Influence of farm milk prices in the EU 25 on profitability and production volume indicators

Vliv farmářských cen za mléko v EU 25 na výnosnost a ukazatele související s objemem produkce

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Abstract: The paper analyses the development of milk prices and effectiveness and economy of holdings included in the particular production category of "411 Milk" and their relations. The influence of prices on profitability, elasticity of production, labour productivity dynamics, effectiveness of long-term assets and resulting cost changes are discussed in particular. Milk profitability was not significantly influenced by different prices in the individual states. The variation of prices in time was more important. The production is supposed to grow with delay. Milk yield (per cow and year) and number of cows per worker are the main determinants of labour productivity growth in the in-kind expression. The influence of prices on labour productivity in monetary expression among individual states is not as important as was supposed.

Key words: milk production, milk price, FADN, costs, labour productivity

Abstrakt: Příspěvek se zabývá analýzou cenového vývoje mléka a analýzou účinnosti a hospodárnosti podniků zařazených do speciálního typu výrobního zaměření „411 Mléko" a vztahy mezi nimi. Jde zejména o vliv cen na výnosnost produkce, elasticitu objemu produkce, vliv na dynamiku produktivity práce, efektivnost dlouhodobého majetku a nákladové změny z nich vyplývající. Na výnosnost mléka nepůsobila významně rozdílná cena v jednotlivých státech, ale spíše cenové změny v čase. Lze očekávat, že růst produkce nastane s určitým časovým zpožděním. Mezi rozhodující faktory růstu produktivity práce v naturálním vyjádření patří norma obsluhy a užitkovost. Vliv ceny na produktivitu práce v hodnotovém vyjádření není mezi jednotlivými státy tak významný jak se původně předpokládalo.

Klíčová slova: produkce mléka, cena mléka, FADN, nákladovost, produktivita práce

The dairy sector is one of the most important parts of the EU. All states of the EU – without any exception – breed dairy cows. Dairy cow breeding is typical for many rural areas and it is vitally important for landscaping, especially in mountain areas. Milk represents about 14% of the total agricultural production output of the EU. The annual turnover of the dairy industry is € 177 milliard. The EU is one of the leading exporters of dairy products (Milk and milk products in the European Union 2006). Its share in world export is 39% for butter, 40% for cheese, 26% for skimmed milk powder (SMP) and 29% for whole milk powder (WMP) (Dairy: World Markets and Trade 2007). The increasing world milk and milk products demand significantly influences the economy of milk production in the EU, especially in the last years. Although this prognosis was made many years ago, the EU is not prepared for such a large increase of the demand. The permanent decrease of dairy cow numbers proves this to be true. The number of dairy cows in the EU 25 has decreased since 2002 from 25.1 million to 22.3 million, i.e. to 88.9% (Dairy: World Markets and Trade 2007). The utility of instruments of current agricultural policy (export subsidies, quotas, subsidy policy) becomes distinctively weaker. The real development of farm milk price is significantly different than were both short term and long term predictions. The increase of the demand for milk and milk products is predicted for 2006 and 2007. Increasing of prices is expected to cause increasing of world production (Dairy: World Markets and Trade 2007; Food Outlook 2007; OECD-FAO 2007; Vysoká poptávka a ceny … 2007).

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The future rise in farm prices and production will probably importantly influence the economy of this sector. While prices will positively influence all enterprises, the effect of production volume increase on economy will be different in different states. Let us deal with these different tendencies of the increase of production.

MATERIAL AND METHODS

This analysis is based on statistic data of the FADN "Milk production" branch. According to the typology of agricultural holdings and companies in the EU, it is a particular type of farming coded as "411 Milk". Together with the "412 Milk and cattle breeding" part, it creates a principal type of farming named "41 Milk production" (85/377/EEC). Cattle under one year, heifers and dairy cows are included in this branch according to the EU directive. Milk production represents 2/3 of the standard gross margin of the "411 Milk" branch. Individual products are not separated in the FADN databases which may lead to a certain misinterpretation when comparing these values with the Czech "Milk production" branch.

Our analysis is made at three time levels. The last FADN published results were for 2004. That is why the state and dynamics of efficiency and economy indicators in 2000 and 2004 are assessed. Prices of agricultural products for 2006 and partly for 2007 have been published yet. For that reason, price comparison is made at three time levels (2000, 2004 and 2007). Different definitions of the individual indicators cause some problems with the analysis of the described branch. This influences both the restricted choice of evaluative indicators and certain incorrectness of those indicators.

The growing demand for milk and milk products and following changes of milk prices reintroduce the question whether increasing of milk prices is the only solution for milk production economy in the EU. It was necessary to clarify how – from the enterprise economy point of view –present price changes have influenced the profitability of production, to assess the elasticity of changes in production volume caused by price changes and to evaluate the way in which those changes may influence labour productivity dynamics, long-term assets effectiveness and cost changes resulting from them.

Table 1. Types of technological development and derived development of the individual characteristics

Type	Relation	Characteristics
1	$iFu = iv = 1$	Fund neutral type of technological development. Long-term assets efficiency is constant. Labour productivity is constant. Technical equipment of work is constant
2	$iv > iFu = 1$	Fund neutral type of technological development. Long-term assets efficiency is constant. Labour productivity increases. Technical equipment of work increases
3	$iv < iFu = 1$	Fund neutral type of technological development. Long-term assets efficiency is constant. Labour productivity decreases. Technical equipment of work decreases
4	$iFu < 1 < iv$	Fund intensive type of technological development. Long-term assets efficiency decreases. Labour productivity increases. Technical equipment of work increases
5	$iFu < 1 = iv$	Fund intensive type of technological development. Long-term assets efficiency decreases. Labour productivity is constant. Technical equipment of work increases
6	$iFu < iv < 1$	Fund intensive type of technological development. Long-term assets efficiency decreases. Labour productivity decreases. Technical equipment of work increases
7	$iFu = iv < 1$	Fund intensive type of technological development. Long-term assets efficiency decreases. Labour productivity decreases. Technical equipment of work is constant
8	$iv < iFu < 1$	Fund intensive type of technological development. Long-term assets efficiency decreases. Labour productivity decreases. Technical equipment of work decreases
9	$iv < 1 < iFu$	Fund saving type of technological development. Long-term assets efficiency increases. Labour productivity decreases. Technical equipment of work decreases.
10	$iv = 1 < iFu$	Fund saving type of technological development. Long-term assets efficiency increases. Labour productivity is constant. Technical equipment of work decreases
11	$1 < iv < iFu$	Fund saving type of technological development. Long-term assets efficiency increases. Labour productivity increases. Technical equipment of work decreases
12	$1 < iv = iFu$	Fund saving type of technological development. Long-term assets efficiency increases. Labour productivity increases. Technical equipment of work is constant
13	$1 < iFu < iv$	Fund saving type of technological development. Long-term assets efficiency increases. Labour productivity increases. Technical equipment of work increases

Comment: iv = index of labour productivity; iFu = index of long-term assets efficiency

The influence of prices on production volume elasticity was calculated with the elasticity ratio of the following type:

$$E = \frac{Q_1 - Q_0}{Q_0} \div \frac{c_1 - c_0}{c_0}$$

where Q stands for production volume and c stands for price. The type of technological development is defined by the relation between technological equipment of work (long-term assets per AWU[1]) and labour productivity in monetary expression. We can divide technological development into 13 types by comparing indexes of long-term assets efficiency and labour productivity (Table 1).

The influence of technological development on relative changes of long-term assets and number of workers is made according to methodology of Střeleček, Lososová (2003). To interpret factors influencing labour productivity, it uses the following relation: $LP = NO \times U \times c$, where LP stands labour productivity, NO stands for number of cows per AWU, U stands for annual average milk yield, and c stands for price of 1 kg of milk.

$$\Delta LP/_F = \frac{\log iF}{\log iLP} \times \Delta LP$$

is valid for the influence of individual factor changes on labour productivity. $\Delta LP/F$ stands for labour productivity changes under the influence of the monitored factor, iF stands for the index of this factor, iLP stands for the index of labour productivity and ΔLP stands for the total change of labour productivity in monetary expression.

RESULTS AND DISCUSSION

Prices of cow's milk

The EUROSTAT offers three types of cow's milk prices – prices of raw milk with 3.7% fat content, raw milk with actual fat content and whole cow's milk for human consumption. If we want to achieve the acceptable comparability with the FADN results, we have to use prices of raw milk with actual fat content.

Hemme et al. (2005) discuss the development of world prices from 1995 to 2001. His study suggests that prices in the EU 15, USA, Canada and other states will decrease. Fast structural changes towards more effective farming system as well as prices will define the volume of milk production and conditions of its sale. Also other predictions are significantly different than the reality of 2007 (Major Issues No. 15). Present prices of raw milk can be divided into 3 groups according to their level (Table 2).

Prices of 20–30 €/100 kg are characteristic for the new member states (NMS) and states in which – in comparison with previous years – the policy of decreasing milk prices is realized. In comparison with 2004, prices of milk have decreased to 61.48% in Malta, to 85.6% in Sweden and to 97.8% in Denmark. The tendency of a significant rise of milk prices is not so explicit for the other groups. We can see the intensive rise of prices (in states which have the highest price index in comparison with 2004 such as 175.9% in Poland, 172.8% in Latvia, 139.3% in Lithuania, 126.1% in Netherlands, 124.7% in Slovakia, 126.4% in Spain, 124.4% in Estonia, 121.9% in Austria, 120.2% in Belgium and 120.1% in the Czech Republic), on the other hand, some states maintain a low profile (109.6% in Great Britain, 108.1% in Finland, 107.7% in Luxembourg and 105.3% in Ireland). It is interesting that those states did not reach high profitability in the first period. The price effect in the individual states manifests extremely differently from this point of view. The influence of prices in individual states of the EU can be assessed either directly, i.e. considering profit (loss) in 2004, or indirectly, i.e. considering the way in which cost transformation is influenced by increased volume of production. Prices of raw milk with the actual fat content show different dynamics in 2000–2007 (Figure 1).

Table 2. States of the EU according to prices in August 2007 (€/100 kg)

20–30	Lithuania (21.19), Malta (24.76), Estonia (26.22,) Hungary (26.61), Portugal (26.61), Slovenia (27.05), Slovakia (27.82), CR (28.24), Sweden (28.30), Poland (28.84), United Kingdom (29.70), Denmark (29.83)
30–35	Ireland(30.91), France (32.19), Italy(33.16)
35–40	Germany (35), Luxembourg (37.04), Belgium (37.08), Netherlands (37.36), Austria (37.46), Greece (38.09), Spain (38.14), Finland (38.64), Cyprus (39.29)

Source: Milk Management Committee

[1] The implementation of AWU (annual work unit), which is based on the standard number of working hours, does not make possible to assess the labour time use and working overtime. Indicators are standardized from this point of

2000–2004 data, i.e. the currently published FADN outcomes, can be used to analyse the influence of price on profit (loss). As can be seen from this analysis, the relation between the development of prices and milk production profitability is not completely explicit. In 2000–2004, milk prices were significantly reduced

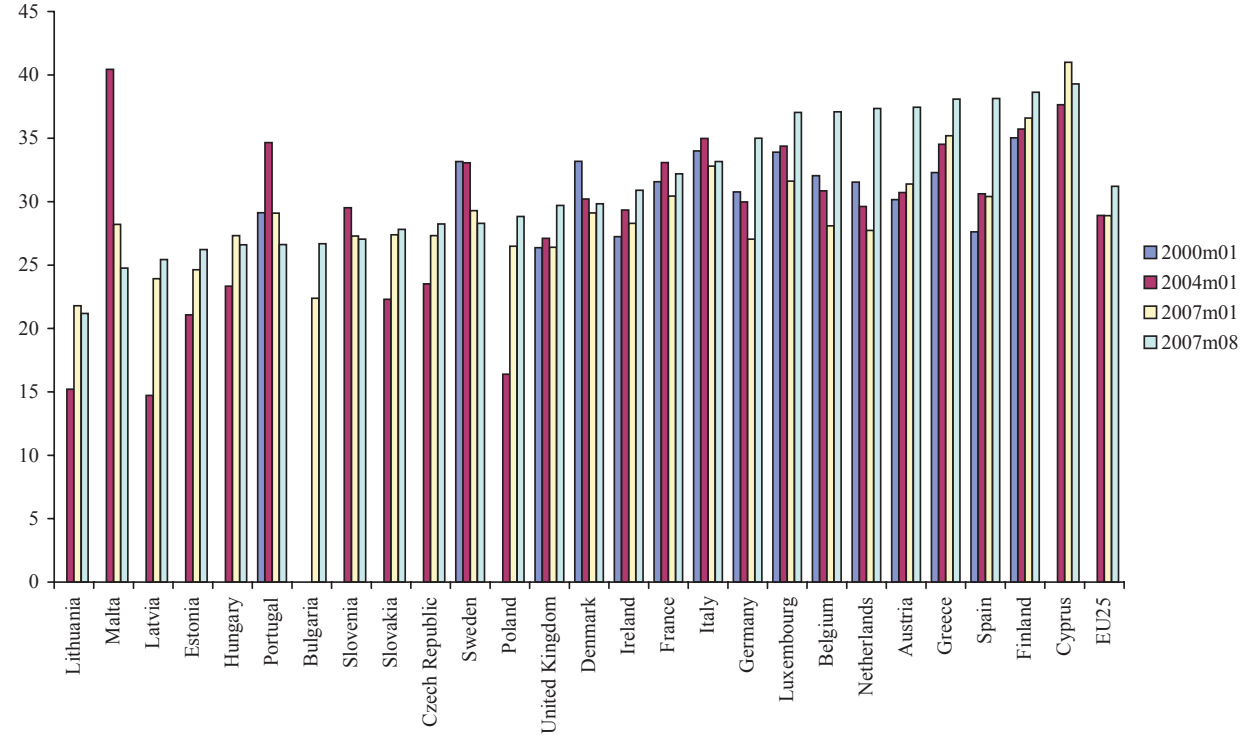

Figure 1. Prices of raw cow's milk with actual fat content (€/100 kg)

Source: Eurostat, Milk Management Comittee

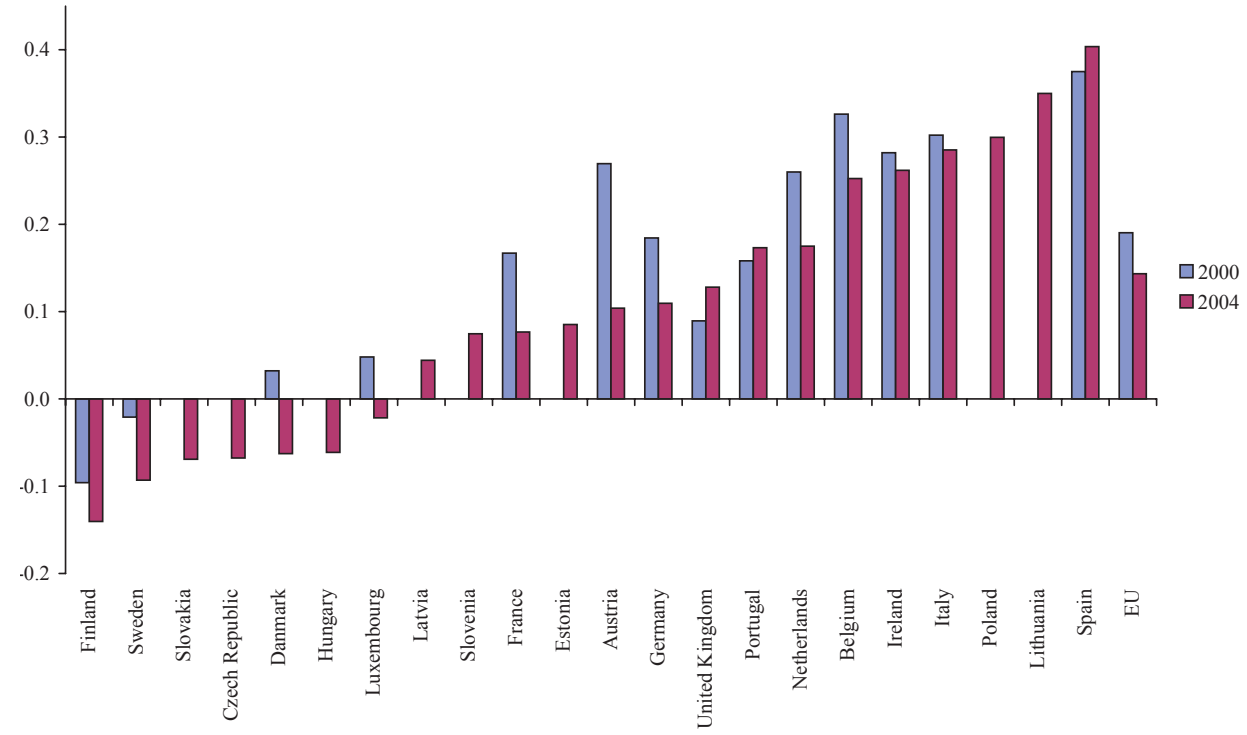

Figure 2. Profitability in 2000 and 2004 (profit/revenues ratio)

Source: FADN, own calculation

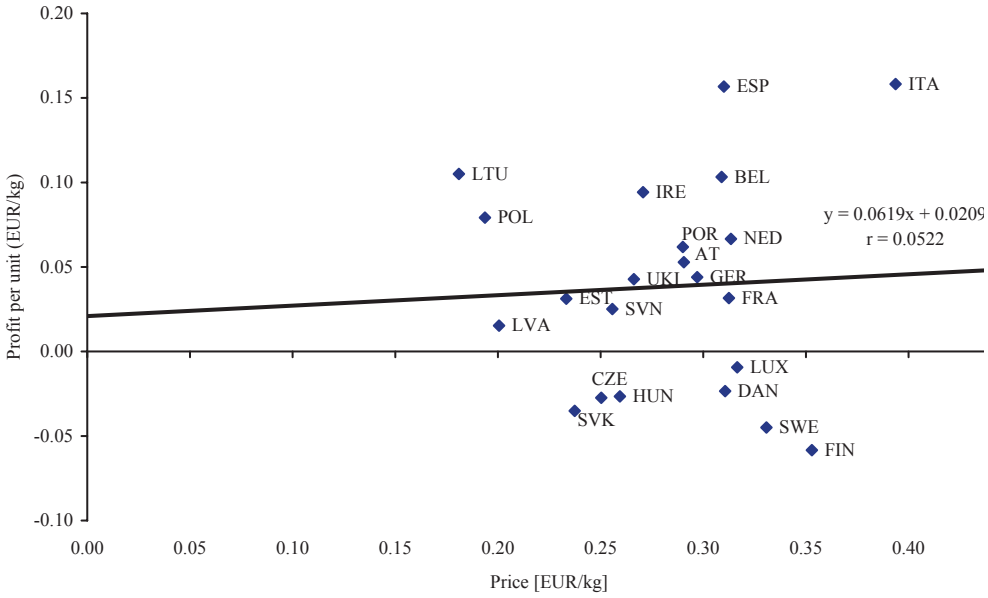

Figure 3. Dependence of profitability on raw milk prices (2004)

Source: FADN, own calculation

especially in Malta, Sweden, Denmark, Germany, Belgium and the Netherlands. These changes have considerably affected the economy of 2004 in comparison with 2000.

These are the results of the analysis:

1. The majority of states with low prices have achieved acceptable profitability, in spite of low labour productivity in the branch. On the other hand, states with the highest prices were in loss (Finland, Sweden). The majority of states managed to get rid of the loss by the influence of prices (Figure 2).
2. The analysis of profitability shows that changes of profit (loss) in the individual states are less sensitive to the level of prices in the individual states and more sensitive to the changes of prices in time (Figure 3).

The regression function parameters show, that it is impossible to prove the dependence according to which states with higher prices are more profitable. It is proved by the almost zero value of the correlation coefficient, low slope of regression function as well as the high variance in profitability of the individual states which have roughly the same price of milk. Price changes in time have a greater influence on the economy of dairy production. The estimation of the relative change in profit under the influence of prices per € 1 000 of revenues from 1st January 2006 to 1st July 2007 is shown in Table 3.

The following statements result from Table 3:

1. Price reduction in the first group resulted in lowering profitability in the dairy sector. There was a significant reduction by 16% only in Malta; the reduction in other states was lower than 1%.
2. The increase of prices up to the average EU 25 price (€ 28.58/100 kg) depended on the level of change. Changes of profitability did not overreach 10%, with the exception of Slovakia and Hungary.
3. States which had prices above the EU 25 average had had the highest prices also in 2006. Their changes of profitability did not overreach 7%, with the exception of Ireland and Finland.

Table 3. The EU states divided into groups according to profit changes under the influence of price changes per € thousand of revenues from 1. 1. 2006 to 1. 7. 2007

To 0	Malta (–168.3), Denmark (–13.5), Czech Republic (–2.5)
0–25	Portugal (6.3), France (7.0), Cyprus (8.2), Latvia (11.1), Sweden (12.5), Greece (15.7), Estonia (17.6), Slovenia (21.4)
25–50	Netherlands (25.1), Italy (26.8), Austria (48.9)
50–75	Spain (51.5), Luxembourg (51.8), Lithuania (54.3), United Kingdom (58.2), Germany (59.0), Poland (63.6), Belgium (65.4), Finland (70.3)
Above 75	Ireland (90.4), Slovakia (105.7), Hungary (118.2)

Source: Milk Management Committee, own calculation

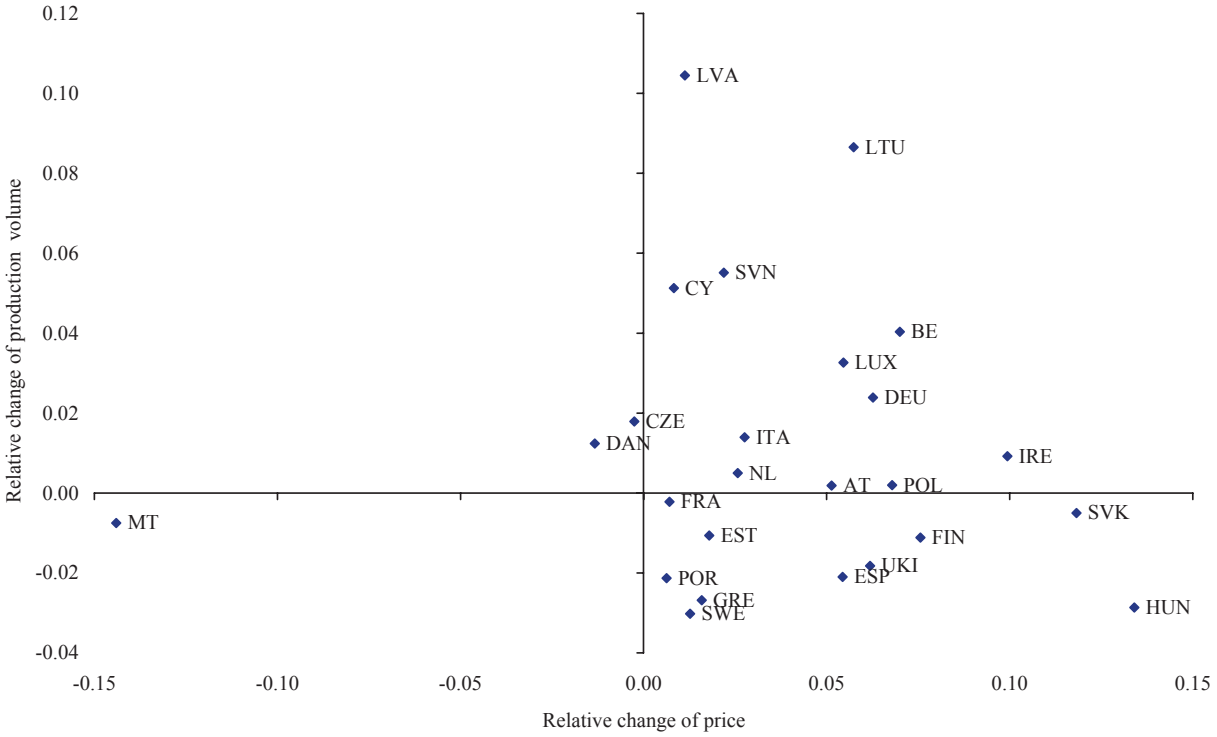

Figure 4. Elasticity of production to relative change of prices (Jan.–July 2007/Jan.–July 2006)

Source: Milk Management Committee, own calculation

4. The most common increase of profitability under the influence of prices did not overreach 5% in the majority of states.
5. There are also some other factors placed into foreground even with this price dynamics – such as the influence of production volume, the influence of labour productivity and the long-term assets efficiency and those relations, by which they influence a certain cost transformation.

The influence of prices on production volume

A number of studies suggest that the high milk prices will result into a major increase in world milk production. The EU 25 production was expected to rise by 1% (Major Issues No. 15). The analysis of elasticity indicators has shown that the increase of prices in 2006 and its acceleration in 2007 is not connected with the corresponding increase of production, the production in many EU states actually decreases. The price effect is not followed by the effect of the amount of production and higher cost effectiveness. Such a low elasticity of production to price changes results from the current Common Agricultural Policy and from the long generation cycle of dairy cows. We can also presume a slower interaction between price dynamics and production volume leading to price stabilization on the acceptably lower level (Figure 4).

Labour productivity

Labour productivity is one of the crucial factors of the global economy of milk production. States of the EU may be divided into four different groups according to labour productivity (Table 4).

Big differences in labour productivity of the first and the third group show the differences among the

Table 4. The EU states divided into groups according to labour productivity in 2004 (in thousand EUR/AWU)

0–40	Poland (7.9), Slovenia (11.1), Lithuania (11.3), Latvia (13.6), Estonia (18.2), Slovakia (20.4), Czech Republic (21.0), Austria (29.0), Portugal (32.6), Hungary (34.6), Finland (37.6)
40–80	Spain (45.8), France (61.8), Ireland (61.9), Germany (69.5), Italy (71.0), Belgium (79.7)
More than 80	Luxembourg (80.5), Sweden (85.4), United Kingdom (100.7), Netherlands (123.1), Denmark (142.0)

Source: FADN, own calculation

individual states in term of management effectiveness. The Czech Republic that represents – together with Hungary – the upper limit of observed indicators of new member states has achieved 46% of the average EU productivity, 30.2% of productivity of Germany, 17.1% of Netherlands, 20.9% of United Kingdom and 14.8% of labour productivity in Denmark. For the purpose of further analysis, it is necessary to divide

Table 5. Technological equipment of work, labour productivity, number of cows per worker, milk yield and price (2004, dairy cows only)

	Technological equipment of work	Number of cows per worker	Milk yield	Labour productivity in in-kind expression	Average exercise price	Labour productivity in monetary expression
	EUR/AWU	COW/AWU	kg/COW	kg/AWU	EUR/kg	EUR/AWU
POL	20 809 (26)	7.01 (30)	4 255 (66)	29 834 (19)	0.194 (63)	5 778 (12)
LTU	11 240 (14)	7.73 (33)	4 889 (75)	37 797 (25)	0.181 (59)	6 839 (14)
LVA	7 061 (9)	8.17 (34)	4 824 (74)	39 401 (26)	0.201 (65)	7 902 (17)
SVN	48 322 (61)	6.38 (27)	5 160 (79)	32 913 (21)	0.256 (83)	8 416 (18)
SVK	84 883 (107)	7.47 (32)	5 372 (83)	40 113 (26)	0.237 (77)	9 522 (20)
EST	23 582 (30)	9.04 (38)	5 477 (84)	49 503 (32)	0.233 (76)	11 548 (24)
CZE	35 003 (44)	9.30 (39)	5 580 (86)	51 924 (34)	0.250 (81)	12 999 (27)
AT	116 551 (147)	9.35 (39)	6 109 (94)	57 106 (37)	0.291 (94)	16 593 (35)
HUN	22 189 (28)	12.65 (53)	6 306 (97)	79 771 (52)	0.259 (84)	20 694 (44)
POR	18 931 (24)	14.49 (61)	6 298 (97)	91 280 (59)	0.290 (94)	26 476 (56)
FIN	64 552 (82)	11.04 (47)	8 189 (126)	90 375 (59)	0.353 (115)	31 895 (67)
ESP	32 551 (41)	20.31 (86)	5 814 (90)	118 058 (77)	0.310 (101)	36 601 (77)
IRE	63 723 (81)	32.29 (136)	5 326 (82)	171 998 (112)	0.271 (88)	46 552 (98)
FRA	66 950 (85)	25.38 (107)	5 907 (91)	149 926 (97)	0.312 (102)	46 848 (99)
ITA	78 933 (100)	20.81 (88)	6 153 (95)	128 009 (83)	0.394 (128)	50 394 (106)
DEU	90 121 (114)	25.83 (109)	6 708 (103)	173 248 (112)	0.297 (97)	51 460 (108)
SWE	130 028 (164)	22.24 (94)	7 946 (122)	176 700 (115)	0.331 (108)	58 443 (123)
LUX	172 253 (218)	26.58 (112)	7 050 (109)	187 361 (121)	0.317 (103)	59 304 (125)
BEL	74 743 (94)	31.88 (134)	6 114 (94)	194 902 (126)	0.309 (100)	60 212 (127)
UKI	52 822 (67)	44.62 (188)	6 760 (104)	301 608 (196)	0.266 (87)	80 285 (169)
NED	140 355 (177)	42.91 (181)	7 535 (116)	323 296 (210)	0.313 (102)	101 348 (213)
DAN	435 757 (551)	48.08 (203)	7 906 (122)	380 162 (246)	0.311 (101)	118 107 (249)
EU	79 150	23.74	6 499	154 293	0.308	47 491

Comment: Table 5 shows the absolute values of individual indicators. The share in the average EU 25 value is in brackets.

Source: FADN, own calculation

Table 6. Variability of the selected factors

	Number of cows per worker	Milk yield	Labour productivity in in-kind expression	Average exercise price	Labour productivity in monetary expression
Variation coefficient	0.64	0.17	0.74	0.182	0.78

Source: FADN, own calculation

labour productivity into subunits – the influence of long-term assets volume per livestock unit (LU); the influence of the number of cows per worker, influence of milk yield and influence of prices. Those indicators are connected with the multiplicative links and that is why both the positive and negative influences intensify mutually.

The Table 6 demonstrates the variability of the individual factors.

The number of cows per AWU has the highest variability (v = 64%). The number of cows per AWU and milk yield increase coefficient of variation of labour productivity in in-kind expression to 74%. Prices increase variability of labour productivity in the monetary expression only by 4 points. Low labour productivity is therefore caused especially by the low number of cows per AWU, which is usually connected with the low milk yield.

The Czech Republic forms an upper edge of the new member states with worse results in every indicator. The low number of cows per AWU (39.2% of the EU level, at the time) and lower milk yield (85.9% of the EU level) were the determinants of low labour productivity in the Czech Republic. Due to those elements, the volume of production in kg per worker was 33.7% of the EU level. Similar conclusions are valid also for the rest of the new member states, with the exception of Hungary. Hungary reaches 43.3% of the EU labour productivity and it has more than 50% of the EU level in all observed indicators. The level of selling has not the crucial influence on total labour productivity in monetary expression either for advanced states. High

Table 7. States of the EU according to long-term assets per cow in EUR (2004)

To 2 000	Latvia (865), United Kingdom (1 184), Portugal (1 306), Lithuania (1 454), Spain (1 603), Hungary (1 754), Ireland (1 973)
2 000–4 000	Belgium (2 345), Estonia (2 609), France(2 638), Poland (2 968), Netherlands (3 271), Germany (3 489), Czech Republic (3 762), Italy (3 793)
4 000–6 000	Sweden (5 847), Finland (5 848), Luxembourg (6 481), Slovenia (7 574)
More than 6 000	Denmark (9 062), Slovakia (11 368), Austria (12 466)

Source: FADN, own calculation

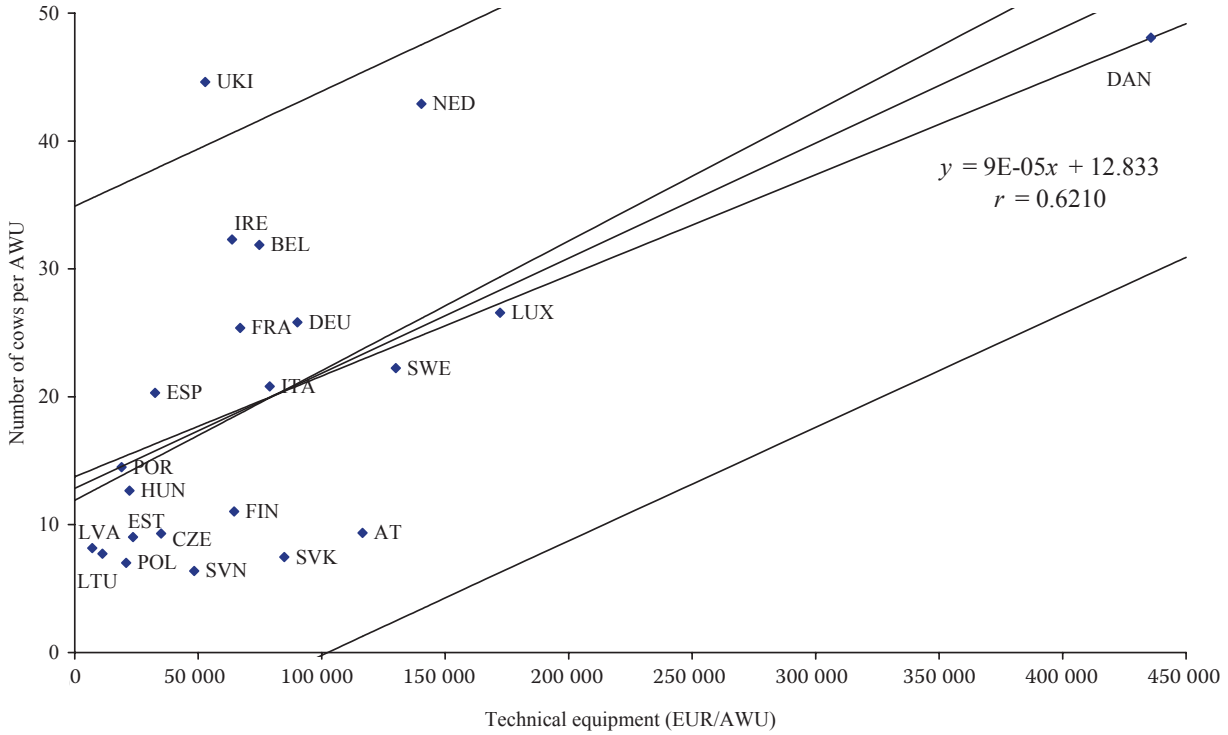

Figure 5. Dependence of number of cows per AWU on technical equipment (2004)

Source: FADN, own calculation

productivity of those states is also influenced especially by number of cows per AWU and milk yield.

Technological equipment of work should be an important element influencing number of cows per AWU. We suppose that a better technological equipment of work should create better conditions for higher labour productivity. This hypothesis is – in the international measure – discredited by differences in manufacturing equipment evaluation and as a result of this it is not completely comparable (Table 7).

The value of technological equipment of the "411 Milk" branch differs significantly in the individual states. It is caused especially by different prices, so that this indicator is almost impossible to compare. Moreover, a better technological equipment does not result in a higher labour productivity. The dependence of the number of cows per AWU on technological equipment is displayed in Figure 5.

There is a medium-high degree of statistical dependence (r = 0.62) between both indicators. An increase of number of cows per AWU up to one livestock unit requires EUR 10 000 in average. However, this basic trend is paralysed by the high variability of technological equipment of work for the same number of cows per AWU, which importantly extends over the common trend.

A higher productivity at keeping stable costs/revenues ratio enables a higher level of remuneration. The review of the annual average wage can be found in Table 8. Figure 6 shows the dependence of the wage costs/revenues ratio on labour productivity.

Table 8. States according to the annual average wage in 2004 (EUR)

To 10 000	Lithuania (2 060), Latvia (2 493), Slovakia (3 023), Poland (3 667), Estonia (4 923), Slovenia (5 348), Czech Republic (6 279), Hungary (6 695), Portugal (6 701)
10 000–20 000	Austria (12 650), Spain (13 436), France (14 697), Italy (16 988), Finland (17 136), Ireland(18 110), Belgium (18 154), Germany (18 395)
More than 20 000	Luxembourg (20 864), United Kingdom (24 428), Netherlands (25 535), Denmark (30 922), Sweden (32 330)

Source: FADN, own calculation

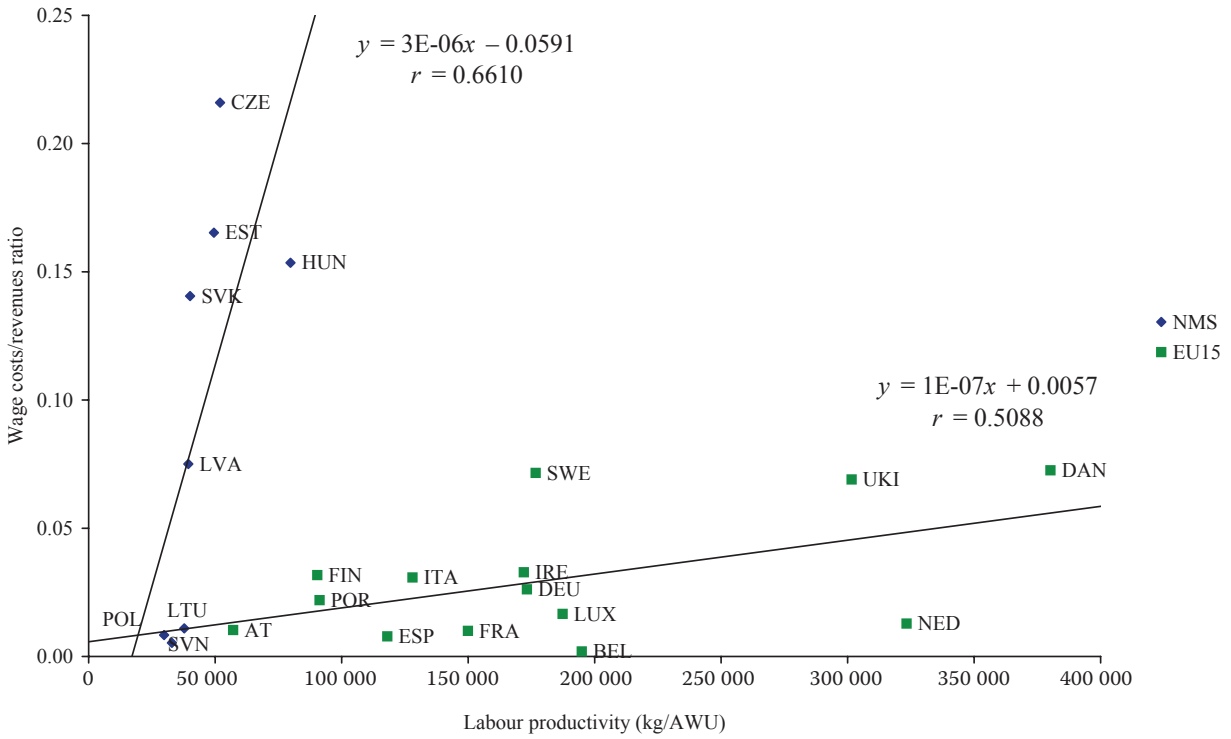

Figure 6. Dependence of the wage costs/revenues ratio on labour productivity (2004)

Source: FADN, own calculation

There is a medium-high level of statistical dependence among the individual states. The increase of labour productivity by 50 000 kg/AWU means the increase of wage costs/revenues ratio by 0.005. This relation clearly shows the improper development of the wage level with regard to the costs/revenues ratio.

Long-term assets efficiency

The long-term assets efficiency is defined by the relation between technological equipment of work and labour productivity. A faster growth of labour productivity than long-term assets and its growing efficiency should be the criterion of reasonable investment (Figure 7, Table 9).

The estimated values, the confidence interval for regression line and the individual observation are derived from Cobb-Douglas power function, which is followed with a high degree of correlation (correlation index $I = 0.97$ in 2000; and $I = 0.85$ in 2004) (Figure 8). These functions clearly prove the fact that growing supplying with long-term assets decreases its efficiency. Coefficient of elasticity less than 1 expresses a decreasing elasticity and so they lead to the capital-intensive type of technological development for which relative overrun of the long-term assets and its cost are significant. The similarity of both functions (2000 and 2004) shows that for long-term assets volume per livestock unit, it is necessary to count with the fact that the average long-term assets efficiency will be less than 1. Increasing of long-term assets with the current growth rate of production is not acceptable from the economic point of view. The benefit of this increasing must be found in different criteria such as a lesser degree of difficulty of work, a better work environment, animal welfare etc. The

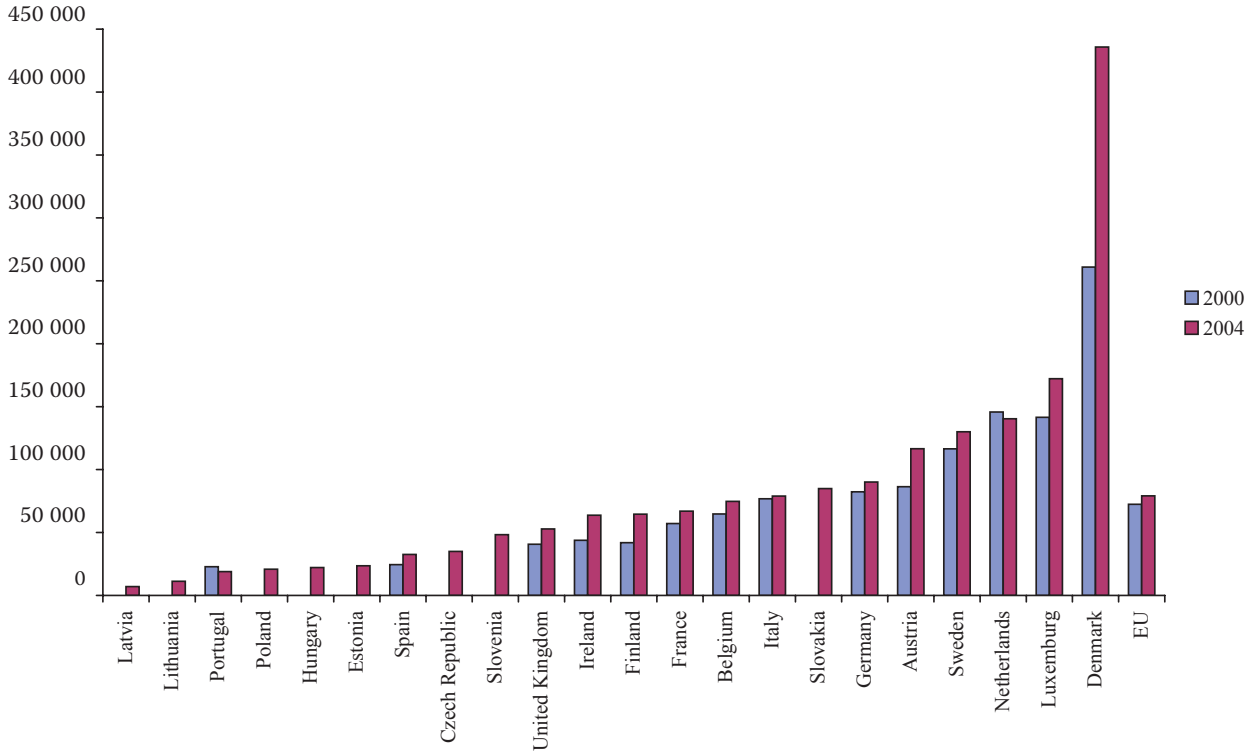

Figure 7. Technical equipment of work in the EU in 2004 (EUR/AWU)

Source: FADN, own calculation

Table 9. The EU states according to the long-term assets efficiency (2004)

To 0.5	Slovakia (0.112), Austria (0.142), Slovenia (0.174), Denmark (0.271), Poland (0.278), Luxembourg (0.344), Czech Republic (0.371), Sweden (0.449), Estonia (0.490), Finland (0.494)
0.5–1	Germany (0.571), Lithuania (0.609), Italy (0.638), France (0.700), Netherlands (0.722), Ireland (0.731), Belgium (0.806), Hungary (0.933)
More than 1	Latvia(1.119), Spain (1.124), Portugal (1.399), Great Britain (1.520)

Source: FADN, own calculation

costs/revenues ratio of long-term assets operation will certainly increase in future. States with relatively low long-term assets (Latvia, United Kingdom, Portugal, Lithuania, Spain, Hungary, Ireland, Belgium, Estonia, France, Poland, and Netherlands) have a higher effectiveness of long-term assets than the states with

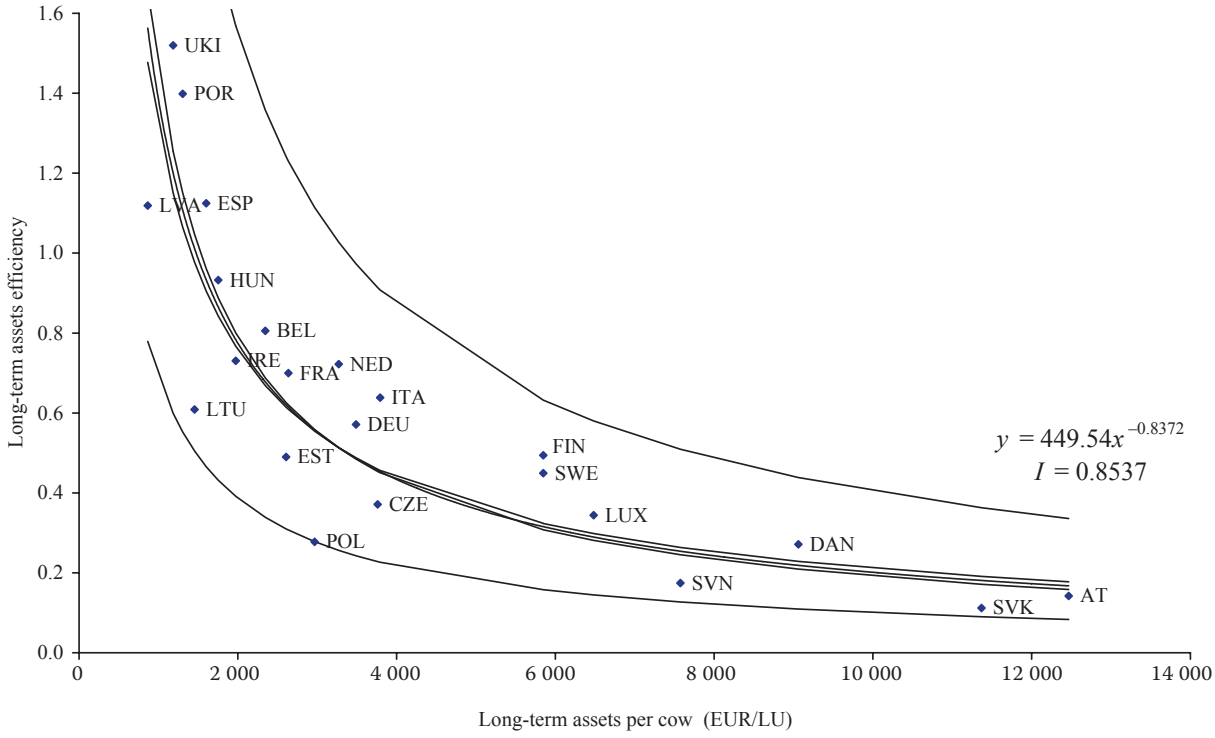

Figure 8. The dependence of the long-term assets efficiency on the long-term assets per cow in 2004

Source: FADN, own calculation

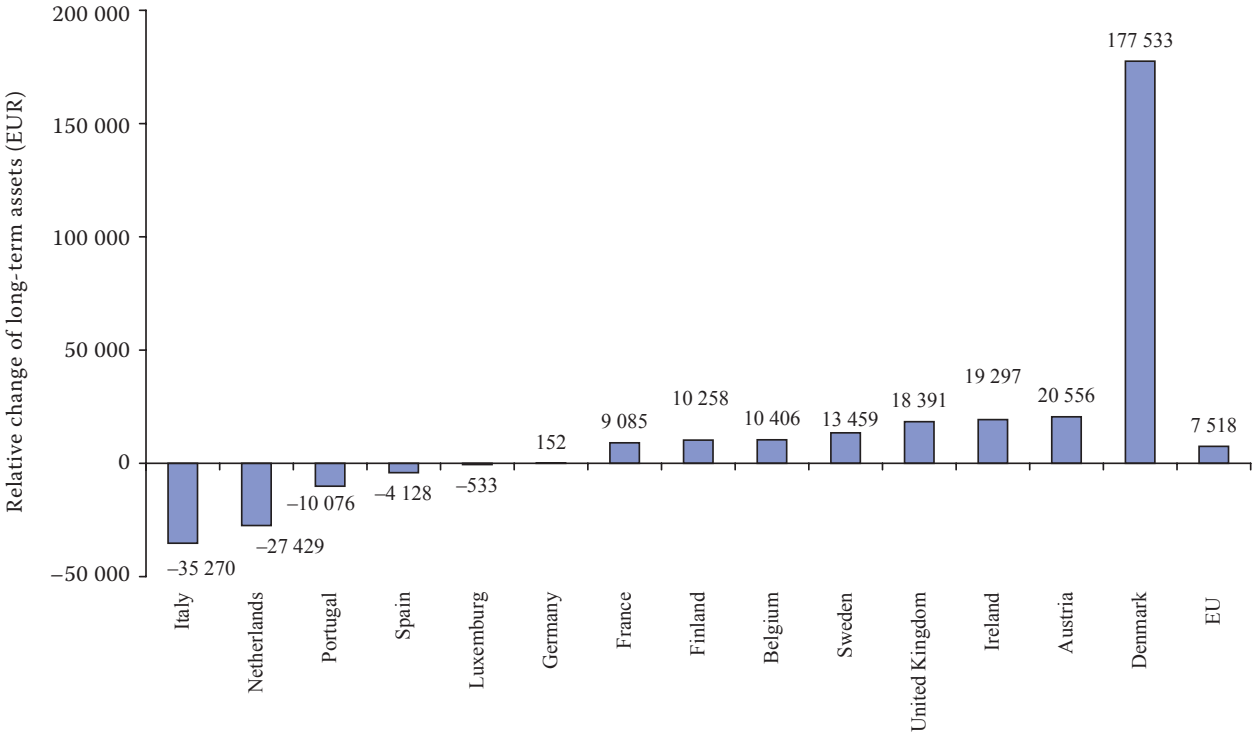

Figure 9. The relative change of the long-term assets (2004/2000) in EUR

Source: FADN, own calculation

Table 10. States according to the depreciation costs/revenues ratio (2004)

To 0.1	Spain (0.039), Hungary (0.069), Lithuania (0.081), Czech Republic (0.087), Latvia (0.089), Estonia (0.096), United Kingdom (0.097), Italy (0.097)
0.1–0.15	Portugal (0.101), Netherlands (0.126), Ireland (0.133), Denmark (0.134)
0.15–0.2	Belgium (0.154), Germany (0.164), Poland (0.169), Sweden (0.193), France (0.198)
More than 0.2	Slovakia (0.261), Finland (0.263), Austria (0.290), Luxembourg (0.294), Slovenia (0.307)

Source: FADN, own calculation

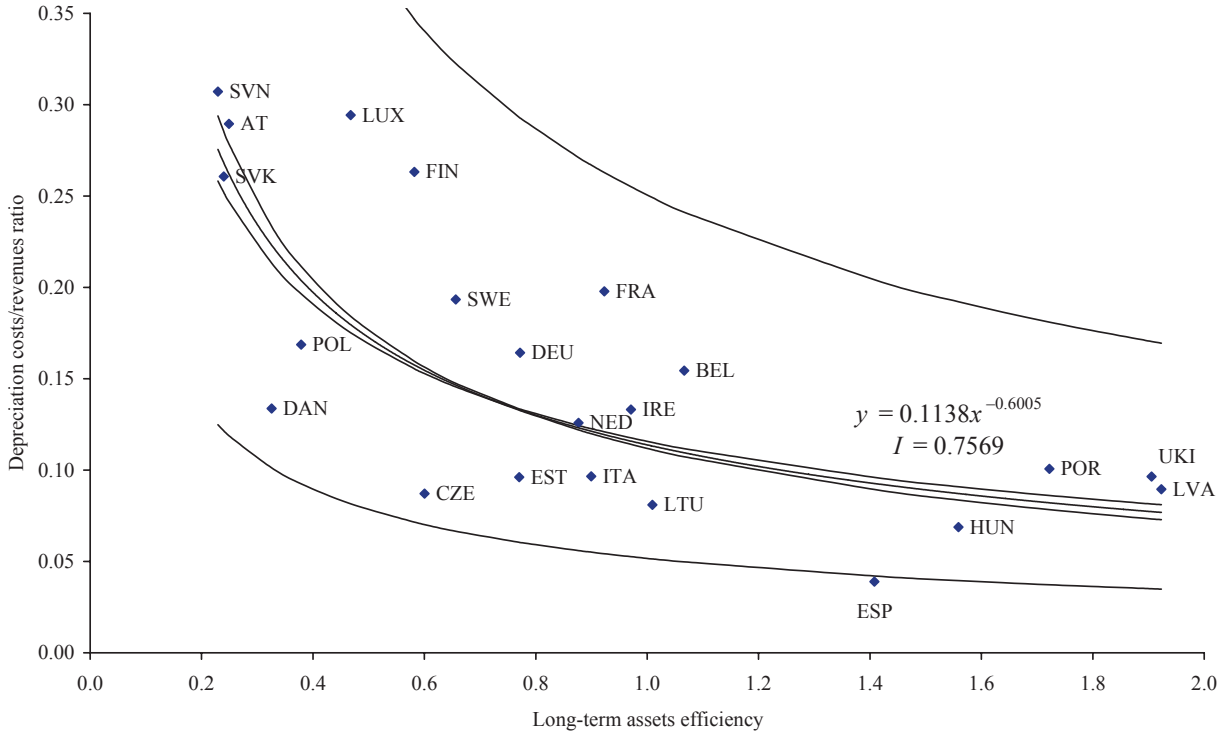

Figure 10. Dependence of the depreciation costs/revenues ratio on the long-term assets efficiency (2004)

Source: FADN, own calculation

high long-term assets. The adherence to quota and production limitations means to realize the capital-intensive type of technological development which is connected with an increase of the costs/revenues ratio. The relative overrun of long-term assets in the majority of states in the EU may serve as a confirmation (Figure 9).

The depreciation costs/revenues ratio is connected with the type of technological equipment (Table 10). The Figure 10 shows that the capital-intensive type of technological development leads to the high depreciation costs/revenues ratio; on the contrary, the capital-saving type of technological development significantly decreases the depreciation cost/revenues ratio. We can assess also other costs connected with investment operations.

CONCLUSION

The growing demand for milk and milk products and the following changes of milk prices reintroduce the question whether the increase of milk prices is the only solution for milk production economy in the EU. It was necessary to clarify how – from the entrepreneur economy point of view – the present price changes have influenced the rate of profit of production, to assess the elasticity of changes in the production volume caused by the price changes and to evaluate the way in which those changes may influence the labour productivity dynamics, the long-term assets effectiveness and the cost changes resulting from them. The analysis has resulted into these outcomes:

1. Price increase was caused especially by those states which previously also had had relatively high prices. Prices in the new member states did not reach the EU 25 average. Milk profitability was influenced more by the changes of prices in time than the differences of prices in the individual states. The reported increase of prices raised the profitability of milk sector by 5% in average.
2. The volume of production elasticity to price dynamics was negative in the period under consideration. Production is expected to grow with a certain time-delay. As a result, higher milk prices will be more permanent.
3. The number of cows per AWU and milk yield will continue to be the determinants of labour productivity. Multiplicative links between those indicators intensify their importance up to the level of labour productivity in the in-kind expression. The influence of prices to labour productivity among the individual states is not as important as was supposed. The low number of cows per AWU in the individual states retriggers a debate about a greater concentration of production in milk sector.
4. The relation between higher technological equipment of work and the decreasing type of technological development of enterprises has been proved. However, it will be necessary to take into account that the increase of technological equipment of work will lead to the capital-intensive type of technological development connected with the increased costs related to this equipment.

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