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Agriculture in the EU and position of the Slovak Republic

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Abstract: The paper analyses disparity in the performance of farms in the EU countries and identifies their causes. The individual countries are ranked in the paper according to the long-term average of the amount of their agricultural produce per unit of area into seven segments, and the relation between the input of fixed assets, intermediate consumption, labour force, levels of animals, and other aspects are identified for the creation of agricultural production. In terms of its performance, the Slovak agriculture ranks in the last but one seventh segment and in comparison with the advanced countries, it shows a low input of fixed assets, intermediate product, livestock units, but also a lower volume of the provided subsidies than the advanced countries. The Slovak agriculture does not make use of its competitive advantages, which involve mainly the size of businesses, the economies of scale, and the productivity of labour.

Key words: disparity of production, fixed assets, intermediate consumption, labour input, segmenting farms in the EU, size of farms, subsidies

After the accession to the European Union, the Slovak agriculture entered the large European market, which involves well-established businesses of advanced countries, which stand for a severe competition. For Slovak producers, to succeed in these markets, there is only a single strategy, namely, imitating the procedures and solutions prevailing in the advanced countries. A lower performance of the Slovak agriculture as well as a lower level of financial supports in the advanced countries remain to act as barriers, which slow down our catching up with the advanced competitors.

In agriculture, however, apart from the standard market factors or the "invisible hand of the market", an important role is played also by the regulation of the branch by means of the Common Agricultural Policy of the EU (CAP) and the regulating instruments of the industry management, implemented in the Slovak Republic by the Ministry of Land Economy and Rural Development. The aim of the CAP EU is, apart from other things, to assist the development of agriculture of the member countries and to eliminate the differences in the performance and effectiveness of the agri-businesses under the conditions of sustainable development, the adequate average producers' incomes and maintaining the country environment. Fulfilment of some of these aims has not been very satisfactory so far; mainly, the differences in the performance of the whole agriculture persist, which results from the economic management of the business entities.

The knowledge from the corporate managerial sphere indicates that in our agricultural businesses managers use in particular the incremental method of developing business strategies, which is typical of the stereotype behaviour without regard to the fast-changing business environment. On the other hand, the achievements of well-managed businesses, which also support the development of the whole branch, depend – apart from a continuous market orientation – also from the optimum combination and utilisation of the production factors, which leads to the costs minimisation.

The paper deals with differences in the performance of the EU-28 countries in agriculture in order to identify the influence of the selected production factors on the results of agriculture of the member countries. It is a partial outcome from the project VEGA No. 1/0316/14.

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METHODS AND MATERIALS

Our analysis is based on the accessible statistics about the Slovak agriculture and that of the selected EU countries. We use the database of the Statistical Office of the Slovak Republic, the Eurostat data and the FADN EU database for the year 2012.

To evaluate the state of agriculture we used the following indicators – agricultural production for the evaluation of effectiveness, intermediate consumption, fixed assets, labour force, levels of livestock, and supports/subsidies for the rendition of the level of inputs.

In our methodological procedures, we use the standard methods of research work, such as the analysis and synthesis, the descriptive statistics, the correlation analysis, the comparison, the segmentation and graphs.

CONCEPTUAL FRAMEWORK

The evaluation of distinct differences in the performance of the EU member countries' agriculture is at the centre of attention of numerous economists as well as managing bodies mainly in the countries that accessed the EU in the year 2004 and later. Frequently, the principal cause of the lower performance of agriculture in the new member countries is seen mainly in the lower level of supports from the EU funds, which is, in our opinion, a little narrow point of view. However, the opinions of authors on this topic vary, as described below.

Siudek and Zawojska (2012) formulate the problem in their paper by asking the question if the maturity and level of the economy of an OECD country affects the amount of support/subsidy to the agricultural producers. They express the level of the economic standard in the terms of the per capita GDP and the support to agriculture by the means of the production subsidies equivalent (PSE). They conclude that the countries with a higher economic level do not provide any support to their agri-producers any longer, and the progress of the branch is on the whole determined by a higher level of the economy.

In our paper (Grznár and Szabo 2012), we indicate that the difference between the Slovak agriculture and that of the advanced EU countries is the low level of the cost management and erroneous decisions on the strategy of increasing the intensity in the post-transformation period. In our later research, we are arriving at the conclusion that the lower agriculture performance of the new EU countries is caused mainly by the lower use of the fixed and variable assets and a lower effectiveness of their utilisation (Grznár 2014).

Střeleček et al. (2009) by means of the shift-share analysis, evaluate the influence of the supports/subsidies in agriculture and of the structure of agricultural production on incomes of businesses, while comparing the Czech Republic, Poland, Germany, and the Great Britain. They conclude that the Czech agriculture is competitive, because it has lower subsidies at lower costs.

Dos Santos (2013) in his analysis classifies 23 EU countries into four clusters according to their performance in agriculture, while the SR and the Czech Republic together form the third cluster with a lower performance, which is characteristic by the largest farming area, the highest labour-capital ratio, the lowest cashflow per farm, but also the lowest output per unit of land.

Chrastinová and Uhrinčaťová (2014) evaluate the level of agriculture of all the EU countries by means of various performance indicators and inputs used, also including the supports/subsidies. They conclude that the accession to the EU has had a favourable impact on the Slovak agriculture, but its position in relation to the EU-15 stagnates because of the lower support.

Jaegers et al. (2013) analyse the economic branches of the EU countries in a longer time span and classify the differences in their development by segmentation of technological level of production. Industries with a higher level of technology recorded a faster development also in the periods of crisis than the traditional production industries, which declined at that time. In our analysis of the differentiation and segmentation of the development of industrial branches of the SR during the crisis (Grznár and Szabo 2013), we observed the identical trend, when the branches with a high technology level were the least affected by the crisis and recorded the growth trends also during the crisis. However, the agriculture of the SR belonged to the branches that were rather palpably affected by the crisis.

The European Commission in the year 2010 published a study on the income situation in the agricultural sector, which deals with the development of incomes in agricultural businesses according to the factors that cause their variability. Main influences are seen in the progress of technology and growth of productivity of labour in the EU countries. During the years 2000–2009, the number of labour force declined

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by 25%. It studies differences in the development of incomes per worker in the new EU-12 countries and in the original EU-15, while considering the land costs (rent), the cost of work and capital costs to be the factors causing the income differentiation.

Špička (2013) explores farm incomes in the new EU-12 countries and the old EU-15 countries for the period 2001–2011 before the enlargement in the year 2004 and after the enlargement. In his research, he creates three groupings of countries by the economic level of their agriculture while the Slovak Republic (SR) and the Czech Republic (CR) are ranked in the second largest segment. When creating clusters, he takes into consideration the size of a business, the number of workers, the levels of livestock, and the income per worker.

Blaas (2013) in assessing the development of the Slovak agriculture and food notes that Slovakia is lagging behind in the use of the resource potential of food production. The analysis deals with the evaluation of the efficiency in agricultural enterprises.

Fandel (2002) examined the structural changes in agriculture and their impact on the business efficiency using the DEA method of data packages.

Jambor and Hubbard (2013) examined the consequences of the Hungary accession to the EU changes in the international trade in the food industry. They noted the growth of the comparative disadvantages of the Hungarian agriculture after 2009.

Labaj (2013) examined changes in production, the creation of the added value and the employment in various sectors of the Slovak national economy in 2008 and 2009 in order to reveal the direct and indirect links of each sector in relation to the domestic and foreign demand. When using the open static Leontief model, it identifies many ties of agriculture and food to other sectors.

Martinho (2015) in his study analyses the performance of the manufacturing industries which are connected to agriculture and fisheries and identifies the factors that influence their development in the EU-27 countries.

Olper et al. (2014) in their paper deal with the determinants of the out-farm migration across the European Union (EU) regions focusing on the role played by the CAP payments. The results show that the standard drivers, such as the relative income and the relative labour share, are important determinants of the out-farm migration. Overall, the CAP payments significantly contributed to the maintaining job in agriculture.

Chrenko and Sojková (2013) in their paper focused on the analysis of weights for the individual indicators of the sustainable development indicator. In the terms of methodology, they proceeded to gather weights by the correlation analysis and factor analysis.

Milov (2013) looked at the impact of the sector structure on the competitiveness of the EU and the USA. It argues that the myth that Europe is lagging behind in productivity and competitiveness of the US to be suspended, as it will serve as a political objective. It argues in particular that the unproductive administrative services and public administration, personnel and auxiliary services and financial services have a greater share in the US than in Europe. However, these represent a productive effect. On the other hand, it must be added that the service sector has the main merit in reducing the unemployment rate in the United States.

THE ANALYSIS

Agricultural production does not record the year-on-year growth rates of the automobile industry or the communications technologies. The rate of saturation of a country's population in the foodstuffs creates a natural barrier to the growth of demand. The EU in itself has excessive supplies of some commodities that must be exported and the low prices of the exports have to be subsidized in view of the higher prices in the EU market. The rise of the hard-to-sell supplies of food commodities sometimes also leads to political decisions, e.g. the sanctions against Russia and the RF's response in the prohibition of importing agrarian commodities from EU countries, which, in turn, was reflected in the fall of prices in the fruit markets in the year 2014.

Another factor that affects the level of production are the climatic conditions resulting in the year-on-year fluctuation of production in agriculture. A free movement of products in the EU countries compensates for the local dropouts of production, but it also increases the rate of competition.

The performance of agriculture in the individual countries may be assessed by means of several factors. We prefer the factors that convey the results of the activity of the sector. The basic output indicators, which are also monitored in the international statistics, include agricultural production; we also use them in our research. It is referred to in the EU FADN by the term *total output*, which will be used in the next part of our paper.

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Table 1. Indices of the development of value of agricultural production in the selected EU countries in fixed prices in the year 2005

Country	2006	2007	2008	2009	2010	2011	2012	2013
EU-28	97.0	143.0	150.5	103.3	103.1	160.9	171.6	156.4
EU-15	97.1	145.3	142.5	101.8	129.1	149.9	168.2	149.4
Belgium	129.8	183.3	141.9	128.2	220.1	195.4	234.5	215.5
Slovakia	94.9	120.5	133.0	84.1	85.3	132.2	134.3	130.3
Czech R.	94.5	152.4	131.6	93.4	122.5	162.8	161.1	162.0
Hungary	102.6	114.3	142.8	98.5	115.2	167.1	152.5	167.3
Poland	100.5	165.0	157.7	127.3	137.5	190.9	208.5	178.8
Austria	116.9	213.4	158.3	115.0	195.0	218.0	248.0	172.2

Source: http//apposso, Eurostat.ec.europa.eu, 8 December 2014

Development of agriculture in the EU

One of the basic resultant indicators of agricultural production is the value of the country's agricultural production. Development trends of this indicator in fixed price indices of the year 2005 during the years 2006–2013 in the elected EU countries are illustrated in Table 1. From the EU countries, we choose indices for the EU-28 and the EU-15, Belgium represents the most advanced agricultural countries of the Union and as new countries, we have chosen the V-4 countries.

The EU-28 managed to increase its production potential in the period evaluated by approximately one half, and with the exception of the years 2009–2010, the production was almost steadily rising. However, the EU countries with the most advanced agriculture that are members of the grouping EU-15 succeeded in increasing their high production by one half during that period, while they almost managed to avoid the decline in the year 2009 (Table 1).

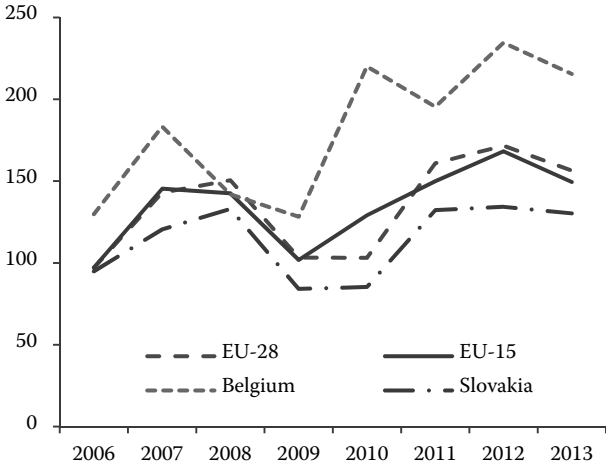

Figure 1. Indices of the development of the value of agricultural production in the selected EU countries

Source: http//apposso. Eurostat.ec.europa.eu

Belgium, as one of the countries with a highly intensive agriculture, recorded in the same period an almost double increase in the production, but on a substantially higher basis. The Slovakia positions in the context of the EU-15 is not very flattering, when the value index of production for the eight evaluated years rose only by one third as compared with the year 2005, which witnesses a very slow adjustment of the Slovakia's performance to the original EU countries. A far greater progress in the growth of production has been recorded in Poland and Hungary.

Figure 1 illustrates these development trends in some countries and groupings in graphics. Belgium highly exceeds the EU-15 average as well as that of the EU-28. The figure shows that the production development trends in the individual countries are very similar, but the differences between the countries are not becoming smaller. For this reason, catching up with the level of the advanced countries in this indicator remains to be a matter of a long-distance race.

Segmentation of agricultural countries of the EU-27

In order to more closely identify the driving forces of agriculture in the current development of the EU countries, we segmented these by the level of performance in terms of the total output per 1 ha of agricultural land. With the help of the Eurostat data, we classified the countries into seven segments on the basis of the average level of the gross agricultural production per 1 hectare of area used in agriculture in the years 2004–2011. The result of this classification is presented in the Table 2.

The Table 2 illustrates a significant rate of disparities on the level of the gross production per one hectare of the utilised area of agricultural land. The difference between the first and the seventh segment accounts

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Table 2. Segmentation of the EU-27 countries by agricultural production in €/ha

Number of segment	Interval of production	Average production interval	Countries in segment
1.	12 000+	12.358	Malta, Holland
2.	3 500–5 300	4.963	Belgium, Cyprus
3.	2 901–3 500	3.333	Italy, Denmark
4.	1 901–2 900	2.526	Greece, France, Luxemburg, Slovenia, Germany
5.	1 501–1 900	1.725	Sweden, Finland, Portugal, Austria, Spain
6.	1 001–1 500	1.192	Great Britain, Romania, Poland, Hungary, Ireland, SR, Czech Republic
7.	up to 1 000	678	Lithuania, Latvia, Estonia, Bulgaria

Source: Eurostat database, April 2013, own classification

for the unbelievable €11 338 per1 ha of the utilised area. However, the first segment is represented only by the countries with the extreme values of production. In addition, the difference between the second segment and our sixth segment is significant, as it amounts to €3375.

The Slovak Republic is in the sixth segment, together with three other V-4 countries and Romania, and the Irish Republic and the Great Britain as more advanced countries. Likewise, Dos Santos (2013) lists similarly the Slovakia "neighbours" in the third group of his classification of the countries. In terms of the number of countries, the strongest groupings are the groupings 4, 5 and 6.

What basic production factors affect the most the current distribution of countries by the amount of gross production per unit of the land area? A partial answer to this question is given by Table 3, in which

Table 3. Production, intermediate consumption and fixed assets in the individual segments in €/ha

Segment	Production	Intermediate consumption	Fixed assets
1.	14 210	9 655	58 268
2.	4 946	3 234	16 102
3.	4 264	2 326	20 976
4.	2 403	1 596	9 201
5.	1 700	1 149	6 284
6.	1 499	1 829	5 974
7.	930	609	1 453

Source: Preliminary FADN 2011, 2012, own processing

parameters of input of production factors of the individual clusters are identified in relation to the performances rendered in agricultural production.

The data in this and in the following tables are processed based on the published results of the FADN for the year 2012 and represent the values for an average business (farm) in the given country. The data on the amount of fixed asset and supports are for the year 2011, since the preliminary data for the year 2012 do not include these items.

A high level of the total agricultural production strongly correlates with the value of the utilised fixed assets. The decline in production is accompanied with the decline in the capitalisation, which is why it is possible to consider the under-capitalisation mainly of the new EU countries as one of the main causes of the low level of production. Given the contemporary rate of growth of fixed assets in agriculture of the Slovak Republic, an early elimination of the differences in the production intensity as compared with the advanced countries can hardly be expected.

Another factor that affects the level of the total agricultural production is the intermediate consumption. Intermediate consumption is an indicator that makes a statement about the amount of the inputs per unit of land, as e.g. the value of the seeds, plants for sowing, fertilizers, agro-chemicals, fuels, electricity and of other purchased inputs. The trend of this indicator again almost copies the trend of the production. The countries of the fifth, sixth and seventh segments again distinctly lag behind the groupings 3, 4 and 5, which represent a certain EU average.

Figure 2 illustrates significant relations between the levels of the individual indicators within the

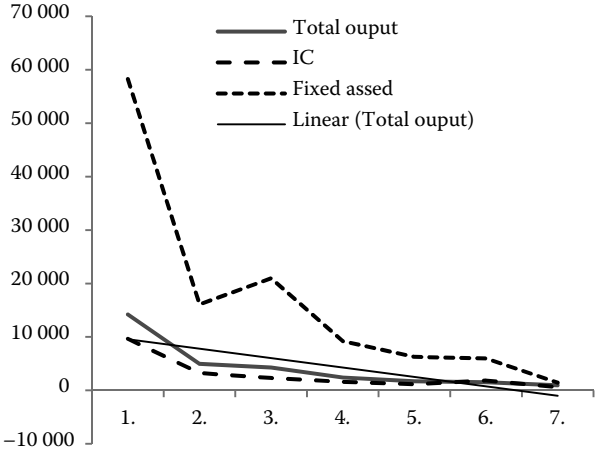

Figure 2. Total output, intermediate consumption and fixed asset in €/ha

Source: http//apposso. Eurostat.ec.europa.eu

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Table 4. Land and animals in the individual segments in ha and the number of animals per 1 ha

Segment	Gross production	Utilised area (ha)	Number of animals (LU)
1.	14 210	19.0	4.7
2.	4 946	29.1	2.5
3.	4 264	53.3	1.2
4.	2 403	62.7	0.9
5.	1 700	37.2	0.7
6.	1 499	140.2	0.6
7.	930	69.8	0.3

Source: Preliminary FADN 2012, own processing

segments by the means of graphics. The coefficient of correlation between the total production and the intermediate consumption records the value of 0.996 and the coefficient between the production and fixed assets records the value of 0.943, which are strong links. The development of production in the segments records a linear trend.

In Table 4, we are looking for the link between the agricultural production of an average business (farm) in the individual segments and the utilised area of agricultural land and the levels of livestock per 1 hectare of agricultural land.

The area of farm land in the individual segments up to the fourth one is gradually rising, then it is followed by a decline; the largest area is in the sixth segment, where it is the most affected by the CR and Slovakia. In the last segment, the size of a business (farm) exceeds the level of the fourth segment. Livestock units from the first through to the last segment are

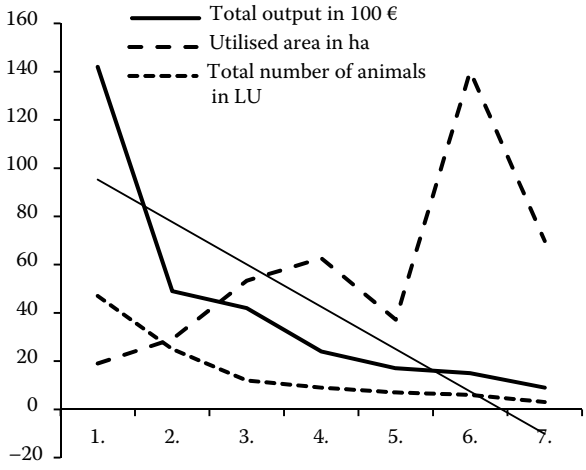

Figure 3. Total output, utilised area and number of animals in clusters

Source: http//apposso. Eurostat.ec.europa.eu

Table 5. Production, workers and support in the segments

Segment	Production €/ha	Number of workers/100 ha	Supports €/ha
1.	14 210	30.8	965
2.	4 946	10.3	536
3.	4 264	5.1	409
4.	2 403	5.7	576
5.	1 700	4.3	511
6.	1 499	4.6	327
7.	930	3.8	221

Source: Preliminary FADN 2012, own processing

continuously falling, and so is the farm production. The Figure 3 illustrates these relations in graphics. The production trend has a linear trend.

The coefficient of correlation calculated between the total production and the size of business is negative, the value being –0.562, the correlation between the production and the number of animals is positive, the value being 0.975. Therefore, the size of business in the EU countries is not a factor that would influence also the intensity of the economic management.

Finally, in Table 5, we will examine the relations between the total agricultural production, between the number of workers and the supports that were provided to an average business per 1 ha of agricultural land.

The number of workers in the individual segments is continually falling from the first to the last segment. However, from the third segment, the decline is just slight. However, this trend is not copied in the supports; their amount varies, but in the last two segments, supports are the lowest.

The correlation co-efficient between the production and labour input shows the value of 0.981 and that between the production and supports is only 0.58, which is an indistinctive relation. It seems that providing supports is not in harmony with the relations of the total production. This relation is also the consequence of the supports lagging behind in the new countries as compared with the EU-15 member countries.

Disparity in the performance of agriculture in the sixth segment

According to Table 6, the sixth segment is the largest in the terms of the number of countries, as it includes as many as seven countries. In agriculture, the Great Britain and Ireland belong to the advanced

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Table 6. Production and selected production factors of countries in the 6th segment

Country	Production €/ha	NVA €/ha	Labour input AWU/100 ha	UA ha/farm	Number of animals LU/100 ha
United Kingdom	2 567	861	1.4	101.3	0.7
Romania	1 280	712	13.0	10	0.7
Poland	1 287	527	6.6	24.2	0.6
Hungary	1 518	743	3.5	46.3	0.4
Ireland	1 285	569	2.4	50.2	1.1
Slovakia	1 010	282	2.6	521.5	0.3
Czech Republic.	1 549	574	2.9	227.8	0.5
Average	1 499	610	4.6	140.2	0.6

Source: Preliminary FADN 2012, own processing

West European countries, but they are island countries. These countries were included in this group owing to a lower performance expressed in the gross production in the yearly average during 2004–2011.

Poland, Romania, Hungary, the Czech Republic, and the Slovak Republic belong to the new countries of the Central and Eastern Europe, whose lower performance is partially inherited from the pre-transformation period. In Table 6, we indicate the performance parameters of these countries, including the utilisation of the selected production factors and the amount of support.

The largest total output per unit of area was achieved in the year 2012 by the Great Britain, which was included in this group owing to the fact that during the years 2004–2011, it is, according to the average, followed by Poland and the Czech Republic. Slovakia is closing the overall succession. It is similar in the case of the net value added (NVA).

The largest differences between countries are in the size of the utilised area (UA), where the SR has the largest area per 1 business (farm), followed by the CR and the Great Britain. The correlation co-efficient of the influence of the area of land on production has, however, a negative value of –0.276, and the expected economies of scale are not reflected in this segment in the volume of production.

An excessive labour input expressed in AWU is recorded in Romania and Poland; Slovakia is below the average in this group of countries. Low numbers of animals in the businesses in the SR are also reflected in the low production per unit of area.

Table 7 shows the comparison in the intermediate consumption per unit of area and production, as well as the capitalisation of agriculture in these countries with fixed assets and the total subsidies.

Compared with other countries, the Great Britain and Ireland belong to the groupings of extreme values of the fixed assets and the acquired supports their agriculture. The agriculture of the V-4 countries is

Table 7. Production and the selected production factors in the 6th segment in €/ha

Country	Total output	Intermediate consumption	Fixed asset	Subsidies
U. Kingdom	2 567	1 00	13 180	422
Romania	1 80	623	2 713	167
Poland	1 287	800	5 418	252
Hungary	1 518	1 016	2 052	340
Ireland	1 285	946	14 608	381
Slovakia	1 010	841	957	331
Czech Republic	1 549	1 66	2 889	394
Average	1 499	1 027	5 974	327

Source: Preliminary FADN 2012, own processing

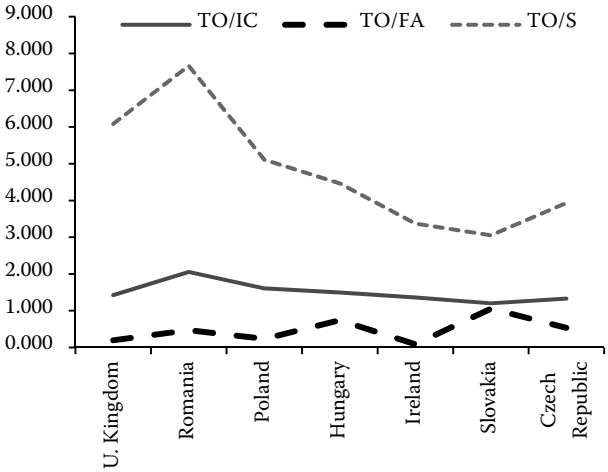

Figure 4. Efficiency of utilising intermediate consumption, fixed assets and supports in coefficients

TO – total output, IC – intermediate consumption, FA – fixed assets, S – subsidies

Source: Own calculations

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Table 8. Production and the selected factors of agriculture of the V-4 countries

Country	Total output €/ha	NVA €/ha	Labour input AWU/100 ha	UA ha/farm	Number of animals LU/100 ha
Poland	1 287	527	6.6	24.2	0.6
Hungary	1 518	743	3.5	46.3	0.4
Slovakia	1 010	282	2.6	521.5	0.3
Czech Republic	1 549	574	2.9	227.8	0.5
EU 27	4 279	1 491	9.2	58.7	1.6

Source: Preliminary FADN 2012, own processing

under-capitalised and the SR is in the worst position in the terms of the availability of fixed assets.

Figure 4 illustrates the efficiency of the utilisation of the intermediate consumption, fixed assets and supports as the ratio of the value of production and the utilisation of these factors calculated per 1 ha of agricultural land. Besides the Great Britain, the intermediate consumption is best appreciated by Romania, Poland and Hungary, where, however, the consumption of variable factors is low. The Slovak Republic appreciates fixed assets quite efficiently, but their input is low, while in the case of the Great Britain and Ireland under the conditions of their high input, the efficiency is the smallest. The appreciation of supports in these countries is relatively balanced.

Agriculture of the V-4 countries

Agriculture in the V-4 countries is discussed in the preceding analysis of countries in the sixth segment, however, in view of the cooperation between these countries within the EU and a common strategy of increasing the performance of agriculture in these countries, the identification of Slovakia's position within this group of countries is rather important.

Hungary and the Czech Republic record the highest production and NVA per unit of area. Slovakia is at the end of the list in both indicators. However, they use the smallest number of workers, have the largest area of farms and the fewest animals per area.

Table 9. Production and the selected production factors of the V-4 countries in €/ha

Country	Total output	Intermediate consumption	Fixed asset	Subsidies
Poland	1 287	800	5 418	252
Hungary	1 518	1 016	2 052	340
Slovakia	1 010	841	957	331
Czech Republic	1 549	1 166	2 889	394
EU 27	4 279	2 914	4 201	425

Source: Preliminary FADN 2012, own processing

The Table 9 contains the utilisation of the selected production factors, and it follows from this that the Czech Republic and Hungary are the countries with the highest performing agriculture owing to a higher utilisation of the intermediate consumption, a better capitalisation and higher supports than those received by the SR.

The comparison of values in the V-4 countries and the average of the EU 27 indicate how large the differences are that our countries should eliminate.

CONCLUSION

Empirical analyses of agriculture in the EU indicated a large differentiation between the individual countries, which lasts in the long term. When identifying the causes, we focused on the most important factors that determine the level of agricultural production, e.g. fixed and variable assets, labour force, land area per a business, number of animals, and the rate of supports provided.

The segmentation of the countries by the indicator of the long-term average of agricultural production into seven groupings showed strong links between the production and the fixed and variable assets, the levels of livestock, and the provided supports. The size of a business and the availability of labour force did not appear to have a significant influence on the performance of an average business in a country.

For Slovakia, the analysis indicated a considerable rate of lagging behind the performance of the EU-15 countries, as well as behind the EU-27 average. This may be explained by a lower input of production factors, lower supports and lower livestock units, as well as the non-utilisation of the potential of the economies of scale in view of the achieved size of businesses. The Slovak Republic approaches advanced countries only in the productivity of labour.

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