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## **Changes in the EU and global milk and dairy products market in view of multilateral trade liberalisation<sup>2</sup>**

**Abstract.** The aim of this article is to present the situation of the milk and dairy products market in the EU countries and in the countries which are the world's major milk producers in view of changes caused by the potential liberalisation of the global milk trade. The volume of trade in milk and dairy products, as well as production, demand and prices paid by consumers were analysed. The study uses the general equilibrium model of the Global Trade Analysis Project (GTAP). Projections were made according to the propositions included in the modalities negotiated at the World Trade Organisation forum in December 2008. It was proved that the progressing liberalisation of foreign trade may increase the competitive pressure both on regional markets and on the global market. In consequence, the dairy producers and processors from the EU countries may lose part of the market to the suppliers from the countries with lower costs of production. Such countries as New Zealand, the USA, Brazil and China may benefit from the liberalization.

**Key words:** milk and dairy products, export, import, production, demand, prices, trade liberalisation

### **Introduction**

Milk production is one of major areas in animal production both in the EU and all over the world. In recent decades the global milk market has undergone considerable changes. Between 1961 and 2012 the global milk production doubled, reaching the amount of nearly 754.0 million tonnes. The value of export of dairy products grew from almost 1.6 billion dollars in 1961 to 76.7 billion dollars in 2011 and the consumption increased from 75.3 kg per head in 1961 to 87.3 kg per head in 2009. There were also significant transformations observed in this sector of the market in the EU countries. Over more than 60 years the volume of milk production increased by nearly 30% in the EU countries, reaching the amount of 155.9 million tonnes and making about 20% of the global production. The value of income from the export of dairy products increased almost 57 times, exceeding the amount of 51.9 billion dollars in 2011 and giving the EU a share of more than 67% in the global export. The consumption also increased by about 33% and it reached 239.0 kg per head in 2009, which was almost 2.5 times more than the average global consumption of this group of products [FAOSTAT 2014].

These changes were caused by numerous factors, including demographic changes and more rapid economic growth in the developing countries of Asia and South America, which resulted in consumers' increased purchasing power and pursuit of improvement in the quality of nutrition. Other factors included liberalisation of the capital flow and facilitation of transfer of technologies to the countries with lower costs of production, as well as the

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development of information and telecommunication technologies and modern forms of trade, facilitating the exchange of agri-food products [Baer-Nawrocka et al. 2012]. Changes in the agricultural and trade policies leading to gradual limitation of protectionism in milk and dairy products trade are also one of major determinants of transformations on the regional and global milk markets. The production and export potential and the degree of import penetration of the dairy sector in the EU countries develop according to the limitations set by the amount of milk quotas. Apart from that, they also depend on the degree of demand and the prices of dairy products on the EU and global markets. In the nearest years the volume of production, trade turnover, demand and prices of dairy products may be significantly affected by the abolition of the quota system in milk production in the EU in 2015<sup>3</sup> and by the progressing processes of liberalisation of the global agricultural trade. Therefore, the aim of this article is to present the situation of the milk and dairy products market in the EU countries and in the countries which are the world's major milk producers in view of changes caused by the potential liberalisation of the global milk trade.

## Research method

The study uses the general equilibrium model of the Global Trade Analysis Project (GTAP). On the one hand, the GTAP general equilibrium model is based on specially adapted Leontief's inter-branch flow (input-output) matrix, and on the other hand, it is based on the assumptions of Walrasian equilibrium<sup>4</sup>. From the mathematical point of view it is a collection of equations describing the behaviour of economic entities, i.e. producers, consumers and governments of individual countries/regions of the world, on the domestic markets of production factors and on the domestic and international markets of final goods. On each market the demand and supply are balanced by the price, which is referred to as the market clearing price – the equilibrium price<sup>5</sup>.

The use of the model to forecast the consequences of changes in the agricultural and trade policies consists in building scenarios of simulated disturbances in the economic policy and in determining the influence of selected variables on the level of economic welfare and the sphere of production, consumption and trade on the global, regional or sectorial scale. Depending whether the study is supposed to identify the short-term or long-term consequences of changes in the economic policy it is important to make an appropriate closure of the model. A standard short-term closure is a classic closure, which is characterised by full employment, flexible prices and exogenous supply of production factors.

Projections of the consequences of multilateral liberalisation of the global dairy trade were made according to the propositions included in the modalities negotiated at the WTO forum in December 2008. They assumed a band formula of reduction of customs tariffs<sup>6</sup>.

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<sup>3</sup> For the consequences of the abolition of milk quotas for milk producers in Poland see Baer-Nawrocka & Kiryluk-Dryjska [2010A] and Szajner [2012], for the EU countries see Baer-Nawrocka & Kiryluk-Dryjska [2010B] and Guba & Dąbrowski [2012].

<sup>4</sup> For more information on the essence of the general equilibrium model see Shoven & Whalley [1984], Robinson & Roland-Holst [1988], Robinson [1989, 1991], Bergman [1990], Devarajan & Go [1998]; for more information about the GTAP model see Pawlak [2013].

<sup>5</sup> Cf. Berck & Dabalen [1995].

<sup>6</sup> The reductions apply to the tariffs of the Most Favoured Nation (MFN) clause.

According to the formula, depending on the amount all tariffs will be divided into four reduction bands and a different reduction coefficient will be applied to each of the bands – the higher the customs tariff, the higher the coefficient<sup>7</sup>. Apart from that, it was agreed that export would not be subsidised<sup>8</sup>.

The current GTAP database (The GTAP 8 Data Base) includes 129 countries/regions of the world and 57 sectors (groups of products or products) of national economies. In order to achieve the aim of the research the standard aggregation of the model database was modified and adapted to the needs of the research. 33 individual countries were identified in a regional arrangement, i.e. the EU countries and the world's greatest milk producers, and a group of the other countries of the world. The aggregation of the agri-food sector was modified, placing milk and dairy products among the most important groups of products. Gragg's non-linear estimation was the method applied to extrapolate changes in trade turnover, production, demand and prices paid by consumers<sup>9</sup>.

## **Results of the potential liberalisation of the global milk trade**

As was proved by the results of simulation analyses using the GTAP model, the potential liberalisation of global trade in milk and dairy products may cause changes in the volume of trade turnover in the countries under study. The implemented changes in the trade policy may lead to limitation of the value of export of milk and dairy products from all of the EU countries except Bulgaria, Greece, Romania and Italy. The greatest loss of income from export can be expected in such countries as Finland, Lithuania and Malta. In comparison with the reference amounts from the GTAP database they might decrease by more than 32%, 22% and 20% respectively, reaching the amounts of 337 million dollars, 367 million dollars and 3.9 million dollars (Table 1). It is noteworthy that none of those countries is an important EU or global exporter of dairy products. In the countries which are the greatest exporters of this group of products in the EU the income from export would probably be limited to a lesser extent. In Ireland, Belgium, Holland and Germany the decrease in export might range from 9% to 14%, whereas in France and Denmark it might reach about 2-3%. In spite of the fact that the EU market would be less protected by customs tariffs, Germany, France and Holland could remain the largest exporters of dairy products in the EU, because their income from the sales of this group of products abroad would reach nearly 8.1 billion dollars, 6.8 billion dollars and 4.7 billion dollars respectively. The potential reduction in the value of export of dairy products from Poland can be estimated at about 6.5% (to 1.5 billion dollars).

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<sup>7</sup> The amounts of customs tariffs to be reduced were taken from the database of the WTO Tariff Profiles, [Available at:] <http://stat.wto.org/TariffProfile/WSDBTariffPFHome.aspx?Language=E>. [Access: February 2014].

<sup>8</sup> Revised draft modalities for agriculture [2008]. The perspectives of development of the dairy products trade in Poland and in the other EU countries were analysed by Poczta & Pawlak [2007]. The analysis included earlier propositions of liberalisation made by the European Commission, the G-20 countries and the USA at the World Trade Organisation forum (proposition of 28 October 2005). The analysis used the GTAP model.

<sup>9</sup> Nonlinear estimation is a general adjustment procedure which is used for the estimation of any type of dependence between the dependent variable (being discussed) and independent variables. Estimation errors in this method are smaller than in the case of linear estimation.

Table 1. Changes in the values of export and import of milk and dairy products in the EU countries and in the countries which are the world's major milk producers in view of the potential liberalisation of the global milk trade (changes in comparison with the base values from the GTAP model)

Countries	Export			Import		
	The base value <sup>a</sup>	The projection	Change (%)	The base value <sup>a</sup>	The projection	Change (%)
	expressed in world prices (million dollars)			expressed in market prices (million dollars)		
Austria	1 251,98	1 188,75	-5,05	817,34	842,82	3,12
Belgium	3 008,20	2 639,27	-12,26	3 130,43	3 184,55	1,73
Bulgaria	76,53	94,89	23,99	86,05	90,97	5,72
Cyprus	57,51	49,88	-13,27	88,45	89,22	0,87
Czech Republic	749,50	683,31	-8,83	536,46	537,15	0,13
Denmark	2 189,15	2 130,82	-2,66	763,41	963,40	26,20
Estonia	183,53	149,45	-18,57	49,74	50,78	2,09
Finland	498,85	337,45	-32,35	306,54	308,28	0,57
France	7 081,53	6 835,11	-3,48	3 679,49	4 052,68	10,14
Germany	8 863,84	8 063,81	-9,03	7 125,81	7 379,99	3,57
Greece	389,20	451,16	15,92	993,68	1 013,60	2,00
Holland	5 259,37	4 662,70	-11,34	2 782,23	3 023,16	8,66
Hungary	284,77	268,32	-5,78	384,30	385,99	0,44
Ireland	2 544,49	2 193,43	-13,80	866,67	836,76	-3,45
Italy	2 390,89	2 672,17	11,76	4 754,37	4 947,36	4,06
Latvia	201,80	184,23	-8,71	94,97	95,38	0,43
Lithuania	474,18	366,59	-22,69	146,47	150,47	2,73
Luxembourg	313,31	290,54	-7,27	337,90	335,23	-0,79
Malta	4,82	3,85	-20,12	44,83	46,28	3,23
Poland	1 562,28	1 460,88	-6,49	470,67	487,47	3,57
Portugal	399,69	366,82	-8,22	671,32	674,73	0,51
Romania	17,38	18,10	4,14	204,93	207,24	1,13
Slovakia	326,12	312,45	-4,19	254,29	254,96	0,26
Slovenia	140,13	125,96	-10,11	143,48	143,53	0,03
Spain	1 210,63	1 159,43	-4,23	2 768,99	2 828,18	2,14
Sweden	370,00	319,90	-13,54	721,21	733,10	1,65
United Kingdom	1 574,71	1 437,63	-8,71	3 994,73	4 180,11	4,64
Brazil	264,16	354,86	34,34	229,75	246,69	7,37
China	293,69	377,06	28,39	993,34	1 046,18	5,32
India	387,05	435,51	12,52	85,30	116,48	36,55
New Zealand	6 124,08	7 843,00	28,07	106,83	117,17	9,68
Russian Federation	388,96	450,30	15,77	2 527,40	2 200,41	-12,94
USA	2 605,24	4 178,08	60,37	2 794,47	3 566,34	27,62
Rest of World	9 754,94	12 996,38	33,23	26 311,00	29 509,81	12,16

a – The base values in the GTAP 8 Data Base refer to the year of 2007.

Source: GTAP simulation.

The world's main exporters of dairy products might turn out to be the beneficiaries of liberalisation. For example, in the USA a 60% increase in the export of milk and dairy products would result in the export value increasing nearly up to 4.2 billion dollars. New Zealand could retain its strong position in the world trade in dairy products, because after the implementation of the liberalisation propositions of 2008 the value of its export would amount to 7.8 billion dollars, which would be nearly 30% greater than the base value of its export in 2007. Also China and Brazil might expect their export value to rise by about 28% and 34% respectively, which would amount to 377 million dollars and 355 million dollars. It is worth noting that the GTAP simulation results are consistent with the predictions made by Baer-Nawrocka et al. [2012], who suggest that in 2020 Oceania, the EU, the USA and South America will still remain the major exporters of dairy products, but the position of some developing countries, such as China, Brazil and India, will be stronger.

Apart from Ireland, Luxembourg and Russia, the reduction of customs protection of the markets in all of the countries under study might cause an increase in the import of milk and dairy products. However, the scale of observed changes would be diversified. It is noticeable that the potential increase in import expenditures in the EU countries might be lower than the increase observed in the world's largest milk producers. Apart from Slovenia, where no significant changes have been noted in this area, the increase in the value of import of dairy products might range from 0.3% (Slovakia) to 10% (France). Only in Denmark it might be greater and exceed the base value of the GTAP model by 26%, which would mean that the import expenditures would amount to 963 million dollars. The largest importers of dairy products in the EU would still be Germany (7.4 billion dollars), Italy (4.9 billion dollars), the United Kingdom (4.2 billion dollars) and France (4.1 billion dollars). In the countries which are the world's largest milk producers the forecast of the increase in the import value could range from slightly more than 5% in China to 36% in India, where the amounts of money spent on foreign purchase of this group of products would range from 116 million dollars (India) to 3.6 billion dollars (USA), so they would still be lower than the amounts spent by the countries which are the leading importers of dairy products in the EU.

Table 2. Changes in volume of production, households' demand and consumer prices of milk and dairy products in the EU countries and in the countries which are the world's major milk producers in view of the potential liberalisation of the global milk trade (changes in comparison with the base values from the GTAP model)

Countries	Production <sup>a</sup>			Households' demand <sup>a</sup>			Consumer prices (change in %)
	The base value <sup>b</sup>	The projection	Change (%)	The base value <sup>b</sup>	The projection	Change (%)	
	expressed in market prices (million dollars)			expressed in market prices (million dollars)			
Austria	6 263,12	6 116,74	-2,34	2 239,98	2 246,09	0,27	-0,39
Belgium	8 536,93	7 901,92	-7,44	3 194,09	3 217,63	0,74	-1,04
Bulgaria	1 892,66	1 919,64	1,43	748,97	748,78	-0,03	0,08
Cyprus	916,46	901,96	-1,58	351,90	352,06	0,05	-0,10
Czech Republic	6 655,88	6 546,17	-1,65	3 136,59	3 138,00	0,04	-0,11
Denmark	9 595,05	9 199,38	-4,12	2 092,05	2 121,15	1,39	-1,57
Estonia	2 073,75	2 018,98	-2,64	1 211,35	1 212,03	0,06	-0,10
Finland	6 027,13	5 669,68	-5,93	2 054,61	2 059,60	0,24	-0,31

Countries	Production <sup>a</sup>			Households' demand <sup>a</sup>			Consumer prices (change in %)
	The base value <sup>b</sup>	The projection	Change (%)	The base value <sup>b</sup>	The projection	Change (%)	
	expressed in market prices (million dollars)			expressed in market prices (million dollars)			
France	55 906,00	54 958,14	-1,70	20 719,03	20 783,22	0,31	-0,44
Germany	57 181,41	55 410,11	-3,10	22 200,66	22 274,02	0,33	-0,49
Greece	8 611,64	8 707,64	1,11	3 608,14	3 610,16	0,06	-0,09
Holland	29 345,87	27 681,62	-5,67	7 665,01	7 720,64	0,73	-0,98
Hungary	7 035,50	7 006,70	-0,41	3 744,46	3 745,00	0,01	-0,04
Ireland	10 788,11	10 067,18	-6,68	2 083,83	2 089,07	0,25	-0,32
Italy	39 122,47	39 317,99	0,50	19 546,38	19 574,84	0,15	-0,22
Latvia	1 944,84	1 919,33	-1,31	1 000,23	1 000,54	0,03	-0,12
Lithuania	3 218,94	3 045,38	-5,39	1 612,71	1 614,75	0,13	-0,28
Luxembourg	898,98	860,76	-4,25	383,53	384,70	0,31	-0,32
Malta	109,41	106,57	-2,60	119,65	119,94	0,24	-0,50
Poland	32 038,54	31 877,36	-0,50	17 931,08	17 933,98	0,02	-0,05
Portugal	5 389,77	5 323,66	-1,23	2 522,13	2 523,20	0,04	-0,09
Romania	7 535,61	7 532,83	-0,04	2 555,74	2 555,90	0,01	-0,03
Slovakia	4 764,91	4 745,55	-0,41	2 792,33	2 792,66	0,01	-0,04
Slovenia	1 407,43	1 385,68	-1,55	735,41	735,60	0,03	-0,06
Spain	20 597,90	20 426,47	-0,83	10 466,07	10 476,82	0,10	-0,18
Sweden	7 594,39	7 487,38	-1,41	3 643,68	3 647,09	0,09	-0,13
United Kingdom	29 867,62	29 388,68	-1,60	14 282,62	14 322,02	0,28	-0,38
Brazil	22 599,92	22 714,75	0,51	13 270,55	13 271,23	0,01	-0,01
China	23 902,19	23 939,87	0,16	14 158,79	14 154,99	-0,03	-0,09
India	66 575,32	66 593,69	0,03	57 322,97	57 321,99	0,00	0,00
New Zealand	14 906,03	17 687,55	18,66	1 270,66	1 264,57	-0,48	2,09
Russian Federation	47 225,82	47 684,34	0,97	34 167,43	34 169,00	0,00	0,38
USA	125 381,73	126 829,52	1,15	49 426,28	49 529,07	0,21	-0,24
Rest of World	280 778,31	281 267,56	0,17	176 489,63	176 773,48	0,16	-0,41

a – The volume of production and demand from the GTAP model may be different than the real values in a particular year. The GTAP database is not a repository of the input-output matrix. The process of making a database affects the contents of input-output tables and they are different from the source data. The underlying input-output tables are heterogeneous in sources, base years, and sectoral detail, thus for achieving consistency, substantial efforts are made to make the disparate sources comparable. For these reasons, the objective of the GTAP Data Base is not to provide input-output tables, but to facilitate the operation of economic simulation models ensuring users a consistent set of economic facts [Available at:] <https://www.gtap.agecon.purdue.edu/databases/v8/default.asp>. [Access: March.2014]. Apart from that, it is necessary to note the fact that there are three types of prices in the GTAP model. The economic entities whose behaviour is described by the model do not make direct transactions, but they make transactions on markets. This means that in fact, each transaction consists of two interconnected contracts: seller-market and market-purchaser, and the model includes agent's prices, i.e. the prices the seller receives or the purchaser pays, and market prices. These prices are not equal and taxes make the difference between them. Transactions on international markets are made at world prices.

b – The base values in the GTAP 8 Data Base refer to the year of 2007.

Source: GTAP simulation.



The reduction of export subsidies and customs tariffs in the global milk trade might also cause changes in the volume of production of milk and dairy products in the countries under analysis. In the EU countries, where the import of milk products might increase in consequence of reduction of the current level of market protection, the dairy production can be expected to remain stable or to decrease. In comparison with 2007 the greatest decrease by about 3-7% could be expected in Germany, Denmark, Luxembourg, Lithuania, Holland, Finland, Ireland and Belgium, which are the countries that play an important role in milk production in the EU (Table 2). In Poland the expected decrease in the production of milk and dairy products may reach about 0.5%. The estimated value of production expressed in market prices would reach 31.9 billion dollars and thus, Poland would be the third largest dairy producer in the EU, following Germany (55.4 billion dollars) and France (55.0 billion dollars), and coming before the United Kingdom (29.4 billion dollars) and Holland (27.7 billion dollars). In the countries which will benefit from free access to the markets of other countries and which will probably increase the volume of export of milk and dairy products an increase in production could be expected. It will be the highest in New Zealand, where the production of milk and dairy products may increase by even as much as 19% and reach the value of 17.7 billion dollars. This value would still be lower than in the countries which are the world's other leading producers. The USA could still remain the largest producer. In view of the implementation of the new agricultural agreement the US dairy production could reach the value of 127 billion dollars. Therefore it can be concluded that the decrease in the production of dairy products is possible in countries which highly support their dairy sector, while countries producing at low prices and supporting the dairy sector at low level, thanks to the liberalization of the world market and increasing their trade values, may gain<sup>10</sup>.

The increase in the supply of dairy products on the markets of the countries under study caused by a dynamic increase in import may lead to a decrease in the prices of these products paid by consumers. As a result, households' demand for the products may increase (the increase may be less than proportional to the decrease in prices). Such changes might be the greatest in Belgium, Denmark and Holland, where the prices may decrease by about 1.0-1.6%, causing a smaller increase in the demand by 0.2 percentage point or 0.3 percentage point if the global dairy trade is liberated according to the draft modalities of December 2008. Similar trends in the prices and demand may also take place in China, the USA and Brazil. Only in New Zealand, where part of the increased domestic production will be 'drained' by export, the prices paid by consumers may increase, thus causing limitation of the demand. In absolute categories, the greatest demand for dairy products may be expected in India (57.3 billion dollars), the USA (49.5 billion dollars) and Russia (34.2 billion dollars), i.e. in the countries with a large population or with high disposable income. In addition, the growing popularity of dairy products in developing countries, advertising and facilitating the access to dairy products by distribution networks developed within foreign direct investments will determine the increase in global demand [Baer-Nawrocka et al. 2012]. As far as the EU countries are concerned, the highest demand for dairy products may be noted in Germany, France and Italy, although it would still be nearly or more than two times lower than in the countries with the greatest demand.

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<sup>10</sup> Cf. Baer-Nawrocka et al. [2012].

## Concluding remarks

The multilateral trade liberalisation according to the rules of the draft modalities of December 2008 may lead to an increase in the import of milk and dairy products both in the EU countries and in the countries which are the world's greatest milk producers and it may cause a decrease in the cost-effectiveness of export from the EU countries to the markets with low prices. In the EU countries the liberalisation of the dairy market may also be accompanied by limited production of milk and dairy products and by increased demand resulting from the drop in consumer prices. The demand would be satisfied with a supply of imported products. In view of those facts we can say that the progressing liberalisation of foreign trade may increase the competitive pressure both on regional markets and on the global market. In consequence, the dairy producers and processors from the EU countries may lose part of the market to the suppliers from the countries with lower costs of production. Such countries as New Zealand, the USA, Brazil and China may benefit from the liberalisation. Taking advantage of freer access to the markets of the countries which used to have a high level of protection they may increase the volume of export and in consequence, they may also increase the volume of production which is necessary to develop their export.

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