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Analysis and international comparison of labour productivity of Hungarian Dairy Farms

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ABSTRACT

Resources needed in production are limitedly available, therefore a strong competition exists to own and use them. With joining the European Union, this pressure became stronger among the producers due to a higher number of the competitors. In this situation, the significance of international comparisons is higher, because the actors of the market can estimate their future situation only this way in the enlarged EU. The network of European Dairy Farmers (EDF) gives the opportunity for this; where in 2003, dairy farms of already 19 countries were compared by using economic indicators. The basis of the partial analysis is the survey on the productivity of labour as production factor. A high share of the costs comes from applying labour in production. Its role and used amount will however change, therefore it is necessary to analyse the use of labour in order to improve the economic results of dairy farming. It is commonly known that the productivity parameters of the Hungarian dairy farms are lower than those of western European farms (Borbély et al., 2000); however the question arises at what level the labour is used in Hungarian dairy farms. From all mentioned previously, the current study deals with the labour productivity of Hungarian dairy farms and revealing the reasons and causes, by comparing the Hungarian productivity with the averages of the EDF and western German dairy farms.
(Keywords: production factor, labour productivity, EDF, international analysis)

ÖSSZEFOGLALÁS

A magyar tejtermelő telepek munkatermelékenységének elemzése és nemzetközi összehasonlítása

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A termeléshez nélkülözhetetlen erőforrások szűkösen állnak a gazdálkodók rendelkezésére, ezért használatukért, birtoklásukért kiélezett verseny folyik. A feszültség - az Európai Unióhoz (EU) történő csatlakozással a termelők között tovább erősödött, mert a versenytársak száma megnőtt, ebből következően a nemzetközi összehasonlítások jelentősége folyamatos növekedést mutat. Erre ad lehetőséget az European Dairy Farmers (EDF) hálózata, ahol 2003-ban már 19 ország tejtermelő telepeit hasonlítják össze gazdasági mutatók alkalmazásával. Parciális vizsgálatunk alapja az élőmunka, mint termelési tényező termelékenységének elemzése. Az élőmunka alkalmazása adja a ráfordítások jelentős részét, szerepe, alkalmazott mennyisége változni fog, ezért elemzése nélkülözhetetlen a termelés gazdasági eredményének javítása érdekében. Köztudott tény, hogy a magyar mezőgazdasági telepek termelékenységi mutatói általában elmaradnak

nyugat-európai farmok hasonló értékeitől, azonban felmerül a kérdés, hogy milyen színvonalú az élőmunka-felhasználás a magyar tejtermelés esetében. Ebből következően vizsgálatunkban a magyar tejtermelő telepek munkatermelékenységének meghatározására, és ok-okozati összefüggéseinek feltárására került sor, összehasonlítva az EDF és a kelet-német telepek átlagával.
(Kulcsszavak: termelési tényező, munkatermelékenység, Európai Tejtermelők Klubja, nemzetközi összehasonlítás)

INTRODUCTION

One of the most important economic figures is labour productivity. The level of labour productivity is an important indicator of the development of a country; its development characterises the dynamism and economic development rate (*Gönczi,* 1970). This figure reflects on the material and equipment basis of the production, and also the content of the capital (*Németi,* 2003). Labour has always been a primary factor (*Kovács et al.,* 2001). Its importance however has grown along with the narrowing availability of other production factors. In dairy farming, the importance of labour is even higher than in the industry because of its labour demanding technology (*Molnár,* 1998).

The growth of labour price predicts the necessity to analyse the labour use per kg milk of the Hungarian dairy farms in order to improve the cost efficiency, and how it influences the production level and results of the agriculture. One possible way is the partial analysis of labour productivity, when the volume of the production is compared to the labour input in the production, expressed in natural units (*Heinrich,* 1996).

MATERIALS AND METHODS

It was reasonable to narrow the available wide database, because of some countries represented by only few farms (e.g. Austria, Denmark), or because their farm size was highly different from the Hungarian average. It has to be mentioned here that the farm structure is highly diverse in Hungary. The average size of the Hungarian dairy farms would be only 12-15 cows if the total cow number were compared to the total number of the dairy farms. However, 89 percent of the produced milk in Hungary is produced by farms with more than 100 cows (*Stefler*, 2003). As farm size highly influences productivity, a line had to be drawn underneath the farms that are not comparable.

The primary aim of the research is to define results for the Hungarian dairy farming. As the Hungarian farms involved in the analysis have more than 100 cows, therefore only those international farms were compared that have more than 100 cows.

To join the EDF network is voluntary, therefore those farms were analysed that are interested in their future and international competitiveness. The majority of the Hungarian dairy farms is not profitable The figures of the analysed Hungarian farms are higher than the average; these do not have economic challenges and are prepared to make economic sacrifices (e.g. visits conferences) in order to develop their future production. *Table 1* shows the number of farms involved in the comparison of four years.

The most difficult part of an international analysis is the data collection (*Szakály et al.,* 1994). The involved dairy farms filled out an analogue questionnaire on their economic data in every business year (*Tütő et al.,* 2003). The data of the questionnaires were used to calculate different indicators and figures (labour productivity, specific labour cost) with a Microsoft Excel based programme.

Table 1

Number of farms analysed

Years	Hungary	East Germany	EDF
1999	9	12	36
2000	13	10	52
2001	16	9	57
2002	9	6	80

Source (*forrás*): EDF, (1999-2002)

1. táblázat: Vizsgált telepek száma

As different numbers of farms were involved in the years considered, the average of four years was weighted with the number of the farms (*Molnár,* 1998). The average figure of the Hungarian farms was compared to the EDF and East German farms. The reason to include the eastern German farms was that they are similar in size to the Hungarian farms. The difference of the averages was tested by T test and significance analysis.

To calculate labour productivity (kg FCM/h/year), primarily the milk yield and the labour input were defined.

Yield (FCM milk kg/year)

- Amount of milk sold to the milk processors,
- Milk used in feeding (only milking herds),
- Milk used in feeding (other species),
- Consumption at farm,
- Locally processed and sold milk,
- Fat content.

Labour intake (h/year)

- Family labour on the whole of the farm,
- Family labour in only milk production,
- Contract labour on the whole of the farm,
- Contract labour in only milk production.

The labour cost influences the labour input and thus the labour productivity. Consequently, in the analysis of Hungarian dairy farms the specific labour cost was defined (euro/100 kg FCM), which consists of paid wages, additional costs (taxes, social fees, superannuation) and opportunity cost.

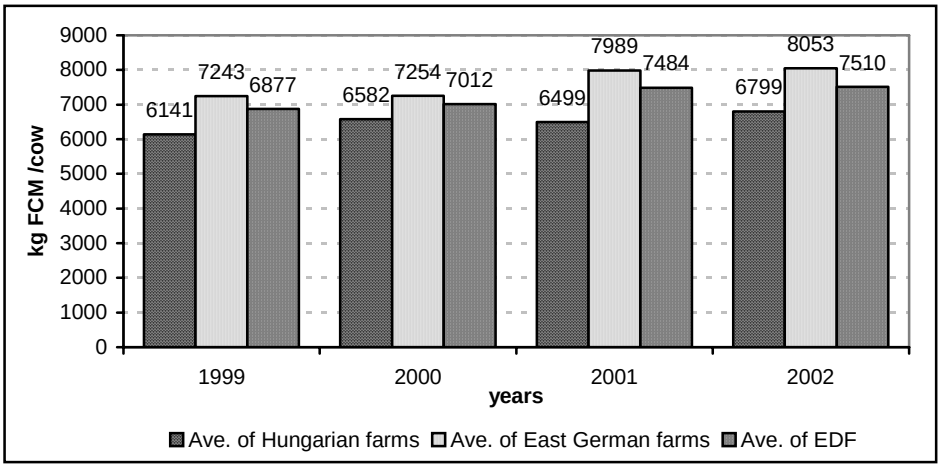
Opportunity cost means the average wage of a skilled worker typical for the given area. Analysis of labour cost and labour productivity at same time makes it possible to avoid false conclusions of the single analysis of labour productivity.

RESULTS

The only main product of specialised dairy farms is milk; both it is quantity and quality influence the results of the farm. As the farm size highly varies, a single analysis of the whole milk yield is not suitable to form an overall and whole picture of the level of milk production. Therefore, milk produced per year on a farm was compared to the cow number. This specific indicator characterises the level of production more exactly.

Figure 1

The specific milk yields of the Hungarian, East German and EDF farms (1999-2002)



Source (*forrás*): EDF, 1999-2002, and own data collection (*és saját adatgyűjtés*)

1. ábra: A magyar, a kelet-német és az EDF telepek fajlagos hozama (1999-2002)

The average figure of the Hungarian farms is lower than those of the East German and EDF farms every year (*Figure 1*). The difference seen is statistically tested ($p<0.05$). Based on the data of the four year, the specific production of the Hungarian farms is 6-15 percent less than that of the EDF farm and 9-19 percent less than that of the East German average. The EDF figure increases from 1999 and reaches 7510 kg by 2002. The degree of the growth is higher than the average growth (1-1.5%) in Europe. The specific yield of East German farms increases from 1999 with a growth rate of 7 percent between 2001 and 2002. The average of the East German farms is every year higher than that of the EDF.

One opportunity to improve productivity is to increase yields. It is not a new idea in Hungary to increase the specific milk yields. As early as in 1972, the government aimed to satisfy the domestic milk demand out of domestic production with increasing the milk yields (*Guba and Ráki,* 1999). The average annual milk yield per cow was between 2200-2400 kg in 1970 and by 2003 it reached up to 6210 kg (*KSH.,* 2003). As milk yields grow, it is more difficult to achieve such great growth rate. Increasing the inputs does not always improve profitability, because yield increase is the result of the changes of several economic factors. To define the effectiveness of the production, both the expenses and the use of the production factors have great role. Therefore, it is necessary to analyse the costs and yields together, which reduces the chance of wrong economic decisions.

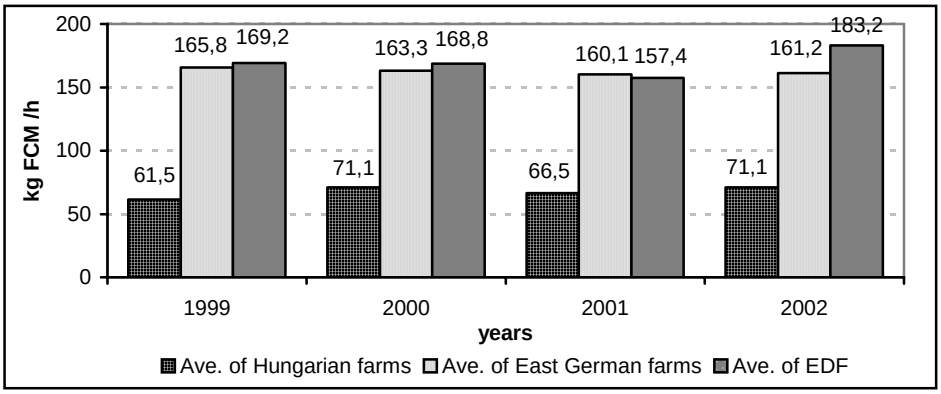
Based on the average specific yields obtained, productivity can be improved by increasing yields; however due to its complexity and investment demand, the economic results are questionable.

Labour productivity

The labour productivity of the Hungarian dairy farms are far below those of the EDF, and East German farms during the four years analysed (*Figure 2*)**.** The Hungarian labour productivity is only 36-42 percent of the EDF average. Similarly, high difference can be seen between the Hungarian and East German farms, since with the exception of year 2002 the figures of the EDF and East German farms are almost the same.

Figure 2

The labour productivity of Hungarian, East German and EDF farms (1999-2002)



Source (*forrás*): EDF, 1999-2002, and own data collection (*és saját adatgyűjtés*)

2. ábra: A magyar, a kelet-német és az EDF telepek munkatermelékenysége (1999-2002)

The difference of the averages is tested ($p<0.05$). The results are considered as even in case of all the three groups. The degree of variation is 14 percent in case of the Hungarian average, 4 percent of the East German average, and stays under 16 percent in case of the EDF average. Knowing the difference of the milk yields, the results obtained reflects on the high labour input of the Hungarian farms and the lower milk yields per labour hour input than in case of the EDF and East German farms. This is shown by the figures of labour per cow in *Table 2.*

Table 2

The labour input per cow (h/cow) (1999-2002)

	1999	**2000**	**2001**	**2002**
EDF	52	55	47	39
East German	45	48	47	43
Hungarian	109	98	98	95

Source (*forrás*): EDF, 1999-2002, and own data collection (*és saját adatgyűjtés*)

2. táblázat: Egy tehénre jutó munka mennyisége (h/tehén)

The difference shown by the data can be the result of a few factors. One of these problems is the low use rate of labour time and low level of intensity. Labour intensity consists of labour input per unit of time, change of labour time basis and extra production (*Szücs,* 1971). Due to the complex labour processes of milk production, improvement in the labour performance of individual areas can not always be seen in the increase of the yields, but results in lower labour input figures. Due to the lower labour input, less employees are needed, which can lead to significantly lower costs. Lower labour input increases labour productivity, which can result in a higher competitiveness of the Hungarian farms. To increase labour intensity is more difficult and due to the employment specialities of the agriculture (such as low wages) has high influence on the effectiveness.

Other reason for low labour productivity is the difference in the employee's skills and education. Typically in Hungary, large farms employ their people. The roles of entrepreneurship and management are separated. The managers and in 60 percent the owners as well have higher education degree in agriculture. Eighty percent of the physical workers do not have agricultural degree. Due to their lower education, they needs more time to carry out tasks, thus labour productivity is lower.

In case of the EDF farms in high share, dairy farms are owned by families and fathers give them to sons. Ninety percent of the farmers bear higher degree. Physical and mental work needed to produce and manage the farm is provided and shared by the members of the families.

The entrepreneur structure of the East German farms is between the system of the Hungarian employment and the family farms of Western Europe. A part of the farms went into western families after the union, while other part of the farms got in the hands of two or three East German families and in little share are owned by co-operatives. Due to the size of the farms, people are necessary employed, but because of its high price, the amount of labour used was significantly reduced (high labour productivity). Eighty-five percent of the work force is skilled, which reflects on the higher level of labour productivity.

In case of the Hungarian farms, the physical workers do not own the farms. Therefore, they are less motivated to work than if they were entrepreneurs of the facility. Lack of appropriate motivation reduces labour productivity.

The questionnaire of the EDF does not cover the issues of motivation and skills of workers. These sorts of quality information were discussed with the managers and owners of the Hungarian farms.

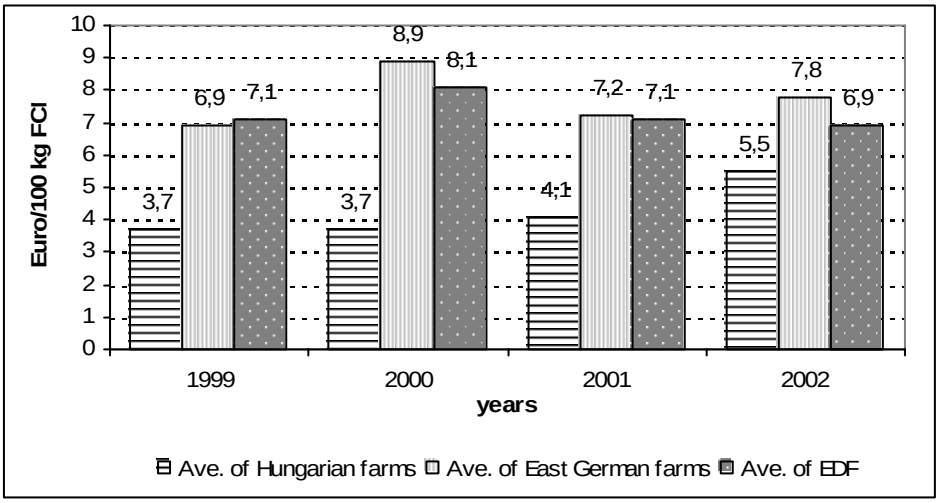
Labour productivity is highly influenced by the level of the production technology. Technology and labour can be exchanged till certain point. The more developed and modern technology (machinery, equipment) is applied, the less labour is necessary. Therefore, labour productivity of different farms can be compared only in case of similar technologic level. The level of technologic development of the Hungarian, EDF and East German farms involved in the analysis were almost the same.

The objective of production, as well as dairy farming is to increase the profit. Those production factors will be used on the farms, which provide the highest profit with least costs. Therefore, labour price and additional labour costs are important information. Here, labour cost consists of all the expenses of labour use in dairy farming.

It was found (*Figure 3*) that in Hungary the specific labour cost is lower (100 kg FCM) than those of the East German and EDF farms. There is a significant difference between the labour costs of the EDF and the Hungarian farms.

Figure 3

The labour costs of the EDF, East German and Hungarian farms (1991-2002)



Source (*forrás*): EDF, 1999-2002, and own data collection (*és saját adatgyűjtés*)

3. ábra: Az EDF a kelet-német és a magyar telepek munkaköltsége (1991-2002)

Especially, high difference is seen in year 2000, when the specific labour cost of the EDF farms was more than twice as much than the average of the Hungarian farms.

The difference was higher compared to the East German farms, hence it is higher than the EDF average figure; of which reason is the higher wage typical in the German areas. The difference was statistically proven in all the four years ($p<0.05$). The Hungarian and the EDF average come closer to each other; and in year 2002, the figure of the EDF farms is only 25 percent higher than that of the Hungarian farms. The reason is that the average Hungarian labour cost continuously increases from 1999. The degree of the cost growth was the highest in 2002, which was basically the result of the officially increased minimum wage. Labour cost contains taxes and social fees of the wages (*Table 3*).

The wage, as well as the labour cost is highly influenced by wage type payments. The nominal value of the employees' wage is only one third of that paid by the employers (labour cost). The employer knowing the taxes and additional labour costs has to decide on employing people or to substitute it with capital.

Labour cost is influenced by the fact as well that the Hungarian farms have to pay wages every month as opposite to the family farms. If it is in their interest (e.g. investment, loss), owners of the farms will not pay themselves, which reduces their costs. In order to avoid the chance of false conclusions, the opportunity cost of own labour was used in the calculations.

Based on the results, labour cost has significant impact on labour productivity. In case of stable milk yields, increase of labour cost will result in less labour use (rational decision). Thus, decrease in labour input increases labour productivity. However, in some cases it happen that increase of labour cost decreases labour productivity. This can

be the case if labour input is below the optimal level (stable yields given). In this situation, along with the increase of labour input, the labour cost grows and labour productivity drops. In other case, increase of labour cost (e.g. increase of minimum wages) does not result in change of labour productivity. The reason is that the employer can not reduce the labour input because of e.g. social consideration or co-operative ownership. Because of the above mentioned problems, it is difficult to define the relation between labour cost and labour productivity. Therefore, in order to achieve exact conclusions, the EDF analysis should be complemented with a well structured deep interview for the participating countries.

Table 3

Rates of taxes and additional social fees on wages in Hungary, percentage in the gross wage (2004)

To be paid by the employee (1)	To be paid by the employer (2)
Individual income tax: 18%, 26%, 38% (3)	Health contribution: 3450 Ft/month (7)
Superannuation tax: 8.5% (4)	Education contribution: 1.5% (8)
Health insurance: 4% (5)	National insurance: 29% (9)
Employee's tax: 1% (6)	Employer's tax: 3% (10)

Source (*forrás*): APEH, 2004

3. táblázat: A munkabért terhelő adók, járulékok Magyarországon a bruttó munkabér arányában (2004)

A munkavállalót terheli(1), A munkaadót terheli(2), Személyi jövedelemadó(3), Nyugdíjjárulék(4), Egészségbiztosítási járulék(5), Munkavállalói járulék(6), EHO(7), Szakképzési hozzájárulás(8), TB-járulék(9), Munkaadói járulék(10)

Low labour cost of Hungarian farms could be for their advantage on the EU countries. This advantage can only be stable if neither the wage type fees, nor the employment regulation will change for worse from the producers' aspect. In year 2001, the difference seen among the labour costs of the three groups analysed decreased significantly, which will likely continue in the future. The driving reason is the difference in the wages. It is likely that the Hungarian wages will grow further in longer terms, which is a disadvantage for the dairy farmers from entrepreneur aspect. If the specific cost of labour is lower than that of other factors, the farms use labour instead of more expensive or limitedly available other sources. This decision can result in an increase of the labour use, which leads to lower labour productivity.

In case of Hungary, low level of the labour productivity not only reflects on a low level of Human resource management, but it can be also a result of a well considered economic decision. To get a more exact overall picture of labour productivity, it is necessary to analyse both the capital productivity and capital cost.

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