THE VIEW OF DAIRY SECTOR AND THE ECONOMIC SITUATION OF MILK PRODUCERS IN POLAND AND IN LITHUANIA AFTER ACCESSION TO THE EU

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ABSTRACT

The dairy sector is the main branch of agricultural production which constitutes source of income of many farms in Poland and in Lithuania. Accession of both countries to the structures of the European Union has radically changed the functioning of the entire dairy sector which faced changes and the necessity to comply with the new free market circumstances. The first aim of this article is to present the overview of the dairy industry in Poland and in Lithuania after the accession to the EU. The second aim is to focus on the economic situation of milk producers. The summary clearly shows the immense progress in complying with the EU requirements, although the gap between these two markets and the biggest EU milk producers is still significant. The economic results of analysed dairy farms in Poland and in Lithuania confirmed the improved performance of productivity since 2004. Relatively small (about 50%) share of subsidies in farm net income makes milk production less dependent on such type of support.

1. INTRODUCTION

The Central and Eastern Europe varies in respect of policy and agriculture but in this geographical area the coutries share mutual historical heritage. After the II World War, these countries found themselves under strong influence of the Soviet Union which caused significant social and agricultural uniformity among them. After the collapse of the Soviet Union, the Central and Eastern European countries gained complete independence and entered the path of democratic policy and free market economy development. Despite the similarities between economies of individual countries, their starting positions varied greatly, at the beginning of the transformation period. The Central and Eastern European countries and the Baltic States seemed to be quicker than other countries to adjust to the market economy rules towards international trade. The pace of economic changes and progress of democratisation in these countries were faster than in the so called Eastern-block countries (Sorsa, 1997). A chance also occurred for economic cooperation, especially between the Baltic States and the Central European countries.

The dairy sector is one of the main branch of agricultural production which constitutes source of income of many farms in Poland and in Lithuania. The transformations of the political and economy system caused radical change of dairy market conditions. This also included the end centrally-planned economy of the dairy sector with significantly subsidised milk processing sector, which was characterised by excessive supply of the raw material. Dairy cooperatives stopped being subsidised by the state and faced the necessity of privatisation. Many countries which participated in the transformation and later on the steps to accession to the European Union structures, had to deal with numerous problems within the food economy in order to function in the reality of free market. To cope with market competition, consolidation measures were introduced, especially pertaining to small and medium-sized enterprises (SME). Also, an increase of the concentration of processing took place.

The old local and regional market networks were broken in the Central and Eastern European countries and were substituted by wider international cooperation. The strong relationship of the Baltic States, within the Baltic Free Trade Area (BFTA) was loosened and ceased to exist in May 2004 due to the accession of Lithuania, Latvia and Estonia to the EU. This allowed for easier international contacts and trade with other countries. A chance also appeared for Polish and Lituanian producers and processors of dairy to widen the international cooperation. The reports, from recent years, stating that international trade activity in the scope of dairy products, and even raw milk trade, between Poland and Lithuania is starting (PAP, 2012). The integration of Poland and Lithuania with the EU visibly changed the country's dairy sector, which leads to observation of the sector's development under new market conditions, the conditions of international trade, and farms' competitiveness conditions. Poland and Lithuania are the biggest milk producer within the Central and Eastern Europe region and it is very interesting to study the path of the dairy sector development of those two closely related countries.

The aim of this study is to present the overview of the dairy industry in Poland and in Lithuania after the accession to the EU. The paper uses domestic statistical data and FADN EU data available between 2004 and 2012 which were subject to tabular and graphic analyses. The second aim is to focus on the economic situation of specialised dairy farms in Poland and Lithuania. In that case the FADN EU data were taken into account. Summary attempts to describe synthetically the current state of the dairy sector as well as the economic condition of milk producers in Poland and in Lithuania.

2. DAIRY SECTOR IN POLAND AND LITHUANIA – THE OVERVIEW

The dairy sector in the modern understanding is a complex including three, tightly related parts which constitute elements of the milk marketing chain (Sznajder, 1999):

- **the production of milk** on agricultural farms, using knowledge and farmer's work, capital and the entire infrastructure of the farm, including: the breeding and husbandry of dairy cows, the plant production for feed (required forage area), the purchasing of means of production and the selling milk,

- **the processing of milk**, most often located outside an agricultural farm, usually at the dairies but also at cheese dairies and milk powdering plants. The processing plant is a complicated structure including: organisation of the company, its technical infrastructure, milk processing technology and waste disposal technology. The procurement of milk is the element joining processing and the production, and the sale of final dairy products is the element joining processing and trade,

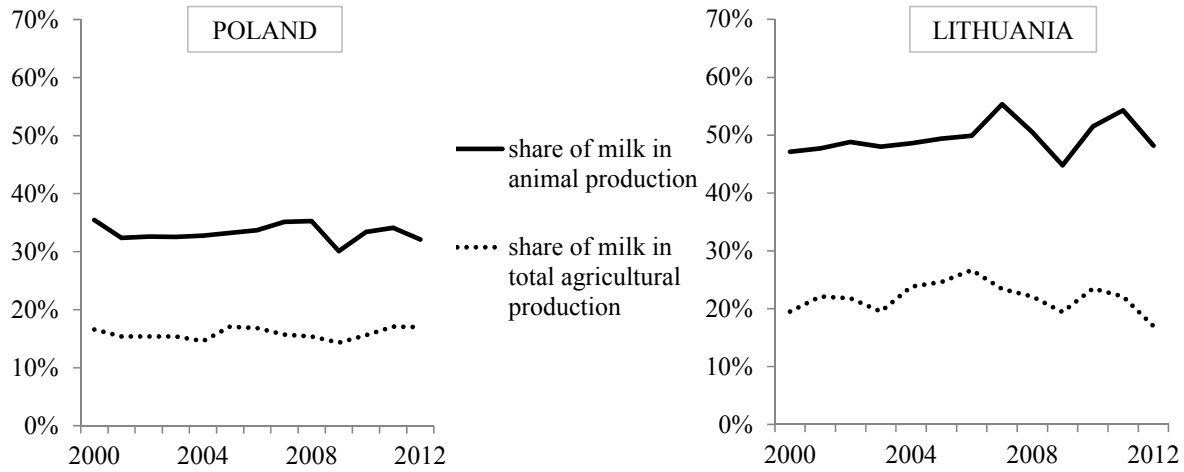
- **the distribution and the trade** which aims at supplying the final client with final dairy products of proper quality, in a way and place to the client's highest satisfaction.

Each stage of the milk marketing chain was the subject to transformation. The direction of the changes is largely influenced by the Common Agricultural Policy (CAP) and Poland and Lithuania participate in shaping it. Changes are also observed within the structure of the chain, for example: greater cooperation between producers and consolidation of processing but also internationalisation of the dairy sector. Without a doubt, changes occur also within the production at dairy farms, especially when it comes to aspects related to the quality of the raw product which, in turn, is connected with consumer expectations. All changes taking place in the dairy sector are visible more strongly in those countries which underwent the transformation of the political system. Especially with the switch of the entire agri-food sector from the centrally planned economy to the market economy system (Malak-Rawlikowska, 2007). The entire milk marketing chain operates within the current free market conditions, both in Poland and in Lithuania, however, changes within individual parts of the chain are characterised by varying dynamics.

2.1. Production of milk in Poland and Lithuania

The animal husbandry, both in Poland and Lithuania, is an important agricultural sector and the dairy cows husbandry and milk production are one of the most important branches of agricultural production. During the first three years after the EU accession (2004-2006) the value of milk production within the value of total agricultural production amounted to: in Poland 15.4%, 14.6% and 17.1%, and in Lithuania 23.8%, 24.6 % and 26,7%, respectively. In later years a small decrease of the share was recorded (Fig.1). The direction of the changes also shows that the significance of milk production increases. During 2004-2012 period, taking into account extreme values, the share of the milk production value within the total animal production amounted to 32.8-32.1% in Poland, and 48.6-48.2% in Lithuania. However, during the pre-accession period (2000-2003) it amounted to, respectively: 35.4-32.6% in Poland and 47.1-48.0% in Lithuania. It should also be noted that the share of milk within the structure of Lithuania's total animal production value was relatively high, and even higher than results of countries including Germany and Holland. In Poland the value equalled the average EU-27 value, similarly to France and Great Britain (Eurostat, 2012).

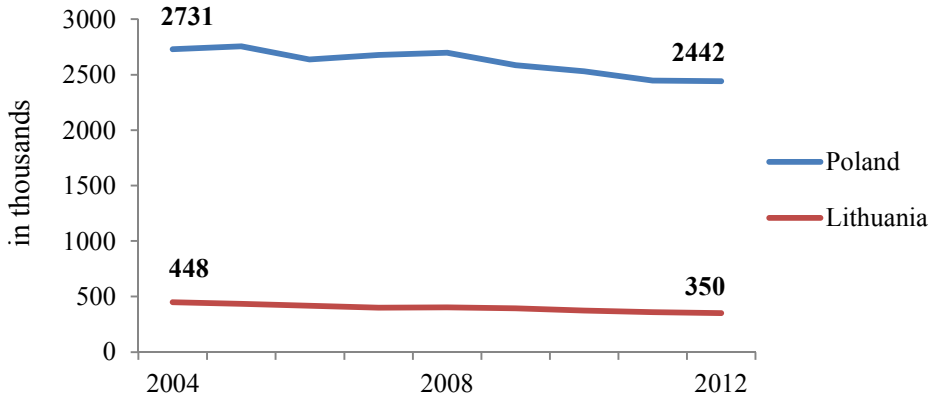
Figure 1. The share of milk production value in total agricultural production and animal production in 2004-2012 in Poland and Lithuania.



Source: Central Statistical Office of Poland and Lithuania, var. years.

The accession to the EU with the introduction of CAP was the main factor stimulating the process of restructuring the dairy sector in the last years. Important elements in this process were, e.g.: improvement of milk quality; pre-accession support investments, export development, increase in milk prices and the milk quota system. Also the increasing competition on a food market (market entry of foreign dairies, especially in Poland) has radically changed production conditions. The restrictive milk quality standards (chemical composition and purity as well as levels of different micro-organisms) mainly caused elimination of small producers from the market, who were unable to meet the quality requirements. The investments on improvement of milk quality required appropriate herd size and milk production scale to achieve the sufficient milk quota. It's worth noting, that milk quota system (limiting the milk production) was considered by producers as a barrier in the use of full production potential of dairy farms. Thus significant reduction in the number of dairy cows can be noted both in Poland and in Lithuania (Fig.2).

Figure 2. Numbers of dairy cows in 2004-2012 in Poland and Lithuania.

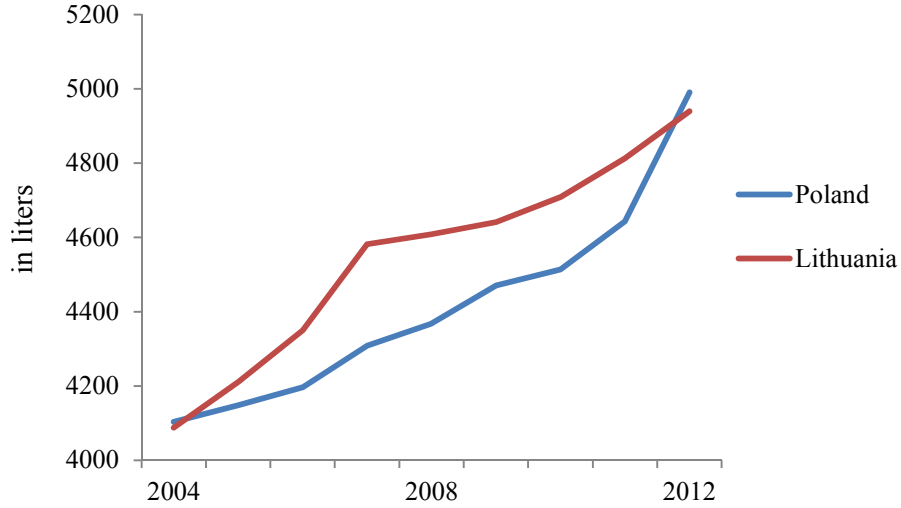


Source: Central Statistical Office of Poland and Lithuania, var. years.

The reduction of number of cows and decrease in population of dairy cows was compensated by the systematic increase of cows' milk yield (Fig.3). During 2004-2012 period milk yield in

Poland increased by 21.6%, and in Lithuania by 20.8%. Despite the decrease in population of cows, the amount of milk produced increased by 18.4% in Poland and in Lithuania – by 19.3% (the higher milk yield being the decisive factor). The increase of milk production was connected with improvement of production technology. The changes in production techniques used in dairy farms were observed, as a result of investments on new technologies (e.g. refrigerator for milk, milking parlors) and changes in nutritional practices (e.g. using the silage rather than hay).

Figure 3. The milk yield in 2004-2012 in Poland and Lithuania.



Source: Central Statistical Office of Poland and Lithuania, var. years.

Increase of milk yield directly influences the strengthening of this direction of agricultural production on the national scale. However, the fragmented production of milk is one of the greatest problems of the dairy sector in both countries. The greatest share within the structure of dairy farms, in both countries, was of the small farms (up to 10 cows). In 2010, in Poland the share amounted to 82.6% of dairy farms (in 2002 to 93.5%), and in Lithuania it amounted to 94.5% in 2009 (in 2004 to 97.7%) In 2010, in Poland 5.9 animals were kept per dairy farm (in 2002 r. – 3.3 animal) and in Lithuania – 3.6 animal in 2009 (2.6 animal in 2002). A slightly better situation can be observed in the typical dairy farms aiming at commercial farming. Studies provided by the European Commission show that between 2004 and 2009 in farms included in the FADN study, specialising in milk production, the average number of cows per 1 farm in Poland amounted to 14-16 animals, and in Lithuania – 12-18 animals; and the average milk yield amounted to, respectively, 4968-5340 kg/cow in Poland and 5046-5344 kg/cow in Lithuania.

It is worth noting that milk production is tightly connected with feed plants production, which is largely influenced by natural conditions of plant production. The use of existing grazing lands for the purposes of roughage production and grazing is important in milk production. The grazing system is the most popular system of sustaining dairy cows, both in Poland and in Lithuania. During the studied period (2004-2012) the share of grazing lands area in Poland is relatively stable in relation to the total of agricultural area and amounted to 19.7% to 21.3%. In Lithuania, in 2004, the share of grazing lands area was relatively high (amounting to 36.7% of agricultural area), however, in the following years the share decreased and amounted to only 19.4% in 2012. According to the studies by the European Commission, in farms specialising in milk production (included in the FADN studies), the use of feed area (area for production of feed in a farm) is very different between Poland and Lithuania. During

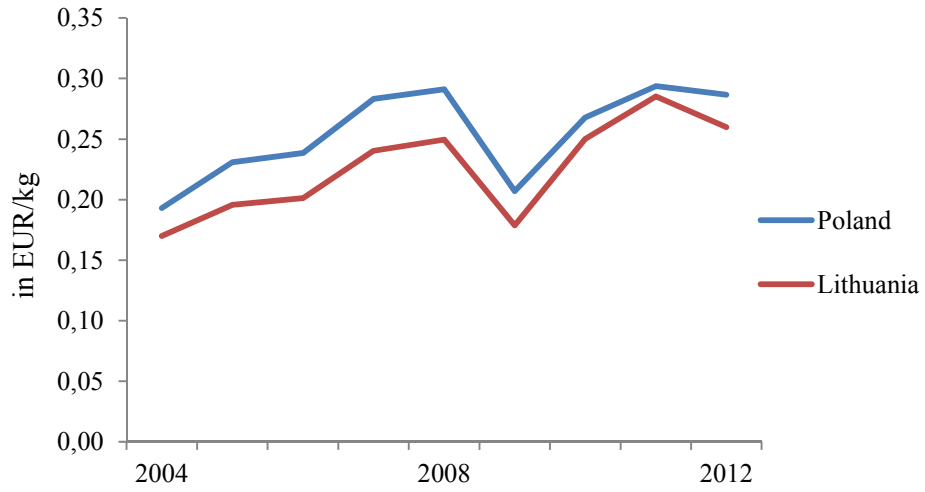
the 2004-2009 period, in Poland the feed area in those farms was on a stable level with 0.8-0.9 ha grazing area per 1 cow (except for 2004 – 0.6 ha/cow). In Lithuania, however, the feed area per 1 dairy cow was significantly larger, and during the said period showed decreasing trend, from 2.4 ha in 2004 to 1.7 ha in 2011.

The monitoring is an important mark of progress in technology of milk production and production of milk, as well as the results of assessment of dairy cows milk yield. It is often thought that with the help of assessment of milk yield modern and professional herd management is possible, including within the scope of: assessment of genetic advantages of animals allowing efficient husbandry and appropriate selection, that is heard improvement through improvement of animal characters and habit (Polish Federation of Cattle Breeders and Dairy Farmers, 2014). The milk yield program facilitates optimal feeding of animals, influences the increase of amount and quality of produced milk, thus increasing its profitability, and allows determination of the costs of production of milk and herd's economic assessment. In Poland, as in Lithuania, the number of dairy cows included in milk yield assessment increases. In 2004 the percentage of cows under control in Poland amounted to 17.4%, and in Lithuania as much as 42.2%. Following years saw a significant increase of interest in the assessment, and in 2012 the percentage of cows under control in Poland amounted to 27.9%. However, in Lithuania during the period remained at a relatively stable level and amounted to 43% in 2012 (during the 2005-2008 period amounted to as much as 47-49%). It should be noted that production results (milk yield) of cows under assessment are much higher than the national average in both countries in question.

The most popular husbandry races within the milk yield assessment include:
in Poland - Jersey, Montbeliarde, Polish Holstein-Friesian, Polish Red-White, Red Polish;
in Lithuania - Lithuanian Native Ash-grey, Lithuanian B & W, Holstein B&W , Native White-back, Ayrshire.

Raw material selling price obtained is a very important aspect of milk production. During the period 2004-20011 milk producers obtained favourable milk sales prices, despite some years of downturn (Fig.4).

Figure 4. The selling milk prices in 2004-2012 in Poland and Lithuania.



Source: Central Statistical Office of Poland and Lithuania, var. years.

Just after Poland and Lithuania's accession to the EU, in 2004, purchase prices were relatively lower which resulted from the decreasing tendency of shaping of purchase prices during the pre-accession period, that is years 2000-2003. In 2009 a significant decrease in milk purchase prices occurred, resulting from the global economic crisis, the results of which were felt by both Polish and Lithuanian producers.

It should be highlighted that milk production, as well as purchase of milk by the dairy industry are subject to seasonal fluctuations. The seasonal character of milk production is shaped by numerous factors, mainly within agriculture, and to a lesser degree within the external surroundings of farms (Matysik-Pejas, 2007). The inequality of production of milk is a phenomenon typical of smaller dairy farms where milk is not the main commercial product. This factor is of no significance to farms with large herds of dairy cows, specialising in production of milk of high quality.

2.2. Milk processing in Poland and in Lithuania

The process of technological and structural adjustment (after the accession to the UE) of milk processing was less impetuous than in case of the changes at the level of producers. Adjustment of milk processing to the EU market requirements was connected mainly with high quality requirements set for the production process but also with high quality requirements for the raw milk. The EU aid schemes, mainly investment grants for modernisation and further development of processing facilities were and still are an important support allowing transformation. A lot of the smaller facilities, which did not meet the requirements, was closed down or bought by large companies. In Poland a significant part (around 20%) of big and medium companies has foreign strategic investors, which not only guarantees external capital injection, technology and management systems know-how but also facilitates access to selling markets and distribution channels, and accelerates promotion of the required standards and procedures. Nevertheless, similar strategic actions may be observed in case of companies with a domestic capital.

After the accession to the EU, considering the number of subjects processing milk, in case of Poland a sudden increase in the number of processing facilities fully adjusted to the EU requirements was noted. There were 55 such facilities in 2004, and only a year later, the number increased to 225. In the following period (2006-2012), the number of processing facilities decreased from 226 to 172, mainly due to concentration and joining of companies into larger structures but also a significant percentage of subjects had to close down. In Lithuania, in 2003 there were 20 processing facilities in the dairy sector, and in the 2006-2012 period, the number dropped and currently there are 13-14 processing facilities. It can be stated that milk processing in Lithuania is very concentrated (in 2012 four main groups of producers in the country combined 80% of income of the total dairy sector).

2.3. Distribution of dairy products in Poland and in Lithuania - export and import

Poland and Lithuania are significant net exporters of dairy products (Bugała 2011). Cheeses, curds, powdered and liquid milk, and cream are the basic export products. Both countries' accession to the European Union influenced the systematic increase of export. The exception being 2009 characterised by lower results of both Polish and Lithuanian foreign trade due to the economic crisis (a small decrease was noticeable in Lithuania as soon as 2008). In 2009 the value of polish dairy products export dropped by about 24% in relation to the record year 2008, and the drop in Lithuania was significantly smaller and amounted to about 14%. The share of dairy import in the total value of food products imported to Poland, as well as to

Lithuania is insubstantial and in 2009 amounted to around 3% and 4%, respectively. The value of import of dairy products has been rising continuously since 2003, with the exception of 2009, as in the case of export.

Table 1. Polish foreign trade in dairy products (mln EUR).

Specification	2003	2004	2005	2006	2007	2008	2009	2010
export	327	561	880	916	1165	1222	925	1177
import	50	62	99	140	259	284	273	364
saldo	276	499	782	776	906	938	652	813

Source: Central Statistical Office of Poland and Lithuania, var. years.

The European Union is the main recipient of Polish and Lithuanian dairy. In 2003 the dairy products imported to the European Union from both these countries amounted to 41% of total value of dairy export. Since Poland's accession to the EU, the percentage has been rising and amounted to 69% in 2004 and 82% in 2009. In case of Lithuania, export to the member states remains at a fairly stable level of 60-65%.

Table 2. Lithuanian foreign trade in dairy products (mln EUR).

Specification	2003	2004	2005	2006	2007	2008	2009	2010
export	152	220	246	285	385	372	320	405
import	11	13	35	59	82	112	73	123
saldo	142	207	211	226	303	260	247	282

Source: Central Statistical Office of Poland and Lithuania, var. years.

In 2010 Poland noted a slight increase in significance of export to countries outside the EU. The increase amounting to almost 23% resulted from the increase of export of dairy products to Russia and Arabic countries. Germany is the most important recipient of Polish dairy products. In 2004 the value of export amounted to only 8%, and currently it amounts to ¼ of the total value of Polish dairy export. However, export of dairy products from Lithuania to countries outside the EU amounts to 35-40%, of which most products reach the Russian market (33% of total export of dairy products in 2010).

The direction of import of dairy products to Poland and to Lithuania is similar to that of export – from member states. In 2003 import share amounted to 82% and 77% of total value of imported dairy products, respectively. In 2010 the share increased to 99.6% within the structure of Polish dairy import, and 100% within Lithuanian. Germany is Poland's main trade partner, and it is from this country that nearly half of all the imported dairy products comes. France and Lithuania are two partners of lesser importance. Potentates from the region of Oceania (New Zealand, Australia), as well as Switzerland are the suppliers from outside the EU. In case of Lithuania, Latvia and Estonia are the main suppliers of dairy products and, what is worth highlighting, so is Poland (as much as 23% of total dairy products import).

2.4. Distribution of dairy products in Poland and in Lithuania – the consumption

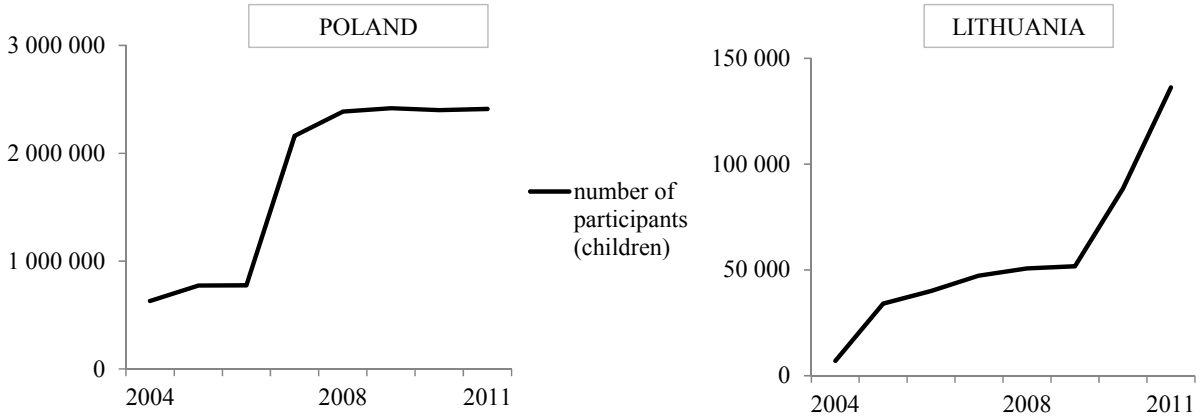
In the 2003-2005 period, in Poland, a decrease in milk and dairy products consumption in general, as well as per capita could be observed. In 2005 total milk and dairy products consumption dropped in comparison with 2003 by 8.5%, and milk and dairy products in milk equivalent consumption (no butter) per capita dropped by 4.4%, and butter consumption per capita decreased by 10.6% (Pietrzak, Szajner 2006). A gradual increase in dairy consumption

can be noted since 2006. In 2009 milk consumption in Poland reached the level of 170-182 litres per citizen, and consumption of butter amounted to around 4.2 kg. Consumption of cheeses increased by nearly 5% in comparison with 2008. According to IAFE-NRI estimates, in 2011 the balance consumption of milk in Poland calculated per citizen amounted to 193 litres (excluding milk used for the production of butter). This means that it was higher by 1% than the previous year and by about 12% than in 2005 . Consumption of butter and cheeses in 2011 amounted to 4.0 kg per capita. Newest data show that dairy products consumption (in milk equivalent) amounted to the average of 280 kg in 2012, calculated per number of Polish citizens.

A systematic increase in general consumption of cheeses and butter may be observed in Lithuania since 2006, however, consumption of milk decreased (Eastagri, 2009). According to FAO data, in 2009, in comparison with 2006, consumption of butter and cheeses increased respectively by 34 and 85%, and consumption of milk decreased in total by around 72%. However, when analysing the consumption of milk and dairy products per citizen, calculated per kg of milk until 2009, it remained at a relatively stable level of 280-290 kg. The consumption per citizen of Lithuania in 2009 in case of milk was at 137 litres, and of butter at 3.49 kg. Consumption of cheeses dropped by nearly 10.5% in comparison with 2008 (Eurostat 2010).

Since 2004, in Poland and in Lithuania the "EU School Milk Programme" social campaign has been run. The aim of the programme is to teach children and youth good eating habits, through promotion of consumption of milk and dairy products. This form of support and promotion of consumption of milk and dairy products met with noticeable interest in both countries. Poland is a leader in implementation of the programme as far as consumption of milk and obtaining of support thanks to EU funds are concerned. The number of children (at educational establishments) consuming milk and dairy products within the programme, in Poland and in Lithuania, are shown in Figure 7.

Figure 7. EU School Milk Programme in 2004-2012 in Poland and Lithuania.



Source: EU School Milk Programme.

The scale of the "EU School Milk Programme" in Poland and in Lithuania is incomparable. Realisation of the programme in these two countries also differs greatly. It is worth noticing that the significant increase in the number of children included in the programme in Poland occurred slightly earlier (in 2006), and stabilised in later years. In Lithuania, the increased interest begun in 2009 and the number of children included in the programme in following years increased further, rapidly.

3. THE ECONOMIC RESULTS OF MILK PRODUCTION IN POLAND AND LITHUANIA

Farms specializing in milk production are an important part of the Polish and Lithuanian agriculture, thus, it is justified to study their productivity and effectiveness. One way to assess the operation of farms is the management effectiveness, that is, the ratio of the effects to the means used (Józwiak, 1998). In order to evaluate the effectiveness of dairy farms, the assessment of farm productivity can be used. Productivity is a quantitative relation between the output and the size of the factor involved in its production (Kołoszyc, Świtłyk, 2004). Effectiveness can be measured using indicators, the most frequently economic and financial ones of a cost and resource nature, in which the aim should be full use of the potential (Kulawik, 2010). In this study, measuring the effectiveness will be based on total output profitability (Kulawik, 2008).

3.1. Materials and methods

The study uses available empirical data collected in the EU FADN from 2004 (the year of the accession to the EU) and 2012 (recently available data on EU FADN database). Study objects were chosen using the purposive sampling method. Groups selected for the analysis were farms specializing in dairy (type of farming – TF14 Specialist milk). The type of farming is defined on the basis of the contribution of individual types of agricultural activities to the total Standard Output value of a farm, and it reflects the pursued system of production. The selected farms specializing in milk production were characterized by the fact that revenues from the sale of milk and dairy products accounted for over 50% of total revenues. For the purposes of this analysis, total revenues are considered to be total output[1] increased by the value of subsidies related to operating activities.

The indicators were used to assess the productivity of farms, as follows:

- Total output per dairy cow,
- Total output per 1 AWU (Annual Work Unit)[2],
- Total output per 100 Euro assets.

The following indicators were used to analyse the economic efficiency:

- Total output profitability [%] = (Total Output + Total Subsidies excl. on investments) / Total Input,
- Total costs/total output.

To illustrate the economic situation of Polish and Lithuanian dairy farms, economic results of farms with the type of farming TF14 specialist milk are also presented in selected EU countries: Hungary (Central Europe) and Latvia (Baltic State).

3.2. Results of the study

It has to be accented that the economic results of surveyed group of farms only reflect the results of the selected sample, but there are indications that it may be an illustration of the

[1] Total output of crops and crop products, livestock and livestock products and of other output, sales and use of (crop and livestock) products and livestock, change in stocks of products (crop and livestock), change in valuation of livestock, various non-exceptional products, less purchases of livestock.
[2] Total labour input of holding expressed in annual work units = full-time person equivalents.

economic performance of milk production in general. The main informations concerning the designated groups of farms in selected countries were presented in table 4.

Table 4. Selected data on the group of farms (TF14 Specialist milk) in the selected countries.

Specification		Poland		Lithuania		Hungary		Latvia	
		2004	2012	2004	2012	2004	2012	2004	2012
Economic size	1000 Euro SO	19.6	29.3	11	18.9	73.6	93.2	18.1	25.1
Labour input	AWU	1.77	1.82	1.49	1.67	2.79	2.87	2.3	1.98
Total Utilised Agricultural Area	ha	15.54	21.04	24.96	32.82	62.1	72.52	52.16	47.27
share of forage crops	%	50	60	69	72	58	60	75	81
Dairy cows	LU[1]	12.2	14.8	8.3	11.1	30.3	33.5	14.1	14.4
Stocking density	LU/ha	2.2	1.8	0.6	0.7	1.2	1.2	0.6	0.6
Milk yield	kg/cow	4688	5304	4476	5340	5968	6722	4627	5651
Total output	Euro	17806	33551	12099	27804	87655	131117	23689	36308
share of milk&milk product	%	64	80	51	66	52	62	52	69

[1] Livestock Unit.
Source: Own calculation based on EU FADN data.

At the beginning, it is worth emphasising that the selected Polish and Lithuanian farms were, in terms of area, several times smaller than the Hungarian and Latvian ones (it is the result of a greater concentration of milk production in Hungary and Latvia). Typically, the structure of crops on dairy farms is dominated by fodder plants, providing cheaper feed from own production. The share of fodder plants in the analysed set of farms was the highest in the studied farms from Lithuania (69-72%) and Latvia (75-81%), whereas it was significantly lower in case of Polish and Hungarian farms (about 60%). Feeding system is an important issue affecting the production and economic results in farms focused on dairy cows.

The degree of specialization has been increasing along with the increase in the scale of keeping dairy cows, both the number of cows and their milk yield. Since 2004, the production situation of selected farms has improved in all the countries concerned. In terms of the average milk yield of cows, in 2012, Hungarian farms reached results by 27% better (about 6700 kg per cow) than Polish and Lithuanian farms (about 5300 kg per cow) and by about 19% better than selected Latvian farms (about 5650 kg per cow). Selected group of Hungarian farms (these were the largest farms amongst others) were also characterized by the best labour productivity. In 2012, the number of people employed full-time per 10 milk cows was 0.86 AWU. In case of Poland, it was 1.22 AWU, Lithuania – 1.50 AWU and Latvia – 1.40 AWU.

The first of the measures used was the value of production (total output) per 1 milk cow. The values of this rate corresponded with the milk yield of cows in the analysed groups of farms increasing progressively in all countries since 2004. Selected group of Lithuanian and Latvian farms reached the value of production of approximately 2500 euro/LU, and Polish farms – about 2300 euro/LU. The results obtained were lower than in the group of Hungarian farms by 36% and 41%, respectively.

Table 5. Selected factors of productivity on the group of farms (TF14 Specialist milk) in the selected countries.

Specification		Poland		Lithuania		Hungary		Latvia	
		2004	2012	2004	2012	2004	2012	2004	2012
Total output per dairy cow	Euro/LU	1460	2273	1459	2503	2891	3920	1686	2521
Total output per 1 AWU	Euro/AWU	10060	18435	8120	16649	31418	45685	10300	18337
Total output per 100 Euro of assets	Euro/100 Euro	25	17	30	31	28	45	50	44

Source: Own calculation based on EU FADN data.

Labour productivity informs about the value of production achieved per 1 full-time employed person. High labour productivity means that at a given workload the production unit achieved a higher value of production. Data presented in Table 5 shows that the labour productivity was higher in the groups with a larger number of cows in the herd. In Polish farms, with a herd of about 15 milk cows, production/AWU was nearly 18.5 thousand euro. There was a similar situation in relation to the studied farms in Latvia (18.4 thousand euro), and slightly worse in case of a group of Lithuanian farms (about 16.6 thousand euro). In the Hungarian farms, the value of production per 1 AWU was higher by more than half compared to the other groups and amounted to almost 46 thousand euro.

Hungarian and Latvian farms made the best use of capital. It is illustrated by the capital productivity index, that is, the value of production per 100 euro of assets involved. In 2012, in case of these groups of farms, this index amounted to 44-45 euro and was by 13 euro higher than on Lithuanian farms and by 27 euro than in the group of Polish farms. Farms in Poland were characterized by the weakest use of capital in the considered years (2004 and 2012).

Output profitability index in the selected group of Polish dairy farms was at the highest level (154%) compared to the other groups. It is worth indicating that in 2012, in case of Polish and Lithuanian farms, total costs were significantly lower than the value of output (costs accounted for 77% of the value of output), and in case of Lithuanian farms only slightly lower (accounted for 90%), and in Hungarian and Latvian farms costs even exceeded revenues (Table 6).

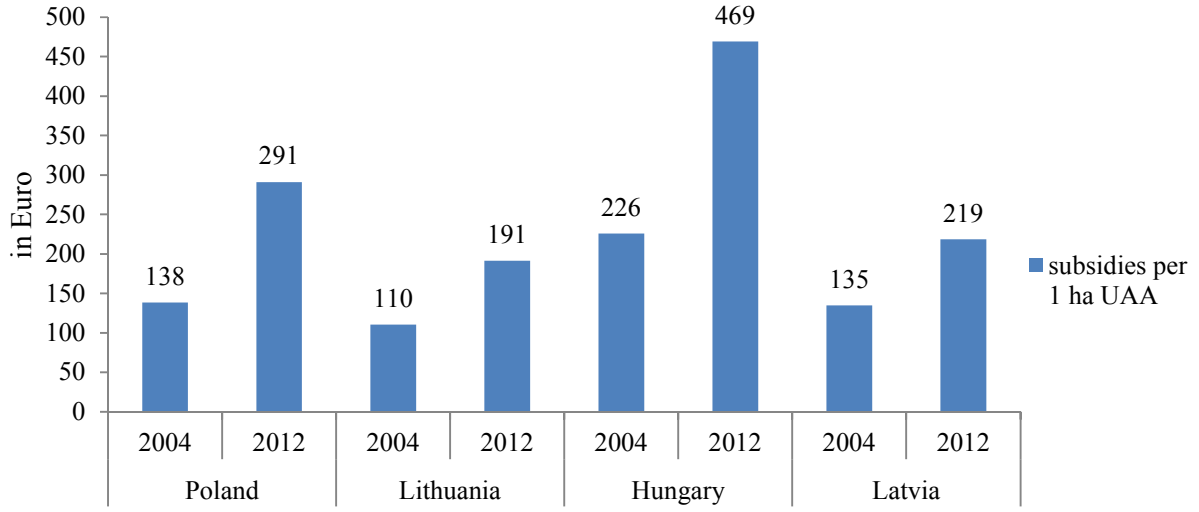
Table 6. Selected indexes of effectiveness on the group of farms (TF14 Specialist milk) in the selected countries.

Specification		Poland		Lithuania		Hungary		Latvia	
		2004	2012	2004	2012	2004	2012	2004	2012
Output profitability	%	160	154	166	137	108	119	137	122
Total costs/total output	-	0.70	0.77	0.74	0.90	1.07	1.06	0.94	1.05

Source: Own calculation based on EU FADN data.

The level of support with subsidies to 1 ha of UAA increased significantly from 2004 to 2012 in all the considered farms, but apparently larger support concerns rather the studied dairy farms in Poland and in Hungary than in case of dairy farms in Lithuania and in Latvia.

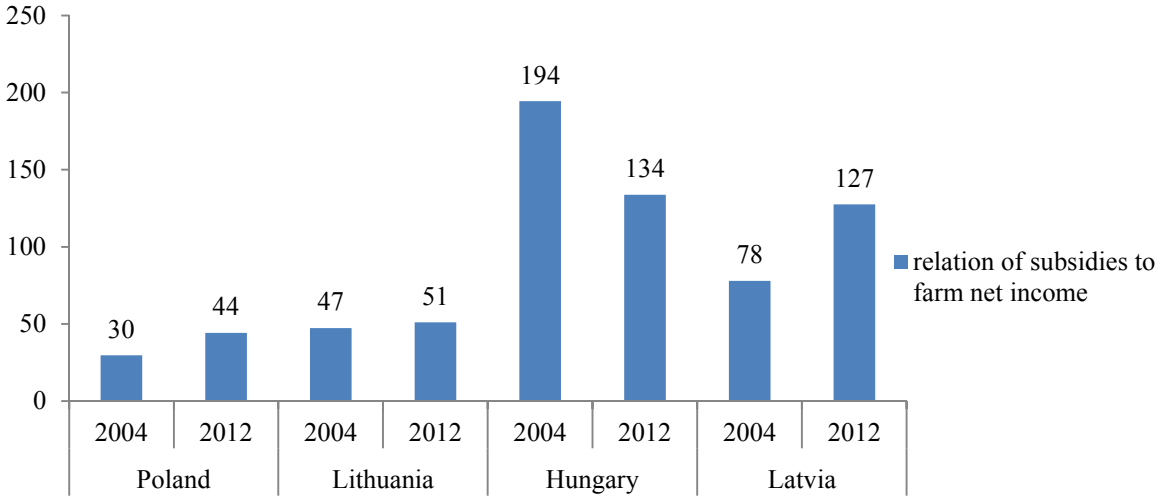
Figure 8. The subsidies per 1 ha UAA on the group of farms (TF14 Specialist milk) in the selected countries.



Source: Own calculation based on EU FADN data.

However, it is worth noting that the relation of subsidies to income from the family farm in Poland and Lithuania is relatively small (less than 50%). In case of Hungarian and Latvian farms, the level of this support amounted to as much as 130% in 2012.

Figure 9. The relation of subsidies to farm net income level on the group of farms (TF14 Specialist milk) in the selected countries.



Source: Own calculation based on EU FADN data.

4. SUMMARY AND CONCLUSIONS

The progress made in recent years (after accession to the EU) in Polish and Lithuanian dairy sector is a highly beneficial phenomenon, however the gap separating the two countries from the biggest EU producer is still wide, for example in the scope of production scale or cows' milk yield. The milk quota system, as one of the most important instruments of intervention on the milk market, had a strong influence on the structural and technological changes in milk production. It caused the elimination of small producers who could not meet the quality

requirements of production from the market which, in consequence, resulted in greater concentration of milk production. Also, as a result, the number of dairy cows was reduced, both in Poland and in Lithuania. The high fragmentation of milk production remains the greatest problem and challenge. The greatest share within the structure of dairy cow farms, both in Poland and in Lithuania, belonged to farms with small herds up to 10 animals. After the accession to the EU, a significant improvement of the situation could be observed, as the result of continuous concentration of production, however, the dynamics of the process is still weak.

A very important informations come from the comparison of the economic performance in selected dairy farms in Poland and in Lithuania with similar specialist dairy farms in Hungary and Latvia. Amongst the surveyed groups the milk production is more concentrated in Hungary and Latvia and the dairy farms appeared to be more specialised (in the matter of farm area and scale of milk production). However, the results of analysed dairy farms in Poland and in Lithuania confirmed the improved performance of productivity since 2004. In the other hand, the level of financial support of surveyed dairy farms was significantly higher in Hungary and Latvia than in Poland and Lithuania. But the selected indexes of the production effectiveness showed the better situation of selected dairy farms in Poland and Lithuania. Amongst the surveyed countries, in case of Poland the highest level of total output profitability index was calculated. The relation of subsidies to farm net income in case of Poland and Lithuania was relatively small (about 50%) which makes milk production less dependent on such type of support. While in case of surveyed dairy farms in Hungary and Latvia the large dependence on the subsidies is shown, in 2012 the relation of subsidies to farm net income was about 130%.

The processors' situation is influenced mainly by the conditions on sales markets of products. Processing facilities realise production strategies for the sale market. In Poland significant part of products is exported to the EU market (mainly Germany); in case of Lithuania, the Russian market is of importance. The long-term restrictions or constraints on import of Lithuanian dairy products observed have negative effect on the processors, who are thus forced to change the structure of production – instead of producing fresh products, products with longer expiry dates are produced, which allows comfortable search for other sales markets. Such products will be sold on Western EU markets, however the profitability of sales on those markets will be lower than in case of the Russian market.

Foreign trade in Polish dairy industry has been playing a major role for a long time, despite numerous difficult periods throughout history. The accession of Poland and Lithuania to the European Union and accepting of the rules of the EU Common Commercial Policy created the effect of establishment of marketing of agri-food products, as well as improvement of positive trading balance. It resulted from removing of all constraints in mutual trade in agri-food products between the "old", as well as the "new" EU member states. In case of Poland, the high dynamic of growth of course of trade was observed in the scope of animal products, especially in the scope of dairy products. Lower prices of the Polish and Lithuanian products were the factors stimulating export of dairy products to the EU countries and providing competitive advantage. A pronounced drop of value of exported products was recorded only in 2009 both in Poland and in Lithuania. This situation resulted from the economic crisis which lead to decreased import demand and lowered prices of dairy products across the world. It is also worth to pay attention to import in trade in milk products, which between 2003 and 2010 showed continuous increase. Even though Germany is still the main supplier

of dairy products to Poland, Lithuania is also of significance among the closest partners. In case of Lithuania, Latvia and Poland are the basic transactors supplying dairy products.

Domestic consumption of milk and milk products in Poland and in Lithuania is significantly lower than in the countries of Northern Europe, such as Denmark or Holland, and in the Scandinavian countries, where similar models of food consumption exist (Seremak-Bulge, 2012). It should also be noted that, so far, production of milk grew faster than consumption. In consequence, it resulted in excess in supply over demand and in self-efficiency in covering home demand for dairy products.

Finally, it should be highlighted that Poland's and Lithuania's accession to the European Union accelerated many positive changes in economies of both countries, and opened new perspectives for development. More and more frequent opinions of observers of economic markets and their thoughts on the closeness between Poland and Lithuania, whose mutual history oftentimes intertwined, are not without significance. Amongst economic reporters you can more often hear: "The Polish–Lithuanian Commonwealth (federation including the Crown of the Polish Kingdom and the Grand Duchy of Lithuania) once existed, now the Baltic Functional Airspace Block – common airspace of the Republic of Poland and of the Republic of Lithuania exists. Why, then, shouldn't there be a Milk Republic, in the sector of dairy, in the future?"

BIBLIOGRAPHY

ARR (2010), **Szklanka mleka**, Warszawa.

Bugała, A. (2011), **Polski handel zagraniczny artykułami mleczarskimi w latach 2003-2010**, FAPA.

European Commission Report, (2013), **EU dairy farms. Report 2012 based on FADN data.** http://ec.europa.eu/agriculture/rica/pdf/dairy_report_2012.pdf [Accessed 20.01.2013]

Eurostat, (2012), http://epp.eurostat.ec.europa.eu [Accessed 20.01.2012].

EastAgri, (2009), **Milk stats: Production, Trade, Consumption.** http://www.eastagri.org /files/Consumption%20of%20Milk%20&%20Dairy%20in%202009.xls [Accessed 20.01.2014].

EU School Milk Programme, www.ec.europa.eu/agriculture/drinkitup/index_en.htm. [Accessed 9.05.2014].

FAPA, (2006), **Polskie rolnictwo - dwa lata po akcesji do UE**, FAPA**.**

GUS, (2012), **Charakterystyka gospodarstw rolnych. Powszechny Spis Rolny 2010.**

Górski, J. (2011), **Litwa-Estonia-Łotwa: Bałtyckie tygrysy liżą rany.** Forum Mleczarskie Biznes.

ICAR, (2014), **Yearly Milk Enquiry**, http://www.survey-icar.org/cow_survey/ [Accessed 20.01.2014].

IDF, (2013), **The world dairy situation 2013.** Bulletin of the international dairy federation 470/2013

Józwiak, W. (1998), **Efektywność gospodarowania w rolnictwie.** Encyklopedia agrobiznesu. Fundacja Innowacyjna, Warszawa, p.146–149.

Kazlauskiene, N., Meyers,W.H. (1997), **The Baltic Free Trade Agreement in Agriculture: Issues and Potential Impacts.** Center for Agricultural and Rural Development, Iowa State University.

Kazlauskiene, N., Meyers,W.H. (2000), **The Baltic Free Trade Agreement In Agriculture: Early Results Of The Experiment.** Economic Policy in Transitional Economies, 9(3).

Kołoszycz, E., Świtłyk, M. (2004), K**oszty, dochodowość i efektywność produkcji mleka**, Związek prywatnych producentów mleka, Warszawa.

Kulawik, J. (2010), **Efektywność przedsiębiorstw wielkotowarowych w rolnictwie**, Zagadnienia Ekonomiki Rolnej nr 3, IERiGŻ-PIB, Warszawa.

Kulawik, J. (2008), **Analiza efektywności ekonomicznej i finansowej przedsiębiorstw rolnych powstałych na bazie majątku RWSP**, IERiGŻ-PIB, Warszawa.

Lekesys, V. (2002), **The emerging farm structure of milk production and trends in production in Lithuania**, Global trends in the dairy Industry: Outlook for the Baltics, OECD.

Matysik-Pejas, R. (2007), **Sezonowość skupu mleka oraz jego cen przed i po wprowadzeniu systemu kwotowania w Polsce**, Zeszyty Naukowe SGGW w Warszawie - Problemy Rolnictwa Światowego, t. 2(17): 258-266.

Maksymowicz, E. (2013), **Polska rzeka mleka**, www.wilnoteka.lt/pl/tresc/polska-rzeka-mleka [Accessed 9.09.2014].

Malak-Rawlikowska, A., Milczarek-Andrzejewska, D., Fałkowski, J. (2007), **Restrukturyzacja sektora mleczarskiego w Polsce. Przyczyny i skutki**, Roczniki Nauk Rolniczych SERiA G, T.94, z.1.

Miklaszewski, S., Malendowski, E. (2009), **Gospodarka światowa w warunkach globalizacji i regionalizacji rynków**, Warszawa.

Polish Federation of Cattle Breeders and Dairy Farmers, (2013), **Czym jest ocena wartości użytkowej bydła**, www.pfhb.pl/?strona=ocean_charakt.htm [Accessed 20.01.2013].

Polish Press Agency, (2012), **Polaków kusi litewski rynek mleczarski**, www. biznes.wp.pl [Accessed 18.01.2012].

Ryan, M. (2002), **Implication for the dairy sector in the Baltic countries**, Global trends in the dairy Industry: Outlook for the Baltics, OECD.

Seremak-Bulge, J., Bodył, M. (2012), **Spożycie mleka w Polsce na tle innych krajów**, Zagadnienia Ekonomiki Rolnej, 338(1) p.146-158.

Sorsa, P. (1997), **Regionalism and the Global Economy: The Case of Central and Eastern Europe**, The Global and Regional Outlook in the Baltics.

Szajner, P. (2009), **Rozprawa doktorska.** IERiGŻ-PIB, Warszawa.

Sznajder, M. (1999), **Ekonomia mleczarstwa**, Wydawnictwo Akademii Rolniczej im. Augusta Cieszkowskiego w Poznaniu.

www.vilnius.trade.gov.pl/pl/Wiadomosci_gospodarcze_z_Litwy/article/detail,2787,Rolnictwo.html [Accessed 9.09.2014].

Žemės ūkio informacijos ir kaimo verslo centras, (2013),http://www.vic.lt/uploads/file/06_ukiu110101_pagal_gyvas_karvs11.pdf,http://www.vic.lt/uploads/file/07_ukiu110101_pagal_gyvus_karvs21.pdf,http://www.vic.lt/uploads/file/08_ukiu110101_pgl_gy_kar22.pdf [Accessed 9.07.2013].