Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 19, Issue 1, 2019
PRINT ISSN 2284-7995, E-ISSN 2285-3952

DISTRIBUTION OF THE RETAIL PRICES OF DAIRY PRODUCTS AMONG SUPPLY CHAIN PARTICIPANTS IN LITHUANIA

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Abstract

This study aims at evaluating the developments in the distribution of the retail prices of dairy products among supply chain participants in Lithuania over the period of 2008 to 2017 and at revealing the main factors that determine this distribution. In order to achieve this aim, the structure of the Lithuanian dairy supply chain has been examined and the shares of milk producers, dairy processors, retailers and state (VAT) in the retail prices of dairy products (drinking milk and Tilsit cheese) have been calculated. The structure of the Lithuanian dairy supply chain indicates that milk producers, a large majority of which are small-scale dairy farmers, are fragmented and less organized, while the dairy processing industry and retail trade can be considered as heavily concentrated. Over the past ten years, the shares of retailers in the retail prices of dairy products have shown an increase, while the shares of milk producers in these prices have decreased. Horizontal concentration and vertical integration are the main instruments that could help to increase the market power of milk producers. Furthermore, milk producers should be opened to entering direct sales marketing, or short food supply chains.

Key words**:** *dairy products, milk producers, dairy processors, retailers, share of the retail price, Lithuania*

INTRODUCTION

Over the years, global and domestic dairy prices have become quite volatile. Dairy price volatility has raised serious concerns about the functioning of global and domestic dairy supply chains and the distribution of value added between milk producers, dairy processors and retailers. At European Union level, it has been recognized that it is important to ensure effectiveness and efficiency of the food supply chain providing consumers with lower prices and supply chain participants with a sustainable distribution of value added [6].

A number of studies were carried out in different countries in order to evaluate the distribution of the retail prices of dairy products among supply chain participants and to identify key factors that determined this distribution over time [e.g. 1; 3; 5; 10; 13; 15; 17; 18]. Studies covering longer periods confirmed that the shares of the retail price received by retailers and dairy processors increased and the share of the retail price received by milk producers decreased [1; 3; 15; 17].

A similar study was carried out in Lithuania in 2009 [11]. This study aimed at evaluating how income from sales of dairy products was distributed between milk producers, processors, retailers and state. Five most popular dairy products were chosen for the analysis (drinking milk (2.5% milk fat), sour cream, butter, *Tilsit* cheese and cottage cheese). The results of the study showed that in 2008, the shares of milk producers in the retail prices of dairy products ranged from 23% to 50%. Processors received 15–36% of the retail prices of dairy products, while retailers received 20–27%. The shares of milk producers in the retail prices of sour cream, butter and *Tilsit* cheese were higher than in the retail prices of drinking milk and cottage cheese. Since this study was carried out almost ten years ago and covered only one year (2008), therefore it would be of particular interest to evaluate the changes that occurred over time.

MATERIALS AND METHODS

This study aims at evaluating the developments in the distribution of the retail

prices of dairy products among supply chain participants in Lithuania and at revealing the main factors that determine this distribution. In order to achieve this aim, two tasks have been set:

-to examine the structure of the Lithuanian dairy supply chain;

-to calculate the shares of milk producers, dairy processors, retailers and state (VAT) in the retail prices of dairy products.

The study covers the period 2008–2017 (the last ten years).

In order to examine the structure of the Lithuanian dairy supply chain, data from the statistical office of the European Union EUROSTAT [8], European Commission [7], Lithuanian Department of Statistics (Statistics Lithuania) [20], Farm Accountancy Data Network (FADN) [9], State Enterprise Agricultural Information and Rural Business Centre [2], State Food and Veterinary Service of the Republic of Lithuania [19], Competition Council of the Republic of Lithuania [4] and Nasdaq Baltic Stock Market have been used [16].

In order to calculate the shares of milk producers, processors, retailers and state (VAT) in the retail prices of dairy products, two specific products with different added value have been chosen: drinking milk (2.5% milk fat) (low added value) and *Tilsit* (semi-hard) cheese (high added value). These products belong to the two groups of dairy products which together account for almost half of the Lithuanian dairy processing industry sales on the domestic market (in 2017, 48%). All data needed for the calculation (purchase prices for raw milk, sales prices of the Lithuanian dairy processing industry and retail prices in the Lithuanian supermarkets) have been taken from the State Enterprise Agricultural Information and Rural Business Centre [2]. In this study, the shares of milk producers, processors, retailers and state (VAT) in the retail prices of dairy products are expressed in relative terms.

The study has been performed employing the methods of mathematical-statistical analysis and systematic, comparative and logical analysis.

RESULTS AND DISCUSSIONS

Milk production

Milk production in Lithuania occupies an important place in the agriculture of the country, but its significance is declining: in 2008, the proportion of milk yield in the total agricultural production made up 23.0%, while in 2016, it made up 17.2%. In 2017, compared to 2008, milk production decreased from 1883.8 to 1617.0 thousand tonnes, or by 14.2%, while milk purchase for processing increased from 1375.6 to 1401.5 thousand tonnes, or by 1.9%.

In Lithuania, small-scale dairy farming is dominant. The average dairy farm in the country is among the smallest in the EU. In 2008, the number of cows per dairy farm was 3.5 and in 2016, it was 6.6. Smaller average dairy farms were found only in Romania: in 2016, the average dairy farm in Romania had 2.4 cows and the average dairy farm in Lithuania had 6.1 cows [12].

In Lithuania, agricultural companies kept the largest herds of dairy cows. According to FADN data, the number of cows per agricultural company of field crops–grazing livestock increased from 337.8 in 2008 to 454.7 in 2016. The average size of family farm generating the largest incomes from milk production was much smaller and it decreased from 13.3 dairy cows in 2008 to 9.8 dairy cows in 2016.

In 2017, 64% of all Lithuanian dairy farms had 1–2 cows and only 1.8% had 50 and more cows. The dairy farms with 50 and more cows kept 40% of all cows in the country. Between 2008 and 2017, the number of dairy farms dropped by 62% and the number of cows fell by 28%. During that period, the number of all dairy farms with less than 50 cows was declining and only the number of dairy farms with 50 and more cows was growing. In 2017, as compared to 2008, the number of cows on dairy farms with 50 and more cows rose by 21%. The decrease in the number of dairy farms with less than 50 cows was the result not only of the deterioration of the very smallest subsistence and semi-subsistence farms with 1–2 cows due to advanced age of

owners of these farms but also of low raw milk prices paid to small milk producers.

The average purchase price for raw milk in Lithuania is among the lowest in the EU. According to Eurostat and European Commission data, as regards the period 2008–2017, in 5 out of 10 years, the average purchase price for raw milk in Lithuania was the lowest in the EU, in 4 out of 10 years, it was 4–12% higher than in Romania, and in the remaining year, it was 3.5% higher than in Latvia and 16.5% higher than in Romania. During that period, the average purchase price for raw milk converted to 3.7% of fat in Lithuania was the lowest in the EU.

The tradition to impose low purchase prices for raw milk on milk producers is rather old and dates back to 1990 when Lithuania restored its independence. In Soviet times, between 1986 and 1990, on average 3,145 thousand tonnes of raw milk was produced every year. According to mandatory planned order, around 40% of the total raw milk was used for processing of dairy products which were dispatched to the Soviet Union. Since 1991, the Lithuanian dairy products were no longer placed in the Soviet Union. At that time state dairy processing enterprises had no experience in exporting of dairy products, in addition, there was no legal basis for exports. During the first years after Lithuania restored its independence, there were large quantities of raw milk on the domestic market while demand for dairy products was limited. In 1993, the average purchase price for raw milk in Lithuania was 6.02 EUR/100 kg. This price was the lowest among present EU Member States and stood at 23% of the average. Although raw milk prices paid to milk producers later increased, the tradition to maintain low purchase prices for raw milk continued.

Small dairy farmers receive considerably lower prices for raw milk than the largest ones. In 2017, the smallest dairy farmers and dairy farmers keeping about 50 cows received about 40% and 20% lower prices for raw milk of basic indicators (in Lithuania, 3.4 of fat and 3.0 of protein), respectively, than the largest ones. The economic viability of dairy farms with less than 50 cows is not ensured and the development of these farms becomes problematic. It is particularly difficult for these farms to stay in business when purchase prices for raw milk drops and the fluctuations of these prices related to trends in global dairy prices are frequent and deep.

In order to receive higher purchase prices for raw milk, dairy farmers join cooperatives (processors pay more for larger quantities of raw milk). In 2017, there were 29 cooperatives in Lithuania that purchased raw milk. Other corporate forms also purchased and resold raw milk to processors. In 2017, 18% of the total raw milk was purchased by cooperatives. The horizontal cooperation was dominant in milk production: large quantities of raw milk purchased by cooperatives were resold to processors. Only 3 cooperatives processed small quantities of raw milk and sold dairy products on the domestic market. In 2008, the project of vertical integration was launched, when a total of 150 milk producers established the agricultural cooperative Pienas LT, the aim of which was to build a dairy processing enterprise and to supply all milk produced on their farms to that enterprise. This project was supported by the Lithuanian Government and co-financed by the EU funds. In 2016, this enterprise officially started its activity, began to produce and sell dairy products both on the domestic and foreign markets. In 2016, the sales volume of Pienas LT represented 4.4% of the total sales volume of the Lithuanian dairy processing industry, while in 2017, it represented about 6% (according to provisional data).

Manufacturing of dairy products

The dairy processing industry is the leading component of the Lithuanian food processing industry. Measured by production value, it accounts for almost one third of the total output of the Lithuanian food, beverages and tobacco processing industry (28% in 2008, 29% in 2017). In 2017, as compared to 2008, the sales volume of the Lithuanian dairy processing industry increased by 36%, to EUR 964.7 million. The dairy processing industry is export-oriented. In 2008, the volume of exports represented 51% of the total sales volume of the Lithuanian dairy processing industry, while in 2017, it

represented 55%. Dairy processing enterprises are lacking in raw milk, therefore additionally rely on import from neighbouring countries (Latvia and Estonia). In 2008, a total of 194 thousand tonnes of raw milk was imported representing 14% of the total raw milk purchased in that year in Lithuania, and in 2017, a total of 407 thousand tonnes of raw milk was imported representing 29% of the total raw milk purchased in that year in Lithuania. The surplus of raw milk in neighbouring countries and the possibility to import large quantities of this milk allow dairy processing enterprises to impose low purchase prices for raw milk on milk producers.

According to the State Food and Veterinary Service, in 2008, there were 33 dairy processing enterprises, and their branches, and ice-cream companies. This number increased to 36 in 2017. About half of all dairy processing enterprises and their branches belong to five major groups. In 2008, the sales volume of the largest group represented 28% of the total sales volume of the Lithuanian dairy processing industry, while in 2017, it represented 25%. In 2008, the concentration index of five major groups of dairy processing enterprises was 0.92, while in 2017, it declined to 0.82 due to the entry of "Pienas LT" into the market. Although the market concentration declined over the past decade, it still remained very high. Between 2008 and 2017, the raw milk purchase market was dominated by several purchasers, therefore this market was oligopsonic.

Retail trade

The Lithuanian food retail market is characterised by high concentration. Until 2016, there were four major retail chains (Maxima, Iki, Norfa and Rimi) operating in the food retail sector. For a long time, the market share of these retailers in the retail food market had been gradually increasing while the market share of the independent retailers or those incorporated into smaller chains or other combinations had been gradually decreasing. According to the Competition Council of the Republic of Lithuania, the market share of Maxima, Iki, Norfa and Rimi in the retail food market rose from 62% in 2004 to 73% in 2010. Between 2010 and 2013, these retailers controlled about 75% of food sales. The number of major retail chains remained unchanged until the year 2016, when a new participant entered the Lithuanian food retail market. In that year Lidl, a German-based global discount retail chain, opened its first stores in Lithuania. Over the last year, this retail chain rapidly expanded and became one of five major retail chains, along with Maxima, Iki, Norfa and Rimi.

Retailers have contracts with all large dairy processing enterprises. Due to the significant market power of retailers, selling dairy products on the domestic market leads to a lower profit for dairy processors than export sales. Small dairy processing enterprises are not in a position to cooperate with the largest retailers since their production volumes are not enough to ensure the availability of dairy products in all retail shops [14].

Distribution of the retail prices of dairy products among supply chain participants

In 2008, milk purchasers and processors received the highest share of the retail price of drinking milk (40.1%), and milk producers received the second highest share (28.2%) (Table 1). The shares of milk producers and processors in the retail price of *Tilsit* cheese were almost equal (more than 36% each) (Table 2). Retailers, compared to milk producers and processors, received significantly lower shares of the retail prices of drinking milk and *Tilsit* cheese (16.4% and 11.8%, respectively). In 2009, the situation changed. In that year, as compared to 2008, the shares of retailers in the retail prices of drinking milk and *Tilsit* cheese increased by 9.0 and 10.3 percentage points, respectively. As a result of the economic crisis, the retail prices of drinking milk and *Tilsit* cheese declined by 12.5% and 6.5%, respectively. Milk producers and processors received lower income from sales of drinking milk (by 28.5% and 23.0%, respectively) and from sales of *Tilsit* cheese (by 30.8% and 11.0%, respectively). Retailers, unlike milk producers and processors, received higher income from sales of both drinking milk (by 34.9%) and *Tilsit* cheese (by 74.3%).

Between 2009 and 2017, the shares of retailers in the retail prices of drinking milk and *Tilsit* cheese showed an overall increasing tendency. In 2017, retailers received 32.1% of the retail price of drinking milk and this share was the largest among supply chain participants and by 15.7 percentage points higher than in 2008. The share of retailers in the retail price of *Tilsit* cheese rose from 11.8% in 2008 to 26.4% in 2017, or by 14.6 percentage points and it was the second largest among supply chain participants.

Table 1. Shares of milk producers, milk purchasers and processors, retailers and state (VAT) in the retail price of drinking milk (2.5% milk fat, 1 l plastic bag) sold in the Lithuanian supermarkets in 2008–2017, %

	Milk producers	Milk purchasers and processors	Retailers	State (VAT)
2008	28.2	40.1	16.4	15.3
2009	23.3	34.9	25.4	16.4
2010	29.2	24.0	29.5	17.4
2011	28.8	25.8	28.0	17.4
2012	27.6	29.5	25.6	17.4
2013	32.5	27.1	23.1	17.4
2014	28.8	32.2	21.7	17.4
2015	24.0	35.3	23.3	17.4
2016	23.4	33.6	25.7	17.4
2017	26.5	24.0	32.1	17.4
Change 2017 compared to 2008, percentage points	**–1.7**	**–16.1**	**15.7**	**2.1**

Source: Own Calculations.

Table 2. Shares of milk producers, milk purchasers and processors, retailers and state (VAT) in the retail price of *Tilsit* cheese (1 kg) sold in the Lithuanian supermarkets in 2008–2017, %

	Milk producers	Milk purchasers and processors	Retailers	State (VAT)
2008	36.7	36.2	11.8	15.3
2009	27.2	34.3	22.1	16.4
2010	33.4	28.9	20.3	17.4
2011	29.6	33.4	19.6	17.4
2012	27.1	32.9	22.6	17.4
2013	33.1	28.0	21.6	17.4
2014	29.9	27.1	25.6	17.4
2015	24.0	31.8	26.9	17.4
2016	24.9	27.8	29.9	17.4
2017	32.0	24.2	26.4	17.4
Change 2017 compared to 2008, percentage points	**–4.7**	**–12.0**	**14.6**	**2.1**

Source: Own Calculations.

During that period, the share of state (Value added Tax) in the retail prices of drinking milk and *Tilsit* cheese also increased since the standard tariff of VAT was set at the level of 19% on January 1, 2009, and on the level of 21% on September 1, 2009. In 2017, as compared to 2008, milk producers and processors received lower shares of the retail prices of drinking milk and *Tilsit* cheese. During that period, the shares of milk producers in the retail prices of drinking milk and *Tilsit* cheese decreased by 1.7 and 4.7 percentage points, respectively, and the shares of processors in the retail prices of drinking milk and *Tilsit* cheese decreased by 16.1 and 12.0 percentage points, respectively.

As regards the developments in the distribution of the retail prices of dairy products among supply chain participants, these should be viewed in the context of the fact that the Lithuanian dairy processors sell dairy products produced from local milk not only on the domestic market but also almost half of them export. Prices of dairy products on the foreign markets fluctuate much more than on the domestic market (Figure 1).

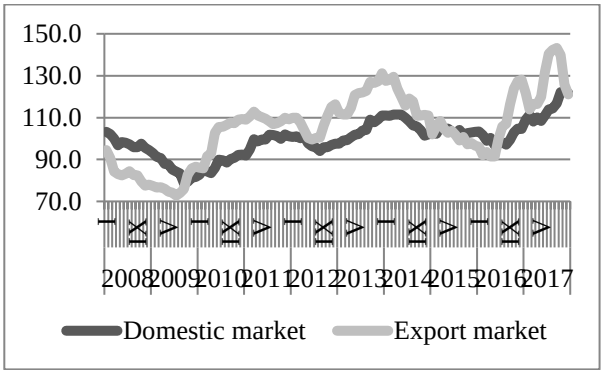

Fig. 1. Price indices of dairy products sold by the Lithuanian dairy processing enterprises on the domestic and export markets in 2008–2017, % (2007–12=100%)
Source: Statistics Lithuania.

The Lithuanian dairy processors set prices for raw milk, taking account of the global demand for dairy products. If the global demand for dairy products is dropping, in order to avoid losses, processors are pushing down prices for raw milk. During that period, retail prices of dairy products sold on the domestic market in comparison with prices of exported dairy products are more stable and

the share of processors in the retail prices of dairy products increases significantly. If the global demand for dairy products is growing, in order to make a gain, processors are pushing up prices for raw milk. During that period, retail prices of dairy products sold on the domestic markets do not rise so rapidly as prices of exported dairy products and the share of processors in the retail prices of dairy products decreases. A significant increase in the shares of processors in the retail prices of drinking milk and *Tilsit* cheese was observed between 2008 and 2009 when the world was facing the economic crisis and between the second half of 2014 and the first half of 2016 when the global demand for dairy products fell (partly due to a trade embargo imposed by Russia) and prices of dairy products declined as the result. The Lithuanian dairy processors were particularly hard hit by the embargo since the exports of dairy products to Russia represented about one third of the total exports of dairy products (Figures 2 and 3).

According to the reports of the largest Lithuanian dairy processing enterprises listed on the Nasdaq Baltic stock market, between 2008 and 2017, these enterprises incurred losses only in 2008. In each subsequent year, their financial performance was positive with two exceptions when two dairy processing enterprises incurred losses in some individual years. As regards family farms generating the largest incomes from milk production, their financial performance was deteriorating. According to FADN data, in 2008, on family dairy farms, the net profitability with subsidies amounted to 51% and the net profitability without subsidies amounted to 21%. Since 2009, on these farms, the net profitability without subsidies was negative, and since 2014, the net profitability with subsidies was also negative. In 2016, on family dairy farms, the net profitability with subsidies amounted to –4% and the net profitability without subsidies amounted to –66%. Milk production in agricultural companies was profitable over the period considered with the exception of 2009 in which the losses were incurred. In 2008, on agricultural companies, the net profitability without subsidies amounted to 19%, while in 2016, it amounted to 4%.

Dairy sectors in some EU Member States face the similar situation. According to IFCN data, in 2017, in the EU, milk producers received on average 45.3% of the retail price of drinking milk, while in Lithuania, they received only 27.6%. In seven countries (namely, in Luxembourg, Romania, Finland, Bulgaria, Italy, Latvia and Sweden), the share of milk producers in the retail price of drinking milk was smaller than in Lithuania (Table 3).

Table 3. Certain indicators of the EU Member States' dairy sectors

EU Member State	Share of milk producers in the retail price of drinking milk in 2017, %	Average number of dairy cows (heads) per farm in 2016	Share of raw milk purchased for processing by the largest dairy processor or share of production of the largest dairy processor in 2016 or 2017, %	Average purchase price for raw milk in 2017, EUR/100 kg
Luxembourg	23.8	73.0	41	35.42
Romania	24.3	2.4	17	29.19
Finland	24.8	37.3	80	37.72
Bulgaria	26.6	8.8	n/a	30.52
Italy	26.6	52.0	4	37.02
Latvia	26.9	8.9	41	30.61
Sweden	27.2	83.0	66	37.94
Lithuania	**27.6**	**6.1**	**25**	**29.76**
Czech Republic	29.5	218.0	13	31.59
Netherlands	29.5	97.0	75	37.96
Austria	31.1	17.0	40	37.34
Slovenia	31.6	11.5	3	30.32
Ireland	31.8	84.0	n/a	36.42
Slovakia	32.2	36.0	n/a	30.99
France	33.5	57.6	19	34.40
Greece	34.8	47.6	n/a	38.79
Portugal	35.9	49.2	32	29.68
Croatia	36.2	16.3	37	31.38
Belgium	37.1	43.2	34	35.05
Hungary	38.5	25.1	n/a	30.48
Spain	40.6	54.0	n/a	30.96
Denmark	42.6	185.0	97	36.90
Cyprus	43.7	133.6	n/a	55.88
Germany	45.3	61.0	26	36.41
Poland	45.9	9.1	n/a	32.37
Estonia	52.5	49.5	n/a	32.68
United Kingdom	52.7	143.0	22	31.82
Malta	61.9	57.0	n/a	48.09
EU-28 (weighted average)	**45.3**	**18.4**	**12.7**	**32.10**

Source: IFCN Dairy Report, European Commission.

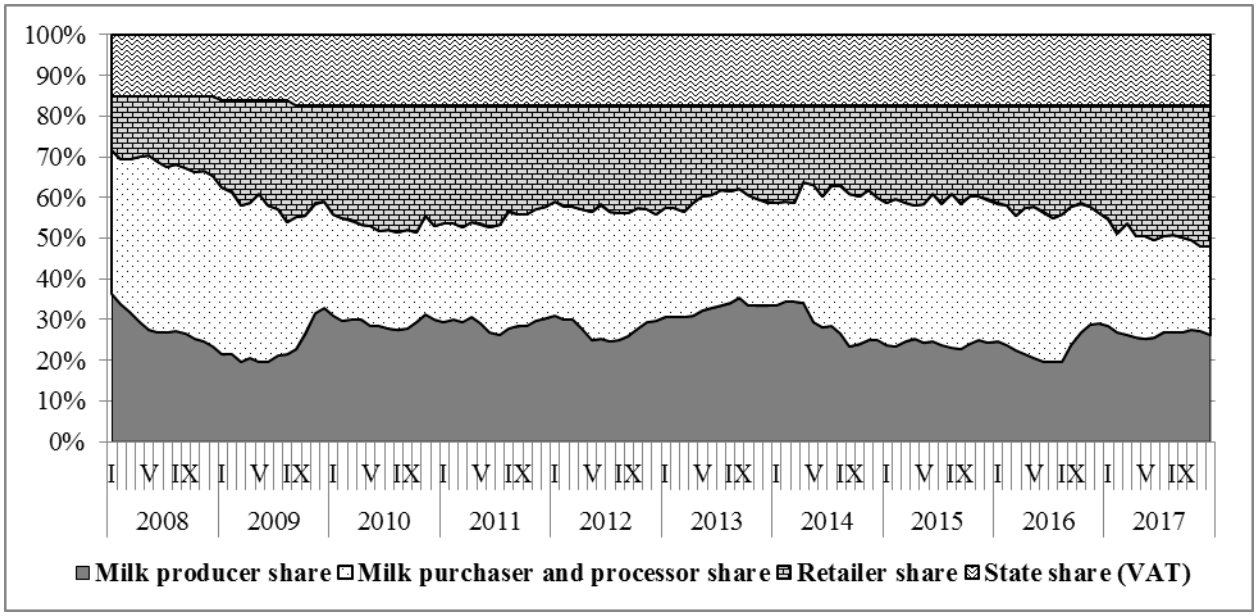

Fig. 2. Structure of the retail price of drinking milk (2.5% milk fat, 1 l plastic bag) sold in the Lithuanian supermarkets in 2008–2017, %
Source: Own Calculations.

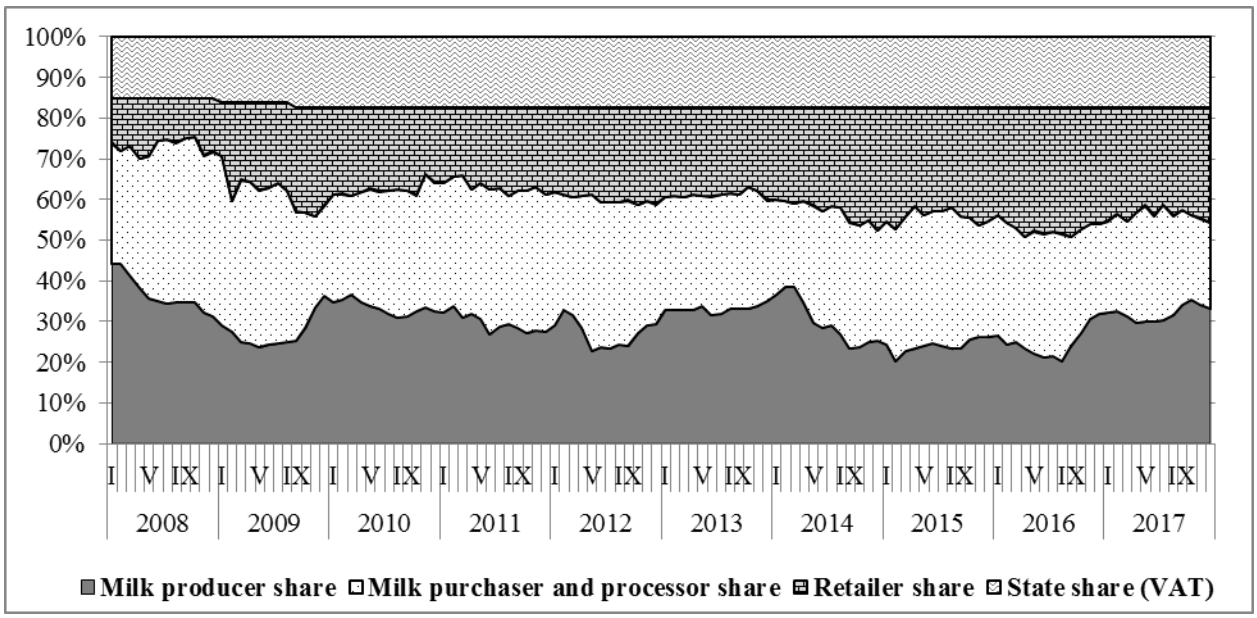

Fig. 3. Structure of the retail price of *Tilsit* cheese (1 kg) sold in the Lithuanian supermarkets in 2008–2017, %
Source: Own Calculations.

In all these countries, either small-scale dairy farming is dominant (Romania, Bulgaria and Latvia) or dairy processing industry is highly concentrated (Finland, Sweden and Luxembourg). In Italy, dairy farms are not small (the average size of dairy farm is 52 cows) and the level of the concentration in the dairy industry is not high (the largest dairy processing enterprise processes about 4% of the total raw milk) but milk producers receive only 26.6% of the retail price of drinking milk. This can primarily be explained by the fact that cooperatives purchase 60% of the total raw milk. Since the vertical integration is dominant in these cooperatives, there is no difference which supply chain participants (milk producers or processors) receive higher shares of the retail prices of dairy products.

CONCLUSIONS

In order to evaluate the developments in the

distribution of the retail prices of dairy products among supply chain participants in Lithuania over the period of 2008 to 2017 and to reveal the main factors that determine this distribution, the structure of the Lithuanian dairy supply chain has been examined and the shares of milk producers, processors, retailers and state (VAT) in the retail prices of dairy products (drinking milk and *Tilsit* cheese) have been calculated.

The structure of the Lithuanian dairy supply chain indicates that milk producers, a large majority of which are small-scale dairy farmers, are fragmented and less organized, while the dairy processing industry and retail trade can be considered as heavily concentrated. The bargaining power of retailers and dairy processors is seen as high, while the bargaining power of milk producers is relatively low. Milk producers are usually the weakest link in the negotiations and therefore, low purchase prices for raw milk are imposed on them, especially at the time when the global demand for dairy products is dropping.

Over the past ten years, the shares of retailers in the retail prices of dairy products have shown an increase, while the shares of milk producers in these prices have decreased. The main factors that determine the distribution of the retail prices of dairy products between milk producers, dairy processors and retailers in Lithuania are as follows:

-different levels of concentration in the milk production, manufacturing of dairy products and retail trade (market dominated by a large number of small-scale dairy farms, several large dairy processing enterprises (several raw milk purchasers) and few big retailers);

-low levels of vertical integration;

-tradition to impose low purchase prices for raw milk on milk producers ever since Lithuania restored its independence in 1990;

-fluctuations in global demand for dairy products;

-possibility to import large quantities of raw milk from neighbouring countries in which there is a surplus of raw milk.

Horizontal concentration and vertical integration are the main instruments that could help to increase the market power of milk producers. Furthermore, milk producers should be opened to entering direct sales marketing, or short food supply chains.

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