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Diversification of economic effects of milk production in selected group of organic and conventional farms in Poland in 2006-2007

Abstract: *Apart from the social and environmental elements of development, an economic aspect of organic production proves to be very important. Strong and weak points of organic milk production can be identified on the basis of a detailed analysis of accounting data at farm and product (milk) level. The main objective of the study was to compare the competitiveness of cow's milk production in organic and conventional farms in the years 2006-2007. The results obtained do not prove significant intensification of milk production in the surveyed organic farms. In comparison with conventional holdings, milk yield per dairy cow was much lower, as well as the selling price for milk. It should be emphasised, however, that milk production in organic farms was a profitable activity, but with a very high share of subsidies in this income.*

Keywords: *economic results; organic milk production*

Introduction

Poland's accession to the European Union (EU) has had a significant effect on the development of organic agriculture. Due to legal and financial support granted under the common agricultural policy, the number of organic farms has increased dynamically. There are prospects for the development of markets in certified organic products, particularly that the demand still exceeds the supply. The production of organic milk in Europe and in Poland continues to be limited. In 2006 the output of this product accounted for less than 2% of total milk output in Europe (Agra Europe 2007). The reasons for the limited production of organic milk in Poland include considerable dispersion of organic farms, a small number of dairy cows as well as their low milk yield.

Methodology

The main objective of the study was to assess the economic and production situation of organic farms. An important aspect was the examination of changes in prices and milk production in terms of quantity and value. Selected economic indicators were also compared in organic and conventional farms.

The study was based on data from two compatible systems: the Polish FADN and the AGROKOSZTY system. The survey sample included organic and conventional family farms and covered the years 2006 and 2007. In 2006, 29 certified organic farms participated at the same time in collecting farm accountancy data in the AGROKOSZTY system and the Polish FADN, whereas in 2007 there were only 19 holdings, 63% of which participated in the survey again. Organic farms participating in the survey were located in two agricultural regions: Mazowsze and Podlasie as well as Małopolska and Pogórze.

In order to present the economic situation of organic farms, they were compared with conventional holdings. The selection of the survey sample of conventional farms was conducted purposefully, on the basis of the following characteristics: the annual average number of animals (it ranged from 1 to 26 in 2006, and from 1 to 17 in 2007), the same economic size class, the same type of farming, location in the same poviat and FADN region. The selected sample included 69 conventional farms in 2006 and 56 in 2007.

In the survey of the activity "dairy cows", conducted under the AGROKOSZTY system, the methodology used for calculating the standard gross margin was consistent with the EU rules (Augustynska, Goraj, Tarka, Pokrzywa, Skarżyńska 2000). It is the first income category, calculated by deducting from the value of production the corresponding specific costs. In the case of dairy cows, the production value was calculated per dairy cow. Annual average transaction prices were used for determining the production value. Specific costs met three conditions: 1) they could be attributed to a given production activity without doubt, 2) their level was proportional to the scale of production, and 3) they had a direct effect on output (in terms of quantity and value). In the case of dairy cows, specific costs include the following: livestock replacement, feedingstuffs not produced on the farm, farm-produced feedingstuffs, rent paid for the use of forage area rented for less than one year, livestock insurance, medicines and veterinary fees as well as special costs. Moreover, records of unpaid and paid labour input related to the surveyed activity are kept in the AGROKOSZTY system, which allows to determine the corresponding labour input during the accounting year. The income from activity account is based on the Polish FADN information collected from the same farm (inter alia: indirect costs, the annual average number of animals).

Farm accounts were performed in line with the FADN methodology. Total costs, calculated according to the Polish FADN methodology, include the following: specific costs, farming overheads, depreciation and the cost of external

factors. These are costs corresponding to current operations of a given farm, related to the output of the accounting year. Furthermore, inputs of marketable products (seeds, seedlings, feed for grazing stock and granivores) produced on the farm and used during current operations – for production purposes – are also taken into account. It should be added that farm taxes and other dues and charges are excluded from total costs, but they are included in calculating the balances of subsidies and taxes on current operations and investments. Moreover, personal income taxes of the holder are not included in FADN profit and loss accounts. Family farm income is calculated by deducting the balance of subsidies and taxes on investments as well as the cost of external factors from the farm net value added. The production value, according to the FADN methodology, is the sum of crop, livestock and other production (IAFE-NRI 2004).

The survey of the activity "dairy cows" performed in organic farms concerned the production costs involved, the share of subsidies on forage land in income from activity and labour intensity. Apart from presenting the results in graphic and tabular form, several analytical methods were applied, mainly pertaining to ratio analysis and dynamics analysis. The first set of methods was used to compare the economic situation of organic and conventional farms. This analysis covered the same group of organic farms surveyed in the Polish FADN and AGROKOSZTY system as well as using FADN data on conventional farms. The analysis of dynamics was aimed at determining changes in prices and output of organic milk. In the ratio analysis, the following were taken into consideration: the farm debt ratio as well as profitability and productivity ratios. Individual fixed-base indices were used for the analysis of dynamics, first of all individual indices of the average milk production as well as milk price indices. The main ratios included in the ratio analysis were as follows:

1. The equity-to-assets ratio (debt ratio-ETAR) calculated by the formula: *equity-to-assets ratio = equity / total assets*.

Equity is very important to a farm, if a given farm has none, then basically it has no possibility to raise a loan. As the ratio increases, so does the farm's creditworthiness as well as its financial independence, which allows the farmer to make independent high-risk economic decisions. The closer this ratio is to 1, the higher the farm's capital potential.

2. The fixed assets turnover (FAT) is calculated by the formula: *fixed assets turnover = production / fixed assets*.

This ratio specifies the value of production/sales obtained from each zloty of fixed assets, in other words, their productivity. The higher the ratio, the bigger the share of production/sales in the value of fixed assets.

3. Return on assets (ROA) is calculated by the formula: *return on assets = income from family farm / value of total assets*.

Return on assets specifies the family farm income derived from each zloty of farm assets. An increasing value of this ratio indicates an improvement in farm profitability.

4. The financial performance indicators (PPI and IPI), calculated by the formulas: ***production performance indicator = total costs / production***, and ***income performance indicator = total costs / income from family farm***.

These indicators measure the relation of costs to the production value and to family farm income (Goraj 2005, Bernstein, Wild 2000, Allred 1997).

In order to examine the dynamics of milk yield and of the selling price for milk in the two years in question, individual fixed-based indices were used. The analysis covered indices of the following: milk yield (quantity of milk / number of cows), the average selling price for milk and the value of milk production (yield x price). The formula presented below was used for calculating the above-mentioned indices:

$$i_0 = \frac{y_t}{y_0}; \ (t = 1, 2, \ ..., \ n);$$

where n is the number of periods in question, yt is the factor in question in period t, y_0 is the factor in question in the initial period (Wysocki, Lira 2003, Luszniewicz 1996).

Results

In both years (2006–2007), the analysed organic farms kept a similar number of cows, an average of 7 and 6 in 2006 and 2007 respectively. However, a slightly higher milk yield was recorded in 2007 as compared to the previous year. The difference was 36 litres (Tables 1 and 2). The selling price for 1 litre of milk was also higher in 2007, by PLN 0.07 (Table 1). But the production and price results were unsatisfactory for organic farmers. In the group of conventional farms selected for comparison the milk yield was slightly better. In 2006 it amounted to 3,421 litres and in 2007 to 3,543 litres per dairy cow. Therefore, it was higher than in organic farms by 2% and 5% respectively. Compared to the average results for family farms in Poland, milk yield per dairy cow was higher in these units than in the surveyed organic farms by as much as 18% and 19% (GUS 2008, IAFE-NRI, AMA, MARD 2008).

The difference in the selling price for milk was also unfavourable for organic farms. In comparison with all family farms in Poland, it was lower by an average of PLN 0.07 per litre in 2006 and by PLN 0.14 per litre in 2007 (GUS 2008). It turned out, however, that in both years in question the selling price for milk in the selected group of conventional farms was lower than in organic farms by PLN 0.09.

Table 1. Production, costs and income obtained in organic farms (per 1 dairy cow) in 2006-2007

Specification		Average in farms with dairy cows	
		2006	**2007**
Number of analysed farms		29	19
Average annual number of dairy cows	[heads]	6.6	5.8
Milk yield	[litres]	3347	3383
Sale price of milk	[PLN/litre]	0.86	0.93
		Per 1 dairy cow	
Total gross output	**[PLN]**	**3602**	**3799**
Total specific costs	**[PLN]**	**1014**	**1444**
Gross margin from activity without subsidies	**[PLN]**	**2588**	**2355**
General inputs linked to production [a]	[PLN]	658	780
Gross added value from activity	**[PLN]**	**1930**	**1575**
Depreciation	[PLN]	545	610
Net added value from activity	**[PLN]**	**1385**	**965**
Cost of external factors	[PLN]	94	84
Income from activity without subsidies	**[PLN]**	**1291**	**881**
Subsidies to forage area [b]	[PLN]	493	729
Income from activity	**[PLN]**	**1784**	**1610**
TOTAL COSTS	*[PLN]*	*2311*	*2918*
Forage area [c]	[ha]	0.77	0.93
Total labour input	**[hours]**	**259.3**	**324.4**
therein: **unpaid labour input** [d]	[hours]	258.8	322.2

[a] General inputs linked to production without cost of external factors.
[b] Subsidies include supplementary payment and so called animal payment with respect to forage area involved per 1 dairy cow.
[c] Area allocated for production of own non-commercial feed.
[d] Own labour input for handling livestock and production of own non-commercial feed.
Source: Own compilation based on the AGROKOSZTY data

In 2007, organic farms achieved a ca. 6% higher production value per dairy cow compared to 2006 (Tables 1 and 2). It was primarily due to the selling price for milk, higher by 8%. In the years in question, milk yield per dairy cow did not change significantly as in 2007 it only increased by 1% on 2006.

Table 2. Individual fixed base indices for organic farms

Specification		Year		Indices	Percentage growth
		2006	**2007**		
Milk yield of dairy cows	**[litre]**	3347.48	3383.18	1.01	1.1%
Sale price of milk	**[PLN/litre]**	0.86	0.93	1.08	7.9%
Value of produced milk	**[PLN]**	2882.18	3142.97	1.09	9.0%

Source: Own compilation based on the AGROKOSZTY data

2006

2007

Other 13%

Own noncommercial feed 3%

Herd replacement 31%

Own commercial feed 49%

Feed from outside a farm 4%

Other 14%

Own noncommercial feed 3%

Herd replacement 20%

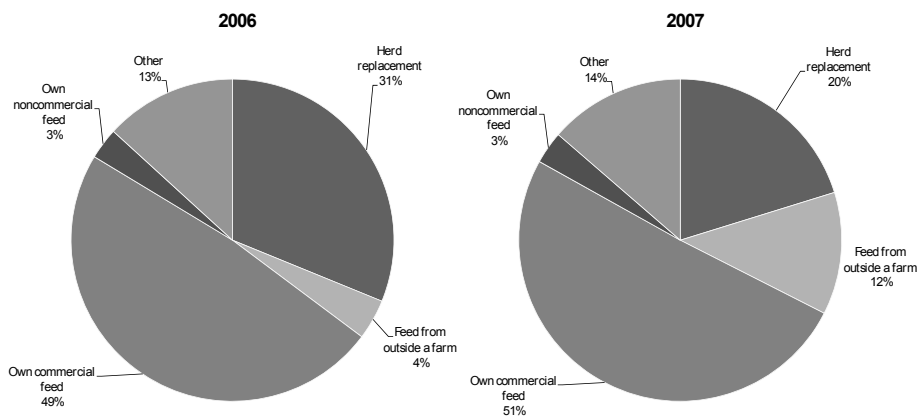Own commercial feed 51%

Feed from outside a farm 12%

Figure 1. Structure of total direct costs of milk production in organic farms in 2006 and 2007
Source: Own compilation based on the AGROKOSZTY data

Total costs per dairy cow were 25% higher in 2007 than in the previous year. A particularly rapid growth concerned specific costs, 48% higher in 2007 than in 2006. It was due to the increase in costs of purchased feedingstuffs (resulting from a rise in cereal prices in the market); as a consequence, the share of these costs in specific costs went up three times (Figure 1).

An increase in specific costs resulted in a fall in income from activity by PLN 174 in 2007 in comparison with 2006. Subsidies on forage area played an important role in generating this income. They constituted 28% of income from activity in 2006 and as much as 45% in 2007 (Figure 2). It can be concluded that subsidies had a considerable impact on the level of income obtained.
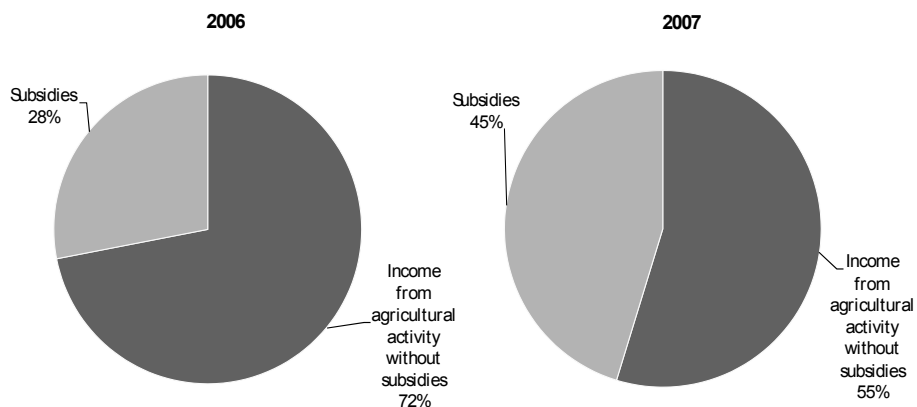
2006

2007

Subsidies 28%

Income from agricultural activity without subsidies 72%

Subsidies 45%

Income from agricultural activity without subsidies 55%

Figure 2. Share of subsidies in the income from activity in organic farms in 2006-2007
Source: Own compilation based on the AGROKOSZTY data

Considering labour input (Table 1), it can be observed that farmers from the analysed holdings allocated a total of 259 hours of work per dairy cow in 2006, i.e. 65 hours less than in 2007. Income from activity per hour of family labour amounted to almost PLN 5 in 2007, and was PLN 1.9 lower than in the previous year.

When analysing the selected economic indicators, it is worth noting that, in both 2006 and 2007, the equity-to-assets ratios (ETAR) were very high and ranged from 0.96 for conventional farms to 0.98 for organic farms (Figures 3 and 4). It means that for the majority of the farms in question equity represented the main source of financing assets, therefore, these units used external sources of funding only occasionally. In both years fixed assets turnover (FAT) was slightly higher for conventional farms. It means that conventional farms were able to generate a higher production value per PLN of fixed assets than organic farms, by PLN 0.02 in 2006 and by PLN 0.08 in 2007. On the other hand, return on assets (ROA) clearly showed that there was a decrease in income from organic farms in relation to the total value of assets. A somewhat different situation was observed in conventional farms where the ratio of income to total assets slightly increased. As regards production performance (PPI), it can be noted that in organic farms the value of total costs incurred in 2007 was higher than in 2006. At the same time, the share of total costs in total production decreased in conventional farms. A rather alarming development was the 60% rise in the ratio of total costs to family farm income (IPI) in organic farms in 2007. In conventional farms, the ratio of costs to income also exceeded 1.
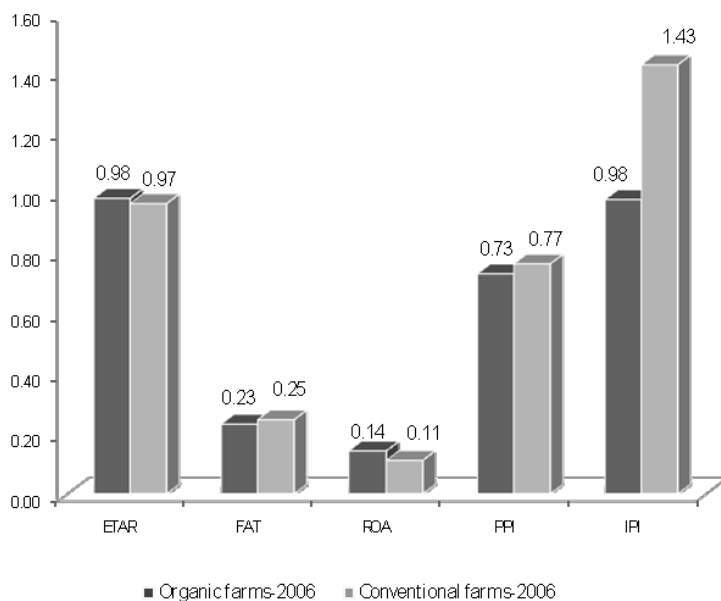

Figure 3. Selected economic indices in organic and conventional farms in 2006.
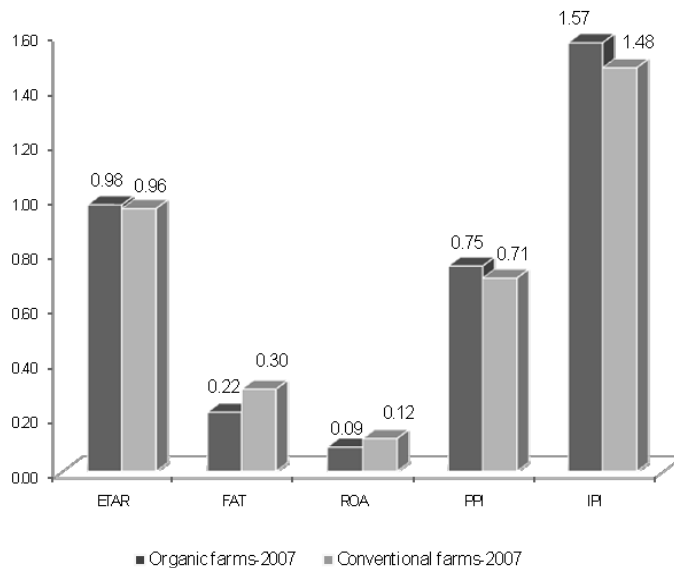Source: Own compilation based on the Polish FADN data

Figure 4. Selected economic indices in organic and conventional farms in 2007
Source: Own compilation based on the Polish FADN data

Conclusions

The prime objective of presenting the results obtained in 2006-2007 was to show the production and economic situation of the surveyed organic farms specialised in dairy farming. Since the group in question was small, their performance should not be directly translated into average production efficiency of Polish organic farms. However, the results presented undoubtedly indicate general trends in organic farming in Poland. The findings from the analyses conducted allowed to observe the following trends:

1. In the years in question (2006-2007) there was no significant intensification of organic milk production, as can be concluded indirectly on the basis of a similar annual average number of dairy cows kept in the surveyed holdings.
2. Lower production results in organic farms were mainly due to lower milk yield of dairy cows. Only a minor increase in milk yield of organic cows was observed in the years in question. However, it was more important that the selling price for milk went up, resulting in a rise in the value of milk production in 2007.
3. In 2007 total costs increased on the previous year. Consequently, the farms in question obtained lower income from activity.
4. The share of subsidies in income from organic milk production – per dairy cow – increased from 28% in 2006 to 45% in 2007.
5. The selected economic and financial indicators (ETAR, FAT, ROA, PPI, IPI) were at similar levels in organic and conventional farms. However, taking into consideration production capacities, conventional farms achieved slightly better results.

In recent years organic farming has been steadily developing in Poland. However, despite the improving performance of such units, it is not reflected in the intensification of organic milk production. It is difficult to increase the number of dairy cows in organic farms with the current structure of agricultural land. Assuming a rise in the number of organic farms with dairy cows, it would be possible to increase the concentration of organic milk production.

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