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## ECONOMIC/FINANCIAL MANAGEMENT IN MILK PRODUCTION ACTIVITY: ASSESSMENT OF AN INVESTMENT MADE IN A COMPOST BARN SYSTEM

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**Abstract:** The adoption of effective management practices is fundamental for the administration of rural production units, as it is a sector subject to climatic adversities and prices defined by the market. Mastery of production technologies has not been enough to maintain profitability over time, as the opening of markets and the intensification of internal and external competition require management knowledge on the part of the producer and agribusiness professionals. Dairy production in the western region of Santa Catarina is a monthly income option, enabling the producer to make essential and future investments, increasing the property's income and increasing the quality of life in the countryside. The general objective of the present study was to evaluate the economic/financial return on an investment made in a compost barn system by a milk producing unit. This was an exploratory and descriptive study with a predominantly quantitative approach, including the survey and analysis of data from the agricultural enterprise researched. The data obtained through the inventory of the property's milk production structure, considering the year 2020, indicates a total fixed investment of R\$ 2,238,854.00. With a herd made up of 73 heads, the production unit had annual revenue of R\$ 1,163,475.00, arising from the sale of milk, waste animals and calves for slaughter. Fixed and variable costs totaled R\$ 1,060,799.88. Some general economic/financial indicators were determined and then the return on an investment of R\$ 150,000.00 made using probity researched in a compost barn system was evaluated. Although the general economic/financial indicators demonstrate a long period of return on investment in the dairy activity, it can be considered that the production unit is viable, as it has the capacity to make investments, as well as maintain and expand existing assets over time, a fact that can be observed in the

payback obtained for the investment in the compost barn system. However, it is necessary to achieve the expected improvements in the technical and production indicators expected from the investment made in the new production system. To this end, economic/financial control of the production unit must be maintained to better support decisions that impact the future of the dairy activity and the production unit itself.

**Keywords:** Dairy production; Economic/financial assessment; Investment.

## INTRODUCTION

Management is one of the most important administrative processes, especially when it comes to rural production units, as it is a sector subject to climatic adversities and prices of products produced defined by the market. Financial management involves several administrative processes such as planning, analyzing and controlling the financial flow of the activities involved and measuring the results obtained. This way, rural entrepreneurs can know the return on their investments, allowing them to make decisions that result in an increase in the net profit of the economic activities carried out in their property.

Rural administration emerged with the purpose of improving management techniques in agricultural activities, making better use of available resources, obtaining better financial results (AZER, 2009). The mastery of agricultural production techniques was in the country enough to maintain productivity at acceptable levels, providing pleasant results for producers. Currently, with the opening of markets and the intensification of internal and external competition, the reality is very different. It is no longer enough to just produce, it is necessary to know what, how and when to produce, and most importantly, how and when to sell.

The present study was carried out in a rural production unit located in the Linha Biguá community, which belongs to the municipality of Iraceminha - SC. This rural production unit has as one of its economic activities the production of milk in the Compost Barn system, a model recently adopted by the property.

Dairy activity in the production unit began in 2000, with few animals, small daily production and reduced participation in the property's total gross revenue. So, we sought to invest more and more in dairy farming, making improvements to pastures, purchasing milking machines and building sheds for the animals. The current herd is made up of 90 animals, of which 45 are lactating cows, 15 pre-calving and 20 replacement heifers.

Milk production for the region is a monthly income option for farmers, enabling the producer to make essential and future investments, increasing the efficiency of the property, improving the quality of the product and the quality of life of the rural worker. Milk, in addition to its economic importance, is a source of essential vitamins for the daily maintenance of the human body regardless of age, in addition to playing a fundamental role in generating jobs in the various sectors that make up the production chain.

In 2020, the property invested in a compost barn system, seeking to improve production technology, increase milk production, provide comfort to animals and improve the quality of milk produced. However, during this period, a financial study has not yet been carried out to assess the economic potential of the milk production activity. Calculating the economic and financial results and controlling costs, however simple they may be, help in making decisions on future investments (PADOVEZA, 2016).

An important factor in evaluating an implemented production system is the

price paid to the producer. In dairy farming there is constant fluctuation in the value per liter of milk produced. In certain periods, the financial return rises and, in others, profitability falls, creating difficulties in maintaining and making investments in the activity. Data released by CEPEA (2021) presents the prices received by milk producers in the last five years (Figure 1).

It can be seen that the monthly and annual price variation is always present, alternating high and low peaks.

Fluctuations in prices paid to milk producers make investment planning difficult. Therefore, it is necessary to consider historical series to estimate revenues resulting from dairy activities.

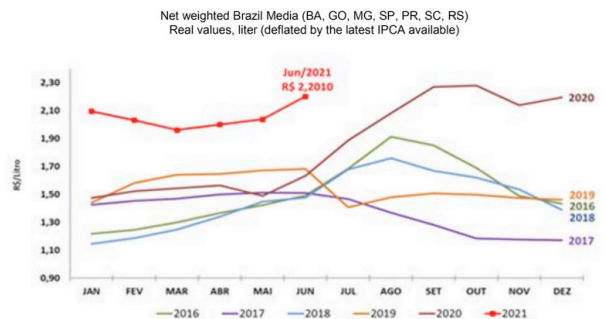


FIGURE 1 - Series of average prices received by the producer (net), in real values.

Source: CEPEA, 2021.

The absence of economic/financial studies makes decision-making for new investments unsafe, as there is no essential information on costs and calculation of profits. Without this information and a more in-depth study on the profitability of the activity, it makes it impossible to formulate a safer future forecast, increasing the degree of uncertainty regarding the investments necessary to maintain and/or expand milk production on the property subject to this study.

Given the considerations presented, the present study sought to answer the following research problem: How to evaluate the

economic/financial return on an investment made in a compost barn system by a milk producing unit?

## **OBJECTIVES**

In view of the definition of the research topic, the general and specific objectives were listed that allowed responding to the problem presented for the present study.

### **GENERAL OBJECTIVE**

The general objective of the present study was to evaluate the economic/financial return on an investment made in a compost barn system by a milk producing unit.

### **SPECIFIC OBJECTIVES**

- Characterize the milk producing unit researched;
- Carry out an inventory of the installed production structure and the cost of milk production;
- Present and interpret economic/financial indicators that allow evaluating the investment made in dairy production by the researched production unit.

## **BIBLIOGRAPHIC REVIEW**

Chapter 2 (two) presents content drawn from the bibliographic and documentary research carried out. The objective was to substantiate aspects related to the economic/financial study carried out on the property subject of this study.

### **DAIRY CATTLE FARMING**

The Brazilian milk production chain has the potential to increase production, however, it needs to survive in an increasingly competitive market. Therefore, it can be observed that the increase in production is associated with the system adopted, as the producer who knows

how to provide a more suitable environment for the animals can achieve better financial results, that is, obtain a profit from the activity.

Brazil is the fifth largest milk producer in the world and has the second largest global herd, with large milk-producing farms and small rural producers that form part of the so-called family farming. Comparing Brazilian production with production in the United States, Brazil has a low production per animal, estimated at 1.6 t/cow/year (IBGE, 2011).

Several Brazilian states have good production; however, Santa Catarina occupies fourth place with 2.81 billion liters produced in 2017 (EPAGRI/CEPA, 2020), production basically originating from family farming, with the Dutch and Jersey breeds predominating.

### **MILK PRODUCTION SYSTEMS**

The traditional milk production system, in addition to being the most used and best known, has several names such as grazing or pasture. According to Silva (2006), it is widely used in the west of Santa Catarina because it is a simple system and the fact that the properties have a small number of animals. In this system, the animals remain on pasture all the time and only go to the stable for milking and to receive supplementary food.

According to Oliveira (2010), the traditional dairy production system basically has two types of natural pasture: uncultivated native fields and artificial, which requires minimal soil preparation and care in its cultivation. Rotational grazing is another method for dairy production that consists of placing the animals in a pasture divided into small parts known as paddocks (MARION; SEGATTI, 2010). These options chosen by many producers make it possible to adapt the production system to each property and extract the best milk production results. Lower operating costs and greater animal movement are the main advantages of the traditional system.

## ECONOMIC/FINANCIAL STUDY

The compost barn consists of a stable with certain composted material. It was developed in the United States in the 1980s and is being adopted by a growing number of dairy farms in Brazil (MILANI E SOUZA, 2010). This system is nothing more than housing in a rectangular shed, using bedding similar to that used in aviaries, however, in this case, sawdust is used, allowing the animal to live in a dry and soft environment.

The compost barn confinement system aims to improve the comfort and well-being of the animals, consequently improving the herd's production rates. The difference is that composting occurs over time together with the bedding material and animal waste. In this system, waste provides essential nutrients such as carbon, nitrogen, water and microorganisms necessary for the bedding composting process. (SINALO; SANTOS,2012).

Free-stall is another dairy production system that emerged in the United States and is widely used in Brazil. The name used means free stable, as it leaves the animals free in a fenced area, containing a place for feeding, another for exercise and a separate part for bed, or resting place. Despite the advantages, this system has a series of disadvantages such as housing in an inadequate space for prolonged periods, which harms the health of the animals, thus affecting milk production and, consequently, reducing profitability. Silveira et al. (2011) show that free-stall is not viable for certain rural properties, especially in relation to the installation cost. However, this system has been increasingly used in Brazilian dairy production, because when well-managed, the animals present a higher yield than the other systems mentioned above.

According to Hastings (2016, p.24), investment is “an allocation of values (directly or indirectly expressible in monetary terms), in a given period of time, with the objective of (attracting and) adding (monetary) value in subsequent period(s).” This modality may include the allocation of financial resources for improvements, acquisition of machinery, animals for both work and fattening or dairy production. Financing used for renovations of facilities, machinery and equipment may be included.

The production costs that affect a rural economic activity are classified as fixed and variables. Dubois (2019, p.33) describes that production cost represents “all elements that participated in the production process.” They are composed of “for materials used in the industrial process, labor and indirect costs.”

To determine the production cost of a rural economic activity, it is necessary to correctly calculate the fixed costs that affect it. The following table presents the main fixed costs and respective concepts.

Cost Items	Concepts
Depreciation	It refers to the loss of value or productive efficiency caused by wear and tear, nature or technological obsolescence, being considered a fixed cost.
Conservation and repairs	Spare parts, lubricating oil, filters, belts and other components purchased for maintenance and repairs on agricultural machines and implements. Material for maintenance of facilities used in milk production, such as stables, milking parlors, drinking fountains and others.
Interest on invested capital	It is the interest attributed to capital invested in land, machinery, equipment, facilities and animals for production and reproduction.
Permanent workforce	Refers to all salaries and labor charges of employees hired on a permanent basis and allocated to any and all activities linked to dairy activity.
Producer labor	Remuneration for the owner's own labor.
Fixed fees and taxes	All the taxes levied on dairy activity, in addition to others that may be present, such as fees charged by breeders' associations and fees from class representation associations.

TABLE 1 - Fixed cost items of a rural economic activity.

Source: Adapted from Barbosa, PF et al., (2002); Conab (2020); Marques (2009).



According to Dubois (2019, p.29), fixed costs are understood as “those whose values are the same, whatever the company’s production volume, within a relevant range.” Therefore, fixed costs include rent, property tax, insurance and depreciation. The same author describes that variable costs “These are those whose values change depending on the volume produced.” Examples of variable costs are the raw materials used for production and direct labor used in the production process.

Economic and financial indicators are important because they reflect the results achieved in an economic activity, making it possible to evaluate the return obtained and/or take more assertive decisions about new investments. Therefore, economic/financial indicators are understood as information about the enterprise that demonstrates its real economic/financial situation (TIAGO, 2020).

**Income statement for the year (DRE)** – For Hastings (2013, p.30) “It is a report for a certain period that provides, through a complete synthesis of financial data, the economic results of operational and non-operational activities, indicating the possibility of profit or loss of the enterprise.”

**Contribution Margin (MgC)**  
**Contribution Margin Index (IMgC)** – Dubois (2019, p.182), “the difference between the sales price (or revenues) and variable costs and expenses is called contribution margin”. The same author presents that IMgC results from the transformation of MgC into an index, or percentage.

**Balance Point (PE)** -It refers to the level of sales at which the company presents neither a profit nor a loss, that is, when the value of total costs equals the value of total revenues Crepaldi, SA and Crepaldi, GS (2014, p.174).

**Internal Rate of Return (IRR)** -For Hastings (2013), it is a process that indicates the intrinsic rate of return on the investment, regardless of any variable external to the project. “The result of the process indicates the financial viability of the investment if the IRR is higher than the adopted capital cost rate” (p.31).

**Payback period** - For Hastings (2013, p.30) it is the procedure that “indicates, very simply, how long the original investment will be recovered.” To this end, “the algebraic sum of the cash flows is made from the beginning of the project, until zero results are reached, counting how many periods (or fraction) of inflows are necessary to compensate for the investment originally made.”

## METHODOLOGY

This chapter addresses the methodological procedures adopted for data collection and analysis, aimed at achieving the proposed objectives, that is, evaluating the economic/financial return on an investment made by a milk producing unit in a compost barn system.

## STUDY DESIGN

The study carried out was exploratory and descriptive with a predominantly quantitative approach, including the survey and analysis of data from the agricultural enterprise researched. According to Gil (2008, p.28) “exploratory and descriptive research are the most used by social researchers and the most requested by organizations”.

Vergara (2016, p.49) highlights that “descriptive research exposes characteristics of a certain population or a certain phenomenon.” It makes it possible to correlate variables and provide a basis for explaining the phenomena studied. On the other hand, Gil (2008, p.26) describes that exploratory research is “main

purpose is to develop, clarify and modify concepts and ideas, with a view to formulating more precise problems or hypotheses to be tested in subsequent studies.” These searches are planned to develop a general view of the topic addressed, developing searches for bibliographic information that result in a research problem that is more susceptible to investigation.

As this is a study that evaluated the economic/financial return of an activity of milk production, quantitative data was used more intensively, which characterizes a predominantly quantitative approach. For Lakatos and Marconi Gil (2021, p.89), the “Quantitative descriptive research consists of empirical research investigations, the main purpose of which is the delineation or analysis of the characteristics of facts or phenomena, the evaluation of programs, or the isolation of main or key variables” (p.89).

### **DELIMITATION OF THE STUDY**

The place where this study was carried out was the Assmann family property, located in the community of Linha Biguá, in the interior of the municipality of Iraceminha - SC, which has existed for 21 years. One of the activities carried out by the production unit is milk production. In addition to improvements in infrastructure resulting from the acquisition of machinery and equipment, specific investments were made in the dairy industry. The production system pasture, was converted to Compost Barn, providing greater ease of handling and milking as well as greater productivity. However, it remained to evaluate the return on capital invested to implement the new production system that was the subject of this study.

### **DATA COLLECTION AND ANALYSIS**

The instruments that were used for data collection were bibliographic and documentary research which, according to Gil (2008, p.26), consist of “developing, clarifying, modifying concepts and ideas, with a view to formulating more precise problems or hypotheses to be tested in subsequent studies.”

Direct observation was another data collection instrument used, as it allowed comparing information collected with the reality existing in the place where the study was carried out. For Michael (2015 p.83), it is a procedure “that allows us to verify how the studied theory and the proposed variables behave in concrete situations and in the real environment where the facts occur.”

For data presentation and analysis, electronic spreadsheets, tables and graphs were used. To process the data, techniques recognized by financial administration were used, resulting in income statements and economic/financial analysis indicators.

### **DATA PRESENTATION AND ANALYSIS**

Chapter 4 addresses general aspects that characterize the rural production unit researched. The inventory of goods used in dairy production and the economic/financial indicators determined from the study carried out are also presented.

### **CHARACTERIZATION OF THE RESEARCHED PRODUCTION UNIT**

The property object of this study belongs to the Assmann family and is located on Linha Biguá in the interior of the municipality of Iraceminha – SC. Its total area is 35 hectares, subdivided according to land occupation and use. For the dairy sector, 20 hectares are used for silage production and 3 hectares are occupied by perennial summer grass surrounded which

is occupied by heifers and dry cows. It also has another 1.6 hectares of natural pasture occupied by newborn calves and 1.4 hectares of pasture that was recently formed.

The area destined for the dairy sector corresponds to 27 hectares. The remainder is divided into areas occupied by improvements, such as houses, warehouses and facilities for the property's poultry sector. Always seeking to improve the production structure, the property invested in essential facilities, machines and equipment to satisfy the needs required both in the dairy sector, as well as in the poultry and farming sector (FIGURES 1, 2 and 3).



FIGURE 2: Aerial view of the property.

Source: Google Maps.



FIGURE 3: Property's compost-barn system.

Source: the author.



FIGURE 4: Milking room on the property,

Source: the author.

The dairy sector has a system for extracting milk with intelligent pulsers that reduces the incidence of excessive milking, that is, it reduces the time between drying the milk in the cow's udder and removing the foreheads from the teats of the cow. It has a feeding room, a cooler with a capacity of 2,000 liters of milk and a recent investment to change the grazing system to the compost barn.

Over the years, several investments were made that resulted in considerable amounts of financial resources invested in the property. Machinery and equipment were purchased for farming activities, along with improvements and installations, totaling more than one million and two hundred thousand reais. The final total invested is two million and three hundred thousand reais. The property carries out two economic activities: dairy farming and poultry farming. The property's main income is dairy activity, representing 80.5%. Poultry farming represents 19.5% of the total revenue obtained in 2020.

## FINANCIAL STUDY

The financial study must take into consideration, aspects related to the amount invested, expenses and revenues arising from an economic activity. Items 4.2.1 to 4.2.3 below present the inventory of the production structure and production costs, technical coefficients and revenues, as well as a statement of results obtained with the dairy activity carried out on the researched rural property.

## INVENTORY AND PRODUCTION COSTS

This item contains the property's inventory, presenting herd data, land area destined for the compost barns system and its commercial values corresponding to the year 2020. Investments made in the dairy sector and fixed costs and production of variables.



Tables 1 to 4 present an inventory of the property's assets used for dairy production. In Tables 5 and 6, the Fixed and Variable Costs of dairy activity are summarized. All values released are relative to the year 2020. Average values were considered that include the total amount spent on each cost item. In Tables 1 to 25 of the Appendix, more details about the data collected and the respective calculations carried out can be found.

Category	Unit	Qty.	Unit value (R\$)	Total value (R\$)
Total area	Hectare	35	37,000.00	1,295,000.00
Area intended for dairy production	Hectare	27	37,000.00	999,000.00

TABLE1 - Total area of the property.

Source: the author.

As it can be seen in Tables 1 and 2, the total area of the property is 35 hectares. Of this total area, 27 hectares are destined for dairy production, distributed between perennial pastures and grassland, soil cover in the area destined for corn silage production and facilities. The value average land value is R\$27,000.00. To define this value, the slope and occupation/destination of the area were taken into consideration.

Table 2 shows the total area destined for dairy production with its respective uses.

As it can be seen in Table 2, perennial pastures occupy 6 hectares, totaling a value of R\$222,000.00. For the area destined for silage and soil cover cultivated in the winter period, 20 hectares are used, totaling R\$ 740,000.00. The facilities intended for the sector occupy 1 hectare. It can be seen that the total value invested in land area for dairy production is R\$999,000.00.

Animal Category	Unit	Qty.	Unit value (R\$)	Total value (R\$)
Lactating cows	heads	58	6,700.00	388,600.00
Dry cows	heads	15	6,200.00	93,000.00
Heifers	heads	17	3,200.00	54,400.00
Calves	heads	12	850	10,200.00
Calves	heads	12	850	10,200.00
Bulls	heads	0	0	0.00
Total animals	heads	114		556,400.00

TABLE 3 - Dairy herd (year 2020).

Source: the author.

Through Table 3, data from the dairy herd and their respective values for the year 2020 can be observed. There are 58 lactating cows with an average value per dairy animal, R\$6,700.00, totaling R\$388,600.00. The number of dry cows, heifers from 8 months of age until the beginning of the pre-calving period and newborn calves until slaughter, or until the animal is sold, is also included.

For the "calves" category, newborn animals up to 8 months of age were considered. It can be seen that the total investment in the dairy herd is R\$556,400.00.

Categories	Price R\$)
Value of land area	999,000.00
Dairy herd.	556,400.00
Improvements used by dairy activities.	291,676.00
Machines and work vehicles used in dairy activities.	246,200.00
Equipment used by dairy activities	126,000.00
Cost of implementing perennial pastures	19,578.00
Total	2,238,854.00

Table 4 - Total investment in dairy activity (year 2020).

Source: the author.

The data in Table 4 demonstrates the total investment in dairy activity, in the various categories considered. The value invested in the area of land destined for this sector amounts to R\$999,000.00, as shown in Table 2. The value corresponding to the dairy herd is the second highest among the

Category	Unit	Qty.	Unit value (R\$)	Total value (R\$)
Total area	Hectare	35	37,000.00	1,295,000.00
Area intended for dairy production	Hectare			
Perennial pastures and grass lands	Hectare	6	37,000.00	222,000.00
Corn for silage and ground cover cultivars	Hectare	20	37,000.00	740,000.00
installations	Hectare	1	37,000.00	37,000.00
Total		27		999,000.00

TABLE 2 - Total area of the property and area destined for dairy production.

Source: the author.

categories used, that is, R\$556,400.00. For improvements, facilities involving animal shelters, reaction deposits, silage silos and electric fences were considered, totaling R\$ 291,676.00. In the category of work machines and vehicles used by dairy activities, items such as milking machines, coolers, fans, vehicles and agricultural machines, used especially to obtain food for animals and disposal/disposal of waste generated, were included, totaling R\$ 246,200 .00. For the cost of implementing perennial pastures, values corresponding to the year 2020 were taken into consideration, such as acquisition of seedlings, soil correction necessary for implementation, totaling the value of R\$ 19,578.00. It can be seen that the total investment to make the property's dairy activity viable is R\$ 2,238,854.00

Table 5 presents a summary of the Variable Costs (CV) of the dairy activity on the property. The amounts spent on the various cost items in 2020 were used. Tables 6 to 10 in the Appendix show all the items that make up the CVs, the quantities and respective amounts spent. Also included are expenses for maintenance of improvements, machinery and equipment (Tables 15 to 17 of the Appendix), totaling a total annual value of R\$ 909,434.29.

Table 6 contains a summary of Fixed Costs (CF) of production, considering the amounts spent in 2020. They are made up of depreciation, interest on invested capital and hired and producer labor (Table 18 of the Appendix). It is worth noting that the value of the hired labor results from a partnership contract signed by the producer. It can be seen that in 2020, the property had a Total Fixed Cost (CFT) of production in the order of R\$ 133,366.16.

Categories	Price R\$)
Dairy herd feed and minerals	649,249.50
Corn for silage.	141,559.60
Vaccines and medicines used by the dairy herd	43,448.25
Fuels	25,980.00
Electricity	16,900.80
Annual pastures for ground cover	12,220.00
Bedding (sawdust)	9,936.00
Maintenance of perennial pastures	6,549.90
Artificial insemination (semen)	2,240.00
Equipment maintenance	672.00
Maintenance of machines and vehicles	547.30
Miscellaneous expenses	500.00
Maintenance of improvements	178.24
Total	909,434.29

TABLE 5 - Variable production costs.

Source: the author.

Categories	Price R\$)
Hired and producer labor	80,400.00
Depreciation of machines and vehicles	10,916.33
Depreciation of improvements	9,694.75
Equipment depreciation	6,720.00
Depreciation of perennial pastures	3,263.00
Interest on machines and vehicles	8,308.80
Interest on improvements	9,527.27
Interest on equipment	4,536.00
Total	133,366.16

TABLE 6 - Fixed production costs.

Source: the author.

## TECHNICAL COEFFICIENTS AND REVENUE FROM DAIRY ACTIVITIES (YEAR 2020)

Tables 7 and 8 present data relating to the technical coefficients and revenues achieved by the producer in dairy activity in 2020. These are data relating to the productive and zootechnical performance of the dairy herd and the annual revenue from the sale of milk and animals of the property.

Items	Unit	Totals
Productive cows	Heads	73
Lactating cows	Heads	58
Lactation period in days	days/year	300
Average daily productivity	liters/cow/day of lactation	35
Interval between births	Months	12
Age at first birth	Months	26
Animal disposal	%	15.00
Lactating cows	%	79.45
Calf mortality	%	5.00
Milk production	liters/year	609,000.0
Milk production	liters/day	1,668

TABLE 7 - Technical coefficients (year 2020).

Source: the author.

As it can be seen in Table 7, the dairy herd consists of 73 productive cows. Of the herd of cows existing in 2020, on average, 58 remained in lactation for an average period of 300 days per year, making up 79.45% of the total number of productive cows on the property. The average interval between births was 2 months. It can be seen that the average production of milk produced per animal in 2020 was 35 liters per cow per day. Annual production was 609,000.00 liters, making a daily average of 1,668 liters.

Animal Category	Unit	Qty.	Unit value (R\$)	Total Value (R\$)
Selling milk	Liters	609,000.0	1.80	1,096,200.00
Sale of cows (disposal)	Cab.	10.95	4,500.00	49,275.00
Sale of calves for slaughter	Cab.	4	4,500.00	18,000.00
Total				1,163,475.00

TABLE 8 - Annual revenue from dairy farming (year 2020).

Source: the author.

Table 8 presents the annual revenue from dairy activities, divided into three categories. It contains the number of liters sold with the average value paid to the producer by the agroindustry per liter of milk in 2020, totaling R\$ 1,096,200.00. An important category of revenue is discarded cows, resulting in a value of R\$49,275.00. The sale of calves for slaughter complemented the volume of revenue from dairy activities, totaling a final value of R\$1,163,475.00, obtained in 2020.

## INCOME STATEMENT FOR THE YEAR (YEAR 2020)

This item addresses aspects related to the Income Statement (DRE) for the year 2020, obtained with the compost barns production system implemented in prosperity. The data presents Total Gross Revenue (RBT), Net Operating Revenue (NOR), costs and expenses, Total Gross Margin (MBT), Total Operating Cost (COT), Anal Operating Profit (LOA) and Monthly Operating Profit (LOM). It is worth highlighting that Hastings (2013) describes that the DRE is a financial instrument that synthesizes financial data, providing the economic results of activities, whether operational or not, indicating whether there was a profit or loss in the period considered in determining the results of a developed economic activity.

The DRE presented in Table 9, relating to the year 2020, contains the values of revenues, costs and expenses of the dairy sector. It can be seen that 94.22% of the revenue comes from the sale of milk. The remaining revenues are diluted in the sales of discarded animals and calves for slaughter. Variable costs correspond to 87.43% and fixed costs represent 12.57% of the total production cost.

The DRE also presents the MBT, which resulted in 20.29%. Despite obtaining an Annual Operating Profit (LOA) of 8.82%, which represents only 0.74% per month, it must be considered that the dairy activity provides the producer with a total value of R\$ 236,041.28 (Margin Gross) which can be used annually to promote investments and maintenance of the herd, as fixed costs are not disburseable and, therefore, remain in the property's cash flow. It is also important to highlight that all production factors are being covered, including a monthly amount of R\$ 3,000.00, destined to remunerate the producer's labor dedicated to dairy production. It is also worth highlighting that dairy farming makes food items available for the family, such as meat and milk.

## ECONOMIC/FINANCIAL INDICATORS

Economic/financial indicators demonstrate, through absolute and relative numbers, the results achieved in a given economic activity. Tables 10 to 13, presented below, provide some important indicators for performance assessment and decision making, relating to the milk production activity of the researched property.

Items	Price R\$)
1) Fixed Investment	2,238,854.00
2) Working Capital	
2.1) Variable costs and expenses	909,981.59
2.2 Labor	80,400.00

Subtotal (1 + 2)	990,381.59
3) Technical Reserve (1% of Total Investment)	22,388.54
IT - Total Investment (1 + 2 + 3)	3,251,624.13

TABLE10 – Total investment and working capital.

Source: the author.

The item 10 presents data on the amounts allocated to investment and working capital in dairy activities. In it, it can be seen that the total investment is R\$ 3,251,624.13, diluted in variable costs, labor, fixed investment and technical reserve. It was decided to allocate a percentage of 1.00% on the value of investment items, aiming to cover aspects that may not have been correctly evaluated, or even underestimated in the development of the financial study.

The data in Table 11 presents economic/financial indicators, namely: Contribution Margin MgC), Contribution Margin Index (IMgC), Break-even Point (PE), Investment Return Rate (IRR) and return period of the capital (Payback) on the total investment allocated to the dairy sector of the property. For Dubois et al (2019, p.182), MgC is “the difference between the sales price (or revenues) and variable costs and expenses”. It is an important financial performance indicator, as the higher the MgC, the greater the possibility of also considering Fixed Production Costs and obtaining a profit in a productive activity.

As it can be seen in Table 11, the MgC obtained on the property studied in the dairy activity is R\$ 236,041.28. Dubois et al (2019), describe that there is the possibility of transforming MgC into an index, that is, what these authors call IMgC (Contribution Margin Index). This way, the IMgC obtained is 0.2029.

Table 11 also presents the Break-Even Point (PE) obtained in the property's dairy activity, which is worth R\$ 657,377.36. According to Crepaldi and Crepaldi (2014,



ITEMS	Price R\$)	%
<b>1) Recipes</b>		
1.1) Sale of milk	1,096,200.00	94.22
1.2) Cows (disposal)	49,275.00	4.24
1.3) Sale of calves (fat)	18,000.00	1.55
<b>TOTAL GROSS REVENUE (RBT) (1.1 + 1.2)</b>	<b>1,163,475.00</b>	<b>100.00</b>
<b>2) VARIABLE COSTS</b>		
<b>2.1) (-) Deductions on sales (FUNRURAL - 1.50%)</b>	<b>17,452.13</b>	
<b>NET OPERATING REVENUE (NOR) (1 - 2)</b>	<b>1,146,022.88</b>	
<b>2.2) Variable costs and expenses</b>		
(-) Annual pastures for soil cover	12,220.00	
(-) Corn for silage.	141,559.60	
(-) Dairy herd feed and minerals	649,249.50	
(-) Vaccines and medicines used by the dairy herd	43,448.25	
(-) Electricity	16,900.80	
(-) Fuels	25,980.00	
(-) Artificial insemination (semen)	2,240.00	
(-) Bed (sawdust)	9,936.00	
(-) Miscellaneous expenses	500.00	
(-) Maintenance of perennial pastures	6,549.90	
(-) Maintenance of improvements	178.24	
(-) Equipment maintenance	672.00	
(-) Maintenance of machines and vehicles	547.30	
<b>Subtotal (2.2)</b>	<b>909,981.59</b>	
<b>TOTAL VARIABLE COST (CVT = 2.1 + 2.2)</b>	<b>927,433.72</b>	<b>87.43</b>
<b>TOTAL GROSS MARGIN (RBT - CVT)</b>	<b>236,041.28</b>	<b>20.29</b>
<b>4) Fixed Costs</b>		
4.1) Depreciation of perennial pastures	3,263.00	
4.2) Depreciation of improvements	9,694.75	
4.3) Depreciation of equipment	6,720.00	
4.4) Depreciation of machines and vehicles	10,916.33	
4.5) Interest on improvements	9,527.27	
4.6) Interest on equipment	4,536.00	
4.7) Interest on machines and vehicles	8,308.80	
4.8) Labor	80,400.00	
<b>(-) TOTAL FIXED COST (CFT)</b>	<b>133,366.16</b>	<b>12.57</b>
<b>(-) TOTAL OPERATING COST (CVT + CFT)</b>	<b>1,060,799.88</b>	
<b>LOA - ANNUAL OPERATING PROFIT (RBT - CT)</b>	<b>102,675.12</b>	<b>8.82</b>
<b>LOM - MONTHLY OPERATING PROFIT (LOA/12)</b>	<b>8,556.26</b>	<b>0.74</b>

TABLE 9 – Income Statement (DRE) (year 2020).

Source: the author.

p.174), PE represents the “sales level at which there is neither profit nor loss, that is, where total costs are equal to total revenues”. Therefore, the revenue that the property needs to obtain in order to have neither profit nor loss (zero profit) in milk production, maintaining current production conditions, is R\$ 657,377.36.

The Internal Rate of Return (IRR) is another important economic/financial indicator to evaluate an economic activity, as it allows comparing the financial profitability obtained on an investment made with a rate desired by the investor. As it can be seen in Table 11, the IRR obtained from the financial performance of the investment made in the property’s dairy production is low compared, for example, with an investment in a savings account, that is, it is 0.26% per month. However, it is important to consider that the capital items invested to make dairy production viable also undergo a process of appreciation over time, as is the case with animals and land. These capital gains, in many cases, are greater than what could be obtained on other financial assets. For this reason, it is not always possible to evaluate an investment considering only one financial indicator, but rather all the production factors used.

For Hastings (2013, p.30) payback indicates “quite simply, how long it will take for the original investment to be recovered”. As it can be seen in Table 11, the return time for the total capital invested in dairy production on the property is around 31 years and 8 months. It is clear that the investment made is considerable, making its return time-consuming. However, it is necessary to constantly monitor the financial performance of the activity, so that it is possible to identify technical and financial aspects that can improve the economic performance of the property’s dairy activity. One of these aspects may be increasing the productivity of the dairy herd.

## RETURN ON INVESTMENT (PAYBACK) MADE IN THE COMPOST BARN

Payback is an indicator used to evaluate the time required for an amount invested in a certain economic activity to return. How the studied property made an investment in the implementation of a compost barn system for production with own resources, one of the objectives of the financial study carried out was to evaluate the extent to which this investment was viable and what the future impacts would be in terms of productivity and capacity to increase the number of animals in the dairy herd. The tables 12 to 14 presented below provide this data.

Items	Current value
Compost Barn	120,000.00
Compost Barn Fans	30,000.00
<b>Total Investment (IT)</b>	<b>150,000.00</b>

TABLE 12 - Investment in the implementation of the Compost Barn.

Source: the author.

Table 12 shows the total value of the investment made in the compost barns system, with the construction of an 800 square meter shed for animal bedding worth R\$ 120,000.00. Six fans were also purchased for a total value of R\$30,000.00. Therefore, the total investment was R\$150,000.00, as some materials, equipment and installations already existed on the property and did not need to be purchased/built.

IT	(÷) LOA	Payback	
150,000.00	102,675.12	<b>1.4609</b>	<b>Or 1 year and 6 months</b>

TABLE 13 - Payback on investment in Compost Barn.

Source: the author.

(*) Contribution Margin (MgC)	RBT	(-) CVT	(=) MgC	
	1,163,475.00	927433.72	<b>236,041.28</b>	
(**) Contribution Margin Index (IMgC)	MgC	(÷) RBT	(=) IMgC	
	236,041.28	1,163,475.00	<b>0.2029</b>	
(***) Breakeven Point (PE)	CFT	(÷) IMgC	PE (R\$)	
	133,366.16	0.2029	<b>657,377.36</b>	
(****) Investment Return Rate (IRR)	LOM	(÷) IT	IRR (%)	
	8,556.26	3,251,624.13	<b>0.2631</b>	or 0.26% per month
(*****) Return period for invested capital (Payback)	IT	(÷) LOA	Payback	
	3,251,624.13	102,675.12	<b>31.6691</b>	or 31 years and 8 months
<b>Subtitle:</b>				
(*) MgC = Total Gross Revenue (RBT) – Total Variable Cost (CVT)				
(**) IMgC = MgC/RBT				
(***) PE = Total Fixed Cost (CFT)/IMgC				
(****) IRR = Monthly Operating Profit (LOM)/Total Investment (IT)				
(*****) Payback = Annual Operating Profit (LOA)/Total Investment (IT)				

Table 11 – Economic/financial indicators.

Source: the author.

In Table 13, you can see the payback obtained for the investment made in implementing the compost barn system. It can be seen that the payback time is 1.5 years. It appears, therefore, that the property has its own resources for investment, as mentioned when the 2020 DRE was presented (Table 9). The financial return obtained from milk production allowed improvements to be made to the production system without the need to access third-party resources and the payback time can be considered excellent.

With the improvements represented by the new dairy production system implemented on the property, the producer estimates an evolution in terms of the size of the dairy herd and productivity. Table 14 contains an estimate of evolution, taking into consideration, aspects related to constant genetic improvement with the acquisition of semen and more productive animals. A quantitative increase in the dairy herd is estimated, from the current 58 to 70 productive cows by the year 2029, maximizing the use of the capacity of existing facilities.

Another important aspect to be observed in Table 14 refers to the increase in Gross Revenue (RB) from the property's dairy activity. For the current year (2021), an

increase of 10.34% is expected, reaching 34.48%, by the year 2029. Productivity gains, maximizing the use of installed capacity, dilute Fixed Costs (CF) and will improve the economic/financial performance of the dairy activity. To make these estimates, the average value received by the producer per liter of bed in 2020 was used, that is, R\$ 1.80.

## FINAL CONSIDERATIONS

The administration of a rural production unit is a determining factor for the continuity of the economic activities carried out and its viability over time. Dairy production is a monthly income option for both small and large producers. Dairy cattle farming has proven to be a good income alternative, enabling investments in properties, making them more efficient and economically viable, having a positive impact on improving the quality of families residing in rural areas.

Financial management is one of the most important administrative processes for managing rural companies, as it is a sector subject to adverse weather conditions and constant price fluctuations that are defined by the market. The present study demonstrated

Year	Cows Productive	Lactating cows	Lactation period in days	Average productivity daily	Total annual production (Liters)	Sales price (R\$)	Annual revenue (R\$)	% evolution of revenue
2020	73	58	300	35.00	609,000.0	1.80	1,096,200.00	100
2021	79	64	300	35.00	672,000.0	1.80	1,209,600.00	10.34
2022	84	67	300	35.00	703,500.0	1.80	1,266,300.00	15.52
2023	86	68	300	37.00	754,800.0	1.80	1,358,640.00	23.94
2024	86	68	300	37.00	754,800.0	1.80	1,358,640.00	23.94
2025	88	69	300	37.00	765,900.0	1.80	1,378,620.00	25.76
2026	88	69	300	38.00	786,600.0	1.80	1,415,880.00	29.16
2027	88	69	300	38.00	786,600.0	1.80	1,415,880.00	29.16
2028	88	69	300	39.00	807,300.0	1.80	1,453,140.00	32.56
2029	90	70	300	39.00	819,000.0	1.80	1,474,200.00	34.48

TABLE 14 - Estimated evolution of the dairy herd.

Source: the author.

the importance of the various management processes composed of administrative functions that involve planning, organization, direction and control, as they allow analyzing, controlling the financial flow and measuring the economic results achieved by the activities carried out in an agricultural production unit.

The property belonging to the Assmann family is located on Linha Biguá in the interior of the municipality of Iraceminha - SC. Its total area is 35 hectares, subdivided according to land occupation and use. The area designated for the dairy sector is 27 hectares. The remainder is divided into areas occupied by improvements, such as houses, warehouses and facilities for the property's poultry sector. As described in item 4.1, the dairy sector has a complete system for management, feeding and milk extraction.

Regarding the characterization of the researched production unit, it was found that the dairy activity began in 2000, representing a reduced share in the property's Total Gross Revenue (RDB). Investments made in improving pastures, feeding, management, equipment, facilities and herd genetics have transformed dairy production into the main economic activity, representing more than 80% of annual Gross Revenue (RB). The investment in a compost barn system carried

out in 2020, aimed to expand and qualify dairy production, improving the efficiency and profitability of the activity. However, it remained to assess the economic/financial viability of the investment, a demand met by the present study.

According to data presented in item 4.2.1, the total investment allocated to milk production on the researched property is R\$ 2,238,854.00 (Table 4). This is a considerable amount and has been achieved over time. The land and dairy herd represent 70% of the total amount invested.

Tables 5 and 6 present the costs required to operationalize the system. Variable Costs (Table 5) total R\$909,434.29, representing more than 87% of the value. According to Dubois (2019, p.29), those values that "change depending on the volume produced", that is, they can fluctuate more or less depending on time and production volume. It is important to highlight that the researched property has demonstrated that it has revenue conditions, or its own financial flows, sufficient to cover the CVs of the dairy activity, as they represent amounts that need to be disbursed daily, a fact that does not happen with Fixed Costs (CF). which are not effective costs, that is, immediate cash disbursements.



Fixed Costs (CF) represent a lower value (Table 6), totaling R\$ 133,366.16. We tried to compose the CF taking into consideration, the main cost items that best adapt to the context of the property. Interest on the value of the land and animals that make up the dairy herd was not allocated, as it is clear that the appreciation of these investment items has behaved above inflation and the percentage of interest considered (6.00% per year) to carry out the financial study.

As for the technical coefficients presented in Table 7, it can be seen that the property is already obtaining good results. However, as it can be seen in Table 25, which presents the estimated evolution of the herd, some indicators can be improved and, consequently, the profitability achieved so far, too.

Item 4.2.3 that presented the Income Statement (year 2020), indicates Annual Gross Revenue (RB) of R\$ 1,163,475.00, arising from dairy activities. It can be seen that the Contribution Margin (MgC) is R\$ 236,041.28, making up 20.29% of the annual revenue obtained. MgC represents a value that is available in the property's cash flow and that can also be used to make investments, as CF, as already mentioned, are not cash costs, that is, they do not represent immediate disbursements.

As it can be seen in Table 11, presented in item 4.3 of this report, the Break-Even Point (PE) of the property's dairy activity can be reached with an annual turnover of R\$ 657,377.36, including a technical reserve of 1.00% on the total value of the investment made in the activity. In other words, this value represents the Total Gross Revenue (RBT) necessary to achieve 'zero profit'. This is a positive indicator, as production activity is maintained when 50.50% of the annual RBT is reached.

In Table 11 of this report, an Investment Return Rate (IRR) of 0.26% per month

was found. This percentage is relatively low compared to the financial income achieved in conservative financial investments such as savings accounts. However, the capital invested in the dairy sector also appreciates over time; in some cases, these gains may be greater than those obtained in other better-paying financial assets. Therefore, some qualitative aspects must be taken into consideration whenever evaluating a financial indicator.

As a result of the IRR, the payback (return time on the total investment in the dairy sector) is 31 years and 8 months. Time considered high, however, it is necessary to continue monitoring the technical and financial performance of the dairy activity and other economic activities maintained on the property, thus observing aspects that can optimize the use of resources and maximize profitability.

Regarding the evaluation of the investment made in the compost barn system, presented in item 4.4 of this report, it can be seen that the total amount invested was R\$ 150,000.00 (Table 12). However, the payback obtained (Table 13) is one year and six months, that is, it demonstrates that the amount invested in improvements in the dairy production system returns in a relatively short period of time. It is important to highlight that there was a need to promote improvements in the dairy production structure, and that the investment was made with own resources.

With the improvements promoted in the property's dairy production system, it is estimated that economic/financial profitability can evolve with increased productivity and better use of the installed production capacity (Table 14). An increase of around 11% in dairy herd productivity and 34% in Total Annual Gross Revenue is expected, considering a period of 10 years (2020 to 2029).

Given the study carried out and the economic/financial performance indicators

obtained, it was observed that some aspects can be improved, positively impacting the results obtained from the property's dairy activity. The increase in the productive herd (Table 14) based on the new system (compost banr), investment in herd genetics and the constant selection of more adapted and highly productive cows will be fundamental to improving productivity and reducing production costs.

A limitation of the study carried out is time, as only the year 2020 was used, a fact that is justified given the lack of financial records and a similar study on the researched property. It is recommended that the economic/financial monitoring of dairy activities be carried out on an ongoing basis, so that it is possible to monitor fluctuations resulting from price variations of production factors and the amount paid per liter of milk to the producer. By obtaining historical data, it will be possible to make better decisions to improve production and improve the results achieved.

The present study adopted the concept of Contribution Margin (MgC), as the property also develops poultry farming as an important economic activity. This way, a similar economic/financial study can be carried out,

considering poultry production, obtaining the MgC of this activity, it is possible to evaluate which of the two (milk or poultry production) contributes more significantly to the formation of the operating profit of the property as a whole.

In this context, given the scarcity of studies with this approach and the importance of dairy farming for rural properties, especially those associated with family farming, this study demonstrated that financial management is essential for measuring economic results and making better decisions at the moment. to promote investments. The relevance of the study carried out for the professional training of Agronomists is also evident, as it is not enough to simply know how to apply the best production technique. It is also necessary to evaluate in advance the economic viability of the investments necessary to develop economic activities with the adoption of available technologies. It is clear that the adoption of administrative functions and concepts linked to the area of rural administration, allows planning, processing and analyzing financial data that serve to measure results achieved and make more assertive management decisions over time.

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# APPENDIX

## INVENTORY AND PRODUCTION COSTS

Category	Unit	Qty.	Unit value (R\$)	Total value (R\$)
Total area	Acre	35	37,000.00	1,295,000.00
Area intended for dairy production	Acre	27	37,000.00	999,000.00

Table 1 - Total area of the property intended for dairy production.

Source: the author.

Animal Category	Unit	Qty.	Unit value (R\$)	Total value (R\$)
Lactating cows	heads	58	6,700.00	388,600.00
Dry cows	heads	15	6,200.00	93,000.00
Heifers	heads	17	3,200.00	54,400.00
Calves	heads	12	850	10,200.00
Calves	heads	12	850	10,200.00
Bulls	heads	0	0	0.00
Total animals	heads	114		556,400.00

Table 2 - Dairy herd.

Source: the author.

Item	Unit	Qty.
Native grassland	acre	1.6
Tifton/Pioneer	acre	3.0
Gigs	acre	1.4
Total cultivated area	acre	6.0

Table 3 - Perennial pastures.

Source: the author.

Item	Unit	Qty.
Winter	ha/year	
Oats + ryegrass	ha/year	26.0
Total cultivated area	ha/year	26.0

Table 4 - Annual pastures for soil cover.

Source: the author.

Item	Unit	Quantity
Silage corn	HA/year	20,0
Total cultivated area	HA/year	20,0

Table 5 - Other crops.

Source: the author.



Items	Unit	Quantity	Unit value	Value (hectares)	Number of hectares	Total value	Useful life/ years (6)
Inputs/implantation	Units/hectares	40.000	0,15	6.000,00	1,4	8.400,00	
Gigs Seedlings							
Limestone	kg/hectare	0	0	0,00	1,4	0,00	
Fertilizer 05-25-25	kg/hectare	250	1,98	495,00	1,4	693,00	
Subtotal/Implementation				<b>6.495,00</b>		<b>9.093,00</b>	
Inputs; maintenance							
Manure	M3/hectares/year	6	35,00	210,00	1,4	294,00	
Urea Herbicide	kg/hectares/year	250	1,96	490,00	1,4	686,00	
Subtotal; maintenance	L/hectares	18	44,50	801,00	1,4	1.121,40	
Tifton/ pioneer				<b>1.501,00</b>		<b>2.101,40</b>	

Items	Unit	Quantity	Unit value	Value (hectares)	Number of hectares	Total value	Useful life/ years (6)
Inputs/implantation	Units/hectares	30.000	0,10	3.000,00	3,0	9.000,00	
Gigs Seedlings							
Limestone	kg/hectare	0	0	0,00	3,0	0,00	
Fertilizer 05-25-25	kg/hectare	250	1,98	495,00	3,0	1.485,00	
Subtotal/Implementation				<b>3.495,00</b>		<b>10.485,00</b>	
Inputs; maintenance							
Manure	KG/hectares/year	250	1,96	490,00	3,0	1.470,00	
Urea Herbicide	M3/hectares/year	12	35,00	420,00	3,0	1.260,00	
Subtotal; maintenance	L/hectares	7	44,50	311,50	3,0	934,50	
Native pasture				<b>1.221,50</b>		<b>3.664,50</b>	

Items	Unit	Quantity	Unit value	Total value	Number of hectares	Total value	Useful life
Inputs/Implementation							
Urea	kg/hectare	250	1,96	490,00	1,6	784,00	
Manure	kg/hectare	5.000	0,00	0,00	1,6	0,00	
Subtotal; maintenance				<b>490,00</b>		<b>784,00</b>	
Total; implantation						19.578,00	
Total; maintenance						6.549,90	
Total cost						<b>26.127,90</b>	

Table 6 - Cost of implementing and maintaining perennial pastures.

Source: the author.

OATS + RYEL	Unit	Quantity	Unit value	Total value	Number of hectares	Total value
Inputs + maintenance						
Black oats (certified seed)	kg/hectare	95	2,00	190,00	26,0	4.940,00
Manure	m3/hectare	8	35,00	280,00	26,0	7.280,00
Total annual cost				<b>470,00</b>		<b>12.220,00</b>
Amount paid for wood shavings used on properties						

Table 7 - Cost of annual pastures for soil cover.

Source: the author.

Inputs	Unit	Quant	Unit value	Value/HA	Numb	Total
Seed	kg/hectares	26	44,73	1.162,98	20,0	23.259,60
Fertilizer	kg/hectares	250	2,10	525,00	20,0	10.500,00
Urea	kg/hectares	300	2,30	690,00	20,0	13.800,00
Herbicide	Liters/hectare	20	21,50	430,00	20,0	8.600,00
Insecticide	Square meters	2	75,00	150,00	20,0	3.000,00
Canvas		1.200	2,60	3.120,00	20,0	62.400,00
Total inputs				<b>6.077,98</b>		<b>121.559,60</b>
Machine rental						
Cutting, transporting and compacting corn silage	RS/hectares	1	1.000,00	1.000,00	20,0	20.000,00
Total cost						<b>141.559,60</b>

Table 8 - Cost of corn for silage.

Source: the author.

Concentrated	Treated animal	Deal in g days	kg/day/animal	Consumption in kg/year	Unitary value	Total cost
Top commercial feed 20% PB	Lactating cows	300	16	278.400	1,95	542.880,00
Top commercial dry cow feed	Dry cows	65	7	6.625	1,98	13.513,50
Top country commercial breed	Heifers	365	3	18.615	1,60	29.784,00
Top commercial calf feed	Calves	365	3	13.140	1,30	17.082,00
Mineralized salt	Lactating cows	180	0,35	4.599	10,00	45.990,00
Total annual cost						649.249,50

Table 9 - Cost of supplementation and minerals for the dairy herd.

Source: the author.

Items	Products	Unit	Units/year	Unit value	Total cost	
Vaccines	POLI-STAR	100 ml bottle	15	28,75	431,25	
	Leptospirose	550 ml bottle	8	68,3	546,40	
Medicines	Terramicina	50 ml bottle	60	15,3	918,00	
	Injetável L A	100 ml bottle	30,00	25,15	754,50	
	Mercepton	30 ml bottle	20,00	33,80	676,00	
	Ganaseg	10 ml tube	456,00	3,60	1.641,60	
	Mastifim	25 ml bottle	70,00	12,90	903,00	
	Agrovet plus	200 ml bottle	30,00	18,30	549,00	
	Calfon	50 ml bottle	20,00	28,90	578,00	
	D 500	500 ml bottle	15,00	38,00	570,00	
	Tribsissen	500 ml bottle	15,00	71,90	1.078,50	
	Soro glicosado	10 ml tube	456,00	5,80	2.644,80	
	Stimovt	50 ml bottle	30	45,00	1.350,00	
	Mastifin VS	50 ml bottle	40	58,90	2.356,00	
	Forgal	10 ml tube	600	2,60	1.560,00	
	Prador	Liter	350	17,50	6.125,00	
	Vaca seca	Liter	350	10,60	3.710,00	
	Disinfectants	Desinfetante Alcalino	Liter	300	11,00	3.300,00
	Post dipping	Desinfetante Ácido	liter	130	93,00	12.090,00
Tickicides/ Germicide	Mastergold	Liter	15	68,90	1.033,50	
Vermifuge	Top-Line Pour-on	Liter	18	28,45	512,10	
Vermifuge	Ripercol oral	50 ml bottle	10	12,06	120,60	
Reproduction	Ivomec bovino	2 ml bottle				
Total annual cost	Ciosin				43.448,25	

Table 10 - Costs of vaccines and medicines used by the dairy herd.

Source: the author.

Item	Unit	Quantity	Unit value	Total value
Electricity consumption	KWH/an	48.288	0,35	16.900,80
Gasoline	Liters/year	2.400,00	5,30	12.720,00
Diesel oil	Liters/year	6.000,00	4,33	25.980,00
Artificial insemination (semen)	Liters/year	70,00	32,00	2.240,00
Compost barn (sawdust) bedding	R\$/year	432	23,00	9.936,00
Miscellaneous expenses	M3/year		500,00	500,00
Total annual cost				68.276,80
Value related to the cost of purchasing the sawdust used in the compost	R\$/year			

TABLE 11 - Other cost items.

Source: the author.

Item/details	Unit	Quantity	Current value	Remaining useful life in years	Residual value	Residual value
Wooden houses / headquarters	Square meters	144	45.000,00	20	20,00%	9.000,00
Compost barn shed	Square meters	800	120.000,00	30	20,00%	24.000,00
Employee house	Square meters	90	18.000,00	20	20,00%	3.600,00
Shed to shelter machinery	Square meters	425	30.000,00	20	10,00%	3.000,00
Electric fence	Meters	3.000	2.816,00	4	5,00%	140,80
Drinking fountains	Unit	8	6.400,00	15	10,00%	640,00
Hydraulic instalations	Meters	800	1.530,00	35	10,00%	153,00
Calf facilities	Unit	12	4.200,00	5	10,00%	420,00
Feeding/milking shed	Square meters	400	35.000,00	30	20,00%	7.000,00
Hay shed	Square meters	81	7.730,00	30	20,00%	1.546,00
Silo, trench	Cubic meters	720	7.000,00	35	20,00%	1.400,00
Silo, trench	Cubic meters	1.080	6.000,00	35	20,00%	1.200,00
Silo, feed	Tons	6	8.000,00	30	10,00%	800,00
<b>Total</b>			<b>291.676,00</b>			

TABLE 12 - Improvements used by dairy activities.

Source: the author.

Item/details	Unit	Quantity	Current value	Remaining useful life in years	Residual value	Residual value
Piped milking machine 5 sets / laser meter	Unit	1	90.000,00	15	20%	18.000,00
Bulk cooler, 200 liters	Unit	1	6.000,00	15	20%	1.200,00
Compost barn fan	Unit	6	30.000,00	15	20%	6.000,00
<b>Total</b>			<b>126.000,00</b>			

TABLE 13 - Equipment used in dairy farming.

Source: the author.

Item/details	Unit	Quantity	Current value	Remaining useful life in years	Residual value	Residual value
Fiat Strada Adventure extended cab 2008	Unit	1	23.000,00	6	20%	4.600,00
Massey Fergusson 55X Tractor	Unit	1	12.000,00	20	20%	2.400,00
Massey Fergusson 292 Turbo Tractor	Unit	1	45.000,00	20	20%	9.000,00
Imasa Phx 700 planter	Unit	1	45.000,00	20	20%	9.000,00
Urea Distributor São Jose 1300	Unit	1	12.000,00	20	20%	2.400,00
Ipacol 6000L Liquid Distributor	Unit	1	26.000,00	20	20%	5.200,00
Imasa MP 1600 seeder	Unit	1	18.000,00	20	20%	3.600,00
6T Tipper Trailer	Unit	1	13.000,00	20	20%	2.600,00
Jet Sprayer 14M 600 L	Unit	1	18.000,00	15	20%	3.600,00
5-rod subsoiler	Unit	1	1.200,00	30	5%	60,00
Ipacol deinsiler 1.5 m3	Unit	1	30.000,00	20	5%	1.500,00
26-disc leveling harrow	Unit	1	3.000,00	20	20%	600,00
<b>Total</b>			<b>246.200,00</b>			

TABLE 14 - Machines and work vehicles used in dairy farming.

Source: the author.

Item/details	Annual depreciation	Interest/capital	Annual maintenance fee	Annual maintenance value	Appropriation
Wooden houses / headquarters	900,00	810,00	2%	22,50	50%
Compost barn shed	3.200,00	4.320,00	2%	80,00	100%
Employee house	720,00	648,00	1%	9,00	100%
Shelter for machinery	1.350,00	990,00	1%	15,00	100%
Electric fence	668,80	88,70	1%	7,04	100%
Drinking fountains	384,00	211,20	1%	4,27	100%
Hydraulic instalations	39,34	50,49	1%	0,44	100%
Place for calves	756,00	138,60	2%	16,80	100%
Shed for employee feeding/milking	933,33	1.260,00	1%	11,67	100%
Hay shed	206,13	278,28	2%	5,15	100%
Silo, trench	160,00	252,00	1%	2,00	100%
Silo, trench	137,14	216,00	1%	1,71	100%
Silo, trench	240,00	264,00	1%	2,67	100%
<b>Total</b>	<b>9.694,75</b>	<b>9.527,27</b>		<b>178,24</b>	
1; Linear method					
2; Average value of the asset X6% per year					
3; Current value of the asset versus current annual maintenance/remaining useful life					

TABLE 15 - Improvements: percentage of appropriation for the milk activity of annual costs with depreciation, interest on invested capital and maintenance.

Source: the author.

Item/details	Annual depreciati on	Interes t/capital	Annual maintenanc e fee	Annual maintenance value	Appropriati on
5 Sets Ducted Milker/Extractor/Laser Meter	4.800,00	3.240,00	10%	600,00	100%
200 Liter Bulk Chiller	320,00	216,00	3%	12,00	100%
Compost barn fan	1.600,00	1.080,00	3%	60,00	100%
<b>Total</b>	<b>6.720,00</b>	<b>4.536,00</b>		<b>672,00</b>	
1; Linear method					
2; Average value of the asset X6% per year					
3; Current value of the asset versus current annual maintenance/remaining useful life					

TABLE 16 - Equipment: percentage of appropriation for the milk activity of annual costs with depreciation, interest on invested capital and maintenance.

Source: the author.

Item/details	Annual depreciation	Interest/capital	Annual maintenance fee	Annual maintenance	Appropriation
Fiat Strada Adventure extended cab 2008	1.533,33	414,00	3%	57,50	50%
Massey Ferguson 55X Tractor	480,00	432,00	3%	18,00	100%
Massey Ferguson 292 Turbo Tractor	1.800,00	1.620,00	3%	67,50	100%
Imasa Phx 700 planter	1.800,00	1.620,00	3%	67,50	100%
Urea Distributor São Jose 1300	480,00	432,00	3%	18,00	100%
Ipacol 6000L Liquid Distributor	1.040,00	936,00	3%	39,00	100%
Imasa MP 1600 seeder	720,00	648,00	5%	45,00	100%
6T Tipper Trailer	520,00	468,00	3%	19,50	100%
Jet Sprayer 14M 600L	960,00	648,00	5%	60,00	100%
5-rod subsoiler	38,00	37,80	2%	0,80	100%
Ipacol deinsiler 1.5m3	1.425,00	945,00	10%	150,00	100%
26-disc leveling harrow	120,00	108,00	3%	4,50	100%
Total	<b>10.916,33</b>	<b>8.308,80</b>		<b>547,30</b>	
1; Linear method					
two; Average value of the asset X6% per year					
3; Current value of the asset versus current annual maintenance/remaining useful life					

TABLE 17 - Machines and vehicles: percentage of appropriation for the milk activity.

Source: the author.

Item	Unit	Monthly value	Yearly value
Value of hired labor	Month	3.700,00	44.400,00
Producer labor	Month	3.000,00	36.000,00
Total annual cost			<b>80.400,00</b>
(*) Contrato de parceria.			

TABLE 18 - Cost of labor used in dairy farming.

Source: the author.

## TECHNICAL COEFFICIENTS AND REVENUES FROM DAIRY ACTIVITIES (YEAR 2020)

Items	Unit	Total
Productive cows	Heads	73
Cows (lactation)	Heads	58
Lactation period in days	Days/year	300
Productivity in days	Liters/vac/day of lactation	35
Average daily productivity	Months	2
Interval between births	months	26
Age at first birth	%	15,00
Animal disposal	%	79,45
Lactating cows	%	5,00
Calf mortality	Liters/year	<b>609.000,0</b>
milk production	Liters/day	<b>1.668</b>
milk production		

TABLE 19 - Technical coefficients (year 2020).

Source: the author.



Category: Animal	Unit	Quantity	Unit value	Total value
Selling milk	Liters	609.000,0	1,80	1.096.200,00
Sale of cows (disposal)	Cab.	10,95	4.500,00	49.275,00
Sale of calves for slaughter	Cab.	4	4.500,00	18.000,00
				<b>1.163.475,00</b>

Table 20 - Annual revenue from dairy activity (as of 2020).

Source: the author.

## INCOME STATEMENT FOR THE YEAR (YEAR 2020).

ITENS	value	%
Income		
Selling milk	1.096.200,00	94,22
Cows (Discard)	49.275,00	4,24
Sale of calves (fat)	18.000,00	1,55
Total gross revenue	<b>1.163.475,00</b>	<b>100,00</b>
Total gross revenue		
Variable costs	<b>17.452,13</b>	
Deductions on sales	<b>1.146.022,88</b>	
Net operating revenue		
Variable costs and expenses		
Annual pastures for ground cover	12.220,00	
Corn for silage	141.559,60	
Dairy herd feed and minerals	649.249,50	
Vaccines and medicines used by the herd	43.448,25	
Electricity	16.900,80	
Fuels	25.980,00	
Artificial insemination (semen)	2.240,00	
Bedding (sawdust)	9.936,00	
Miscellaneous expenses	500,00	
Maintenance of perennial pastures	6.549,90	
Maintenance of improvements	178,24	
Equipment maintenance	672,00	
Maintenance of machines and vehicles	547,30	
<b>Subtotal (2.2)</b>	<b>909.981,59</b>	
Total gross margin	<b>927.433,72</b>	<b>87,43</b>
4) Fixed costs	<b>236.041,28</b>	<b>20,29</b>
Depreciation of perennial pastures		
Depreciation of improvements	3.263,00	
Equipment depreciation	9.694,75	
Depreciation of machines and vehicles	6.720,00	
Interest on improvements	10.916,33	
Interest on equipment	9.527,27	
Interest on machines and vehicles	4.536,00	
Labor	8.308,80	
Total fixed cost	<b>80.400,00</b>	
Total operating cost	<b>133.366,16</b>	<b>12,57</b>
Total operating cost	<b>1.060.799,88</b>	
Annual operating profit	<b>102.675,12</b>	<b>8,82</b>
Monthly operating profit	<b>8.556,26</b>	<b>0,74</b>

TABLE 21 - Total investment and working capital.

Source: the author.

## ECONOMIC/FINANCIAL INDICATORS

Item	Items	Price R\$)
1	<b>Fixed Investment</b>	<b>2,238,854.00</b>
2	<b>Working capital</b>	
	2.2) Variable costs and expenses	909,981.59
	2.2 Labor	80,400.00
	<b>Subtotal (1 + 2)</b>	<b>990,381.59</b>
3	<b>Technical Reserve (1% of Total Investment)</b>	<b>22,388.54</b>
4	<b>IT - Total Investment (1 + 2 + 3)</b>	<b>3,251,624.13</b>

TABLE 22 - Total investment and working capital.

Source: the author.

Contribution margin	<b>RBT</b>	<b>(-) CVT</b>	<b>(=) MgC</b>	
	1.163.475,00	927433,72	236.041,28	
Contribution Margin Index	<b>MgC</b>	<b>(+) RBT</b>	<b>(=) IMgC</b>	
	236.041,28	1.163.475,00	0,2029	
Balance point	<b>CFT</b>	<b>(+) IMgC</b>	<b>PE (R\$)</b>	
	133.366,16	0,2029	657.377,36	
Investment return rate	<b>LOM</b>	<b>(+) IT</b>	<b>TIR (%)</b>	
	8,556,26	3.251.624,13	0,2631	or 0,26 % by month
Return period for invested capital	<b>IT</b>	<b>(-) LOA</b>	<b>Payback</b>	
	3.251.624,13	102.675,12	31,6691	or 31 years and 8 months

Subtitle

Gross revenue; total variable cost

Mgc/RBT

Total fixed cost

Monthly operating profit / total investment

Monthly operating profit / total investment

TABLE 23 - Economic/financial indicators.

Source: the author

## RETURN ON INVESTMENT MADE IN THE COMPOST BARN (PAYBACK).

Itens	Current value
Compost Barn	120.000,00
Compost barn fan	30.000,00
Total investment	<b>150.000,00</b>

TABLE 24 - Investment in the implementation of the Compost Barn.

Source: the author

<b>(*****)</b> Return period for invested capital	<b>IT</b>	<b>(-) LOA</b>	<b>Payback</b>	
	150.000,00	102.675,12	1,4609	Or 1 year and 6 months

TABLE 25 - Payback on investment in Compost Barn

Source: the author.

Year	Productive Cows	Lactating cows	Lactation period in days	Average productivity daily	Total annual production (Liters)	Sales price (R\$)	Annual revenue (R\$)	Accumulated % change
2020	73	58	300	35.00	609,000.0	1.80	1,096,200.00	100.00
2021	79	64	300	35.00	672,000.0	1.80	1,209,600.00	10.34
2022	84	67	300	35.00	703,500.0	1.80	1,266,300.00	15.52
2023	86	68	300	37.00	754,800.0	1.80	1,358,640.00	23.94
2024	86	68	300	37.00	754,800.0	1.80	1,358,640.00	23.94
2025	88	69	300	37.00	765,900.0	1.80	1,378,620.00	25.76
2026	88	69	300	38.00	786,600.0	1.80	1,415,880.00	29.16
2027	88	69	300	38.00	786,600.0	1.80	1,415,880.00	29.16
2028	88	69	300	39.00	807,300.0	1.80	1,453,140.00	32.56
2029	90	70	300	39.00	819,000.0	1.80	1,474,200.00	34.48

TABLE 26 - Estimated evolution of the dairy herd.

Source: the author.