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Roman Kulikowski

Institute of Geography and Spatial Organization
Polish Academy of Sciences,
Twarda 51/55, 00-818 Warsaw, Poland
e-mail: r.kulik@twarda.pan.pl

The changes in and the spatial patterns of Polish agriculture

Abstract: *Although the contribution of agricultural production to national income decreased from 58% in 1947 to 3.3% in 2001, Polish agriculture still provides employment to roughly 20% of the total of persons employed in the country. Average size of individual farms increased from 7.2 hectares in 1990 to 8 hectares in 2001. The small acreage of private holdings is prevalent in the southern provinces of the country. Worsening of the profitability of agricultural production at the beginning of 1990s (the loss of eastern markets), liquidation of state farming, increase of fallow areas, and a marked fall of funds in farm investments entailed a collapse in crop production, in animal breeding (especially in cattle raising) and in agricultural production as a whole. Gross agricultural production showed in 2000 the decrease by 12.4% in comparison with its level in 1990.*

Key words: *agriculture, spatial differentiation, labour resources, agrarian structure, land and labour productivity.*

Introduction

The political changes in Poland taking place after 1989 have started a number of processes aiming at transition from the centrally controlled economy to the market economy. Furthermore, Poland belongs to the group of countries, which will become EU members in May 2004. Like the whole economy, Polish agriculture faces difficult problems resulting from the need of adopting it to integration with the structures of United Europe.

The statistical basis for the analysis here presented is constituted by the statistical data from agricultural censuses, general and branch agricultural statistical yearbooks and the publications devoted to the problem (Bański 2001; Kulikowski 2000, 2001; Niemczyk 2001; Orłowski 2001; Poczta, Wysocki 2002, *Polska Wieś* 2002; *Strefy ubóstwa*... 1998; Szafraniec 2001; Wawrzyniak 1999; Wilkin 2000; Woś 2001; Zegar 2001).

Contribution of agriculture to Polish economy

During the post-war period agriculture has long been an important division of Poland's economy. In the last years, though, its role is more significant in terms of the work place for a big number people, and less so as a component of GDP. The post-war period in Poland was characterised by vast structural changes of the income sources of rural population. In 1950 farming was the source of income for 73% of rural population, this proportion having declined to 27% by 1998. At the same time the proportion of the agricultural population receiving social benefits grew from 2% to 35% (retirement pays – 14.8% disability payments – 12.5%, unemployment and other social benefits – 7.7%, see Zegar 2001 and Niemczyk 2001).

Agricultural land occupied 54% of total Polish area in 2002 (16899.3 thousand hectares), the surface of agricultural land having declined since 1996 by 1439.9 thousand hectares (6.9%). More significant changes in land ownership have taken place in the 1950s, when the doctrine of socialisation was put to practice. This caused a rise in the share of the state and collective farming, blocking for many years the development of peasant agriculture. The transformation of the 1990s was characterised by two periods of deterioration of rural economy and macroeconomic conditions for agricultural production. First, the years: 1990–1995, was marked by the liquidation of state farms and rural trade co-operatives, worsening, first of all, the living standards of the former state farm workers. The second, from 1996 on, is characterised by the fact that the price ratio of agricultural products to the non-agricultural ones deteriorated visibly (Zegar 2001). At the beginning of the 1990s the efficiency of production factors in agriculture dropped significantly in comparison with other Polish economic sectors, what resulted in a serious reduction of incomes of agricultural population. In the years 1999–2000 the income of agricultural population, in comparison with the non-agricultural one, reached the lowest ratio during the whole post-war period. The parity indicator of agricultural income amounted to only 40% (Orłowski 2001). According to A. Woś (2001) the disposable gross revenues per person employed in agriculture constitute only 22% of those outside agriculture. In 1997 62.5% of total rural population lived below the social minimum, and 8.7% below the existential minimum (*Strefa ubóstwa*... 1998).

Polish food sector engages about 31% of total country's employment. Out of the total resources of labour in Polish agribusiness almost 88% is constituted by the persons employed in agriculture. At the same time agriculture has the shares of 34.6% in gross production and 27.7% in total investments in that sector (*Polska Wieś* 2002, diagram 3.1, p. 38).

Contribution of agriculture to national income has been decreasing from 58% in 1947 to 34% in 1960, 12% in 1989, and 3.3% in 2001 (Figure 1). This was largely due to the more dynamic growth of other branches of national economy and the collapse of agricultural production, connected with the liquidation of the state farms after 1991, the collective farming having dominated in some north-

ern and western areas of the country. The indicator of agriculture's share in national income varies across space from 1–2% in highly urbanised areas (the regions around Warsaw, Łódź and Katowice) up to 8% in the eastern part of the country (EU-15 – 1.7%, Germany – 0,8%, United Kingdom – 1%, France – 1.9%, Italy 2.7%, Greece 8%) (Poczta, Kołodziejczak 2002).

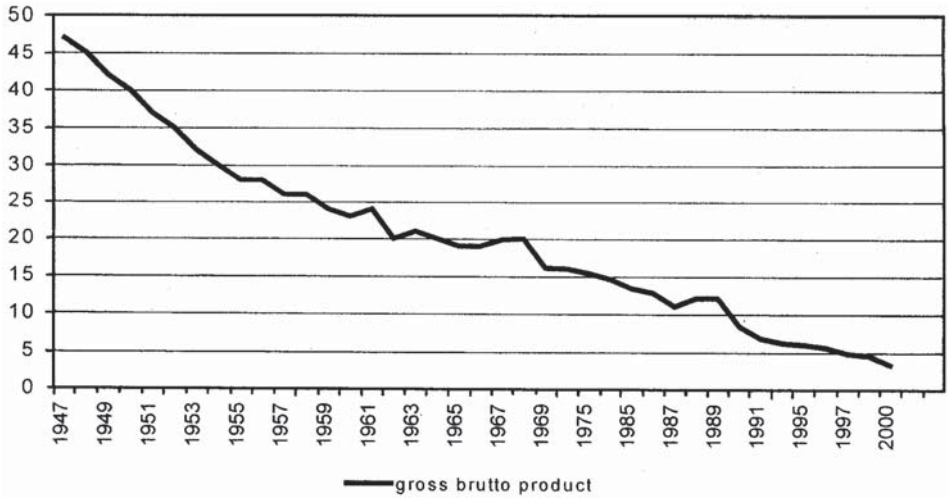

Figure 1. Percentage share of agriculture in total Polish gross brutto product

Employment in agriculture

Polish agriculture was engaging about ⅕ of the total country's employment in 2001 (EU-15 – 5%, United Kingdom – 1.9%, Germany – 2.9%, France – 4.6%, Portugal – 13.3%, Greece – 19.8%). The data from the 1996 Agricultural Census show that 54.2% of farmers and 45.2% of rural inhabitants over the age of 15 undertake other income-generating activities simultaneously with farming. The average number of persons actively employed in agriculture per 100 hectares of agricultural land dropped in Poland from 24 persons in 1989 to 22.9 persons in 2000. This number, likewise, varies considerably across space, ranging from 7 persons in the Western Pomeranian voivodship and 9 persons in the Warmian-Masurian voivodship to about 50 persons in the Carpathian piedmont regions (Figure 2).

W. M. Orłowski (2001) estimates the number of farm workers in Poland as equal roughly 2.5 million, and the number of persons forming the so-called "social sector" (not working and running agricultural activity as a secondary one) as equal at least 1.5 million. According to this author the real share of population actively employed in Polish agriculture amounts to 16% and is comparable with the average for the OECD countries. A. Woś (2001) estimates the number of people constantly involved in agriculture at 1.6 million.

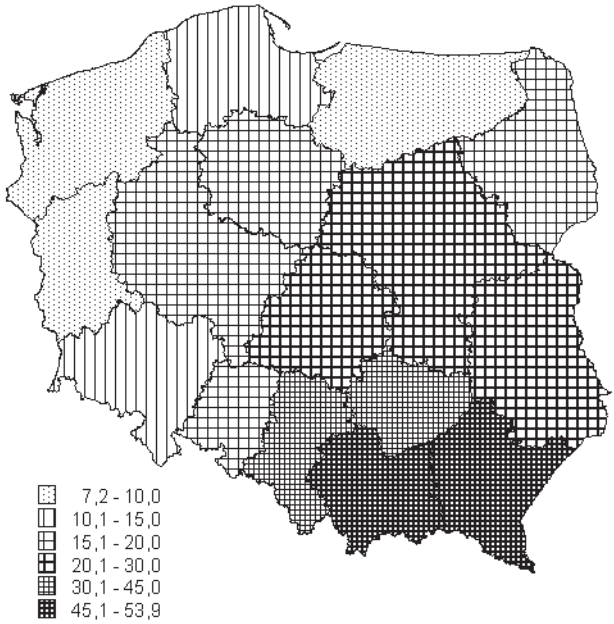

Figure 2. Number of persons actively employed in agriculture pre 100 hectares of agricultural land, 2000

According to W. Poczta and A. Mrówczyńska (2002) the number of fully employed in Polish agriculture amounts to 14.7 persons per 100 hectares of agricultural land, and varies across space from 4.7 persons in the Lubusz voivodship to 31 persons in the Little Polish voivodship.

The changes in labour resources in the 1990s encompassed their increase in the south-east and central Poland, where considerable surplus was noted, and a decrease in the northern and western parts of the country. In the EU the average number of persons employed in agriculture per 100 ha of agricultural land is much lower, and ranges in particular countries from 2.6 persons in United Kingdom through 3.5 in France and Spain, 9 in Italy, up to 16 in Portugal (Figure 3).

The rural and agricultural population is characterised by the lower level of education in comparison with the urban population. In 1998 44.6% of farmers had the primary and incomplete primary education. Only 17.5% of agricultural population living on rural territories have secondary education (in towns: 34.3%). In the majority of EU-15 the level of education of rural population is much higher (Figure 4).

Agrarian structure

At the beginning of the 1990s significant changes took place in Polish agrarian structure – especially in terms of land ownership. In 1989 private farming

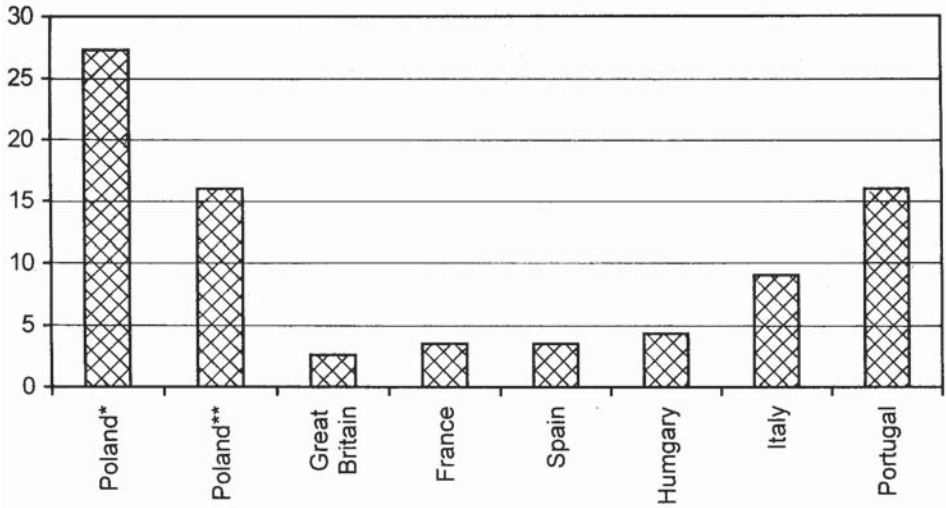

Figure 3. Percentage share of population actively employed in agriculture in total employment
* data according Main Statistical Office
** data according Orłowski, 2001

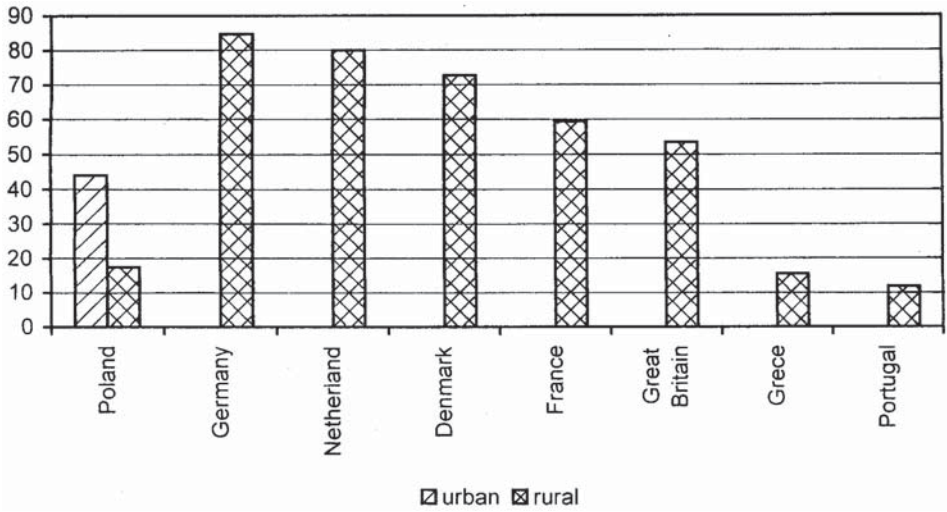

Figure 4. Percentage share of rural population with high and university education in total number of rural population, 2000

owned 76.2% of total agricultural land in Poland, state farms possessed 18.8%, 3.8% was under collective ownership, and some 0.3% was kept by the agricultural circles. In the years 1992–1995 state farms and agricultural circles were liquidated and their land, together with the land belonging to the State Land Fund was taken over by the Agency for Agricultural Property of the State Treasury. Under the administration of the Agency some 4 million hectares were

given to the users, out of which 2.9 million were leased and barely 380 thousand were sold. As the result of transformations the share of land used by private agriculture increased to 92% of total agricultural area and the average size of a private individual farm has increased from 7 ha in 1990 to 8 ha of agricultural land in 2001. Simultaneously, the number of individual holdings decreased from 2138 million to 1882 million in parallel with the process of polarisation involving the increase of the share of the smallest holdings (1–2 ha) and of farms above 15 ha. The smallest acreage of holdings is observed in the southern provinces of the country, while the provinces featuring the largest acreage were in the North, where farms of more than 15 ha constitute about 70% of total agricultural area. (Figure 5). In spite of these positive changes the average acreage of private farm in Poland was still more than two times smaller than in the countries of the European Union (Figure 6).

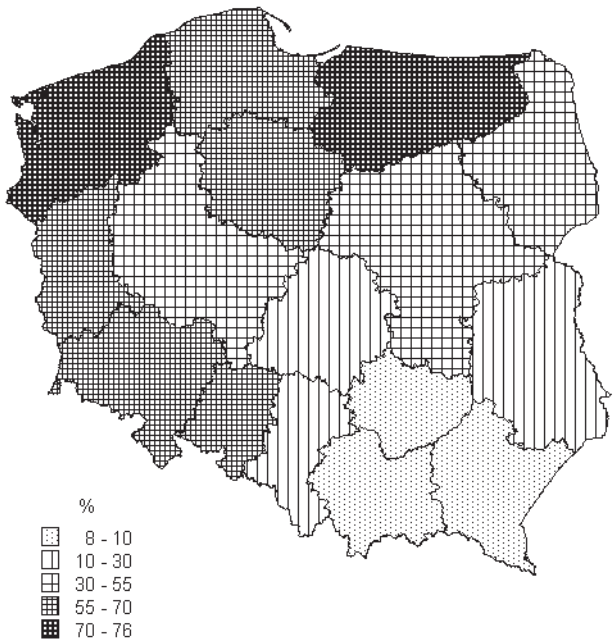

Figure 5. Agricultural farms above 15 ha as a percentage of total area of agricultural land, 1999

Investment expenditures and technical production means in agriculture

Financial expenditures in agriculture have significantly decreased in the years 1990–1999 (in constant prices), so that in the last year of this period they amounted to 42% of the level from 1990. There was also a wide range of values of this indicator across space: from 317 PLN/ha (Polish zlotys per hectare) in the

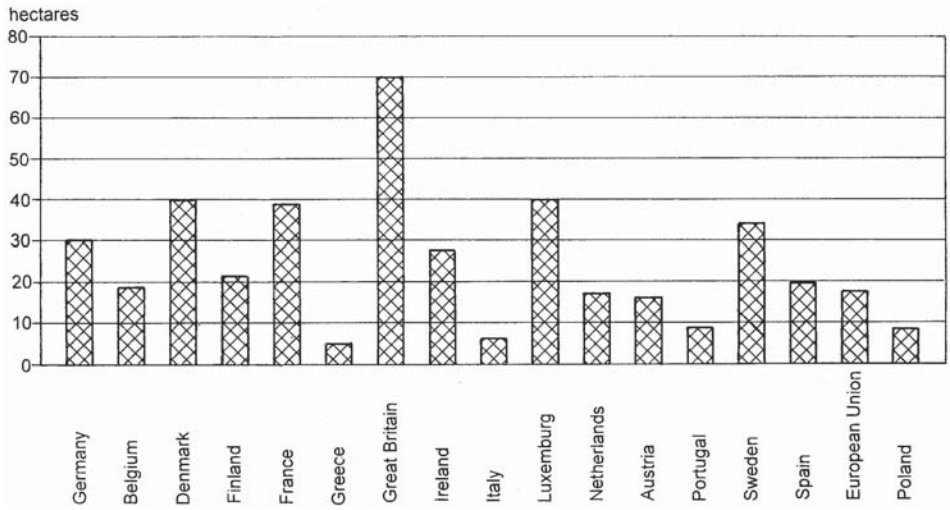

Figure 6. Average size of farms in Poland and in the UE countries, 2000

former province[1] of Poznań (Greater Poland) to 31 PLN/ha in the former provinces of Krosno (Carpathians) and Jelenia Góra (Sudety Mountains).

In the years 1989/1990–1992/1993 a distinct collapse of application of mineral fertilisers was observed – from 164 to 66 kg of NPK per hectare of agricultural land. The greatest decrease of volumes of mineral fertilisers applied was observed in that period in the northern and western parts of Poland in connection with the decline of plant production in the former state farms. By 2000/2001 application of mineral fertilisers increased up to 85 kg, though it is still much lower than in most of the EU countries (Great Britain – 121 kg, Denmark – 152 kg, France – 162 kg, Germany – 172 kg, Belgium – 200 kg, The Netherlands – 236 kg).

Sale of plant protection chemicals decreased from 20,600 tons (active content) in 1989 to 8,800 tons in 2000. During the last two years only some 0.62 kg of plant protection chemicals per 1 ha of arable land was used.

Total traction in agriculture in Poland grew from 9 million traction units in 1990 to 10 million in 1999, and the animal traction share, associated with the decrease in the horse number, shrank in the same period from 9.7% to 4.7%. The number of tractors increased during this time interval from 1.1 million to 1.3 million. The area of agricultural land per 1 tractor decreased from 16 ha in 1990 to 14 ha in 2000 (in the Netherlands – 5.2, in Italy – 5.6, in Germany – 9.7, in France – 14). In fact, over half of these tractors are old, produced before 1980. There is lack of small tractors adapted to the very numerous small farms.

[1] Between 1976 and 1998 Poland was divided into 49 provinces of the size of French departments, after which the larger units (16) were re-established.

Agricultural land use and crop production

Poland belongs to the countries with high percentage of agricultural land in the total area (54%) and a very high percentage of arable lands in the total of agricultural lands (77.2%). The data from the 2002 Agricultural Census show, however, that since 1996 the area of arable land decreased by 5.1% (0.7 millions of hectares), and the sown area shrank by 12.5% (1.5 million hectares). In the years 1990–2002 fallow lands increased from 163 thousand hectares (1.1% of total arable land) to 2.3 million of hectares in 2002 (13.6% of total agricultural area and 17.6% of total Polish arable land). The highest shares of fallow lands occur in the northern and western regions of Poland (20–25%), where this is associated with the extensification of agricultural production (the former provinces of Olsztyn, Słupsk, Koszalin and Zielona Góra), and in the former province of Warsaw, where the cause of fallowing is the wish of changing the function of the agricultural land into the non-agricultural one.

In 2002 the agricultural use of land for crop production was dominated by cereals (8.3 millions hectares and 77% of total area of crops, 65.6% in 1995), including wheat (22.4%, 18.7% in 1995), rye (14.5%, 19% in 1995), cereal mixtures (12.7%), and barley (9.8%, 8.1% in 1995). Among root crops potatoes dominate (7.5%, 11.8% in 1995); industrial crops took 7%, with 4.3% under rape seed. The changes in the crop structure during the 1990s consisted in the growth of share of the cereal area (by about 20% with respect to the year 1990 and by 11.5% in the years 1995–2002). There was a particularly steep increase in the shares of wheat and cereal mixtures, accompanied by a decrease of the area under rye and barley. Regarding other crops the areas under potatoes and crops for green forage decreased during the period in question.

Yields of cereals decreased from 3.2 tons per hectare in the years 1989–1991 to 2.7 tons in 1992–1995, then to 2.5 tons in 2000, and then increased to 3.2 tons in 2001–2002, still far below the levels of Germany – 6.2 tons, France – 7.2, Great Britain – 7.0.

Crop production in 2000 was lower by 17.5% in comparison with its value from 1990, the cereal production having dropped from 27 million tons in 1990–1991 to 20.8 million tons in 1992–1993 (decrease of yields and of the sowing area), then increased to 24 million tons in 1999–2000, and to almost 27 million tons in the years 2001–2002.

Production of potatoes decreased from 35.4 million tons in 1989–1990 to 22 million tons in 1999–2000 and 17.5 million tons in 2001–2002. Yields of potatoes in Poland depended very much on weather conditions and have been varying from 13.3 tons per ha in 1992 to 20 tons in 1998, 16.2 tons in 2001 and 19.3 in 2002. In selected EU countries these yields were as follows: in Belgium – 49 tons, in Netherlands – 43 tons, in Germany – 40.2 tons, in France – 37 tons.

The total harvests of vegetables (5.5–6.0 million tons) do not show bigger variations except for the lower harvests in 2002, while production of fruits from trees

rose from 1.8 million tons in 1990–1995 to 2.3 million tons in 1999–2000 and 2.8 million tons in 2001–2002. More than $^1/_3$ of tree fruits came from the small, but very intensive orchard region located South of Warsaw.

Animal breeding

In comparative terms the value of animal production in Poland decreased by 8.3% in the years 1990–2000. Two species of farm animals are of greatest importance in animal breeding in Poland – cattle and pigs. In the years 1990–2002 the number of cattle stock decreased from 10 million heads to 5.5 million heads, reaching the level close to the situation of 1947. The average number of cattle per 100 hectares of agricultural land decreased from 54 heads in 1990 to 35 heads in 2002. The highest number of cattle per 100 ha of agricultural land is noted in the Podlasie Province (53 heads), the lowest in the western provinces of the country (12–12.6 heads). The fact that the number of cattle dropped almost by half in the northern and western Poland was to a great extent caused by the liquidation of state farms.

The pig stock increased from 19 million heads in 1990 to 22 million in 1992, but then shrank to 18.6 million in 2002. The number of pigs per 100 ha of agricultural land decreased from 110 heads in 1992 to 97 heads in 1997 and increased in 2002 to 110 heads – yet not because of a pig stock increase, but because of significant decrease of the area of agricultural land. This number was much higher in most of the EU countries, e.g. in The Netherlands – 572 heads, in Denmark – 444, in Belgium – 496, or in Germany – 143, but it was lower in France – 51, Great Britain – 48 and Italy – 83.

Sheep breeding was virtually completely discontinued (decrease from 4.2 million heads in 1990 to 342 thousand in 2002). A certain recession was also noted in poultry production.

Land and labour productivity

The value of agricultural production per unit of agricultural land, treated as land productivity indicator, is an important index of socio-economic efficiency of land. Land productivity measured in PLN per 1 ha of agricultural land attained in 2000 the value of 3041 PLN (about 760 USD). Out of total gross agricultural production 59.4% constitutes commercial agricultural production (62.5% in 1990). According to *Polska Wieś* (2002, Table A36) the average value of commercial agricultural production per 1 hectare of agricultural land was equal 1805 PLN in the year 2000. For spatial differentiation of the level of agricultural production is shown in Figure 7 and 8.

There are historically conditioned regional differences in the levels of agricultural development and in the levels of land productivity in Poland. High levels of land productivity characterised Greater Poland, Kujawy, Western Pomerania and Lower Silesia, as well as agricultural suburban zones of big agglomerations

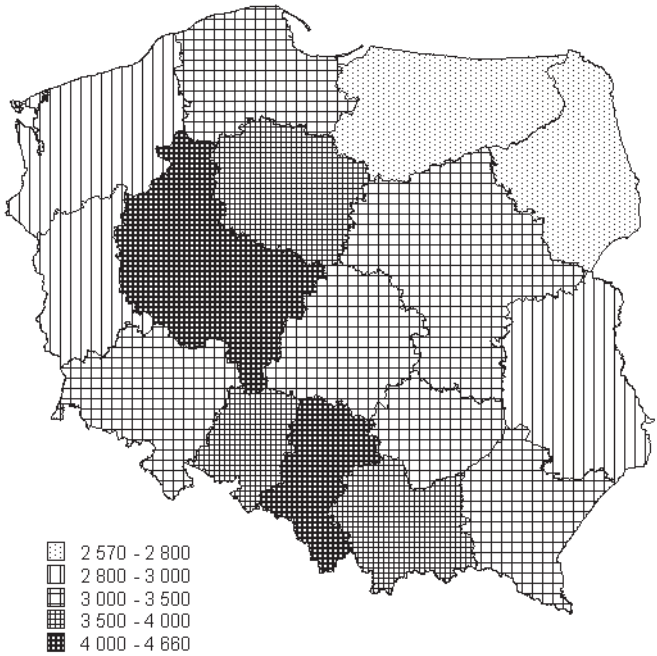

Figure 7. Value of gross agricultural production in PLN per hectare of agricultural land, 2000

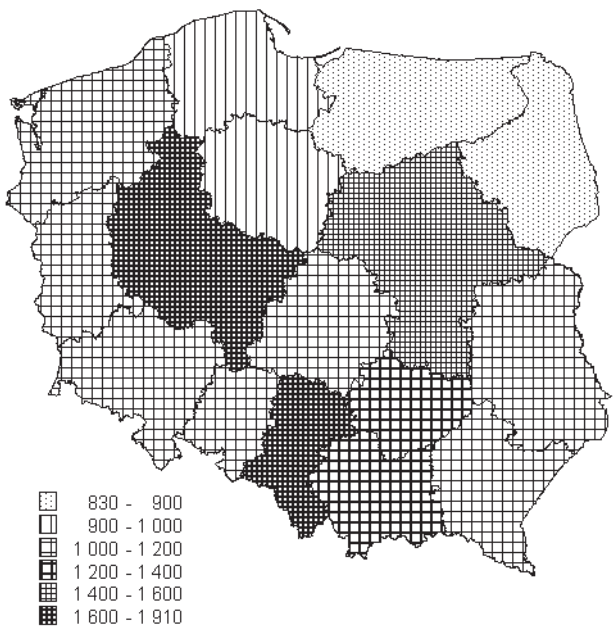

Figure 8. Agricultural added gross value in PLN per 1 ha of agricultural land, 1999

with high degree of specialisation in horticulture. The lowest level of the index mentioned was noted in central and eastern provinces, where small scale individual holdings dominate and more then half of them are subsistence farms (Figure 9 and Figure 10).

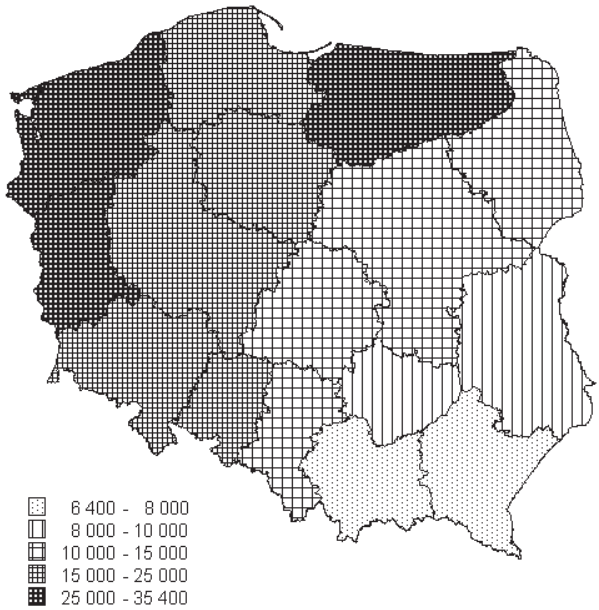

Figure 9. Value of gross agricultural production in PLN per 1 person fully employed in agriculture, 1999

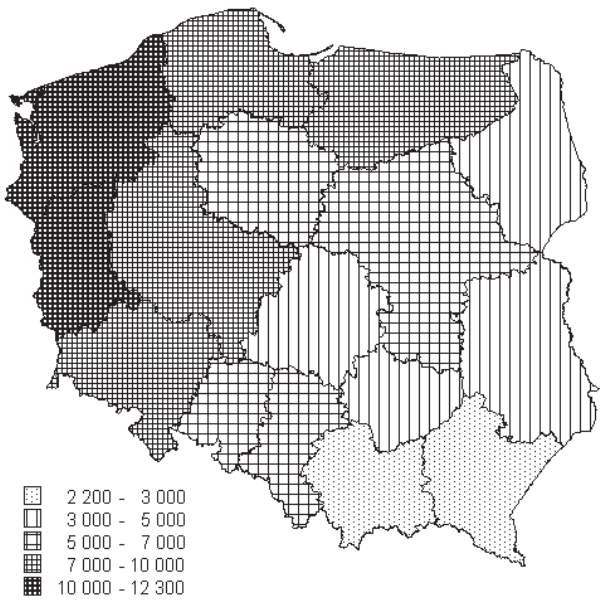

Figure 10. Agricultural added gross value in PLN per 1 person fully employed in agriculture, 1999

Another important measure of agricultural efficiency is the value of agricultural production per 1 person actively employed in agriculture. In the study here reported labour productivity is shown through the value of gross agricultural production in PLN per 1 person fully employed in agriculture. In 1999 the index mentioned attained 14,355 PLN, while the value of gross added agricultural production per one person fully employed in agriculture was equal 5113 PLN. Spatial differentiation of this first index is closely connected with the size of farms, level of education of farmers, level of mechanisation, as well as degree of specialisation of agricultural production. The spatial differentiation of labour productivity in Poland is shown in Figures 9 and 10.

Conclusions

Polish agriculture is diversified across space due to natural conditions and historical past. Stagnation or even regression of agricultural production, brought about by the technological backwardness of this sector of economy and the worsening profitability of production, caused that starting with 1993 foreign trade in agricultural and food products has been noting negative net balance in the exchange with the countries of the EU. Four times higher direct subsidies for the EU farmers and the financial support for the processed food products cause that agricultural production of these countries is and will remain more competitive than Polish agriculture. State allowances in the form of direct subsidies for agricultural producers and for maintenance of prices of agricultural products amounted to 765 EUR per1 ha of agricultural land in the EU and to the mere 172 EUR per 1 ha in Poland. The same goes for the most recent proposals of the EU Commission concerning future direct subsidies for Polish farmers (after 2004), which will be four times lower than the respective support for the EU farmers (along with 10 year transitional period).

Further processes of transformation of Polish agriculture are, however, unavoidable, although they will be significantly distributed over time, and connected with Polish membership of EU. Inclusion into the EU agricultural policy and liberalisation of agricultural trade with this group of countries may be in the future a factor of development of agricultural production. Nevertheless, according to A. Woś (2001) besides certain benefits, which are promised by integration, at the same time the integration demands certain real concessions, such as additional costs of partial loss of national independence, broadening of the range of risks and social fear of unknown future.

The hope for the resolution of these problems resides not so much in agriculture itself as in the remaining links of the food economy, which, following the model of the western European countries, ought to form with time a food system chain united by the common interest, rather than the set of isolated links. The present Polish food economy is characterised by too high employment in agriculture and too high percentage of agricultural production in the total value of production of this sector.

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