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ECONOMIC ANALYSIS OF THE VALUE ADDING CHAIN IN MILK SECTOR

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Abstract

The study deals with the value adding chain in milk sector examining production and market situation in milk production and processing stages by analysing set of factors what determine the value added in each stage. Evaluation of relations between different stages of the value adding chain in milk sector is also included. The objective of the study is to determine the level of development of the value adding chain in milk sector and to give proposals how to increase the value added. Presently milk production is the only sector in Latvia what considerably exceeds self-sufficiency level. Therefore, the development of this export-oriented sector will be determined by competitiveness in foreign markets. Comparative advantage of lower external costs and capital consumption has determined competitiveness of milk resource export up to now, however in the future reduction of intermediate costs as well as creation of special value will be the measures of main priority to ensure competitiveness together with adequate income level. The value adding chain in milk sector is evaluated to be in the process of development. Strengthening of horizontal and vertical cooperation will give a considerable increase in the efficiency of formation the value added.

Key words: milk production, milk processing, the value added, the value adding chain, competitiveness

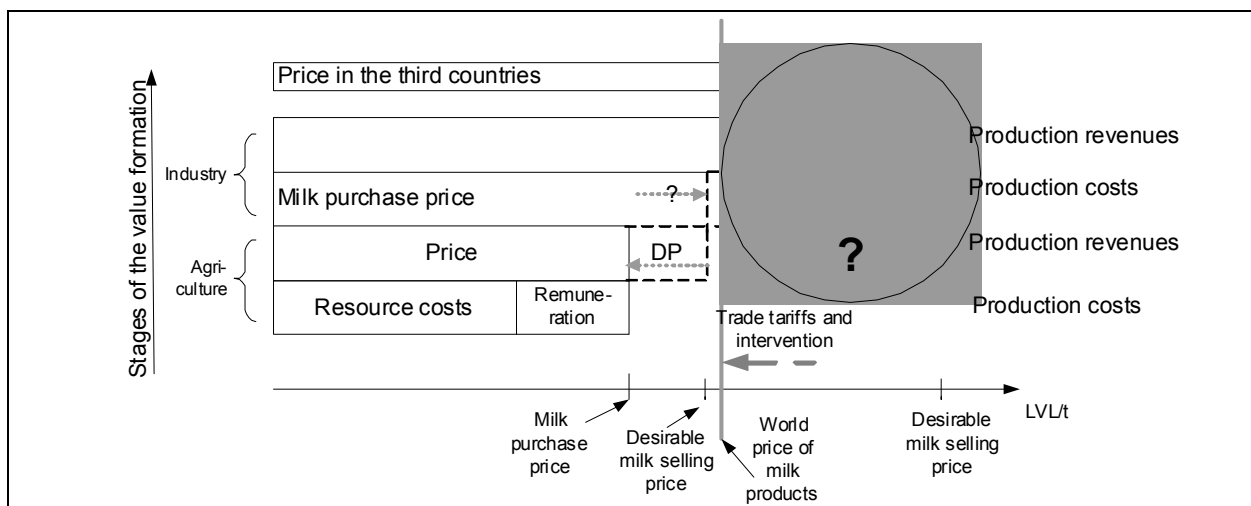
Background

Milk production is one of the key agricultural sectors in Latvia. Over recent years milk has established its positions with annually increasing share in total production value. There has been only a slight change in volumes, the main contributor to the growth of milk production values are prices, which have risen considerably after Latvia joined the EU single market. The share of milk production constitutes 25% of total agricultural output at producer prices in year 2005, and that is the biggest result among individual products and product groups [14, 30]. Milk processing also forms 21% of total food processing output value [15].

Besides upward production values, there is also increase in external assets value in the External Balance sheet. However some internal and external factors are signalling about possible threats to stabilization and development achieved in milk sector already in the near future.

The reformed EU Common Agricultural Policy (CAP) as an external factor affects the current system breaking the former economic balance in the sector and creating contradictions between structure of revenues and production costs. Resolution of this problem causes one of the biggest challenges to milk production and processing sector. It becomes crucial to question the viability of agriculture as market oriented business activity. The aim of the EU CAP Reform is market oriented agricultural entrepreneurship what envisages majority of subsidies to be paid independently from the volume of production, decrease in level of intervention (or at least not to increase) in markets of agricultural products (including gradual opening of the EU market to the third countries). Expected loss of coupled payments means significant decrease in income generated from milk production.

One of the simplest method how to compensate for losses in income is to raise prices, however this method can turn out not to be feasible because processing industry's ability to pay for resource is also limited by competition on final consumption markets. There is also movement to gradual lifting of production restrictions, the present milk quota system expires in year 2015, however different speculations place it under doubt whether existing quota system will long till then. It is expected that liberalization of agricultural markets – departure from intervention and quota systems as well as mitigation of external trade barriers – also restrict future growth in prices.



*DP – direct payments

Figure 1. Effect of reformed CAP on economic balance in the sector

Source: LSIAE constructions

Some internal factors also indicate on significant development problems that can be caused already in near future. In terms of net value added per employed person, what is one of the most widespread efficiency as well as sector competitiveness indicators, Latvia is considerably falling behind when compared to the EU average level and majority of other EU countries. According to FADN data net value added of grazing livestock specialization farms in Latvia in year 2004 constituted only 31% of the average EU level [18]. As regards processing sector, the output of total food industry per employed person in Latvia compared to the average EU gross value added per employed person level is already 1.7 times less, so net value added is lagging behind even more [17].

Objectives and methods

Aforementioned problems raise **two crucial questions**. Firstly, whether it is possible and, if it is, how to increase economic efficiency of production without raising product prices to ensure adequate income level for employed persons in the sector. Secondly, whether it is possible and, if it is, how to produce goods for what buyers in final consumption market are ready to pay more.

In order to answer these questions the analysis of the value adding chain in milk sector was carried out. The primary **objective of the study is to determine the level of development of the value adding chain in milk sector and to make proposals on how to increase the value added**. To reach the objective several **tasks** were set - to carry out production and market economical analysis and to evaluate the formation of the value adding chain in the sector by graphical depiction of the results of this estimation, as well as to formulate proposals for raising the value added.

The value added (VA) was assumed to be additional value, what is created (added to the intermediate product) in each successive stage of production, starting from primary production and ending with the marketing (from farm to fork) and what is distributed among owners of factors of production (land, enterprise, capital and labour). In value terms, it is calculated as the difference between production value and intermediate consumption. The analysis of the value adding chain in milk sector was carried out by analysing group of factors what determines the value added in each stage of the chain. Production and market analysis covered resource production and processing stages but in the schematic summary all stages what milk sector can be divided into (including trade) are considered. Theoretical assumption envisages that in the framework of each stage the VA can be increased by larger amount of production, by increasing of output prices and reducing the costs of production. In the sector as a whole, the formation of the VA is determined by such factors as vertical coordination and consumption. Improvement of vertical coordination can give a significant increase in the formation of the VA. Total food consumption, which is represented by amount of consumed goods and prices, serves as a reference point for making decisions about production of resources and processing of products. Changes in consumption patterns should be followed by the corresponding changes in the production of resources – in terms of not only volume, but also the quality features.

Methods applied in the study include quantitative and qualitative analysis methods. Statistical analysis and logically constructive analysis methods are employed to summarize data analysis, brainstorming and interview results.

Results of the value adding factor analysis in milk production stage

Economic analysis of volumes in milk production stage shows that the present production level (806.8 thsd tons in 2005) is low when compared to milk production in mid 90ties, however when compared to internal consumption level the self-sufficiency outcome is 121% in year 2005 (see Table 1), that means that this sectors is export oriented.

If the whole amount of milk were produced in market-oriented farms, then the initial milk quota for Latvia would be already filled at the present production volumes, however at the existing structure of farms there is small reserve. Milk quota for Latvia is 728,6 thsd tons (including additional quota) [13, 51].

When looking at the price, as can be seen from the Table 1, after slight fluctuations in the previous years, there has been considerable increase after Latvia joined the EU single market. This price is taken from the Economic Accounts for Agriculture (EAA) and it covers those kinds of uses that according to the methodology are included in the output of the agricultural industry. For milk, these are all uses, except losses, consumption in livestock feed and processing on farms.

Table 1

Selected indicators of milk sector in Latvia in 2000-2005

Types of indicators	2000	2001	2002	2003	2004	2005
Volume of produced milk, thsd tons	823.0	845.9	811.5	783.1	784.0	806.8
Milk producer price, LVL per ton	83.88	93.56	92.16	93.96	127.10	154.63
Share of dairy cows in farms with 10 and more cows, %	26%	30%	31%	37%	39%	42%
Volume of sold milk to processing companies, thsd tons	398.1	402.6	384.9	435.6	463.6	501.7
Milk purchase price, LVL per ton	87.17	95.52	94.09	96.09	131.06	155.20
Sales value of milk products*, thsd LVL	85 882	95 050	101 602	103 193	126 072	151 526
Average selling price of the main processed milk products, LVL per kg	0.36	0.41	0.42	0.45	0.48	0.64
Export value of milk products, thsd LVL	11 594	12 789	11 741	14 234	26 220	43 489
Average export price of milk products, LVL per kg	0.61	1.02	1.04	1.05	0.94	0.70
Self-sufficiency level, %	96%	102%	100%	102%	107%	121%

*sales value of those processing companies that meet statistical requirement of at least 20 persons employed and turnover of the previous year over LVL 300 thsd

Source: CSB of Latvia and the EAA data [1-8], [14], [15], [19], [20]

According to Dairy Committee LTO Netherlands International Milk Price Comparison of the milk prices paid by large European dairy companies, the average calculated price of for standard milk containing 4.2% fat, 3.35% protein, a bacterial count of 24.999 per ml, a somatic cell count of 249.999 per ml and a yearly delivery of 350 tons was 286.5 EUR per ton in year 2005 [16]. In Latvia the average purchase price of milk expressed in EUR constituted 220.8 EUR per ton at the average fat content 4.25% and the average protein content 3.31% [19], but the price received by the most qualitative milk producer cooperatives for their milk sold to Lithuanian processing companies has already reached the price level dominant in West European countries. Having regard of the export oriented characteristic of the sector, the rise in average price of the milk is possible only if there is structural improvement in milk production sector (increase in amounts delivered from one farm and improvement in the average quality of milk).

At the present the structure of milk producing farms is very fragmented with a large share of small farms what each separately produce insignificant amount of milk. In year 2005, 78% of total milk producing farms was subsistence farms with one or two cows and they concentrated 58% of total dairy cows. The share of market-oriented farms (not less than 10 cows) in total farm number was only 4% [1, 28]. Although the average yield in subsistence farms is lower, the share of produced milk in total milk production is still large.

At the present milk production structure, the sector creates smaller added value when otherwise possible, because in subsistence farms milk is mainly used for self-consumption needs, that means no incorporation of this milk in subsequent stages of the value adding chain, besides there is low productivity in these farms and consequently high production economic costs.

The situation is starting to improve lately because there is tendency in the sector towards decrease in number of dairy cows in farms below 10 cows and increase in farms with 10 and more dairy cows (see Table 1) what have much better productivity and higher share of milk sales. Despite the decrease in total number of dairy cows, the total volume of milk has been almost unaffected due to higher average milk yield, furthermore there is rise in total volume of sold milk to processing companies. However the rate of the structural changes is slow.

Table 2

Costs in grazing livestock specialization farms in Latvia in 2002-2004

Types of costs	Costs per livestock unit, LVL			Costs per production value, LVL			Changes, +/- %	
	2002	2003	2004	2002	2003	2004	2004/2003	2004/2003
Total costs	529	501	604	1.00	0.92	0.85	21%	-8%
Intermediate consumption	407	392	494	0.77	0.72	0.69	26%	-4%
Capital consumption	36	45	53	0.07	0.08	0.07	20%	-9%
External costs	81	59	52	0.15	0.11	0.07	-13%	-34%
Production taxes	6	5	5	0.01	0.01	0.01	9%	-17%

Source: LSIAE calculations based on FADN data [10-12]

Together with increase in producer prices, there has also been considerable growth in production costs. The average cost level per livestock unit in FADN grazing livestock specialization farms (production of milk and cattle) was LVL 604 in year 2004 what is 21% more than the year before. The distribution of costs among individual cost positions is shown in Table 2.

When compared costs per production value in year 2004 with the appropriate cost level in year 2003, there is even decrease by 8% because growth in milk and cattle prices exceeded increase in resource prices in year 2004. In the future increase in ordinary milk prices has no economic basis, but it is expected that resource prices continue to grow, and that means that if not reduced otherwise, costs per production value will increase.

Comparison of costs per production value shows that Latvia with 85% of total costs in output value has better ratio than the EU average share of 92% [18]. Total costs in Latvia are reduced by less value of external costs (compensation for employees, rents and interest paid), as well as smaller value of consumption of fixed capital. In terms of the value added these costs are also part of income received by owners of the factors of production, so greater costs (income) correspond to larger value added, but as regards competitiveness in market – it is decreased by higher price because of higher costs. Present level of external and capital costs positively affects competitiveness of local products but this is attained at the expense of lower income level. However there is a rapid increase in these costs lately, consequently Latvia is going to lose this comparative advantage in terms of competitiveness very soon.

The level of intermediate consumption in Latvia is higher than in the EU on the average. Among individual cost position there is comparatively large share of energy (14% - for Latvia and 5% - the EU average) and livestock feed (41% - for Latvia and 29% - the EU average) costs in the total cost value [18]. Consequently, these are the costs whose reduction can normally increase the value added because possibilities to increase the value added at the expense of price and volume at the present condition are almost reached their limits. Improvement of intermediate cost efficiency is also the way of ensuring competitiveness at the adequate income level for owners of the factors of production including compensation for employees.

As analysis of production costs per production value in farms of different size shows that in small farms the average intermediate consumption level is higher than in medium and big farms, structural changes in farms structure also will facilitate the overall increase in cost efficiency. The total cost level per production value is higher in bigger farms due to larger labour cost level.

Results of the value adding factor analysis in milk processing stage

Comparatively large amount of milk resources has determined the development of milk processing. At the present the volume of local resources is limited by quota, but still only 62% of total produced milk is sold to processing companies.

In milk processing industry there is a high level of concentration (Top 4 = 61% and Top 10 = 83%) what indicates the market power of these companies [19]. However in comparable terms Latvian milk processing units are small. During year 2000 until 2005 the volume of purchased milk by processing companies has grown and it has reached 501.7 thsd tons in year 2005 (see Table 1). There were 13.7 thsd tons of imported milk without packing [19], thus the volume of resources available for processing industry totalled 515.4 thsd tons with only 3% of resource import. In the same time it has to be stressed that according to Latvian Central Dairy union estimates the total annual processing capacity reaches 1.25 mio tons of milk, so the present utilized capacity is only about 40%. The calculation states that increase in total utilized capacity by 100 thsd tons of milk (it equals the volume of milk what is presently exported as resource) could rise the average price for milk resource in the whole industry by about LVL 0.005 per kg without any changes to amount of costs.

The most important product of milk processing industry in terms of sales value is cheese (26% of total sales in year 2005), then followed by milk and cream (16%), unripened cheese, including curd (14%), unflavoured acidified milk products (14%), butter (8%) and flavoured acidified milk products (7%). During years 2000-2005 sales of all products have increased, the fastest growth has been for flavoured acidified milk products (about 6 times when compared to year 2000) and for cheese (about 3 times) what has now become explicitly the most important product. The considerable growth is mainly due to increase in production volumes. From the main products only the volume of sold milk has dropped in this period [15].

As regard prices, milk purchase prices have grown faster than sales prices for processed milk products (61.5% and 32.9% accordingly in 2005/2003). Having regard of approximate share of milk resource price in price of processed milk products, the calculations show that increase in milk resource price is not fully incorporated in prices of processed milk products. That means decrease in the value added of the processing industry at the expense of these costs. When estimating the actual share of milk purchase price in sales prices of different processed milk products, it has considerably grown for products of lower price, but for products of higher price, the increase is not so notable. This also indicates on not fully incorporated rise of the milk resource price in the sales prices of processed products because there was no reason for drop in other costs that also could explain the increase of the share. Based on selling prices, all processed milk products can be divided into high price (cheese, butter, unripened cheese and curd) and low price (milk) products. As mentioned before, the share of products with the highest sales prices has increased, but the share of milk what is product of the lowest price has fallen. When year 2005 volumes expressed in year 2000 prices, the average-selling price also has risen due to increase in the share of higher price products (LVL 0.36 per kg in 2000, but in 2005 – LVL 0.45 per kg). However there is still dominance of low price products in the total volume of sales, what is indicated by the average price [15].

Analysis of financial statements of enterprises under NACE classification “Manufacture of dairy products” (1.1. – 15.5.) during years 2003 – 2005 shows that costs associated with production of milk products exceed turnover and there has been profit only due to income from other activities. Costs of the main importance in terms of proportion in total cost value are production costs (other costs – sales costs, administrative costs etc.), during years 2003-2005 they have grown more rapidly than revenue from sales – production costs have risen by 55%, but net turnover – by 52% [19].

According to interviews with milk processors milk costs count for the major part of total production costs (70%), other materials and services constitute about 19%, personnel costs – 5%, but electricity and fuel – 3%.

There is significant export of milk production what constituted 26% of total sales value in year 2005. The main commodity exported is cheese what counts for almost half (49%) of total export value, then followed by milk and cream, milk powder and butter. As regards volumes, low price products dominate in the export. The average export price of processed milk products was LVL 1.41 per kg in year 2005 [19]. In the last few years the most rapid growth has been for milk resulting in decrease in the average export price of milk production (see Table 1). It has to be mentioned that milk export volumes mainly consists of milk as resource. Overall, the dual movement of milk has grown because import volumes of unpacked milk have also increased. Export of milk resource has negative effect on processing companies' international

competitiveness due to additional burden of unutilised capacity what increases fixed costs per produced item. As a good factor, there has also been considerable growth in volumes of exported cheese.

Evaluation of the value adding chain in milk sector

In Figure 2 is given a schematic summary of the value adding chain in milk sector throughout all stages. The chain can be described as dual because one part of the resources goes to further processing (62%), but the other part is consumed on farms or sold directly to end consumers in direct sales (from farm).

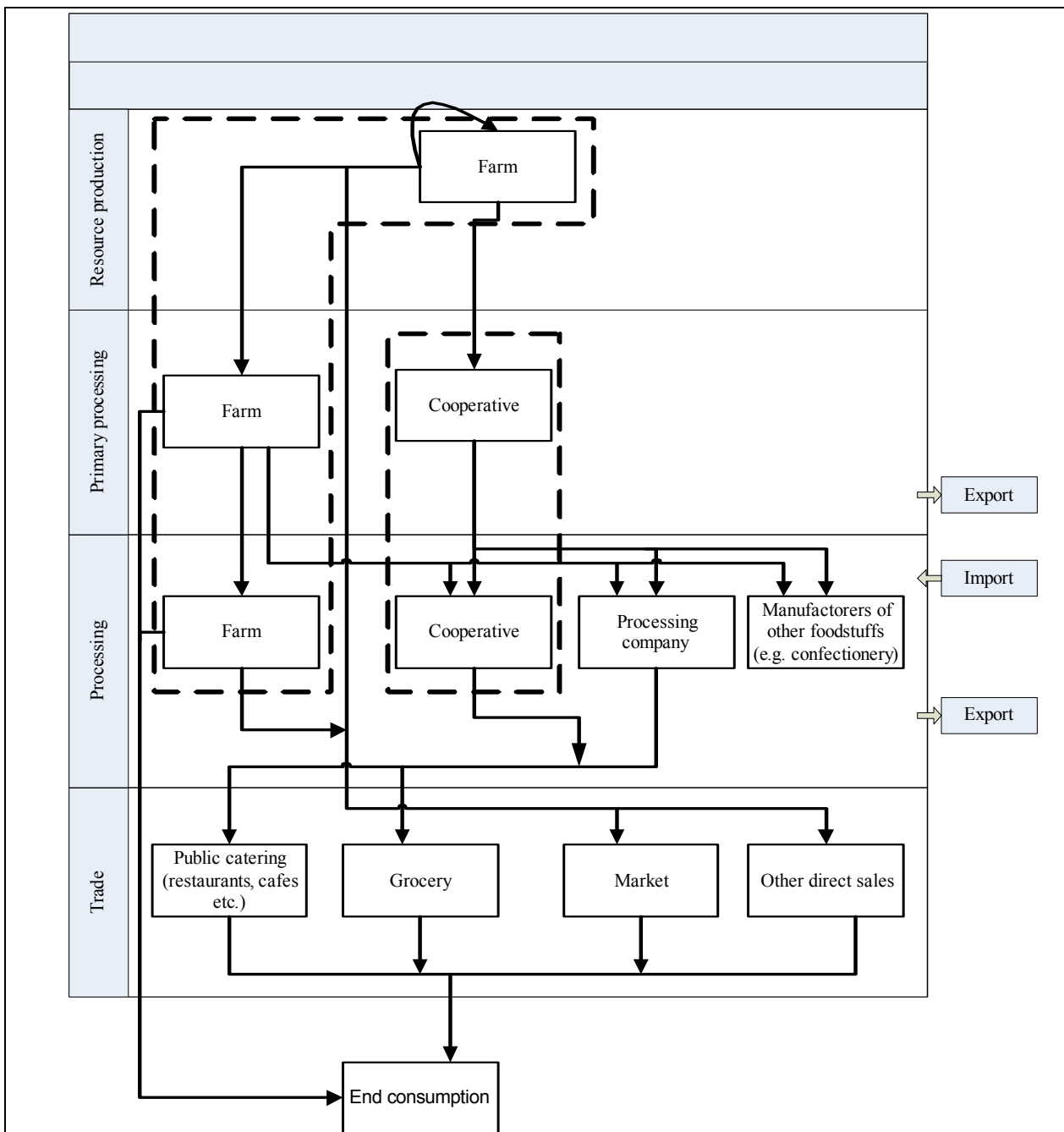


Figure 2. The value adding chain in milk sector

Source: LSIAE constructions

Export of milk products occurs in processing stage as both export of milk resource for further processing and export of milk products ready for consumption or as inputs in production of other goods.

There is some evidence of vertical integration in the sector (see discontinuous lines) when in one unit several activities what overlap more than one value added stage are performed. Cooperation between participants of the chain has also started to establish, especially in milk production stage, thus facilitating milk primary processing (refrigeration) and logistics.

However the major part of enterprises engage in undetermined cooperation based on undetermined date (or volume) agreements what do not ensure lasting cooperation. Having regard of different business goals of each of enterprise, the cooperation based only on contractual relations can come to end by change in the situation in market and change in distribution of market power.

When looking at consumption what affects formation of the value added in the sector as a whole, milk products account for 16.8% of total food expenses and that is the second largest result [9]. From years 1999 till 2003 there has been upward consumption trend for milk products, although last three years it has slightly dropped. Together with increase in income, consumption of butter and whole milk has decreased, but consumption of yoghurt and cheese has increased. The tendency is expected to continue in the future setting production patterns for the sector.

Conclusions

To conclude, even if milk production volumes remain at the present production level what is most possible having regard of present milk quota and changes in farm structure, at the present volume level Latvia already considerably exceeds self-sufficiency level, thus the development of this export-oriented sector will be by all means determined by competitiveness in foreign markets.

There is strong cooperation among producers in milk production stage what positive aspect is because to a certain extent this has enabled to address problems caused by fragmentation (small production volumes and quality) and thanks to cooperation producers of milk have secured significant increase of milk price what has now reached the EU level. Having regard of the milk sector export-oriented characteristic in Latvia and the fact that milk prices in the EU are regulated by intervention system, in long-term milk prices in Latvia cannot be higher than in other EU countries, therefore future forecasts for milk price predict stabilization (in the framework of certain product quality). So it is very important to consider benefits of cooperation because in the future cooperation should also give contribution to raising cost efficiency (first-hand livestock feed and energy costs) what compared to volume and price is still subject to significant improvement. On the other hand, cooperation has facilitated increase in export of milk resource. Presently competitiveness of milk resource in export markets is determined by comparatively lower capital and external costs. However export of milk resource raises burden of unutilised capacity on total costs consequently weakening competitiveness of processed milk products in final consumption markets and relieving entry for import goods. It can be assumed that increase in capital and external costs will diminish profitability of milk export what together with weakened processing industry can have negative effect on income level of milk resource producers and the competitiveness of the whole sector. As to prevent these problems, it is important to recognize milk sector in which up to now the value adding chain has been developed weakly as one entity with high production efficiency in all stages of the value adding chain and to have these stages connected with each other, as well as oriented to end consumers and with a single aim of creating product what is competitive in foreign markets.

Proposals on increasing the value added

Efficient value adding chain means high intellectual and technical development of all stages, as well as readiness and interest of all participants to collaborate with the aim of delivering product from farm to final consumption market in compliance with specific quality, quantity and other conditions. Therefore the main tasks in achieving this include increasing of production efficiency both in milk resource production and milk processing stage, as well as facilitation of vertical coordination in the value adding chain.

Analysis of production costs of milk processing companies showed that milk resource costs are of the main importance in the total cost value and also in determining the price of the final product, with low

labour productivity in terms of the value added in production stage at the same time. Therefore it is of main priority to raise production efficiency in milk resource production stage.

Increase in the efficiency of formation the value added can be achieved not only by changes in volume, price and costs, it also crucial to decrease the number of employed persons in the sector provided that the production is lead by highly qualified specialists. The main proposed actions include stimulation of farm structural changes by support to market-oriented farms, promoting cooperation and providing product quality control, as well as creation of new workplaces outside the sector. Among the actions is also provision of additional knowledge and skills for employed persons in management, production technology, collaboration and in modern means of communication, as well as support to investments, including standard models. Switch from cost competition to quality competition what means creation of special value products (brand, organic products etc.) is another possibility for raising the value added. In the future cost efficiency could be outdone by importance of special value what is real or emotional because advantage from cost efficiency gains also has limits.

Current situation in milk processing stage is the reflection of the consequences caused by inefficiency – high production costs result in weak competitiveness in final production market, due to fragmented production structure and additional burden of unutilised capacity on production costs processing companies cannot afford to pay appropriate price for qualitative milk resource.

Increase of production efficiency in milk processing stage is important because of additional value that can be added to primary milk production sector product during this stage. Besides changes in volume, price and costs, production efficiency in this sector is also closely connected with reduction in number of employed persons and with recruitment of highly qualified specialists in both management and production. Problem of fragmentation of processing companies and unutilised capacity can bet tackled by supporting cooperation and engagement of the companies in joint projects, providing product quality control and compensating for withdrawal of capacity. Proposed activities for raising production efficiency in this stage also include improvement of knowledge in management, production techniques and brand, as well as measures concerning introduction of modern technological solution in processing stage (managerial software, scientific research projects etc.). Creation of special value products can turn out to be crucial in increasing the value added.

It is not any more competitiveness of agriculture alone but the competitiveness of the whole production and processing chain what should be considered. Vertical coordination between different stages is important because it reduces unproductive costs in the chain (intermediary, excess transportation costs etc.), promotes determined and directed development of the sector by delivering product from farm to fork and by conducting information from end consumer to resource producer what regards changes in demand and in different features necessary to be taken into account when offering resource to processing industry and processed products to end consumers. Vertical coordination does not mean decrease in competition, but it is the way of strengthening positions and improving long-term competitiveness for operating in the EU single market. Proposed actions in this respect include stimulation of vertical cooperation by different measures aimed at development of collaboration between participants of different stages as well as promotion of vertical integration what means participation in more than one stage of the chain.

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