



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

THE ROLE OF STRUCTURAL CHANGES IN INCREASING COMPETITIVENESS OF BALTIC DAIRY FARMS

Armands Veveris, M.oec, Latvian State Institute of Agrarian economics, Struktoru str.14,
Riga, Latvia, LV-1039, e-mail: armands@lvaei.lv



*Paper prepared for presentation at the 118th seminar of the EAAE
(European Association of Agricultural Economists),
‘Rural development: governance, policy design and delivery’
Ljubljana, Slovenia, August 25-27, 2010*

Copyright 2010 by Armands VEVERIS. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Abstract

The paper provides analysis of dairy farms in the Baltic States, their development since accessing EU. During this period the specialisation level has increased but the total number of farms has fast reduced. The total economic indicators increased until 2007, but they still significantly lag behind Western Europe. Big investment has been made, but in the result, the cost level has not reduced but even increased, which has several reasons. Thus many farms were not ready to survive the economic downturn. The results of the research allow concluding that when planning future support for dairy industry the main attention should be paid to introducing cost competitive technologies, supporting cooperation in the purchase and use of fixed assets; it is necessary to educate farmers in efficient business management, as well as to facilitate integration of milk producing and processing enterprises.

Keywords: Dairy sector (O13), income (Q14), investment (O16), support (Q18).

Introduction

Already since 2004 the Baltic States have joined the common European Union market; however, significant differences exist in the income level between most of the farmers of the “old” and the “new” EU Member States. Among the new Member States, Rumania, Bulgaria, Poland, Latvia and Lithuania have especially low income per one employed person in agriculture – it lags behind the EU-15 level for about 5-6 times. The present paper analyses the situation in the Baltic States, especially in Latvia and Lithuania, taking into consideration the fact that agriculture plays a significant role in the economics of these countries, especially in employment. One of the main industries in the Baltic agriculture is dairy industry, therefore the paper analyses dairy farms, which partly characterizes the situation in the entire agriculture sector.

The goal of the research is to find out the main factors determining the lower income level in the Baltic dairy farms if compared with the total EU level and to assess the role of structural changes in reducing these differences.

To attain the goal, the research characterizes the role of dairy industry in the Baltic States, studies the structure and the economic indicators of dairy farms, comparing them with dairy farms of certain West European countries (the Netherlands a.o.). The main factors determining differences in the yield of dairy industry among countries are revealed. The structural changes over the last 7-20 years and their impact on increasing the income level have been assessed. At the conclusion of the present paper the author offers recommendations concerning the necessary changes to increase the stability and competitiveness of the Baltic dairy industry.

The analysis performed within the framework of the research considers the economic aspects of the introduced structural changes, but they undoubtedly have big impact on social and environmental issues. However, a detailed research of these two areas is an object of another study.

During the research the author used economic information about dairy industry – results of the surveys of the structure of dairy farms, FADN, EAA, market and price information, general statistical data. To attain the goal, economical statistical methods were used: comparative analysis, analysis and synthesis, logically constructive and graphical method. The analysed period of time largely depends on data availability, but the emphasis was put on comparing the period before accessing EU (or the year of accession) and after it. In certain cases a longer period of time was analysed.

Two main indicators for characterising the role of dairy sector were used – gross value added (GVA) at factor cost and use of labour in full time equivalent units.

1. The role of dairy sector in the Baltic States

The dairy sector primary level is the most significant part in the Baltic agriculture, according to its weight in GVA at factor cost in agriculture. The dairy sector primary level GVA at factor cost has increased more than 3 times in the period of 2000-2007, mainly due to the growth in state and EU support payments as well as in milk purchase price (from 150 EUR up to 260 EUR per tonne). The

data of GVA at factor cost at the dairy sector secondary level are unstable; however, they do not indicate a substantial upward trend.

The importance of the dairy sector is proved by the fact that dairy production makes approximately 47% of GVA at factor cost of agricultural sector in Latvia and it employs 42% of the labour employed in agriculture. At the national economy level, the role of dairy sector in employment is hardly to be overvalued, because, despite the fact that labour use at dairy sector primary level decreased by 35% in 2007 over the year 2000, the part of dairy sector in the employment structure of Latvia still makes 5-6% in full time equivalent units (Author's calculations for 2006-2007). Similar data are gained about the other Baltic countries; however, Estonia exhibits the tendency that the role of agriculture, including the dairy sector, is slightly smaller there than in Latvia while in Lithuania it is bigger (see Table 1). The period from 2004-2006 was analysed because then the impact of the Baltic countries accessing EU was expressed and the prices were comparatively stable in this period, whereas large fluctuations of milk price taken into account after that period.

Relation of the dairy sector GVA at factor cost of each Baltic State to its GDP at current prices allows concluding that the dairy sector is most significant in Lithuania, where it constitutes 2.6-3% of the GDP. Latvia is next, with approximately 2%, and in Estonia this sector is relatively smaller – 1.2-1.6% of the GDP. The weight of dairy sector in the structure of economies decreased in the period 2004-2006, but it is still significant.

Table 1. Dairy sector gross economic effect indicators in the Baltic States, 2004-2006

State	Latvia			Lithuania			Estonia		
Indicator/year	2004	2005	2006	2004	2005	2006	2004	2005	2006
GVA at factor cost at dairy sector primary level (evaluation), M EUR	210.0	202.1	229.3	452.8	526.7	479.4	134.8	129.8	119.3
GVA at factor cost in manufacture of dairy products (NACE Rev. 1.1 DA 15.5), M EUR	42.4	52.7	54.5	94.6	101.3	135.7	24.2	30.2	42.4
Dairy sector GVA at factor cost, M EUR	252.4	254.8	283.8	547.4	628.0	615.1	159.0	160.0	161.7
Dairy sector GVA related to GDP at current prices, %	2.3	2.0	1.8	3.0	3.0	2.6	1.6	1.4	1.2

Sources: FADN, EAA, Eurostat, Ministry of Agriculture of the Republic of Estonia, Statistics Lithuania and author's calculations

An important indicator characterising effectiveness is GVA per labour unit. In this respect a positive trend is a substantial increase at Latvian primary level, exceeding the Lithuanian indicator. However, an opposite trend can be observed in milk processing, where Latvian GVA level was the highest in the Baltic States until 2005 and notably lost its relative position in 2006.

GVA at factor cost per utilised labour in full time equivalent units at dairy sector secondary level in 2006 over 2004 increased by 82% in Lithuania, by 56% in Estonia and only by 27% in Latvia. This allows assuming that current dairy sector problems in Latvia are to a large extent caused by insufficient efficiency at the dairy sector secondary level (see Figure 1).

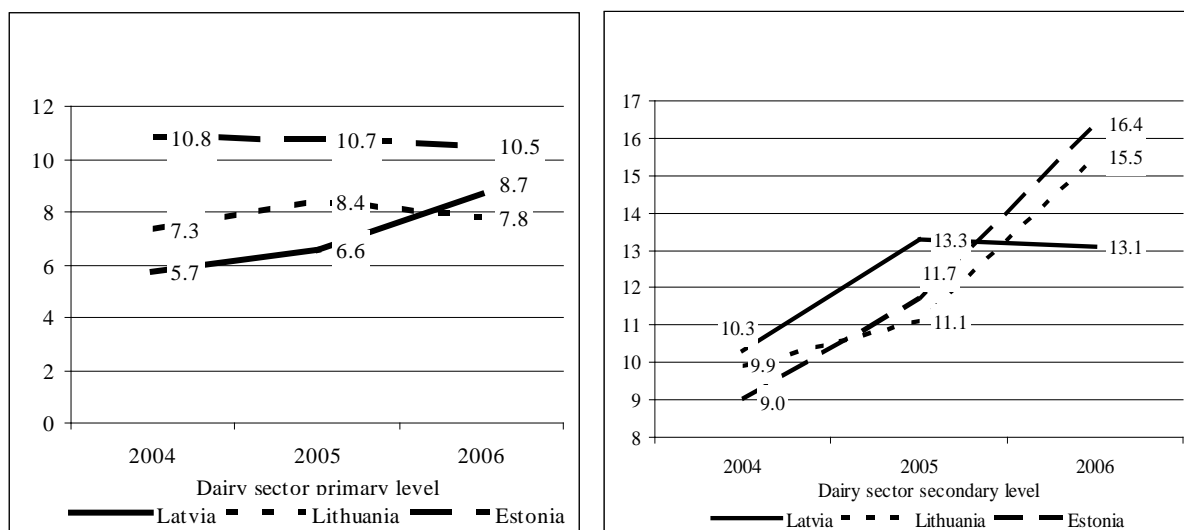


Figure 1. GVA at factor cost per utilised full time equivalent labour unit in the Baltic States, 2004-2006, thousand EUR/year

Sources: FADN, Eurostat, Ministry of Agriculture of the Republic of Estonia annual reviews on agriculture and rural development, Statistics Lithuania and author's calculations

2. The structure and economic indicators and their changes of dairy farms

After the agrarian reform and renewal of land property to former owners at the beginning of 1990-ies, a fragmentary structure of rural farms was formed in the Baltic States: there were many farms but small production volumes. So, if in 1989 the average area of agricultural land of the main agricultural producers – collective farms and soviet farms was 3828 ha in Latvia (Latvian Statistics, 1990), then in 1996, 74 thousand farms and 126 thousand personal auxiliary farms were registered, with an average area of only 6.65 ha (Latvian Ministry of Agriculture, 1996). In addition, so swift changes together with transition to market economy, losing almost any state support, led to a dramatic decrease in output volumes in the entire agriculture sector. Already in 1994 agriculture production reached only 50% of 1990 level, but in 1999 it was only 35%. Among it, dairy production constituted 53% in 1994 and 42% in 1999 of 1990 volume. Moreover, most of the newly made small farms produced only for their own consumption, thus the volume of milk purchased for further processing decreased even more: if in 1990 processing companies purchased 85% of the produced milk, then in 1995 – only 34%. (Central Statistical Bureau of Latvia (CSB), 1997) In the coming years the volumes of processed milk started to grow; however, only shortly before accessing EU, the proportion of milk sold for processing exceeded 50% of the produced milk. (CSB, 2004) Most of the new farms were not specializing in anything, they found it difficult to develop a specific industry and they also lacked resources for it. Income was so small that there were almost no opportunities to invest. In such a situation it was practically impossible to get credits either. As a result, in mid-1990ies the amount of investment had dropped to almost a zero. According to statistics, capital investment in agriculture and forestry in Latvia in 1994 constituted only 1.2% (!) of 1990 amount in comparable prices, but in 1996 – 2.8%. At the same time, there were very many farms operating in a particular industry: at the beginning of 1997, 116.7 thsd. farms were in dairy cattle industry and 113.1 thsd. or 97% of them possessed not more than 5 cows. Only 23.2% of the total number of cows in Latvia was in the farms with 10 and more cows. (CSB, 1997). The situation was similar in the other Baltic States, with slight differences.

Data about the farm specialisation in Latvia are summarized starting with 2001 agriculture census. There were very few specialized dairy farms then – 5694 or 4% of all the economically active farms. Milk was mainly produced by mixed crop and cattle farms, which were 52 thsd. (37% of the total number). (CSB, 2003). The situation began to change along with the introduction of wider modernization measures since the EU funds financing became available. Part of the farms developed rapidly, specialisation increased and thus also the number of milk producing farms reduced. The

indicators characterising dairy farms and changes in the indicators in Latvia after accessing EU are summarised in Table 2.

Table 2. Indicators characterising dairy farms and the specialisation level in Latvia, 2003-2008

Indicators	2003	2005	2007	2008
Number of farms with dairy cows	61108	59594	38825	35592
incl. specialised dairy farms	5662	13145	22076	n.d.
Average number of cows per farm	3.0	3.1	4.6	4.8
incl. specialised farms (FADN sample)	15.6	15.3	12.3	13.1
Average milk yield from a cow, kg per year	4261	4364	4636	4822
incl. specialised farms (FADN sample)	4300	4624	5034	5294
Total amount of milk (thsd. tonnes)	783.1	806.8	838.4	832.1
Amount of sold milk (thsd. tonnes)	435.6	501.7	630.7	633.8
% of sold milk from the produced milk	56%	62%	75%	76%

Sources: Central Statistical Bureau, FADN

In the other Baltic countries the concentration processes were expressed even more. In Estonia the number of farms with dairy cows reduced 2 times from 2003 till 2007 – from 12 thsd. farms to 6 thsd., in Lithuania it reduced by 34% (from 193 thsd. to 123 thsd.) (Eurostat, 2010).

The indicators characterising the economics of specialised dairy farms in the Baltic States are depicted in Table 3. Specialised farms corresponding to FADN threshold, which is 2 European Size units in the Baltics, were included in the analysis. For comparison, the indicators of the Netherlands were also added, because the territory and the geographical location of this country does not differ much from the Baltics, but agriculture, including milk production, is very well developed there, among one of the highest yields in EU.

Table 3. Average results of specialised dairy farms in the Baltic States and the Netherlands in 2004 and 2007

	Lithuania		Latvia		Estonia		Netherlands	
	2004	2007	2004	2007	2004	2007	2004	2007
Total livestock units	23	20	28	21	111	93	113	112
Total output (Euro)	21409	27024	26989	28108	133352	161272	203228	246562
Total inputs (Euro)	14491	18906	26018	28204	123188	162870	168698	199750
Share of inputs %	68%	70%	96%	100%	92%	101%	83%	81%
Total fixed assets (thsd Euro)	45	65	33	43	222	287	2118	1882
Total liabilities (thsd Euro)	4,4	12	6,5	13	61	112	581	653
Total labour input (AWU)	1,9	1,9	2,4	2,0	6,5	5,4	1,7	1,6
Net value added (Euro/AWU)	6492	8033	4789	6183	8882	12744	48623	69037
Farms represented	2830	8740	4650	8370	1210	1300	20370	19510

Source: FADN database (Eurostat)

Output value is shown without any subsidies (at producer prices)

The data summarised in the table indicate that despite several differences in the dairy industry of the Baltic States (in Estonia farms are significantly larger, thus also the average income is bigger), common tendencies can be observed. First, it is strange that irrespective of the production concentration in the countryside, the average number of livestock units in dairy farms has dropped. It might be related to the increase of the total number of specialised farms in Lithuania and Latvia when smaller farms specialise in dairy production. Whereas in Estonia, already in 2004, the number of livestock in dairy farms was almost similar to that in the Netherlands. From 2004 till 2007 the proportion of costs in the output value has grown in all three Baltic States but it has reduced in the Netherlands. The best situation in this respect is in Lithuania, where it is comparatively lowest.

Although the value of fixed assets has grown, it lags behind the one in the Netherlands: in 2007 the value of fixed assets per livestock unit is EUR 2000 in Latvia, EUR 3250 in Lithuania, EUR 3000 in Estonia, but EUR 16800 in the Netherlands, thus the difference is 5.5-8.5 times. However, it should be noted that since 2004 the difference in the supply of basic funds has decreased. As for purchasing most of the fixed assets credits have been taken, the total liabilities have grown: 2.7 times on average per farm in Lithuania, 2 times in Latvia and 1.8 times in Estonia. As a result, the amount of liabilities against fixed assets in Latvia has already approached the level of the Netherlands (30% and 35% respectively) but in Estonia even exceeded it (39%). It has caused a significant increase in interest payments, which increases costs and in case of low productivity is an additional threat for farm solvency. The situation is more beneficial only in Lithuania, because there the proportion of liabilities against fixed assets makes only 18% in 2007.

Although the net value added/AWU has grown in the analysed three years, its growth in Lithuania (by 24%) and Latvia (by 29%) drops behind the growth in the Netherlands (by 42%). Only in Estonia it is similar (43%) to the Netherlands. However, in 2007, when compared with the Netherlands, in absolute figures the net value added/AWU is 5 times lower in Estonia, 8.6 times in Lithuania and even 11 times lower in Latvia. These data prove that irrespective of the improvement in certain indicators, lagging behind the leading agricultural countries in Western Europe is still significant and there is no reason to consider that it is significantly reducing.

Analysing the income and cost structure of dairy farms in Latvia (see Table 4), it was revealed that despite the milk purchase price increase, production value in specialised farms has very little increased from 2004 till 2008 – only by 11%. Value of produced milk has grown more – by 37% but the increase in costs is even more significant – 42%. The result of this situation is rapid increase of the share of costs in the output value – from 92% in 2005 to even 107% in 2008.

The share of all the main cost units has increased, but most exactly those costs that so far had been comparatively lower in Latvia than in most EU states – depreciation of fixed assets, interest paid. Thus, depreciation per farm on average has increased 2.4 times from 2004 till 2008, but rent and interest paid – 2.7 times. Overheads have also increased significantly – by 43%. The increase of specific costs is relatively smaller; moreover, the level of these costs in Latvia was higher than in other EU states already in 2004 (Veveris et al, 2007), thus one would expect that the investment facilitated the decrease of the direct costs, but the current data do not reveal it – vice versa, their proportion in the output value has also increased.

Table 4. Cost structure in specialised dairy farms (on average per farm) in Latvia, 2004-2008 (producer prices)

	2004	2005	2006	2007	2008	2008/2004
Production value, EUR	26989	30354	25084	28108	29956	111%
milk	50%	51%	57%	57%	62%	137%
Total costs, EUR	26018	28018	25003	28204	32129	123%
Share of costs, %	96%	92%	100%	100%	107%	1,11
i.a. specific costs	46%	45%	50%	47%	50%	120%
feed	35%	34%	36%	35%	37%	117%
specific crop costs	6%	6%	8%	8%	8%	150%
overheads	23%	27%	25%	26%	29%	143%
fuel	9%	11%	10%	9%	12%	137%
maintenance	6%	8%	7%	7%	7%	135%
Depreciation	7%	10%	12%	14%	16%	241%
Wages paid	6%	5%	7%	6%	8%	154%
Rent & interest paid	2%	3%	3%	3%	4%	267%
Gross investment, EUR	6141	12392	9045	9377	7982	130%

Source: FADN database

Due to this, the economic efficiency of Latvia dairy farms has reduced. The summarised data allow concluding that in 2008 positive economic results in dairy farms in total could be reached only taking into account the state and EU paid support because the output value did not reach the total costs.

Comparing the proportion of certain significant cost units in the Baltics and in other EU States in 2007, it is revealed that the proportion of main costs in the output value is significantly higher in the Baltics. Feed costs have the highest proportion – in Latvia and Estonia they made 35% of the output value but in Lithuania – 27%. Whereas in the Netherlands, feed costs constituted only 16% of the output value. Some other countries have similar indicators – 17% in France, 19% in Germany and Poland. Similarly, depreciation, despite the rather low security with fixed assets, is similar to the Netherlands: 14% of the output value in Latvia, 11% in Estonia and Lithuania, but 12% in the Netherlands. It means that the Netherlands can gain more output with the same amount of investment. Here not only the size of investment but also its quality – service length and yield is important.

Among other countries, Latvia stands out with a high proportion of energy costs – 12% of the output value. In Estonia they are 8%, in Lithuania – 7%, but in the Netherlands – only 4%. Whereas the highest labour costs are in Estonia – 20%, while in Latvia they are 7%, in Lithuania – 3%, but in the Netherlands – only 1% of the output value. This figure includes only the paid labour, which is dominant in Estonian farms. (Eurostat database, 2009)

Capital costs (interest and rent) make a comparatively smaller amount in the Baltics – 3-4% of the output value while in the Netherlands this is one of the main cost units with 16%, but average in EU is 8%. It can be explained with a larger amount of liabilities in the “old” Member States and, of course, the loan effectiveness is determined by the opportunity to gain profit from using these resources. However, as it has been described above, the proportion of liabilities in the Baltic dairy farms has already reached the level of the Netherlands. Thus, the opportunity to increase the production volume with the help of liabilities is already becoming limited.

3. Evaluation of the impact of rural policy and structural changes

The present section evaluates the potential impact of the most significant EU and country policy measures on dairy cattle industry and the rural environment as such.

Already before accessing EU, preparatory measures were taken to introduce EU legislation – taken over EU directives, new demands for farmers, control institutions created and extended their mandate. The demands included, e.g. limitations to livestock slaughtering and trade, strict requirements for livestock breeding, processing agricultural products a.o. It was also provided that starting with 2006 Latvian processing enterprises may purchase only the highest quality milk. The execution of these demands required large investment also from larger farms, but it was an unsurpassable obstacle for many small farms to continue their livestock business. This to large extent explains the rapid decrease in the number of farms with dairy cows (see section 2). The above mentioned demands often caused protests among the farmers and it was indicated that the demands are often stricter than in the “old” EU States where home industry is widespread in many places.

At the same time accession to EU created the opportunity to receive significant payments for the area, other kinds of direct payments and investment support payments. In addition, during the first years after accession to EU, milk purchase price significantly increased. These factors have created slight dairy output increase. From 2003 till 2008 net dairy output increased by 18% in Latvia, by 17% in Estonia and by 8% in Lithuania. (Eurostat, 2010) The actual productivity increase is lower because part of the output that previously was used as livestock feed, was sold when the milk price rose. However, taking into consideration, as it was mentioned in section 2, that milk production in Latvia dropped by 57% from 1990 till 1999, the above mentioned increase is not even close to the production potential existing in the Baltic States, in this case in Latvia.

A significant impact was created by the fact that EU policy does not provide for a support system that facilitates production. Production is limited by quotas, thus this requirement already restricts growth at the country's level. In addition, in case of the Baltics a very unfavourable situation is that quota reporting period coincided with the minimum production level in the second half of 1990ies. Area payments became the main form of support. Their requirements provide keeping the land in a good agricultural condition. If in Western European countries, where the production infrastructure is

stable and yield from production is sufficiently high, change of such support terms may not have a significant impact on the producers' wish to produce, then in the Baltics, especially in the small farms that do not have a sufficiently strong facilities or whose facilities are outdated due to the lack of resources for capital investment, payments that are not directly related with a particular output volume do not offer enough stimuli to production. Thus, as the surveys of the structure of farms show, the number of active farms (those that produce agricultural output), irrespective of the support measures, has significantly decreased in the Baltic States from 2003 till 2007: by 42 thsd. or 15% in Lithuania, by 19 thsd. or 15% in Latvia and by 13.5 thsd. or 37% in Estonia (Eurostat, 2010). It causes growing anxiety that the countryside is more and more turning from an inhabited area into a territory managed by some farmers from which most of its inhabitants are forced out.

In addition to area payments, milk producers also receive payments according to milk quotas, but as provided by the decision of European Commission of 2007, these payments have to be separated from production, thus they have no relation with the real production level. Taking into account that the amount of payments is rather large (about 30 EUR per tonne), it helps to maintain competitiveness for its beneficiaries but it does not serve as a stimulus to production because it stays at 2006 level irrespective of the actual output volume.

One of the significant support forms that became partly available already before accessing EU within SAPARD funds but since 2004 within the framework of Structural Funds and Rural Development Programmes is investment support for farm modernisation. It was the main incentive to invest in agriculture and, as it is depicted in Table 4, gross investment in Latvian dairy farms from 2004 till 2008 has reached 32% of the output value, with a climax of 41% in 2006. Investment grants among them reached 12% of the output value in 2006. (FADN, 2010). However, as accounting data of the farms indicate (see Table 4), it has caused increase in depreciation and interest payments, but currently it is impossible to speak about the increase in the efficiency of business activity as a result of this investment.

Conclusions

1. The results of the research indicate that milk production is important in all Baltic States. It is the main industry in agriculture. Milk production and processing together constitute 2% of the GDP of the Baltic States but it employs 5% of the labour force (except for Estonia).
2. Since the Baltic States accessed EU, dairy industry has experienced significant structural changes – the number of farms has rapidly decreased (by 35% in Lithuania, 43% in Latvia and by 50% in Estonia), the specialisation level has increased (the number of specialised farms in Latvia has increased from 9% until even 57% (2007)), the cow productivity has grown (by 13%). It can be considered that already in some years after accessing EU the milk price in the Baltic States reached the level it may have being in the common EU market, and beginning with 2006, fluctuations in the milk price mainly depend on the situation in milk and its products market in EU and the world.
3. Because of the state and EU support to investments, farms have invested big resources – on average every specialised farm in Latvia invested more than LVL 30,000 from 2004 till 2008, which almost one and a half times exceeds the average turnover per year. However, along with it, a rapid increase of costs has taken place, when not only the absolute value of all main cost units but also their proportion in the output has increased (in Latvia – from 92% in 2005 to 107% in 2008). As a result, the profitability of the farms market has turned from positive in 2004-2005 to negative in 2008. Lagging behind of income from the leading dairy producing countries is still very large – net value added/AWU was 5-11 times smaller in the dairy farms of the Baltic States than in the Netherlands in 2007. Thus it could be concluded – the performed investments and other support measures in dairy industry have not sufficiently facilitated more efficient use of resources and the position of Latvian dairy farms in the EU market is threatened, especially during the recession.
4. In planning the development of the dairy industry, quantitative goals (increase of capital, livestock, milk yield, etc.) should be switched to resource-saving goals to produce qualitative product at the lowest possible costs but sell it for the best price possible, corresponding to the product quality. The performed measures allow concluding that the perspective directions for increasing the competitiveness of dairy farms would be:

- with the state and EU resources firstly to support purchase of such technology that allows reducing unit production costs, supporting cooperation in the purchase and use of machinery and other fixed assets;
- to educate farmers in efficient business management, capital management, skill to reduce risks to overcome recession, etc.;
- to develop cooperation and vertical integration of farms for milk producers to have the opportunity to impact the terms of resource and output price and agreements.

References

1. Agricultural Holdings. Results of Economic Analysis. Annual reports. LSIAE. Riga, 2004-2008.
2. Agriculture and Rural Life. Annual reports. Ministry of Agriculture, Republic of Estonia. Tallinn, 2005-2007.
3. Agriculture in Latvia. A collection of statistical data. Central Statistical Bureau of Latvia. Riga, 1997.
4. Agriculture of Latvia in 2003. A collection of statistical data. Central Statistical Bureau of Latvia. Riga, 2004.
5. Latvijas Republikas lauksaimniecības ražošanas rādītāji 1995.gadā (The agricultural data about Latvia in 1995). Riga, Ministry of Agriculture, 1996.
6. Latvijas tautas saimniecība. Statistikas gadagrāmata. Latvijas Valsts statistikas komiteja, Rīga 1990.
7. Results of the 2001 Agricultural Census in Latvia. Collection of Statistical Data. Central Statistical Bureau of Latvia, Riga, 2003.
8. Structure of Agricultural Farms of Latvia in June 2003. Central Statistical Bureau of Latvia. Riga, 2004.
9. The Structure of Agricultural Farms of Latvia in June 2007. Central Statistical Bureau of Latvia. Riga, 2008.
10. Veveris A., Krievina A., Leimane I. "Efficiency analysis of agricultural sector in Latvia compared to other EU countries, based on FADN data" // *Proceedings of the International Scientific Conference "Economic Science for Rural Development"*, No.13, 2007, Latvian Academy of Agriculture and Forestry Sciences, Jelgava, p. 13-19.
11. Vēveris A., Krieviņa A. Latvijas lauksaimniecības ekonomiskais kopaprēķins 2007-2008. [The Latvian Economic Accounts for Agriculture 2007 – 2008]. LSIAE, Riga, 2008.
12. Eurostat database. European Commission. Available at: http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database
13. FADN database. European Commission. Available at: http://ec.europa.eu/agriculture/rica/dwh/index_en.cfm
14. Statistics Lithuania. Available at: <http://www.stat.gov.lt/en/>