerned changes in the structure of sales. In general, those were primarily reflected in a rise (from 47% to 57%) in the share of animal products in total sales. It was accompanied by further discontinuation of animal production by a growing number of units, although a marked



slowdown was observed. In 2000-2005, the share of highly commercial entities engaged in such activities went down from 79% to 75%, i.e. by an average of 0.8% each year, whereas in 1996-2000 the corresponding rate was 1.5%.

Highly commercial farms which continued animal production significantly increased their livestock. As a result, between 2000 and 2005 livestock per 100 ha of agricultural land rose from 62.6 to 102.7 livestock units, i.e. by 64%. This upward trend was particularly conspicuous in dairy cattle farming, on account of conditions prevailing in the milk market. In 2005, as compared to 2000, the average number of cows in highly commercial farms increased from 7.5 to 14.5, i.e. by more than 93%. As a consequence, the period of 2000-2005 saw a significant growth in the share of highly commercial holdings with relatively large cow herds. At the same time, the proportion of highly commercial entities with 21 or more cows rose from 6% to 27%, whereas a downward trend was observed in the case of highly commercial holdings with one cow (a fall from 25% to 16%). After 2000 such trends appeared for the first time as in 1992-2000 the share of highly commercial farms keeping only one cow increased from less than 20% to ca. 25%. It suggested the discontinuation of subsistence milk production in highly commercial holdings, as well as reflecting the processes of simplification and specialisation of production in highly commercial entities.

Such developments were mostly found in relatively large highly commercial farms, which was reflected in the relation between the value of crop and animal production (Figure 4). Although in the period in question highly commercial units of 1 to 10 ha of agricultural land were mostly oriented towards crop production, with a major share of fruit, vegetables and crops grown under protection, some new trends could be observed. In units from the size group of 1 to 5 ha of agricultural land products such as poultry and eggs, and fur-bearing animals accounted for a growing proportion of market output. At the same time, highly commercial entities of 5 to 10 ha of agricultural land became increasingly oriented towards crops whose share in commercial production went up from 81% in 2000 to 92% in 2005. It was largely attributable to the fact that a number of highly commercial farms of 5 to 10 ha of agricultural land discontinued commercial production of pigs for slaughter and milk.

As regards holdings of 15 to 50 ha of agricultural land, between 2000 and 2005 there was a steady rise in the share of fattening pigs, milk and sugar beet in commercial production, whereas units of 50 ha of agricultural land or more increasingly focused on the production of cereals, industrial crops and cattle for slaughter. Therefore, it should be recognised that such developments

indicated efforts at more efficient harmonisation and use of production factors (particularly land).

**Table 4. Changes in the structure of sales by highly commercial farm**

Year	Share in total sales of										
	cereals	potatoes	industrial crops	vegetables	fruit	crops grown under protection	animals for slaughter		milk	poultry products	other products*
							pigs	cattle			
Figures in a row add up to 100											
2000	11.2	5.1	10.3	12.4	12.8	1.7	24.6	4.6	12.9	3.2	1.2
2005	10.3	2.0	13.7	7.3	8.9	0.8	27.5	5.8	19.5	3.1	1.1

\* The group included seed of arable crops, horses, goats and goats' milk, sheep and wool.

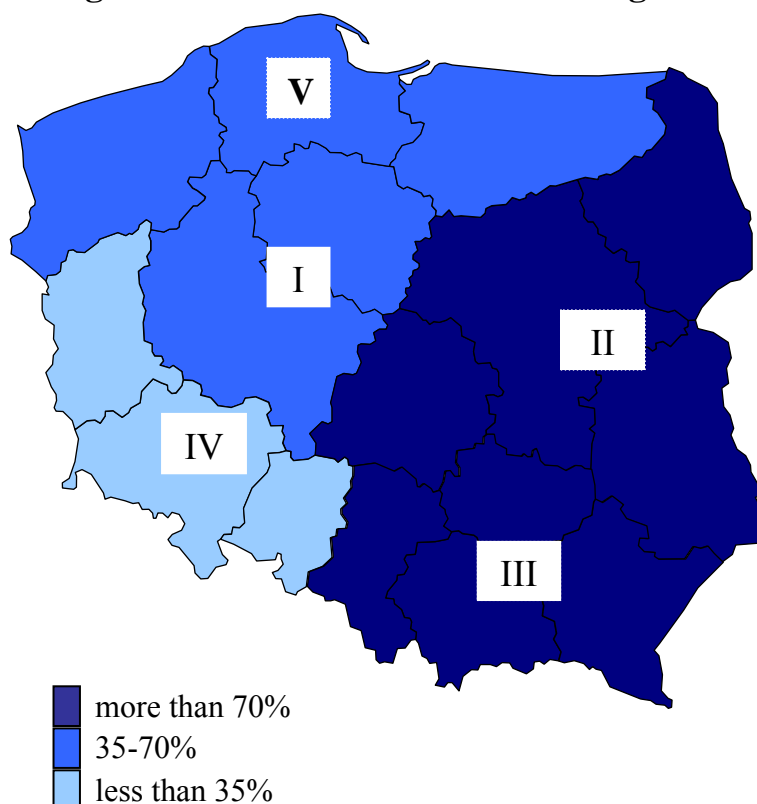
Source: 2000 and 2005 IAFE-NRI surveys.

A detailed analysis of data on sales of specific agricultural products (product groups) relative to total commercial production in 2005 indicated a rise on 2000 in the share of the following: industrial crops (from 10% do 14%), pigs for slaughter (from 25% to 28%), cattle for slaughter (from 5% do 6%) and milk (from 13% to 20%). At the same time, between 2000 and 2005 there was a fall in the share of cereals (from 11% do 10%), vegetables (from 12% to 7%) and fruit (from 13% to 9%), whereas the share of potatoes and that of crops grown under protection dropped approximately by half (from 5% to 2% and from 2% to 1% respectively). No major changes in the share were observed only in the case of sold poultry products (3%), as well as of seed crops, horses, goats and goats' milk, sheep and wool (those represented a total of ca. 1%).

Specific agricultural products accounted for similar shares of commercial production across Poland, although the described trends varied between macroregions. It stemmed from regional differences in agricultural structures, mostly embedded in production traditions of particular areas. For instance, the Central-Western macroregion was characterised by an exceptionally high share of pigs and cattle for slaughter (46% and 8% respectively) in total sales of agricultural products. Furthermore, no holdings located in the macroregion were engaged in commercial production of fruit, greenhouse and poultry products. At the same time, market output of highly commercial farms in the Central-Eastern macroregion was characterised by a particularly high proportion of sold milk (33%) and poultry products (8%). Marketed pigs also accounted for a major share (28%). The structure of sold agricultural production in the South-Western and Northern macroregions was distinguished by a high share of cereals (26%-35%) and industrial crops (28%-31%). It should be also

added that in the former macroregion other important marketed products included potatoes (10%), whereas in the latter – milk (20%). At the same time, market output of highly commercial farms in the South-Eastern macroregion was characterised by a particularly high share of sold fruit (45%), vegetables (20%) and crops grown under protection (4%), whereas commercial production of poultry was discontinued.

**Map 2. Regional distribution of highly commercial farms with one product accounting for a minimum of 75% of total agricultural sales**



\* *Macroregions and the voivodships covered as in Figure 1.*

*Source: 2000 and 2005 IAFE-NRI surveys.*

Efforts at the simplification and specialisation of production were also reflected in fluctuations in the share of units where products representing the basic commercial offer of the farm could be identified. In order to determine the scale of this development, highly commercial entities were broken down by share of one type of agricultural products in total market output of individual holdings<sup>10</sup>. According to this criterion, in 2000-2005 there was a marked improvement in the simplification and specialisation of the product range of

<sup>10</sup> The calculation of this indicator was based on grouping the products on account of similar technological requirements (e.g. cereals) and relations in the production process (e.g. milk and milk products).

highly commercial entities. The share of units where one product accounted for a minimum of 40% of total sales showed an increase (from 88% to 95%). Even greater changes could be observed with a threshold of 75%. In 2005, such entities represented more than 54% of highly commercial farms, whereas the figure was only ca. 30% five years before.

The above trends and efforts at simplified and specialised production profiles of highly commercial farms were similar across Poland. At the same time, there were certain regional differences in the intensity of the process. Those were mostly attributable to different production traditions of particular macroregions as product-specific technological requirements and the need to apply good farming practice largely determine the scope of specialisation in agricultural activities. According to the surveys, in the period in question the simplification of production of highly commercial units was relatively the most advanced in the Central-Eastern and South-Eastern macroregions. In 2005, in more than 70% of highly commercial entities located in this part of Poland sales of one product type accounted for a minimum of 75% of total sales. This trend was much less significant in the South-Western macroregion where the respective indicator was only 21%.

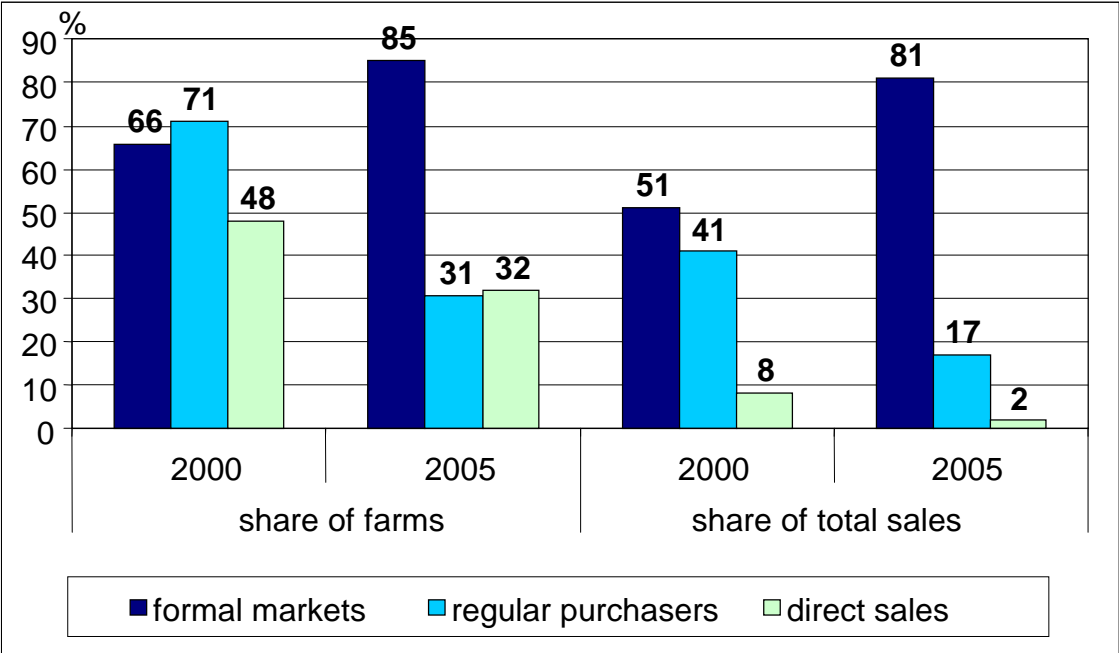
### **1.3.2. Forms and methods of selling agricultural production by highly commercial farms**

Under increasing competitive pressure, the development of stable relations with customers and joint economic initiatives are gaining in importance. According to the IAFE-NRI surveys, farmers from highly commercial units rather quickly managed to establish relatively stable relations with the agricultural market, and gradual improvement in this respect mainly concerned the degree of formalisation of commercial relations. In 2000-2005, the share of farmers from highly commercial entities declaring agricultural sales in formal markets increased from 66% to 85%, whereas the value of output marketed in this way rose from 51% to 81%. Within this group, nearly 74% of farmers had signed supply contracts, approx. 20% declared selling agricultural production in wholesale markets and commodity exchanges, whereas slightly above 6% reported sales both under supply contracts and in commodity exchanges and wholesale markets.

According to the surveys, in highly commercial farms growing sales under supply contracts and in commodity exchanges and wholesale markets were accompanied by diminishing importance of regular but informal

cooperation with customers. Between 2000 and 2005, the share of highly commercial entities selling agricultural products to regular purchasers dropped from 71% to 31%, whereas the proportion of production marketed in this way fell from 41% to 17%.

**Figure 5. Changes in the forms of sale of agricultural production**



Source: 2000 and 2005 IAFE-NRI surveys.

The period of 2000-2005 witnessed a further decline in already limited direct sales by highly commercial farms. In 2005, the sale of agricultural production to neighbours and in the marketplace was only found in ca. 32% of highly commercial units, and direct sales accounted for a mere 2% of total market output of this group of farms. The corresponding figures for 2000 were approx. 48% and 8% respectively.

The share of specific forms of selling agricultural production significantly varied between macroregions. It mostly resulted from production traditions of particular areas as the type of products largely determines the form of marketing [5, 6]. In 2005, the highest share of sales by highly commercial entities under supply contracts and regular cooperation was found in the South-Western macroregion where nearly 93% of managers of highly commercial farms had signed supply contracts, and 69% declared having a regular customer. Such forms of marketing were the least popular in the South-Eastern macroregion where only 24% of managers of highly commercial units claimed to have signed contracts, whereas less than 18% declared regular cooperation with a customer.

Farmers in this macroregion, mostly specialising in the growing of fruit, field and greenhouse vegetables, preferred to sell their production in commodity exchanges and wholesale markets (nearly 72% of highly commercial entities). At the same time, this form of marketing was the least frequent among farmers from the South-Western macroregion. Characterised by a dominant role of cereals and industrial crops, the macroregion only had 8% of highly commercial farms selling agricultural products in commodity exchanges and wholesale markets.

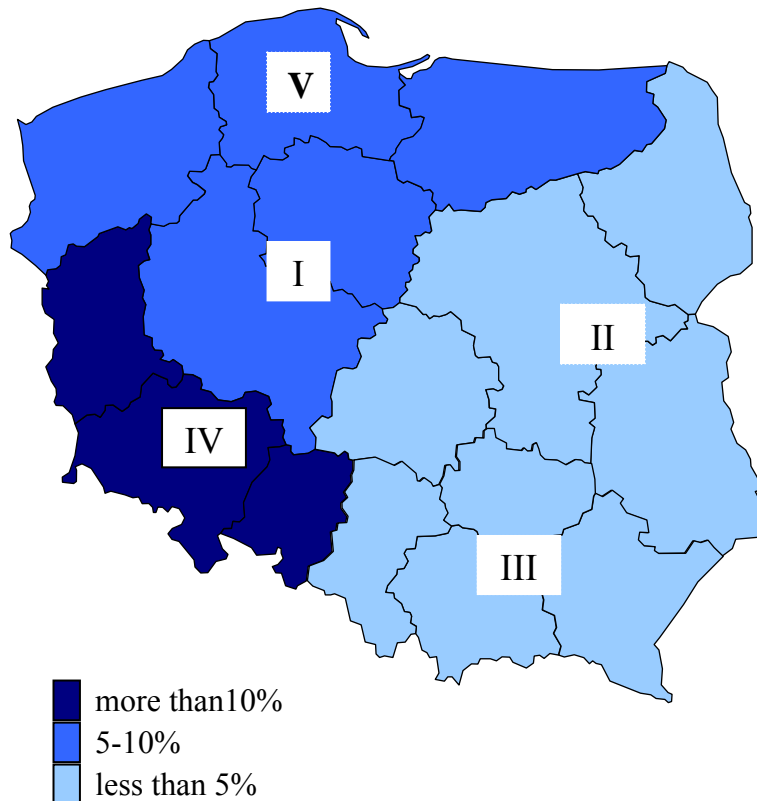
The market position can also be strengthened through activities within producer groups, which increase the joint market offer of a homogeneous product (in terms of variety and quality). This contributes to the establishment of regular contracts, usually more favourable than the sale of limited lots of goods. Moreover, group action helps reduce operating costs in individual farms and obtain funds for investment as well as facilitating the introduction of broader technological and biological progress. Despite a number of production and commercial benefits, this form of farmers' economic activities still attracts relatively little interest. However, certain improvement was observed in the group of farms in question.

According to the surveys, in 2000-2005 the number of highly commercial farms operating within producer groups doubled, whereas their share increased from less than 3% to nearly 7%. It should be also added that in 2005, as five years before, managers of highly commercial units represented a vast majority of members of agricultural producer groups. The increase in the number of highly commercial units operating within agricultural producer groups was accompanied by their extended horizontal integration. In 2000, highly commercial farms operating in groups were only located in three macroregions, namely in the Central-Western, Central-Eastern and South-Eastern macroregions, but in 2005 such entities could be found across Poland, with a share varying between macroregions (Map 3). Group farming was the most popular among managers of highly commercial holdings in the South-Western macroregion. At the same time, it should be emphasised that in the period in question the macroregion experienced a surge in farmers' interest in joint agricultural activities of highly commercial units, the strongest in Poland. In 2005, nearly 17% of highly commercial farms operated within producer groups, whereas no cases of such cooperation were found five years before.

In 2005, group activities were relatively the least widespread among managers of highly commercial farms in the Central-Eastern and South-Eastern macroregions. In those regions only approx. 3% of farmers from highly commercial entities were members of agricultural producer groups.

### Map 3. Regional distribution of highly commercial farms operating within producer groups

(% of all highly commercial units in the relevant macroregion\*)



\* Macroregions and the voivodships covered as in Figure 1.  
Source: 2000 and 2005 IAFE-NRI surveys.

With regard to regional differences and distribution of group activities undertaken by highly commercial entities, it is worth mentioning that an exceptional situation was found in the South-Eastern macroregion, covering the Małopolskie, Podkarpackie, Śląskie and Świętokrzyskie voivodships. It was the only macroregion to experience a decrease in the number of managers of highly commercial associated in agricultural producer groups in 2005 (it fell be more than half compared to 2000, from over 3% to nearly 7%). It should be also noted that five years before the share of highly commercial holdings operating within agricultural producer groups in the South-Eastern macroregion was the highest in Poland.

### 1.3.3. Productivity of production factors

For the group of farms in question, maintaining the competitive position in the agricultural market involved not only increasing production assets and adjusting their structure, but also required an improvement in farming efficiency. Due to the character of survey data, it was only possible to partially analyse the effectiveness of using production factors, and exclusively in relation of market output to the input of land and labour. Such measures fail to accurately reflect actual farming efficiency and the use of production factors, particularly with regard to labour productivity. Nevertheless, they allow to describe certain trends and assess the scale of relevant developments.

In 2005, agricultural sales per ha of agricultural land in the group of highly commercial farms amounted to PLN 5,498<sup>11</sup>. Compared to 2000, it was more than 24% growth, i.e. above the inflation rate of approx. 19%.

**Table 5. Commercial production by size of highly commercial farms**

Size group	Average commercial production				Index (2000 = 100)	
	per ha of agricultural land		per annual work unit (AWU)		per ha of agricultural land	per annual work unit
	2000	2005	2000	2005		
Total	4,417	5,498	67,429	94,272	124	140
1-5	24,652	44,843	71,639	115,022	182	161
5-10	15,337	17,427	70,357	83,849	114	119
10-15	6,073	10,246	43,524	70,386	169	162
15-20	4,347	6,929	42,068	67,256	159	160
20-30	4,067	5,238	56,879	71,788	129	126
30-50	3,201	4,267	67,341	87,763	133	130
50 or more	2,287	3,970	145,409	231,990	174	160

*Source: 2000 and 2005 IAFE-NRI surveys.*

In 2005, as in previous years, in the group of highly commercial units an increasing farm size was accompanied by decreasing sales per ha of agricultural land, from PLN 44,843 in entities of 1 to 5 ha of agricultural land to PLN 3,970 in the largest holdings, i.e. those of 50 ha of agricultural land or more. Therefore, average sales (relative to the area of agricultural land) by the smallest farms were more than ten times higher than in the largest units. Furthermore, it should be emphasised that the above relations between sales per ha of agricultural land and the farm size were greater in 2005 than in 2000 as average

<sup>11</sup> All figures represent current prices.



sales per ha of agricultural land in farms from the size groups in question were PLN 24,652 and 2,287 respectively, i.e. the latter figure was 9.5 times lower than the former. The gap widened as a result of stronger growth in commercial production of the smallest highly commercial entities than in market output of the largest units (Table 5).

Between 2000 and 2005, in highly commercial farms of 1 to 5 ha of agricultural land sales per ha increased from PLN 24,652 to PLN 44,843, i.e. by 82%, whereas the group of highly commercial entities of 50 ha of agricultural land or more noted a rise from PLN 2,287 to PLN 3,970, i.e. by 74%.

As regards other size classes, average sales went up to a lesser extent, but only in highly commercial farms of 5 to 10 ha of agricultural land the growth rate was lower than the inflation rate (14% against 19%).

As far as regional differences are concerned, commercial production per ha of agricultural land was only found reduced in highly commercial holdings located in the South-Eastern macroregion (down from PLN 11,923 in 2000 to PLN 10,132 in 2005, i.e. by 15%). When attempting to identify the underlying reasons for this decrease, it should be remembered that in the five-year period of 2000-2005 highly commercial farms in this macroregion underwent intensive land concentration. Therefore, it should be recognised that at least in some cases full production effects of such changes had not been achieved. Nevertheless, if farming efficiency is measured by the value of commercial production per ha of agricultural land, highly commercial farms located in the South-Eastern macroregion continued to make the most efficient use of land, and market output per ha was 84% higher than average sales in the group of holdings in question.

A rise in commercial production per ha of agricultural land was observed in all the other macroregions, and the growth rates ranged from 28% in the South-Western macroregion to 56% in the Northern macroregion. However, it should be noted that insofar as in 2000-2005 the Northern macroregion was characterised by definitely the most significant increase in agricultural production per ha in Poland, highly commercial farms in this area continued to be the least efficient at land utilisation. In 2005, in this macroregion market output per ha of agricultural land was PLN 3,197, nearly 42% lower than the figure for all highly commercial entities. It should be pointed out, however, that regional disproportions in land productivity in highly commercial agricultural holdings ceased to increase. In 1992, the ratio of the most intensive (the South-Eastern macroregion) to the most extensive (the Northern macroregion) use of agricultural land was 2:1, over the following eight years it went up to 6:1 in 2000, and in 2005 the corresponding ratio was 3:1. The above ratios not only suggest greater intensification of production of agricultural raw materials in the

Northern macroregion, but also point to the overcoming of barriers to the development of family farms and their coping with competitive pressure.

As has already been mentioned, to some extent labour productivity can be assessed on the basis of the value of market output relative to the input of family labour in agricultural activities on the family farm. Furthermore, such relations also indicate farming efficiency and compensation for farm work.

As individual members of a farming family engage in agricultural activities to a varying degree, labour inputs were expressed in full-time equivalent jobs, i.e. full-time workers. The calculations were based on GUS rates. It means that one full-time worker corresponds to one annual work unit (AWU), therefore works on the farm 2,120 hours a year, i.e. 265 working days, eight hours a day [11, 20]. At the same time, sales of agricultural products were expressed as amounts per full-time worker.

In 2005, sales of agricultural products per full-time worker in highly commercial farms reached PLN 94,272. It means that in 2000-2005 witnessed approx. 40% growth, being not only more than double the inflation rate, but also significantly exceeding the rise in commercial production per ha of agricultural land. Therefore, the presented relations allow to conclude that there was an increase in labour productivity in the surveyed group of highly commercial family farms. Those changes should be primarily attributed to factors such as faster adjustment of employment in highly commercial entities after 2000. In the group in question, between 2000 and 2005 employment per 100 ha of agricultural land fell by more than 19% (from 7.2 to 5.8 AWU), whereas in 1992-2000 the corresponding figure decreased by less than 5%.

**Table 6. Commercial production of highly commercial farms by macroregion**

Macroregion*	Commercial production				Index (2000 = 100)	
	per ha of agricultural land		per AWU		per ha of agricultural land	per AWU
	2000	2005	2000	2005		
Total	4,417	5,498	67,429	94,272	124	140
I	4,020	5,577	58,228	89,449	138	154
II	4,919	6,501	55,682	93,499	132	168
III	11,923	10,132	73,870	94,545	85	130
IV	2,859	3,671	65,774	89,836	128	137
V	2,050	3,197	66,092	115,757	156	175

\* Macroregions and the voivodships covered as in Figure 1.

Source: 2000 and 2005 IAFE-NRI surveys.

Increased agricultural production per full-time worker was observed in all size groups of highly commercial farms, with the strongest growth noted in entities of 10 to 15 ha of agricultural land. In this size group, in 2005 sales of agricultural products per full-time worker amounted to PLN 70,386, 62% more than in 2000 when the corresponding figure was PLN 43,524. Between 2000 and 2005, the slowest rise in commercial production per full-time worker was found in the group of highly commercial holdings of 5 to 10 ha of agricultural land, from PLN 70,357 to PLN 83,849 respectively (i.e. only by 19%, equal to the inflation rate). Therefore, it can be concluded that only highly commercial farms in this size group failed to increase labour productivity.

The growth in sales of agricultural products per full-time worker noted in highly commercial farms in 2000-2005 varied between regions as well. Particularly favourable developments were observed in highly commercial holdings in the Northern macroregion. It should be recalled that those were relatively large entities. In 2005, the average area of such units was 61.9 ha of agricultural land, i.e. more than double the figure for all highly commercial holdings (29.5 ha). Between 2000 and 2005, average commercial production per full-time worker in such farms increased from PLN 66,092 to PLN 115,757, i.e. by 75%. As a result, in 2005 highly commercial entities in the Northern macroregion were characterised by the highest sales per full-time worker in Poland. Furthermore, it should be added that it was approx. 23% above the average for the group of highly commercial farms (PLN 94,272 per AWU), whereas five years before it was slightly below average (by 2%) for all highly commercial entities where agricultural market output per full-time worker amounted to PLN 67,429.

The least robust growth in sales per full-time worker was observed in highly commercial farms in the South-Eastern macroregion, which had been characterised by the highest level of this indicator until 2000. Between 2000 and 2005, commercial production per full-time worker in those entities went up from PLN 73,870 to PLN 94,545, i.e. by 30%. Consequently, the figure was roughly average for the whole group of highly commercial farms, whereas it was 10% above average in 2000.

All the survey findings concerning issues related to farming efficiency indicate that in 2000-2005 in the group of highly commercial farms there was a widespread improvement in this respect, and the growth rates exceeded those noted in previous years. Such trends were relatively stronger in regions characterised by rather low farming efficiency in family farming before 2000.

## 1.4. Investment activity of farmers from highly commercial farms

The description of the group of highly commercial farms should also take account of their investment activity as maintaining a strong market position and coping with competitive pressure involves continuous and intensive measures aimed to improve the competitiveness of agricultural products offered and to increase general farming efficiency. In order to achieve this goal it is necessary to systematically adapt the stock and structure of production assets. Farmers need to continuously invest not only in the replacement, but also in the modernisation and enlargement of production assets of individual holdings.

### 1.4.1. The level and distribution of productive investment

According to the surveys, nearly 81% of highly commercial farms implemented agricultural investment projects between 2000 and 2005<sup>12</sup>. An average amount of PLN 121,400 per investing farm was spent for such purposes, and each holding engaged in agricultural investment implemented an average of 2.1 investment projects of various types.

**Table 7. Highly commercial farms with agricultural investment by macroregion**

Macroregion		Share of farms with agricultural investment	Share of total investment in:			
			farm buildings	machinery and tractors	livestock	land
		Figures in a row add up to 100				
<b>Total</b>	<b>1996-2000</b>	<b>75.2</b>	<b>29.4</b>	<b>36.8</b>	<b>16.7</b>	<b>17.1</b>
	<b>2000-2005</b>	<b>80.5</b>	<b>30.5</b>	<b>34.8</b>	<b>18.6</b>	<b>16.1</b>
Central-Western		87.1	30.0	35.2	22.4	12.4
Central-Eastern		89.3	28.5	35.6	20.8	15.1
South-Eastern		43.6	27.0	34.9	11.1	27.0
South-Western		92.9	33.3	32.1	9.9	24.7
Northern		84.1	37.1	32.9	12.9	17.1

*Source: 2000 and 2005 IAFE-NRI surveys.*

<sup>12</sup> In the paper, investing farms refer to all units which purchased fixed assets for agricultural production and engaged in construction works. In order to exclude entities only performing minor repairs from the analysis, a certain threshold was set for expenditure on repair and modernisation in specific types of farm buildings and structures. For the years 2000-2005 it was a minimum of PLN 1,500, whereas in 1996-2000 it was at least PLN 1,000.

Trends observed in the period in question with regard to investment in the highly commercial sector in family farming indicated increased activity in this respect. Although in the five-year period of 2000-2005 the average annual share of highly commercial holdings implementing productive investment projects was 2.7 percentage points lower than the corresponding figure for the years 1996-2000 (16.1% against 18.8%), but the fall in the proportion of units engaged in the replacement, enlargement and modernisation of fixed production assets was accompanied by a rise (nearly by 11%) of the number of projects implemented and investment outlays.

In 2000-2005, an average of PLN 24,300 was spent by each highly commercial farm with agricultural investment a year, whereas between 1996 and 2000 the corresponding amount was PLN 14,100. According to the surveys, investment in production assets of highly commercial entities continued to significantly vary between macroregions, in terms of both distribution and investment outlays (Tables 7 and 8).

**Table 8. Agricultural investment outlays in highly commercial farms by purpose**

Macroregion		Average investment (PLN thousand per farm)	Share of total investment in:			
			farm buildings	machinery and tractors	livestock	land
		Figures in a row add up to 100				
<b>Total</b>	<b>1996-2000</b>	<b>56.2</b>	<b>24.7</b>	<b>38.1</b>	<b>4.8</b>	<b>32.4</b>
	<b>2000-2005</b>	<b>121.4</b>	<b>31.1</b>	<b>46.8</b>	<b>5.5</b>	<b>16.6</b>
Central-Western		82.4	37.9	38.4	5.7	18.0
Central-Eastern		141.9	34.4	44.0	8.0	12.6
South-Eastern		93.8	40.4	44.7	1.9	13.0
South-Western		105.1	16.4	39.1	1.3	43.2
Northern		210.7	16.3	68.4	3.1	12.2

*Source: 2000 and 2005 IAFE-NRI surveys.*

Any interpretation of the above patterns should take account of macroregional differences in the distribution of such farms, the stock and structure of their production assets, their financial standing as well as in skills of farm managers. Thus, in the five-year period of 2000-2005, as in previous years, the least frequent efforts at the replacement, enlargement and modernisation of production capacities of highly commercial entities were observed in areas characterised by the lowest share of highly commercial holdings in Poland, i.e. in the South-Eastern macroregion. In this part of

Poland, a mere 44% of highly commercial farms implemented agricultural investment projects, with rather limited funds (an average of PLN 93,800), whereas the national average was PLN 121,400. Furthermore, it was the only macroregion to record reduced activities aimed at the enlargement of production assets as compared to the years 1996-2000, with a fall in the share of highly commercial holdings engaged in agricultural investment from 62% to 44%. It should be also added that in the period in question a fall in the proportion of such entities was only found in this macroregion, from 8% in 2000 to 7% in 2005 [7]. The above-mentioned developments confirm increased difficulties with coping with competitive pressure, already significant and still growing, and with efficient functioning of family farms located in the south of Poland, characterised by land fragmentation.

In 2000-2005, as in 1996-2000, the highest share of highly commercial entities investing in production fixed assets (nearly 94%) was recorded in the South-Western macroregion.

The highest investment outlays were found in highly commercial holdings in the Northern macroregion (an average of PLN 210,700 per farm with agricultural investment, i.e. 74% above the national average). Those areas were characterised by the best area structure and the highest average size of highly commercial farms in Poland, with relatively extensive production methods. Such trends reflect faster modernisation and increasing competitiveness of family farming in northern Poland, but also suggest the continuation of regional disproportions observed in previous surveys<sup>13</sup>.

Relatively high investment activity was also noted in the group of highly commercial farms in the Central-Eastern macroregion. In the five-year period of 2000-2005, this macroregion was not only characterised by the above-average share of highly commercial entities with agricultural investment (89% against 81%), but also investment outlays were 17% above the national average (PLN 141,900 against PLN 121,400). Between 1996 and 2000 those areas were distinguished by significant efforts at agricultural investment, related to the necessary adaptation to strict quantity and quality requirements of the dairy industry. This trend was reflected in markedly above-average investment outlays on the modernisation of livestock buildings and the purchase of livestock in the Central-Eastern macroregion. In the five-year period of 2000-2005, highly commercial holdings spent an average of PLN 17,400 on the purchase of livestock and PLN 57,300 on the modernisation of livestock buildings, whereas

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<sup>13</sup> In the four-year period of 1996-2000, every highly commercial farm with agricultural investment in the Northern macroregion spent an average of PLN 99,300. It was the highest amount in Poland, almost 77% above the average for all highly commercial holdings.

in the Central-Eastern macroregion the amounts were at least 50% higher, at PLN 25,900 and PLN 89,400 respectively. Similar relations had been observed in 1996-2000. In that period, highly commercial entities as a whole allocated an average of PLN 8,100 for the purchase of livestock and PLN 15,700 for the modernisation of livestock buildings, while in the Central-Eastern macroregion the respective amounts were PLN 12,800 and PLN 20,200. It should be also noted that throughout the period of 1996-2005 investment outlays on animal production in the Central-Eastern macroregion were the highest in Poland.

#### **1.4.2. Productive investment by type**

The production capacity of a farm is determined not by its production assets, but also by their structure. Therefore, the selection of specific investment projects plays a vital role in the investment process.

According to the surveys, both in 2000-2005 and in previous years the group of highly commercial holdings mostly invested in machinery and tractors (Table 7). At the same time, the share of purchased machinery and tractors in the total number of investment projects showed a slight decrease, from 36.8% in the four-year period of 1996-2000 to 34.8% in 2000-2005, which largely stemmed from the fact that farmers' needs in this respect had been increasingly satisfied relative to other requirements. In the periods in question, a less significant fall was noted with regard to the share of the purchase of agricultural land (from 17.1% to 16.1%), which should be attributed to the situation in the agricultural land market. Furthermore, in the five-year period of 2000-2005 projects concerning the construction, repair and modernisation of farm buildings were slightly more frequent than in 1996-2000 (a rise in the share of from 29.4% to 30.5%). It should be emphasised that in the case of livestock buildings the increase in the proportion was much more significant, particularly with regard to modernisation projects aimed at comprehensive mechanisation of production systems (from 4.1% to 8.9%). Furthermore, in 2000-2005 more farmers invested in livestock than in the four-year period of 1996-2000 (18.6% against 17.1%). Farm managers were increasingly interested in certified breeding material, which was reflected in more frequent purchases of breeding animals as investment in livestock (from 61% in 1996-2000 to 70% in 2000-2005). Such efforts indicated more widespread use of biological progress and growing interest in supplying high-quality animal products.

Broken down by share of specific types of investment projects implemented in the whole period in question, the highest amounts were

allocated for the purchase of machinery and tractors, with an upward trend observed between 2000 and 2005 (Table 8). Insofar in the four-year period of 1996-2000 the share of funds for mechanisation in total investment outlays slightly exceeded 38%, in 2000-2005 it went up to nearly 47%. The increase resulted from purchases of modern and highly efficient machines which were also relatively expensive. At the same time, there was a rise in the share of construction, repair and modernisation of farm buildings (from less than 25% to over 31%) and of purchases of livestock (from less than 5% to nearly 6%) in total investment. In the five-year period of 2000-2005 the proportion of funds allocated for the purchase of agricultural land was almost half the figure for 1996-2000 (approx. 17% against over 32%).

The described general trends in the structure of investment outlays and types of productive investment projects in highly commercial farms were similar across Poland. At the same time, certain regional differences could be observed with regard to the proportion of specific types of purchases. In the Central-Western and Central-Eastern macroregions investment in animal production accounted for a major share. The South-Eastern macroregion was distinguished by above-average investment outlays on farm buildings, particularly greenhouses and foil tunnels. Investment activity by highly commercial farms located in the South-Western macroregion was characterised by rather significant purchases of agricultural land, whereas farmers in the Northern macroregion mostly invested in machinery and tractors.

Although not significantly dissimilar to general trends, those macroregional differences in investment preferences reflected specific characteristics of agriculture in particular regions, its structural differentiation and related distinctive production orientations of highly commercial farms and implemented investment projects.

## **2. The socio-demographic structure of the population living on highly commercial farms**

The pace of economic changes in agriculture depends on a number of factors, also on the characteristics of socio-demographic structures. Demographic developments (above all population growth) represent autonomous factors, but population characteristics (age, sex, the level of education) may hinder or stimulate efficiency-oriented economic changes under specific circumstances. This also holds true for agriculture where, as in other



sectors, due to growing competition the economic performance of individual farms is increasingly dependent on the quality of labour.

## **2.1. The demographic structure of the population living on highly commercial farms**

Between 2000 and 2005, there were no major changes in the number of persons living on highly commercial agricultural holdings. The 2% increase in the population in question observed in that period resulted from a rise in the number of highly commercial entities [7]. Consequently, the share of the population living on highly commercial farms in the total farming population showed a marginal growth (from slightly more than 13% in 2000 to 14% in 2005). At the same time, the average number of household members in families living on highly commercial farms remained unchanged, at nearly five in both 2000 and 2005.

The relative stabilisation of the population living on highly commercial holdings was accompanied by changes in its demographic structure, and developments noted in 2000-2005 with regard to the age structure of the population in question indicated the beginning of an ageing process. It was reflected in a fall in the number of pre-working age persons (from 31% to 26%) and an increase in the share of older working age population (from 17% to 21%). The proportion of the younger working age population, i.e. up to 44 years of age, remained the highest and virtually unchanged, at 39% in 2000 and 41% in 2005. The most stable, and at the same time the smallest group represented the post-working age population, with a share of ca. 13% throughout the period in question. It should be added, however, that the described signs of an ageing population observed in highly commercial entities were relatively less relevant than those noted in the whole farming population [27]. Therefore, it should be recognised that the population living on highly commercial agricultural holdings was not only relatively younger in demographic terms than the whole farming population, but also the gap slightly widened in the period in question.

The above-mentioned trends in the demographic structure of the population living on highly commercial farms varied between macroregions, although it did not affect the scale of regional dissimilarities in this respect. As a result, in 2005 the most significant differences continued to be observed in the share of the retirement-age population. With regard to this age group, the lowest and the highest shares were less than 7% in the South-Western macroregion and approx. 14% in the South-Eastern macroregion. Relatively less marked

differences were found in the share of the non-mobility working age population and that of the pre-working age population. Relatively the lowest proportion of persons under 18 years of age was noted in families living on highly commercial holdings in the South-Western macroregion (less than 19%), whereas the highest shares characterised the Central-Eastern and Northern macroregions (slightly over 29%). At the same time, the Northern macroregion was distinguished by the lowest share of the older working age population, i.e. 45 years of age or over (approx. 15%). A different age structure was found in the South-Eastern macroregion where the non-mobility working age population accounted for nearly 24% of the population living on highly commercial farms. As regards the younger working age population, dissimilarities were relatively the least significant, and the share of persons aged 18 to 44 ranged from 38% in the Central-Eastern macroregion to 44% in the Northern macroregion.

The analysis of the population living on highly commercial holdings broken down by sex demonstrates that in 2005, as five years before, the relations between the number of men and women were similar and rather stable. In the period in question, the share of women in families living on highly commercial farms remained unchanged, at ca. 49%. At the same time, it should be emphasised that in 2005, as five years before, the proportion of women in such households showed only minor differences between regions (ranging from 48% in the Central-Western macroregion to 51% in the South-Eastern macroregion).

Demographic characteristics of the population living on highly commercial farms are not the same as features of the population engaged in agricultural activities as some persons are economically inactive or have off-farm jobs and do not consider agriculture to be a career option [15]. At the same time, on account of specific characteristics of agricultural production, it is common practice for members of farming families to engage in farm work to a varying degree [10]. Furthermore, the scope of and the need for participating in agricultural activities differ depending on the requirements of agricultural production as well as on the make-up and development stage of the family. As a consequence, some persons perform auxiliary tasks on a part-time basis. Due to the nature of such work and relatively limited employment in agricultural production, this group contributes to the output to a marginal degree.

The economic and production performance of farms is largely determined by the population engaged in agricultural production on a permanent full-time basis. Any information on this group seems particularly relevant to the analysed highly commercial entities.

According to the survey findings, in 2005, as in previous years, the majority of economically active members of farming families owning highly

commercial holdings were engaged in agricultural activities pursued by highly commercial entities. Throughout the period in question, such persons accounted for more than 96% of the economically active population aged 15 or over, whereas the remaining share of less than 4% only had non-agricultural jobs<sup>14</sup>. However, with the employment rate virtually unchanged, the population working on highly commercial entities was increasingly dominated by persons mostly engaged in agricultural activities on the family farm. It was mainly reflected in an increased share of persons employed exclusively in agricultural production on a permanent full-time basis (up from 46% to 51%). At the same time, there was a marked decline in the proportion of persons engaged in agricultural activities of highly commercial farms every day, but less than eight hours a day (from 37% to 28%), and a rise in the share of persons participating in farm work on a seasonal or casual basis (from 17% to 21%).

According to the IAFE-NRI data, the favourable demographic structure of persons exclusively engaged in agricultural activities<sup>15</sup> of highly commercial farms continued in 2005. It should be noted, however, that even though in 2005 the mobility working age population (18 to 44 years of age) represented the largest group (nearly 60%), in comparison with 2000 there was an increase in the share of non-mobility working age persons (from less than 31% to almost 40%) and a fall in the proportion of the retirement-age population (from 3% to less than 1%).

The described trends in the demographic structure of the population working on highly commercial farms on a permanent full-time basis varied between regions. In 2000-2005, an improved age structure of the economically active population living on highly commercial holdings was found in central and eastern Poland. A particularly strong improvement was observed with regard to permanent full-time workers in highly commercial units located in the Central-Eastern macroregion as there was almost threefold growth in the share of the younger working age population in the group in question (from 23% to 63%). As a result, in 2005 the working population in highly commercial farms in the Central-Eastern macroregion appeared to be demographically the youngest in Poland.

As regards other regions, certain unfavourable developments were observed in the demographic characteristics of the population working in highly commercial holdings on a permanent full-time basis. Between 2000 and 2005,

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<sup>14</sup> According to the surveys, there were no unemployed persons in the economically active population living on highly commercial farms.

<sup>15</sup> In the paper, it refers to persons engaged in agricultural production on a permanent full-time basis, i.e. to those who work as farmers.

relatively the most significant signs of an ageing population were noted in highly commercial entities in the Northern macroregion. In those areas, the share of persons aged 18-44 dropped from over 77% to less than 62%. Nevertheless, in 2005 relatively the oldest permanent full-time workers were found in highly commercial farms in the South-Western macroregion. In this group, the mobility working age population only accounted for 40%.

Differences in demographic characteristics of persons mostly engaged in agricultural activities in highly commercial farms in 2005 and 2000 were not confined to the age structure, but also concerned the breakdown by sex. In the period in question, there was an increase in the share of women in this group. In 2005, women accounted nearly for 43% of the total number of permanent full-time workers of highly commercial entities, whereas the figure was less than 39% five years before.

The analysis of regional differences in the share of women in the group of permanent full-time workers of highly commercial farms revealed similar trends in all the macroregions. Despite an increased share of women, the majority of persons working as farmers continued to be men. In 2005, as in previous years, definitely the least numerous women farmers were found in the South-Eastern macroregion (accounting for less than 19%). As regards other parts of Poland, the proportion of women in the population working in highly commercial holdings on a permanent full-time basis ranged from 42% in the South-Western macroregion to 49% in the Central-Eastern macroregion.

## **2.2. The educational level of the population**

In the five-year period in question, there was an improvement in the educational level of persons<sup>16</sup> from farming families living on highly commercial farms. It concerned both general education and agricultural qualifications. The improvement was observed in all levels of post-primary education, but it was found the strongest with regard to tertiary education (the share of persons with a university degree went up from less than 3% to over 6%) as well as to secondary and post-secondary education (up from 22% to nearly 30%). Despite such positive changes, in 2005 almost 31% of members of farming families living on highly commercial farms continued to have only primary or lower secondary education, whereas 35% had vocational education.

Between 2000 and 2005, there was an increase in the share of persons with non-agricultural education, from less than 32% to 38%. At the same time,

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<sup>16</sup> The analysis included persons aged 15 or over who had completed their education.

the proportion of the population with agricultural education remained practically unchanged, at 30-31%.

The quality of labour in a farm is mostly determined by persons engaged in agricultural production on a permanent full-time basis. Basically, due to the scope and degree of participation in farm work, only this group actively shapes the character of agricultural activities and largely determines the economic and production performance of farms.

A significant improvement in the educational level was also observed in the group of persons mostly engaged in agricultural activities on highly commercial farms. Between 2000 and 2005, there was a further decline in the share of the population with primary or lower secondary education (from 21% to 17%). In the period in question, vocational education was the most common, although the proportion of persons with such education showed a marked fall (from nearly 50% in 2000 to 39% in 2005). The opposite was the case with secondary and higher education. In 2000-2005, the share of persons with secondary or post-secondary education increased from 28% to 34%. A markedly greater improvement was observed with regard to the group of university-educated persons mostly engaged in agricultural activities on highly commercial farms. However, despite the threefold growth in the share of such persons observed in the period in question, they accounted for less than 10% of those employed in agricultural production.

Between 2000 and 2005, there was a improvement regarding professional preparation for farming in the population working on highly commercial farms on a permanent full-time basis. It was reflected in an increased share of persons with agricultural qualifications in this group. In the period in question, the proportion of farmers who had agricultural education went up by 9 percentage points (from 35% to 44%). At the same time, non-agricultural qualifications also showed improvement. In the five-year period of 2000-2005, the share of persons with non-agricultural vocational education among the working population in highly commercial entities rose by 5 percentage points (from 34% to 39%).

An increased educational level of the population working on highly commercial farms on a permanent full-time basis was noted almost in all the macroregions, with particularly strong improvement observed in central Poland. As a consequence, in 2005 relatively the highest level of education characterised persons working in highly commercial entities in the Central-Western and Central-Eastern macroregions. In those areas, the whole population mostly engaged in agricultural activities had general post-primary

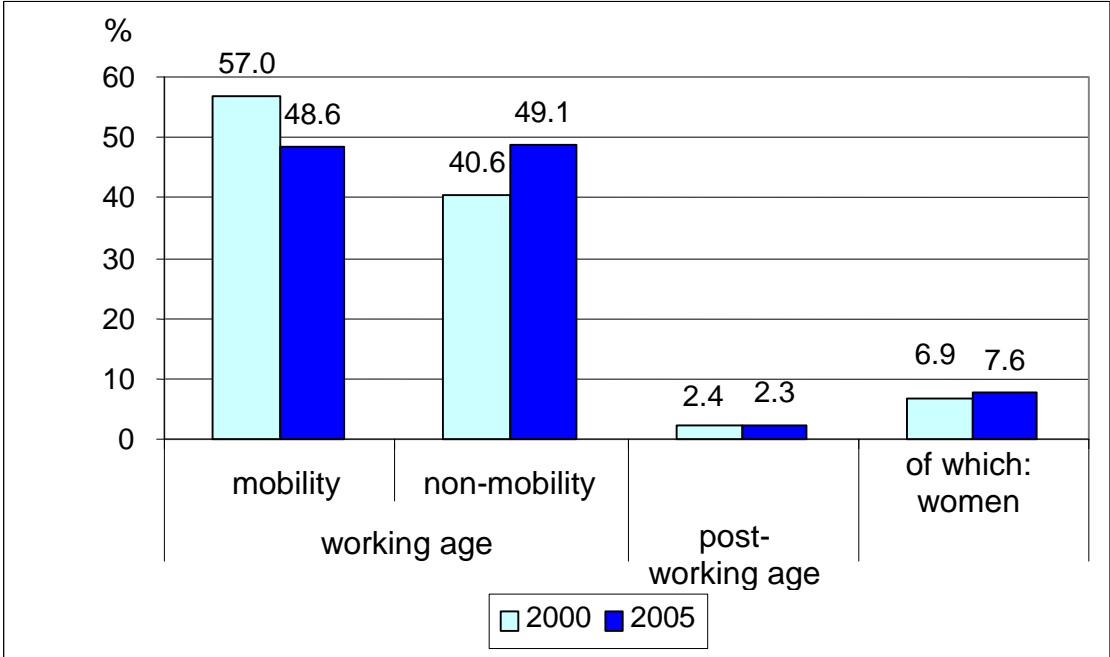
education, and nearly 15% were university-educated. At the same time, almost 63% had agricultural vocational education.

A very different situation was observed in the South-Eastern macroregion where no university-educated persons were found among those working on highly commercial farms on a permanent full-time basis, and more than one-fourth had general primary education. In this macroregion, only every third worker of a highly commercial unit had agricultural education.

**2.3. Socio-demographic characteristics of managers of highly commercial farms**

The production and economic performance in agricultural activities is largely determined by farm managers<sup>17</sup>. Therefore, the age structure and education of managers significantly affects development prospects for specific groups of agricultural holdings, including highly commercial units.

**Figure 6. Managers of highly commercial farms by age and sex**



Source: 2000 and 2005 IAFE-NRI surveys.

According to the surveys, between 2000 and 2005 in an average of approx. 2% of highly commercial farms a year there was a change of the manager for demographic reasons. The process was less intensive than in 1996-

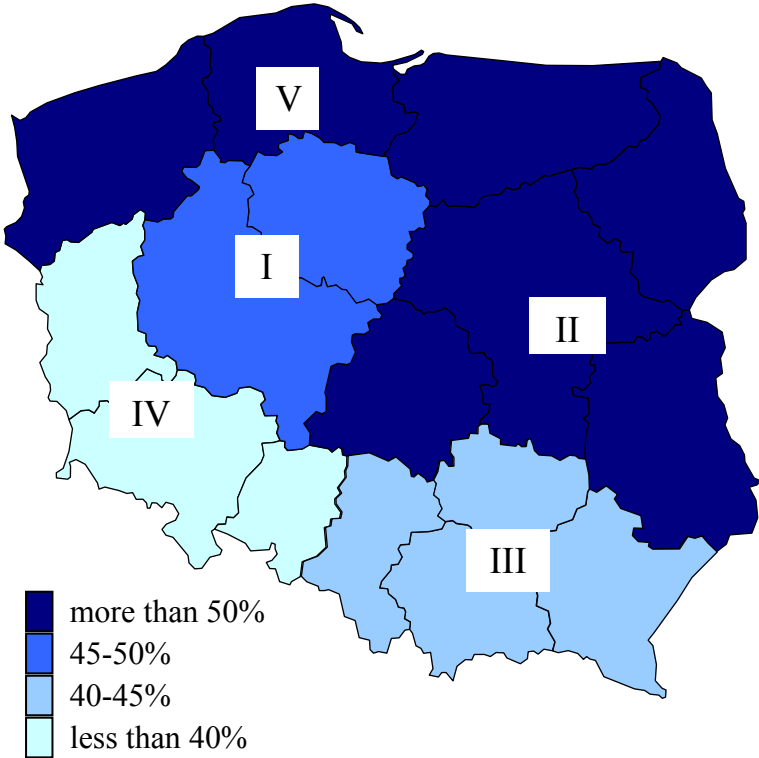
<sup>17</sup> In the paper, the terms “managers” and “users” are used interchangeably.

2000 when such cases were found in an average of 3% of highly commercial units a year. However, the slowdown in generational changes did not result in significant deterioration of the age structure of managers of highly commercial agricultural holdings (Figure 6).

In 2005, the demographic structure of managers of highly commercial farms continued to be relatively favourable. The share of managers at the mobility working age was nearly 49%. Nevertheless, it was markedly lower than in 2000 when persons up to 44 years of age accounted for 57% of all farm managers in such units. Furthermore, there was an increase in the proportion of older working age managers (over 44 years of age). In 2000-2005, it went up from less than 41% to more than 49%. At the same time, the share of post-working age managers remained unchanged, at slightly over 2% in both 2000 and 2005.

The analysis of managers of highly commercial agricultural holdings broken down by sex demonstrates that in 2000-2005 the relations between the number of men and women were similar and rather stable. Women managers of highly commercial units accounted for approx. 7-8%.

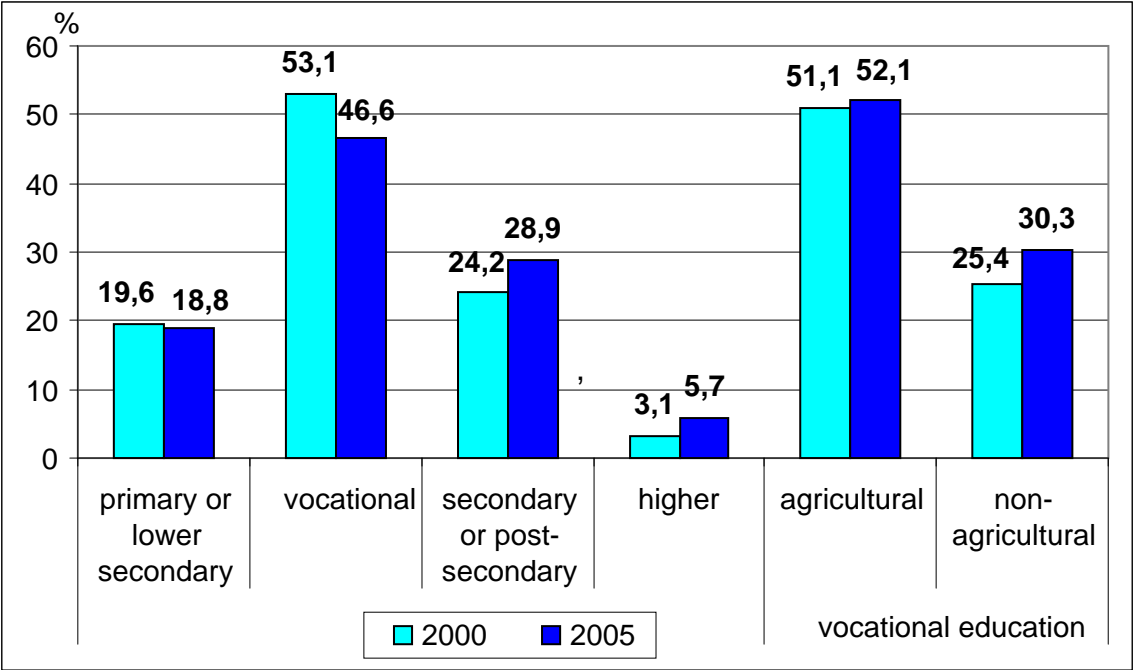
**Map 4. Regional distribution of the share of mobility working age managers of highly commercial farms**



Source: 2000 and 2005 IAFE-NRI surveys.  
 \* Macroregions and the voivodships covered as in Figure 1.

Any interpretation of regional differences in demographic characteristics of managers of highly commercial farms should take account of the fact that dissimilarities resulted not only from farm-specific factors (the size, equipment, market relations), but also from different levels of socio-economic development in particular regions and related attractive job opportunities outside agriculture. The above-mentioned factors influenced attitudes of young people towards farming as a career choice. As a result, managers of highly commercial holdings located in the Central-Eastern and Northern macroregions were relatively younger, and the share of women managers was lower than in southern and south-western Poland.

**Figure 7. Managers of highly commercial farms by level of education**



Source: 2000 and 2005 IAFE-NRI surveys.

Generational changes in the group of managers of highly commercial farms were related to the improving level of education, although between 2000 and 2005 the share of managers who had completed only primary education showed a marginal decrease (from 20% to 19%). In both periods in question, vocational education was the most common, and the proportion of managers with such qualifications fell from over 53% in 2000 to less than 47% in 2005.

At the same time, there was an improvement with regard to secondary and post-secondary schools (up from 24% to 29%) and higher education (the share of university-educated managers of highly commercial farms rose from 3% to 6%).



**Table 9. Regional differences in the educational level of managers of highly commercial farms**

Level of education	total	by macroregion *				
		I	II	III	IV	V
Share of managers with general education						
- primarily or lower secondary	18.8	12.9	23.4	29.9	7.1	11.4
- vocational	46.6	56.1	42.6	42.6	35.7	50.0
- secondary or post-secondary	28.9	28.8	25.5	21.8	52.4	31.8
- higher	5.7	2.2	8.5	5.7	4.8	6.8
Share of managers with vocational education						
- agricultural	52.1	72.0	45.4	34.5	42.9	47.7
- non-agricultural	30.3	18.2	29.8	34.5	50.0	38.6

\* Macroregions and the voivodships covered as in Figure 1.

Source: 2000 and 2005 IAFE-NRI surveys.

In both years in question, managers of highly commercial holdings with agricultural education represented the largest group, but the share of persons with such qualifications remained virtually unchanged (51% in 2000 against 52% in 2005).

When interpreting regional differences in the level of general and agricultural education of managers of highly commercial farms, one should bear in mind similar conditions to those relevant to the demographic structure of the group in question. In 2005, relatively the best preparation for working as a farmer still characterised managers of highly commercial entities in the Central-Western macroregion. In this part of Poland, 72% of those managing highly commercial units had agricultural education. A different situation was observed in the South-Eastern macroregion where only 35% of managers of highly commercial holdings graduated from agricultural schools.

## Summary

The surveys demonstrated that maintaining a competitive position in the agricultural market required considerable changes in the production potential and in the functioning of highly commercial farms. Such changes in the group of highly commercial units were best reflected in the area of agricultural land. Between 2000 and 2005, the average farm size in the group of highly commercial holdings increased by 27% (from 23.2 to 29.5 ha of agricultural land). It was rather significant improvement as in 1996-2000 the average size of

a highly commercial unit only went up by 12% (from 20.8 to 23.2 ha of agricultural land). As a result, the difference in the area of agricultural land between highly commercial farms and market-oriented agricultural holdings as a whole increased from 2.5-fold advantage of the former in 2000 to nearly threefold in 2005, and the share of agricultural land used by highly commercial entities rose from 31% in 2000 to more than 38% in 2005.

The concentration of agricultural land entailed more intensive changes aimed at the enlargement of other production assets. A particularly strong upward trend was observed with regard to livestock. Consequently, between 2000 and 2005 livestock per highly commercial farm engaged in animal production grew almost by 78% (from 18.4 to 32.7 LSU). The concentration of animal production was a widespread development, but it was particularly conspicuous with regard to dairy cows, on account of conditions prevailing in the milk market.

In 2000-2005, there were also considerable changes in the equipment of highly commercial units with technical production assets. As a result of high investment activity of managers of highly commercial holdings, oriented towards improving technical equipment of their farms, the share of entities well or very well equipped with machinery showed more than twofold increase (from 22% to 59%). At the same time, machinery used in such units became more comprehensive. The share of highly commercial farms equipped with machinery ensuring full mechanisation of the technological process went up as follows: potatoes – from 35% to 72%, sugar beet – from 53% to 75%, hay and silage – from 64% to 82%, cereals, grain maize and rape – from 62% to 64%. Similar trends were also observed in animal production, but such efforts were markedly less comprehensive than in the case of crops. In 2005, even in the group of very competitive market players full mechanisation of farm buildings was relatively rare (9% of barns and 11% of piggeries), but the share was still double the 2000 figure.

The analysis demonstrated that maintaining a strong position in the agricultural market requires regular and intensive investment efforts. Between 2000 and 2005, 81% of highly commercial farms implemented agricultural investment projects, and the scope of such undertakings suggested extended investment. Farmers were oriented towards not only increased economies of scale, but also the quality of output. The main goal of such projects was improved farming efficiency, which was reflected in the type of investment.

Maintaining a strong market position involved not only greater production capacities of highly commercial farms, but also improved utilisation of such potential and adjustment of specific production factors. It was reflected in

developments such as increased agricultural sales per ha of agricultural land. In 2005, the figure was PLN 5,500, a rise by ca. 24% on 2000, i.e. above the inflation rate of approx. 19%. An even greater change was observed with regard to sales per full-time worker in highly commercial farms. Between 2000 and 2005, it went up nearly by 40% (from PLN 67,400 to PLN 94,300 per AWU).

According to the analyses conducted, in 2000-2005 there was a limited but steady increase in the population living on highly commercial farms, closely related to fluctuations in the number of such units. At the same time, the demographic structure of the population living on highly commercial holdings and of farm managers continued to be favourable. An improvement was also observed with regard to the educational level of members of farming families living on highly commercial farms. Such developments were particularly evident in the group of permanent full-time workers of highly commercial holdings, particularly farm managers. At present, when human capital is increasingly important in economic performance, a marked improvement in the level of education, much more significant than with regard to all persons employed in family farming, represents a significant condition for further growth of the group of farms in question.

According to the survey findings, in 2005, as in previous years, the majority of economically active members of farming families living on highly commercial holdings were engaged in agricultural activities. However, the group was increasingly dominated by persons regarding work on highly commercial family farms as a main activity, usually on a permanent full-time basis. It reflected increased attractiveness of employment in well-equipped, efficiently organised and rather profitable family farms. It also proves a more professional approach to farming.

## References

1. *Charakterystyka gospodarstw rolnych w 2005 roku*, (2005): GUS, Warszawa, s. 26-27.
2. Duczkowska-Małysz K., (1998): *Rolnictwo–wieś–państwo. Wokół interwencji państwa w sferę wsi i rolnictwa*, PWN, Warszawa, s. 76.
3. Kapusta F., (1999): *Uwarunkowania zmian struktury agrarnej w Polsce [w:] Determinanty transformacji struktury agrarnej w rolnictwie polskim*, cz. I, Roczniki Akademii Rolniczej w Poznaniu CCCVIII, Poznań, s. 135.
4. Karwat-Woźniak B., (2005): *Możliwości rozwojowe chłopskiego rolnictwa na przykładzie gospodarstw wysokotowarowych*, Raport nr 10, IERiGŻ-PIB, Warszawa, s. 9-12.
5. Karwat-Woźniak B., (2006): *Zmiany form i sposobów sprzedaży produktów rolniczych w latach 2000-2005*, [w:] *Przeobrażenia w strukturze społeczno-ekonomicznej wsi objętych badaniem IERiGŻ-PIB w latach 2000-2005*, IERiGŻ-PIB, Warszawa, s. 54 i dalsze.
6. Karwat-Woźniak B., (2006): *Zmiany w charakterze powiązań rynkowych gospodarstw chłopskich w latach 2000-2005*, IERiGŻ-PIB, Warszawa, s. 12, 16-18, 29-30.
7. Karwat-Woźniak B., Chmieliński P., (2006): *Gospodarstwa wysokotowarowe w strukturze społeczno-ekonomicznej rolnictwa chłopskiego rok po akcesji do Unii Europejskiej*, Raport nr 54, IERiGŻ-PIB, Warszawa, s.38 i dalsze.
8. Karwat-Woźniak B., Chmieliński P., (2007): *Highly commercial farms in family farming in Poland*”, Raport nr 72.1, IERiGŻ-PIB, Warszawa, s. 13-15 oraz 93.
9. Kowalski A., (1998): *Czynniki produkcji w agrobiznesie [w:] Encyklopedia agrobiznesu*, Fundacja Innowacja, Warszawa, s. 109.
10. Leopold A., (1997): *Praca w rolnictwie*, [w:] *Gospodarstwo rolnicze wobec wymogów współczesnego rynku i Unii Europejskiej*, SGGW, Warszawa, s. 36.
11. Paszkowski S., (2005): *Główne kierunki procesów przystosowawczych w rolnictwie rodzinnym do warunków gospodarki rynkowej*, *Kwestia agrarna w Polsce i na świecie*, SGGW, Warszawa, s. 164, 171 i 172.
12. Poczta W., Pawlak K., Kiryluk-Dryjska E., Siemiński P., (2007): *Perspektywy polskich gospodarstw rolnych w Europejskim Modelu Rolnictwa*, Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, z. 2, t. IX, Warszawa-Poznań-Kraków, s. 299-300.
13. Rudnicki H., (2005): *Przemiany strukturalne w polskim rolnictwie w okresie transformacji systemowej*, [w:] *Kwestia agrarna w Polsce i na świecie*, SGGW, Warszawa, s.184 .

14. Sikorska A., (2000): *Zmiany strukturalne na wsi i w rolnictwie w latach 1996-2000 a wielofunkcyjny rozwój obszarów wiejskich*. Synteza, IERiGŻ, Warszawa, s. 5-10.
15. Sikorska A., (2002): *Struktura społeczno-demograficzna ludności wiejskiej*, [w:] *Analiza produkcyjno-ekonomicznej sytuacji rolnictwa i gospodarki żywnościowej w 2001*, IERiGŻ, Warszawa, s. 427.
16. Sikorska A., (2003): *Gospodarstwa socjalne w strukturze społeczno-ekonomicznej wsi*. Studia i Monografie, z. 117, IERiGŻ, Warszawa, s. 8.
17. Sikorska A., (2006): *Rynek ziemi rolniczej. Stan i perspektywy*, Analizy rynkowe nr 9, IERiGŻ-PIB, Warszawa, s. 7-8.
18. Sikorska A., (2007a): *Przemiany w strukturze agrarnej gospodarstw chłopskich*, IERiGŻ-PIB, Warszawa, s. 21-22.
19. Sikorska A., (2007b): *Przeobrażenia w strukturze społeczno-ekonomicznej wsi a proces włączania się Polski do Wspólnej Polityki Rolnej Unii Europejskiej*. Synteza, IERiGŻ-PIB, Warszawa, s. 100.
20. Szemberg A., (1998): *Przemiany agrarne i ludność w indywidualnym rolnictwie*, [w:] *Analiza produkcyjno-ekonomicznej sytuacji w rolnictwie i gospodarce żywnościowej w 1997 roku*, IERiGŻ, Warszawa, s. 192.
21. Szemberg A., (2001): *Przemiany struktury agrarnej w rolnictwie chłopskim*, [w:] *Rynki wiejskie: ziemia, kapitał, praca*, IRWiR-PAN, Warszawa, s. 14.
22. Woś A., (1994): *Tendencje rozwoju rolnictwa w warunkach rynkowych*, SGH. Warszawa, s. 34.
23. Woś A., (1998): *Wzrost gospodarczy i strategie rozwoju polskiego rolnictwa*. Eseje 2, IERiGŻ, Warszawa, s. 61.
24. Woś A., (2000): *Układy strukturalne w rolnictwie chłopskim (w świetle danych rachunkowości rolnej)*. Komunikaty, Raporty, Ekspertyzy, nr 465, IERiGŻ, Warszawa, s. 9.
25. Woś A., (2001): *Rolnictwo polskie wobec procesów globalnych w gospodarce*, Studia i Monografie, z. 105, IERiGŻ, Warszawa, s. 26.
26. Zegar J. St. (2000): *Dochody gospodarstw chłopskich w okresie transformacji (na przykładzie gospodarstw prowadzących rachunkowość rolną)*, Studia i Monografie, z. 101, IERiGŻ, Warszawa, s. 19 i 27.
27. Zwoliński Ł. (2007): *Wybrane cechy demograficzne ludności wiejskiej w latach 2000-2005*, Raport nr 58, IERiGŻ-PIB, Warszawa, s. 9 i 45.