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Relationship between production levels and profitability margin of small dairy production company in Ecuador: Subtropical case study of Bolívar

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Abstract

In recent years, micro dairy enterprises have experienced significant growth due to the increasing demand for fresh and healthy dairy products by consumers. This demand has created business opportunities for entrepreneurs and small-scale producers looking to enter the dairy sector. One of the most notable aspects of these micro enterprises is their socioeconomic impact. The data for this research were obtained from Noelys, a micro enterprise located in the subtropical region of Bolívar province. IBM SPSS Statistics 25 software was used for statistical analysis. The Shapiro-Wilk normality test and parametric correlation were conducted. The results indicate a direct relationship between production levels and profitability margins, and their impact on the local socioeconomic conditions.

Keywords: *Socioeconomics, profitability, production, micro enterprise, subtropical.*

Introduction

Milk is a staple food in a varied and balanced diet, it is easily accessible and relatively affordable (Uscanga et al., 2019). It provides a high content of nutrients, making its consumption particularly important for vulnerable population groups such as children and adults (Varela, 2018). Milk and its derivatives such as cheese, butter, yogurt, among others, contribute to the improvement of

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various pathological conditions such as cardiovascular diseases, diabetes, and intestinal diseases (Villamil et al., 2020).

The dairy sector is one of the fundamental pillars of the economy and society in numerous countries around the world. Not only does it supply a basic and growing food demand, but it also generates significant socioeconomic impact and presents a key profitability margin for the actors involved in this production chain (Rozhkova & Olentsova, 2020). The importance of the dairy sector lies in its ability to generate employment, promote rural development, and contribute to economic growth. Activities related to the production and processing of dairy products involve a wide range of actors, from small producers and livestock farmers to processing and distribution companies. These activities create employment opportunities in both rural and urban areas, helping to combat unemployment and poverty in various communities (Nasner & Calderón, 2022).

In the last 30 years, milk production has increased worldwide, as around 150 million households in the world are engaged in milk production, as this food generates quick profits, with the majority being small farmers. India is considered the largest milk producer in the world, followed by the United States, China, Pakistan, and Brazil (UN, 2023). Despite the Covid-19 pandemic and its constant restrictions on the international market, the dairy sector continued to operate during the 2020 crisis, closing with a value of $785.92 billion dollars, with India, as the largest producer, registering 197 million tons, followed by the United States with 100.54 million tons, Brazil with 35.7 million tons, China with 33 million tons, Germany with 32.4 million tons, and other producers reaching 854 million tons that year (Murcia, 2022).

Regarding dairy consumption, it is projected that from 2017 to 2026, the global consumption of fresh dairy products and processed dairy products will grow by 2.1% and 1.7% annually, respectively. The majority of milk and dairy product consumption will correspond to fresh dairy products, which will utilize around 50% of the total global milk production, a percentage that will increase to 52% over the next 10 years due to the increased consumption of milk in developing countries (OECD, 2018).

In Ecuador, the dairy industry is a dynamic economic activity, with over one million people working in the milk production chain, representing 1% of the total GDP, 14% of the agri-food GDP, and 5.4% of the industrial GDP (Lácteos LATAM, 2020). This activity has a significant contribution to the national economy, where more than 60% of the producers are small and medium-sized peasant farmers, with a strong participation of family groups, generating employment in rural areas (Muñoz Á., 2022).

The Ecuadorian dairy industry has been affected by the Covid-19 pandemic and the pre-existing crisis. However, it has shown improvement in its financial indicators, except for profitability, which experienced a decrease due to declining sales caused by informal competition and the sale of whey (Carrillo et al., 2022). Whey sales decreased by 50% at the beginning of the pandemic due to uncertainty about product scarcity (Baquerizo, 2022), resulting in economic and social impacts that

affected society and Ecuadorian companies, posing threats to some and opportunities to others (López, 2020). Approximately 5.5 million liters of raw milk are produced daily in Ecuador, with 4.4 million liters belonging to the Sierra Region, about 0.9 million to the Coast Region, and only about 0.2 million to the Amazon. The province with the highest milk production in the country is Pichincha, accounting for 18% of the national production, according to the National Institute of Statistics and Census (INEC, 2022).

In the Ecuadorian context, small and medium-sized enterprises (SMEs) play a fundamental role in the economy. Currently, there are an estimated 300,000 such businesses in the country, employing approximately 1.5 million people directly and indirectly. This industry is characterized by its diversity and encompasses various economic sectors. It is important to note that the distribution of production in this industry shows significant disparity. On one hand, there are large companies, accounting for 80% of the total production, focusing on generating inputs used in the production of other derived products. On the other hand, the remaining 20% of production is divided among small and medium-sized enterprises (SMEs). Despite their lower share in terms of production volume, SMEs play an important role in the economy as they promote diversification, innovation, and local job creation (Orbe et al., 2022).

In recent years, dairy microenterprises have experienced notable growth due to the increasing demand for fresh and healthy dairy products by consumers. This demand has translated into business opportunities for entrepreneurs and small producers seeking to enter the dairy sector. One of the most notable aspects of these microenterprises is their socioeconomic impact. By establishing themselves in rural or peri-urban areas, dairy microenterprises contribute to local development by generating direct and indirect employment. This not only drives the local economy but also improves people's quality of life by providing stable and sustainable income sources (Terán, 2019).

The province of Bolívar serves as a bridge between the Coast and Sierra regions, being the Andean province that extends the most into the subtropics. It is worth noting that it has been producing dairy products for centuries. In this province, 88% of properties have less than 20 hectares, of which 42% are used for agriculture and livestock purposes. The average size of a farm is 4.7 hectares/UPA. Its extensive pasturelands allow for significant livestock coverage, and despite still having low production averages, it provides an average of 270,000 liters of raw milk per day, representing 5% of the daily national production. Currently, the province of Bolívar is not solely dedicated to raw milk production; it also manufactures cheeses, which are well-known in most of the Ecuadorian market (CIL, 2020). Regarding profitability, the dairy sector presents significant opportunities for the stakeholders involved. The diversity of dairy products, ranging from liquid milk and cheese to yogurts and dairy derivatives, allows for differentiation and the creation of brands that can capture specific market segments. Furthermore, the growing global demand for dairy products offers growth and expansion opportunities for companies in the sector. It is important to consider that profitability in the dairy sector is subject to challenges such as input

price volatility, fluctuations in demand, and changes in regulations and trade policies. However, companies that manage to optimize their production processes, improve the quality of their products, and diversify their distribution channels can achieve significant benefits (Ministry of Agriculture, Livestock, Aquaculture, and Fisheries, 2016).

According to the aforementioned, the dairy sector has experienced several problems that affect the sales of dairy products, impacting the entire production chain and especially microenterprises due to the economic and social challenges that have arisen before and after the health emergency. Moreover, these types of businesses often face difficulties in accessing markets, particularly when competing with large dairy companies. They also lack access to modern technology and adequate training in production practices and quality management. Another significant challenge they face is the difficulty of accessing financing and credit to invest in their operations and improve their production capacity. Despite these challenges, this sector plays a crucial role in economic development by generating employment, stimulating the local economy, and contributing to international trade. Therefore, the aim of this study is to analyze the production, socioeconomic impact, and profitability margins of the microenterprise "Lácteos Noelys" in the subtropical region of Bolívar province, Ecuador.

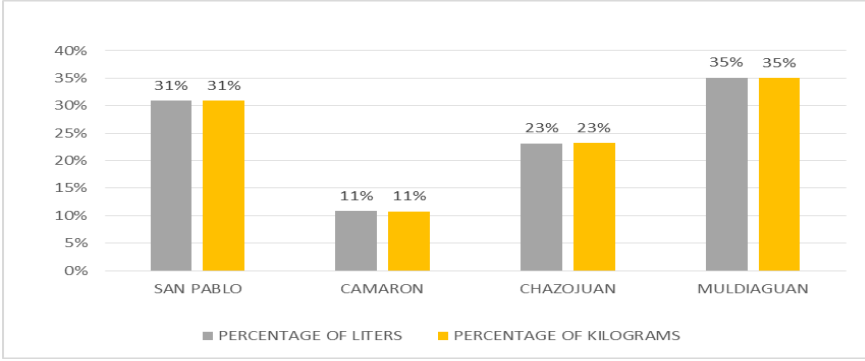
METHODOLOGY

Data Organization and Acquisition

The data collected were from various communities in the subtropical region of Bolívar Province, organized using an Excel spreadsheet, where the total monthly production of cheese in kilograms and milk in liters in the year 2022 was recorded. The data were then represented and analyzed in percentage terms. The obtained data results were used to calculate the profitable margin based on the quantity of production sold.For the statistical analysis of the data regarding the acquisition of milk liters and total cheese production in the four communities, IBM SPSS Statistics 25 software was used. The Shapiro-Wilk normality test was performed, followed by parametric correlation análisis.

RESULTS

Figure 1.- Milk Production (Liters of milk versus annual cheese kilograms) corresponding to the communities in the subtropical region.



Source: Own elaboration, based on Excel spreadsheet

The production of milk has a significant socioeconomic impact in Ecuador. The dairy industry generates employment both in rural and urban areas, as it requires labor for activities such as milking, animal care, dairy processing, transportation, and distribution. This contributes to job creation and economic development in local communities (Muñoz et al., 2022). Its importance lies not only in production but also in the generated added value, input utilization, and territorial occupation (Tinitana, 2019). Despite this, the dairy sector has yet to reach the necessary pace to occupy the position it deserves within the national economic structure (Chávez & Gavilánez, 2019).

In this context, the results of this research show that in the Mulidiaguan community, there are approximately 24 raw material suppliers, representing a 35% market share. On the other hand, in San Pablo, there are around 12 suppliers, representing a 31% market share. These suppliers are characterized by their seriousness, commitment, and responsibility towards the microenterprise under study. However, the lack of adequate infrastructure, such as roads and refrigeration systems, may hinder the timely and secure delivery of milk (Franco et al., 2019). Therefore, it is crucial to strengthen the dairy value chain from production to commercialization. This involves working closely with all stakeholders, including producers, processors, distributors, and retailers, to improve efficiency and ensure a fair price for small producers (Zambrano et al., 2017).

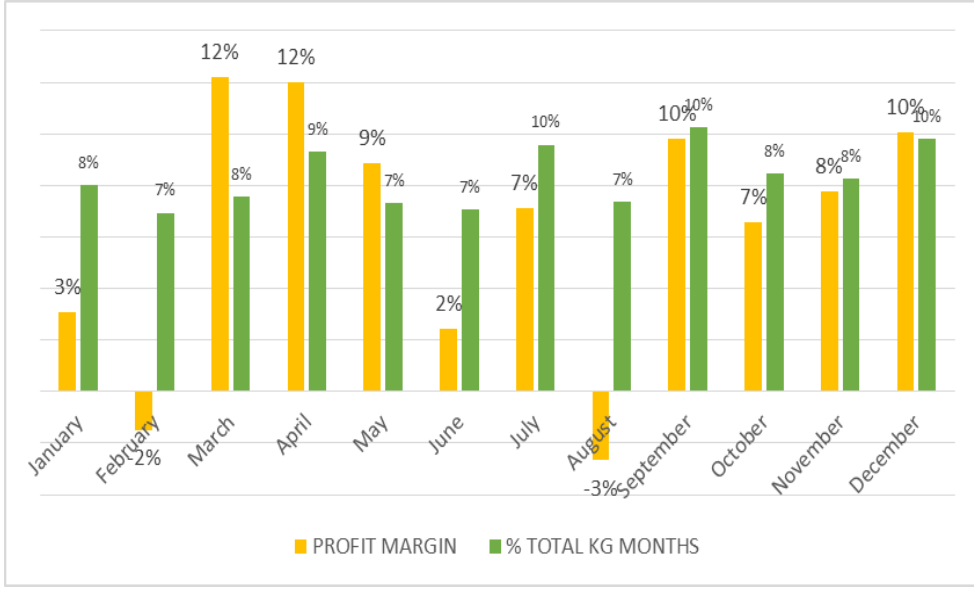
Regarding large companies, according to Vásquez and Corrales (Vásquez et Corrales, 2017), suppliers are evaluated based on delivery compliance and flexibility. These companies implement decision-making techniques to mitigate such adversities, which contribute to the growth of the industry in Latin America. In this regard, research has been carried out on transportation costs related to the allocation of specific quantities to each supplier.

Suppliers aim to market the raw material at a price that allows them to cover their production costs. According to ('Los cinco cambios que impone la Ley para fijar el precio de la leche', n.d.), the price per liter of raw material varies between 0.42 and 0.49 cents. The microenterprise under study sets an acquisition price of 0.45 cents per liter in the Muldiaguan and Chazojuan communities, while in Camarón and San Pablo, the price is 0.43 cents. This difference is due to the additional costs

associated with the mobilization of the raw material from these communities.

It should be noted that when milk prices are low, small-scale producers face significant economic difficulties, as the income generated from milk sales may not be sufficient to cover production costs, leading to financial losses and a decrease in dairy farm profitability (Chávez & Gavilánez, 2019). Consequently, if the income is not sufficient to cover costs and generate profits, some producers may be forced to abandon dairy farming, which could lead to a decrease in milk supply and affect food security and the rural economy. Additionally, when prices are low, producers have fewer resources available to invest in improvements in their production systems, limiting their capacity to adopt more efficient practices, improve product quality, and increase productivity, which in turn can affect their competitiveness in the market (Navas, 2022).

Figure 2. Gross Margin Percentage



Source: Own elaboration, based on the Excel document

During the months of February and August, it was observed that the average production is in negative percentages, implying that the company incurred losses, as stated by Chávez and Gavilánez (2019). While the Ecuadorian dairy industry does not aspire to reach levels similar to those of dairy powerhouses like New Zealand, it is at least desirable to produce the regional average of 7.8 liters of milk per day. In this regard, the results of this study show that the average production of "Lácteos Noelys" during the months of February and August is in negative percentages, indicating that the company incurred losses during these months. This is associated with three factors: production costs, productivity, and selling price (Patermina et al., 2021). On one hand, production costs have a significant effect on the dairy industry since production involves various

processes, including livestock feeding and care, milk collection, processing, and packaging (Parreño & Alejandro, 2022).

However, the average production yield in the remaining months shows profitability, specifically in March and April. This increase or decrease in yield can be attributed to various factors such as winter and dry seasons, as well as the quality of pastures that are not suitable for milk production. In other words, the company "Lácteos Noelys" had better performance during most months of the year, except for February and August as previously mentioned, generating profits, with the highest in March and April. However, it is important to consider that small dairy production companies generally have limited profit margins, which are due to low productivity, high production costs, and low milk prices (Carrasco et al., 2022).

Normality Test

Table 1 - Normality Test

Normality Tests			
	Shapiro-Wilk		
	Statistic	gl	Sig.
KGMES	0,918	12	0,268
PROFIT_MARGIN	0,925	12	0,326

Source: Own elaboration based on the IBM SPSS program

With the confidence level, we can test that since p >= 0.05, we reject Ha and accept Ho, meaning that the data follows a normal distribution. Therefore, we apply parametric statistics, which implies that for the variable "KG_MES," the significance value (Sig.) is greater than 0.05 in both tests (0.918* and 0.268), indicating that there is not enough evidence to reject the null hypothesis (Ho) that the data follows a normal distribution. Thus, we can consider that the variable "KG_MES" has an approximately normal distribution.

As for the " PROFIT_MARGIN " variable, we observe that the significance values (Sig.) in both tests (0.925* and 0.326) are greater than 0.05. This leads us to the same conclusion that there is not enough evidence to reject the null hypothesis (Ho) that the data follows a normal distribution. Therefore, we can consider that the variable " PROFIT_MARGIN" also has an approximately normal distribution.

Since the data approximates a normal distribution, we can apply parametric statistical techniques for analysis and interpretation of the results.

Table 2.- Correlation Test

Correlations			
		KGMES	MARGENRENTABLE
KGMES	Pearson Correlation	1	,730**
	Sig. (two-tailed)		0,007
	N	12	12
PROFIT_MARGIN	Correlación de Pearson	,730**	1
	Sig. (two-tailed)	0,007	
	N	12	12
****. Correlation is significant at the 0.01 level (two-tailed).**			

Source: Own elaboration based on the IBM SPSS program

Since p =< 0.05, there is a significant relationship between kilograms produced and profitability. This relationship is positive, meaning that higher production leads to higher profitability, and the relationship is strong.

The results of the Pearson correlation between the "KG_MES" and "PROFIT_MARGIN " variables indicate a significant positive correlation. The Pearson correlation between the two variables is 0.730**, and the significance value is 0.007, indicating a statistically significant relationship between kilogram production (KG_MES) and profitability (PROFIT_MARGIN).

The relationship between the variables is direct, implying that as kilogram production increases, profitability also increases. This finding suggests a strong association between the amount of kilograms produced and profitability, which is positive for the economic outcomes of the company or business.

The relationship between milk production and profitability in the dairy industry is complex and influenced by various factors. Generally, as the volume of milk production increases, economies of scale can be achieved. This means that production costs per unit of milk tend to decrease, which can enhance profitability. However, it is important to consider that there are limits and additional costs associated with increasing production, such as feed costs, labor, infrastructure, and management, which also need to be taken into account in assessing profitability (Craviotti & Vértiz,

2020).

Conclusions

The relationship between milk production and profitability in the "Lácteos Noelys" company is direct, implying that as production increases, so does the profit margin. This is positive for the company's economic results as it demonstrates the ability to effectively manage production costs.

However, there are external factors that impact the performance of small milk-producing companies, which adversely affect the entire production chain. These companies face difficulties in accessing markets, particularly when competing with large dairy companies. Additionally, many of these companies lack access to modern technology and adequate training in production practices and quality management.

For years, raw milk suppliers have complained about the low selling price, which can have a negative impact on the social stability of rural communities dependent on dairy production. The lack of income for these producers can lead to increased rural poverty, migration of young people to urban areas in search of better opportunities, and a decline in the quality of life in rural areas. Therefore, it is important for governments, agricultural organizations, and society as a whole to work together to support and strengthen these producers, as they play a crucial role in rural development and food security in the country.

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