The impact of Slovak entry into the EU on the selected indicators of wheat production in production areas

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Abstract
Agriculture is one of the most important sectors of the national economy of the Slovak Republic, in particular, for its long tradition and at the same time for a long-term great political influence of farmers. Therefore, each year flows into the agricultural sector in the EU countries huge amounts of money. Analysed period of 1999-2009 has been divided into two equally long period of time, in the middle of which the Slovak Republic entered the EU and the agrarian policy has changed from purely national to the EU common agricultural policy (Cap). Important reform of the CAP in 2003 was the Fischler reform, by which the single payments decoupled from production and began to provide per hectare of agricultural land. In this paper, we explore how our entry into the EU has been translated into the economy of the selected commodity (wheat) and how the support effected the rate of profitability and the economic income result during this period. For the assessment of the production of wheat, we used indicators such as the yield per hectare, the total and the unit costs, prices, total support. Two indicators have been chosen of the cost-profitability: profitability without support and profitability with the support and the hypothesis was set, by which we explore the development of these indicators per production areas that we divide on less-favoured and favoured. By the hypothesis we verify whether selected indicators confirm the natural expectation that in the better production areas will be achieved their more favourable values.

Thanks to the subsidies the economic income results in I. and also in the II. period got from the negative values only to a positive outcome.

Keywords: wheat, production, profitability, support, favoured area

JEL Classification: Q02, Q14

1. Introduction
The period within which we evaluate in this paper the development of agricultural policy, the development of Slovak agriculture and its structure of production can be considered in two directions as "breakthrough". The first period was characteristic by the completion of the transformation of the Slovak agriculture and the second was characterized by the entry of Slovakia into the European Union. The transformation of the Slovak agriculture is considered an economic necessity. On the basis of the available scientific and research work in the field of study of the development of agrarian policy and the CAP in Slovakia, we can talk about a significant impact on Agriculture of the SLOVAK REPUBLIC.

According to Tangermann, S. (2007) the CAP after 2013 must after decoupling of direct payments make them coupled to a specific goals and outputs useful for the society. The future development of the CAP will be significantly affected by the financial and then economic crisis. The economy of the Slovak agriculture has been greatly affected by the accession to the EU because annually it runs a large amount of funds in the form of subsidies to this sector.

Based on the concept of agricultural and food policy, agricultural policy in the cultivation of cereals is based on the principle of a high percentage of food sovereignty. The other principle in their cultivation is the intensification, which is a gradual increase in average of yields.
Cost-effective production of cereals is a prerequisite for achieving high sales and earnings by adequately high own costs according to Borekova, (2004).

Production conditions of agricultural enterprises are different and dependent on natural conditions (climate, soil type, grain size, depth, stoniness, soil and its exposure). The social requirements for the farmers are to ensure the nutrition for the population which is not possible to satisfy only by the production of agricultural products in better natural conditions, but for production purposes are used even worse conditions, where the production cost are higher. (Chrastinova et al., 2001)

In terms of inputs, in particular in the production area of maize and beet there are used an intensive cultivation methods, which must ensure the profitability of their production. In the potato and potato-oat area, the cereals cultivation should not be at a loss and in the mountain area, emerging losses should be compensated by the subsidies. An intense production of cereals is also a basic condition for the export oriented subsidy policy by which to achieve competitiveness within the EU.

2. Data and Methods

The methodology of work is based on the use of theoretical and practical knowledge from the study of the literature. Work is focused on one commodity of crop production, namely: winter wheat. Observed time horizon is 11 years, since 1999 until 2009 and was divided into 2 periods due to the change in the pattern of the subsidies on the first period prior to entry into the EU in 2004 and the second beyond. We would like to show the effect of these changes on two equal periods of time. The dates for period before entering the EU were found just from 1999, therefore the years chosen to compare were chosen till 2009 and not longer. We try to point out the changes in the structure of the areas and production of selected commodity and to determine whether this commodity is losing or increasing its importance.

Calculation of costs, support and profitability of commodity is based on the methodology of Research Institute of Agriculture and Food Economics. Summary reports are developed for research purposes in a different classification and cost structure. The results presented in the publication are used primarily to evaluate the efficiency of production of agricultural products in different environmental conditions, in forecasting agricultural policy, various analyses and comparisons of costs. The publication data are processed on the actual costs of selected plant and other economic data to assess the efficiency of production.

This survey is done on selected set of farms divided by five types of production areas, namely:

C - Corn area - is an area with the most favourable conditions for the development of agriculture. The most important regions of this area are the Danube and East Slovak lowland.

B - Beet area – area in flat and hilly parts of the lowlands and occupies the territories of the Záhorská lowland, Košice, and south Slovakian lowland where the conditions for growing are great for mostly sugar beets and intensive cereals.

P - potato area – area in Orava, Kysuce, Podtatranska kotlina and in the low Beskydy Mountains.

PO- potato and oat area, where mostly potatoes, forage crops and less intensive cereals as oat are grown.

M- mountain area, composed mostly from sub mountain and mountain regions where less intensive cereals, forage crops and potatoes are grown.
For the purposes of this work on the basis of research of Chrastinová (2010), Foltín (2008) the production areas were put together and associated with the less favored areas (LFA):

C+B: favored areas outside of the LFA (non-LFA).

PO+H: areas of the LFA.
P: areas outside of the LFA and partly with the LFA areas.

Total support (TS) contain all the support allocated on wheat by ( RIAFE ).
P- profitability, S- support, P+ S profitability with support, P-S profitability without support 
Pz-prize, Y-yield per hectare, UC - unit cost per tons, US- unit support 
(TS/Y), TC-total cost per hectare,

The calculation of profitability:
P-S = Pz / UC
P+S = (Pz +US) / UC

Hypothesis1: The selected indicators in the assumption confirm the natural expectation that in the better production areas will be achieved their more favorable values.

The assumption:
Y (C+B) > Y (PO+H)

TC (C+B) > TC (PO+H)
Pz (C+B) > Pz (PO+H) - This assumption is based on the expectation that the soil-climatic conditions in the better production areas positively affects the amount of prices as a result of higher production quality.

UC (C+B) < UC (PO+H)
P-S (C+B) > P-S (PO+H), P+S (C+B) > P+S (PO+H)

(Foltín 2008)

The basis for the collection of data in the studied area for the theoretical background was continuous monitoring and study of available professional domestic and foreign literature, scientific journals and book information, obtained through libraries, the Internet and other sources.

3. Results and Discussion

The entry of Slovakia into the EU influenced also foreign trade of cereals. It was a system of direct payments for the production of selected agricultural products and the SLOVAK REPUBLIC started to adapt to new rules and conditions.

Area under crops of cereals in Slovakia in 2005-06 was 799.8 thousand of hectares and harvest area reached 794.7 thousands of hectares. Compared to the previous marketing year, the areas under crop were less about 2.22 % and harvest area was smaller about 2.55 %. The average yield of cereals at that time of 4.51 hectares per tonnes was compared to the 2004-05 marketing year lesser about 0.14 tonnes. Yield of all cereals in 2005-06 was 3 585.2 ths. of tons and compared to the previous year it was about 207.9 thousands of tons lesser.

Growing wheat achieved its peak in SR in the year 2001-02, when the area under crops amounted to 446.5 ths. Ha, harvested area was 448.9 ths. Ha, the yield was 4.01 tons per
hectare and the production has reached 1800.1 thousands of tons. Even the domestic consumption amounted to its historical peak in volume of 1682.3 ths.of tons, especially on food and animal purpose. In the long term view, from this period, the area under crop and the harvested area of wheat in the Slovak Republic decrease. Except the years 2008-09, when the production of wheat reached maximum value in the amount of 1819.5 ths.t, the production of wheat has decreasing tendency.

In 2004-05, the production of wheat reached the second-highest level since 2001-02 in the volume of 1764.8 ths. t, representing an increase by 89.68% compare to the previous year, when production was at an extremely low level of wheat (930.4 tis. t). Still, even at a low initial stock, which has caused a sharp increase in imports, increased consumption compare to the previous year, it also came to a sharp increase in exports, up to 201.78% higher than in 2001-02. In comparison with the record crop in 2004-05, the production of wheat in 2005-06 was reduced by 8.9%. Domestic consumption compared to the previous period only slightly decreased, however, due to the high initial stocks of wheat the export volume could reach 451.8.ths.t. and this has contributed to the reduction of stocks to 232.8 ths of tons. In the period 2006-07 the area under crop and the harvested area of wheat decreased again and also yield of wheat decreased, which contributed to the reduction of the total wheat production for about 16.5 %. Lower initial stocks increased the volume of imports by 194.40% over the previous period. In comparison with 2006-07 wheat production in 2007/08 has risen slightly. This has a connection in slight increase in cropping and harvesting areas, however, the yield of wheat slightly decreased by 0.78%. Lower initial stocks and import slightly decreased the total supply. With a lower total consumption final stocks slightly increased compared with the previous period by 17.08%.

Table 1: Balance sheet of wheat in Slovakia

<table>
<thead>
<tr>
<th>Indicator</th>
<th>units</th>
<th>2001/02</th>
<th>2004/05</th>
<th>2008/09</th>
<th>2009/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area under crops</td>
<td>ths.ha</td>
<td>446.5</td>
<td>369.4</td>
<td>374.4</td>
<td>380.3s</td>
</tr>
<tr>
<td>Harvesting area</td>
<td>ths.ha</td>
<td>448.9</td>
<td>367.8</td>
<td>373.7</td>
<td>379.2s</td>
</tr>
<tr>
<td>Yield</td>
<td>t/ha</td>
<td>4.01</td>
<td>4.80</td>
<td>4.87</td>
<td>4.06s</td>
</tr>
<tr>
<td>Production</td>
<td>ths.t</td>
<td>1800.1</td>
<td>1764.8</td>
<td>1819.5</td>
<td>1537.9s</td>
</tr>
<tr>
<td>Initial stock</td>
<td>ths.t</td>
<td>177.2</td>
<td>79.0</td>
<td>209.6</td>
<td>*713.7</td>
</tr>
<tr>
<td>Import</td>
<td>ths.t</td>
<td>2.2</td>
<td>55.3</td>
<td>158.5</td>
<td>120.0</td>
</tr>
<tr>
<td>Other source</td>
<td>ths.t</td>
<td>0.0</td>
<td>82.0</td>
<td>50.3</td>
<td>48.3</td>
</tr>
<tr>
<td>Total supply</td>
<td>ths.t</td>
<td>1979.5</td>
<td>1981.1</td>
<td>2237.9</td>
<td>2419.9</td>
</tr>
<tr>
<td>Domestic consumption:</td>
<td>ths.t</td>
<td>1682.3</td>
<td>1357.8</td>
<td>1104.5</td>
<td>878.1</td>
</tr>
<tr>
<td>-food</td>
<td>ths.t</td>
<td>521.2</td>
<td>530.2</td>
<td>443.7</td>
<td>470.0</td>
</tr>
<tr>
<td>-seed</td>
<td>ths.t</td>
<td>104.9</td>
<td>110.6</td>
<td>109.5</td>
<td>105.0</td>
</tr>
<tr>
<td>-fodder</td>
<td>ths.t</td>
<td>860.5</td>
<td>560.0</td>
<td>330.6</td>
<td>196.0</td>
</tr>
<tr>
<td>-other</td>
<td>ths.t</td>
<td>195.7</td>
<td>157.0</td>
<td>220.6</td>
<td>107.1</td>
</tr>
<tr>
<td>Export</td>
<td>ths.t</td>
<td>50.5</td>
<td>152.4</td>
<td>385.9</td>
<td>577.0</td>
</tr>
<tr>
<td>Other costs</td>
<td>ths.t</td>
<td>25.0</td>
<td>122.6</td>
<td>33.7</td>
<td>26.5</td>
</tr>
<tr>
<td>Total use</td>
<td>ths.t</td>
<td>1757.8</td>
<td>1632.8</td>
<td>1524.1</td>
<td>1481.6</td>
</tr>
<tr>
<td>Final stock together</td>
<td>ths.t</td>
<td>221.7</td>
<td>348.3</td>
<td>713.7</td>
<td>938.3</td>
</tr>
</tbody>
</table>

Source: Statistical office of the SR, RIAFE: cereals: situation and outlook reports 2004-2009

Crop and harvest wheat area in 2008-09 were larger than the previous year. The yield per hectare was higher by 27.49%, (1.05 tons) and the production of wheat reached a historical
maximum in observed period and was about 31.89% higher than the previous year. Production, together with an initial stock and increased import with at the same time slightly elevated domestic consumption and export has created an increase of final stocks in the volume of 713.7 ths. t., which represents interannual increase by 240.51%.

In the period of 2009-2010, crop and harvest areas of wheat slightly increased, however, the decrease in the yield by 16.63% compared to the previous year decreased the total production by 15.48% to 1 537.9 thousands of tons. Initial stock together with the reduced import contributed to the increase of the total supply and at a reduced domestic consumption (especially for the feed purposes – by 40.71%) the export increased. Final stocks has increased by 31.47 % to the value of 938.3 ths. tons.

3.1. Trend of the selected indicators of winter wheat for the period of 1999-2009 according to selected production areas and per Slovakia in total.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Index SR 2/1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C+B</td>
<td>P</td>
<td>PO+H</td>
</tr>
<tr>
<td>Yield t/ha</td>
<td>4,068</td>
<td>3,376</td>
<td>3,329</td>
</tr>
<tr>
<td>Area ha</td>
<td>18800</td>
<td>7962,8</td>
<td>2462,6</td>
</tr>
<tr>
<td>Production t</td>
<td>76542</td>
<td>26947</td>
<td>8394,4</td>
</tr>
<tr>
<td>Total cost €/ha</td>
<td>566,15</td>
<td>513,56</td>
<td>572,57</td>
</tr>
<tr>
<td>Unit cost €/t</td>
<td>136,42</td>
<td>149,29</td>
<td>166,6</td>
</tr>
<tr>
<td>Prize €/t</td>
<td>133,23</td>
<td>123,45</td>
<td>126,93</td>
</tr>
<tr>
<td>Total support €/t</td>
<td>14,97</td>
<td>35,949</td>
<td>35,278</td>
</tr>
<tr>
<td>Profitability without support</td>
<td>-1,049</td>
<td>-15,73</td>
<td>-21,96</td>
</tr>
<tr>
<td>Profitability with support %</td>
<td>9,924</td>
<td>7,7193</td>
<td>-1,29</td>
</tr>
<tr>
<td>Income €/ha</td>
<td>34,206</td>
<td>852,4</td>
<td>-27,97</td>
</tr>
<tr>
<td>Income €/ t</td>
<td>7,8469</td>
<td>8,3411</td>
<td>-9,709</td>
</tr>
<tr>
<td>Income without support</td>
<td>7,7124</td>
<td>27,61</td>
<td>-44,99</td>
</tr>
</tbody>
</table>

Source: author’s calculations according to RIAFE

P- profitability, S- support, P+ S profitability with support, P-S profitability without support
Pz-prize, Y-yield per hectare, UC - unit cost per tons, US- unit support

The results for the hypothesis stated in methodology:
For the average values from period I. and period II. we can conclude that:
Y (C+B) > Y (PO+H)
Yield per hectare: for both periods we can say, that the yield in area: C+B > PO+H
(this assumption is confirmed)

TC (C+B) > TC (PO+H)
Total cost: in the I. period the cost in PO+H > C+B by 6.42 €/ha (assumption is only confirmed in II period)
UC (C+B) < UC (PO+H)
Unit cost per ton: for both periods we can say, that costs per tons in area C+B > PO+H (this assumption is confirmed)

Pz (C+B) > Pz (PO+H)
Prize: for both periods we can say, that the prize in C+B > PO+H (this assumption is confirmed)
P-S (C+B) > P-S (PO+H), P+S (C+B) > P+S (PO+H)
P-S; P+S: for both periods we can say that P-S and also P+S are higher in more favourable area of C+B (this assumption is confirmed)

A hypothesis about the production areas in the period I (before accession to the EU) was not confirmed only for the total cost per hectare. Throughout this period, in the area of PO+H were the highest total costs per hectare in 2003 and compared to the area of C+B were higher by nearly 59 €/hectare. In this year unit cost were also at the highest value simultaneously at the lowest production, not only for (I) but also for the II period. This has reflected also in the P-S and P+S in the areas of PO+H, which as the only area of production has reached negative values for the whole I. period without support and even with the support.

During the period I for the average of SR the yield per hectare was 3.89 t/ha as a result of unfavourable year of 2003. In the period II. yield rose by 0.87 t/ha due to the impact of favourable years in 2004 and 2008, which is a growth of 22.17%. In the period I and II supports have been paid to the producers, which they have reached the average value of 19 €/t in I. period and 29.9 €/t in II.

Profitability without support through the transition from I period to II. has not changed much and has remained slightly negative. The impact of the support has significantly reflected in profitability in the period I and II, which increased on average by up to 57%. In the period I negative profitability have changed thanks to the support to positive on 9.44%. In II. period profitability with the support increased on the level of 18.8%.

There has been a significant change in profitability with support as a result of the impact of increasing support after joining the EU, compared to the period prior to entry.

**Figure 1: Profitability and income of wheat with and without support for the I. and II. period.**

Source: author’s calculations according to RIAFE
Compared to I. period P+S in average of the SR, increased in the II. by almost 10%.
Significant increase was seen in the production areas, with the largest increase occurred in
the production area of PO+H where P+S has increased by more than 17%. In the II period
profitability in PO+H with the influence of support to less-favoured areas increased from
minus 23.7% by nearly 40% and reached a value of about 16%. Profitability in this area
almost adjusted to the C+B area of 17.5.
Thanks to the subsidies, the income in I and also II period got out of the negative values to the
positive outcome, besides the area of PO+H in the I period where it still remained negative.

A significant impact on the change of the profitability P+S in period II had also a highly
favourable year of 2004, when has been reached the second highest yield per hectare of 5.3
t/ha at the lowest unit cost of 113.46 €/t for the whole reference period in SR. The highest P-S
was in 2004 with the value of 19.72% and in 2007 when it was at historic maximum of
21.45%. The profitability with support in the II period reached its highest value of 43.88% in
2007 to what had an impact the historically highest prize of 189.27 €/t and also the highest
support of 34.96 €/t, while normal yield of 4.24 t/ha and the production of 158,236 t.

Production for the average of SR in the period II reduced compared to the period I by almost
4% and was decreasing in both periods also in production areas, besides the area C+B in
which the production was at about the same level compared to the period I. The reduction of
production is influenced also by harvested areas, which have their share also decreasing for all
production areas, and compared to period I have been reduced for about 21.53%

The opposite trends were seen in the total costs, which increased in all areas and in the II.
period increased on average by about 22.69% compared to the I. The unit costs and prizes
remained at about the same level. There was an increase of unit costs only by 0.46 % and
prizes slightly rose by 2.44%.

4. Conclusion

The CAP, which is superior to the national policies determines the common rules, principles,
objectives and conditions for the provision of subsidies to farmers in all Member States. In the
agrarian policy there is a number of tools and mechanisms by which it is implemented and
one of the most important are subsidies which, according to many studies, has an impact on
the overall development and thus the structure of the production of commodities.

Data processed in this paper were drawn from various sources, one of the most essential of
which is RIAFE and their results of the survey of agricultural products within the selected file
of business entities. According to the (RIAFE, 2000): "these are the only data that allows to
evaluate the economics of agricultural products in the Slovak Republic."

After the entry of Slovakia into the EU agriculture in SR recorded a slight recovery, which
can be attributed to in particular the growth of support, however, this did not continue in
constantly increasing trend. In the years 2004 – 2008 was the development of agriculture,
cyclical with fall and the rise of the individual indicators.

The entry of Slovakia into the EU has introduced a system of direct payments for the
production of selected agricultural products and the agricultural sector of SLOVAK REPUBLIC started to adapt to the new rules and conditions.

Due to the fact that the production of wheat takes approximately 35% of the total cereal
production, it can be considered as the most important crop within the cereals on the world.
The development of wheat over the selected period is very similar to the development of cereals.
From 2001-2002 the area under crops of cereals in the Slovak Republic has decreasing tendency and the yield per hectare slightly increases. The production is uneven, reflecting both the area under crops and yield. The consumption of cereals decline and mostly those for feed purposes. We see similar trends in the cultivation and production of wheat, in the overall declining consumption where it is dominated by, in particular, reduction of the consumption of wheat for feed purposes which decreased approximately 3.5 times in 2010 compared to 2001.

We have analysed the wheat in production areas, divided into advantaged and disadvantaged areas and we explored whether the natural expectation that applies in a more favourable production areas have achieved better value of selected indicators (yield per hectare, the total and unit cost, the prize, profitability without and with support and the income). The reference period 1999-2009 has been divided on I. period before and II period. after the entry of the SR to the EU, and we explored the changes after 2004, when the single farm payments decoupled from production.

From the index analysis of winter wheat in average of SR results that the production decreased by almost 4 % compared to period I, what was influenced by the harvested areas, which fell as much as by 21.5 %. The costs per ton and the prizes only slightly increased on the contrary to the subsidies that greatly increased by up to 57%. Calculated profitability, which was throughout the reporting period without the support negative has change to a positive values as well as the income, due to the impact of the support. According to the results the corn-beet production area, which was considered to be advantaged, was in both periods more profitable. Disadvantaged area of potato-oat-mountain, however, thanks to almost three times higher subsidies almost adjusted to the advantaged area in the second period and the difference in profitability was only 1.6%.

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