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## RESTRUCTURING AND COMPETITIVENESS OF DAIRY PRODUCTION IN SLOVENIA REŠTRUKTURALIZÁCIA A KONKURENCIESCHOPNOSŤ SLOVINSKÉHO MLIEKARSTVA

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This paper analyses market developments in the Slovenian dairy sector focusing on market restructuring, milk quality improvements and competitiveness of milk production. The dairy markets and dairy processing in Slovenia have undergone structural adjustment changes and harmonisation of quality standards towards the European Union (EU) standards with implications for domestic dairy markets. Slovenia has remained a net exporter of dairy products. With the introduction of comparable EU quality standards the share of marketed milk production and the quality of purchased milk have increased substantially. The relatively low yield per cow has increased, because cow milk production is concentrated towards more efficient family farms. A shift in milk production from family household's subsistence needs towards more productive and efficient larger family farms specialized in milk production has caused a greater commercialisation and concentration of cow milk farms with a reallocation of existing factors in the pre-existing dairy sector.

**Key words:** dairy, restructuring, competitiveness, quality improvements

The dairy cow sector in Slovenia has been traditionally considered as a key agricultural sector. This crucial role of the dairy cow sector has been determined by both the subsistence nature of production on family farms in the past and later its important role for cash inflows in the family farms with the milk production commercialisation. The dairy products has been sold on domestic market and exported particularly on a traditional former Yugoslav markets. In spite of a fact that some trade diversion effects have occurred on these markets after the collapse of the former Yugoslavia, Slovenia has remained a net exporter of dairy products.

The dairy markets and dairy processing in Slovenia have undergone substantial adjustment changes and harmonisation of quality standards towards the European Union (EU) standards. During these adjustment and harmonisation processes, the Slovenian dairy sector has experienced considerable structural changes with implications for domestic dairy markets. Similar to Poland and the other former Yugoslav countries, also in Slovenia the majority of small-scale agricultural households have been traditionally engaged in milk production for subsistence needs of family members. With transition to a market economy liberalization of domestic markets, part-time and subsistence farming have deteriorated in their importance. Domestic dairy production in the past has been protected, which caused the lower level of international competitiveness and the lower degree of international trade integration (e.g. Bojnec, 1999; 2001). Nominal and effective protection rates for dairy products have been relatively high, while international competitiveness measured by domestic resource costs indicated a lack of international competitiveness. Trade liberalization and the process of integration of Slovenia into EU induced pressures for restructuring with exit of less viable and efficient dairy cow farms. With the introduction of the comparable EU quality standards the purchased cow milk of higher quality has increased substantially. With the exit of traditional, smaller family milk producers, the commercialisation and concentration of dairy farms have increased towards more productive and efficient larger family farms specialized in cow milk production.

Therefore, one considerable change observed during the most recent years, there is a shift in cow milk production from family household's subsistence needs towards a greater specialization and commercialisation of dairy cow family farms. The share of marketed cow milk production outside the family households has increased. With the increased quality requirement standards to comply with the EU requirements, a deeper market selection process among dairy family farms has been induced (Klopčič and Valjavec, 2001; Klopčič et al., 2001). The quality of cow milk delivered to dairies has increased. At the same time, considerable reallocations of existing production factors on dairy farms have occurred. We present material and methods that are used in this paper. After then we present evidence on market developments in the Slovenian dairy cow sector focusing on restructuring, quality improvements and competitiveness to provide discussion on lessons learned and policy implications.

### Material and methods

The Policy Analysis Matrix (PAM) is often used approach to estimate protection, policy transfers and competitiveness on a certain market. The PAM compares revenues, costs of traded intermediary inputs, costs of non-traded intermediary inputs and primary domestic resources (land, labour, and capital), and profitability (the difference between the revenue and all costs) at private (domestic) and economic (social) prices (Monke and Pearson, 1989). The PAM structure, indicators of profitability at private (domestic) prices and economic (shadow or social) prices, measures of protection and competitiveness are described in Table 1.

The level of protection is presented on the basis of nominal protection rate (NPR) and effective protection rate (EPR), while efficiency and international competitiveness on the basis of domestic resource costs (DRC) measure. NPR greater than zero (0%) indicates implicit nominal protection or subsidy by producers, and implicit nominal tax, when NPR is less than 0%.

**Table 1** Policy Analysis Matrix (PAM), indicators of profitability, protection, and efficiency

	Revenue (1)	Traded intermediary costs (2)	Primary domestic resource costs (3)	Profitability (4)
Private (domestic) prices (5)	A	B	C	D = A - B - C
Economic (shadow) prices (6)	E	F	G	H = E - F - G
Policy transfers (7)	I = A - E	J = B - F	K = C - G	L = D - H = I - J - K
Private profitability (8)				D = A - B - C
Economic profitability (9)				H = E - F - G
Transfers to output (10)				I = A - E
Transfers to traded intermediary inputs (11)				J = B - F
Transfers to primary domestic resources (12)				K = C - G
Net transfers (13)				L = D - H = I - J - K
Nominal protection rate (NPR) (14)				NPR = [(A / E) - 1]*100
Effective protection rate (EPR) (15)				EPR = [((A-B)/(E-F)) - 1]*100
Social cost-benefit ratio (SCBR) (16)				SCBR = (F+G)/E
Domestic resource cost (DRC) (17)				DRC = G/(E-F)
Private cost ratio (PCR) (18)				PCR = C/(A-B) or G/(A-B)

Sources/Zdroj: Monke and Pearson, 1989; Tsakos, 1990; Bojnec, 2001

**Tabulka 1** Matica analýzy politík (PAM), indikátory rentability, ochrany a efektivity

(1) výnosy, (2) obchodné prechodné náklady, (3) primárne náklady na domáce zdroje, (4) ziskovosť, (5) súkromné (domáce) ceny, (6) ekonomické (tieňové) ceny, (7) transfery, (8) súkromná rentabilita, (9) ekonomická rentabilita, (10) transfery výstupu, (11) transfery obchodovateľným prechodným vstupom, (12) transfery primárnym domácim zdrojom, (13) čisté transfery, (14) nominálna miera ochrany, (15) miera efektívnej ochrany, (16) ukazovateľ prínosov sociálnych nákladov, (17) náklady domácich zdrojov, (18) ukazovateľ súkromných nákladov

EPR greater than 0% implies effective protection of value-added by producers, and effective taxation of value added by producers, when EPR is less than 0%. When DRC is less than 1, but greater than 0, this implies internationally competitive production. On the contrary, DRC greater than 1 implies that a certain product is not competitive internationally. Moreover, when DRC is less than 0, this implies very unprofitable, internationally loss-making activity.

The degree of external integration is measured by intra-industry trade (IIT). Similar product is often exported and imported at the same time. Trade in the same product group is in literature known as IIT in comparison with inter-industry trade. The weighted Grubel-Lloyd (1975) index of intra-industry trade (GLIIT) is defined:

$$GLIIT_i = \left( 1 - \frac{\sum_j |X_{ij} - M_{ij}|}{\sum_j (X_{ij} + M_{ij})} \right) \cdot 100$$

where  $X_{ij}$  and  $M_{ij}$  are values of exports and imports respectively of a five-digit Standard International Trade Classification (SITC) product  $j$  of two-digit SITC product group  $i$ . GLIIT is defined between 0 and 1 (or between 0% and 100%). GLIIT is equal 0 when all trade inside product group  $i$  is inter-industry type (for example, only exports or only imports). GLIIT is equal 1 (100%) when all trade inside product group  $i$  is intra-industry type (for example, exports is equal imports).

The quality of traded products and the quality differences in IIT are assessed by the use of unit value of exports to unit value of imports. The export f.o.b. unit value ( $UVX_{ij}$ ) and the import c.i.f. unit value ( $UVMM_{ij}$ ) are derived on the basis of export (import) values and export (import) quantities of a given five-digit SITC product  $j$  of two-digit SITC product group  $i$ . The ratio of the export to import unit values per tone ( $IATT_{ij}$ ) for a particular product  $j$  at the five-digit SITC level in the two-digit SITC group  $i$  is defined as:

$$IATT_{ij} = \frac{UVX_{ij}}{UVMM_{ij}}$$

The weighted unit values of matched exports ( $UVMX_i$ ) and the weighted unit values of matched imports ( $UVMM_i$ ) at the two-digit SITC product group  $i$  are defined as:

$$UVMX_i = \sum_j UVMX_{ij} \left( \frac{LIIT_{ij}}{LIIT_i} \right)$$

where the weight is the level of IIT of product  $j$  in group  $i$  ( $LIIT_{ij}$ ) in total level of IIT of product group  $i$  ( $LIIT_i$ ). The ratio between the  $UVMX_i$  and  $UVMM_i$  is defined as:

$$UVMM_i = \sum_j UVMM_{ij} \left( \frac{LIIT_{ij}}{LIIT_i} \right)$$

which is an indicator of the relative quality of exports vis-à-vis imports (e.g. FAO, 1999)? A ratio, which is greater than one indicates that matched export is more expensive (of higher quality) than matched import, but vice versa, when the ratio is less than one. Export-to-import price ratio close to one indicates that export price is equal to import price of a similar product, which suggests that there is no substantial quality difference between exported and imported product.

## Results and discussion

We first present farm-gate milk prices and competitiveness in dairy products in Slovenia. Milk prices at farm gate level (milk collection centres) in current nominal Slovenian tolar (SIT) terms increased up to 2002, when in Slovenia was recorded the maximum level of cow's milk production. However, in current nominal Euro terms the highest average cow's milk price was already achieved in 2001. Since then we can see the decline in the average cow's milk price in current nominal Euro terms. The

**Table 2** Farm-gate prices of cow's milk in Slovenia

Years (1)	Average price of cow's milk (SIT per unit of measure) (2)	Exchange rate SITs for 1 Euro (3)	Average price of cow's milk (Euro per unit of measure) (4)
1989	544	3.2266	169
1990	3,485	14.3895	242
1991	6,304	34.0177	185
1992	20,965	105.0788	200
1993	27,684	132.2802	209
1994	36,227	152.3622	238
1995	39,335	153.1177	257
1996	42,016	169.5098	248
1997	48,077	180.3985	267
1998	54,443	186.2659	292
1999	56,169	193.6253	290
2000	59,490	205.0316	290
2001	64,840	217.1851	299
2002	65,560	226.2237	290
2003	66,100	233.7045	283
2004	65,500	238.8615	274
2005	65,000	239.6371	271

Note: In 1990, the denomination of the former Yugoslav dinar for four zeros was carried out. The unit of measure for milk is per 1000 litres

Sources: Statistical Office of the Republic of Slovenia for average prices, and Bank of Slovenia, Monthly Bulletin, for the exchange rate Slovenian tolar (SIT) for 1 Euro

**Tabulka 2** Ceny kravského mlieka pri výstupe z poľnohospodárskej prevádzky (farm-gate) v Slovinsku

(1) roky, (2) priemerná cena kravského mlieka (slovinský tolar na mernú jednotku), (3) výmenný kurz slovinského toliara (SIT) k Euro, (4) priemerná cena kravského mlieka (Euro na mernú jednotku)

**Table 3** Indicators of protection, policy transfers and international competitiveness in Slovenia

Years (2)	Producer Subsidy Equivalents (PSE in %) <sup>1/</sup> (1)								Domestic Resource Costs (DRC) (4)			
	1992	1993	1994	1995	1996	1997	1998	1999				
Milk (3)	48	46	50	48	42	47	59	55				
Years (2)	Nominal and Effective Protection Rates (3)								Domestic Resource Costs (DRC) (4)			
	NPR in %				EPR in %							
Years (2)	1995 <sup>2/</sup>	1995 <sup>3/</sup>	1997 <sup>3/</sup>	1998 <sup>4/</sup>	1995 <sup>2/</sup>	1995 <sup>3/</sup>	1997 <sup>3/</sup>	1998 <sup>4/</sup>	1995 <sup>2/</sup>	1995 <sup>3/</sup>	1997 <sup>3/</sup>	1998 <sup>4/</sup>
Milk (3)	143	30	29	63	–	34	32	95	–	1.05	1.09	1.37

Sources/Zdroj: <sup>1/</sup> OECD, 2001; <sup>2/</sup> Bojnec, 1999 and 2001; <sup>3/</sup> Kavcic, 1998; <sup>4/</sup> Kuhar, 1999

**Tabulka 3** Ukazovatele ochrany, transferov politík a medzinárodnej konkurencieschopnosti v Slovinsku

(1) ekvivalent produkčných subvencií (PSE v %), (2) roky, (3) mlieko, (4) miery nominálnej a efektívnej ochrany, (5) náklady na domáce zdroje

decline is a slightly faster in a case that current nominal Euro prices are deflated by the consumer price index for the Euro zone. The entry of Slovenia into the EU led to further milk price declines. However, according to most recent evidence, there has been an increase in cow's milk price in 2007 and 2008 both at the farm-gate and at the consumer levels caused by an inverse whether conditions and lack of competition in dairy processing and marketing chains. During these two years Slovenia has also replaced SIT by Euro.

In comparison with the EU prices, milk prices in Slovenia were initially less than in EU, and since 1998 they have been approaching or even slightly exceeding the EU levels (EU-Commission, 2002). It is worth mentioning that unlike in other Central and Eastern European transition countries, Slovenian agricultural and food prices in several cases were above the relevant EU levels during the second half of the 1990s.

The international competitiveness for cow milk in Slovenia is constraint by high production costs that are caused by less

favourable natural conditions and relatively small-scale farm structures. Prior to the EU accession, domestic cow milk production was shield by the protection measures and government transfers. This is revealed by high nominal protection rates and even higher effective protection rates as well as by high producer subsidy equivalents (PSEs) (OECD, 2001 and Table 3). The significant share of value for milk producers was delivered via the government transfers. The product is competitive internationally when the DRC measure is between less than 1 and greater than zero. Unfavourable natural conditions, lower efficiency of small-size individual private farms, and high costs of domestic resources and non-tradable services are the most important constraints impeding competitiveness at international economic conditions.

The calculations of the GLIIT indexes revealed initial relatively low level of integration of Slovenian agricultural and food products in international trade (FAO, 1999; Bojnec and



**Table 4** The share of domestic production in domestic consumption in % in Slovenia

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Milk(1)	121	111	114	115	115	113	120	122	120	119	117	119	117

Sources: OECD (2001), and Agricultural Institute of Slovenia (2006)

**Tabulka 4** Podiel domácej produkcie v domácej spotrebe Slovinska v % (1) mlieko**Table 5** Cow's milk production and its quality in Slovenia

	1995	2000	2001	2002	2003	2004	2005	2006
Number of cows and heifers in calf (1)	241 737	205 306	200 030	206 858	197 912	193 865	188 456	185 844
Number of milk cows at the end of the year (2)	147 608*	140 236	135 805	139 980	130 711	134 009	–	–
Yield in litres per cow (3)	3 681*	4 224	4 520	5 202	4 589	4 821	–	–
Net production of cow's milk – total (1 000 l) (4)	589 985	629 736	633 820	706 446	642 380	631 456	639 836	623 555
Cow's milk collected by dairies (1000 l) (5)	388 400	440 676	458 996	473 479	484 180	488 683	493 535	496 133
Quality of purchased milk (6):								
– average percent of fats (7)	3.93	4.10	4.12	4.13	4.14	4.16	4.15	4.08
– average percent of proteins (8)	3.24	3.36	3.34	3.33	3.34	3.36	3.36	3.31
– bacteriological class extra in % (9)	61.50	85.71	90.46	90.78	91.75	92.96	93.72	90.15
– bacteriological class 1 in % (10)	17.12	9.45	6.24	6.38	6.35	5.62	4.79	7.63

\* 1997 data

Slovenian Dairy Association, Volk and Zagorc (2005) and SORS (2007)

**Tabulka 5** Produkcia kravského mlieka v Slovinsku a jeho kvalita

(1) počet kráv a telných jalovic, (2) počet mliekových kráv na konci roka, (3) výnos v litroch na kravu, (4) čistá produkcia kravského mlieka – celkovo (1 000 l), (5) kravské mlieko zhromaždené v mliekarňach, (6) kvalita vykúpeného mlieka, (7) priemerné percento tuku, (8) priemerné percento proteínov, (9) bakteriologická 'extra' trieda, (10) bakteriologická prvá trieda

Hartmann, 2004; Majkovič et al., 2007). There are, however, differences by product categories and by geographical markets. The GLIIT indexes with the former Yugoslav republics are among the highest in spite of trade disintegration and barriers, which have been imposed on trade. The GLIIT indexes for dairy products and eggs (SITC 02) are relatively low. The traditional former Yugoslav markets have remained the most important destination for the Slovenian exports of dairy products. As expected, the level of integration with the EU markets is increasing with trade liberalization and EU membership. As most of trade in dairy products with the EU is still inter-industry type, reallocation of factors and restructuring of dairy industry has occurred upon the EU accession. One-way trade flows in dairy products are even more often seen with the rest of the world. Liberalization of trade and the EU accession have caused an additional adjustments and restructurings in the Slovenian dairy sector.

Export-to-import price ratio of a similar product implies similarity and quality differences between exported and imported product. For dairy and eggs (SITC 02) the ratio increased from less than 1 (0.778 in 1992) to more than 1 (1.009 in 1995), and declined again at less than 1 (0.719 in 1999). With the EU-15, the ratio was low initially (less than 0.6 in 1992), but increased after then (1.175 in 1995), with the decline to less than 1 since 1996. Since 1995, Slovenia has exported to the EU-15 cheaper products than imported and thus the decline or stagnation in terms-of-trade has been identified with the EU-15 also later (Bojnc and Fertő, 2007a and 2007b). The ratio of export-to-import price for dairy does not reveal improvements in quality of exported vis-à-vis imported similar products. This suggests that additional efforts are needed in order to further increase quality of exports and quality of production towards the increasing competitive pressures arising from trade liberalisation and adjustments on

the business conditions in the SEM. However, the surplus in milk production in Slovenia has continued (Table 4). The largest surplus occurred in 1999. The milk surplus has largely been exported in the neighbouring Italy and Croatia as well as to other countries on the territory of the former Yugoslavia.

The number of cows and heifers in Slovenia has declined steadily during the last two decades. The decline is also recorded for the number of milk cows (Table 5). However, on the other hand, cow's milk production has increased up to the year 2002 clearly indicating the increase in the yield of milk per cow. The decline in cow's milk production and its stabilization after 2002 can be explained by adjustments of the Slovenian dairy sector on the membership in the EU and on stronger competition in the Single European Market (SEM). In spite of the fact that net cow's milk production in Slovenia has declined since 2002, the cow's milk collected by dairies has increased. This implies an ongoing process of the dairy farm restructuring by the exit of small farms that were not able to comply with an increased quality standards and requirements as well as not being anymore cost and price competitive. Clearly, there has been the rapid increase in the bacteriological class extra from 61.5 percent in 1995 to 85.7 percent in 2000 and further up to 93.7 percent in 2005. On the other hand, the bacteriological class 1 has been reduced rapidly from 17.1 percent in 1995 to 9.5 percent in 2000 and 4.8 percent in 2005. This indicates the significant increase in quality of purchased cow milk. The average milk fat for the cow milk delivered to dairies in Slovenia is around 4.1 percent and the average protein content is around 3.3 percent.

Although in Slovenia the dairy farm concentration and specialization is an ongoing process, milk production is still on different farm structures. The implementation of the CAP-15 in Slovenia has even resulted in farm and dairy farm de-concentration as both the total number of farms and dairy farms, respectively, have increased between the pre- and

**Table 6** Milk quotas, direct payments and intervention prices for Slovenia, 2004–2007

	2004/05	2005/06	2006/07	2007/08
Milk quota (000 tones) (1)	560,424	560,424	576,638	576,638
Direct premium payments (Euro/tonne) (2)	6.9 (8.15)	14.7 (16.31)	– (24.49)	– (24.49)
Envelope for additional payments (000 Euro) (3)	2,051	4,114	6,170	6,170
Additional payment (Euro/tonne) considering envelope and quota for Slovenia (4)	3.7 (3.66)	7.3 (7.34)	– (10.70)	– (10.70)
Intervention price (Euro/tonne) (5):				
– butter (6)	3,282.00	3,117.90	2,953.80	2,789.70
– skimmed milk in powder (7)	2,055.20	1,952.40	1,849.70	1,746.90

Note: In the parenthesis are full amount payments in the EU-15  
Source/Zdroj: Volk and Zagorc, 2005

**Tabulka 6** Mliečne kvóty, priame platby a intervenčné ceny pre Slovinsko, 2004–2005

(1) mliečna kvóta, (2) priame prémie platby, (3) finančná obálka pre dodatkové platby, (4) dodatkové platby s ohľadom na obálku a kvótu pre Slovinsko, (5) intervenčná cena, (6) maslo, (7) odtučnené mlieko v prášku

after-entry of Slovenia into the EU. Therefore, so far the entry of Slovenia into the EU has not resulted neither in farm decline nor in farm size increases. The major farm restructuring in Slovenia had been achieved before the entry of Slovenia into the EU and before full adjustment of the Slovenian agricultural policies to the CAP of the EU-15. With the entry of Slovenia into the EU, in the market year 2004/05, Slovenia has begun with the implementation of the CAP policies for milk by the introduction of the milk quota system, direct payments and intervention prices for the period 2004–2007 (Table 6). Since 2004/05, farmers in Slovenia have been eligible for direct payments (base premium and additional payments) with the quota system in an amount of around 10.60 Euro/tonne. Whereas intervention price for butter and skimmed milk in powder have been gradually reduced, direct payments to farmers have increased.

The empirical results have confirmed an ongoing process of restructuring of cow milk production in Slovenia. Quality of cow milk has improved considerably since the EU quality standards have been implemented. The Slovenian agricultural and dairy sector policies have been adjusted to the CAP of the EU-15. Dairy production in Slovenia in the past has been protected, which caused the lower level of international competitiveness. Nominal and effective protection rates for dairy products have been relatively high, while international competitiveness measured by domestic resource costs indicated a lack of international competitiveness. With the introduction of comparable EU quality standards the purchased milk of higher quality has increased substantially. An increase is also recorded in the relatively low yield per cow, whereas cow milk production has been concentrated towards more efficient family farms. Some small producers, particularly during the pre-accession period, stopped with milk production. With the exit of traditional, smaller family milk producers, the commercialisation and concentration of cow milk farms have increased towards more productive and efficient larger family farms specialized in milk production. A shift in milk production from family household's subsistence needs towards greater commercialisation of farms have occurred and the share of marketed production outside the family households increased.

Therefore, similar to some other new member states of the EU, Slovenia has made substantial quality improvements in cow milk production. The ongoing process of market selection, concentration and rationalisation of production is an outcome of the increasing competitive pressures and the EU membership. With the Slovenian gradual adjustment of agricultural policy to the CAP of the EU-15, there is no considerable difference in the level of agricultural protection between Slovenia and the EU-15. Since 2004, agricultural policy and particularly

budgetary measures in Slovenia have been applied to make agricultural policy comparable with the CAP of the EU-15, which has not be the case for other new member states of the EU. With the Slovenian membership in the EU, imports of dairy products have increased and some decline in exports of dairy products occurred. However, Slovenia has remained the net exporter of milk and dairy products, particularly for some niche products, but the Slovenian dairy sector is challenged by the foreign competitors to keep the market shares on domestic markets and to increase exports to the EU markets.

## Súhrn

Príspevok analyzuje vývin trhu v oblasti slovinského mliekarstva so zameraním na reštrukturalizáciu, zlepšenie konkurencieschopnosti a kvality mlieka. Mliekarský trh a výroba v Slovinsku prešli zmenami, ktoré zabezpečili štruktúrne prispôsobenie a harmonizáciu s kvalitatívnymi štandardami v Európskej únii, implikovanými na domáci mliekarský trh. Slovinsko zostalo čistým exportérom mliečnych výrobkov. So zavedením kvalitatívnych štandardov, ktoré sú porovnateľné s Európskou úniou, za značne zvýšil pomer mliekarskej produkcie umiestnenej na trhu a kvalita vykupovaného mlieka. Zvýšila sa relatívne nízka dojivosť, keďže produkcia dojníc sa zamerala najmä na produktívnejšie rodinné farmy. Posun mliekarskej výroby od tej, ktorá zabezpečovala len rodinné potreby k produktívnejším a väčším rodinným farmám, špecializovaným na produkciu mlieka mal za následok vyššiu komercializáciu a koncentráciu fariem dojníc s prerozdelením existujúcich faktorov v jestvujúcom mliekarskom sektore.

**Kľúčové slová:** mliekarstvo, reštrukturalizácia, konkurencieschopnosť, zlepšenie kvality

## References

- Agricultural Institute of Slovenia. 2006. Market Balances and Report on Agriculture, Food and Forestry. Ljubljana: Agricultural Institute of Slovenia and Ministry of Agriculture, Forestry and Food.
- BOJNEC, Š. 1999. The Competitiveness of Slovenian Farms and Food Processing Activities, In: Agrarwirtschaft, vol. 48, 1999, no. 8/9, p. 295–303.
- BOJNEC, Š. 2001. Agro-food Competitiveness in Slovenia: The Policy Analysis Matrix Approach, In: Bulgarian Journal of Agricultural Science, vol. 7, 2001, no. 4–5, p. 351–364.

- BOJNEC, Š. – HARTMANN, M. 2004. Agricultural and Food Trade in Central and Eastern Europe: The Case of Slovenian Intra-Industry Trade, IAMO Discussion Paper, Halle (Saale): Institute of Agricultural Development in Central and Eastern Europe (IAMO).
- BOJNEC, Š. – FERTŐ, I. 2007a. Hungarian and Slovenian Agro-Food Trade with Three Main European Union Partners, In: Journal of Economics, vol. 55, 2007, no. 4, p. 345–358.
- BOJNEC, Š. – FERTŐ, I. 2007b. The Catching-up Process of European Enlargement: Hungarian and Slovenian Agricultural, Food and Forestry Trade, In: Eastern European Economics, vol. 45, 2007, no. 5, p. 5–34.
- EU-Commission. 2002. Agricultural Situation in the Candidate Countries: Country Report on Slovenia, Brussels: European Commission, Directorate-General for Agriculture.
- FAO. 1999. Project TCP/SVN/6713(A) on Policy Options for Slovenian Agriculture in an EU Accession Environment, Ministry for Agriculture, Forestry and Food and Food and Agricultural Organisation of the United Nations, Ljubljana and Rome.
- GRUBEL, H.G. – LLOYD, P. J. 1975. Intra-Industry Trade: The Theory and Measurement of International Trade in Differentiated Products. London : MacMillan.
- KAVČIČ, S. 1998. Economic Aspects of Slovene Livestock Production in Changing Environment. In: Research Reports of Biotechnical Faculty University of Ljubljana – Agriculture, Supplement, vol. 30, 1998, p. 75–81.
- KLOPČIČ, M. – OSTERC, J. – VALJAVEC, I. – PODGORŠEK, P. 2001. Primerjava mlečnosti in sestave mleka pri kravah v kontroli z odkupljenim mlekom v Sloveniji, In: Sodobno kmetijstvo, vol. 34, 2001, no. 7–8, p. 311–314.
- KLOPČIČ, M. – VALJAVEC, I. 2001. Količine, kakovost ter odkupne cene mleka v Sloveniji, v EU in v svetu. In: Sodobno kmetijstvo, vol. 34, 2001, no. 7–8, p. 348–355.
- Kuhar, A. 1999. Application of the Policy Analysis Matrix to four agricultural production systems in Slovenia, Research Report, Wye College – University of London, 1999, 16 p.
- MAJKOVIČ, D. – BOJNEC, Š. – TURK, J. 2007. Development of New Members' EU Trade: Evidence from the Slovenian Food Sector. In: Post-communist Economies, vol. 19, 2007, no. 2, p. 209–223.
- MONKE, E. A. – PEARSON, S. R. 1989. The Policy Analysis Matrix for Agricultural Development. Ithaca and London : Cornell University Press, 1989.
- OECD. 2001. Review of Agricultural Policies: Slovenia. Paris : Organisation for Economic Co-operation and Development, 2001.
- SORS. 2007. Statistical Yearbook of Slovenia. Ljubljana : Statistical Office of the Republic of Slovenia, 2007.
- TSAKOK, I. 1990. Agricultural Price Policy: A Practitioner's Guide to Partial-Equilibrium Analysis. Ithaca : Cornell University Press, 1990.
- VOLK, T. – ZAGORC, B. 2005. Ocena stanja v slovenskem kmetijstvu v letu 2004: Pregled po kmetijskih trgih. Ljubljana : Agricultural Institute of Slovenia, 2005.

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## THE IMPACT OF FIXED ASSETS ON POLISH AGRICULTURAL PRODUCTION VPLYV DLHODOBÉHO HMOTNÉHO MAJETKU NA POĽSKÚ POĽNOHOSPODÁRSKU PRODUKCIU

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The power function was used to show the dependence of gross, final and sold output on the gross value of total fixed assets and on the ratios of this value to the productivity of these three production categories. Further elaboration included the characteristics of variable features. The system of independent variables employed in the study allowed for the estimation of both extensive and intensive utilisation of fixed assets in Polish agriculture from 2002–2005. The study showed the diminishing impact of the productivity of fixed assets and the decreasing productive efficiency of Polish agriculture from 2002–2005. This situation was caused by the relative stability in the generic structure of fixed assets and by a slow average annual rate of increase in new fixed assets (8.74 %).

**Key words:** production, productivity, impact, extensive and intensive utilisation of fixed assets

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This paper examines the potential of fixed assets on Polish agriculture during the period 2002–2005. Poland's accession to the EU (Lissitsa and Balmann, 2003) in May 2004 induced several changes in Polish agricultural development. This study reveals the extent of these changes on the utilisation of fixed assets in agricultural production.

The potential of fixed assets includes information on their quantitative and qualitative impact as well as their utilisation. This makes it possible to use a conventional system of interpretation to explain changes in the quantitative and qualitative impact of fixed assets in determining the comparative levels of gross, final and sold output in Polish agriculture from 2002–2005.

### Material and methods

The power function was the basic method of deriving the functional model<sup>1/</sup> showing the dependence of gross, final

<sup>1/</sup> Verification of the lowest squares assumptions method was conducted basing on the rests being estimations of random components in econometric model. The survey of random deviations attributes was conducted using tests. Random surveying-test of numbers series. Normality survey-test of Shapiro-Wilk. Auto-correlation survey-test of Durbin-Watson. Survey of homoscedastity-test Goldfeld-Quandt.