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Comparison of typical Hungarian and German model dairy farms

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ABSTRACT

This study, one of the first fruits of the IFCN (International Farm Comparison Network), compares farm economics indicators for one typical dairy farm in Germany and one in Hungary, facilitated by the TIPI-CAL simulation model. The authors measured and assessed the competitiveness of these typical production sites for the period 1996 to 1999. Examination of the results obtained allows it to be ascertained that, according to the findings of the study performed, Hungarian farms enjoy a considerable advantage over private farms in Germany with respect to land and labour costs, but that these advantages lose their edge or may disappear completely in consequence of negative phenomena accompanying agricultural activity and economics. Although on international comparison purchase prices for raw milk in Hungary remain below those observed in the European Union, in contrast with the tendency observed until the mid-1990s substantial price rises are now emerging. Despite this, the dairy production sections of a number of agricultural enterprises are now existing merely in a state of vegetation, the primary grounds for maintaining these being the no endeavour towards maintenance of profitability. By comparing data for a German and a Hungarian dairy farm the authors attempt to shed light on reserves in dairy production in Hungary, the rational exploitation of which could result in a substantial improvement in production competitiveness in Hungary.
(Keywords: dairy farm, comparison, competitiveness, simulation)

ÖSSZEFOGLALÁS

Magyar és német tipikus tejtermelőüzem-modellek összehasonlítása
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A tanulmány, mely az IFCN (International Farm Comparison Network) egyik első eredménye, egy német és egy magyar tejtermeléssel foglalkozó modellüzem gazdasági mutatóit hasonlítja össze, TIPI-CAL szimulációs modell segítségével. Versenyképességük mérését az 1996-1999–es időszakra végeztük el. Az eredmények ismeretében megállapítható, hogy az adott vizsgálatban a magyar gazdaság a föld és a munkaerő költségeit tekintve jelentős előnnyel bír a német magánfarmmal szemben. Ezek az előnyök

tompulnak vagy teljes mértékben eltűnhetnek a gazdálkodást kísérő negatív jelenségek következtében. Bár a magyar nyerstej felvásárlási ára, nemzetközi összehasonlításban alatta marad az EU-ban tapasztalhatónak, a 90-es évek közepéig tartó tendenciával ellentétben, jelentős emelkedés következett be. Ennek ellenére számos gazdaság tejtermelő ágazata csak vegetál, fenntartásának elsődleges oka a vállalati likviditás megőrzése, nem a jövedelmezőség. Egy német és egy magyar tejtermelő gazdaság adatainak összehasonlításával próbálunk rávilágítani a hazai tejtermelés tartalékaira, melyek ésszerű kihasználása jelentősen növelhetné a hazai termelés versenyképességét.
(Kulcsszavak: tejtermelő farm, összehasonlítás, versenyképesség, szimuláció)

INTRODUCTION

The assessment of dairy production and measures to make improvements have always been accorded an emphasised rôle in Hungarian agriculture. In consequence of this, within the framework of the cattle programme launched in 1972, with substantial state support, this sectoral branch underwent a period of restructuring unparalleled among its kind. Almost ten years after this process came to a standstill *Bozó* (1992) set out the balance of the transformation undergone as follows: up to 1982 Hungary imported 22,000 Holstein-Friesian heifers, 200 bulls, one million doses of sperm and 1,500 embryos. As a result of breed improvement cross-breeding, the domestic milk requirement could then be met by means of 300,000 fewer cows than were previously required, this being accompanied by considerable savings in expenditure with respect to investment, livestock feeding costs and expenses related to care of the livestock (*Gere,* 1993). By the mid-1980s a deceleration in the rate of restructuring had brought to the surface a number of problems, which were further deepened by the economic difficulties resulting from the change in political system. *Széles* (1993) summarised this situation as follows: in the period 1990-1992 effective demand for dairy products declined by approximately 30%, and a substantial proportion of the traditional eastern markets for the Hungarian food industry was simultaneously lost, a determinant role in this being borne by livestock production outputs. That is, the majority of farms were merely maintaining solvency by means of the sale of breeding animals. Returns from livestock sale served only to cover wages and the related mandatory contributions. A continuous decline in total livestock numbers and low levels of profitability suffered by this sectoral branch continued until the end of the 1990s. A very modest rise in purchase prices for milk did not keep pace with rising production costs, which led to loss-making activity in the whole dairy production branch. This inevitably resulted in decreases in cattle stocks and also the closure of a number of dairy sites (*Iváncsics*, 1998). The situation improved to a certain degree by the effect of the process, beneficial to producers, in the course of which purchase prices for raw milk rose by almost 60% within two years.

At present the primary issue centres around the effects on the future of this branch of production to be anticipated from entry of Hungary into the European Union. In the European Union the products of dairy production are among the most strictly price-regulated of those of all branches of production, market mechanisms being less influential. A fact not insignificant from the aspect of the future of dairy production is that the degree of self-sufficiency with respect to milk and dairy products prevailing within the European Union is above 100%. Presumably dairy production in the central and eastern European countries intending to join the European Union will increase at a faster pace than the rise in the consumption of milk and dairy products likely to

accompany an improvement in the standard of living, which may result in a suppliers' market and fiercer competition. If the basis on which quotas are to be determined is the level of consumption at the time of the beginning of discussions, or the prevailing levels of production in Hungary, although the export opportunities open to Hungary would not be restricted subsequently, Hungary would clearly become the consumer market of the Union, or alternatively would be obliged to shoulder the penalties incurred for exceeding quotas (*Erdész et al.,* 1997).

On comparison of data for actual farms *Heinrich* (1996) pointed out the advantages of production in Hungary, summarising these as follows: the specific profit attained by a Hungarian farm site with a higher than average level of production (6500 kg) can be achieved by a farm in eastern Germany equipped with similar production technology only if approximately 1000 kg higher yield is accomplished.

In such circumstances the parallel investigation results derived from one German and one Hungarian dairy farm may arouse interest, although it should be pointed out that in a number of cases the drawing of comparisons between these two differing economic environments have given rise to difficulties.

MATERIALS AND METHODS

The model farms were constructed for the purposes of application of the TIPI-CAL simulation model. TIPI-CAL is a recursive dynamic, production simulation and accounting model, the farm-level modelling of which was developed at the Institute of Agricultural Economics of the German Federal Agricultural Research Centre (FAL, Braunschweig). In the development of the concept recourse was also made to several members of the staff of the AFPC (Agricultural & Food Policy Centre) network operating at the A&M University in Texas.

The model forms the base for the IFCN (International Farm Comparison Network), in which, on examination of typical farm reaction characteristic of a particular given region, the resulting data are used to attempt to provide an accurate image with respect to international competitiveness in dairy production in each country.

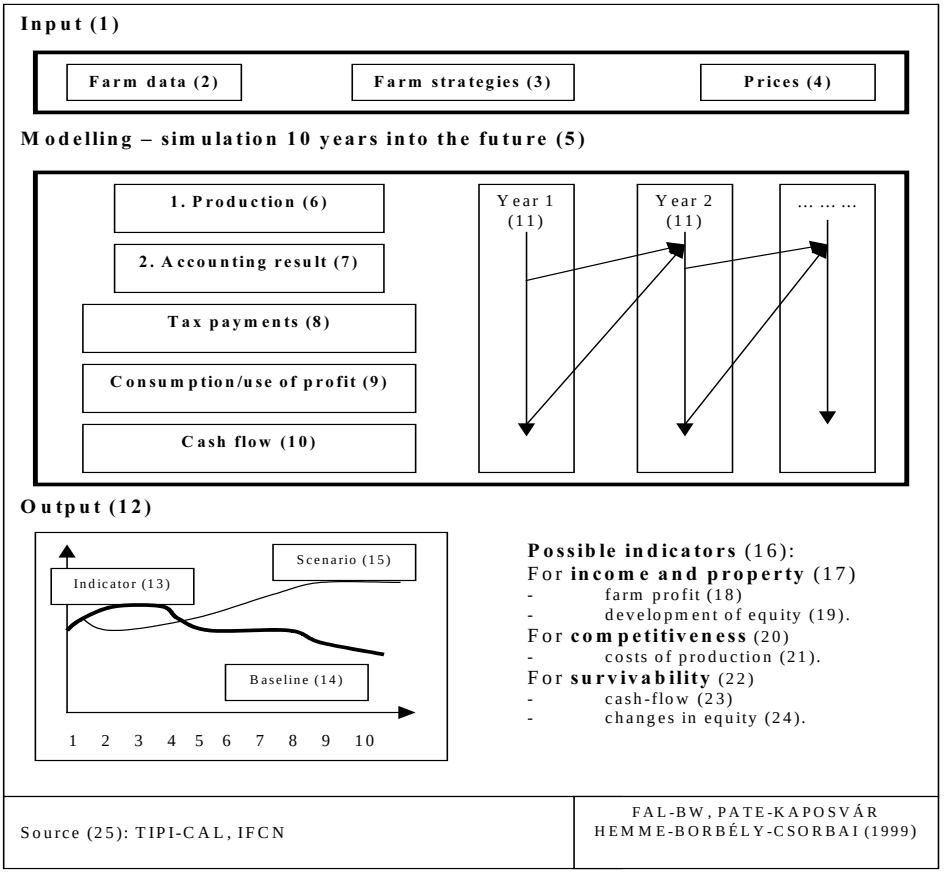
The model used in this study facilitates the detection of the effects of political measures and changes in the legislative environment on agricultural activity, these effects manifesting themselves primarily in the various strategies of farm management.

Outline of the model

The theoretical background for the functioning of the model is illustrated in *Figure 1*.

The model serves first and foremost to simulate agricultural production. At the end of the financial year balance sheets, profit and loss accounts and reports on cash flow are produced. The model also provides the facility for the results of taxation and profit sharing data to be displayed. A prognosis for the ten years to come is then formulated, the data for the close of one year constituting the starting data for the following year. Although this model includes, primarily with respect to the sum of indicators, an internal monitoring system, the results obtained are still influenced strongly by farm data and the correct setting of price-cost relations. Model input is divided into two parts: in the first, farm data and strategies are entered, while the second stage consists of the entering of prices and data on yield. In addition there also exists the facility for the economic and political conditions for any given country to be incorporated into the model.

Figure 1



1. ábra: Hogyan működik aTIPI-CAL modell?

Inputok(1), Üzemi adatok(2), Üzemi stratégiák(3), Árak(4), Modellkészítés és szimuláció 10 évre(5), Termelési eljárás(6), Könyvzárás(7), Adózás(8), Kifizetések(9), Cash-flow(10), Év(11), Outputok 1(12), Indikátor(13), Kiindulási helyzet(14), 1. szcenárió(15), Lehetséges indikátorok(16), Bevétel és vagyon esetén(17), Nyereség(18), Vagyon változás(19), Versenyképesség(20), Termelés költségei(21), Stabilitás(22), Cash-flow(23), Sajáttőke változás (24), Forrás(25)

Outline of the model farms

The most relevant data recorded for the typical 400-cow Hungarian dairy farm and the German 75-cow private farm for the period studied are summarised in *Table 1*.

Table 1

Data for the typical farms

		Hungary 400 cows (1)				**Germany 75 cows (2)**			
Farm data (3)		**1996**	**1997**	**1998**	**1999**	**1996**	**1997**	**1998**	**1999**
Number of dairy cows (4)		400	400	400	400	74	74	74	74
Milk production (5)	t/year	2134	2155	2177	2199	533	541	550	558
Land area (6)	ha	423	426	427	428	76	76	76	76
Prices in DEM excl. VAT (7)									
Milk price (8)	/100 kg FCM	35.4	42.2	47.1	47.5	55.7	56.0	56.0	55.7
Cull cow price (9)	/kg	1.4	1.5	1.6	1.6	1.9	1.9	1.9	1.9
Male calf price (10)	/head (22)	119	132	133	134	183	165	165	165
Land rent (11)	/ha	80	88	89	90	500	500	500	500
Labour costs (12)	/h (23)	2.0	2.2	2.3	2.3	25	26	26	27
Quota rent price (13)	/kg	-	-	-	-	0.12	0.18	0.18	0.18
Concentrates (14)	/t	410	416	420	427	275	310	304	303
Productivity (15)									
Labour productivity (16)	kg milk/h (24)	46	47	47	47	131	133	135	137
Land productivity (17)	t milk/ha (25)	5045	5059	5098	5137	7112	7219	7327	7437
Capital productivity (18)	DEM/Cow (26)	3815	4078	4347	4627	9692	9691	9873	10050
	DEM/t milk (27)	715	757	799	842	1344	1324	1329	1333
Milk yield (19)	kg FCM/year (28)	5335	5388	5442	5497	7209	7318	7427	7539
Dairy cow culling rate (20)	%	30%	30%	30%	30%	30%	30%	30%	30%
Source (21): TIPI-CAL, IFCN		BW-FAL, PATE-KAPOSVÁR HEMME-BORBÉLY-CSORBAI (1999)							

1. táblázat: A tipikus üzemmodellek adatai

400 tehenes magyar telep(1), 75 tehenes német telep(2), Üzemi adatok(3), Fejőstehenek száma(4), Tejtermelés(5), Földterület(6), Árak DEM-ben ÁFA(7), Tejár(8), Fejőstehén ára(9), Bikaborjak ára(10), Fölbérlet(11), Munkabér költsége(12), Tejkvóta bérleti díja(13), Tejelőtáp felhasználás(14), Termelékenység(15), Munkaerő (16), Termőföld(17), Tőke(18), Tej hozam(19), Selejtezési arány(20), Forrás(21), /szarvasmarha(22), /óra(23), kg tej/óra(24), t tej/ha(25), DEM/tehén(26), DEM/t tej(27), t FCM/év (28)

Assumptions for the calculations

The cost calculations are based on a dairy enterprise consisting of the following elements:

- milk production in the strict sense;
- the raising of replacement heifers;
- forage production for dairy cows and replacement

The analysis produces a comparison of returns and total costs per kg milk. Total costs consist on the one hand of expenses from the profit and loss account (cash costs, depreciation, etc.), and on the other hand of opportunity costs for farm-owned factors of production (family labour, own land, own capital). The estimation of these costs can lead to considerable errors, since the potential income of farm-owned factors of production in other uses is not normally known.

In performing the estimations and calculations the authors proceeded as follows.

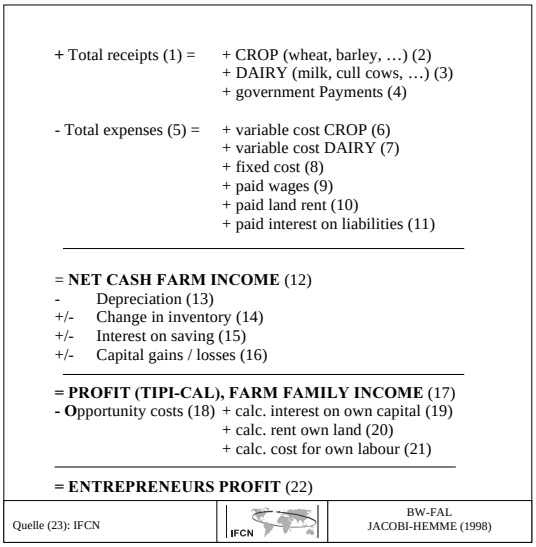
- Labour costs: For hired labour, actual labour costs incurred were recorded. For unpaid family labour, the average wage rate for a qualified full-time worker in that particular region was taken.
- Land costs: For rented land, actual rents paid by the farmers were used. For land owned by those working it, the regional rents supplied by the farmer were taken.
- Capital costs: For borrowed funds, a real interest rate of 6 per cent was used for both countries; for owner's capital, the real interest rate was estimated at 3 per cent.
- Quota cost: For rented or leased quota, rent values were used; purchased quota was valued at depreciation values from the profit and loss account.
- Depreciation: Machinery and buildings were written off on purchase prices.
- Fat content adjustment: All cost components and forage production are related to FCM (fat corrected milk with 4.0% fat).
- VAT adjustment: All cost components and returns are given without value added tax (VAT).

Definition of farm economic indicators in TIPI-CAL

The definition of farm economics indicators used is outlined in *Figure 2*.

Figure 2

Farm economic indicators



2. ábra: Az üzem ökonómiai mutatói

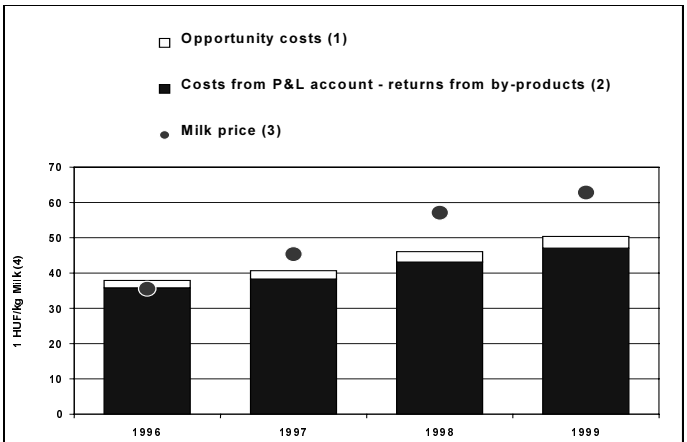
Összes árbevétel(1), Növénytermesztés (árpa, búza)(2), Tejtermelés (tej, selejttehén)(3), Állami támogatás(4), Összes kiadás(5), Növ. term. változó költségei(6), Tejterm. változó költségei(7), Állandó költségek(8), Vásárolt takarmány(9), Földbérleti díj(10), Hitelek kamatai(11), Üzemi eredmény(12), Amortizáció), Készlet változás(14), Betéti kamat(15), Vagyon növekedés/csökkenés(16), Családi bruttó jövedelem(17), Haszonáldozati költség(18), Saját tőke kamatai(19), Földbérlet(20), Saját munka(21), Vállalkozói nyereség(22), Forrás (23)

RESULTS AND DISCUSSION

High, but slightly decreasing inflation is prevalent in Hungary (1997 18%, 1998 14%). Therefore, economic analyses are difficult to perform, since projections depend very much on assumptions relating to macroeconomic statistics, such as inflation and interest rate. The past two years have seen output prices in nominal terms, particularly those for milk, rise more steeply than costs of production (*Figure 3*).

Figure 3

Dairy farming in Hungary, development of a typical Hungarian dairy farm, 1996-1999



Farm data (5)		1996	1997	1998	1999
Number of dairy cows (6)	no.	400	400	400	400
Milk production (7)	t	2134	2155	2177	2199
Prices in 100 HUF excl. VAT (8)					
Milk price (9)	/100kg FCM	36	45	57	63
Cull cow price (10)	/kg	1,4	1,7	1,9	2,1
Male calf price (11)	/head (21)	120	142	161	178
Land rent (12)	/ha	80	94	108	118
Labour costs (13)	/h	2,0	2,4	2,7	3,0
Concentrates (14)	/t	240	360	409	448
Income indicators (15)					
Family farm income (16)					
per farm (17)	1000HUF/farm	-434	24.107	38.852	42.604
per 100 kg milk FCM, HUF (18)		-0,2	11	18	19
Return on labour input (per h) (19)					
per total hours (20)	100 HUF/h	1	6	10	11

Source: TIPI-CAL calculations (22)

IFCN International Farm Comparison Network

FAL-BW, PATE-KAPOSVÁR HEMME-BORBÉLY (1998)

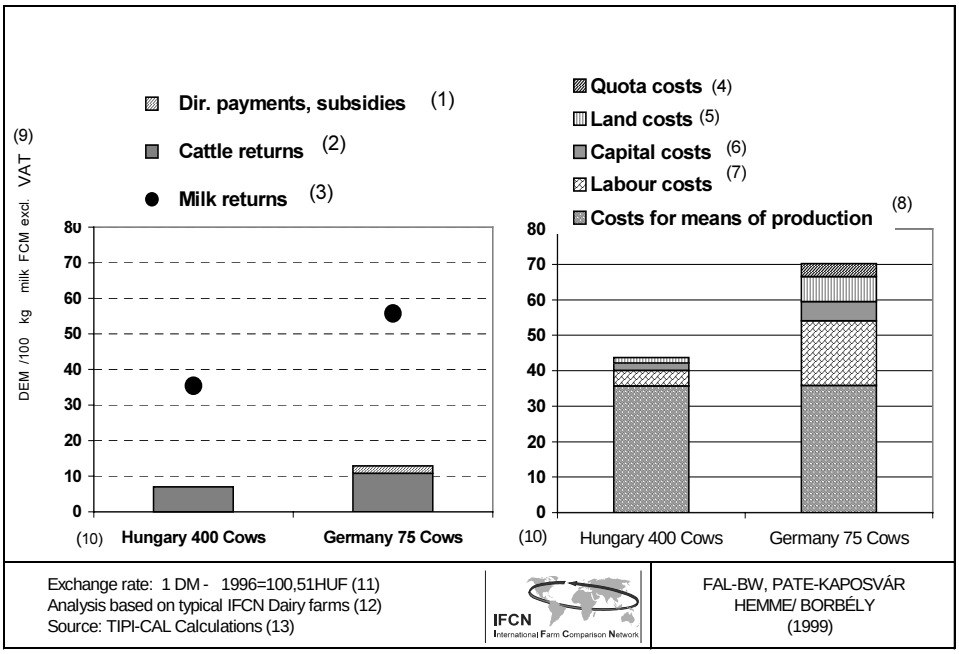
3. ábra: Tejtermelés Magyarországon, a tipikus magyar tejtermelő üzem fejlődése, 1996-1999

Haszonáldozati költség(1), Költségek az eredmény-kimutatásból – a melléktermékek árbevételei(2), Tejár(3), 1 HUF/kg FCM tej(4), Üzemi adatatok(5), Fejőstehenek száma(6), Tejtermelés(7), Árak 100 Forintban ÁFA nélkül(8), Tejár(9), Selejt tehén ára(10), Bikaborjú ára(11), Földbérlet(12), Munkabér(13), Tejelőtáp(14), Árbevétel mutatói(15), Családi bruttó jövedelem(16), /farm(17), /100 kg FCM(18), Munkaerő hatékonysága(19), /összes óra(20), /szarvasmarha(21), Forrás: TIPI-CAL számítás(22)

In comparison with a typical German 75-cow farm the 400-cow operation in Hungary has cost advantages in terms of land, labour and capital costs. This can be attributed to very low wages and reasonable levels of productivity (*Figure 4).*

Figure 4

Dairy farming in Hungary and Germany, comparison of typical farms, 1996



4. ábra: Tejtermelés Magyarországon és Németországban, tipikus üzemek összehasonlítása, 1996

Állami támogatások, kifizetések(1), Állatértékesítés(2), Tej árbevétel(3), Tejkvóta költség(4), Termőföld költség(5), Tőke költség(6), Munkaerő költsége(7), Termelés közvetlen költségei(8), DEM/100 kg FCM tej ÁFA nélkül(9), 400-as magyar tehenészeti telep, német 75 tehenes farm(10), Árfolyam(11), Az analízis tipikus IFCN üzemek adatain alapul(12), Forrás: TIPI-CAL számítás(13)

Disadvantages in Hungary include low output prices and high costs for energy and concentrates.

The potential of Hungarian milk production can be viewed from two aspects. On the one hand it is possible to reduce costs by improving dairy management (milk yield, concentrate use, mortality rates, etc.). On the other hand, in costs analysis depreciation and capital stock are underestimated due to inflation. Depreciation is calculated on the basis of purchase prices before inflation, and is therefore very low. Costs can be 20-40% higher for a dairy farm purchased at present.

In comparison to the German dairy farm the profitability of the established 400-cow dairy farm in Hungary appears highly favourable. Milk prices are rising more steeply than the inflation rate, increasing by 0.13 DEM/100 kg in the period 1996-1998.

Under the conditions given, for 1998 the typical farm in Hungary would attain a return on investment as high as the interest rate prevailing in Hungary (20%). The future prospects for this farm currently appear promising. Farmers who have bought or will buy a farm in the future incur far higher levels of depreciation and liability, and therefore lower profitability and higher risk.

In the long term Hungary appears a highly competitive milk producer on the European market. Investment in Hungary must be monitored for each individual case, and is highly dependent on the financial situation (i.e., liabilities / equities and interest rate) and the management skills of those engaged in dairy production.

CONCLUSIONS

The primary objective of this study, compiled within the framework of the IFCN, to place in parallel dairy farms typical of Germany and of Hungary, was to assess the international competitiveness of Hungarian dairy production.

Within this study, the results obtained provide a clear indication of the advantages and disadvantages of dairy production in Hungary on the scale of international comparison. The primary advantages are seen to be low wages and the low cost of agricultural land, which are likely to remain so after Hungary enters the European Union. This prognosis, negative for many, is based principally on experience gained in eastern Germany, where even years after reunification prices and costs have still not attained synchronisation, despite the fact that prices and wages have risen substantially in the east of the country.

With respect to the three factors of production, in two (land and labour) Hungary maintains a comparative advantage, but capital-related costs now approach very closely those prevailing in the European Union. Consideration of these aspects and the increases seen in purchase prices for raw milk gives cause for reflection on why capacity for profitability is so low in dairy production in Hungary. On the basis of the example given, a livestock feeding study may provide an answer to this. Although not reflected to its full extent in the data published here, very high feed costs had to be anticipated and calculated for at the Hungarian dairy farm. This was attributable primarily to the low nutrient content of concentrates, for which producers attempt to compensate by feeding large quantities of expensive feed specifically produced for lactating cows.

A further negative factor emerges in the form of the generally poor state of health of stocks of cattle, which, practically as a matter of course, entails the culling of dairy cows after two or three lactations, and also involves relatively high energy costs.

Comparison of the German farm with the Hungarian one provides an image of the reserves latent in Hungarian dairy production, a proportion of which could be turned to advantage in the light of a new approach. Exploitation of such reserves would on the one hand increase capacity for profitability in this branch of production, while on the other hand potentially leading to a slight deceleration in the continuous rise in consumer prices for milk, all of which could result in an increase in the international competitiveness of dairy production in Hungary.

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