

# **PHD THESIS**

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## **ECONOMIC ANALYSIS OF THE COMPETITIVENESS OF ORGANICALLY PRODUCED COW MILK**

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## 1. PRELIMINARIES AND OBJECTIVES OF THE STUDY

The pollution of the environment has accelerated due to the man's activity (chemisation, industrialisation) in the modern age; and the human food is also threatened by this pollution, which leads to disorders or illness. In the '20ies, a certain layer of the society developed its demand for chemical free, healthy and safety food; this demand is even stronger due to the food scandals of the recent years. The main objective of organic production is to produce healthy and biologically high value food by applying least polluting cultivation and methods. As in different countries different nominations are used, the following definitions have similar meanings: eco-, bio-, organic, ecological.

One of the most ancient and healthiest foods is milk for human beings. Therefore, considering both the nutritional and environmental advantages, an ideal pairing is organic milk. Organic milk is produced in organic way and an independent auditor company regularly controls and marks it. The control means the whole producing process from feed production to packaging (*Ráki Zs., 2004*). Despite of all, in Hungary both the production and the consumption of organic milk are lower than in the Western countries. Considering that the consumers of organic milk are primarily milk consumers, the lower figure is not surprising; hence even the consumption of milk and milk products is lower than the average level of the European Union. This fact is not favourable from the point of either the nutritional science or agricultural production; the aim is to increase the production of organic milk and the promotion of the consumption.

Organic milk production is a continuously developing area, which has not been investigated, thus the available information is little, which blocks the further development.

The *objectives* of the dissertation were to investigate the current situation of organic milk production, reveal the difficulty and the bottleneck, and also the hidden opportunities waiting for exploitation. It also wants to give information and feedback to both the producers and the supporting institutes (law makers, controlling companies), analyse the situation of the organic milk production in Hungary, in international comparison as well.

In order to achieve the above objectives, the following *tasks* were reasonable to solve:

1. To review the start and the development and the current situation of organic production.
2. Analysis of the quality of organic products in depth, thus to find the reasons for the production of organic products.
3. To reveal the producers of organic milk, and to show the producing herd and the production.
4. To reveal the difficulty of the product chain both in Hungary and internationally.
5. To define the competitiveness of the Hungarian organic dairy farming.

## 2. MATERIAL AND METHODS

Both primary and secondary sources were used in the dissertation.

### Secondary survey

In order to get a picture on organic dairy farming, firstly the Hungarian situation, the legal frames and the support system of organic farming were needed to review.

The secondary data sources were: the annual reports of the Biocontrol Hungary Co. and the Hungária Öko Garancia Co., the data of the Hungarian Central Statistical Office, the Office of Agricultural and Rural Development (MVH), and the Milk Product Board.

International data were collected from the Zentrale Markt- und Preisberichtsstelle GmbH (ZMP) and Internet sites.

Besides the analysis of statistics, also Hungarian and international professional literature, proceedings and other publications were reviewed.

### Primary survey

The primary survey contained two different researches:

- In 2003, deep interviews were carried out with Hungarian organic dairy farmers, when the organically produced milk was assessed.
- According to the method of the International Farm Comparison Network (IFCN) – that covers actually 31 countries – the typical organic farms were created, which were the basis of the economic analyses. Also the software TIPI-CAL of the network was used to analyse the economy of the farms. In two years (from 2002 to 2003), a comparing international research on organic milk production was carried out in Germany, Denmark, Austria, Argentina and Hungary. From Hungary, the

department of Farm Economics of the University of Kaposvar was involved in the research.

### **3. RESULTS**

#### **3.1. Comparison of organic and conventional cow milk**

According to the results obtained, it is not obvious that all the parameters of organic products are better than those of a conventional product; but it is fact that some of these are better. These are in case of plant for example higher Vitamin C and dry matter and lower nitrate content, in case of animal products, higher CLA and Omega 3 fatty acid content. Similar results were obtained in the analysis of the organic milk, such as it differs only in a few parameters from the conventional milk (higher CLA, Vitamin E, Beta carotene content), which is primarily due to grazing. Besides of all, the positive impact of organic production on animal welfare and the environment is unquestionable, out of which the latter comes from the relatively lower pollution of the environment.

#### **3.2. The Hungarian organic dairy farms**

The share of the cows (number 555 head) involved in the survey is 11.4 percent of the cattle kept in organic farms in Hungary, which represents a low share within the domestic organic animal production. Out of the total number of milking cows, the share of the organic milk producing cows is only 0.16 percent in Hungary.

The majority of the herd can be found In the Hungarian Great Plane; however a high number of the animals can be seen in County Pest as well. The basic species of the Hungarian organic milk production are the Hungarian Spotted and Holstein Frisian, the genetic basis is provided by the first one. Out of the analysed farms, two have conventional tied system, in one of these, the animals are tied only in winter time, while in case of 75 percent of the farms free range or outdoor keeping was seen, which meets the

prescriptions of ecologic farming. One third of the farms plan to rebuild their stables, but only one out of those with tied system. In 75 percent of the farms, the density is between 2 and 5 hectares per cow, in the rest, it is between 10 and 23 hectares. The average is 0.35 head unit livestock per hectare cultivated land. Typically, the land is rented by the farms. The land quality is poor in case of 75 percent of the farms, as it is below or around the Hungarian average and only one fourth of the land is better than 18 Hungarian gold crown unit..

Altogether 12 ecological farms produced 3,786,000 litres organic milk in 2003, which is 0.2 percent of the total annual milk production. The specific milk yield on the organic farms varies between 3,500 and 7,500 litres from farm to farm. The stable average is  $5,100 \pm 1,317$  litres, the weighted average is much higher, 6,820 litres.

The quality of the produced milk was only estimated on the basis of the nutritional value, as at least this information was more or less available. As many farmers sell their milk on site, even the nutrient content can not be studied in all cases. Almost all of the farmers (11 out of the all) could tell the fat percentage of the milk produced, however only 42 percent of them could give information on the protein content. Based on the data available, the average fat content is 4 percent with a variation 0.38, and the protein percentage is  $3.5 \pm 0.31\%$ , which is a relatively high variation.

As organic milk is ruled in the same way as conventional, its production is also under quota regulation. This is important information from the point that there is not different amount of quota defined for organic milk products. Only one third of the domestic farms are covered with milk quota, while 89 percent of the produced organic milk.

Besides selling raw milk – with an exception - almost all of the farms process their own milk, which is either consumed on the farm or also sold as

added value product, and widens the range of organic milk products. The produced milk is mainly sold on site, or to marketers. One fourth of the farmers sell their milk to processing factories; however this means the majority of the milk produced. As organic milk products, 75 percent of the products are sold with an average of 25 percent extra price. Following raw milk, the second most frequently sold product is curd cheese, and then cheeses and sour cream follow. The smallest market share is represented by organic butter, kefir and yogurts. As an opposite of most organic products, the main market for organic milk products is Hungary, at the moment milk product is not exported.

Summarising, in all farms, the whole product chain of organic milk production can be found from feed production through its conservation, heifer raising and handling or processing the products to the marketing of the end products (raw milk, cheese, curd cheese, butter, etc.). The farmers intend to both horizontal and vertical complexity. Horizontal complexity is aimed especially on the farms, where the market receipts from organic milk is less than 60 percent. In case of 42 percent of the farms however, plays definite role in the market receipts.

It is unfortunate that direct payments are not available for organic cow milk production – similarly to other countries. At the time of the research, the farms could get support only by participating the Program of the National Agricultural Environment Protection. One third of the farmers considered the lack of direct payments as a problem of organic milk production.

In Hungary, two third of the organic dairy farmers think that ecologic farming does not mean extra costs compared to the conventional production, however they added that smaller receipts can be achieved due to the lower yields.



Based on the answers given by the farmers involved in the study, two groups were formed according to their motivation:

- Transiting due to inner encouragement or persuasion (67%), and
- Those considering both economic reasons and their inner encouragement (33%).

All of the farmers work full time, and without exception also members of the family work on the farm. Larger farms typically hire local labour, and a manager with higher education is employed as well. The number of the employees is reasonably chosen according to the farm size, which ensures the quality of the daily work.

Although the age of managers of the dairy enterprises is highly differs (with an average of  $46 \pm 10$  years), they agreed in one thing: that is their farm will still operate as organic farm after 5 years; the farmers have positive vision for their future.

### **3.3. International comparison of typical organic dairy farms**

The typical organic farms and their parameters given by the participating countries:

*Germany:* two small farms (38 and 50 cows), out of whose the 38 cow farm is situated in South-Germany, the 50 cow farm in North Germany. Besides these, also a larger family farm with 120 cows was analysed, which is privatised former cooperation. Milk is produced with Hegytarka and Holstein Frisian cows fed with small amount of silage and green forages (clover, Lucerne, Green pea). The results obtained were compared to a 35 cow conventional farm.

*Denmark:* a 90 and a 150 cow organic farm were compared to a conventional 80 cow farm. The extremely high yield (7500 kg/cow/year) is produced with Holstein-Frisian cows that are both grazing and given barley and pea.

*Austria:* a 22 and a 30 cow organic farm were compared to a conventional 30 cow farm. The Austrian milk is produced in the Alps, with Hegyitarka that are grazing on 100 days of the year, but in winter time they are kept in tied stables.

*Argentina:* according to the features of the country, two large organic farms were set up, one with 350 another with 1800 cows, which were compared to a conventional 350 cow farm. The cows are grazing (oat, sorghum, other grasses) all year around. The conventional farm is also extensive, therefore the difference between the conventional and organic production is small.

*Hungary:* a 5 cow small farm and a large farm with 400 cows that were compared to an also 400 cow conventional farm. In the small farm, the cows are milked into bowls, the basic feed is hay, Lucerne hay, pea and own produced crop. The large farm uses its crop producing land for forage production. The animals are fed with maize silage, pea, hay and own produced crop.

The highest animal density was seen in case of the South German 38 cow farm and the Austrian organic farms. However, due to the lower milk yields, less feed is needed. In Argentina and partly Hungary extensive organic dairy farming is typical.

According to the annual milk production, Hungary can be considered as a medium level country. The yields are 5 to 20 percent lower than that of the conventional farms, and this difference is the smallest in Hungary.

The highest realised price of organic milk was found in case of the Hungarian small farms, which was caused by the higher price of directly sold milk. Due to the higher volume of milk produced by larger farms, which can be sold to processing factories, the large farms realize similar price to the western countries.

In order to get full information on the production value of the farms, it is important to analyse the other receipts of the farms beside of the milk receipts. There are market receipts of animal sale, direct payments and other (e.g. financial) receipts in the profit and loss account of the farms. The figure of animal sales is the highest in the South German and the Austrian farms. The reason for such high share within the farm receipts is the good price of the Hegyitarka livestock kept in these farms. The higher price is achieved by the higher slaughtering weight, good meat ratio and higher slaughter value. Besides of all these, in the western countries, there is a higher demand for organic beef generated by a stronger consumption. In Hungary and Argentina, the animal receipts are only between 1.5 and 2 €/100 kg ECM.

Compared to the western European countries, Hungary is less subsidised, thus the received milk price represent a higher share in the farm receipts than in the other countries.

In the smaller Hungarian farm, the labour costs are higher than in Western Europe, which is caused by the high opportunity costs. Similarly to the Argentine farms, the lowest labour costs were found in case of the 400 cow organic farm. The land costs are the second lowest in Hungary – following Argentina – which is an advantage in the international comparison. However, as the Hungarian figures of labour and land productivity show, Hungary is far behind its competitors.

When analysing the effectiveness of the production, two indicators of profitability are reasonable to look at. One of these is the difference between the production value and costs from the profit and loss account, that is, the farm income that is mentioned as net income by farm economists. However, besides the cash costs, the entrepreneur profit contains also the opportunity costs of own production factors. Consequently, the real effectiveness of the production of the farm is shown by the figure of entrepreneur profit

containing the expected income on the use of the own factors. Looking at the farm income, positive figures can be seen in all countries analysed, however in different volume. The highest numbers belong to the Austrian and the South German farms, while the other farms achieved between 5 and 10 €. If however, we consider the entrepreneur profit only a few countries produce profitably. It is joyful that the highest figure is obtained by the Hungarian 400 cow organic farm.

The Hungarian 400 cow farm was compared to two farms; one of these was a highly mechanised Danish large farm, another was the extensive Argentine farm with 350 cows. Thus the strengths and weaknesses of two different production systems can be compared. The analysis can be considered as “semi-SWOT”, because neither opportunities nor threats of the farms are mentioned.

The high figures of the total receipts and milk receipts of the Hungarian farm are eye-catching, compared to the Argentine farm; where both the government support is low and the organic milk market is less developed. However, disadvantage can be seen in the case of the production costs, out of these the costs of feeding, energy, fuel and labour are higher than those of the Argentine farm.

Higher receipts are achieved in the Danish 150 cow farm than in Hungary, which comes directly from the higher milk price and animal sales. The lower production costs are advantage for Hungary, although it is not true in case of every cost elements, such as the high fuel and energy costs. Summarising, the Hungarian organic dairy farming is in disadvantage – however in different extent – because of the high fuel and energy costs compared to the different production systems. Despite of this fact, the Hungarian model farm achieves higher entrepreneur profit compared to both cases.

#### 4. CONCLUSIONS

Only a few objective factors explain the consumers' decision and preference on organic milk compared to conventional milk; rather such subjective factors can play any role in this decision such as chemical free, or the positive effect of the organic production on animal welfare and environment, which latter one comes from a less polluting production system.

Considering that a production way still under a development process is analysed, it can be said that organic cattle farming has a significant share within the Hungarian organic animal production. However, the share of the organic milk producing cows is low. Knowing the current level of demand, a boost in organic milk production can be induced by new transiting farms.

In Hungary, the altogether 12 ecological farms produced 3,786,000 litres organic milk in 2003, which is 0.2 percent of the total annual milk production. The international comparison shows that – similarly to the other Eastern European countries (The Czech Republic, Slovakia) – the Hungarian organic milk production is significantly lower than that of the Western European countries. Behind this fact stands that these have stronger tradition and consumption, which - among more - is due to the favourable climatic, soil and geographic conditions.

Only one third of the domestic farms is covered with milk quota, while 89 percent of the produced organic milk. The data show that primarily the larger farms think that it is important to meet the legal requirements; however the small farms produce without quota. The production of the farms without quota increases the volume of the “grey milk” (illegally sold milk) that is still a problem in Hungary. In order to eliminate the volume of illegal milk, a better information flow should be ensured and getting quota should be easier fro them.

The produced organic milk and milk products are mainly sold on site, or to marketers, because a higher price can be realised in these ways.

The hygienic requirements of milk production are surely met by 58 percent of the farms. However, 11 farms sell fresh milk. If the remaining farms do not pasteurise their milk produced, they will have to do it as soon as possible. Until this happened, despite of being produced organically, the products can not be considered as healthier than the conventional milk products, because of the bacteria that can be found in the products. If they do this, they will be able to produce marketable and healthy milk products.

The main motivating factor to start organic dairy farming is natural friend thinking, while one third of the farmers were motivated by the higher achievable profit as well. During the personal deep interviews it became clear that a group is forming at the moment, which wants to give up polluting the nature by applying the “tools of the modern age”, and wants to “escape” into its own world, farm.

The international comparison showed that the realised milk price was the highest in the case of the Hungarian 5 cow farm, which is explained by the direct sale. Due to the higher volume of milk produced by larger farms, which can be sold to processing factories, the large farms realize similar price to the western countries. This higher price is induced by the development of the Hungarian demand for organic milk and milk products.

The share of milk receipts is higher in the Hungarian farms than in the other countries, which represents 85 to 95 percent in the total receipts. This can be explained by the low level of support and animal sale.

Out of the production costs, the second highest costs are the labour costs following the factor costs. In case of the smaller Hungarian farm (Hu-5) the labour costs are higher than in other western European countries, which is due to the high opportunity costs of the family labour.

Compared to the conventional farms, the net income was positive and in general also higher on all farms. This is caused by partly the higher market price and partly the support.

The highest net income was achieved by the Hungarian large farm, which was caused by the lower opportunity costs of the Hungarian labour and land.

## **5. NEW SCIENTIFIC RESULTS**

1.) The organic dairy farms have been searched and their economic and farming situation have been revealed.

2.) According to the method of the IFCN, typical Hungarian organic farms have been set up.

3.) An international order of the organic cow milk production has been created according to the Hungarian and international competitiveness of typical farms.



## **6. PUBLICATIONS IN THE FIELD OF THE DISSERTATION**

### **PUBLICATIONS IN FOREIGN LANGUAGES (1)**

HEMME ET AL. (2003): IFCN Dairy Report 2003, IFCN/Global Farm, Braunschweig, ISSN 1610-434X (a magyar fejezet)

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**TÓTH K.**, BORBÉLY CS., SZENTE V. (2004): Ökotejet termelő üzemek hazai helyzete. Gazdálkodás XLVIII. évfolyam, 2. szám, pp. 34-38.

### **PROCEEDINGS IN FOREIGN LANGUAGES (4)**

**K. TÓTH**, V. SZENTE, B. KOVÁCS (2004): Challenges of the organic milk production in Hungary. IV. Nemzetközi Élelmiszertudományi Konferencia, Szeged, 2004. május 20-21., (CD kiadvány)

**K. TÓTH**, CS. BORBÉLY, SZ. GESZTI, B. KOVÁCS (2003): Organic milk production in Hungary, XXX. Ciosta-Cigr V Congress Proceedings, Turin, Italy, September 22-24, pp. 623-628.

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**PROCEEDINGS IN HUNGARIAN (2)**

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**PRESENTATIONS IN FOREIGN LANGUAGES (1)**

**TÓTH K.** (2003): Organic milk production in Hungary. IFCN Dairy Conference 2003, Braunschweig, május 27.

**PRESENTATIONS IN HUNGARIAN (1)**

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