

STUDY ON THE DYNAMICS OF CATTLE LIVESTOCK, MILK PRODUCTION AND FRESH DAIRY PRODUCTS IN ROMANIA BETWEEN 2016-2020

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Abstract

Farmers receive subsidies from the state and an assessment of the living standard in the respective nation can be made based on the dynamics of cattle livestock and the development of dairy products. The EU Council receives data on these issues from EU nations each year. The data processed in the study were collected from the Annual Statistical Surveys. The data came from about 600 economic operators but summative data organization and presentation techniques (descriptive statistics) were used for processing. In Romania, during the analyzed period, even though the cattle herd decreased by 8.01%, milk production increased by 15.91% from 2016 to 2020, as farmers were interested in exploiting genetically valuable specimens. Butter production followed a sinusoidal trajectory, increasing in 2017 (177 tons), decreasing by 12 percent until 2019, and then increasing by 14.33 percent in 2020. Cheese production followed an upward trend ranging from 1 to 5.68 percent, with the highest determined increase (5 127 tons) in cheese production for 2018 compared to 2017.

Key words: butter and cheese production, cattle livestock, dairy, development regions, fresh dairy.

INTRODUCTION

In Romania, milk and dairy products are frequently consumed food products. This is also reflected in the farmer's interest to increase productivity and in the diversification of the dairy products range by processors. (Constantin, 2009).

Over the last 30 years, milk production has increased by 64% worldwide and by 225% in Asia (<https://www.fao.org>). A statistical study conducted by *Our World in Data* ranked the countries with the highest milk production worldwide from 1961 to 2018. From 1998 to 2018, India ranks first, with a production about three times higher compared to US, which ranks second. Milk production depends mainly on the productive and reproductive performance of cattle (Rajiv Baliram et al., 2018).

The world's largest milk producer is India. It accounts for almost 20% of global production (Mishra, P. et al, 2020). The United States, China, Pakistan and Brazil also make a significant contribution to global milk production (FAO).

The Food Outlook (June 2022) estimates world milk production at 937 million tonnes in 2022, an increase of 1% compared to the previous year.

Globally, a fairly high proportion (16.9%) of milk consumed by humans comes from different species other than cattle (Faye & Konuspayeva, 2012).

Milk is an important component of the human diet (Kapaj & Kapaj, 2021), dairy products are vital sources of nutrition (*OECD-FAO, 2022*) with implications for health (Bleasdale, 2021), it also indicates the development level of a country (Vidu, 2002).

MATERIALS AND METHODS

Development regions are administrative divisions at a certain level. Funds (national and European) are allocated at the level of these regions. A series of statistical studies are carried out at the regional level in various fields. In Romania there are 8 development regions: North-East, South-East, South-Muntenia/South, South-West Oltenia/ South-

West, West, North-West and Center, Bucharest-Ilfov, Figure 1.



Figure 1. Development regions in Romania
Source: <https://www.mediafax.ro>

Data (from about 600 economic operators) were collected from the Annual Statistical Surveys of the National Institute of Statistics in order to track the trend in cattle herds, milk production and dairy products at the national level and by development region. The working methodology for these surveys is in accordance with the Council Directive no.96/16/EC on the milk production and fresh dairy products from 10.03.1996. This Directive is designed to allow short and medium-term monitoring of the EU market for dairy and fresh dairy products. The Directive specifies deadlines according to which EU countries must send the results of various surveys to the European Commission (EUROSTAT). Another source for data collection (animals livestock registered in the official production control) was the National Agency for Animal Husbandry. Statistical processing was carried out using techniques and procedures designed to organize and present data in a summative way by graphically representing the frequencies of the analyzed variables categories (Defta, 2021).

RESULTS AND DISCUSSIONS

Cattle livestock dynamics over the period under analysis reveal a decrease of 166631 heads, percentage representing a decrease of approximately 8.01%. from 2016 to 2020. The largest decline was in 2017 compared to 2016 (68949 heads or 3.31 percentage points).

The lowest cattle population of the last 10 years was recorded in 2015 (Shahbandeh, 2021). A statistical study elaborated by Our World in Data indicates that in 2018, India was the country with a livestock of 185 million cattle heads. The same source (<https://ourworldindata.org>) states that in Europe, countries with cattle livestock between 10 - 50 million heads were established in: Russia (18.29 million heads), France (18.55 million heads) and Germany (11.95 million heads).

Analysing the cattle livestock distribution by development regions in the period 2016 - 2020, it was found that the only region with an increase (4202 heads, i.e. 1.26%) of cattle livestock in 2020 (338158 heads) compared to 2016 (333956 heads) was the Center region, Table 1.

For the North-East and South-West areas, a decrease in the herd was observed every year, and this reached 7.91% (2018 compared to 2017 in the South-West region). The Bucharest-Ilfov area has a small number of cattle livestock compared to the other development regions. This area also registered the largest decline in cattle number (34.62% less in 2020 compared to 2019).

Even though cattle livestock were decreasing during 2016-2020, milk production increased by 15.91% (180055 tonnes). This increase is due to the exploitation of animals with a high productive potential, with special attention being paid to welfare status and nutrition in order to boost genetic potential.

Comparing the quantity of raw cow's milk collected by processing units from livestock holdings and collection centers for the mentioned period, the milk production dynamics are as follows:

- in 2017 there was an increase of 75878 tons of milk (7.38%) compared to 2016. For 2017 milk production was 1027830 tons;
- in 2018 milk production was 92583 tons of milk (8.26%) more than what was collected in 2017;
- for 2019 there was an increase of 4887 tons (0.43%) of milk collected compared to the previous year;

Table 1. Cattle livestock dynamics during 2016-2020

Year	NE	SE	SM	SV	V	NV	C	BI	Total
2016	537717	240571	233222	203503	156877	368640	333956	6747	2081233
2017	512175	229814	221490	193566	158010	364909	325516	6804	2012284
2018	502939	224585	223338	178254	154938	372814	338472	6679	2002019
2019	486041	225321	214741	171654	153385	365055	340005	6371	1962573
2020	467771	216263	210676	160571	151961	365037	338158	4165	1914602
Mean									
	501328.6	227310.8	220693.4	181509.6	155034.2	367291	335221.4	6153.2	1994542.2
Standard error of the mean (SEM)									
	11840.981	3972.040	3875.394	7665.582	1105.101	1550.443	2625.536	502.642	27657.217

Note: NE - North-East; SE - South-East; S - South-Muntenia; SV - South-West Oltenia; W - West; NW - North-West; C - Center; BI - Bucharest-Ilfov.

- compared to 2019, in 2020 there was an increase in milk production of 6,707 tons (0.59 percentage points).

Even though its share varies only between 4.77% (2017) and 6.90% (2020) for the total annual production, the West region is the only one for which an upward trend in milk production has been observed.

The situation was different for the South-East region, determining a downward trajectory from 2016 (64428 tons, Chart 1A) to 2020 (48308 tons, Figure 2A), which represents a 2.5% decrease in the share of total annual production. The largest year-on-year difference was 6687 tons in 2019 compared to 2018 (11.23%), Figure 2B.

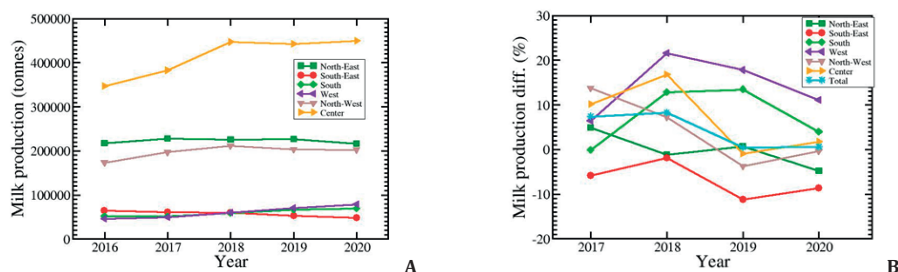


Figure 2. The dynamics of milk production in the period 2016-2020, by development regions

For the South-Muntenia/South region, milk production has been increasing from one year to the next, except 2017 when production slightly decreased (64 tons, Figure 1A; 0.12%, Figure 2B) compared to 2016.

The Centre, North-East and North-West regions have the highest contribution to the total annual production in all years included in the study. For the Center region, the only year when production decreased was 2019 (442368 tonnes, Figure 1A), with 1% difference (Figure 1B) compared to 2018 (446743 tons).

This region has the highest contribution to total annual production ranging from 36.48% (347314 tons, 2016) to 39.87% (449801 tons, 2018).

The Central, North-East, and North-West regions contributed 75% to the annual production in 2018.

The results of the research carried out in Romania regarding the consumption of fresh dairy products are consistent with the statistical processing of the present study, which shows that during 2016-2020 the quantity of fresh dairy products increased by 25736 tons, which represents an increase in production of about 9.60% (Figure 3). In 2018 and 2020 production showed a lower increasing compared to 2017 and 2019. For example, in 2017, production increased by 9829 tons (3.66%) and in 2019 by 9293 tons (3.29%), whereas in 2018 production increased by only 4497 tons (1.61%) and in 2020 by 2117 tons (0.72%).

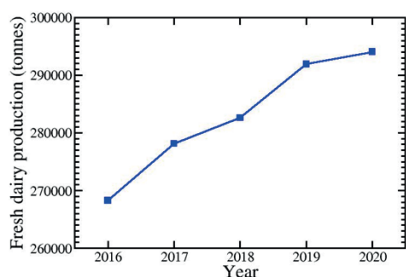
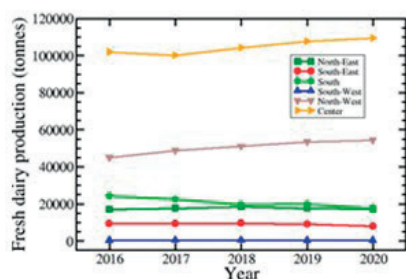
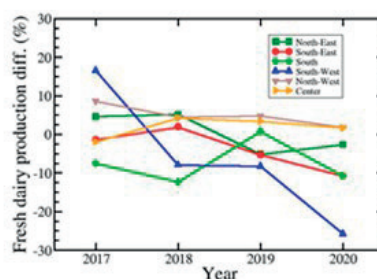


Figure 3. Dynamics of fresh dairy production in the period 2016-2020 in Romania

Comparatively, among the eight development regions, the largest increase in production of fresh dairy products during the period under review was reported for the North-West region (+9386 tons).



A



B

Figure 4. Fresh dairy production (2016-202) by development regions

Annual butter production follows a sinusoidal trajectory, increasing by 177 tons in 2017 compared to 2016, then decreasing by approx. 10.21% in 2018 and by approx. 2 percent in 2019, before increasing by 1526 tons (14.33 percent) in 2020 (Figure 5).

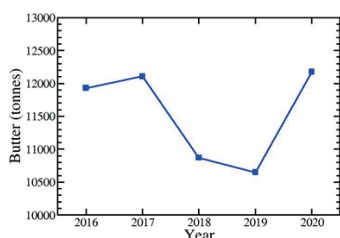


Figure 5. The dynamics of butter production in the period 2016-2020 in Romania

This region is the only one where fresh dairy production is on an upward trend (Figure 4A). For the Center region, production was 1880 tons less than the region mentioned above.

The two development regions, North-West and Center contribute each year with the highest shares to the total production in the country: the Center region with almost twice as much as the North-West.

For the South-Muntenia/South region, a decrease of about 6612 tons (27%) was reported from 2016 to 2020.

The largest percentage increase, year-on-year, was determined for the South-West region, i.e., an increase of 16.50% in 2017 compared to 2016 (Figure 4B).

National butter production was mainly reported in the Center region (about half each year); those in South East and South regions reported only 1-3.5%.

In 2018 production increased to 359 tons (Figure 5A), which is about 60.27 % higher than the previous year.

For the North-East region, 2017 was the only year with a reported increase in butter production: +4.65% compared to 2016 production. In the following years (2016-2020), production was decreasing, with 23.47% total (Figure 6A and 6B).

Figure 6B shows the differences from one year to the next by development region.

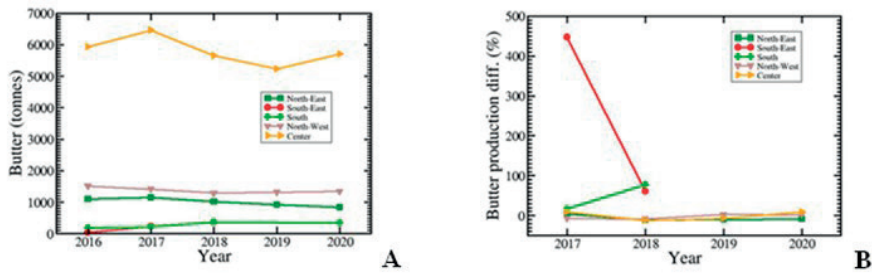


Figure 6. Butter production (2016-2020) by development regions

Cheese is another dairy product appreciated by Romanians. A continuous increase in the production of cheese (including curd) was observed for the studied period. Each year, the increased production varied between 1 and 5.68%, with the highest increase in 2018 (5127 tons) compared to 2017 (Figure 7).

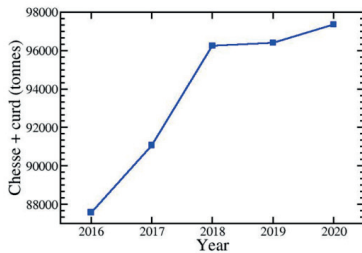


Figure 7. Cheese production (including curd) in Romania (2016-2020)

For the analysed period, it was observed that in five of eight development regions (North-East, West, North-West, Center and Bucharest-Ilfov) production increased at the end of 2020 compared to 2016, with fluctuations in cheese production during this period.

The highest production was recorded in the Central region and the lowest in the Bucharest-Ilfov region (47 tons, 2016 - 65 tons, 2020). For the Center, the dynamics of cheese production followed an upward path from 2016 (31136 tons) to 2020 (40575 tons), with an increase of 9436 tons in production and 30.31% respectively. It is the only area where cheese production (including curd) increased year-on-year (Figure 8A).

The graphical representation of cheese production in the North-East region shows a sinusoidal production trajectory: it increased by 1335 tons in 2017 (Figure 8A), decreased by 828 tons in 2018, and increased again by 1385

tons in 2017 (6.27%, Figure 8B), with a small decrease in the following year (135 tons). Figure 8B shows the percentage differences from one year to the another.

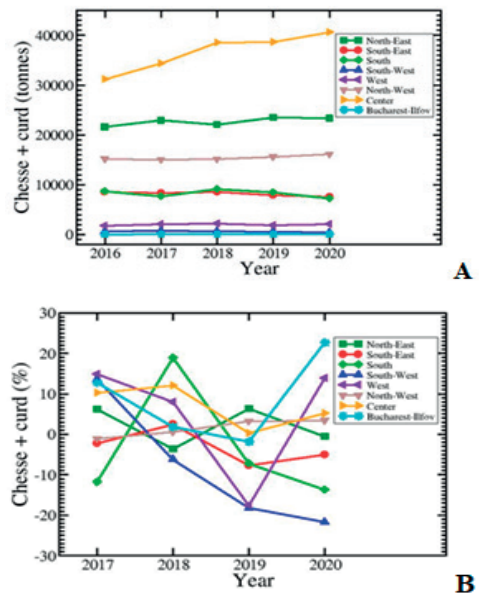


Figure 8. Cheese production, including curd (2016-2020) by development regions (A, B)

CONCLUSIONS

Given the conditions of the world population explosion, an important concern for securing food resources is cattle rearing and exploitation, as this animal species provides raw material for a wide range of food products. Even though the cattle livestock has decreased during the period under review, milk production has increased, as farmers are interested in exploiting animals with high production potential and ensuring optimal conditions for animal welfare.

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