

# **THESES OF DOCTORAL (PhD) DISSERTATION**

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## **THE ECONOMIC ANALYSIS OF MILK PRODUCTION IN DIFFERENT SECTOR-SIZED FARMS IN THE CENTRAL TRANSDANUBIAN REGION**

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## **PLERIMINARIES OF THE RESEARCH, OBJECTIVE**

Cattle breeding and the milk production sector are very important for the satisfaction of human nutrition demands and the production of animal protein in every country all over the world. Through its products, it has a very significant role in domestic food supply, in foreign economy, and in export. At the beginning of the 90's, significant changes took place in the Hungarian agriculture, therefore the co-operatives and state farms transformed or closed down. The political changes influenced the cattle sector as well, as the decrease of livestock has reduced the amount of milk.

Because of Hungary's approaching EU membership it would be important to solve the problems of the milk sector, to improve the milk quality of small farms, and to make revenue conditions feasible for milk producers. Efforts will have to be made so that the domestic number of cattle and the amount of milk production do not decrease more in the future. They should be increased since the aim at the EU negotiations is to agree on as high a milk quota as possible.

The Central Transdanubian Region, among the 7 regions of Hungary, has advantageous geographical position and conditions for animal breeding. The Region has an important role in the milk production of the country, and the average sector-size of dairy farms which produce milk in these counties are much bigger than the average of the country. The region, as a political-administrative classification, is also significant in the regional policy of EU and in distribution of structural funds.

Taking the aforementioned into consideration, the objective of dissertation is to examine ecological and economic characteristics of the Central Transdanubian Region and to analyse milk production of dairy farms of Region in respect of economy, and to compare the production of different sector-sized dairy farms and to reveal the differences in their production, which come from their various sizes. This dissertation examines and grades mostly those factors that influence the profitability of milk production, and aims to reveal future possibilities.

### **METHODOLOGY AND DATABASE**

The research refers to the period of 1995-1998. The farms that take part in the examinations geographically belong to the Central Transdanubian Region of Hungary, which includes 3 counties.

The willingness of farm management to participate in the examination and to give their data highly determined the selection of farms. In most cases I visited the leaders or animal breeders in person to interview them, and I have collected information and data from farm registers, annual records, reports, pedigrees and filled a questionnaire I have prepared myself. The country-related and national data come from statistical yearbooks, publications of the Research and Information Institute for Agricultural Economics, and from the database of the Milk Product Council and the Agrarian Chamber of Fejér county.

The examinations refer to the production of 3 different sector-sized dairy farm groups (formed of 12 farms, in the dissertation

mentioned as “A”, “B” and “C” farm [groups], each of them being the average of 4 roughly similar size farms regarding cow numbers). I present the milk production of farms, using natural indexes as a starting point through examinations of cost structure, profitability, and revenue circumstances of milk production. I used mathematical-statistical methods to reveal the economic interconnections of milk production. The analysis also includes the examination of productivity of utilised resources. I used models to demonstrate some connections that are important in respect of profitability of milk production.

To value the data and the connections between its elements, I used correlation and regression calculations, the variables of which were the raw data of the 12 dairy farms regarding the 4 years. The values of calculated coefficients in regard of size relate only to the examined farms, but their tendencies are generally true for milk production.

In certain analysis, where the value of the correlation coefficient shows a strong connection between the variables, I continued the analysis with regression calculation. Knowing the regression function, I determined how big the change is in the dependent (y) variable if the independent (x) variable has changed by one unit.

I used correlation calculation to determine how close the connection is between the critical milk yield and the variables (average price per a litre of milk, variable cost per a litre of milk, annual fix cost per a cow) that influence the milk yield. The connection between the number of cows and the material cost per

cow, and the milk yield per cow and the fodder cost per cow were also analysed by correlation. In the case of the connection of milk yield per cow and fodder cost per cow, the value of calculated correlation coefficient gave reason to make regression calculation too. To reveal the connection between the revenue and the variables that influence its measure, the correlation calculation was suitable as well. The analyses were done by computer software. The connections between the examined variables are represented in a frame of reference that demonstrates the character and the relation between the connections very well.

### **THESIS POINTS**

- The different number of cows in the counties of Region can explain by the various production circumstances, the agricultural conditions, and the animal breeding traditions of counties. The number of cows is decreasing continuously in the Region.
- Veszprem county has the best ecological conditions for animal breeding out of the 3 counties of the Region.
- Index of the frequency of cattle in the corporations of the Region is higher than the average of country. The cattle number per 100 hectares of agricultural area is the largest in Veszprem and Fejer counties.
- The average sector size of farms in the Region, is higher with 19% than the average of the country.

- The conditions, the indexes of the frequency of cattle in the Region, and the unutilised capacity of buildings make it possible for farms in Central Transdanubian Region to increase their livestock.
- There were significant differences between the production level of the 3 examined farm groups. The larger sector-sized farms ( of about 1000 cows) have been producing excellent milk quality with high milk yields per cow under better production conditions, while the farms of 200-300 cows – except for the last year of the research – have suffered losses in production.
- The average number of cows and the milk yield per cow of farms were increasing between 1995 and 1998.
- According to the indexes of the frequency of cow, these farms have the possibility to increase their livestock.
- The production costs of milk were much bigger on smaller farms, which had a small number of cows (200 to 300 cows) than it was on the larger sector-sized farms.
- The cheap fodder produced on big fodder fields of large farms and their low labour costs have reduced their production expenses significantly.
- The analyses of cost-proportional profitability and cost level proved unambiguously the profitable production of big farms and the loss-suffering production of farms with 200-300 cows. The profitability was improving on all farms between 1995 and 1998.

- In the Central Transdanubian Region too, the lack of capital and the unprofitable, low level milk production are mostly peculiar to small farms.
- The amount of critical milk yield was influenced the most by the annual fix cost per cow. The variable cost of a litre of milk was also an important factor, and the average price of milk was in reverse correlation with the amount of critical milk yield.
- On the basis of my research I have found that the decrease of milk quality and so the milk price, depending on the different circumstances of farms, makes the critical milk yield increase in relative smooth rate only until it has achieved a certain level of milk price, after it the additional decrease of milk price makes a drastic increase on the level of critical milk yield. The level of critical milk yield can decrease significantly by improving the milk quality in fix circumstances.
- The increase by one unit of variable cost per litre of milk, during other factors are fixed, makes the level of critical milk yield increase. At the beginning, the increase of milk yield is relative slow and when it has stepped over a certain cost limit the critical milk yield immediately goes up significantly. It is a new scientific point, that there is a limit in compensating the increase of variable cost by increasing the critical milk yield, after it so high milk yield would be necessary to the profitable production that surpasses a cow's biological efficiency.

- Between the number of cows and material cost per cow, and the milk yield per cow and the fodder cost per cow, strong connections were shown by the correlation coefficients.
- According to the result of regression calculation, the increase by one litre of milk yield per cow on the examined farms, raises the fodder cost per cow by 26 Ft, which is much higher than the average of the country between 1995 and 1998.
- During the examined time period, milk quality of farms was improving continuously.
- The milk quality influenced the milk price in the case of the examined farms too. Besides the milk quality, the amount of milk yield was also influenced the sales possibilities and the determination of prices. The average sales price of milk was increasing on every examined farm between 1995-1998.
- From the examined variables, the connection between milk yield per cow and revenue gave the biggest value of correlation coefficient, which means that the milk yield per cow influenced the amount of revenue the most.
- After the milk yield per cow, the milk price was the next factor, which, if increased, caused positive change in the amount of attainable revenue. The connection between the revenue and the average milk price was also semi strong and positive.
- The connection between the revenue and the number of cows was also semi strong.
- On the examined farms, the connection between the fodder field and the revenue was weak, in other words, in the case of these

farms the bigger revenue was not necessarily the result of a bigger fodder field.

- There was only a very weak connection between the revenue and the number of cows per worker.
- The productivity of labour concerning the number of cows per worker and the labour cost per a 100 litre of milk was the best on farms producing with the lowest number of cows. However, regarding the milk yield per worker and the revenue per worker, the indexes of the farm with the biggest number of cows exceeded the others by far. These indexes also showed that smaller farms suffered greater losses in production.
- The break-even contribution of large farms gave funds to the fix costs, but in small farms, except of 1998, did not.

### **PROPOSALS**

- It would be necessary to create a data collection system in Hungary that would make farms interested in providing real data. This way the national production could be followed continuously and precisely, so that not only approximate data would be attainable for the experts. Data collection would be easier for researchers too, and by revealing and analysing the real situation, they could give more precise advice as well.
- The advantageous position and conditions of the Central Transdanubian Region enables farms of the Region to rent more fodder fields and to produce fodder of their own.

- Because of the low animal frequency and unused capacity of buildings, it would be reasonable to increase their number of cattle on farms of the Region.
- It would be possible to improve the milk producing features of cow livestock using the modern breeding methods and thus to reach higher yield per cow.
- It is necessary to improve the milk quality on some farms of the Region by professional milking providing high level hygiene conditions, and by appropriate methods of milk treatment. It is also very important to reveal the environment factors that affect the hygienic condition of the udder, and to screen the genetic factors that cause udder diseases.
- The labour productivity has to be increased on farms where the number of cow per worker is low.
- The labour needs further education to do more effective and higher quality work.
- It is important to make the workers interested in effective work. A bonus system, paid according to milk quality, could be encouraging.
- It is necessary to renovate the neglected buildings and renew the old machines. Because of their huge energy use the energy cost increases significantly.
- The alliance and association of small farms could help solve the problems of production coming from the deficiency of capital.

- Introducing a highly processed new product to the market could be an alternative for the farms that have a large number of cows and produce a profit, to improve their competitiveness.
- It is crucial to make investments to improve and update the conditions of production. (For example, the introduction of the individual feeding of cows, computerised individual register, additional improvement of milk quality etc.)
- It is advisable to determine the critical milk yield of farms and to improve the disadvantageous variables.
- It is important to pay attention to the variables that influence the amount of revenue and to implement changes if necessary.

## THE LIST OF SCIENTIFIC PUBLICATIONS WRITTEN FROM THE SUBJECT OF DISSERTATION

### *Articles published in Hungarian:*

#### Dissertations:

H. HINGYI (1996): Economic evaluation of the Lajta-Hansag joint-stock company. *Scientific Students Essay*

H. HINGYI (2000): Economic analysis of a dairy farm. *Thesis*

#### Revised journal articles:

L. SALAMON- H. HINGYI (1998): Adjustment possibilities of the agriculture in the Northern-West Transdanubian Region. *VI. International Agrarian-Economic Scientific Days, Gyöngyös, 1-7. Pages, Vol. 4.*

F.E. BÚZÁS – H. HINGYI (1999): Examination of milk production, procession, and sales in Hajdu-Bihar county. *Acta Agronomica Ovariensis* Vol. 41. No.1.

H. HINGYI (2001): Economic analysis of a dairy farm in Fejér county. *Acta Agronomica Ovariensis*, Vol. 43. No.1. 61-68.

#### Posters:

R. BEDNARIK – H. HINGYI – T. KOVÁCS (1998): Milk production of a transformed co-operative in Islandlane. *VI. International Agrarian-Economic Scientific Days, Gyöngyös, poster*

#### Presentations (abstracts published in proceedings):

H.HINGYI – R. BEDNARIK (1998): Milk production of Fejér county in the mirror of the regime change. *Scientific Days of Óvár.*

H. HINGYI – R. BEDNARIK (1998): Possibilities of the increase of competitiveness in milk production of Fejér county. *40<sup>th</sup> Georgikon Days of Keszthely*.

R. BEDNARIK – H. HINGYI (1998): Milk production of Győr-Moson-Sopron county in the mirror of the regime change. *Scientific Days of Óvár*

R. BEDNARIK-H. HINGYI (1998): The actual economic aspects of milk production in Győr-Moson-Sopron county. *40<sup>th</sup> Georgikon Days of Keszthely*

T. KOVÁCS- I. SIMONYI- H. HINGYI (1998): Model of the economic and financial analysis of companies. *Scientific Days of Óvár*

H. HINGYI (1999): Changes in the Hungarian milk sector. *PATE, Keszthely, V. Junior Scientific Forum*

***Articles published in English:***

*Revised journal articles:*

H. HINGYI – T. KOVÁCS– I. TELL- L. SALAMON: The milk production of Hungary on the eve of joining the EU. *Acta Agronomica Ovariensis* (under publishing)

T. KOVÁCS – L. SALAMON – H. HINGYI: The agro-commercial and agro-diplomatic relationship between Hungary and the EU. *Acta Agronomica Ovariensis* (under publishing)

*Presentations (abstracts published in proceedings):*

H. HINGYI – Z. KIRÁLY (1997): Reorganisation process of state farms on the example of Lajta-Hanság Shareholder's Company. *ICA Summer University, "Agricultural Challenges and EU Enlargement"*