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COSTS OF GROWING WHEAT AND OILSEED RAPE IN SLOVAKIA AND OTHER V4 COUNTRIES

Lenka Hudáková Stašová, Radoslav Bajus

ABSTRACT

This paper deals with the issue of cost in primary agricultural production. In this paper, we assess the trends in the costs of agricultural products in the V4 countries and compare them with each other. The subject of the analysis is the evaluation of the structure and development of costs and benefits for agricultural production as a whole, partially for crop and for livestock production and also for two specifically selected products. The purpose is to find out whether the costs incurred for the cultivation of wheat and oilseed rape in Slovakia are adequate as they are compared with the surrounding countries. Following the evaluation of the development of total costs, we define the substantive issues in overhead costs and evaluate their development. Based on the results of the analyses we have defined the proportion of overhead costs in agriculture as an important component of total production costs. The paper points to the need to innovate and modernise the way we think about overheads and the method of their calculation. We also look for the answer to how modern cost management methods could influence their height and development. We propose to improve the calculation system of agricultural enterprises in the analysed countries by introducing of non-traditional calculation method which removes the inaccuracy of the traditional methods and the non-targeted allocation of high overheads to the products.

Keywords: cost calculations; competitiveness; overhead costs; calculation methods; Slovakia; Czech Republic; Hungary; Poland

INTRODUCTION

Costs are an effective tool of economic management of businesses. The worldwide trend is focusing on improving product quality, reducing company costs, increasing productivity, increasing flexibility to respond to market needs and so on. Concepts for building a business and the means to gain a competitive advantage are specific, depending mainly on the sector, and the size of the company. Agriculture is a particularly specific sector. It is the sector of the economy whose main task is to ensure the nourishment of the population. This important task is the cornerstone of the very existence of the society and mankind. The main mean of its production is land. Characteristic activities in agriculture are tilling the land, the cultivation of crops and raising livestock. A characteristic feature of agricultural production is its connection to land.

The costs of agricultural products and their calculation, unlike in other sectors of the economy, are influenced by other factors resulting from the character of agricultural production. Among the most important ones are natural factors, which include soil conditions, weather conditions and the location of the land. These factors determine the quality of land and hence, the yield of individual crops. Another important particularity is high consumption of own production in the production process – in-house consumption. Its large extent is due to the combination of two basic sectors of agricultural production – plant and animal productions. Both sectors mutually supply their products as raw material. Also, the fragmentation of plots and their shape adversely affect transportation costs and labour costs for mechanised labour in the crop production. The nature of certain fixed assets in agriculture is different. For example, land – provided it is treated expertly – is not subject to wearing out; its period of use can be considered as infinite. This eliminates the problem of the depreciation. The circulation of current assets affects the development of costs and the inequality of their reproduction during the calendar year (accounting, tax year). In the crop production, the production takes a year, in most of the livestock sector the production cycle is longer than a year. Agriculture is also affected by industry, which increasingly impacts on the level of costs (scope, quality of agricultural inputs). In agriculture, there are some damages that directly or indirectly affect the costs (death of animals, frost of winter crops, destruction of plants by floods, droughts, pests, etc.).

For agricultural enterprises, it is very important to know the amount of costs spent on manufactured products. This information is necessary in the decision-making process of a company. Knowledge and the use of it is a pre-condition for the success of emerging companies as well as the successful adaptation of existing enterprises to the market economy.

The cost-calculation reflects the quality of the work done in the business on mechanised production. Therefore, the calculation methodology includes both intracompany comparisons, as well as intercompany and international comparisons. The calculations must be factually and formally comparable, especially in terms of the content and breakdown calculation formulae. Comparing costs and revenues of agricultural products between countries mutually enables to define the position in the international competition.

In every competitive economic environment, costs play an important role in the decision making to choose the optimal production volume. Costs are a great instrument in the hands of managers. Managers can use the information obtained from calculations and comparisons to assess the viability of the products or business strategies used and to choose between alternative options **(Bogdanoiu, 2011; Kozelová et al., 2010, 2013).** Cost information is used to assess the level of individual cost items and costs of activities and uncovering reserves for decreasing them. It is also important for planning and recording costs **(Sedliačiková et al., 2012; Kubicová and Habánová, 2012)**. Cost management currently focuses on two main areas. The first area is an accurate assessment of the cost of corporate activities. For this purpose, the calculation of costs is used. The second area of the cost management strategy is the ability to affect existing costs in a targeted way. It is a method of reducing costs. For effective management, it is necessary to know, which products are the most profitable, and which, on the other hand, produce loss and it is also important to know how much each activity performed costs and if it is being implemented efficiently. However, managers often have limited information on the cost structure; very often companies know their costs only by generic classification of inputs and, on the other hand, only the value of net profit for the enterprise as a whole. This kind of monitoring of costs does not give managers sufficient information about the actual implementation of activities and their relationship to corporate activities (products). Managers often only focus on the management of direct costs (material, wages) and do not pay sufficient attention to indirect overhead costs that are a high proportion of the total costs of the company. For costing, many businesses still use traditional methods, such as allocating variable costs in direct proportion to fixed costs, that do not provide accurate information on the costs related to corporate activities **(Popesko, 2012, Popesko et al., 2015)**. Costing methodologies are different ways to quantify cost items attributable to a calculation unit. The choice of method for the calculation of costs depends on the nature of the activity and the conditions in which the activity takes place (type of activity, technology and production type). There exists a variety of methods how to do a good calculation, but recently companies have been developing their own calculation formulas and forming their own calculations that have the explanatory power they need. This is a positive process because it is the only way to obtain optimal results **(Gallo, 2015; Kozáková et al., 2014)**. It is important that management can determine which calculation method it can use for a specific decision-making task. The use of inappropriate methods may lead to incorrect decisions with a negative impact on the economic outcomes and efficiency of a company, and thus, its competitiveness. Methods for calculating the full costs are suitable for calculating the sales price, which should strive to reproduce all costs and bring a company profit. They are necessary for long-term, strategic management and decision-making. They are not appropriate in those cases, where there is a need to respond rapidly to the changing conditions of the market environment. In such a case it is necessary to work with fixed and variable costs (not with direct and indirect costs) and to use methods to calculate marginal (variable) costs, which are suitable for short-term management and decision-making. To carry out effective management and decision-making, managers need to calculate both full and marginal costs **(Škorecová and Košovská, 2010)**. It is necessary to establish a form of calculation, which will be sufficient for the purpose, i.e. to determine a fair amount of the costs for a product in a rational manner. In this case, it is also appropriate to examine under what conditions the costs calculations used could be improved for improving the management process and pricing policy. **(Kupkovič and Tóth, 2004)**. Current manufacturing technology allows increased automation and lower personnel costs; on the other hand, it increases the costs of servicing activities in production. The greater proportion of overheads a company achieves, the more the correct allocation of overheads becomes important. For manufacturing companies, it is not rare that direct costs are less than 50% of the total cost; the rest is swallowed by manufacturing overheads, shipping, customer service, R&D and product design and quality control. Overhead costs should be allocated to the products according to the extent to which the products are responsible for the overheads being incurred **(Schawel and Billing, 2012).** This problem is solved using the Non-traditional method of Activity Based Costing ABC). It is a suitable cost management tool. Activity Based Costing is an approach to solve the problems of traditional cost management systems. These traditional costing systems are often unable to determine accurately the actual costs of production and the costs of related services. Consequently, managers make decisions based on inaccurate data especially in case of multiple products. Instead of using broad arbitrary percentages to allocate costs, ABC seeks to identify cause and effect relationships to objectively assign costs. Once costs of the activities have been identified, the cost of each activity is attributed to each product to the extent that the product uses the activity. In this way ABC often identifies areas of high overhead costs per unit and thus, directs attention to finding ways to reduce the costs or to charge more for costly products **(Kaplan and Anderson, 2005, 2007)**. Traditional cost accounting methods were developed in the period, when direct costs of labour and material factors of production were dominant and when changes in the technology and consumer demand were not so fast. The problems with traditional cost accounting emerge, when indirect costs (such as maintenance, insurance, production

preparation, etc.) amount to significant sums or are even higher than direct costs. Activity Based Costing is a commonly used tool and has practical significance for the specific conditions of agricultural production, where it can be used to achieve the improvement of cost management **(Zakić and Borović, 2013).**

Scientific hypothesis

The aim of this paper is to assess the trend in overall production cost of agricultural firms in V4 countries, to compare the level of costs between countries as well as evaluating the development of yields on farms and evaluating the amount of profit achieved. Following the analysis of the total cost, another aim of the paper is to define substantive problems in overheads and to assess their dynamics. The purpose is to find out whether the costs incurred for the cultivation of wheat and oilseed rape in Slovakia are adequate as they are compared with the surrounding countries. We also look for the answer to how modern cost management methods could influence their height and development.

MATERIAL AND METHODOLOGY

The subject of the analysis is the evaluation of the structure and development of costs and benefits for agricultural production as a whole, partially for crop and for livestock production and also for two specifically selected products. The reporting period is the period 2009 – 2013, while in Poland we evaluated the years 2009 – 2012, and in case of Hungary we added an extra year (2014).

From the methodological point of view, we use traditional calculation methods for compiling calculations of costs and we note the benefits of the non-traditional calculation method Activity Based Costing. For the needs of analysis, we work with the following products: wheat and oilseed.

The data on the level of costs and revenues are denominated in Euro, per ton of manufactured product. The conversion is calculated using current exchange rates (at the time of writing).

In our analysis the following groups of businesses are used: 1st Group – agricultural enterprises included in the survey in individual countries - Slovakia, the Czech Republic, Poland and Hungary. We chose this group to analyse the development of the total cost, and the level of overheads. 2nd Group Surveyed group of companies – we created a group of businesses in which we performed our own questionnaire survey. The group consists of 18 agricultural enterprises in Slovakia (30 firms were approached) – cooperatives, limited liability companies and share companies.

We used data on the cost of selected agricultural products in organisations devoted to determining the cost of agricultural products statistically, separately in each of the countries analysed.

In Slovakia, this is the National Agricultural and Food Centre – Research Institute of Agriculture and Food in Slovakia (Národné poľnohospodárske a potravinárske centrum, Pracovisko: Výskumný ústav ekonomiky poľnohospodárstva a potravinárstva – VÚEPP), Research Institute of Agricultural and Food Economics, Bratislava office. The information concerning income and expenditures of business entities was obtained using statements of their total costs. Some companies are unwilling to provide requested information, even though it would be appropriate, if calculations were compiled by every business entity, even if it is methodologically very difficult and demanding. The group of companies included in this survey represents about 40% of all farms in Slovakia (of 200 respondents, about 75 participated in the research. For the year 2013, 75 business entities (granges, Ltd., joint stock company) provided data, the numbers vary slightly in the analysed years.

Before processing costs considerable attention is paid to checking the factual accuracy of data. After multiple analysis and the removal of errors, the summary reports were prepared.

The results of the research on the cost of agricultural products can be used in various analyses of costs and production efficiency of agricultural products in different geographical conditions, for forecasting agricultural policy, the creation of different analyses and comparison of costs etc. The level of total production costs of agricultural products, as is apparent from the characteristics of total internally produced inventory costs, apart from direct costs, also includes a share of production overheads and if necessary a share of administrative expenses. The direct costs of the calculated activity as well as the share of production overheads are expenses directly related to the relevant activity, which are recorded as costs of the activity or in a narrower concept as the costs of production. The administrative costs incurred in the process of economic activities are considered costs not identifiable with a specific activity and are designated as periodic expenses and in a narrower concept as non-production costs. The level of the total production cost of a surveyed business was included in the final calculations of the surveyed sample. The total costs are the sum of direct and indirect costs together. The direct costs per 1 ha of harvested area (also 1 ton of product) or per 100 feeding days include: the consumption of purchased and produced seeds, seedlings, feed, litter; The consumption of purchased and manufactured fertilisers; The consumption of other purchased materials; The consumption of other products; Payroll; Social costs; Repairs and maintenance of external and internal; depreciation of intangible and tangible fixed assets; other direct costs; share of the costs of ancillary activities (e.g. work of tractors, combines, freight). Indirect costs consist of general and administrative expenses. The share of production overheads is the share of indirect costs related to the management and service of crop and livestock production. It is the actual overheads incurred related to crop and livestock production which would be impossible or uneconomic to assign (monitor) directly for individual crops and breeds of animal. The amount of production overheads is obtained from the analytical accounts to individual cost accounts or internal records. Costs of production overheads are assigned to different crops and animal breeds through allocation units. The allocation base is the actual direct costs of individual crops and species of animal. The share of the administrative costs, the share of indirect costs related to the management and administration. The share of administrative expenses attributable to individual crops and breeds is determined

by the cost-allocation units. The amount of administrative expenses is obtained from the analytical accounts to individual accounts or cost of factory records. The allocation base is the actual direct costs of individual crops and breeds.

In the Czech Republic, the data on the costs of agricultural products is compiled by the Institute of Agricultural Economics and Information in the Czech Republic (Institute of Agricultural Economics in Prague). The results on revenues and costs are presented for a set of 240 to 280 farms from all regions and agricultural production areas of the Czech Republic. Data is collected from internal calculations for activities within double-entry bookkeeping. Most respondents have audited accounts. All the data collected from the farms is inspected, analysed and then processed. Businesses included in the research set ascertain the total production cost by calculations, where the total costs are the sum of direct and indirect costs together. Direct costs per 1 ha of harvested area/1 ton of product and 100 feeding days include: direct material costs (purchased and own seeds, purchased and own fertiliser, spraying of plants with protection products and other direct materials, other direct costs and services, direct labour and personnel costs, payroll and personnel costs of ancillary activities, depreciation and amortization, costs of ancillary activities. Indirect costs include costs of general and administrative expenses. Total costs are the sum of direct and indirect costs. The Research Institute monitors costs in the following breakdown for each product by production areas. It does not separately monitor the total cost of crop and livestock production and total cost of agricultural production.

In Poland, the data collection is done by the Institute of Agricultural and Food Economics – National Research Institute, Agricultural Accountancy Department in Poland (Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej – Państwowy Instytut Badawczy, Zakład Rachunkowości Rolnej). In individual years it calculates the economic situation of selected groups of farms. Statistical results contain information about production, costs, income from agriculture, economic results and selected financial metrics and ratios. Businesses submit information in a standard format. Using a special questionnaire, data is collected from about 200 farms (legal entities). From the data obtained, a database is subsequently created using specially created computer programs. Direct costs in crop production include: seeds and plants, seeds and plants home-grown, fertilisers, crop protection, other crop specific costs. Direct costs of livestock products include: feed for livestock, feed for livestock home-grown, other livestock specific costs. Direct costs also include: machinery and building current costs, energy, contract works, depreciation, wages paid, rent paid, other direct inputs. Indirect costs are tracked in one item: total farming overheads.

In Hungary, information on the costs of agricultural products is compiled by the Research Institute of Agricultural Economics in Hungary (Agrárgazdasági Kutató Intézet). The Institute collects and analyses data, conducts research and distributes the results obtained through their publications. It obtains information on the results achieved in agriculture, forestry and food production. It ensures the comparability of time series in connection with the published data for previous years. The data is useful for international comparisons, and researching key trends. Data are collected at enterprise level, in businesses that maintain double-entry bookkeeping. The results are presented in the form of standard tables. The costs are not recorded with classification as direct or indirect costs, just as the totals for individual agricultural products. The costs of agricultural production of 1 ton of products in the research include both costs for seeds and seedlings (purchased from external suppliers and own production) cost of fertilisers (purchased and own) the cost of food and bedding (purchased and own), consumption of other purchased material costs, labour, depreciation of fixed assets, other direct costs, general overhead costs. The institute provides information (as in the Czech Republic) on the total cost of each product by production area. It does not specifically monitor the overall cost of crop and livestock production and the total cost of agricultural production.

Businesses included in the researched groups in individual countries ascertain their total level of costs using traditional calculations. From the cost structure included in total production cost in different countries, it is evident that they are mutually comparable.

When comparing the competitiveness of plant commodities, it is necessary to consider that the economic results of individual farms are affected by different production technology, size of enterprise (farm), forms of ownership, the amount of support provided in different countries, development of world and domestic markets. **(Janotová and Boudný, 2013)**.

RESULTS AND DISCUSSION

Development and comparison of costs and benefits for agricultural production as a whole, and broken down into crop and livestock production

In Table 1 and Chart 1 we show values for indicators for agricultural production as a whole. We evaluate the total cost of 1 ha of agricultural land in euro, the share of overhead costs to total own costs, earnings per one hectare for the entire agricultural production as well as the profit or loss on one hectare in euro. We compare two countries, Slovakia and Poland.

In 2009, Slovak farms spent more on agricultural production costs than Poland, but revenues were at a similar level. Slovakia, in the given year, lost € -87.44 / ha from agricultural production and Poland achieved a profit of € 44.02 / ha. In 2010, Slovakia again had higher overall costs, with lower yields than Poland, which was reflected in the fact that although both countries made profits, in the Slovak Republic it was € 7.65 / ha, while in Poland € 175.03 / ha. In 2011 Slovakia had lower costs than Poland, as well as lower yields. Both countries were profitable. In 2012, Poland achieved a significantly higher income from agricultural production, which was reflected in the achievement of high profits, € 249.25 / ha. Profit in Slovakia in that year was € 64.1 / ha. However, in terms of the share of overheads, Poland has a significantly higher share.

In Table 2 and Chart 2 we show the same variables as in Table 1 and Chart 1, but now separately for crop production and for livestock production.

Table 1 Costs, revenues and the profit and loss statement for agricultural production in €/ha.

Agricultural production		Slovakia				Poland			
		Total costs / 1ha	Proportion of overhead costs	Revenues / 1ha	Profit or loss / 1ha	Total costs / 1ha	Proportion of overhead costs	Revenues / 1ha	Profit or loss / 1ha
	2009	1177.14	16.60%	1089.7	-87.44	1033.16	21.61%	1077.18	44.02
	2010	1113.28	19.00%	1120.93	7.65	1070.6	24.71%	1245.63	175.03
	2011	1193.27	17.29%	1296.46	103.19	1216.43	23.67%	1435.89	219.46
	2012	1224.02	18.36%	1288.12	64.1	1301.93	23.60%	1551.18	249.25
	2013	1302.30	17.47%	1319.08	16.78	*	*	*	*

Source: Own calculations on data of The National Agricultural and Food Center - Research Institute of Agriculture and Food in Slovakia, The Institute of Agricultural and Food Economics – National Research Institute, Agricultural Accountancy Department in Poland.

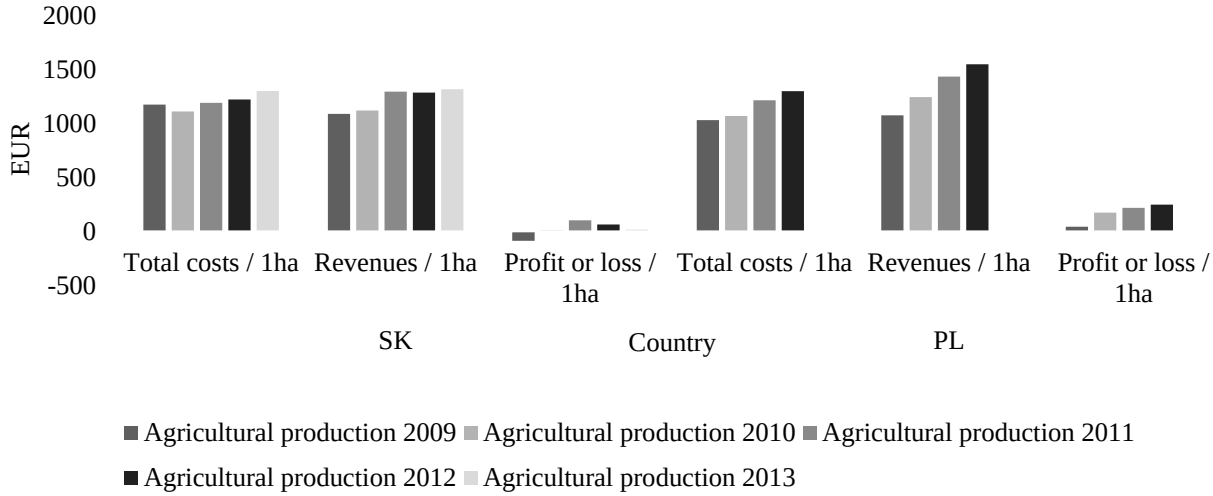

Figure 1 Costs, revenues and the profit and loss statement for agricultural production in €/ha. Source: own chart on data from Table 1.

Table 2 Costs, revenues and the profit and loss statement for agricultural production and livestock production in €/ha

		Slovakia				Poland			
		Total costs / 1ha	Proportion of overhead costs	Revenues / 1ha	Profit or loss / 1ha	Total costs / 1ha	Proportion of overhead costs	Revenues / 1ha	Profit or loss / 1ha
Crop production	**2009**	560.32	16.98%	538.99	-21.33	498.73	28.40%	536.82	38.09
	2010	504.32	20.21%	537.27	32.95	602.32	28.52%	717.59	115.27
	2011	590.73	17.68%	747.5	156.77	678.54	28.36%	805.3	126.76
	2012	604	19.94%	747.04	143.04	694.72	28.98%	884.34	189.62
	2013	636.72	21.49%	730.08	93.36	*	*	*	*
Livestock production	**2009**	616.81	16.36%	550.71	-66.1	534.43	18.27%	540.22	5.79
	2010	608.96	18.01%	583.65	-25.31	468.28	21.54%	528.05	59.77
	2011	602.54	16.91%	548.96	-53.58	537.89	20.07%	630.59	92.7
	2012	620.02	16.82%	541.08	-78.94	607.21	20.18%	667.49	60.28
	2013	665.58	16.85%	589	-76.58	*	*	*	*

Source: Own calculations on data of The National Agricultural and Food Center - Research Institute of Agriculture and Food in Slovakia, The Institute of Agricultural and Food Economics – National Research Institute, Agricultural Accountancy Department in Poland.

We evaluate the total cost per 1 ha of agricultural land in euro, the share of overhead costs to total costs, earnings per one hectare for the entire agricultural production as well as the profit or loss on one hectare in euro. We compare the same two countries, Slovakia and Poland.

In crop production in 2009, Slovakia lost money and Poland profited, even though revenues were higher in the Slovak Republic. In 2010, Slovakia was also making profits, although earnings in Poland were significantly higher. Although Poland had higher costs, it also had

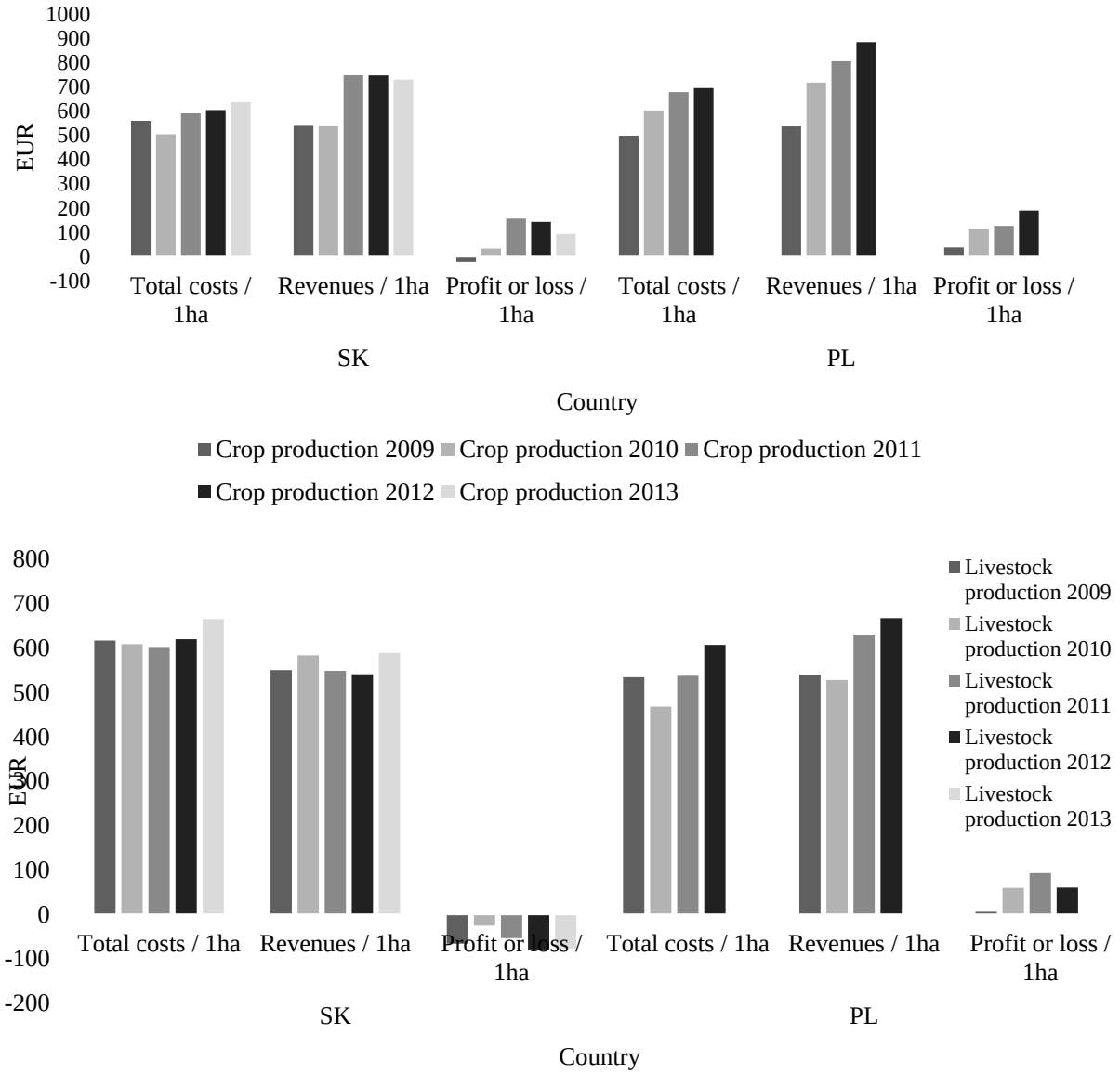

Figure 2 Costs, revenues and the profit and loss statement for agricultural production and livestock production in €/ha. Source: own charts on data from Table 2.

higher yields. In 2011, the profit of Slovakia increased significantly over the previous year, reaching € 156.77 / ha. In this year, it is higher than the profit from crop production in Poland. In 2012, both countries were again profitable, but Poland was more profitable again at € 189.62 / ha. The share of overheads was significantly higher in Poland.

In livestock production Slovakia lost money in all years, and Poland made profits in all years. The highest loss in Slovakia was € -78.94 / ha in 2012. Poland had its highest profit in 2011. It is also the case in livestock that Poland reported a higher proportion of overheads relative to total costs.

Development and comparison of total costs and yields for selected crops in the V4 countries

Development and comparison of total costs and yields of wheat

In Table 3 and Chart 3 we present, the figures for the total cost of wheat in euro per 1 ton of product produced, the shares of overhead costs to total costs as a percentage, per yield of 1 ton of wheat in euro, as well as profit and loss for 1 ton of product.

The highest total cost per 1 ton of wheat in 2009 was in Slovakia, the lowest in Hungary. All countries studied this year grew wheat at a loss except Hungary which made a profit of € 53.63 / t. In 2010 the highest cost of 1 ton of wheat was again in Slovakia, which was the only studied country reporting a loss. All other countries were growing wheat at a profit, the highest profit was achieved in Hungary, € 58.26 / t. In 2011 all four countries were already profitable; the most profit again was again achieved in Hungary, even though it had the highest production costs.

The lowest profit was in Slovakia at € 17.91 / t. The Czech Republic achieved almost the same profit as Poland and the two countries also had similar costs. In 2012, all countries were profitable, the highest profit was again seen in Hungary, followed by Slovakia. The cost of production was at a comparable level in the two countries. In 2013 Hungary was the most profitable again. Slovakia achieved profits, but much lower than in the previous year. The

Table 3 Costs, revenues, profit or loss statement for the cultivation of wheat in €/t.

Agricultural crop	Year	Indicator	Slovakia	The Czech Republic	Poland	Hungary
Wheat	**2009**	Total cost / t	154.8	112.08	104.08	97.64
		Proportion of overhead costs	15.89%	16.49%	24.90%	*
		Revenues / t	137.19	94.64	84.52	151.28
		Profit or loss / t	-17.61	-17.44	-19.56	53.64
	2010	Total cost / t	157.27	110.12	105.58	129.23
		Proportion of overhead costs	19.84%	17.35%	26.70%	*
		Revenues / t	152.97	125.29	140.81	187.49
		Profit or loss / t	-4.3	15.17	35.23	58.26
	2011	Total cost / t	143.7	110.19	112.06	166.35
		Proportion of overhead costs	17.15%	18.30%	27.07%	*
		Revenues / t	161.61	159.19	165.06	237.91
		Profit or loss / t	17.91	49	53	71.56
	2012	Total cost / t	199,47	151.66	155.12	195.52
		Proportion of overhead costs	19.21%	17.77%	26.70%	*
		Revenues / t	261.3	179.32	200.24	269.12
		Profit or loss / t	61.83	27.66	45.12	73.6
	2013	Total cost / t	164.14	127.51	*	156.63
		Proportion of overhead costs	17.18%	14.56%	*	*
		Revenues / t	193.27	167.1	*	240.79
		Profit or loss / t	29.13	39.59	*	84.16
	2014	Total cost / t	*	*	*	154.01
		Proportion of overhead costs	*	*	*	*
		Revenues / t	*	*	*	269.93
		Profit or loss / t	*	*	*	115.92

Source: Own calculations on data of The National Agricultural and Food Centre - Research Institute of Agriculture and Food in Slovakia, The Institute of Agricultural Economics and Information in Czech Republic, The Institute of Agricultural and Food Economics – National Research Institute, Agricultural Accountancy Department in Poland, The Research Institute of Agricultural Economics in Hungary.

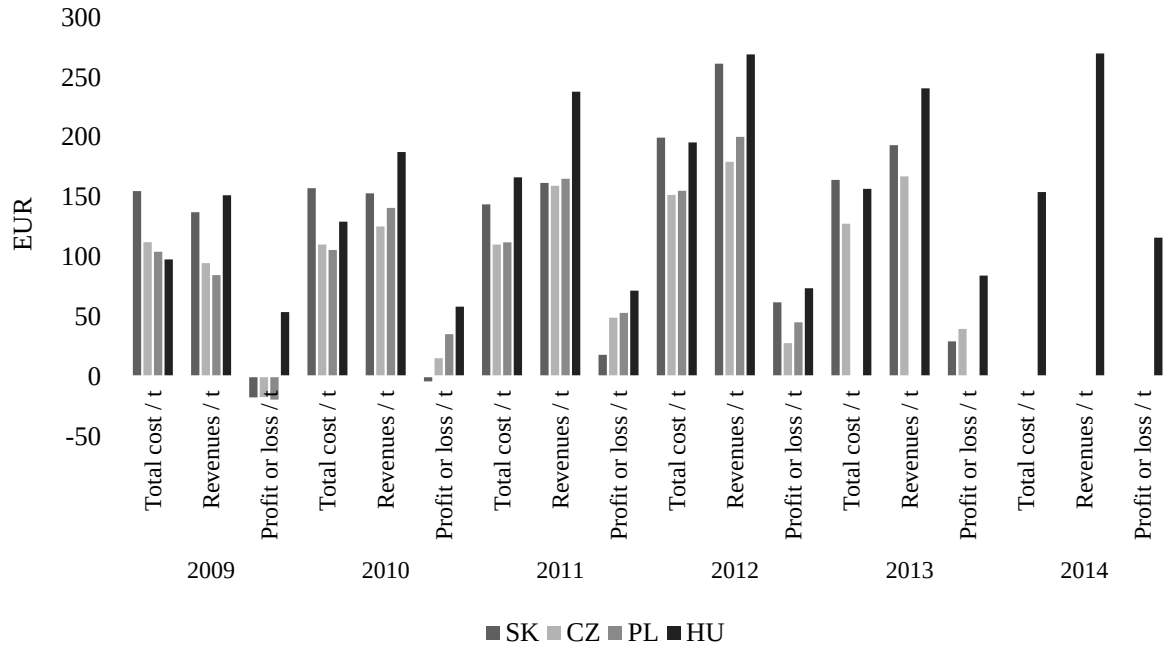

Figure 3 Costs, revenues, profit or loss statement for the cultivation of wheat in €/t. Source**:** own chart on data from Table 3.

lowest cost of production this year was in the Czech Republic, which achieved a higher profit than the Slovak Republic. Hungary is a country that has a growing trend in terms of making a profit in the cultivation of wheat. In other countries, the development of profits showed fluctuating characteristics. The shares of overheads to total

Table 4 Costs, revenues, profit or loss statement for the cultivation of oilseed rape in €/t.

Agricultural crop	Year	Indicator	Slovakia	The Czech Republic	Poland	Hungary
Oilseed rape	**2009**	Total cost / t	337.79	271.12	*	245.14
		Proportion of overhead costs	13.93%	15.01%	*	*
		Revenues / t	342.74	246.02	*	363.99
		Profit or loss / t	4.95	-25.1	*	118.85
	2010	Total cost / t	349.85	288.7	*	271.4
		Proportion of overhead costs	17.52%	16.48%	*	*
		Revenues / t	329.02	283.02	*	353.6
		Profit or loss / t	-20.83	-5.68	*	82.2
	2011	Total cost / t	373.75	345.46	*	386.73
		Proportion of overhead costs	16.24%	17.72%	*	*
		Revenues / t	469.78	375.32	*	511.74
		Profit or loss / t	96.03	29,86	*	125.01
	2012	Total cost / t	465.44	371.09	*	451.3
		Proportion of overhead costs	16.12%	16.73%	*	*
		Revenues / t	628.97	431.98	*	718.43
		Profit or loss / t	163.53	60,89	*	267.13
	2013	Total cost / t	353.9	318.57	*	359.45
		Proportion of overhead costs	17.24%	15.02%	*	*
		Revenues / t	452.86	380.47	*	470.39
		Profit or loss / t	98.96	61.9	*	110.94
	2014	Total cost / t	*	*	*	328.1
		Proportion of overhead costs	*	*	*	*
		Revenues / t	*	*	*	534.96
		Profit or loss / t	*	*	*	206.86

Source: Own calculations on data of The National Agricultural and Food Centre - Research Institute of Agriculture and Food in Slovakia, The Institute of Agricultural Economics and Information in Czech Republic, The Institute of Agricultural and Food Economics – National Research Institute, Agricultural Accountancy Department in Poland, The Research Institute of Agricultural Economics in Hungary.

production cost is evaluated for the Slovak Republic, the Czech Republic and Poland. For these countries, the highest proportion of overheads is Poland, 24.9 to 27.07%. Slovakia and the Czech Republic have a similar proportion of overheads to total costs, from 15.89 to 19.84% during the monitored period.

Development and comparison of total costs and yields for oilseed rape

In Table 4 and Chart 4 we present, the figures for the total cost of oilseed rape in euro per 1 ton of product produce, the share of overheads to total costs in percentage and yields per 1 ton of rape in euro as well as the economic result per 1 ton of product. For this product, we are excluding Poland from this evaluation. In this country, we were unable to obtain data for these indicators separately for oilseed rape, only oil crops in general, which would distort the mutual comparison.

In 2009, cultivation of oilseed was at a loss in the Czech Republic while Slovakia made a small profit. High profits were achieved in Hungary, and in this year, it also saw the lowest cost of oilseed cultivation in all countries evaluated. In 2010, two countries lost money, Slovakia and the Czech Republic, while Hungary once again made profits, though significantly lower than in the previous year. Hungary had the lowest costs, but their amount was comparable to costs in the Czech Republic. Slovakia had significantly higher costs. In 2011, all three countries had comparable costs per 1 ton of oilseed; all made a profit from oilseed cultivation. A much higher profit on a comparable level of costs was achieved in Hungary at € 125.01 / t. The smallest profit this year was in the Czech Republic, € 29.86 / t, but it had the lowest costs. The year 2012 can be evaluated similarly to 2011, the highest profit was in Hungary at € 267.13 / t and the lowest costs in the Czech Republic. In 2013, all countries had comparable costs in the range 318.57 to 359.45 € / t, whereby the lowest value was in the Czech Republic. All countries made a profit; again the highest was in Hungary, although it was much lower than in the previous two years at € 110.94 / t. For Hungary, we have data for 2014, which found that generated profits almost doubled in comparison with 2013. During the monitored period, we found a comparable level of costs in different countries, but Hungary achieved significantly higher earnings in all years. This success is largely influenced by high yields. This can be explained mainly by better natural conditions in southern areas.

We evaluate the share of overheads to total costs for this product only for the Slovak Republic and the Czech Republic, between which these costs are similar. The development share of overhead costs has a variable character.

Calculation methods versus the amount of overhead costs

In our own survey was focused on enterprises in primary agricultural production. The set of businesses covered by the survey is described in more detail under methodology. Even though the group consists of only 18 enterprises, the

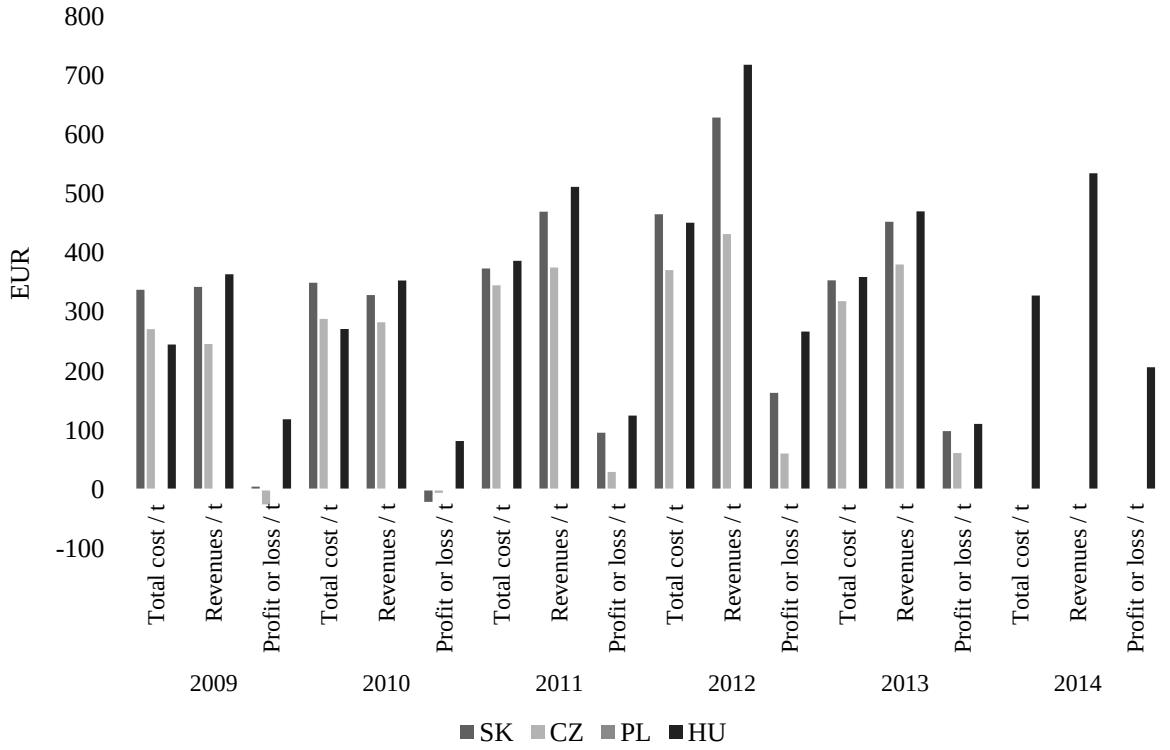

Figure 4 Costs, revenues, profit or loss statement for the cultivation of oilseed rape in €/t. Source**:** own chart of data from Table 4.

data obtained can help in assessing the situation of cost calculations in agriculture. We found that overhead costs were a high proportion of the total production cost. Up to 62% of the respondents replied that their share of overheads was 21 – 30%. While 28% said their overheads were 31 – 40%. The cause of the high calculated proportion of overhead costs was deemed to be misleading calculation by 35% of the analysed companies. 88% of the companies surveyed use traditional overhead calculation. Traditional overhead calculation is usually unsatisfactory because of its inaccuracies and static nature. It does not provide correct information in determining business conditions, such as prices, volume discounts or even the evaluation of real profit from partial production or customers. 61% of the companies surveyed did not use any software in calculations. It is not always required to have expensive, capital intensive costing software. Smaller and more simple companies that do not have the personnel, financial and software capabilities yet despite this still need a reliable tool for calculation and pricing can build a calculation methodology using MS Excel.

Enterprises included in the researched groups in individual countries ascertain their total level of costs using traditional calculations. We also found that 88% of our respondents' agricultural enterprises in Slovakia uses only traditional methods of cost calculation. Based on the results from all analyses performed, we consider the proportion of overhead costs in agriculture to be high, forming an important component of the overall production cost. From these findings, we can conclude that it is appropriate to innovate, modernise the way we think about overheads and the method of calculating them.

Direct allocation of costs to products or services does not reflect the real flow of costs to the business. Traditional calculation systems are not able to calculate costs of products with sufficient precision. Most of the cost is assigned to products based on an allocation base that does not reflect the real causes of costs. The result is distorted, which adversely affects the decisions of the managers.

Most of the costs, however, are caused by the implementation of activities. Therefore, it is advisable to use a process-oriented controlling system that can describe links between resources consumed, activities undertaken and manufactured products. The method of Activity Based Costing appears to be the most effective tool for controls. It increases the transparency costs of processes, activities and actions and with their help creates "process costing" of products. We understand controlling as a function of economic management. In the broader sense, it means collecting feedback on the performance of an organisation, which is a broader area than just cost analysis. The Activity Based Costing method (supported in the business by appropriate specialised software) is a partial tool for controlling. In the literature, it is sometimes referred to as a method of controlling overheads.

The share of overhead costs to total costs is an important factor that a business should consider, when deciding whether to use a calculation method of costing. The higher the proportion of overhead costs to total costs in a certain business is, the greater the uncertainty in terms of allocating costs using an allocation base. For this reason, *we propose* that agricultural businesses phase in or improve their existing systems of cost management by creating a flexible model of functioning of their company. According to present knowledge and international experience, a suitable method for the creation of such a model is Activity Based Costing.

The biological character of the production is not an obstacle to the introduction of Activity Based Costing (ABC) in agriculture. The ABC method is universal. Any business that can be broken down into activities can benefit from ABC. A large part of business processes are common, regardless of the nature of the production. These are, for example, processes associated with supplies, a large part of administrative processes, supporting processes related to the maintenance of machines and buildings, the sales process, processes associated with the communication with customers. Opportunities for savings and improvements often hide in just such general - supporting processes that managers do not consider as significant.

CONCLUSION

Comparing the costs between companies that produce the same or related products can be used mainly to guide the production process, ensure optimal profitability of production activities especially by reducing production costs, identify new lines of technological development to upgrade the technology of production processes, improve the organisation and management of a company or internal department.

We compared the costs and revenues of selected agricultural products in V4 countries. Such information is important for defining the status of a particular country in international competition. When taking into account the selected period, the highest revenues from wheat cultivation were achieved in 2012 in Hungary and Slovakia. The wheat production in all selected countries except Hungary generated loss in 2009. The following years were more successful and profitable than 2009. In case of oilseed rape 2012 was the most successful year. The best result was achieved by Hungary, followed by Slovakia and the Czech Republic. Generally is can be noted that the most profitable country growing wheat and oilseed rape is Hungary. It is necessary to consider that the economic results are affected by different production technology, size of enterprise, forms of ownership, the amount of support provided in different countries, development of world and domestic markets.

Comparison also helps to identify various economic results of agricultural production. Monitoring, planning and cost control is justified in finding reserves to reduce costs, provide the basis for cost planning for future periods and it is also the basis for pricing. It enables the determination of the position of domestic producers relative to international competition and the discovery of the reasons for differences in the economic performance of agricultural production. Such information is useful not only for agricultural policy makers in the country, but also for farmers. The global competitiveness of a company cannot be secured without building a quality calculation and budgeting system meeting the requirements of a developed market economy. The company must use the calculations correctly to enable it to increase the effectiveness of the use of inputs costs. And just for this purpose, we propose to improve the calculation system of agricultural enterprises in the analysed countries by introducing of non-traditional calculation method which removes the inaccuracy of the traditional methods and the non-targeted allocation of high overheads to the products.

REFERENCES

Bogdănoiu, C. 2011. Place and Role of Management Accounting and Cost Calculation in Food Industry of Manufacturing Dairy Products. *Journal of Applied Economic Sciences VI, v*ol. 4, no. 18, p. 282-285.

Bogdănoiu, C. 2011. Bases for Managerial Accounting and Cost Calculation. *Journal of Applied Economic Sciences* VI, vol. 4, p. 211-221.

Gallo, P. 2015. *Target Costing* (Cieľové kalkulácie) [online] 2016-08-01 [cit. 2017-08-20] Available at: http://www.dominanta.sk/kalk.htm.

Janotová, B., Bodný, J. 2013. International comparison of costs and revenues of selected agricultural crops (Mezinárodní komparace nákladů a výnosů vybraných zemědělských komodit) [online] s.a. [cit. 2017-10-20] Available at: http://www.uzei.cz/data/usr_001_cz_soubory/bu1303.pdf.

Kaplan, R. S., Aderson, S. R. 2005. Rethinking Activity-Based Costing - HBS Working Knowledge [online] 2015-08-01 [cit. 2017-08-20] Available at: http://hbswk.hbs.edu/item/4587.html.

Kaplan, R. S., Anderson, S. R. 2007. *Time – Driven Activity – Based Costing*. Boston : Harvard Business School Press. ISBN 978-1-4221-0171-1.

Kozáková, J., Lančarič, D., Savov, R., Tóth, M. 2014. Organic and Conventional Production in Slovakia: Comparison of Selected Managerial and Financial Indicators. *Potravinarstvo*, vol. 8, no. 1, p. 254-260. https://doi.org/doi:10.5219/386

Kozelová, D., Matejková, E., Qineti, A. 2010. Analyzing consumers opinion on organic food, their safety and availability in the Slovak food market. *Potravinarstvo*, vol. 4, no. 3, p. 30-35. https://doi.org/10.5219/16

Kozelová, D., Vietoris, V., Fikselová, M. 2013. Quality and availability of organic foods by Slovak consumers. *Potravinarstvo*, vol. 7, no. 1, p. 146-150. https://doi.org/10.5219/306

Kubicová, Ľ., Habánová, M. 2016. Development Of Milk Consumption and Marketing Analysis of Its Demand. *Potravinarstvo*, vol. 10, no. 1, p. 557-562.

Kupkovič, M., Tóth, M. 2004. Porovnanie prirážkovej kalkulácie nákladov a kalkulácie nákladov podľa čiastkových činností (Comparison of Survey Cost Calculation and Cost Calculation by Sub-Actions) (method ABC – Activity Based Costing). *Ekonomický časopis,* no. 2, p. 133-147. (in Slovak)

Popesko, B. 2012. Process cost management by using Activity Based Costing method (Procesní řízení nákladu s využitím metódy Activity Based – Costing). *Úspěch – produktivita a inovace v souvislostech*, vol. 7, no. 2. p. 1

Popesko, B., Papadaki, Š., Novák, P. 2015. Cost and Reimbursement Analysis of Selected Hospital Diagnoses via Activity-Based Costing. *E&M Economie and Management*, vol. 18, no. 3, p. 50-61.

Schawel, Ch., Billing, F. 2012. *Activity Based Costing. Top 100 Management Tools*. Germany : Springer Gabler Verlag. p. 16-18. ISBN 978-3-8349-4104-6.

Sedliačiková M., Šatanová A., Foltínová A. 2012. Financial controlling in theory and praxis of small and medium size enterprises. *Ekonomický časopis*, no. 09, p. 949-966.

Škorecová, E., Košovská, I. 2010. Application of process management and ABC method in the livestocks production (Uplatnenie procesného riadenia a metódy ABC v živočíšnej výrobe). In *National and regional economics VIII*. Košice : Technická univerzita v Košiciach - Ekonomická fakulta, p. 1-7. ISBN 978-80-553-0517-2.

Zakić, V., Borović, N. 2013. Application Of Activity-Based Costing in Agricultural Enterprises. AgEcon Search. *Research in Agricultural & Applied Economics*, no. 9, p. 13.

Research Institutes: National agricultural and food center - Research Institute of Agriculture and Food in Slovakia (Národné poľnohospodárske a potravinárske centrum, Pracovisko: Výskumný ústav ekonomiky poľnohospodárstva a potravinárstva - VÚEPP) [online] s.a. [cit. 2017-08-20] Available at: http://www.vuepp.sk/04_naklady.htm.

Institute of Agricultural Economics and Information in Czech republik (Ústav zemědělské ekonomiky a informací - ÚZEI) [online] s.a. [cit. 2017-08-20] Available at: http://www.uzei.cz/nakladovost-zemedelskych-vyrobku/.

Institute of Agricultural and Food Economics – National Research Institute, Agricultural Accountancy Department in Poland (Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej – Państwowy Instytut Badawczy, Zakład Rachunkowości Rolnej) [online] s.a. [cit. 2017-08-20] Available at: http://fadn.pl/publikacje/wyniki-standardowe-2/wyniki-standardowe-srednie-wazone/.

Research Institute of Agricultural Economics in Hungaria (Agrárgazdasági Kutató Intézet) [online] s.a. [cit. 2017-08-20] Available at: https://pair.aki.gov.hu/web_public/general/home.do?lang=en&changelangaction=true.

Contact address:

Ing. Lenka Hudáková Stašová, PhD., Technical University of Košice, Faculty of Economics, Department of Finance, Němcovej 32, 040 01 Košice, Slovakia, E-mail: lenka.hudakova.stasova@tuke.sk

Ing. Radoslav Bajus, PhD., Technical University of Košice, Faculty of Economics , Department of Finance, Němcovej 32, 040 01 Košice, Slovakia, E-mail: radoslav.bajus@tuke.sk