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TRENDS IN CONSUMPTION OF MILK AND DAIRY PRODUCTS IN SLOVAKIA AFTER EU ACCESSION

In the paper are evaluated changes and development in consumption of milk and dairy products in recent years from accession of Slovakia to the European Union in 2004. Consumption of milk and dairy products in Slovakia lags far behind countries of the former EU-15. Consumption of these products in the value milk free butter was 158.6 kg in 2012. Compared with ODP, dairy consumption 220 kg in 2012 was of 61.4 kg less and considering its importance is nutritionally unfavorable. Particularly unfavorable was consumption of drinking milk, which ensured recommended amount of food only at 60%. Only the consumption of cheese and curd was at the level of given recommended amount 10.1 kg.

Key words: *Income, Consumer Prices of Dairy Products, Consumption of Dairy Products, Income and Price Elasticity of Demand.*

Introduction

Recently, in the process of economic reforms and the ongoing economic crisis, is to increase public interest in professional practice and the analysis of consumer behavior, particularly in relation to changes in real prices and income levels of the population. Quality, quantity and price level of goods and services that cater to individual households depends on the level of income. Prices of purchased goods and services, along with other household expenses are the basis of household financial well-being. The purchasing power of many households currently does not allow to meet demand for food and other essential goods. Due to increasing energy prices, rents, medicines and other services, the households framed residual part of the domestic budget for providing nutrition. Existing numerous works and studies (Jurkovičová, J. 2005 Kubicová, L. 2013 Kleinová, K.-Kretter. A. 2011 and others) suggest that nutrition and overall food consumption in Slovak households do not correspond with a healthy lifestyle.

Aims and Methods

The main aim of the paper was to point at the trends in consumption of milk and dairy products
in Slovakia after EU accession. Food expenditures take the special place within the final household consumption. The growth of income marginal propensity expenditure on food declines until it reaches a point where energy consumption does not depend on income. More food consumption does not increase and may even decline to changes in objective conditions of consumption. Food costs are close to the relative saturation and on the effect of quality is a relative decline in spending and falls short of absolute saturation. (Grznár, M. 2004). Demand for goods and therefore also the foods which supply (consumption) comes close to saturation, respond to growth in income inelastically.

When processing the numerical material, this has been taken from the Slovak Statistical Office (COICOP), Commodity Reports RIAFE and information from the available literature, we have used correlation analysis, basic and chain indices and trend functions. Examining the development of indicators for the period of the time series was described by the average growth coefficient k ', linear and quadratic function.

Income elasticity of demand and the saturation limit of consumer demand for food products were analyzed by means of multiple linear regression function. The linear regression model demand for dairy products (qi) is based on relationships:

$$qi = f(P1, I) + ei$$

where: qi = demand for i - dairy product in kg per person per year
P1 = price of individual i-dairy products in Euro per kg
I = net cash income in Euro per person per year
ei = random, residual component

Evidence of the regression parameters and the suitability of the selected regression model was verified by using the index of determination R^2. The text is supplemented with tables and graphs with achieved results. Calculations and graphs were performed by using Microsoft Excel software.

Research Results and Discussion

Consuming of milk has a tradition in Slovakia. History of manufacturing of dairy products is here more than 100 years old. In 1989, Czechoslovakia consumed 260 kg of milk per person. In Czechoslovakia in 1989, there were 166 dairies which were centrally managed. After Slovakia joined the EU, was allocated milk quota for milk production, which was set at 1 115,6061,6 mil.kg in 2014/2015. During 17 years (1995-2012) had a trend of consumption of milk and dairy products per person downward trend, with the exception of cheese and curd and sour milk products, as illustrates Figure 1.

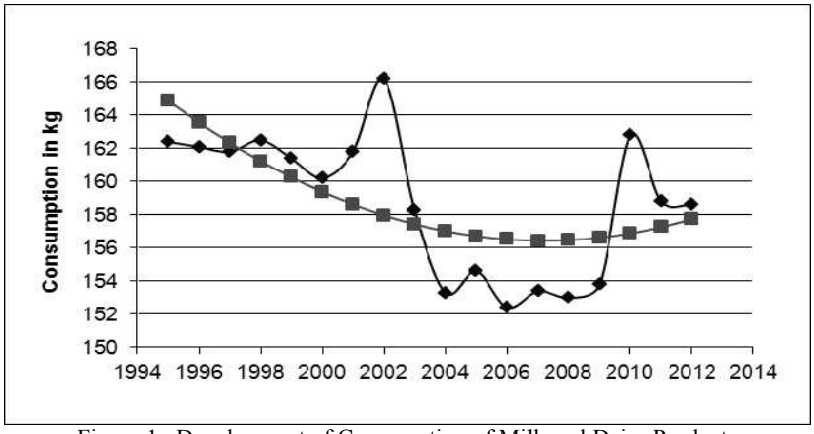

Figure 1 Development of Consumption of Milk and Dairy Products
Source: Statistical COICOP, own calculations

Development of milk consumption is marked by two different developmental stages. By 2000, consumption fell slightly, hovering at levels from 162.4 kg to 160.2 kg per person in 2002. After 2003 and 2004 there was a significant fall in consumption of milk and milk products to the level of 153.3 kg in 2004 and less fluctuation consumption is maintained at this level in the following years. Increase in consumption of milk and dairy products has been evident since 2010. Overall, based on the linear trend can be concluded that decreased consumption of milk and dairy products by an average of 0.998 kg per person per year. In the last 17 years, consumption of milk and dairy products noticed the average yearly decline of 0.838 kg per capita and thus consumption of milk and in 2012 dairy products achieved only 97.78% of the level of consumption compared to 1995. Given recommended amount of milk and dairy products is 220 kg per person and rational consumption zone is 206 to 240 kg per person, present development for milk consumption can be assessed as a low positive. In the consumption of milk, Slovakia significantly lags the other Member States, in particular the EU-15. In the last ten years there has been increasing concave course of the development of the consumption of milk and dairy products in particular with higher added value primarily to yogurt and cheese.

Previous development of consumption of milk and dairy products in Slovakia reflects a quadratic function with the parameters:

$$g_i = 166.318 - 1.496\ t + 0.0566\ t^2 \qquad R^2 = 0.616 \quad F_{(2,14)} = 4.362 \quad \alpha = 0.0277$$

Listed quadratic model of consumption of milk and dairy products is statistically significant at the significance level $\alpha = 0.027$ and test ($F_{(2,14)} = 4.362$).

Based on the concave course of the quadratic function parameters with a risk of error less than 5% (0.027), we are able to estimate the increase of consumption of milk and dairy products to the level of 158.2 kg per person in 2014.

In the structure of Slovak household, the expenditures on food and milk represent second most important item, right behind the expenditures for meat and meat products, and are involved in food expenditures in the range of 18.1 % to 19. 3% for each year As mentioned by Bielik and Hupková (2010), the share of total household

expenditures on food in the EU declined with income growth and now is this proportion from 10% to 35% of total consumer spending with the lowest share in the EU 15.

The downward trend in the total consumption of milk and dairy products account for most decline in consumption of drinking milk. Its usage declined every year with small fluctuations around the linear trend, in average per year is coefficient of growth of 1.8% (k '= 0.982) (Figure 2)

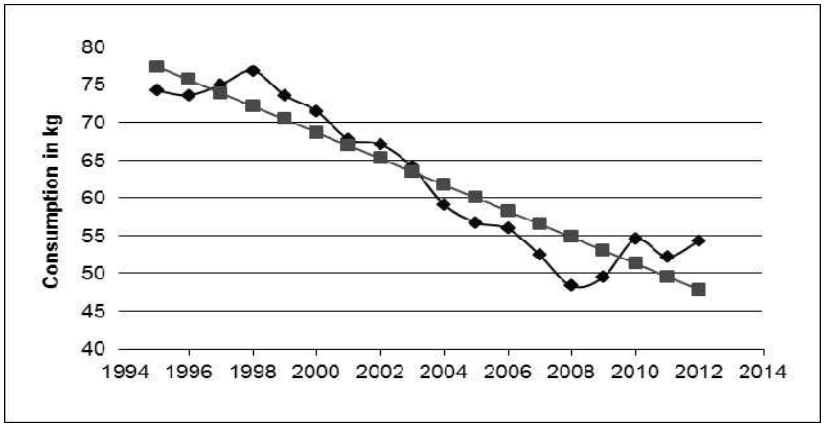

Figure 2. Development of Drinking Milk Consumption
Source: Statistical COICOP, own calculations

In 2012, compared with 1995, consumption of drinking milk decreased from 74.2 kg to 54.3 kg, and represented only 73.2% of the level of milk consumption in 1995. Development of drinking milk consumption in the period from 1995 to 2012 in Slovakia is characterized by a decreasing linear trend of development and is expressed as a function with parameters:

$$g_i = 79.09 - 1.74\,t \qquad R^2 = 0.934 \qquad \alpha = 1.453\text{-}06 \qquad F_{(1,16)} = 109.57$$

Model of drinking milk consumption development in Slovakia is characterized by a linear function is a statistically significant and 93.48% is explained by parameters of this function. Therefore we can conclude that the decrease in consumption of drinking milk ranged annual average of 1.74 kg per person in the period 1995 to 2012.

The downward trend in the consumption of drinking milk is observed since 2000, when consumption fell to 70 kg per person per year, followed by the decline of the average annual consumption below 60 kg in 2004. The declining share of consumption of drinking milk in the last decade is influenced by wider and increasing offer accompanied by intensifying advertising and relatively cheap and flavored drinks, gradually increasing unit price of drinking milk. Nutritionally as a positive development trend should be seen the increasing growth in supply and demand for yogurt, cheese and sour milk products.

The decline in milk consumption also occurs in several EU countries. In the Czech Republic in 2011, consumption declined year by year to 57.7 kg per person, in Denmark to 92.5 kg in Austria increased to 80.7 kg.

Wider offer of quality flavored sour milk products, as well as increased milk prices, contributed to the significant fall in consumption of drinking milk. Sour Milk products are often referred as fermented products, are easily digestible, lower cholesterol, increase immunity and have a preventive effect against cancer. Increased and diverse selection of sour milk products from domestic and foreign production associated with the effects of marketing communication and a wider margin of price levels were reflected in increasing of their consumption by an average annual rate of 2.66% (k '= 1.0266) per person. This is also evident in the figure 3.

In 2012, consumption of sour milk products stood at 14.3 kg and compared with 1995 increased by 5.1 kg per person.

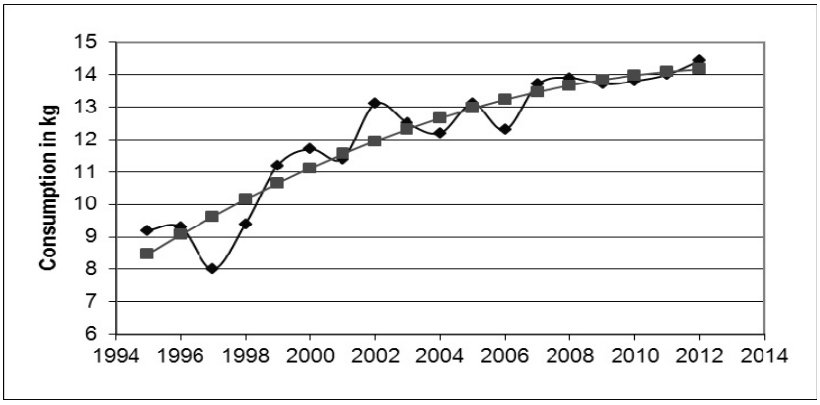

Figure 3 Development of Sour Milk Products Consumption
Source: Statistical COICOP, own calculations

Development of sour milk products consumption between 1995-2012 can be expressed, similarly to the development of consumption of milk and dairy products, by the quadratic function, with parameters:

$$g_i = 7.836 + 0.6649\,t - 0.0163\,t^2 \qquad R^2 = 0.947 \quad \alpha = 6.93E\text{-}08$$

Quadratic model of sour milk products consumption explains the course of development depending on the particular years (time) to 94.7% (R^2 = 0,947) and is statistically significant at the significance level α = 6.93E-08. Thus, within the parameters of the convex quadratic function and the risk of error less than 5%, we can predict the sour milk products consumption at 13.936 kg per person in 2014.

With a larger annual variation than those reported in demand for sour milk products, annually increased the consumption of cheese and curd. By 2000 consumption of cheese and curd was settled at level 8.0 kg per person per year. After 2000, there is a pronounced increase in demand for cheese but with larger annual variation than what was seen in the development of sour milk products consumption, and in 2012 the level of consumption of cheese and curd was 10.1 kg per person, which illustrates also Figure 4.

Development of cheese and curd consumption in the observed period is characterized by a quadratic function with parameters:

$$g_i = 7.827 + 0.0754\,t + 0.0036\,t^2 \quad R^2 = 0.910 \quad \alpha = 1.78E\text{-}06$$

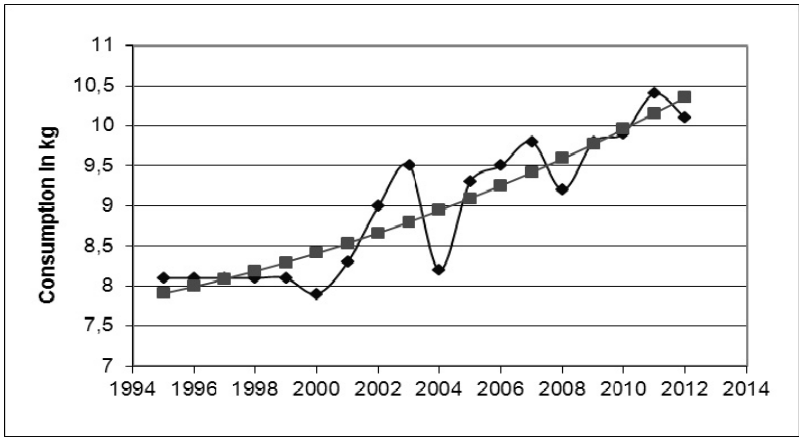

Figure 4. Development of Cheese and Curd Consumption
Source: Statistical COICOP, own calculations

Quadratic function describes the course of development of consumption cheese and curd of 91.0% and is statistically significant at the significance level α = 1.78 E-06. At the risk of estimation error less than 5% can be expected evolution of consumption of cheese and curd at 11.03 kg per person in 2014. Increasing consumption of cheese and curd in the period of years 1995 to 2012 in Slovakia reached an average annual rate of 1.6% (k '= 1.016) per person.

The consumption of cheese and curd in Slovakia is at level of their consumption in Bulgaria and Hungary. Slovakia significantly lags behind consumption of cheese per person compared to the EU in particular France, Germany and Austria.

Yearly, the consumption of cheese in 2011 increased mainly in the Czech Republic to 16.4 kg in Austria to 19.9 kg., in France fluctuated at around 23.9 kg per person per year, in Poland (of 8.5%), Germany and Latvia (of 1.7%).

Price and Income Elasticities of Demand for Selected Dairy Products

Table 1 Parameter Estimates of Demand Functions of Selected Dairy Products (q_i) of Households in Slovakia

Food	$q_{ij} = b_0 + b_1$ price $+ b_2$ income	Elasticities		R^2
		E_{PDi}	E_{IDi}	
Low Fat Milk	$q_{i,} = 65.104 + 11.12\ P_i - 0.0051$ PR	0.126	-0.426	0.432*
Yoghurt	$q_{i,} = 9.433 - 1.661\ P_i + 0.00086$ PR	-0.472	0.407	0.841**
Cheese and Curd	$q_2 = 10.657 - 1.328\ P_i + 0.00091$ PR	-1.078	0.549	0.691**
Other Dairy Products	$q_i = 14.087 - 1.188 P_i - 0.00049$ PR	-0.292	-0.207	0.873**

Source: Statistical COICOP, own calculations
Note: * Model statistically significant at the 5% level of significance (α <0.05)
** Statistically significant at the 1% significance level (α <0.01)

The coefficients of demand functions characterizing the impact of prices of low fat drinking milk and the impact of income accruing to one household member are statistically significant at the significance level at $\alpha = 5\%$.

Downward trend in consumption of drinking milk is mainly conditioned by the level of consumer prices of milk. Conversion coefficients of own drinking milk prices do not reflect the theoretical principles of demand and increasing of the own milk prices has not resulted in a decrease in demand in monitored households. Demand for drinking milk was price inelastic and relatively did not respond to the change in the price of drinking milk. After increasing of consumer prices of drinking milk by 1%, demand for milk increases by 0.126% ($E_{PDi} = 0.126$), but after income increasing by 1%, demand for milk responded by its decreasing by 0.426% ($E_{IDi} = -0.426$).

Consumer demand for yogurt was developing according to the theoretical assumptions . After income increasing by 1%, consumer demand fell by an average of 0.472% and after income increasing, demand for yogurt increases by an average of 0.407% ($E_{IDi} = 0.407$).

Demand and consumption of cheese and curd ran price and income according to theoretical assumptions and was characterized by stronger bonding lines on the analyzed factors (prices and incomes). Increasing of unit consumer prices of cheese by 1%, had an elastically course and reflected the decline in demand by 1, 078% ($E_{PDi} = -1.078$). Increasing of money income by 1%, resulted in demand increase for cheese and curd in average by 0.549% ($E_{IDi} = 0.549$).

Consumption and demand for other dairy products reacted according to theoretical assumptions and growth rates led to a decline in demand in average by 0.292% ($E_{PDi} = - 0.292$). Increase in the money income by 1%, resulted in a decrease in demand for other dairy products in average by 0.207% ($E_{IDi} = - 0.207$).

Conclusions

In the last years there had been seen a concentration of manufacturing industry, which makes the entry of foreign companies into the Slovak entities, this facilitated the modernization of production and economically stabilized the dairy companies. Crucial part of the processors engaged in the production of cow's milk, the production of butter, yoghurt, sour milk products and cheese and curd committees.

Results showed that consumption of milk in Slovakia has a long tradition and the industrial processing of milk has more than a century history. However, for the past 17 years, has the trend of consumption of drinking milk downward trend, excluding consumption of cheese, cottage cheese, sour milk products and butter. Expressed by linear regression model can be said that in recent years (monitored since 1995), in Slovakia has occurred overall reduction in the consumption of milk and dairy products expressed in average growth rates in average by 0.998 kg per person per year. This development was mainly conditioned by the annual descent of demand for drinking milk, because its consumption with little annual variation is reduced by a factor expressed in average annual growth in average by 1.8% (k '= 0.982) kg per person. This development is largely a result of the increase in milk prices and increase in wider offer of quality and flavored sour milk and cheese products. Consumption of sour milk products in recent observed years has increased, expressed by an average growth rates

coefficient in average by 1.0266% (k '= 1.0266). In 2014, predicting with a five percent risk of error of estimate, could be increased consumption of sour milk products on level of 13.936 kg per person and consumption of cheese and curd could reach the level of 11.03 kg per person in 2014.

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