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Comparison of milk production costs among EU members

J. Mach, H. Řezbová

Czech University of Life Science Prague, Faculty of Economics and Management, Department of Economics

Abstract

This paper attempts to identify factors which influence the effectiveness of milk production. The basic aim is to compare levels of costs in the dairy industry between Czech and European producers. The average cost per 100 kg ECM milk is determined from data provided by the European Dairy Farmers association (EDF). The total costs per 1 litre of Czech milk producers are on the European average level with high production efficiency. The problem is only in the utilisation of basic production factors, especially land and labour.

The paper resulted from a contribution to an institutional research project MSM 6046070906 „Economics of resources of Czech agriculture and their efficient use in the framework of multifunctional agri-food systems“.

Key words

Milk production, costs, profitability, production factors

Anotace

Příspěvek se zabývá stanovením faktorů, které mají vliv na efektivitu výroby mléka. Základním cílem je komparace úrovně nákladovosti v prvovýrobě mléka mezi českými a evropskými producenty. Je stanoven průměrný náklad na 100 kg ECM mléka v rámci EU, k čemuž jsou využita data členů asociace European Dairy Farmers. Celkové náklady na litr mléka jsou u českých producentů na úrovni evropského průměru při poměrně vysoké produkční efektivnosti. Problémy se objevují pouze ve využívání základních produkčních faktorů, zejména půdy a práce.

Poznatky prezentované v článku jsou výsledkem řešení výzkumného záměru MŠM 6046070906 "Ekonomika zdrojů českého zemědělství a jejich efektivní využívání v rámci multifunkčních zemědělskopotravinářských systémů".

Klíčová slova

Produkce mléka, náklad, ziskovost, produkční faktory

Introduction

Currently the breeders of dairy cattle struggle with a number of problems arising from the cost escalation (especially in feedstuffs and fuel) in the first half of 2008, and from the dramatic fall of milk purchase prices at the turn of 2008/09. Milk purchase prices in 2009 dropped by an average of 30 % throughout Europe compared to 2008, and many farmers are now questioning whether to stay in the sector. Most farmers protested against the current conditions in the milk sector during 2009, when present quotas in milk production will be conserved - and will even be increased by one percent each year until 2015. The European Commission has now ruled out the chances of

quota changes which farmers have been demonstrating for (including the implementation of minimum purchase prices, such as exists on the sugar or potato starch market). It is evident, that under present conditions and with reduced international demand only the most productive farmers will survive in the subsequent competitive market.

The question remains, whether Czech dairy farmers are able to compete in comparison with other dairy farmers in the EU, and if the status quo, when the purchase price of milk is deeply below production costs, is sustainable in the long term, or what might be done to avoid this unfavourable development.

Country	Germany	Denmark	Belgium	United Kingdom	Netherlands	Ireland	France	Italy	Spain
	DE	DK	BE	UK	NL	IE	FR	IT	ES
Number	32	3	15	24	43	16	28	3	18
Country	Luxemburg	Sweden	Austria	Switzerland	Poland	Czech Republic	Slovakia	Ukraine	
	LU	SE	AT	CH	PL	CZ	SK	UA	<i>TOTAL</i>
Number	10	9	3	4	26	4	13	4	255

Source: EDF data base.

Table 1: The number of respondents from particular European countries.

The aim of the next analysis is to provide a comparison of utilisation of production factors and costs in milk production among European countries and to highlight the problematic points which are especially crucial for Czech milk producers. Total milk yields relating to the level of costs and to milk purchase prices are also discussed.

The Institute of Animal Science, Prague, has been concerned in the long term with the economic effectiveness of dairy cattle breeding [Kvapilík (2008); 6]; this author also considers the questions of milk purchase prices [7]. The norms for agricultural production including cost limits are prepared by composite authors from the CULS Prague [Kavka (2008); 4].

Other authors from the Institute of Agricultural Economics and Information, Prague, developed studies which look at the profitability of milk production including a subsidy [Poláčková (2009); 9], [Kopeček (2009); 5], [Foltýn et al. (2009); 3], [Foltýn et al. (2008); 2] and [Novák(2009); 8]. The studies mentioned above were made between years 2002 – 2008.

Material a methods

The methods of comparative analysis and break-even point analysis were used to fulfill the basic aim. The correlation analysis was utilised for a formulation of dependence between land productivity and land rent.

Data was obtained from questionnaires from the European Dairy Farmers association (EDF) among 255 dairy farmers (producers) from 17 European countries. The processed data provided results for 2008, and so it is necessary to approach them from the viewpoint of cost and price developments in the last year as far as it is mentioned in introduction. The EDF methodology uses accounting data

integrated with so-called “Opportunity costs” (a valuation of own (self)-costs) – especially in the case of family farms where the work of family members and valuation of owned land is added. For Czech farms (large PLC’s) these costs are on a low level and its value is 3.5 € / 100 kg of milk. The costs are calculated for the whole company including costs of calves and heifers.

Not only the sales of milk, but also animal sales and subsidies (direct payments bonded to production and decoupled payments) are included in returns. The exchange rate of the Czech crown against the Euro was taken from the end of April 2009, when the questionnaires were distributed, when it was 26.71 CZK per 1 €. The values referred below are usable rather as an orientation review of the Czech milk producer situation within the EU because there are only 5 of the monitored countries) and only 4 farms provided data. A better view is given by a comparison of central European countries – the Czech Republic and Slovakia – together. They have similar types of companies and similar technologies. A summary of the number of respondents is shown in table 1.

Results and discussion

In the table 2, the milk production in the Czech Republic (CR) is summarised in a time series. It is significant to observe the rise of milk yield per cow and year (MYPCY) from 2003 to 2008 by about 1,020 litres. The MYPCY achieved in 2008 (6,776 litres, i.e. approx. 6,959 kg) is higher than the average milk yield in the EU-15 in the same year. The increase of the average milk purchase price in the first quality class of to 8.45 CZK/l (0.34 €/l) in 2008 has been seen positively and is the highest average price in the period since the accession to the EU.

	unit	2003	2005	2006	2007	2008	differ. 08-07
Dairy cows	thous.	460	438	423	410	403	-7
Daily milk yield	l/cow	15.77	17.13	17.45	17.94	18.51	+0.57
Yearly milk yield	l/cow	5,756	6,254	6,370	6,548	6,776	+228
Milk production	mil. l	2,646	2,739	2,694	2,684	2,728	+44
Market milk prod.*	mil. l	2,531	2,613	2,612	2,619	2,596	-23
Market share	%	95.7	95.4	97.0	97.6	95.2	-2.4
Milk purchase price**	CZK/l	7.83	8.31	7.83	8.37	8.45	+0.08

*) deliveries and direct sales (in 2003 - 2007 by State Agriculture Intervention Fund - SAIF, year 2008 Czech Statistical Office - CSO).

**) average milk purchase price of first class milk.

Source: CSO – beef breeding, Ministry of Agriculture – departmental statistics, SAIF – milk quotas[6].

Table 2: Characteristics of milk production in the CR.

The all Czech respondents in the EDF net were joint stock companies. The average land area is 2,770 ha there, and 90 % of leased land is from that. The returns from milking activities reached about 44 % of all firms' returns. The MYPCY in the monitored Czech companies is between 8,000 and 13,000 kg of energy corrected milk (ECM¹). On the other hand, the average value of all countries involved in the EDF net is 412 ha of land area with 52 % of leased land and with 78 % share of milk returns in the total returns of a firm. The average MYPCY in the EDF net was 7,979 kg of milk.

Concerning the total costs of milk production, the average costs of the farms associated with the EDF were 41.9 € per 100 kg of ECM in 2008. The Czech Republic is just under this figure (41.7 €, i.e. 10.55 CZK/l with fat content of 4.01 % and protein content of 3.35 % - according to the laboratories of the Czech and Moravian Association of Breeders – CMAB [6]).

The lowest values of total costs were in the U.K. (34.1 €) followed by Poland (34.4 €) and Ireland (34.8 €). At the other extreme, the highest total costs were estimated in Switzerland with 62 € per 100 kg of ECM, followed by Austria (59 €; see figure 1). A similar survey, taken in the worldwide net of the IFCN (International Farm Comparison Network) for 2007 [1] showed a range of total costs in the EU of between 45 \$ - 58 \$ per 100 kg of ECM (33 – 42.4 €/100 kg).

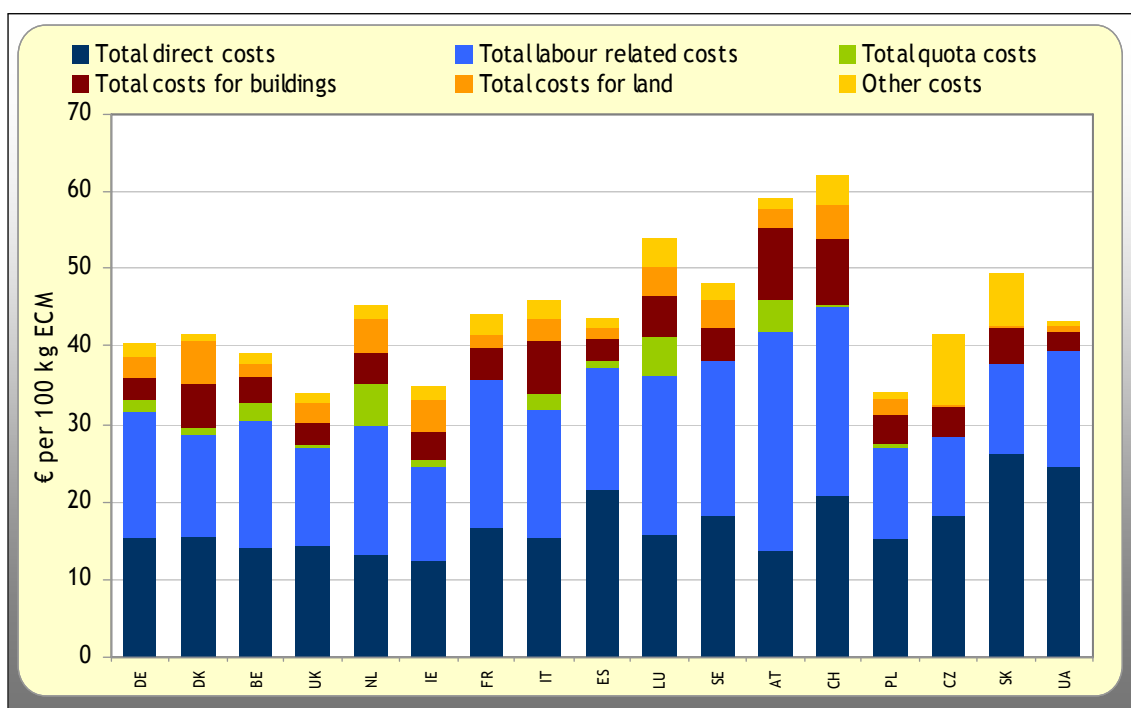
In terms of cost classification, the CR exceeds the all-European average in feedstuff purchase – the figure is 157 % against the EDF average (14.4 € per 100 kg of ECM). The next important item is wage

payments (6.4 €) which exceeds the EDF average by approximately 2.7 times. The valuation of work of family members is zero due to the legal form of Czech companies – and the same situation exists in Slovakia and Ukraine. As a result of the lower milk production, as well as increase of the milk quota in spring of 2008 and not reaching the quota for this year, the quota costs almost reached a zero level (0.2 €) where the EDF average is on the level of 1.8 € per 100 kg of ECM.

If we were to compare the results of the EDF cost survey with similar surveys taken in the CR, we would have only calculated the accounting costs – they are used only in Czech methodologies – and have deducted opportunity costs. We then obtain the total costs on the level of 38.2 € per 100 kg of ECM which is approximately 9.66 CZK/l. Subsequently, we get a range of total costs throughout 2008 of between 8.83 CZK/l according to Burdych (in Yearbook of Cattle Breeding – YBCB [6], and 9.66 – so an interval of 0.83 CZK (see the figure 2). From the figure it is seen that somewhere from June 2008 the milk production is unprofitable.

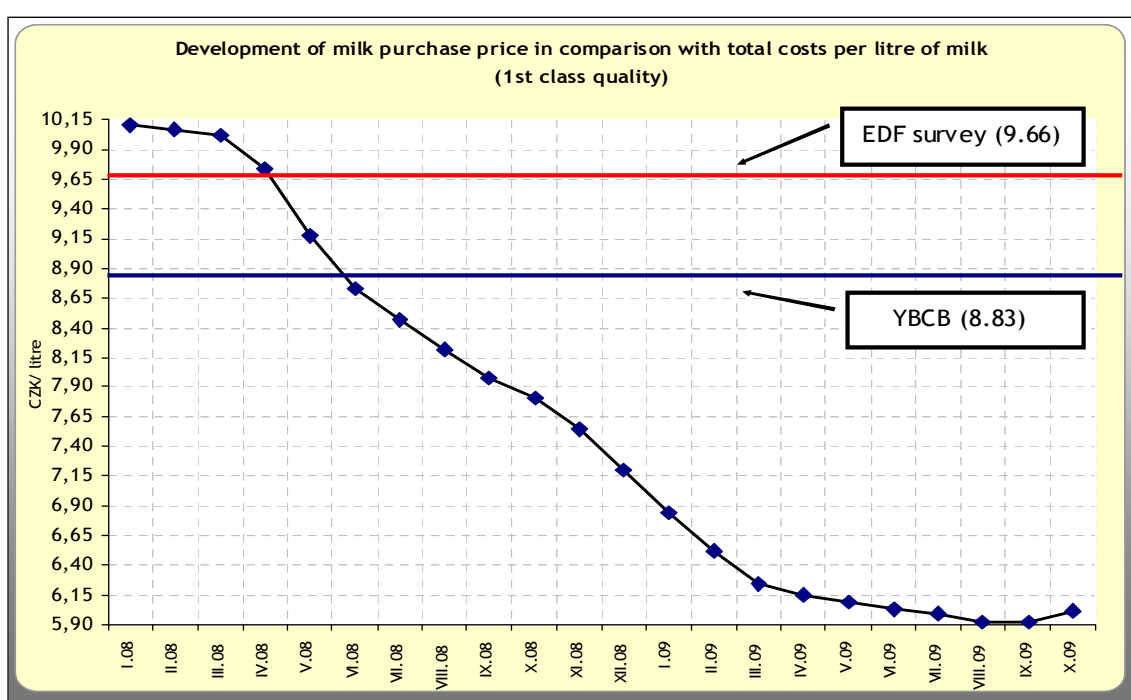
In September 2009, the average EU-25 milk price stood at 26.24 €/100kg (see table 3). This was an increase of 3.3 % (0.85 €/100kg) when compared to the average price in August 2009. Annual comparisons show that the EU-25 average price fell by 8.90 € (25.3 %) from 35.14 €/100kg in September 2008. In September 2009, there were sixteen EU countries that had a higher average price than the Czech Republic, including Italy, France, United Kingdom and Denmark. Between August and September, all EU-25 counties saw a rise in their average price, with the exception of Germany and the CR.

¹ ECM = (0.327 x lb of milk) + (lb of fat x 12.95) + (lb of protein x 7.2)



Source: EDF data base

Figure 1: Structure of costs of the dairy enterprise.



Source: CSO, YBCB, EDF data base

Figure 2: Comparison of costs vs. milk purchase price.

	€/ 100 kg	Relation to Average EU 25		€/ 100 kg	Relation to Average EU 25
Cyprus	52.84	201.4%	Slovenia	24.41	93.0%
Finland	39.59	150.9%	Belgium	23.48	89.5%
Greece	36.75	140.1%	Czech Rep.	23.00	87.7%
Italy	31.02	118.2%	Poland	22.73	86.6%
France	30.42	115.9%	Germany	22.07	84.1%
Netherlands	28.06	106.9%	Hungary	21.28	81.1%
Spain	27.90	106.3%	Slovakia	20.96	79.9%
Portugal	27.40	104.4%	Estonia	19.77	75.3%
Sweden	27.26	103.9%	Lithuania	16.50	62.9%
United Kingdom	26.83	102.2%	Latvia	16.44	62.7%
Austria	26.14	99.6%	Malta	c	c
Ireland	25.02	95.4%	Average EU 10	24.21	92.3%
Luxembourg	24.69	94.1%	Average EU-15	28.08	107.0%
Denmark	24.50	93.4%	Average EU 25	26.24	100.0%

Source: DG Agri (<http://www.dairycos.net/market-information/dg-agri.aspx>), c - confidential

Table 3: Milk purchase prices in September 2009 (EU 25).

The figure 3 represents an income from operations. The average milk purchase price in 2008 is compared to the “break-even point II” (BEP II.²).

From the results it can be seen that in spite of higher milk prices at the beginning of 2008, the average milk purchase price (in the Czech conditions it was about 33 €/100 kg of ECM) could not cover all economic costs of production. Break-even point II was on the level of 34.2 €/100 kg of ECM. As closely as the accounting costs are calculated and the opportunity costs are deducted, 30.9 €/100 kg is obtained which is the “BEP I”, and this is below the milk purchase price mentioned above.

In summary, the total income including all subsidies was on a very low level of only 0.4 €/100kg of ECM (the EDF average was 2.6 €) but without subsidies it was negative as well as the EDF average. From European countries, the negative income from operations (also without subsidies) was then in Luxemburg, Austria, Switzerland and Slovakia. It corresponds to outputs of Foltýn [3] who evaluates an impact of the agrarian policy and submits that in an average formulation the milk production profitability in the

CR without subsidies was negative after 2004 and that only subsidies helped the income into positive figures.

If we consider the differences in farming among single member states in more detail, we must take note of the lower labour productivity which is about 8% less in the CR than in the EDF average, and is 172 kg of ECM per 1 hour of work. In comparison to the Netherlands, it is roughly a third less, and in comparison of Denmark it is almost a half less (see figure 4). In these countries, the total requirement of labour per one cow is about 30 hours yearly compared to 58 hours in the Czech Republic. The lowest labour productivity was in Slovakia, Ukraine and Poland (with 72, 81 and 83 kg/hour, respectively), with the labour requirement of more than 100 hours per cow yearly.

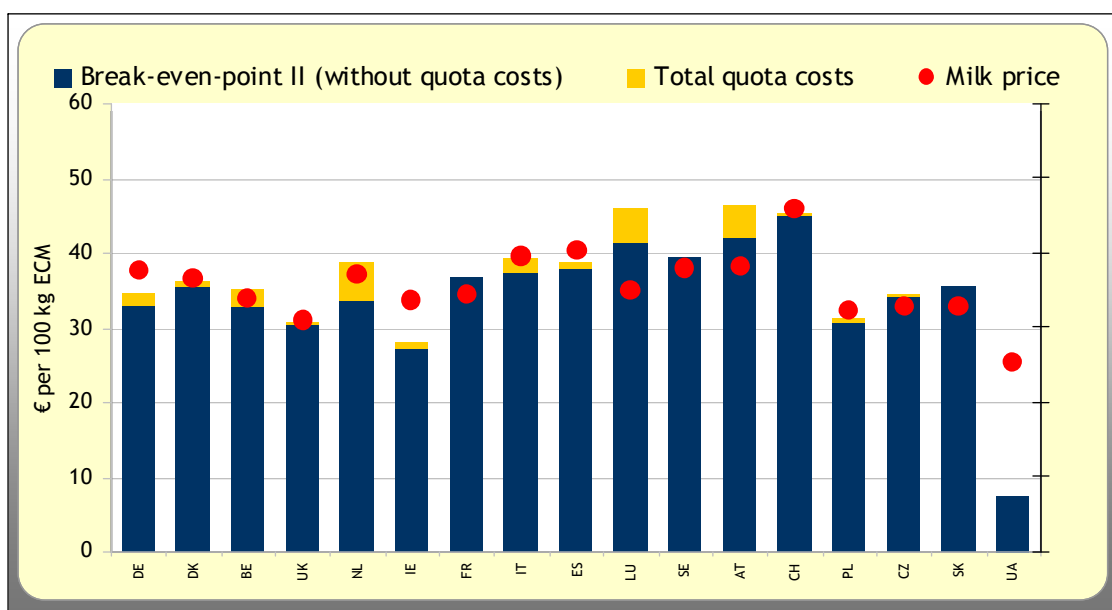
A comparison of capital productivity is also interesting, the Czech Republic has 2,377 kg of ECM per 1,000 € of total asset (machinery, buildings, shares in other companies etc.), 30 % above the EDF average.

The land productivity relates directly to the land price and is especially high in places where the land price is also high. It refers above all to Italy and Spain where the figures of land productivity are the highest and varies above 20 tons of ECM per hectare, which is considerably larger than the EDF average (12.8 t ECM/ha). With regard to large managed areas, the Czech Republic has this

² BEP II = total costs (without quota cost) – total returns + returns from milk sales. The number represents milk price to cover full economic costs, equal to total economic costs of milk production, without consideration of quota costs.

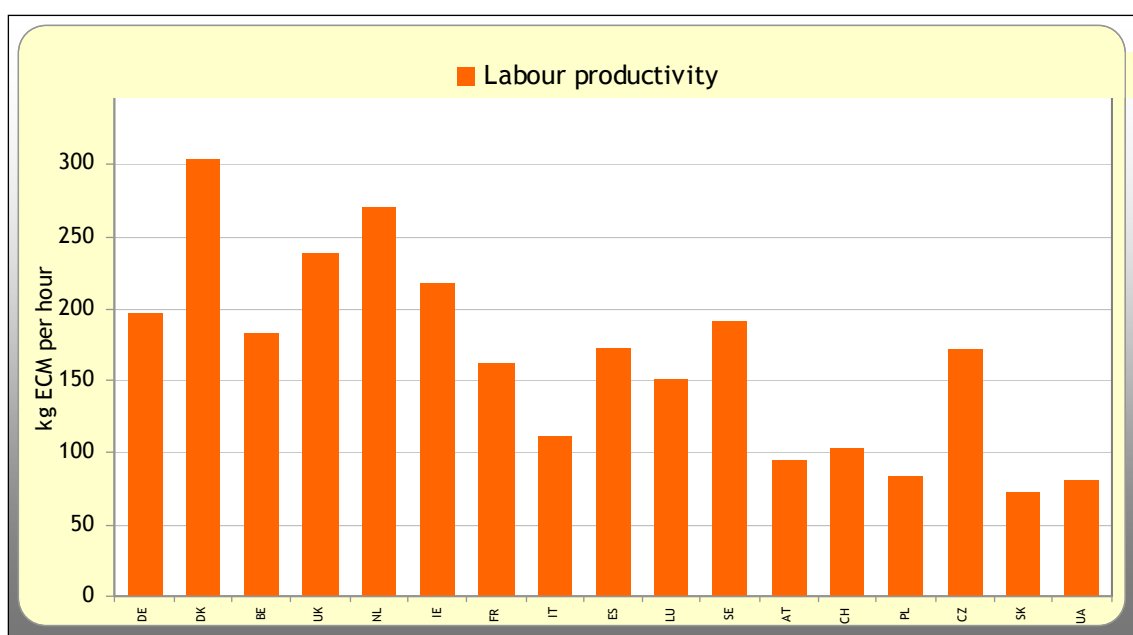
productivity on a level of two thirds of the EDF average. There is also a visible dependence between the values of land rent (which corresponds with the real land price) and milk production per hectare of grazing area. There could be an estimation that with the rising price of this production factor, the milk production per unit also rises, so that a land user tries to maximise its utilisation (see figure 5). This relationship is best described by a multiplicative function with the dependence about 44 % and is characterised by the formula: $y = 374.99x^{0.5926}$ (see figure 6).

It is also necessary to mention some other indicators of milk production, for example the parturition interval which is 413 days in Czech conditions (about 12 days longer than average) and it is the second highest after Spain (425 days). At the other extreme, the lowest figure for this indicator can be observed for Belgian cows, with 362 days. Additional factors include the cow culling rate which is about 35 % in our conditions and is also the highest figure among EDF members but similar to figures observed in Slovakia and Sweden. The lowest values of cow culling rate are traditionally seen in Ireland (15 %) and Switzerland (19 %).



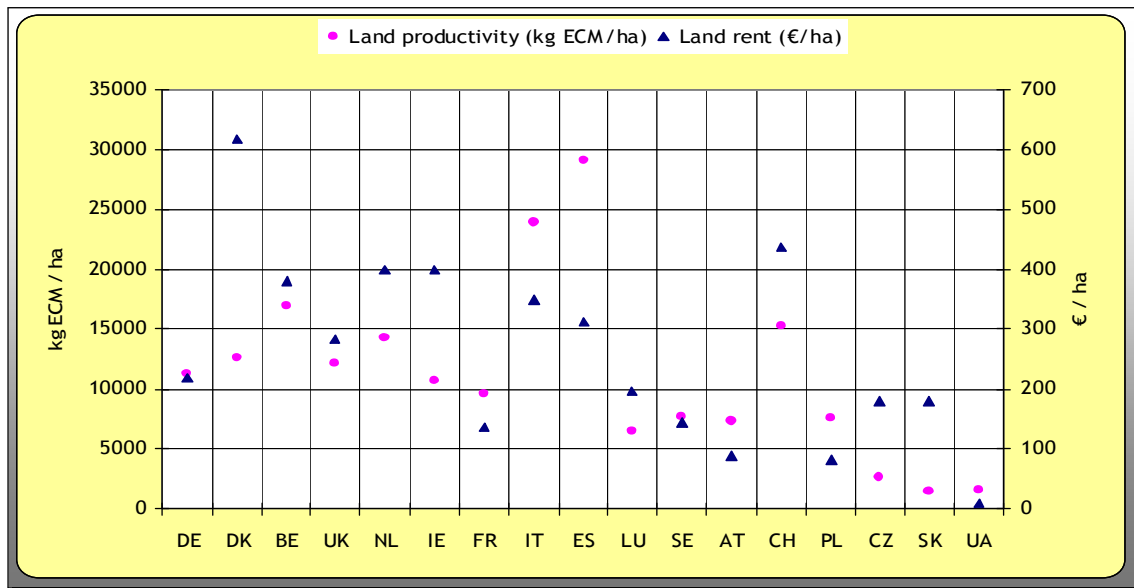
Source: EDF data base

Figure 3: Costs in relation to returns in milk production (2008).



Source: EDF data base

Figure 4: Milk production per 1 hour of work.



Source: own calculations on the base of EDF data

Figure 5: Land productivity and land rent price in the EDF countries.

Regression Analysis - Multiplicative model: $Y = a \cdot X^b$					

Dependent variable: Productivity					
Independent variable: Rent					

Parameter	Estimate	Standard Error	T Statistic	P-Value	

Intercept	5,9269	0,920112	6,4415	0,0000	
Slope	0,592567	0,171516	3,45488	0,0035	

NOTE: intercept = $\ln(a)$					
Analysis of Variance					

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value

Model	5,12861	1	5,12861	11,94	0,0035
Residual	6,44503	15	0,429668		

Total (Corr.)	11,5736	16			

Correlation Coefficient = 0,665679					
R-squared = 44,3129 percent					
Standard Error of Est. = 0,655491					

Calculations with decimal comma.

Source: own calculations on the base of EDF data

Figure 6: Statistical characteristics of the dependence between land productivity and rent.

With regard to the milk performance, the CR is at the top of milk production together with Denmark and Sweden. The average figure of MYPCY in these countries is above 9,000 kg of ECM. In this calculation, it is also necessary to include the amount of concentrated feedstuff used for the production of 1 kg of milk which particularly influences the costs (especially in 2008). While in

Sweden the intake of concentrated feed was over 10 kg per cow and day on this type of feedstuff for a 78 % share of total milk production, in Czech farms it was only 5.7 kg with a 42 % share of total milk production. The concentrated feedstuff consumption also relates to the high price of land, where for example, for Italian farmers it is cheaper to buy feedstuffs from other sources, and its share

in total production is comparable to Sweden – 77 %. Czech producers have then a range for optimisation of quality and quantity of feedstuffs. On average, the concentrated feedstuffs in member states of the EDF took a share of 58 % in the total milk production. This was also influenced to a large extent by the feed prices which were twice as high as the EDF average in Czech conditions.

Synthesis of results and conclusion

(i) In comparison to other EU countries, Czech milk producers do not lag behind in terms of the production intensity. With a relatively high milk yield they have reached the European average for the total level of costs per litre of milk. The main problem remains the basic production factors – especially labour and land. A lower labour efficiency in the CR is compensated by the low price of labour, lower land productivity, and by the lower costs of land (a rent price). The capital

efficiency is at a relatively good level, apart from machinery usage. The perspectives of Czech producers are, therefore, in increasing labour and land productivity.

(ii) As regards to milk purchase prices, there was some recovery in global demand towards the end of 2009, together with a slight increase of purchase prices. It may be considered that in 2010 prices will become stabilised at a level of between 8 and 9 CZK/l, which, given the low prices of inputs (fuel, energy and feed) in 2009 and its projected stagnation in 2010, could be sufficient to cover the cost of production.

(iii) Given the current increase in production quotas and their subsequent elimination in 2015, it may be expected that the milk prices will fluctuate more often due to a sector liberalisation and the influence of global supply and demand for this commodity..

Corresponding author:

Ing. Jiří Mach, Ph.D.

Czech University of Life Sciences Prague, Department of Economics

Kamýcká 129, 165 21 Prague-Suchbát, Czech Republic

Phone: +420 224 382 394, e-mail: mach@pef.czu.cz

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