

## ORGANIC AND CONVENTIONAL PRODUCTION IN SLOVAKIA: COMPARISON OF SELECTED MANAGERIAL AND FINANCIAL INDICATORS

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### ABSTRACT

The paper deals with comparison of organic and conventional agriculture from two points of view. Firstly the managerial point of view examining number of employees and the personal costs per hectare. Secondly, the owners' point of view examining profitability of organic farming. Both views result from the specifics of organic farming. Organic production usually generates higher employment, higher personal cost and results in lower yields. We evaluated differences between organic and conventional agriculture in Slovakia over period of years 2009-2012 on a sample of more than 1050 farms in each year. The share of organic farms was 15%. Using t-test as evaluation method we found no significant differences from the managerial point of view (measured by employees per hectare and personal costs per hectare). From the owner's point of view (measured by return on costs, return on equity and total assets per hectare) we conclude that the subsidies successfully compensate the lower revenues of organic farms (there was no significant difference in ROE and ROC). Our results are based on the sample of organic farms with Average utilised area of 850 hectares which reflects the farm structure in Slovakia. We can conclude that large organic farms do not support employment in rural areas and generate comparable profit when compared to conventional farms.

**Keywords:** organic farming; conventional farming; labour input; ROE; ROC

### INTRODUCTION

Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved (IFOAM, 2008). Organic agriculture is based on four fundamental principles (which also constitute the main organic research areas):

1. The Principle of Health - organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.
2. The Principle of Ecology - organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.
3. The Principle of Fairness - organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.
4. The Principle of Care - organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

The definition and the fundamental principles are based on environmental and social aspects of an entrepreneurship. An increasing number of papers have recently started to explore the relevance of social and moral concerns when focusing on environmental sustainability and environmental compliance (van den Bergh et al., 2000; Schwartz, 2002; Venkatachalam,

2008). Frey and Stutzer (2008), argue that individuals might contribute to a public environmental good because of an "intrinsic motivation to act according to one's values". On the other hand, farmers (including organic farmers) are still entrepreneurs, which manage their business with the goal to generate profit. Despite the fact that such a pragmatic point of view is not outlined in official statements (for example FAO/WHO „Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods“, U.S. National Organic Program Standards, Codex Alimentarius) it is actually becoming a point of interest for steadily increasing number of authors.

The increasing consumer demand for organic products caused that the organic food market has expanded in all continents of the world. Organic foods represent a specific segment of the food market (Kozelová et al., 2013). Organic farming research is worldwide provided primarily by FiBL – Research Institute of Organic Agriculture. They are focusing mainly on the general characteristics of the system and its development in individual countries. (Willer et al., 2010, 2013). Apart from the evaluation of various organic aspects, authors often examine the conversion process from conventional to organic farming (Kerselaers et al., 2007; Acs, 2007; Stolze and Lampkin, 2009; Damgaard et al., 2014) and the comparison of organic and conventional farming systems from different perspectives, such as soil, energy use, sustainability, social responsibility or risk (Gündoğmuş, 2006; Berentsen et al., 2012; Ubrežiová et al., 2013; Arnhold et al., 2014; Patil et al., 2014). Comparison of

both systems is also reflected in the economic research. In this area, attention is drawn primarily to support of organic agriculture (in form of subsidies) (Lesjak, 2008; Pašová et al., 2014) and its impact on farm efficiency (Breustedt et al., 2011; Argyropoulos et al., 2013).

In Central and Eastern Europe (CEE) countries economic marketing and safety issues of organic farming and food processing is examined by: Woźniak, 2002; Wolcz and Pummer, 2004; Wachter et al., 2005; Jánický, 2005; Březinová, 2008; Moschitz and Stolze, 2010; Živělová et al., 2010; Bujna et al., 2013, Rozman et al., 2013. Mentioned authors primarily focus on income and expenses of organic food production and organic farm economy. Their research results clearly shows that organic production generates increased costs (material and labour). On the other hand, this production system depends less on expensive technology and chemicals widely used in conventional farming.

While some authors (e.g., Nieberg and Offermann, 2003) argue that organic production allows relatively high price premiums, others argue that organic farming is not more profitable than conventional farming (Klonsky and Greene, 2005). Thanks to a review of the literature on profitability of organic farming, Greer et al. (2008) report that the profitability of organic and conventional farms in the EU and the US has generally been found to be similar. Interestingly, Acs et al. (2007) report higher income for organic farming. However, after taking into account some factors likely to influence conversion, namely, extra depreciation costs, hired labour availability, organic market price uncertainty and minimum labor income requirement, organic farming may become less profitable than staying conventional (Mzoughi, 2011).

Both conventional and organic agriculture are considerably subsidized. Theoretical studies suggest that subsidies may have a positive impact on farm production and at the same time a negative impact on farm productivity (Hennessy, 1998; Ciaian and Swinnen, 2009). According Rizov et al. (2013) the impact of subsidies on productivity is a net effect of allocative efficiency losses and the investment-induced productivity gains caused by the interaction of market imperfections with the subsidy. As a response to the agrarian crisis, both national as well as state governments introduced measures like loan waivers, subsidies and policies favoring sustainable agricultural practices including organic farming (Patil et al., 2014). This support has common rules under „direct support schemes for farmers“ in all EU member states as a part of Common Agriculture Policy (CAP). With a yearly budget of € 40 billion (EC, 2014), direct payments form a significant part of the EU budget. Direct payments are payments granted directly to farmers under certain direct support scheme (Single Payment Scheme - SPS, Single Area Payment Scheme - SAPS, coupled schemes and/or specific support) listed in Annex 1 of Council Regulation (EC) No 73/2009. Payments under direct support scheme can be required by each farmer (who declare min. 1 ha of agriculture land) in Slovakia. This is financed by *European Agricultural Guidance and Guarantee Fund (EAGGF)*. For organic farmers there are Agroenvironmental payments financed by *European Agricultural Fund for Rural Development (EAFRD)*.

Mentioned supports are in Slovakia administrated by Agricultural Payment Agency (APA) - Part Direct and Agroenvironmental Support, which is subordinated by the Ministry of Agriculture and Rural Development.

In Slovakia there are authors who examined the economy of organic agriculture (Šimčák, 2005; Paška, 2006; Kozáková, 2011). Market of organic products and consumer's opinion in Slovakia are analysed by Kozelová et al. (2010). From this analysis it can be concluded that even though consumers have some idea about bio - food and trust them more compared to other conventional food, they think that their market supply is not sufficient. This article builds on their results and compares organic and conventional agriculture from two points of view. Firstly, the managerial point of view examining the number of employees and personal costs, secondly the owners view examining his motivation to focus on organic agriculture as a business through selected financial indicators. Based on the literature and previous research we formulated following research hypotheses:

**H1:** Number of employees per hectare is higher in the case of organic producers when compared to conventional producers.

**H2:** Personal Costs per hectare are higher in the case of organic producers when compared to conventional producers.

**H3:** Total assets per hectare are lower in the case of organic producers when compared to conventional producers.

**H4:** Return on Costs per hectare is higher in the case of organic producers when compared to conventional producers.

**H5:** Return on Equity per hectare is higher in the case of organic producers when compared to conventional producers.

## MATERIAL AND METHODOLOGY

For calculations we used the data from database of the Slovak Ministry of Agriculture and Rural Development (IL MoARD, 2013), over the period 2000-2012. The database consists of individual farm data, including balance sheets and income statements. Data submission is obligatory for all agricultural farms. For our analysis, data were selected according to the type of production to subset of the conventional producers (farmers) and the subset of the organic producers (farmers). We included only active organic producers (those enterprises generating sales from organic farming) into subset of organic producers. Only data for production cooperatives and companies (Ltd., JSC) were available. There were no data for family farms and soleholders.

We calculated following indicators for each farm. These indicators are commonly used to evaluate managerial and financial aspects of efficiency and profitability (Rábek and Čierna, 2012; Klišťik and Valášková, 2013; Krechovská and Taušl Procházková, 2014):

$$PCH = \frac{\text{personal costs (EUR)}}{UAA \text{ (ha)}} \quad (1)$$

$$ROC = \frac{\text{net profit after taxes (EUR)}}{\text{total costs (EUR)}} \times 100 \quad (2)$$

$$ROE = \frac{\text{net profit after taxes (EUR)}}{UAA \text{ (EUR)}} \quad (3)$$

$$TAH = \frac{\text{total assets (EUR)}}{UAA \text{ (ha)}} \quad (4)$$

We had to do data adjustment (Klocoková, 2011; Munk et al., 2013). In order to assess the personal costs per hectare (PCH), return on costs (ROC), return on equity (ROE) and total assets per hectare (TAH), the data of the following farms were excluded from the dataset:

- farms with negative equity (liabilities exceeding total assets),
- farms with return on equity (ROE) exceeding

+/- 100% (average profit or loss exceeds equity) over the observed period,

- another outliers (obvious mistakes in filling the financial statements).

After the necessary adjustment there remained 1150 farms in 2009 (1037 conventional farmers and 113 organic farmers), 1086 farms in 2010 (970 conventional farmers and 116 organic farmers), 1159 farms in 2011 (1021 conventional farmers and 138 organic farmers) and 1169 farms in 2012 (1029 conventional farmers and 140 organic farmers).

To evaluate the significance of differences in selected indicators over the period of years 2009-2012 (for each

**Table 1** Employees per hectare (2009-2012).

Year	Category	Mean	Median	Percentile 25	Percentile 75
2009	conventional farmers	0.036	0.025	0.016	0.038
	organic farmers	0.030	0.023	0.014	0.032
2010	conventional farmers	0.035	0.023	0.014	0.035
	organic farmers	0.031	0.020	0.014	0.029
2011	conventional farmers	0.032	0.021	0.013	0.034
	organic farmers	0.031	0.021	0.013	0.028
2012	conventional farmers	0.033	0.021	0.013	0.032
	organic farmers	0.025	0.019	0.011	0.028

Source: own calculation based on data from the Information Letters of the MoARD SR (2013)

**Table 2** Personal Costs per hectare (2009-2012).

Year	Category	Mean	Median	Percentile 25	Percentile 75
2009	conventional farmers	340.111	224.859	127.489	358.793
	organic farmers	247.975	191.600	101.500	290.926
2010	conventional farmers	340.266	221.489	124.954	352.782
	organic farmers	251.992	196.249	112.172	275.175
2011	conventional farmers	324.012	214.661	114.213	364.048
	organic farmers	285.931	192.299	109.673	290.458
2012	conventional farmers	319.993	212.566	119.911	365.924
	organic farmers	264.844	181.975	93.866	285.006

Source: own calculation based on data from the Information Letters of the MoARD SR (2013)

**Table 3** Total assets per hectare (2009-2012)

Year	Category	Mean	Median	Percentile 25	Percentile 75
2009	conventional farmers	3011.854	1695.306	999.878	2620.712
	organic farmers	2550.479	1340.016	894.423	2501.909
2010	conventional farmers	2905.651	1671.518	1000.765	2597.653
	organic farmers	2521.328	1325.729	833.147	2142.107
2011	conventional farmers	2959.783	1686.976	1014.125	2586.478
	organic farmers	2970.407	1364.298	938.057	2913.860
2012	conventional farmers	3030.367	1698.094	1029.533	2654.888
	organic farmers	2879.030	1331.135	974.626	2426.586

Source: own calculation based on data from the Information Letters of the MoARD SR (2013)

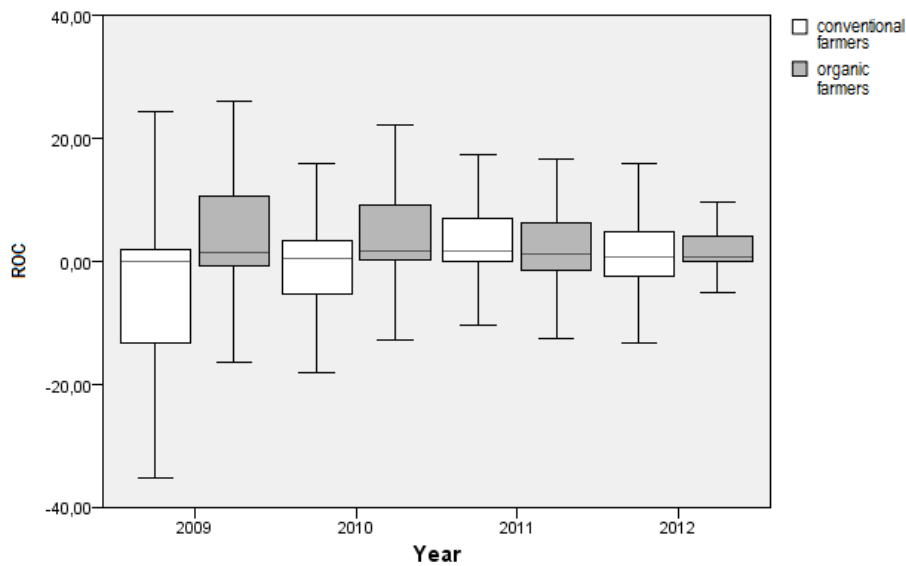
year separately) we used t-test for independent samples and the statistical software IBM SPSS v.20 for calculation.

**RESULTS AND DISCUSSION**

As a first indicator we evaluated the number of employees per hectare separately for each year and each farming system. The results are summarized in table 1. We found out that in each year the average number of employees per hectare is higher in the case of conventional farmer when compared to the organic farmers (0.036 to

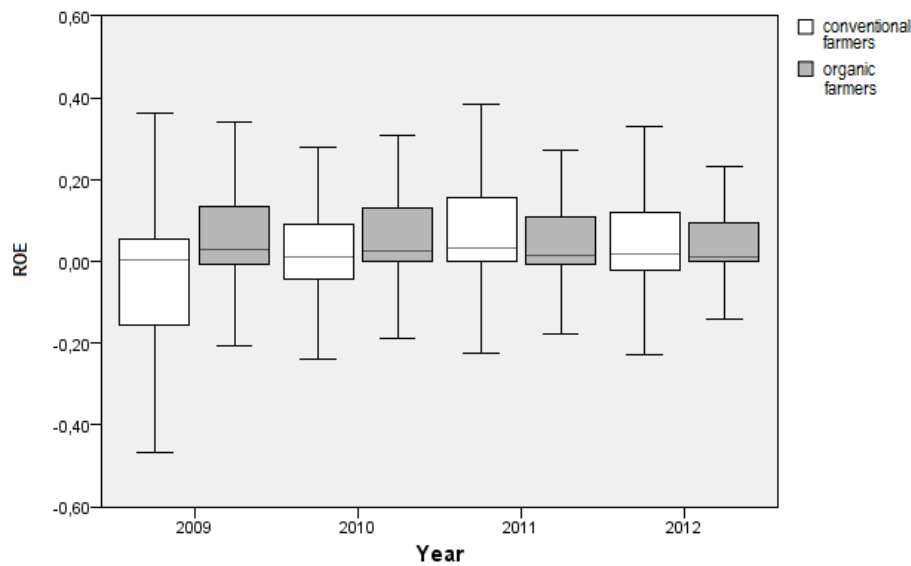
0.030 in 2009; 0.035 to 0.031 in 2010; 0.032 to 0.031 in 2011 and 0.033 to 0.025 in 2012). The differences in median are even lower (Table 1). This finding is further confirmed by the 25 and 75 percentiles.

We evaluated the existence of statistically significant differences using t-test for independent samples. As the descriptive statistics indicated there is no significant difference in the number of employees per hectare in organic and conventional production (Table 5). We conclude the hypothesis H1 was not confirmed.



**Figure 1** Return on Costs – Boxplot (2009-2012).

Source: own calculation based on data from the Information Letters of the MoARD SR (2013)



**Figure 2** Return on Equity – Boxplot (2009-2012).

Source: own calculation based on data from the Information Letters of the MoARD SR (2013)

Table 5 Table of Contrasts (2009-2012) – Results of t-test.

Year	EH	PCH	NPH	ROC	ROE	TAH
2009	no	yes	yes	yes	yes	no
2010	no	no	yes	yes	yes	no
2011	no	no	no	no	no	no
2012	no	no	no	no	no	no

Source: own calculation based on data from the Information Letters of the MoARD SR (2013)

no - there is no statistically significant difference in evaluated indicator between the conventional and organic farming,  
 yes - there is statistically significant difference in evaluated indicator between the conventional and organic farming,

Obtained result directly contradicts the theory that the organic farming system is characterized by higher amount of manual work which leads to the higher number of employees. One of the possible explanations is the average acreage of the Slovak farms. The majority of the land is utilized by farms with the acreage over 500 hectares (Rábek et al., 2014). In this aspect the Slovak Republic is unique when compared to other European Union member states. To be able to utilize such acreages the farm needs to rely heavily on the technology and not on the manual work.

As a next indicator we analysed personal costs per hectare. Theory says (Offerman and Nieberg, 2000) that personal costs in organic farming are higher than in conventional system because of higher requirements for manual work. However, theories differ from praxis in the Slovak Republic. Average personal costs per hectare are lower in organic farming than costs in conventional system (Table 2) in every year of the observed period (the difference changes from approximately 93 EUR in 2009 to 55 EUR in 2012). Based on the obtained results we conclude the hypothesis H2 was not confirmed (Table 5). Lower personal costs in organic farming are connected with lower number of employees per hectare in organic farming (Table 1). In 2009 personal costs in organic farming represented 73% of personal costs in conventional system. In 2012 this share was 83 %.

The third evaluated indicator were total assets per hectare. In respect to theory (Paška, 2009) the organic farmers need lower assets when compared to conventional farmers (in form of equipment and machines) because the higher share of the manual work in case of organic farmers. In three years of four observed years (2009, 2010, 2012) the total assets per hectare were indeed lower in farms with organic farming system (Table 3). Total assets per hectare (mean value) of organic farmers were 2550 EUR (conventional farmers 3011 EUR) in 2009; 2521 EUR (conventional farmers 2905 EUR) in 2010; 2879 EUR (conventional farmers 3030 EUR) in 2012. In 2011 the total assets per hectare of organic farmers were 2970 EUR while the total assets per hectare of conventional farmers were 2959 EUR. According to results of t-test these differences were not statistically significant (Table 5). We conclude the hypothesis H3 was not confirmed.

Return on costs (Figure 1) and return on equity (Figure 2) are without doubt important factors from the financial and

economic point of view. There are statistically significant difference between organic and conventional farmers in 2009 and 2010 in both indicators (Table 5). The organic farmers were more profitable in comparison to the conventional farmers (they generated higher return on equity and higher return on costs). However, in 2011 and 2012 there are no significant differences. Based on these results hypotheses H4 and H5 were not confirmed.

### CONCLUSION

Organic farming and organic food products are nowadays preferred by individuals and society. Also public funds in form of subsidies are supporting this farming system. Higher subsidies are underlining the benefits of organic farming for the whole society. According to the theory this type of farming results in higher number of employees per hectare, lower capital needs and higher costs (material and labour). In the paper we focused on these specifics in Slovak farms. The structure of farms in Slovakia is different in comparison to other EU member states mainly in Utilised agricultural area (UAA) per farm. Farms with more than 500 hectares manage almost 80 % of the total UAA.

Our aim was to measure the differences in the specifics of organic farming on a sample of more than 1050 large farms in Slovakia. Based on the results we can conclude there are no statistically significant differences between conventional and organic farms over the whole observed period. The fact that organic farms have higher number of employees was confirmed in none of the years observed. Also higher personal costs of organic farms could not be confirmed. Organic farming in Slovakia does not generate increased labour input. The financial benefit for the owner was evaluated by ROC and ROE. The statistically significant differences between organic and conventional farming were confirmed only in two out of four years. According to the theory organic farms are less profitable and therefore the production should be more subsidized when compared to conventional farms. In respect to our results we conclude that organic farms in our sample generate results comparable with conventional farms in sense of profitability. Higher subsidies of organic farms successfully compensate lower revenues and therefore the motivation for the owner to focus on organic farming is not lower than to focus on conventional farming. In some years of the observed period organic farms were even more profitable than conventional ones.

Further research should be focused on the differences between organic farms with respect to UAA. The average UAA of organic farms in our sample was 850 hectares. The absence of above described general specifics in Slovak organic farms included in our sample might be influenced by this fact.

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