

ANALYSIS AND OUTLOOK OF DAIRY SECTOR IN BALTIC STATES

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Abstract. The dairy sector is one of the most developed and most important agricultural commodity production sectors besides grain production in the Baltic States - Latvia, Estonia, and Lithuania. In the structure of agriculture production in the Baltic States, milk production is the most important sector among livestock farming sectors. Over the last 16 years, farms have been modernized (including the purchase of new machinery and improving the infrastructure), largely it has been possible due to the availability of the European Union (EU) structural funds (farmers have access to various forms of support, such as direct payments to farmers, investment in agricultural production and processing). They have also been targeted towards educating farmers in animal management, animal welfare and feeding. An important factor is also breeding of animals - the farmers are choosing cows with a higher genetic potential for productivity. As a result, the average milk yield per cow increased, while the number of dairy cows decreased (mainly due to the small family farms with 1-5 cows going out of the business). As the industry is influenced by many factors (for example, the lactation process of cows), it is important to prepare and review the sector's development outlook. The purpose of this study is to analyze the dairy sector in the Baltic States and prepare the outlook for its future development trajectories. To reach these purposes, research tasks were set, which helped analyze the key elements of the dairy sector in the Baltic States.

Keywords: dairy sector, outlook, analysis, Baltic States.

Introduction

The EU is a major player on world markets for dairy products and dairying is one of the most profitable sectors of the EU agriculture [1]. Therefore, the dairy sector, which includes milk and milk products, also is one of the significant agricultural sectors in all Baltic States and it has proven itself as a sector with stable development and future perspective [2].

The dairy sector in the Baltic States was significantly affected by the accession of the Baltic countries to the EU and further implementation of various EU planning documents. For example, on the milk sector in the Baltic States milk quotas had a strong impact, which were introduced by the EU on the 1st of April, 2010. Following the abolition of this quota, the dairy sector adapted rapidly to the new situation. The most important changes include increased milk yields per cow, increased total milk production, decreased number of cows, and decreased milk consumption [3]. The dairy sector in the Baltic States depends not only on events in the EU, but also on the world events. Therefore, the milk crisis, when the milk price was on the lowest level in 2014-2016, was caused by the Russian Federation import embargo on the EU agricultural products, which entered into force on 7 August 2014, as well as the instability of the world dairy market and a particularly sharp drop in the demand in the Asian market, especially in China at the end of 2014 [4; 5]. Given that China is one of the largest milk producers in the world, its impact on the world market, including the Baltic States, is significant [2]. The above-mentioned crisis contributed to increased investments in dairy farm modernization for keeping pace with the new technological progress; innovations and investment in new feeding and milking technologies, to raise only cows of a high production level and provide selection pressure for high breeding bulls [5].

The main trends in the dairy sector until 2019 showed a decrease in cows and farms, an increase in the average number of dairy cows and an increase in the milk yield, an increase in milk production, and an improvement in milk quality [5]. In 2020, a Covid-19 pandemic began, affecting all economic sectors around the world, including the agricultural sector. As a result, the agricultural sector has substantial shifts in the demand for food and food services [7]. The supply of dairy products has been hit strongest by COVID-19 mostly because of many countries that have imposed lockdown [8]. In addition, countries are taking steps to avoid a dramatic economic downturn affecting farmers, workers, and consumers around the world [7].

Research results and discussion

During the last 16 years, the total number of dairy cows has decreased in all Baltic States. The largest decrease has been in Lithuania from 448 thousands in 2004 to 256 thousands in 2019, while in Estonia the decrease has been stable and slow (Table 1) [11-13]. Despite this fact, the average milk yield

per cow increased during the last 16 years. This trend can be explained by the fact that farmers start to manage productive livestock more precisely and select cows with the highest genetic potential, which can produce more milk during lactation and therefore farmers need a smaller number of dairy cows [9]. Another reason is that farms with 1-5 cows, which were traditionally less productive, have left the business, but larger professional farms have remained, thus increasing the total amount of raw milk produced while the number of cows decreases.

The authors calculated the growth rate for the number of cows and the chain growth rate for the number of cows. These calculations allowed to obtain indicators of changes in the dynamics of the rows for the number of dairy cows.

Table 1

Dynamics of the number of dairy cows in the Baltic states

Year	Latvia			Lithuania			Estonia		
	Number of dairy cows	Growth rate for number of cows	Chain growth rate for number of cows	Number of dairy cows	Growth rate for number of cows	Chain growth rate for number of cows	Number of dairy cows	Growth rate for number of cows	Chain growth rate for number of cows
2004	168	-	-	448	-	-	117	-	-
2005	185	99.46	99.46	434	96.85	96.85	113	96.82	96.82
2006	182	97.85	98.38	417	92.97	95.99	108	93.05	96.10
2007	180	96.77	98.90	399	89.04	95.77	103	88.41	95.02
2008	170	91.40	94.44	404	90.27	101.38	100	86.18	97.48
2009	166	89.25	97.65	395	88.10	97.60	97	83.00	96.31
2010	164	88.17	98.80	375	83.62	94.91	97	82.83	99.79
2011	164	88.17	100.00	360	80.29	96.02	96	82.58	99.69
2012	165	88.71	100.61	350	78.01	97.16	97	83.09	100.62
2013	165	88.71	100.00	331	73.88	94.71	98	84.03	101.14
2014	166	89.25	100.61	316	70.45	95.35	96	82.06	97.65
2015	162	87.10	97.59	314	70.09	99.49	91	77.77	94.77
2016	154	82.80	95.06	300	67.05	95.67	86	73.91	95.03
2017	150	80.65	97.40	286	63.77	95.11	86	74.16	100.35
2018	144	77.42	96.00	273	60.94	95.55	85	73.13	98.61
2019	138	74.19	95.83	256	57.14	93.77	85	72.96	99.77

Table 1 shows that in Latvia, Lithuania, and Estonia the indicators predominantly are decreasing every year compared to the previous year. A similar situation was observed comparing the indicators with the base year. This means that in average these indicators have decreased since 2004 in all Baltic States.

The rate of decline in Latvia and Estonia has been steady, averaging -1.95% (in Latvia) and -2.04% (in Estonia), but in Lithuania it was 3.64%. A comparison of the indicators with the base year shows that the rate of decrease in Latvia has been slower, averaging 12.01%, while in Lithuania and Estonia it has been more rapid, averaging 17.73% in Lithuania and 22.50% in Estonia.

Even though the total number of dairy cows is decreasing in all Baltic States, the average milk yield per cow is increasing (Fig.1) [11-13]. As mentioned above, one of the reasons why the total number of dairy cows is decreasing while the average milk yield per cow is increasing is that farmers select cows with a highest genetic potential.

The reason why farmers can afford dairy cows with a highest genetic potential is that farmers have opportunities to use the EU funding. Farmers have access to various forms of support, such as direct payments to farmers (including support for young farmers and small farmers), investment in agricultural production and processing, and the implementation of training and scientific knowledge. This, in turn, provides an opportunity to modernize their farms, to introduce new technologies or new methods, thus developing their farms and, as a result, increasing the milk yield. Another reason is changes in the farm structure, because more small-scale farmers with less productive cow herds and smaller milk yields are leaving the business, medium and large dairy farms with better and more precisely managed livestock farming and thus higher milk yields increase the overall productivity [2].

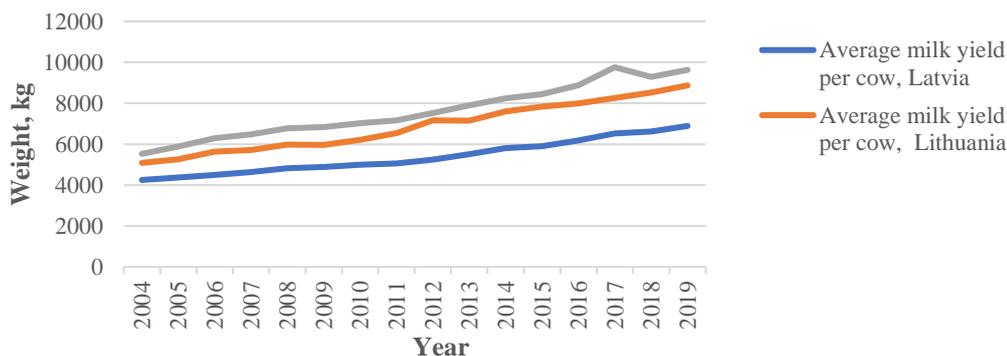


Fig. 1. Average milk yield per cow

A comparison of indicators of average milk yield per cow in the base year shows that it has increased in all Baltic States. In Latvia it was 28.53%, in Lithuania 37.19% and in Estonia 40.04%. Compared to 2004, the average milk yield per cow in all Baltic States has increased and the largest increase was in Estonia.

One of the rather contradictory reasons for that might be that initially the Estonian government provided lower additional financial support to farmers during the dairy crisis compared to Latvia and Lithuania. The Estonian government reduced the level of subsidies per dairy cow and per tonne of milk, which forced Estonian dairy farmers to control their costs, optimize their operations, and control the health of the herd without relying on government co-financing [10]. The comparably lower level of subsidies in Estonia also lead to the small farms going out of the business, which in long run increased the reflection of productivity and milk yield per cow in the statistics, as the cows kept in larger farms are usually managed more professionally and are more productive than the cows in small family farms.

The increase in the average milk yield per cow affected the total amount of raw milk produced in Latvia and Estonia, but in Lithuania raw milk production decreased. However, Lithuania, compared to Latvia and Estonia, has had the highest amount of raw milk produced from 2004 to 2019.

In general, despite the fact that the amount of milk produced in the Baltic States has been unstable, from 2004 to 2019, the amount of milk in Latvia increased by 24.5%, in Estonia it increased by 25.3%, but in Lithuania the amount of milk decreased by 16.1%. Comparing the indicators with the base years, it can be observed that Latvia and Estonia showed an increase, on average 14.45% in Latvia and 13% in Estonia, but in Lithuania there was a decrease of, on average 5.36%.

To forecast raw milk production (Fig. 2, 3, 4) in the Baltic States until 2025, the authors used one of the regression models – linear regression [14]. This method allows modelling the relationship between a scalar response and one or more explanatory variables.

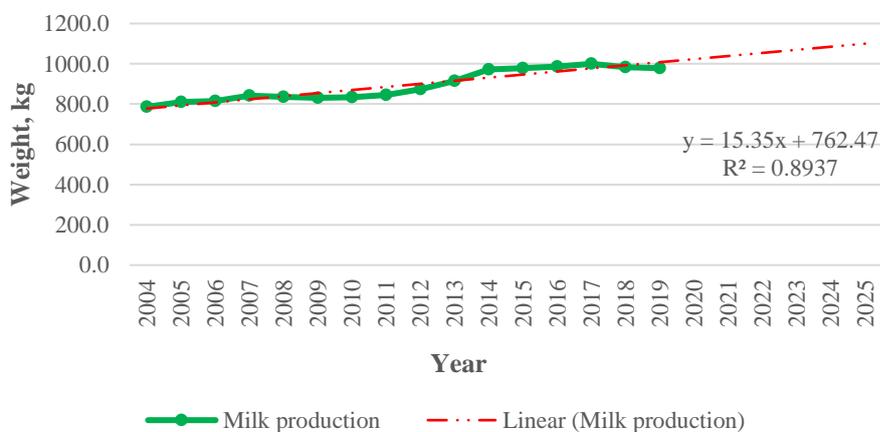


Fig. 2. Forecast of raw milk production in Latvia

Based on the calculations, Figure 2 shows that in Latvia the amount of raw milk produced will continue to grow.

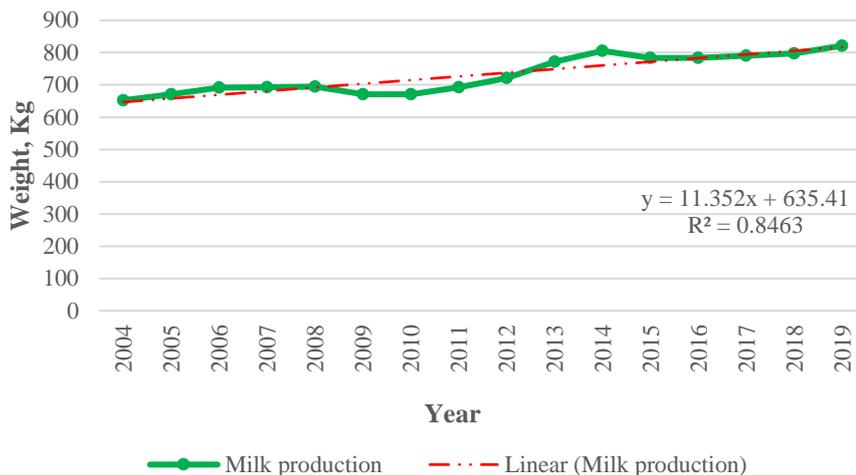


Fig. 3. Forecast of raw milk production in Estonia

As in Latvia, the amount of raw milk produced will continue to increase also in Estonia, but it will be slower than in Latvia (Fig.3.). Compared to 2020, in 2025 an increase is expected by 8.35% in Estonia and 9.14% in Latvia.

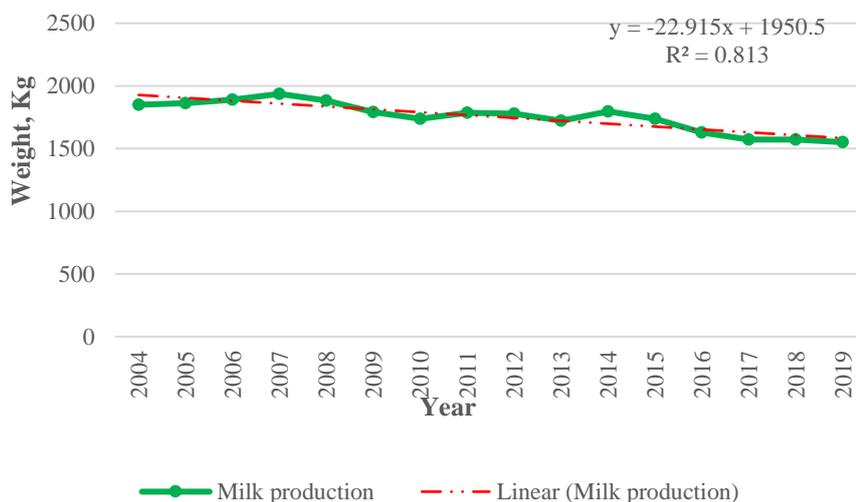


Fig. 4. Forecast of raw milk production in Lithuania

Lithuania is in a different situation, where raw milk production is expected to decrease. Compared to 2020, in 2025 a decrease is expected by 7.34%. One of the reasons is that raw milk is imported to Lithuania from other countries, including from Latvia. However, despite this fact, the total amount of raw milk in Lithuania will continue to be higher than in Latvia and Estonia.

One of the factors affecting the dairy sector is the lactation process of cows. It means that in summer, spring and autumn (when fresh fodder (grass) is available) milk production increases and thus the milk price decreases, but in winter, when milk production decreases and there is less milk on the market, the price of milk increases. In this work, the authors have researched whether seasonality affects the milk prices in the Baltic States and EU-27 (Fig.5). The average milk price from 2015 to 2020 in Latvia was 26.67 euro, in Lithuania 26.52 euro, in Estonia 28.51 euro and in EU-27 34.43 euro.

Figure 5 [14] shows that in the winter months, when less milk is produced, milk prices are higher than the average price (seasonality index is above 1), while in the summer months, prices are lower than the average price (seasonality index is below 1). In general, seasonality has a relatively small effect on the milk prices in the Baltic States and EU-27.

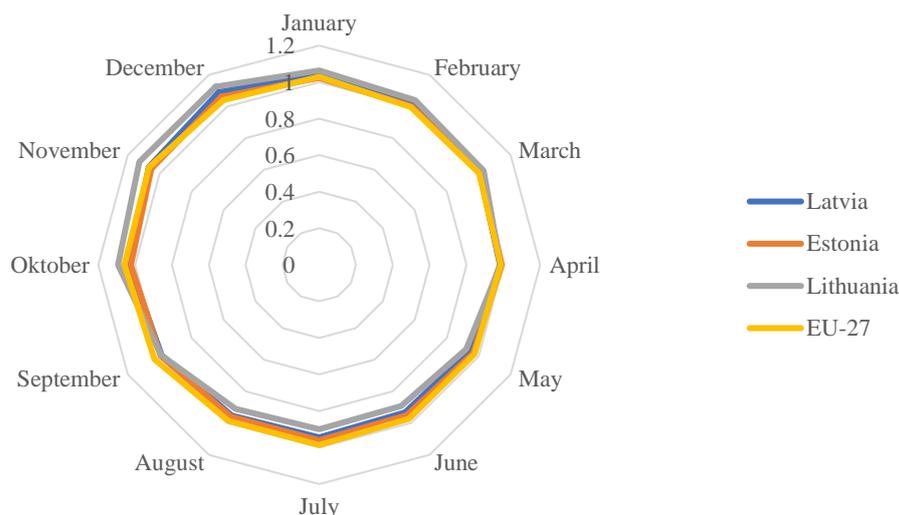


Fig. 5. Milk price seasonal index in Latvia, Lithuania, Estonia and EU-27

Conclusions

1. During the last 16 years, the total number of dairy cows has decreased in all Baltic States, while the average milk yield per cow increased. One of the reasons is that farmers select cows with the highest genetic potential. Another reason is the changes in the farm structure, because more small-scale farmers with less productive cow herds and smaller milk yields are leaving the business, medium and large dairy farms with better and more precisely managed livestock farming, and thus higher milk yields, increase the overall productivity.
2. Over the last years, dairy farms have been modernized (including the purchase of new machinery, and improving the infrastructure), largely it has been possible due to the availability of the European Union (EU) structural funds. They have also been targeted towards educating farmers in animal management, animal welfare and feeding.
3. The average milk yield per cow in all Baltic States has increased and the largest increase was in Estonia (40.04%). One of the explanations is that the Estonian government provided lower additional financial support to farmers during the dairy crisis compared to Latvia and Lithuania. For example, the Estonian government reduced the level of subsidies per dairy cow and per tonne of milk, which encouraged Estonian dairy farmers to control their costs, optimize their operations and control the health of the herd without relying on government co-financing.
4. The forecast of raw milk production till 2025 shows that in Latvia the amount of raw milk produced will continue to grow (compared to 2020 an increase is expected by 9.14%) as well as in Estonia (compared to 2020 an increase is expected by 8.35%). However, Lithuania is in a different situation, where raw milk production is expected to decrease. Despite this fact, the total amount of raw milk in Lithuania will continue to be higher than in Latvia and Estonia.
5. The milk price seasonal index shows that in the winter months, when less milk is produced, the milk prices in the Baltic States and EU-27 are higher than the average price (seasonality index is above 1), while in the summer months, the prices are lower than the average price (seasonality index is below 1). In general, seasonality has a relatively small effect on the milk prices in the Baltic States and EU-27.

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