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Development of dairy farming in the state of Tocantins in recent years

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ABSTRACT
Dairy farming has a fundamental role in the rural environment and in the economy of the country, with this, the research aimed to analyze the activity in the state of Tocantins in the last decade and used statistical data from the Brazilian Institute of Geography and Statistics (IBGE). The territory adopted for the research was the state of Tocantins. The study was developed from the productive history of the dairy chair in the last decade. In this study, the Brazilian Institute of Geography and Statistics (IBGE) was used as a research source in order to collect productivity variables from all 139 municipalities in the state of Tocantins. Data on milk production from 2010 to 2019 were used for the research project. The data were submitted to analysis of variance and the means were compared by the Scott-Knott test. In relation to annual production, there was a progressive increase, ranging from 2074.49 million liters in 2011 to 3215.96 million liters in 2017, that is, it presented an increase of 55.02%. As for productivity, there was a considerable increase, with higher rates in the years 2018 (924.84 liters.year-1) and 2019 (909.22 liters.year-1) and the lowest were in charge of the years 2013 (608.25 liters.year-1), 2012 (612.39 liters.year-1) and 2011 (622.68 liters.year-1). The dairy chain showed an increase in productivity between the years 2010 to 2019, and there is still potential to increase, because when compared to other Brazilian states, the average of Tocantins is still considered low.

Keywords: Production, Tocantins, Productivity, Milk.

1 INTRODUCTION

Agribusiness has long been considered the "strong arm" of the Brazilian economy. Faced with the serious political-economic crisis faced by Brazil in recent years, it has contributed positively to the national economy, generating millions of direct and indirect jobs (SIDRA, 2019). In Brazil, milk is one of the six most important agricultural products, being essential in the supply of food and in the generation of employment and income for the population (De Almeida L. et al. between 2000 and 2010). Corrêa et al (2010) and Souza et al (2009) stated that since the beginning of the 90s, the dairy activity has undergone major transformations in the country, making it competitive and innovative in the global market, focusing on scale production with quality, value addition and industrialization of differentiated products.

The state of Tocantins has a cattle herd of 8.6 million dairy heads (SIDRA, 2019) and milk production of 385.5 million liters (SIDRA, 2019). There are more than 528 thousand cows milked with productivity of 730 liters/cow/year.

The municipality of Araguaína stood out in relation to milk production in 1997 and 2007. However, it is verified that in the last decade the municipality presented a decrease in milk production and it was observed a rise of other municipalities such as Araguaçu, Araguatins, Arapoema, Bandeirantes do Tocantins, Colmeia and Pequizeiro. This increase in milk production was also reflected in an increase in monetary values (SIDRA, 2019).

Thus, it is essential to make a diagnosis about the state milk production and to verify the main factors that caused the decline of the sector in recent years in Araguaína. Therefore, the objective was to characterize and analyze the dairy chain of livestock comparatively the herds and productions of dairy farming in the municipalities of the State of Tocantins in the last decade.

2 THEORETICAL FRAMEWORK

2.1 DAIRY FARMING

Milk is essential to human food and is produced all over the world. The importance can be observed in the world productive and economic environment, especially in countries considered to be developing and in family farming systems. Over the past three decades, global milk production has increased by more than 50%, reaching 769 million tonnes in 2013 (FAO, 2016).

Milk is produced worldwide, however, using different production systems and in properties that can be small, medium or large (COSTA et. al, 2015). Rodrigues et al., (2013) stated that the world milk production comes from 85% of cattle farming.

According to the Food and Agriculture Organization of the United Nations (2016), approximately 150 million families worldwide are involved in dairy production, and it is characteristic of most developing countries to produce from small farmers as it provides return.

Brazil has doubled milk production in the last ten years, becoming the fourth largest producer in the world, behind the United States, China and India. Last year, there were almost 34 billion liters, about 7% of the total produced in the world (PÉTRIN, 2019)

2.2 DAIRY FARMING IN TOCANTINS

According to Basto et. al. (2013), Tocantins is the third largest producer of bovine milk in the North region, the State aims to expand production and increase the quality of dairy products. Tocantins currently produces an average of 280 million liters of bovine milk per year. More than 15 thousand rural properties are dedicated to this type of production.

According to Seagro's supervisor, Tocantins has the potential to expand this brand with productive quality. Dairies are now at half capacity. If we can work together with partner entities and producers, we are able to increase this production and who wins are the producers and consumers who will have higher quality in the product (BASTO et. al., 2013).

According to Basto et. al. (2013), the action plan for the sector in the next five years includes eight strategic axes, namely: increasing production, improving milk quality, business and technical education, technical assistance and rural extension, improving the quality of life of the producer, industrialization and marketing of milk and dairy products, information management (information chain planning) and logistics and infrastructure.

2.3 IMPORTANCE OF DATA ANALYSIS

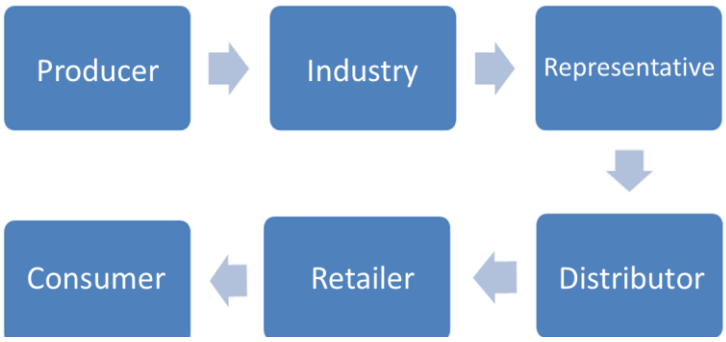
The need to economically analyze the dairy activity is important, because, with this, the producer comes to know and use, in an intelligent and economic way, the factors of production (land, labor and capital) and, from there, locate the bottlenecks to then concentrate managerial and administrative efforts in order to achieve success in the activity (BUENO, 2018).

For Marin et al., (2014), the cost is all expenses made in the production of a good or in the provision of a service. Every good or service that is consumed to generate a new good or service will be cost.

According to Mochón et al., (1999) in every business decision has the origin in production cost, in which the management of these costs provides the planning, management and control of the entity.

Thus, the productivity diagnosis aims to evaluate the performance and efficiency of existing procedures and what should be improved. Thus, the Brazilian Institute of Geography and Statistics (IBGE) has been increasingly used in research, it is worth mentioning that it provides a cross-referencing of data and facilitates an analysis of productive indicator (Figure 1).

Figure 1. Flowchart of the milk production chair.



Source: Authors.

According to Rodrigues et al., (2013) Brazil was an importer of milk until 2004, when it became self-sufficient thanks to the constant increase in its production. However, despite the increase in

production rates, from the point of view of Gobbi and Pessoa (2009), the Brazilian dairy sector faces difficulties in being competitive, especially in productivity, quality and efficiency. Parallel to these aspects, the Brazilian consumer has become more demanding in relation to the quality of the dairy products offered, and, seeking to meet this demand, the Brazilian dairy industry has sought to modernize, demanding from producers a better quality milk, seeking competitiveness with imported products (GONZALEZ, 2004).

3 METHODOLOGY

The territory adopted for the research was the state of Tocantins. The choice of this region for the study is justified by the fact that livestock is highlighted, being an area with tradition in this sector. The study was developed from the productive history of the dairy chair in the last decade.

In this study, the Brazilian Institute of Geography and Statistics (IBGE) was used as a research source in order to collect productivity variables from all 139 municipalities in the state of Tocantins. Data on milk production from 2010 to 2019 were used for the research project.

The data were submitted to analysis of variance and the means were compared by the Scott-Knott test at 5% probability using the Sisvar® Software (FERREIRA, 2019).

4 RESULTS AND DISCUSSION

There was a significant difference at the level of $P<0.05$ for the treatment effect for the variables: Annual Production and Productivity (Liters.year-1) (Table 1).

Table 1. Annual production (x thousand liters), cows per municipality, productivity (liters.cow-1.year-1), proportion of dairy cow herd in the last decade in the state of Tocantins.

Year	Annual production *	Cows by county ns	Productivity (Liters.year-1) *	Dairy cow herd ratio ns
2010	2093.82 b	3836.84	659.77 c	0.07
2011	2074.49 b	3129.40	622.68 d	0.06
2012	2105.05 b	3222.96	612.39 d	0.06
2013	2099.25 b	3252.65	608.25 d	0.06
2014	2376.67 b	3484.01	703.83 c	0.07

2015	2382.21 b	3384.00	704.83 c	0.06
2016	2814.67 a	3767.74	785.09 b	0.06
2017	3215.96 a	3907.15	885.27 a	0.06
2018	3061.96 a	3546.83	924.84 a	0.06
2019	3032.32 a	3583.04	909.22 a	0.06

*Significance at level 0.05.
NS – Not significant.

In relation to annual production, there was a progressive increase, ranging from 2074.49 million liters in 2011 to 3215.96 million liters in 2017, that is, it presented an increase of 55.02%. The last four years were the ones that presented the highest yields statistically, obtaining in 2016 (2814.67 million l-1), 2017 (3215.96 million l-1), 2018 (3061.96 million l-1) and 2019 (3032.32 million l-1). These values are above the increase in world production, according to FAO (2016), in the last three decades, world milk production has increased by more than 50%, reaching 769 million tons in 2013.

Although the number of cows milked per municipality in the State of Tocantins increased, no significant difference was obtained and ranged from 3129.40 (2011) to 3907.15 (2017).

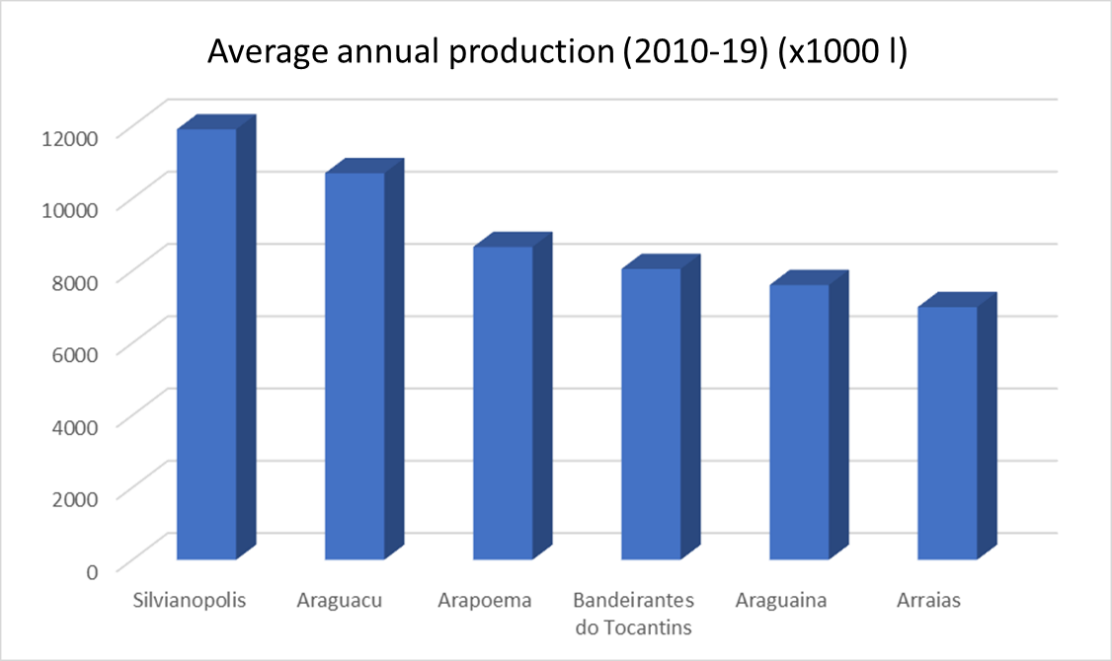
As for productivity, there was a considerable increase, with higher rates in the years 2018 (924.84 liters.year-1) and 2019 (909.22 liters.year-1) and the lowest were in charge of the years 2013 (608.25 liters.year-1), 2012 (612.39 liters.year-1) and 2011 (622.68 liters.year-1).

Despite the increase in state productivity, it is still below the national and world average, according to Jung & Júnior (2017), Brazil has a productivity of 1,154 liters cow/year, while the United States represents 7,953 liters of milk per cow/year. For Bueno et al (2004) this demonstrates the need for the use of technologies and care with the feeding of the herd, which may directly impact on productivity.

Regarding participation in MERCOSUR, Brazil leads the milk production indexes, followed by Argentina, Uruguay and Paraguay (RODRIGUES et al., 2013). Brazilian exports are also low, destined for African and Latin American countries, since the quality standards of national production are below the requirements of the European Union and the United States (MAIA et al, 2013).

Regarding the proportion of cows milked in relation to the total cattle herd, there was a variation between 6 and 7% in the last decade. According to the IBGE (2018), these values are similar to those presented by Brazil (7.7%) and higher than those observed in the North Region (4.6%). It was found that the municipalities with the highest average annual productions were: Silvanópolis, Araguaçu, Arapoema, Bandeirantes do Tocantins, Araguaína and Arraias, respectively (Figure 2).

Figure 2. Municipalities with the highest milk production in the State of Tocantins in the last decade (2010-19).



5 CONCLUSION

The dairy chain showed an increase in productivity between the years 2010 to 2019, and there is still potential to increase, because when compared to other Brazilian states, the average of Tocantins is still considered low.

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