



Munich Personal RePEc Archive

## **Vertical integration in the Czech agriculture – focus on dairy and meat sectors**

Janda, Karel

Institute of Economic Studies, Faculty of Social Sciences, Charles  
University in Prague, CERGE-EI, Faculty of Finance and  
Accounting, University of Economics, Prague, University of  
California, Berkeley

12 December 2010

Online at <https://mpra.ub.uni-muenchen.de/27408/>  
MPRA Paper No. 27408, posted 16 Dec 2010 14:23 UTC

# **Vertical integration in the Czech Agriculture – Focus on Dairy and Meat Sectors**

**Karel Janda**

**IES FSV UK, UC Berkeley, KBP FFU VSE, CERGE-EI**

Abstract:

In this paper we provide an overview of the two most important sectors in the Czech Agriculture: the dairy farming and the meat production. Since the focus of our paper is on the vertical integration, we provide this overview along the whole production vertical line. We start with the suppliers for the farmers and continue through the farm production, distribution and milk and meat processing and storage facilities. The final links in the production vertical structure are wholesale and retail consumers. In both of the considered vertical lines we concentrate on the key analytical parameters which are price transmission elasticities and we provide an overview of their values obtained in the Czech agricultural economic research. Since the question of competition and strategic relations inside the vertical supply-demand structure is an important topic in industrial organization theory and policy, we also pay attention to major cases of alleged fair competition violations in the Czech meat and dairy industry.

Keywords: Vertical intergration, meat, dairy, Czech Republic

JEL codes: L11, Q12, Q13

Acknowledgement: The work on this paper was supported by the Czech Science Foundation, grants 402/09/0380, 403/10/1235 and by the research project MSM0021620841.

# Dairy Sector

## **Introduction to the dairy sector**

Production of milk accounts for more than one third of the value of animal production and its share of the value of the gross agricultural production is around 17 %. There was a clear trend in milk production in the Czech Republic before May 2004 when the Czech Republic entered the EU. From the end of the 1990s a more or less stable volume of milk, of around 2700 mil litres a year, was produced as a continuous decline in the dairy herd compensated for an increase in the average yield.

Opening up the market brought a new dynamic to producers' behavior and to the development of the basic parameters of milk production. While, in the period before EU enlargement, foreign trade in the dairy sector in the Czech Republic was represented by trade in milk products almost entirely, EU enlargement has created a market in raw milk in Central and Eastern Europe. Exports of raw milk from the Czech Republic represent an important part of dairy production.

Demand from processors abroad together with demand in the domestic market has increased the domestic price and encouraged a greater volume of milk production. The long-term declining trend in dairy cow herd size changed with a slight increase in 2005. The average number of dairy cows in the Czech Republic was 437 900 head in 2005, with an average yield of 6254 litres.

Total production of milk increased in 2005 by 5.2 % compared to 2004 and was 2738.8 mil litres however exports of raw milk meant that less was available for domestic

processors than in previous years and milk imports did not cover the loss of raw milk on the domestic market.

The direct payment budget given from Brussels transferred into an acreage payment was 2110.4 CZK/ha (70.86 €) in 2005. Support for milk producers is supplemented by a top-up payment of 2 006.6 CZK/livestock unit (67.37 €) in 2005. Also foreign trade in milk products in the Czech Republic has exhibited significant dynamics after EU enlargement. Within two years exports of milk products expressed in milk equivalent had increased by 8 % and imports had increased by 90 %. The positive balance decreased from 2003 to 2005 by almost 40 %. In 2005, the share of exports of milk products (expressed in milk equivalent) in total milk utilization was 33.6 %, the share of imports 21.6 %.

From the territorial point of view, a considerable shift occurred in Czech trade in milk products with EU countries in 2004 and 2005. While in 2003 the share of export value from the Czech Republic to the EU-25 countries was 46 % of the total value of Czech exports, in 2005 this share had increased to 66 %. Imports from the EU-25 countries accounted for 96% of the total value of imported milk products in 2003 and 99 % in 2005.

### **A dual sector**

Semi-subsistence dairy farms do not have an important position in the milk sector in the Czech Republic. Their importance can be documented by the data of milking control. In 2004 together 97.5 % of dairy cows in the Czech Republic were included to the milking control made by the Czech-Moravian Union of Breeders. Only 0.1 % of dairy cows in this control were in herds with 1- 10 cows.

### **Prospects for dairy product consumption**

Human consumption of milk and milk products expressed in milk equivalent has shown a persistent increasing trend. Within last 8 years the annual consumption of milk and

milk products (excluding butter) per capita rose by about 22 %. In 2004 the average consumption reached 230 kg/head. In 2005 61.6 kg per capita of liquid milk was consumed, 12.0 kg cheese (without curds), 3.6 kg curds and 32 kg other milk-based products. The greatest increase was exhibited by the consumption of cheese, especially fresh cheese. A jump in 2000 (in connection with BSE) was continuously followed by significant increases in the following years, more so after EU Accession due to the variety of cheeses available from other EU-25 countries and a fall in the domestic price. The rising per capita consumption of milk and milk products as well as consumption of cheese is expected to continue.

The increase in human consumption of milk products has appeared most in high value added products – cheese. Also the consumption of butter has increased significantly. After a comparison of consumption development and price change we can state, that there is no direct relation between these two indicators. However the significant factors seem to have been price stabilization post 2000 couples with rising incomes and changing tastes.

### **Milk production**

Substantial investment in technical equipment and in modern forms of stabling in recent years has resulted in the contemporary situation where more than 60 % of the dairy population is housed in facilities with modern technical equipment. Hygiene and quality of raw milk is of a high standard. In 2005 98.7 % of milk delivered to dairy plants was of 1st standard or extra quality. Both the milking and storage infrastructure have been modernized.

One of the key points of issue for milk producers became the EU quota system. In the past two years it has represented a restrictive measure for a lot of producers. Market share of milk produced is at the highest level. In 2005 95.4% of milk production was sent for processing in dairy plants. In the quota year 2004/05, deliveries of milk for further processing amounted to 99.22% of the national reference quantity, while in quota year 2005/06 supply was 2,697,768.5 tones, which represents an overshoot of 0.62, the national reference quantity for deliveries being 2,678,931.9 tones.

Another point of issue seems to be the expected price development in the near future. After a rapid increase in the farm gate price of milk in 2004 and at the beginning of 2005, a continuous decline followed. The average producer price of milk in the first five months of 2006 was almost 5 % lower than in the same period in 2005 and under CAP reform further decline is expected. In spite of the proposed further milk price decrease, the volume of milk production in the Czech Republic in near future is forecast to follow the upper band of the national reference quantity.

Another point of issue is the amount of labor used in milk production in the Czech Republic. The share is relatively high in comparison to the EU-15 countries. Modern technical equipment is used by some agricultural enterprises only, while the smaller, but still important part of the sector need investments in this area. Wage costs are predicted to rise, but those enterprises yet to be modernized lack the financial resources for investing in modern technical equipment.

### **Milk collection from farms**

Milk collection is organized by particular processing plants for their own needs. Currently an every day collection prevails, however the number of producers with the equipment to enable collection only every two or even three days is gradually increasing thus reducing costs within the dairy chain.

Approximately one half of milk sales are organized through marketing organizations. The strongest one controls about 30 % of milk sold to the processing sector. The average producer price recorded by this marketing organization exceeded the republic average slightly. Another approximately 20 % of milk sales is controlled by a number of smaller marketing organizations. The rest is sold directly by producers to processors.

From 2005 all direct purchasers of milk have been required to deliver purchased milk to processors only, i. e. no other agents in the sale of raw milk are allowed. For this reason a new registration of raw milk purchasers took place during 2005. In this registration 91 purchasers were registered, 51 processors and 40 marketing organizations. At the end of 2005 9 of these, 6 processors and 3 marketing organizations left the industry.

## **Milk processing stage**

More than 99 % of processed milk is processed outside farms, i. e. in processing plants. About 60 % of the whole volume of milk is processed in the 10 biggest plants. Daily purchase of 500 000 litres is exceeded by 3 of these plants.

Processing is to a high standard. The vast majority of the processing plants comply with EU standards; only about 6 % of plants do not yet comply. The success of Czech processors is the fact that till now most of them have survived by making huge investments in order to reach EU standards. However previous investments and financial commitments constrain the ability to modernize further to increase production efficiency.

The main contemporary points may be characterized as follows:

- Competition in the raw milk market is growing. Purchases of milk from domestic sources have declined due to its exportation; foreign sources of raw milk are limited, too.
- Competition in the domestic milk products market is strengthening. Exports of milk products are growing much less than imports. Domestic consumption of milk products is being met increasingly by imported products. Selling domestic products on the Czech market is becoming more difficult. Some kinds of milk products are especially under pressure from imported goods - e.g. cheese, curds. The saturation of the domestic market in a number of areas is high. The opportunities to create new markets seem very limited.
- Continuing WTO discussions suggest a future reduction of export subsidies. The orientation of processors on the production of high value products will become increasingly important.
- The share of milk products being sold through market chains has stabilized at around 70 % in the past four years. Strengthening competition between particular market chains, together with incoming discount outlets is leading all these retailers to seek to increase their market share by driving down the prices of milk products to the detriment

of milk processors and the primary producers.

- The quality of Czech milk products corresponds fully to EU standards but the position of the Czech milk processing industry in the international premium market is unfavorable. One possible way to get a competitive advantage and to establish oneself on the market could be the introduction of regional marks and specialties. In this sphere the position of the Czech milk industry has many reserves.

Future development will be influenced and determined by the strengthening competition. The effort to minimize production costs will lead to a drive for the growth of production, the result of which is assumed to be the concentration of processing. The less successful processors are likely to be absorbed by the more successful ones. Strong foreign companies are expected to take the opportunity for to make capital investments in the Czech Republic.

#### Main trends in the dairy sector

The contemporary position of Czech producers and processors of milk puts intense requirements on further produce and business strategy.

The deteriorating trend of producer price of milk is forcing producers to find a way to minimize costs. The possibility of doing this by increasing production is very limited due to milk quotas, which are fully used.

Milk processors face growing competition on the raw milk market due to quotas limiting milk production and exports. Competition in the domestic milk product market is strengthening, too. In two years exports of milk products have increased by 8 % and imports by 90 %. Export of milk products outside the EU, being depended on export subsidies, is more difficult. The high share of milk products being sold through marketing chains inhibits higher product prices.

Formulating a uniform strategy and a general way out is difficult. The future strategy depends on many factors from the area of milk inputs, milk price, activities of particular market participants, development of market regulation, continuing WTO discussions, to the development of consumers' demand.

In the framework of the existing uncertain conditions, Czech milk producers and processors should focus on the following points:

The question of milk demand remains open. As producer prices tend towards approximate equality throughout the EU, the foreign demand for Czech raw milk could weaken, however we expect that Czech milk will continue to aid to the expansion of processors in nearby countries. In the processing phase the orientation on production of high value products will become increasingly important. The importance of vertical integration of the whole supply chain will strengthen.

The maintenance of the present volume of production and processing of milk in the Czech Republic will require adequate real producer prices for milk and the cooperation of milk producers and processors.

The factors influencing the competition in the Czech dairy sector

### **The concentration in the Czech dairy industry**

Dairy industry in the Czech Republic went through big changes during transition period starting in 1990. These changes influenced significantly the concentration rate in this industry. The transition started with a very concentrated industry in 1989, then went through a quite fragmented industry in the middle of nineties and ended as a partly concentrated industry after 2000.

In 1989 seven regional monopolies controlled the dairy industry. After their disintegration in the first half of the nineties 90 independent firms were established. Only one milk processing firm, Jihoceske mlékárny inc. Ceske Budejovice, continued to operate all the time as an original undivided firm. With its six factories they are currently the biggest firms among the Czech milk processing companies. Other firms decomposed into minor units, often down to the level of a single milk processing plant

with a very small market share. This trend was prevailing up to the 1995. In the second half of nineties the opposite trend started. Decomposition of dairy sector companies stopped and concentration process started again. This period may be characterized by a foreign capital entry into Czech dairies and high decrease of a number of business entities operating in the dairy industry. It happened not only as a result of the repeated integration of businesses into bigger units, but also as a result of bankruptcy of many dairy businesses, which got into critical situation and did not successfully manage the rescue.

As an example we may consider the situation in the South Moravia region. From the regional monopoly, the state enterprise Lacrum Brno, which operated there before the start of economic transition in the nineties, 27 independent businesses emerged within five years after the 1989. But only 19 of them survived by 2000, while 3 of them cooperated with foreign strategic partners.

The dairy industry in the Czech Republic is currently a partly concentrated industry. There is a small group of big firms with a major market share in the Czech dairy industry, which is complemented with a very numerous group of small firms, which have a minor market share. The present level of industry concentration intensifies the rivalry between the competing sellers in the Czech milk processing industry and cuts down the industry profitability.

We may expect further continuation of market concentration in the future. More bankruptcies of smaller and less profitable dairies will happen with the increasing integration of the Czech Republic in the EU. These will be dairies which will not be able to survive in the competition of increased imports following the market opening and entrance of new foreign subjects in the Czech dairy market. We can expect further integration into larger units and entrance of foreign capital into the Czech dairies. This development will lead to the growth of the industry concentration level, which will contribute to the decrease of rivalry intensity and from this point of view to the improvement of the position of the surviving businesses.

### **Industry growth rate**

Liberalization of prices and decrease of purchasing power of Czech consumers accompanied by a change of consumer preferences and nutrition habits led to a rapid decrease of the consumption of the milk based products at the beginning of the economic transformation. As a consequence of this, the market for milk products experienced a down-turn. From 1990 to 1995 annual decline was from 5 to 11 percent. In 1995 the Czech total consumption of milk products was only 71.5% of the corresponding consumption in 1989. The negative development trend turned over in 1996. From this year, there is a slow annual growth of about 5 percent.

The insufficient demand and excessive supply of dairy products leads to the increasing rivalry among the competing sellers at all stages of dairy vertical chain. Foreign trade partly reduces this high difference between Czech domestic production and consumption.

We can say that the Czech dairy industry is the industry in the mature stage. The industry grows slowly, excess of production over consumption exists and it of course intensifies rivalry among competing sellers. This factor considerably increases competitive fight in the industry at present and it decreases industry profitability.

We should not expect any improvements in the industry growth rate in connection with further integration of the Czech Republic into EU economic and social structures. Excessive production also exists in other EU countries and this excess is also placed with the help of export subsidies in markets outside the EU. The Czech domestic consumption should go up slowly according to forecasts of the Czech Ministry of Agriculture, though. The effort is to increase Czech domestic annual consumption of milk and milk products to 230 kg per inhabitant with the help of activities promoting the increase in domestic consumption.

### **Exit barriers**

Exit barriers in the dairy industry of the Czech Republic are mostly based on specialized equipment, which cannot be used for anything else. Relatively high capital demands strengthen exit barriers too. Capital demand in the dairy industry is about 40% (measured by the share of annual sales in liabilities). This fact forces the companies to

stay in the industry at all costs and to continue in competition fight. It is the reason for existence of many dairy firms of different size in the Czech dairy industry in spite of a relatively low average return on invested capital, which is about 5 percent (measured by the share of liabilities on operational profit) and in spite of unused capacity in the industry. The exit barriers obviously intensify the rivalry among competing sellers.

The influence of the exit barriers factor did not decrease with the entry of Czech Republic to EU. Highly specialized milk-processing technologies, which are not useful in any other industry, continue to work as an important exit barrier.

### **Level of fixed and storage costs**

The decisive characteristic for the determination of the level of fixed costs (depreciation, part of labor costs and financial costs) from the point of view of their influence on intensity of competition in the industry is the share of fixed costs on value added. This share is about 70% in the Czech dairy industry, which is quite high. This high share is not caused by too high total fixed costs. It is caused by a very low value added, which amounts to 10% of the total output only. Businesses in the Czech dairy industry have a high level of costs for external inputs – the price of inputs amounts to almost 80% of total costs. This means that the gross margin is low. Therefore the dairy firms are under a strong pressure to maximize capacity utilization so that they are not in loss.

Storage costs in the milk processing industry are not too high. However, milk and milk products cannot be stored for a long time since a great emphasis is put on their freshness. Therefore it is necessary to sell these products quickly. Because of this reason the businesses often promote sales by temporary reduction of prices. These sales promotions significantly intensify rivalry among competing sellers and push down the industry profitability. The increase in prices of milk and milk products after the entry of Czech Republic into EU led to growth of value added. But the decrease of fixed costs level and the reduction of intensity of competition in the industry is clear so far and its future development will depend on the dynamics of fixed costs level in the Czech dairy industry and on the competition within EU. There were not any significant changes in storage cost connected with the EU membership of the Czech Republic.

## **Product differentiation**

Product differentiation in dairy sector is low and different according to the type of product in the industry. There are specific products where the loyalty of consumers to brand names appears in the Czech dairy industry. The examples of such products are yoghurts or some kind of cheeses. Such consumer loyalty is promoted by massive advertising campaigns. But only foreign firms or firms with with foreign capital participation are able to afford these advertising campaigns – the examples of such firms are Zeletavske syrarny, Danone, Pribina, Zott etc. For other products the consumers follow mainly the price – the good examples on the Czech market are butter or milk.

The room available for further product differentiation intensifies competitive fight in the Czech dairy industry at present. Growth of the pressure of advertising campaigns on the Czech consumers, further growth of differences in packaging, and preferences of brand names are expected in the future. But no significant changes of the influence of product differentiation on the intensity of competition in the Czech dairy industry should be expected.

## **Size of capacity augmentation**

Economies of scale are achievable only by building new capacities by big discrete (as opposed to small continuous) increases in the Czech dairy industry. This is caused mainly by a need for specialized equipment, which is used for production of milk and milk products. Because of the current excessive capacity in the Czech dairy industry, this factor is an important element intensifying the rivalry among the competing sellers.

## **Diversity of competitors**

One source of competitor's differences in the Czech dairy industry lies in the competitive range. Only the large companies operate on country-wide level. The small firms serve mainly their regional markets. The relevant competition therefore has to be considered on two different levels – the national one and the regional one.

The Czech dairy companies are diverse in their scope of production too. Only two companies (Jihoceske mlekarny and Olma Olomouc) produce the full assortment of milk products. The medium and small size dairies specialize in production of a few types of products or in one product (for example Zamilk Chocen focuses on production of spread butter, Mlekarna Varnsdorf on production of Swiss cheeses, etc.)

Another source of competitors' diversity is the foreign capital availability. Businesses with foreign capital participation have more funds for competition fight. They can afford to spend more money on advertising and they have better possibilities for renovations and for new technology acquisitions.

All these three aspects lead to different goals, different methods of competition, and different strategies of companies in the Czech dairy industry. It may be difficult for the individual companies to forecast each other's plans and come to certain rules of competition within the industry. This strategic uncertainty increases the intensity of competition in the industry.

#### Price transmission in the Czech dairy sector

Price transmission is defined as the proportion of an input price change that is passed on to output prices. The level of price transmission is particularly important in the analysis of welfare effects of changes in agricultural policies like elimination of farm price support programs or introduction of alternative support mechanisms and in the analysis of economic effects of new technologies. In many industries it has been observed that while increases in input prices are almost instantaneously reflected in the output prices, input price decreases are usually followed only by delayed and partial drops in the output price. The analysis of price transmission in the Czech dairy sector, which is presented here, is based on Novak (2007). This analysis aims to assess the impact of market structure on price transmission process within commodity chain of milk in the Czech Republic with the focus on milk products with low (milk) or high (yoghurt, edam cheese) value added. The database used for this analysis is represented by monthly prices at individual stages of the dairy commodity chain in the period January 1998 – March 2006. The analysis uses three levels of prices: Farmer's price of cow milk,

Processor's price of milk (or Edam cheese or white yoghurt), consumer's price of milk (or Edam cheese or white yoghurt).

The simple descriptive inspections of the price time series shows the following results:

On the first transmission level (between farmer and processor) the processor's price partially copies farm price development only for the milk. For yogurt and cheese it is clear that the processor's price development is besides the price of cow milk also influenced by other costs.

On the second transmission level (between processor and consumer) the data show that the consumer price levels of all three analyzed product lines copy the trend in producer's prices. In the case of yogurt and cheese strong fluctuations within processor's prices are absorbed in both directions. The similarity between processor's and consumer's prices is highest in the case of milk product line, as we would intuitively expect.

When we focus on the share of individual links in the commodity chain (farmer, processor, retail) on the final consumer price for analyzed commodities, we see that the highest share on consumer price has the farmer in the case of milk, where the farmer's price of milk represents on average 58% of consumer price. The share of processor in this case represents on average only 20%. When we consider yogurt or cheese the situation is reversed: the processor's share is around 50% while the farmer's share is around 20%.

After this descriptive analysis we may perform the evaluation of intensity of price transmission by the coefficient of price transmission elasticity (EPT). This coefficient shows by how many percents price at one market level changes, if the price at another market level changes by 1%.

When we evaluate the intensity of price transmission by the coefficient of price transmission elasticity, we get the following results. On the first transmission level (farmer – processor) the transmission of inputs into outputs is inelastic (lower than unitary elasticity) for milk and it is elastic for yogurt and cheese. On the second

transmission level (processor – consumer) the transmission of inputs into outputs is inelastic for all considered products.

## Meat Sector

### Introduction to the meat sector

Meat production is the most important sector in Czech animal production. The share of gross agricultural production (GAP) in 1989 fixed prices was about 51 % in 2005 and amounted to 37.4 billion CZK (1.26 billion €). The share of meat production (beef, pork, poultry, mutton including fish and game) in the gross animal production was more than 67 % and amounted to 25 billion CZK (0.83 billion €). The most important sector within animal production is cattle farming included milk and beef production. The share of this sector in total animal production in financial terms was almost 45.2 % in 2005 (43.8 % in 2000 and 44.4 % in 2003)

From 2000 to 2005 the value of the gross agricultural production was almost constant. In 2000 it was 74.3 billion CZK (2.09 billion €) and by 2005 it had reached 73.6 billion CZK (2.47 billion €). The relative shares of gross plant production and gross animal production have remained almost constant since 2003. Gross animal production reached about 55 % and gross plant production was about 45 % of the gross agricultural production. The increase of gross plant production has come about after the Czech Republic's EU Accession in 2004 and has led to an equaling out of the importance of both sectors of agricultural production.

Total meat production in Czech Republic fell gradually from 2000 to 2005. In the Czech Republic 1088000 tones live weight of meat (i. e. 788300 tones slaughter weight) was produced in 2000, while in 2005 it was only 964200 tones lw (i. e. 700500 tones slaughter weight), which constituted a 11.4 % reduction (i.e. 123800 tone live weight). With regard to the volume of meat production pig farming is the most important sector of animal production in the Czech Republic. Its share in total animal production in weight terms was 53.7 % in 2000, decreased to 53.5 % in 2003 and in 2005 fell to 49.9 %. In the beef production sector the change occurred between 2000 and 2005. The share

of slaughter cattle in total meat output was 19.1 % in 2000 and through the five years declined to 15.7 %. By contrast there was dynamic growth in poultry meat production. Its share of total animal production was approximately 27.0 % in 2000 and had grown to 34.1 % by 2005. The share of mutton in total meat production is insignificant and amount to about 0.2 %.

Total domestic consumption of meat in the Czech Republic has dropped from 1112700 live weight (806440 slaughter weight) in 2000 to 1089000 tones live weight (808580 slaughter weight) in 2005. But this drop wasn't as drastic as that in production being only 2.1 %. The share of beef in this consumption has decreased from 18.9 % in 2000 to 12.9 % in 2005. The consumption of pork has been relatively stable at approximately 54 % throughout the time period. In contrast the share of poultry meat has grown from 27.3 % in 2000 to 33.1 % in 2005. The share of mutton in total domestic consumption is very low and has fluctuated from about 0.2 to 0.3 %.

The Czech Republic is not quite self-sufficient in meat production and this trend is increasing annually (97.8 % self-sufficient in 2000, 86.8 % in 2005). Self-sufficiency has markedly declined in pork, but has decreased also in poultry meat. The Czech Republic was only self-sufficient in beef production in 2001 – 2005 and the self-sufficiency level reached 105.9 % in 2005.

The meat processing industry also plays an important part in the food industry. The share of meat industry sales in the total for the food industry (food and drinks production) was 20.9 % in 2000 and 21.9 % in 2005.

#### Structure of the sector and its recent evolution

Pig meat, beef and poultry meat is produced mainly in the Czech Republic. The production of sheepmeat and goatmeat and other meats (fish, rabbit etc.) is almost negligible.

#### Pigmeat

The most important meat production is pigmeat. Pigmeat consumption is traditionally quite high in Central Europe as well as in the Czech Republic where it holds first place among meats.

The situation on the pigmeat market has not been favorable for breeders of pigs and pigmeat producers for several years. Production has decreased annually together with the number of pigs and sows. The main reason for this unhappy situation in the pork market is the constantly rising trend of imports of pork. The processors import particularly the cuts of pork for low prices mostly. The demand for pigs from Czech producers has decreased due to imports of lower priced cuts of pork. The economics of production of pigmeat (the economics of pig feeding) have shown bad results for several years and some agricultural enterprises have had to close. This has led to an increase in unemployment and decreased demand for feed mixtures and coarse grains used for pigfeed.

Pigmeat production declined by 19.7% i.e. by 111900 tonnes liveweight from 2000 to 2005. We predict the continuation of this downward trend i. e. by 3.6% in 2006. The number of livestock declined by 22 % during the same period. We predict a further decrease in 2007 by 1.3% year – on – year. Domestic consumption only decreased by 2.8% from 2000 to 2005. The difference between domestic production and domestic consumption has increased as self – sufficiency decreased. The measure of self – sufficiency was 97.7% in 2000 and only 81.4% in 2005. The self – sufficiency value for pork meat is the smallest of the meats. The imports of live pigs and pigmeat soared after the EU-Accession. Imports have reached 28 % of domestic consumption. The growth of exports has not been so impressive.

## Beef

Cattle breeding i. e. for milk and beef production is the most important sector in total agricultural production point of view. The number of cattle fell by 11.2% and of this, the number of cows by 6.7% from 2000 to 2005. This decline continues. The production of beef also decreased in the same period. The main reason was not only the decline of direct consumption of meat but also the decline of processed meat used in producing meat products. Beef is being replaced by poultrymeat which is cheaper. Beef has faced

strong competition from poultrymeat in the last few years. The main reasons are price, ease of preparation and health trends.

In the total production of beef, 51 % is from steers and bulls, 39 % cows, 9 % heifers and 1 % calves. Beef production has declined by 20.7 % and consumption of domestic beef has declined by 33.4% in the period 2000 to 2005. The per capita consumption of beef (including veal) declined by 20 % in the same period.

### Poultrymeat

The production of poultrymeat plays a key role in the meat sector and has increased, now being second to pigmeat with per capita consumption at around 26 kg/person per year. The demand for poultrymeat has increased due to the favourable consumer prices, easy cooking and wide range of poultry cuts and poultry products. Domestic consumption of poultrymeat increased by 18.7 % from 2000 to 2005. There has also been a change in the structure of poultrymeat consumption from “fatty” poultry (duck and goose meat) to “white” meat (chicken and turkey meat), with chicken and turkeys accounting for 89 % and 6 % respectively of poultrymeat consumed.

The production of poultrymeat increased by 9.5 % overall from 2000 to 2005 though with a break in the upward trend in 2003 when production declined by 4.1% due to a fall in the producer prices below production costs which bankrupted some producers. The demand for poultrymeat was lively in 2004 and 2005 and production recovered though currently fears of avian influenza are likely to lead to limit the growth of poultry production. The gap between production and consumption has widened annually from 2000, self – sufficiency being 90.6% in 2005 and is forecast to have been 89.8% in 2006.

### Sheep and Goats

After a deep decline in the 1990s, the national sheep flock has grown slightly from 2000. State support for the sector speeded the gentle upward trend of the flock, the majority of is composed of meat and combined breeds. Only about 25 % of lamb and goatmeat is processed on slaughter as in the Czech Republic the on-farm sale of the

animals and meat direct to the consumer still prevails. There were in 2005 about 13 plants slaughtering sheep and lambs.

The decline in the number of enterprises that produce meat and meat products as well as slaughterhouses has been happening from the beginning of the privatization of the meat processing industry. The enterprises faced strong competition (there were a lot of enterprises strictly specialized) and strong pressure to comply with strict hygiene and technical standards. There were 208 slaughterhouses and processors of beef and pork with more than 20000 employees in 2001. There was a significant reduction to 176 enterprises in 2002. During the other years the decline of number of enterprises hasn't been so noticeable. There were 175 enterprises in the meat sector at the end of September 2006.

In 2000 there were 30 poultrymeat processors (slaughterhouses and breeders), which process their own poultry in The Czech Republic and 25 poultrymeat processors in 2005. The five enterprises in the table slaughtered 65% of the total poultry. The introduction of the EU hygiene and other standards was financially very hard for many enterprises before EU Accession leading to many producers getting into debt or going bankrupt. Pressure still remains on the profits of meat producers which causes the concentration and specialisation of production in order to continue respecting the standards imposed.

#### Policy and standards

Prior to Accession, the Czech government subsidized suckler cows (via a calf subsidy) and also paid a sheep subsidy. Government support also covered export aids for cattle, pigs and poultry. These subsidies have been abolished post-Accession and aid to the sector is now on the basis of SAPS from EU funds with direct aid payments to farmers according to their area of agricultural land and Czech national funds topping-up some selected commodities. In this way cattle, sheep and goat subsidies of 2006.60 CZK (67.37 €) per livestock unit were paid in 2005 and 2581.60 CZK (91.08 €) in 2006. Pigs and poultry are not subsidized in this way.

The Czech Government also uses state funds to improve the genetic potential of breeding farm animals and subsidizes progeny testing and the testing of cattle, pig and poultry feed conversion efficiency. These irrecoverable subsidies are used for partial reimbursement of costs in breeding, keeping genetic reserves, operation of bull-rearing stations and providing identity of breeding domestic animals.

Domestic policy is aimed at observing EU hygiene practices and ensuring high quality foods standards (monitoring by state quality control of foods); also, quality and hygiene of animal feedingstuffs and medicines is monitoring by the veterinary administration. Veterinary costs such as blanket vaccinations, inoculation against tubercular diseases and compulsory examinations including check tests and also part of the costs of the destruction of infected carcasses are all reimbursed from the national budget.

In addition, there are the Supporting Programs (OP) and Horizontal Rural Development Plan (HRDP) which provide assistance to primary producer associations and producer marketing organizations. The Support and Guarantee Fund for Farmers and Forestry (PGRLF) indirectly subsidises the development and improvement of breeding and help to young farmers' businesses. Recently it has become more common to provide subsidies within the rural development programme – the European Agricultural Funds for Rural Development (EAFRD).

#### Market trends and prospects for meat consumption

As can be seen from the table below, pork, poultrymeat and beef and veal are the main meats in terms of consumption per head, with consumption of mutton and goatmeat being practically insignificant. The consumption of poultrymeat has risen by over 15% in the past five years, whilst that of pigmeat has been relatively stable and beef consumption has fallen by a fifth.

#### **The trend in meat consumption (kg/person/year)**

<b>Sort of meat</b>	<b>2000</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
---------------------	-------------	-------------	-------------	-------------	-------------

Beef and veal	12.5	11.3	11.6	10.4	10.0
Pork	40.9	40.9	41.5	41.1	41.5
Poultrymeat	22.3	23.9	23.8	25.3	26.1
Mutton	0.3	0.3	0.3	0.2	0.4
Other	8.8	8.7	8.7	9.0	9.2
All meat	79.4	79.8	80.6	80.5	81.4

Source: ČSÚ

Within total meat consumption, about 52 % is sold as meat and 48 % in the form of meat products and semi-finished products. Imported beef and pork is mainly processed into products. Sales of packaged meat are rising in importance in supermarkets and hypermarkets are in the form of packaged meat is coming. Demand for bio meat is very low in the Czech Republic because of its relatively high price compared to conventional products. Bio beef is offered only in a few shops or in up-market restaurants. Few other kinds of meat are being sold under a bio mark

The main factors affecting meat consumption are price, quality, consumer habits and the availability of the various meats. The occurrence of infectious diseases has also had an impact on the trend in demand for meat in recent years. In the period 2000 to 2002, the occurrence of FMD and BSE had a significant effect in reducing demand for beef in particular in Europe. Czech consumption of beef fell whilst that of poultrymeat increased. It also had an impact on the farmgate prices of these commodities. The decline in consumer demand for beef caused a fall in beef cattle prices and a rise in pig and chicken prices at both the farmgate and consumer price level. Also in the production of meat products and butcher's products, poultry is increasingly used as a substitute for beef for price reasons. The threat of avian influenza has to some extent, but probably only temporarily, limited consumption of poultrymeat in the past two years (2005 and 2006) causing producer prices and consumer prices to fall. This has caused a reduction in the number of broiler chicken producers because the price level has fallen below costs and a lot of businesses have suffered a loss.

In the absence of further health scares, there is unlikely to be any significant change in the meat consumption pattern. If there is a positive trend in the Czech economy and a

rise in purchasing power, a slow increase in consumption of beef in place of pork could be expected. Also there could be a rise in demand for higher quality products including organic produce bio. Consumption of poultrymeat is not expected to expand further. In CR consumption of mutton is not traditional and is limited by high price among others; hence further increases in consumption of mutton are unlikely.

#### Recent evolution and the perspective for trade

The volume of meat production is limited not only by supply and demand in the domestic market but also by the ability of domestic producers and processors to compete in external markets. Foreign trade rather markedly affects the amount of domestic production and number of animals kept. EU Accession brought changes to the pattern of the Czech Republic's foreign trade notably increasing competition in the domestic market. Imports of beef and poultrymeat rose as had been expected, but the greatest rise occurred with pork imports. Processors are importing cheaper cuts of meat for use in their products under price pressure from the hypermarkets and supermarkets. An unexpected result of Accession has been a significant growth in exports of live animals, particularly cattle and pigs.

Production of beef cattle reduced from 2000 to 2005 as a result of the reduction of the number of cows and the increase of exports of calves and cattle for fattening. The balance of foreign trade on live cattle was positive in the period 2000 to 2005, whereas for beef it has been negative since 2003. In the period 2000 to 2003 only breeding animals were imported. A marked break occurred in the foreign trade in live cattle and beef after Accession. The Czech meat industry Republic adapted to the enlargement and the higher competition within the EU countries relatively quickly. Exports of live cattle now make up approximately 90 % of total cattle and beef exports. Cattle for immediate slaughter have been rising since 2005 at the expense of exports of calves and cattle for fattening. The main business partners were other EU countries, for imports Slovakia, Germany, France, and for exports Germany, Austria and Italy.

Imports of beef have been increasing markedly after the Czech Republic's EU Accession; 14600 tonnes more beef were imported in 2005 than in 2003 - a sixfold

growth. Countries from which beef was imported from were Slovakia, Poland, Austria, and Germany. Exports of beef rose only a little after EU Accession and these were to neighboring EU countries (Poland, Slovakia, Germany and Austria). If exports of cattle for fattening continue, the volume of imported beef is likely to rise further and in the medium-term a major source could be low-priced imports from South America notably Argentina, Uruguay and Brazil.

Foreign trade in live pigs and pigmeat, including processed products, increased in the period 2000 to 2005; the volume and financial balance of trade was positive for live pigs over the whole period but that for pigmeat was negative. The Czech Republic's foreign trade in pigmeat had been mainly with the EU countries for several years before entry and became even more so after Accession. At the same time there has been a marked sharpening of competition. Imports of live pigs have been rising since 2004: but whilst pre-Accession imports were only of breeding animals, post-Accession there has been a growth of imports of piglets and pigs for slaughter because of falling pig numbers in the Czech Republic. Piglets were imported mainly from Denmark, the Netherlands and Germany and pigs for slaughter from the Netherlands, Germany and Slovakia.

Imports of pigmeat have also risen markedly since 2004, the volume in 2005 being seven times that of 2001; the main sources being Germany, Poland and Austria. This has adversely effected domestic production and pig numbers. Pigmeat exports were much lower than imports through the period from 2001 to 2005, the main export destinations being Slovakia, Germany, Romania and Hungary. In the short term pigmeat imports are likely to continue as are exports of live pigs.

Foreign trade in poultrymeat has long had a negative balance and this is expected to continue, imports having grown annually throughout the last few years. One of the reasons was the large amount of poultry and poultrymeat imported in the first four months of 2004, when the tradesmen were trying to use up import quotas in extenso including the so-called "double zero". In the context of the so-called "double zero" variant this was export/import between the Czech Republic and the EU realizing with a zero rate of duty. A structural adjustment of traded assortment direction of imported

superior poultrymeat in the two last years has also been registered, i.e. increase in import price also.

The major exporters of poultrymeat to the Czech Republic are Poland, Brazil, Germany and the Netherlands. Live poultry is traditionally imported from the neighboring countries of Slovakia, Poland and Germany. Exports of poultrymeat and poultry have been increasing annually also, but not as fast as imports. The value of exports has increased by almost seven times from 2000 to 2006. Important export destinations for poultrymeat are Slovakia, Germany and the Netherlands. After the Czech Republic's EU Accession there was a marked growth of exports to Germany and to the Netherlands as the poultry trade responded quickly to price differences. Export of live poultry takes place to neighboring countries such as Slovakia, Poland and Germany. Exports of live poultry are more significant than imports (Slovakia, Germany).

Imports of poultrymeat will probably increase in the medium-term, especially from other EU countries. Imports of poultrymeat from third countries to the EU increased markedly from 1997 to 2001. There was a significant decrease in 2004 because of avian influenza occurring in south - eastern Asia and strict customs controls of salted meat. The decline of imports from third countries will also contribute to the new system EU of customs tariffs with Brazil and Thailand.

#### Success and challenges for the sector

Success in breeding cattle is gradually changing the specialized make-up of the national cattle herd. The indicator of reproduction hasn't worsened with the rising efficiency, it means the calving indexes (number of calves born per 100 cows and number of breeding calves per 100 cows) that are comparable with the average numbers in other EU countries (viz. ANNEX). It will be necessary to increase the output of beef meat per cow from 230 kg lw to 380 kg lw per annum in future.

It will be important to change the structure of foreign trade, exporting finished cattle or beef instead of exporting calves and cattle for fattening. It is important to solve in organic farming in livestock production that both the breeding calves and the fattening

would be organic too. It is necessary to solve immediately the weight growth problem as well as the whole economics of fattening cattle.

It is necessary improve the cooperation of the producer marketing organizations on the one hand and the processors of meat on the other.

The production of pigmeat is expected to concentrate more in large specialized enterprises without land. These enterprises will cover their investment requirement from the structural funds from EU or by direct foreign investment. Pig production in other enterprises will continue in restricted amount.

The production of pork meat will continue, in spite of this unfavorable prediction, and provide the main part of domestic production and consumption. It is possible to suppose a further decline of production due to increase of imports of pork parts for low prices by the pigmeat processors. Further development and breaking into the European market will be needed to reduce unit costs and to improve the reproduction indicators in breeding pigs.

The meat processing industry is expected to become more concentrated and the number of enterprises will decline. Czech producers and processors will face the strong competition on the European market.

The consumption of pigmeat is not expected to increase significantly because of strong competition from poultrymeat. The future movement of domestic producer prices will be strongly influenced by the development of prices elsewhere in the EU and the Czech Republic is expected to remain a net in the medium term.

The poultrymeat sector has gone through restructuring that led to both increased production and a wider range of poultrymeat products with the share of chilled poultry, poultry cuts, semi – finished products and poultry products expanding.

The main problem of the poultrymeat sector is how to raise profitability in the long term. EU-Accession increased both imports (more significantly) and exports. There was also tariff harmonization and acceptance of EU standards and norms after.

Main trends in the meat sector

Cattle breeding and beef production are pivotal branches of animal production and the main source of beef will continue, as in the past, the national dairy herd. Gradually beef production is likely to increase because of higher output of meat per cow/year brought about by increasing the percentage of cattle stall-fed to maturity. Domestic consumption is predicted to stagnate in the short-term, but could increase slightly in the medium-term. It is assumed that beef imports, not only from EU but also from third countries, especially Argentina, Uruguay will continue growing. It is assumed also that exports of cattle for fattening and exports of live fattened cattle will continue to rise in the European countries (Italy, Austria and Germany).

Pig breeding and pigmeat production are both under heavy competition from other EU countries. The country has not been self-sufficient in pigmeat production since 1999 and the position is getting worse. The national pig herd and domestic production are both falling year-to-year due to rising imports and the inability of Czech producers and processors to compete on prices in the domestic and foreign markets. The balance of trade in pigmeat and live pigs combined has been in deficit for several years, reaching a record of CZK 4.068 billion (0.144 billion €) in 2005.

Pig breeding within the Czech Republic is likely to follow trends elsewhere in the EU, becoming more and more centralised in large specialized companies that have all the necessary veterinary, animal welfare and hygiene conditions to satisfy international standards.

Despite the above-mentioned unfavorable predictions, pig production is expected to continue to supply part of domestic consumption, but to succeed in the European market it will be necessary for both producers and processors to reduce unit costs and improve efficiency.

The production and consumption of poultrymeat are both predicted to show a modest increase in the medium term, though producers will face strong competition in European markets. The producers and processors should focus on the exports of specific

value-added products. It is also necessary to improve animal welfare standards and reduce the stocking density of broiler units. The big imponderable is how will avian influenza develop?

#### **Development of production of meat in 000s tonnes liveweight**

<b>Type of meat</b>	<b>2000</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Beef and veal	208,0	201,5	198,4	177,0	166,9
Pork	583,9	585,4	579,9	547,0	472,0
Poultry	294,3	317,0	304,0	310,2	322,3
Mutton	2,0	2,3	2,1	2,2	2,9

*Source: CZSO*

#### **Development of consumption of meat in kg/person/year**

<b>Type of meat</b>	<b>2000</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
Beef and veal	12,5	11,3	11,6	10,4	10,0
Pork	40,9	40,9	41,5	41,1	41,5
Poultry	22,3	23,9	23,8	25,3	26,1
Mutton, goat m.	0,3	0,3	0,3	0,2	0,4

*Source: CZSO*

#### **Example of cartel behavior in the meat vertical chain**

Czech antimonopoly office investigated a number of cases of possible anti-competitive behavior of some firms engaged in the meat production, processing and selling vertical chain. In the following paragraphs we will show a few examples of such cases.

In 1999 the regional society of pork producers Agropork was fined a fine 150 000 CZK for anti-competitive behavior. The society was prosecuted because the board of the society fixed purchase price of pork meat.

In 2003 the two major food retail chains in the Czech Republic, Billa and Julius Meinl, were charged a total fine 51 mil CZK because they created the price cartel. Both chains agreed to coordinate and unify the purchase prices and trade conditions in relation to their suppliers of food products.

In 2003 the Czech Union of Meat Processors was fined 100 000 CZK because it recommended to its members to transfer the cost of compulsory veterinary check for beef meat to their agricultural suppliers.

In 1999 four Czech poultry production firms were charged with the total fine of 80 000 CZK for price agreement. The firms agreed on price which they will charge the food market retail chains for the delivery of frozen chickens.

In 2002 the 8 cattle breeding companies were charged a total fine of 2 570 000 CKZ because of cartel agreement for cattle insemination. The companies concerned agreed on uniform prices for their products.

Not all cases investigated by the Czech antimonopoly office are concluded by the imposition of a fine. For example in 2004 this office launched a large scale investigation on the whole pork meat vertical including the farm level producers, the processing firms and the retail sales. After this investigation the Czech antimonopoly office concluded the firms in the pork vertical chain did not violate the competition laws and regulations.

#### Price transmission in the Czech meat sector

For the analysis of the price transmission in the Czech meat sector we use the same methodology as we used in the dairy section of this report. The results at this section are based on Lechanova (2006). The data used in this analysis are monthly prices in the periods I/2000-V/2005 (poultry), I/199-X/2005(pigs), I/1997-X/2005 (beef). In the pig and beef chains we perform separate price transmission analysis for low quality meat

products (flitch and boneless beef) and for high quality meat products (pork boneless leg, beef sirloin). The considered food chains have therefore the following forms:

1. Farm prices of broilers – producer's prices of broilers – consumer's prices of broilers.
2. Farm prices of pigs – producer's prices of flitch – consumer's prices of flitch.
3. Farm prices of pigs – producer's prices of boneless pork leg – consumer's prices of boneless pork leg.
4. Farm prices of cattle – producer's prices of boneless beef – consumer's prices of boneless beef.
5. Farm prices of cattle – producer's prices of beef sirloin – consumer's prices of beef sirloin.

After the computation of the coefficients of price transmission elasticities of inputs into outputs we obtained the following results. First we consider the results between farmer and processor. The price transmission in both pork chains and in the low quality beef chain is inelastic. The price transmission in the poultry chain and in the high quality beef is elastic. Then we consider the relation between the processor and consumer. Here all elasticities were smaller than one, so we consider this case as an inelastic case, or we may also alternatively interpret this situation as incomplete price transmission.

## **Conclusions**

In this paper we provide an overview of the two most important sectors in the Czech Agriculture: the dairy farming and the meat production. Since the focus of our paper is on the vertical integration, we provide this overview along the whole production vertical line. Starting with the suppliers for the farmers, continuing through the farm production, distribution and milk and meat processing and storage facilities. The final links in the production vertical structure are wholesale and retail consumers. This conventional approach to the production vertical line actually misses the last stages which are the garbage utilization and recycling stages which should be considered an integral part of the whole production vertical too.

In both of the considered vertical lines we concentrate on the key analytical parameters which are price transmission elasticities and we provide an overview of their values obtained in the Czech agricultural economic research.

Since the question of competition and strategic relations inside the vertical supply-demand structure is an important topic in industrial organization theory and policy, we also pay attention to major cases of alleged fair competition violations in the Czech meat and dairy industry.

## Literature:

Stav ceskeho mlekarenstvi. Mimeo prepared by Czech Trade Unions in Food Industry, May 2007.

Abrahamova, Miluse, Boskova, Iveta, Menzlova, Josefina and Ourednik, Josef. „Situation and Perspective for Meat Sector in Czech Republic.“ Research report, March 2007.

Bednar, Josef. “Vybrane pripady z oblasti zemedelstvi a potravinarstvi 1999-2004.“ Informacni list UOHS, 3/2004.

Boskova, Iveta and Slaisova, Jirina. „Structure and Competitiveness of the Milk and Dairy Supply Chain in the Czech Republic“ Research report, October 2006.

Cernikova, Renata. „Factors Influencing Intensity of Competition in the Czech Dairy Industry.“ Agricultural Economics, 2002, vol. 48 no.7, pp. 315-320.

Janda, Karel. ”The Econometric Application of the Linear Demand System to the Estimation of Demand for Selected Food Products.” Agricultural Economics, May 1995, 41(5), pp. 197-206.

Janda, Karel and Linhart, Karel. ”Masny prumysl v zemich Evropskych spolecenstvi” Agricultural Economics, June 1992, 38(6), pp. 509-15.

Janda, Karel and Linhart, Karel. ”Mlekarensky prumysl v zemich Evropskych spolecenstvi.” Agricultural Economics, June 1992, 38(6), pp. 516-521.

Jelinek, Ladislav. „Vztah technické efektivity a technologické změny v sektoru výroby mléka.“ PhD dissertation, Czech Agricultural University, 2006.

Krivanek, Milan. „Výhled zpracování mléka po vstupu ČR do EU (2004-2013). Mimeo, March 2007.

Lechanová, Iva. „The Transmission Process of Supply and Demand Shocks in Czech Meat Commodity Chain.“ *Agricultural Economics*, 2006, vol. 52 no.9, pp. 427-435

Novák, Petr. „Some Approaches to the Analysis of Market Structure's Impact in Milk Commodity Chain.“ Paper presented at 104th EAAE-IAAE Seminar, Budapest, Hungary, September 6-8, 2007-11-02