



WHY WHEY

Improvement of Production and Management Processes in Dairy-Cheese Sector and Dairy Waste Management

Whey Production Report of Hungary

Foundation of Knowledge

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The role of whey in Hungary

The Situation of the Dairy Market

The raw milk producer prices fell 2 percent in New Zealand, while it increased in the European Union by 2 percent, in the US 4 percent. In the US, the price of raw milk will rise a further 1 per cent next year.

Immediate (spot) market prices of raw milk in Italy fell by 10.5 percent and 26.5 percent in the Netherlands, then it rose by 3 percent. In Hungary, the export price of raw milk was 19 percent higher than the domestic market price.

In Hungary, the average production price of raw milk increased by 11 percent over the previous year. The export prices of raw milk have risen by 26 percent in one year and it exceeded the producer price by 20.5 percent. In Hungary, the purchase price of raw milk was 6 percent less in 2013 than in the previous year. The total fat content milk exports fell by 8.5 percent over one year.

According to the European Commission's medium-term forecasts the cow's milk production in the EU will reach 157.3 million tonnes by 2023, which is 5 percent more than in the year 2012. In the EU-15 the production of cow's milk may increase by 7 percent to 132.1 million tonnes, while in the EU-13 it may stagnate at 25.2 million tonnes. The milk yield may reach 7986 kg by 2023, which is 24 percent higher than in 2012. The milk yield in the EU-15, may increase by 22 percent to 8504 kg / cow, while in the EU-13 by 31 percent to 6052 kg/cow in 2023 compared to the year 2012. The dairy herd is expected to fall to 19.7 million by 2023, a decline of 15 percent compared to the 2012 year figure. The number of dairy cows may decrease by 24 percent in the EU-13 while in the EU-15 the decrease may be 12 percent. After the elimination of the milk quota on 1 April 2015, robust expansion is expected in the milk production in those countries (Poland, the Netherlands, Denmark, Germany, Austria and Cyprus), where the milk quota cut back on the production growth rate. Analysts expect the decrease in milk purchase in Hungary, Croatia, Romania, Bulgaria, Slovenia, Finland, Slovakia, Greece and Czech Republic.

Export – Import

According to the Statistical Office in Hungarian dairy export revenues increased of 24 percent, while the value of imports by 8 percent. The value of imports was 4 percent higher than the export turnover.

The export of raw milk was almost 16 times more than that of the import. 79 per cent of the total exports of raw milk was full milk, 13 percent was skimmed, 8 percent was semi-skimmed milk. 23 percent of the total raw milk went to Italy, 21 percent to Croatia, 17 percent to Romania. 84 per cent of the raw skim milk was transported to Italy.



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Imports of cheese and curd was twice of the exports. The cheese and curd exports rose by 40 percent, imports increased by 8 percent over the previous year. 53 percent of imports came from Germany, 13 percent from Poland. 20 percent of exports was directed to Lebanon, 18 percent to Italy, 16 percent to Romania.

The exports of whey, which is a by-product of cheese production, was 6.6 times that of its imports. 25 percent of exports was directed to Kosovo, 22 percent to Romania, 17 percent to Bosnia-Herzegovina.

Imports of canned milk was 1.25 times that of its exports. The canned skimmed milk imports rose by 30 percent, while the total by 20 percent, the semi-skimmed dropped by 46 percent in one year. 54 per cent of semi-skimmed milk came from Slovakia, 25 percent from Austria, 17 percent from the Czech Republic. The canned skimmed milk exports rose by 31 per cent, the full milk by 27 per cent. 99 per cent of semi-skimmed milk was delivered to Romania. Imports of fermented milk products was 5.4 times higher than the exports. 44 percent of imports came from Germany, 26 percent from Poland. 67 per cent of exports was directed to Romania.

The imports of butter and buttercream were 5.3-fold higher than the exports. 37 percent of imports came from Germany, 16 percent from Slovakia, 14 percent from the Netherlands, and 11 per cent from Poland.

Milk production in Hungary

The cows, the milk production and milk quality are 100 percent controlled by the authorities. The genetic basis is at a high level, it is not an obstruction to competitiveness. The milk yield per cow belongs to the European best results. In Hungary, the milk yield has not changed significantly since 2009, but in 2012 it increased by 3 percent compared with a year earlier. Milk yield in 2009 was 6661 litres/cow/year and in 2012 6866 litres/cow/year.

In Hungary, the consumer milk has always represented a larger proportion in milk consumption than in other neighbouring or European countries. This characteristic patterns of consumption prevails today. During the last decade the production of an acidified (fermented) products increased significantly, and they became the second most manufactured products in the entire product range. The drinking milk represented 28.2%, fermented milk products represented a ratio of 10.93% of the total quantity of milk purchased in 2012.

The butter production showed a smaller-scale reduction, which is only partly explained by the characteristics of consumer habits, today the production of low fat butter is most significant. The absorption capacity of the domestic market implies a greater volume of production, which is justified by the amount of import of butter. The lack of domestic production capacity or producer disinterest may cause this controversy.

In the cheese production area, the low level of production is due to the failure in production increase, in technical development and in the expansion of choice. It should be noted that the statistics often show the production of cheese and curd in a consolidated amount. In Hungary,



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the cow's milk curd counts as a specific product because the domestic rugged curd is not known in the European countries. Curd has a very broad and general role as food and in case the aggregate production volumes of cheeses and curd are shown, the actual amount of neither the cheese production nor the curd production can be analysed.

Milk and dairy product exports, imports, self-sufficiency level

The dairy industry was not highly export-oriented industry. Excess production during the 1980's was able to meet the domestic consumer demand but the choice was no longer appropriate. Primarily, the surplus products were exported to the Middle East as Orientalist type cheese exports, partly as milk powder and butter exports. Today's milk production cannot meet the levels of consumer demand, not the quantitative side primarily, but with regard to choice. Recognizing this, the domestic trade (independent from sectors) broadened the palette of milk and dairy products for the sake of the consumers, using the opportunities from EU legislation, which now shows a latent import overweight. However, developmental investments made between 2002 and 2013 do not justify the efforts of domestic dairy processors who tried to expand the product range using domestically produced and processed milk to supersede non-domestic products from the shops.

The outlined contradiction has brought about changes in the export structure. The majority of Hungarian milk and dairy product export is in the form of producer or pasteurized milk and it is primarily directed to northern Italian regions. Apparently this is a quick and perhaps intermittently additional revenue to producers and processors but in the long run the competitiveness of the sector is critically impaired and the ability of increasing the higher value-added GDP is reduced and the sustainability of the sector is made hazardous.

Consumption of dairy products

It is characteristic of the structure of the domestic consumption of dairy products that the primary place in the product scale is drinking milk. Annual consumption in Hungary is around 65 litres/capita which is circa 45% of all consumption per capita (on average 150 litres/person/year), which is high in Europe. The product family which shows range expansion and consumption growth in the past years are the acidified milk-based dessert products. Here, however, import goods have a significant proportion and the domestically produced products are limited to the produce of 3-4 businesses.

Whey

Whey is a by-product of the manufacture of cottage cheese and cheese. Since the second half of the 20th century, it has been increasingly used by dairy farms in different products.

Whey was also known in the ancient times as a beauty care and healing material. Similarly to herbs, beneficial biological characteristics of whey was discovered earlier than its chemical identification data.

The most important by-product of the dairy industry is whey made during the manufacture of cheese. Earlier the treatment of whey posed a problem because of the high cost of treatment



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and storage for the industry. The organic matter content of untreated whey is high, which could lead to the pollution of natural waters, and can cause the formation of stench. There are many options for the extraction or utilization of the protein and lactose content of whey. Nevertheless, these solutions have only recently become technically and economically feasible.

The solids content of whey in conventional cheese making processes is around 6%. In Hungary, 30-50 years ago, the resulting total whey was used as a feed. Later, with the expansion of the livestock industry, the possibility of this usage became limited. Subsequently, in the dairy industry, the disposal of whey was considered as an insurmountable problem due to high treatment costs of the conventional wastewater treatment systems. The dairies often solved the problem by pouring whey on fields, or into natural waters or wells. Because of the lactose and protein content, the organic matter content of untreated whey is high, which may lead to the pollution of natural waters, and may cause stench.

Preventive options:

There are several ways of extracting the valuable, high-quality protein from sweet whey. Nevertheless, these solutions have only recently become technically and economically feasible. Examples:

- Ultrafiltration followed by the spray drying of the whey protein concentrate.
- Production of whey powder (evaporation and spray drying to form whey powder thereafter)
- For use as animal feed
- Demineralization or reducing the mineral content of whey
- Anaerobic fermentation

Chemical components of whey is already known today. Besides macro- and microelements, protein and fat, it is rich in vitamins. A parallel can be drawn between mother's milk and whey if their natural components are taken into consideration.

Nowadays, due to its beneficial biological characteristics, large amounts of whey is used in the medical science, in the food industry, in the personal nourishment, in the beauty industry and in the fitness branch in Hungary. Whey is also used for preventing and decreasing of symptoms of cancer and osteoporosis. This is the reason why both small workshops and large industries produce liquid and powdery whey products.

Whey is also used in organic farming as feed for pigs and poultry. Besides preserving animal health, it plays a very important role in increase of weight.

In Hungary, the annual whey production was estimated about 450 thousand tons between the 1980s and 1990s that was mainly used for animal feed. Unfortunately, the unused whey left as waste.



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Today nature protection rules and controls prohibit to drain whey. But it is not a problem because the whole amount of the produced whey is used for human consumption and animal feed in animal husbandry.

According to the official statistical figures, the whey production was 360.5 tons in 2009; 302.5 tons in 2010; 299 tons in 2011; 338 tons in 2012 and 309 tons in 2013 in Hungary.

The produced whey is not a pollutant material anymore but it is sold as valuable human food and as animal (meat) product in the market. For example infant formulas contain 25-40%, dried soups contain 50-70% and bakery products and desserts contain 3-10% whey powder. At the same time, according to human health, it must be noted that lactose intolerant people do not consume neither whey nor whey dust.

It is proven by experts that athletes and those who continue active lifestyle need more protein than others. For this need food supplements are the best choice. Protein is needed for our organism to produce new muscular tissues and for regeneration, too. Without protein there is no muscle building and preservation. Protein rich food supplies are safe and popular alternatives for protein rich nourishment. Different whey dusts also have other benefits: they have antioxidant effects, prevent the proliferation of cancer cells and promote metabolism with the help of their special components so they are excellent for diet.

Immunoglobulins that can be found in whey have beneficial effects for the immune system, hereby, they prevent inflammatory diseases too.

Hungary recognized the animal/human health importance of whey and whey dust and thus the whole amount of it is used in the food industry.

One possible alternative use of the generated large amounts of whey is the production of Single Cell Protein (SCP), during which the cheese whey is grafted onto yeast (E. g. *Kluyveromyces*), and by proliferating on it, the yeast converts the lactose content (5%) of the whey into protein (about 50% of the yeast mass). The obtained product has high biological value (about 87%) and after adequate pre-treatment it can be used in human consumption (as a dietary supplement) and as an animal feed as well (for performance improvement in monogastric animals and in case of ruminants as a protein feed that affects the functioning of the rumen favorably).

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