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Walenty Poczta, Wawrzyniec Czubak

The University of Life Sciences, Poznań, Poland

THE EFFECT OF POLAND'S INTEGRATION WITH THE EU ON CHANGES IN THE VOLUME OF PRODUCTION AND AGRICULTURAL INCOME

1. Introduction

Agriculture, due to its role in satisfying basic nutritional needs, its specific character manifested in the combination of economic, social and environmental functions, as well as diverse natural conditions and varying production structures [Czubak, Pawlak 2008; Erjavec et al. 1998; Rowiński 2000;], requires a certain adjustment of the market mechanism and transfer of support to agriculture [Beard, Swinbank 2001; Czyżewski, Henisz-Matuszczak 2004; Czyżewski et al. 2005]. For this reason agricultural policy has played a significant role in the process of integration between European countries and since the very beginning it has been rather common than national in character [Burkiewicz et al. 2007]. In the opinion of Kowalski and Rembisz [2002], a key factor in the scope and methods adopted within state interventionism in agriculture is the level of economic development determining the range of financial support. Among other things, this was why Poland's accession to the European Union and the incorporation into the Common Agricultural Policy (CAP) created new conditions for the development of Polish agriculture and food economy, seen as a chance to solve the most fundamental problems observed in this sector of economy [Petrick 2004; Baldwin 1995]. Despite numerous changes in the functioning of the European Community and then the European Union, the agricultural sector, thanks to the Common Agricultural Policy, has remained the focal point of public and political interests [Poczta 2003; Kulawik 2003; McCalla, Ayres 1997]. In Poland the economic and social importance of agriculture has been much greater than in most EU countries. Thus we may observe a particularly high interest, not only on the part of farmers, in the

consequences of the integration process for Polish agriculture and rural areas [Wilkin 2002]. This means that it is both essential and advisable to investigate changes occurring in the first years of Polish agriculture operating within the EU market [Poczta, Hardt 2005]. Since agriculture is first of all a real economic sphere, we need to consider the effect of this integration on production output and economic results of agriculture.

In this paper the data of Economic Accounts for Agriculture – EAA were used. Methodology of calculations is accordance with the calculations of production output and income in Eurostat.

2. Results

Poland's integration with the EU had a positive effect on an increase in the volume of agricultural output (expressed in terms of constant prices). In the period before Poland's accession to the EU (in 2000-2003) the annual average volume of agricultural production in constant prices in 2000 was 51.8 billion Polish złotys, while in the post-accession period (in 2004-2008) its average level at identical constant prices was 59.1 billion złotys, i.e. when comparing these two periods it increased by 14.1%, and its absolute annual average increment was 7.3 billion złotys (Table 1). At the same time between these two periods an increment in subsidies on products was found, which annual average in the pre-accession period was 0.4 billion złotys, while in the post-accession period its annual average was 4 billion złotys (Table 3). This means that almost half of the annual average increment in the volume of production (7.3 billion złotys) resulted from the increment in subsidies on production, while the other half was the actual increment in the volume of production.

In the first year after Poland's accession to the EU (2004) an increase in real prices of agricultural output was observed in relation to the year 2003 (by 5.3%), but they remained lower than in 2000 (by 1.3%), in the successive years (2005 and 2006) real prices of agricultural output decreased in relation to those of the year 2000, although in 2006 they increased in relation to the previous year. Only in the last two years (2007 and 2008) a definite increment of real prices was found both in relation to the earlier years and in relation to the level of agricultural product prices in 2000.

These two parameters, i.e. changes in the volume of production in the real terms and changes in real prices, jointly determine real increments of value of agricultural output. In all the years following Poland's accession to the EU their level was higher than in the pre-accession period, both in relation to that in 2003 and in 2000. Thus it may be stated that the real growth in the value of output was influenced to the highest degree by the actual increment in the volume of production and an increase in the level of subsidies on production, while a positive effect of the real increase in prices of the agricultural sector was relatively modest and was observed in the highest degree as late as the years 2007 and 2008.

Table 1. Agricultural output

Specification	2000	2001	2002	2003	2004	2005	2006	2007	2008
1. Value of agricultural output (constant prices 2000)									
1.1. million zł	49996.5	52500.3	52686.9	51974.2	59178.0	58749.3	58089.1	61095.6	58624.7
1.2. 2000=100	100.0	105.0	105.4	104.0	118.4	117.5	116.2	122.2	117.3
1.3. previous year=100	96.1	105.0	100.4	98.6	113.9	99.3	98.9	105.2	96.0
2. Nominal increase of prices of final agricultural output									
2.1. 2000=100	100.0	104.0	97.8	99.6	109.2	103.1	108.2	123.5	132.6
2.2. previous year=100	113.3	104.0	94.0	101.8	109.6	94.4	105.0	114.1	107.4
3. Value of agricultural output (current prices)									
3.1. million zł	49996.5	54609.6	51528.7	51758.4	64595.2	60556.2	62849.4	75434.6	77716.1
3.2. 2000=100	100.0	109.2	103.1	103.5	129.2	121.1	125.7	150.9	155.4
3.3. previous year=100	108.9	109.2	94.4	100.4	124.8	93.7	103.8	120.0	103.0
4. Real growth of prices of agricultural sector									
4.1. 2000=100	100.0	100.5	92.4	93.8	98.7	90.8	93.9	103.8	108.1
4.2. previous year=100	105.6	100.5	92.0	101.4	105.3	92.0	103.4	110.5	104.1
5. Real growth of value of production									
5.1. 2000=100	100.0	105.6	97.4	97.5	116.9	106.7	109.2	126.8	126.7
5.2. previous year=100	101.5	105.6	92.3	100.1	119.9	91.3	102.3	116.2	99.9

Source: Economic Accounts for Agriculture, the authors' own elaboration.

In contrast, a markedly higher level was recorded for nominal prices of the agricultural sector and the value of agricultural output expressed in current prices (Table 1). It needs to be added here that in the pre-accession period it had been one of the expected consequences of the integration process [Erjavec et al. 1998]. Nominal prices of agricultural output in each of the post-accession years were higher both in relation to prices in 2003, i.e. the year preceding Poland's accession to the EU, and in relation to prices in 2000. Except for the year 2005, in all the other years of the post-accession period (2004-2008) there was a nominal increase in prices of final agricultural output in relation to the previous year. This resulted in a situation when the annual average value of agricultural output in current prices in the post-accession period (the years 2004-2008) was 68.2 billion złotys and it exceeded the average annual value of agricultural output in current prices in the pre-accession period, amounting to 52 billion złotys, by 16.2 billion złotys, i.e., by over 30%. The increment in nominal prices and the value of output in current prices is crucial in confrontation with an increase in nominal prices of intermediate consumption and it determines the levels of generated income.

In the first post-accession year (2004) there was a one-time, but very modest increment in the volume of intermediate consumption (Table 2) both in relation to 2003 (by 4.7%) and in relation to 2000 (by 4.8%). In the following years after Poland's accession to the EU, after a slight decrease in the volume of intermediate consumption in the year 2005, it again increased slightly and stabilized. In the pre-accession period (the years 2000-2003) the annual average volume of intermediate

consumption in terms of constant prices of the year 2000 was 31.5 billion złotys, while in the period following Poland's accession (2004-2005) it was 32.4 billion złotys, i.e. considering the post-accession period to the last four years before accession the volume of intermediate consumption increased by as little as 2.9%, i.e. more slowly that the actual (without subsidies on production) increment of the volume of agricultural output, which increased between these two periods by 7.2%.

Table 2. Intermediate consumption in agriculture

Specification	2000	2001	2002	2003	2004	2005	2006	2007	2008
1. Value of intermediate consumption in agriculture (constant prices)									
1.1. mln zł	31299.0	31516.5	31740.9	31329.1	32804.6	31936.5	32654.3	32480.8	32179.8
1.2. 2000=100	100.0	100.7	101.4	100.1	104.8	102.0	104.3	103.8	102.8
1.3. previous year =100	96.0	100.7	100.7	98.7	104.7	97.4	102.2	99.5	99.1
2. Nominal increase of prices of intermediate consumption									
2.1. 2000=100	100.0	104.6	102.1	107.0	115.6	112.9	115.3	135.3	148.9
2.2. previous year =100	115.4	104.6	97.6	104.8	108.1	97.6	102.1	117.4	110.0
3. Intermediate consumption of agricultural sector (current prices)									
3.1. mln zł	31299.0	32958.0	32393.8	33511.8	37923.6	36046.6	37638.1	43961.3	47916.7
3.2. 2000=100	100.0	105.3	103.5	107.1	121.2	115.2	120.3	140.5	153.1
3.3. previous year =100	110.8	105.3	98.3	103.5	113.2	95.1	104.4	116.8	109.0
4. Real increase of prices of intermediate consumption									
4.1. 2000=100	100.0	101.1	96.5	100.7	104.6	99.5	100.1	113.8	121.4
4.2. previous year =100	107.6	101.1	95.4	104.4	103.8	95.1	100.6	113.7	106.7
5. Real increase of value of intermediate consumption									
5.1. 2000=100	100.0	101.8	97.8	100.8	109.6	101.5	104.4	118.1	124.8
5.2. previous year =100	103.3	101.8	96.1	103.0	108.7	92.6	102.9	113.1	105.7

Source: Economic Accounts for Agriculture, the authors' own elaboration

In the first post-accession year also a real increase in the prices of intermediate consumption was recorded in relation to the previous years, with a stabilization observed in the next two years and a repeated significant increase in real prices of intermediate consumption was found as late as 2007 and 2008. These two parameters, i.e. the increment in the volume of intermediate consumption and its real prices, caused a significant (almost 10%) increment in the real value of intermediate consumption in the year 2004.

Throughout the post-accession period the real value of intermediate consumption was higher than in the analyzed pre-accession period, while in 2005 it decreased in relation to the previous year.

The nominal increase in prices of intermediate consumption (Table 2) exceeded the respective increase in nominal prices of final agricultural output (Table 1) in 2005, 2007 and 2008, while in 2004 and 2006 the situation was more advantageous from the point of view of farmers, since nominal prices of final agricultural output were increasing faster. Generally it may be concluded that in the post-accession

period in the agricultural sector the increments in nominal prices of agricultural output and outlays were similar and did not cause any dramatic changes in the economic conditions of production, i.e. the process of integration with the EU and the Single European Market stabilized exchange conditions for agriculture.

The real actual increment in the volume of agricultural output, the comparable rate of increment in nominal prices of agricultural output and intermediate consumption (the identical rate of increase in prices of the agricultural sector and prices of incurred outlays at the occurring surplus in the value of output over outlays brings about an increase in income), and first of all an increased support for the agricultural sector with subsidies, at the stabilization of the other items being a burden for agricultural income, caused a rapid increment in agricultural entrepreneurial income at Poland's accession to the EU (Table 3).

Table 3. Income and subsidies of agricultural sector

Specification	2000	2001	2002	2003	2004	2005	2006	2007	2008
1. Agricultural entrepreneurial income (current prices)									
1.1. mln zł	9094.6	11310.0	8986.0	8195.7	20197.5	18336.4	20666.6	27350.3	23397.6
1.2. 2000=100	100.0	124.4	98.8	90.1	222.1	201.6	227.2	300.7	257.3
1.3 previous year =100	112.0	124.4	79.5	91.2	246.4	90.8	112.7	132.3	85.5
2. Dynamics of income of agricultural entrepreneurial (constant prices)									
2.1. 2000=100	100.0	120.2	93.4	84.8	200.9	177.7	197.3	252.8	209.7
2.2. previous year =100	104.4	120.2	77.7	90.8	236.8	88.4	111.1	128.1	83.0
3. Subsidies on products (current prices)									
3.1. mln zł	269.7	386.7	518.0	491.1	3692.4	3747.9	4461.3	3670.1	4222.4
3.2. 2000=100	100.0	143.4	192.1	182.1	1369.1	1389.7	1654.2	1360.8	1565.6
3.3. previous year =100	115.0	143.4	134.0	94.8	751.9	101.5	119.0	82.3	115.4
4. Other subsidies (current prices)									
4.1. mln zł	589.8	474.1	410.9	311.2	4303.0	4762.3	6303.8	7864.5	6301.4
4.2. 2000=100	100.0	80.4	69.7	52.8	729.6	804.7	1068.8	1333.4	1068.4
4.3. previous year =100	112.4	80.4	86.7	75.7	1382.7	110.3	132.8	124.8	80.1
5. Total subsidies of agricultural sector (current prices)									
5.1. mln zł	859.5	860.8	928.9	802.3	7995.4	8510.2	10765.1	11534.6	10523.8
5.2. 2000=100	100.0	100.2	108.1	93.3	930.2	990.1	1252.5	13420.0	1224.4
5.3. previous year =100	113.2	100.2	107.9	86.4	996.6	106.4	126.5	107.1	91.2
6. Share of subsidies in agricultural entrepreneurial income (current prices) (%)									
	9.5	7.6	10.3	9.8	39.6	46.4	52.1	42.2	45.0

Source: Economic Accounts for Agriculture, the authors' own elaboration

In terms of current prices this income in the first post-accession year in relation to that of 2003 increased by 146.4%, while in relation to 2000 it was by 122.1%, whereas in constant prices this increment was slightly lower, although still very high, as it amounted to 136.8% and 100.9%, respectively. The average level of annual agricultural entrepreneurial income in current prices in the pre-accession

period (2000-2003) was 9397 million złotys, while in the post-accession period (2004-2008) it was 21 990 million złotys, i.e. it increased by 134%, whereas in real terms its increase may be estimated at approx. 102%. Thus we may talk here of a doubled average annual income of the agricultural sector in the post-accession period (2004-2008) in relation to the pre-accession period (2000-2003). As it was already indicated, it would not have been possible without a definite increase in the level of subsidies. In current prices in the last four years before Poland's accession to the EU their average annual level was 863 million złotys, while in the five years following the accession their average annual value was 9 866 million złotys, i.e. it was over 11 times higher. On the basis of calculations presented above we may estimate that the average annual increment of income in the post-accession period was in over 70% caused by an increment in the level of subsidies. The role of subsidies in the modification of agricultural income in the post-accession period is confirmed by the share of subsidies in income, which average annual level in the period before Poland's accession to the EU was slightly over 9%, while its average annual level in the post-accession period was 45%.

Polish agriculture following our country's integration with the EU in view of the other, especially "old" member states, recorded a high growth rate for agricultural output (Table 4). Agricultural output in Poland in 2007 exceeded its level in 2001 by 34.9%, while in the same period the increment of agricultural output in the EU-27 was 4.7%, and that of the EU-12 was 28.6%. A higher increase of agricultural output than that of Polish agriculture in that period was recorded only for agriculture in the Baltic states. Despite a significant increase of agricultural output in Poland in the post-accession period, due to its relatively low intensity, the share of Polish agriculture in the volume of agricultural output generated by agriculture within the EU-27 was as little as 5.7%.

Very high labour resources in Polish agriculture, high land resources, low capital outlays as well as a relatively low level of output in relation to the resources available in Polish agriculture result in the low productivity of its land and labour resources (Table 4). Land productivity, mainly as a result of the lower production intensity and lower intensity of agricultural production organization (a high share of cereals in the cropping structure and relatively low stocking rates of farm animals), is markedly (by 36%) lower than that recorded in the EU-27 and it is almost 50% lower than that in EU-15 countries. A land productivity lower than that of Polish agriculture is found for agriculture in the Baltic states, Romania, Bulgaria, the Czech Republic or Slovakia. The relatively low land productivity, at the satisfied domestic demand and surplus generated in foreign trade in agri-food products, do not directly justify negative opinions; however, it is only on condition that it leads to cheaper production, thanks to the lower capital intensity of the production process.

Table 4. Gross agricultural output and productivity of resources in European Union countries (constant prices)

Country	2002	2003	2004	2005	2006	2007			UE-27 = 100	Productivity		
	Indices (previous year = 100)						2001 = 100	mln euro		land resources (production in euro per 1 ha Arable Land)	labour resources (production in euro per 1 AWU)	capital outlay (production in euro per 1euro of outlay*)
Austria	96.5	100.3	103.2	92.2	105.2	112.0	108.5	6013	1.7	1885.5	38348.2	1.18
Belgium	90.7	102.6	102.7	95.3	102.7	107.5	100.5	7304	2.1	5315.9	110666.7	1.29
Bulgaria	94.2	92.3	108.3	98.8	103.3	97.7	93.8	3038	0.9	1113.2	6144.8	1.38
Cyprus	.	.	98.9	99.8	103.1	101.6	.	600	0.2	3947.4	23076.9	1.96
Czech Republic	100.6	88.5	123.5	94.3	103.1	122.6	131.1	4238	1.2	1204.7	30687.9	1.17
Denmark	91.7	98.5	103.9	91.9	103.1	113.0	100.5	9058	2.6	3401.4	155102.7	1.14
Estonia	99.1	102.4	110.0	109.7	102.3	128.6	161.0	629	0.2	693.5	19118.5	1.35
Finland	98.6	99.0	101.1	101.9	87.1	116.9	102.3	4089	1.2	1784.0	59693.4	1.00
France	99.3	98.1	102.9	98.4	95.2	109.7	103.0	64709	18.8	2345.3	71835.0	1.37
Germany	93.2	97.2	108.6	87.3	103.7	113.3	100.8	45195	13.1	2669.2	81550.0	1.20
Greece	100.5	103.3	101.1	99.2	86.3	102.8	92.4	10320	3.0	2590.4	17680.3	1.91
Hungary	105.8	91.5	117.9	93.9	98.0	111.2	116.7	6487	1.9	1533.9	14123.7	1.27
Ireland	98.9	102.4	103.4	92.8	96.0	108.6	101.5	5973	1.7	1443.1	41536.9	1.25
Italy	99.4	101.1	105.4	90.8	98.4	102.9	97.3	43096	12.5	3391.2	35470.0	1.43
Latvia	101.0	95.1	118.4	113.5	113.0	124.9	182.3	946	0.3	533.3	8808.2	1.20
Lithuania	101.6	102.9	111.4	116.8	98.6	126.8	170.0	1953	0.6	737.3	17131.6	1.30
Luxembourg	101.1	99.9	104.4	88.5	100.7	113.0	106.2	271	0.1	2068.7	73243.2	1.17
Malta	99.1	92.0	97.5	98.7	100.8	101.6	89.9	119	0.0	11900.0	28333.3	1.60
Netherlands	98.7	100.2	99.7	101.7	106.6	104.1	111.2	22883	6.6	11955.6	119182.3	1.35
Poland	89.9	88.0	121.7	105.7	107.4	123.2	134.9	19763	5.7	1276.9	8595.2	1.52
Portugal	96.8	101.5	106.0	92.7	103.9	98.0	98.3	6598	1.9	1792.9	17632.3	1.27
Romania	94.3	106.5	120.5	92.8	109.9	99.8	123.3	13202	3.8	949.3	5957.6	1.28
Slovakia	102.9	99.0	119.2	89.3	103.5	117.1	131.4	1924	0.6	1023.9	21166.1	1.12
Slovenia	109.4	89.4	113.9	97.4	99.9	106.3	115.2	1131	0.3	2312.9	13464.3	1.26
Spain	101.2	108.7	98.6	94.9	94.1	107.8	104.4	39031	11.3	1570.3	41557.7	1.90
Sweden	101.3	100.8	100.2	89.2	99.4	114.8	104.2	4670	1.4	1497.8	68175.2	1.05
United Kingdom	101.4	94.3	106.0	84.3	101.2	107.9	93.3	21647	6.3	1362.0	77008.2	1.24
EU-15	98.2	100.3	103.5	93.4	98.4	108.0	101.2	290855	84.3	2336.8	51676.3	1.37
EU-12	95.8	96.1	118.8	98.6	105.6	112.9	128.6	54029	15.7	1132.2	8905.5	1.38
EU-27	97.9	99.8	105.3	94.1	99.4	108.7	104.7	344 884	100.0	2003.0	29489.1	1.37

* Sum of intermediate consumption and depreciation.

Source: the authors' own elaboration on the basis of Eurostat data.

A far more important problem in Polish agriculture is the productivity of labour resources, as it directly determines the value of generated income per capita. Labour productivity in Polish agriculture, measured by produced output, is 3.4 times lower than the average in the EU-27 and 6 times lower than in the EU-15 (among all the EU member states a lower labour efficiency than that in Polish agriculture is found only in Romanian and Bulgarian agriculture, and a similar value is recorded in Latvian agriculture). This very low labour productivity in Polish agriculture is a threat for the competitiveness of Polish agriculture, or it is definitely going to result in the low payment for labour expenditure in Polish agriculture. In order to maintain its competitive edge Polish agriculture has to retain low labour payment rates.

Good results in the export of agricultural produce in Poland in recent years have been, at least in part, at the expense of "social dumping" of labour force in Polish agriculture and food industry. Such a situation should not be the objective of the long-term economic policy or agricultural policy realized in Poland. Economic policy needs to promote increased labour efficiency and this is not possible without providing those employed in Polish agriculture with higher levels of other production factors and at the same time it proves the necessity of structural transformations in the Polish agricultural sector.

Productivity of capital outlays measured by the volume of production in Polish agriculture is similar to the average level for the entire EU. This index may not be evaluated as positive, since at a markedly lower level of outlays per 1 ha of arable land in Polish agriculture than the respective level for the entire EU, in accordance with the principle of decreasing final efficiency of outlays their productivity in Polish agriculture should be higher than the EU average. Thus the capital outlays productivity index does not explain positively the low productivity of land resources, mentioned above. This shows that in Polish agriculture, despite the low level of capital outlays, they are still poorly utilized, which may be explained by the technological backwardness (these results being confirmed by Kulawik [2005]) as well as deficient professional qualifications of those employed in agriculture.

The conducted analysis of the productive and economic situation in Polish agriculture proves that despite the significant progress under conditions related with Poland's accession to the EU, still in view of the agricultural sector in the EU-27 and EU-15 it yields relatively poor results, which shows its structural and technological deficiency.

3. Conclusions

1. The process of Poland's integration with the EU has had a positive effect on an increase in the volume of agricultural output (expressed in constant prices). In the post-accession period (the years 2004-2008) in relation to the pre-accession period (2000-2003) the annual average volume of agricultural output expressed in constant prices of 2000 increased between these two periods by 14.1%. This

increment was in almost 50% caused by an increment in subsidies on production, while the other part was the actual increment in the volume of agricultural outlays.

2. In the post-accession period in the agricultural sector the increments in nominal prices and outlays were similar and did not cause any dramatic economic changes in production conditions, i.e. in other words Poland's integration with the EU and the single market conditions stabilized exchange conditions for agriculture.

3. The real actual increment in the volume of agricultural production, the similar increment in nominal prices of final agricultural output and intermediate consumption, and first of all the increasing support for the agricultural sector with subsidies, at the stabilization of the other items being a burden on agricultural income, resulted in a rapid growth of agricultural entrepreneurial income at Poland's accession to the EU. The average annual entrepreneurial income in the agricultural sector in the post-accession period (2004-2008) in terms of constant prices was doubled in relation to the pre-accession period (2000-2003).

4. The increase in income of the agricultural sector would not have been possible without a significant increase in the level of subsidies. In the post-accession period (2004-2008) in relation to the pre-accession period (2000-2003) their average annual level increased by over 11 times. It may be estimated that the average annual increment of income in Polish agriculture in the post-accession period in over 70% was caused by the increment in the levels of subsidies, while the share of the other factors (an increase in the physical volume of production, improved price relations, technical change – improved technical efficiency of production) accounted for the other 30%.

5. Very high labour resources in Polish agriculture, high land resources, low capital outlays as well as the relatively low output level (in relation to the resources available in Polish agriculture) result in low productivity of land and labour resources in Polish agriculture.

6. The analysis of the production and economic situation in Polish agriculture in comparison to the entire EU agriculture shows that despite the significant production and economic progress observed at Poland's accession to the EU, the Polish agricultural sector is still characterized by low productivity, which confirms its structural and technological deficiency and the necessity of further transformations in its agrarian and production structure.

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