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ECONOMIC FEASIBILITY OF COW-CALF BEEF CATTLE PRODUCTION

VIABILIDADE ECONÔMICA DA BOVINOCULTURA DE CORTENA FASE DE CRIA

VIABILIDAD ECONÓMICA DE LA GANADERÍA DE CORTE EN LA FASE DE CRÍA

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ABSTRACT

The objective of this study was to analyze the economic viability of beef cattle production in the breeding phase on a rural property located in the state of Maranhão. The study was conducted in seven stages. First, a brief market analysis was carried out. The second stage focused on defining the project's technical characteristics. Next, in the third and fourth stages, expenditures and revenues were surveyed, respectively. In the fifth stage, a cash flow statement was prepared based on the information obtained in the previous stages. In the sixth stage, economic viability indicators were calculated using the values presented in the cash flow. Finally, based on the indicator results, a conclusion was drawn regarding the economic viability of beef cattle production in the breeding phase. The results show that beef cattle production in the breeding phase is economically viable for the case study in question. Considering the investor's profile for this project, it is concluded that undertaking the investment is viable as a strategy for diversifying asset risk.

Keywords: Rural Management. Agribusiness. Investment. Livestock. Profitability.

RESUMO

O objetivo deste estudo foi analisar a viabilidade econômica da produção de bovinos de corte na fase de cria em uma propriedade rural localizada no estado do Maranhão. O estudo foi desenvolvido em sete etapas. Inicialmente, realizou-se uma breve análise de mercado. A segunda etapa concentrou-se na definição das características técnicas do projeto. Em seguida, na terceira e quarta etapas, foram levantados, respectivamente, os custos e as receitas. Na quinta etapa, elaborou-se um fluxo de caixa com base nas informações obtidas nas etapas anteriores. Na sexta etapa, foram calculados os indicadores de viabilidade econômica a partir dos valores apresentados no fluxo de caixa. Por fim, com base nos resultados dos indicadores, chegou-se a uma conclusão quanto à viabilidade econômica da produção de bovinos de corte na fase de cria. Os resultados demonstram que a produção de bovinos de corte na fase de cria é economicamente viável para o estudo de caso em questão. Considerando o perfil do investidor para este projeto, conclui-se que a realização do investimento é viável como estratégia de diversificação de risco dos ativos.

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Palavras-chave: Gestão Rural. Agronegócio. Investimento. Pecuária. Rentabilidade.

RESUMEN
El objetivo de este estudio fue analizar la viabilidad económica de la producción de ganado bovino de carne en la fase de cría en una propiedad rural ubicada en el estado de Maranhão. El estudio se desarrolló en siete etapas. En primer lugar, se realizó un breve análisis de mercado. La segunda etapa se centró en la definición de las características técnicas del proyecto. Posteriormente, en la tercera y cuarta etapas, se relevaron los costos y los ingresos, respectivamente. En la quinta etapa, se elaboró un flujo de caja con base en la información obtenida en las etapas anteriores. En la sexta etapa, se calcularon los indicadores de viabilidad económica a partir de los valores presentados en el flujo de caja. Finalmente, con base en los resultados de los indicadores, se llegó a una conclusión sobre la viabilidad económica de la producción de ganado bovino de carne en la fase de cría. Los resultados muestran que la producción de ganado bovino de carne en la fase de cría es económicamente viable para el estudio de caso analizado. Considerando el perfil del inversor para este proyecto, se concluye que la realización de la inversión es viable como estrategia de diversificación del riesgo de los activos.

Palabras clave: Gestión Rural. Agronegocios. Inversión. Ganadería. Rentabilidad.

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1 INTRODUCTION

The world's population has been growing at an exponential rate over recent decades. In 1950, the planet had a total of 2.5 billion human beings, and according to data from the United Nations (UN), it reached 8 billion in 2022. Still according to the UN (UN, 2024), there is a high-confidence estimate that the global population will reach 11 billion by 2100. Given this scenario, it is possible to observe the importance of global agribusiness in meeting the demand for food in the coming years.

In the context of worldwide food production, Brazil stands out significantly, as data from the Food and Agriculture Organization of the United Nations (FAO) and the United States Department of Agriculture (USDA) (FAO, 2024; USDA, 2024) show that the country is among the world's leading producers and exporters in the main food chains, such as soybeans, corn, coffee, orange juice, meat (beef, poultry, and pork), and cow's milk.

Brazilian beef cattle production presents remarkable figures, accounting for 18.6% of global production in 2023 according to FAO (2024). These numbers position Brazil as the world's second-largest producer and the largest global exporter of beef. According to data from the report "Projections for Brazilian Agribusiness – 2022/23 to 2032/33," published in 2023 by the Ministry of Agriculture, Livestock, and Food Supply (MAPA), beef production in Brazil is projected to grow by 1.2% per year until 2032/33, rising from the current 9,065 tons to 10,186 tons.

In the country, the Midwest and Southeast regions hold the greatest share of the activity. The states with the highest production volumes in 2022 were: Mato Grosso (15.8%); São Paulo (11.5%); Mato Grosso do Sul (11%); Goiás (9.9%); Minas Gerais (9.5%); Pará (8.2%); Rondônia (6.9%); and Rio Grande do Sul (5.5%) (IBGE, 2024).

To achieve such significant figures, as mentioned above, beef cattle production "within the farm gate" is divided into three phases: breeding, growing, and finishing (fattening). The breeding phase is responsible for raising calves up to approximately nine months of age. The farmer maintains dams (cows) and bulls for reproduction. There are two methods for carrying out the breeding phase: Natural Mating or Fixed-Time Artificial Insemination (FTAI). In the first method, a larger number of bulls is required to mate with the cows. In the second, fewer bulls are needed because cows undergo the insemination process, and bulls are used only for backup mating.

After the breeding phase, the growing phase begins, starting with the weaned calf and continuing until it develops into a lean steer. Following the growing phase is the finishing

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phase, also known as “fattening,” which begins with the lean steer and ends with the finished animal ready for slaughter at the meatpacking plant.

Based on a pre-defined interest rate and the calculation of economic indicators, an economic viability study indicates the project’s level of profitability (Santos, Almeida & Holanda, 2017). In such a study, all financial outflows (expenses) and inflows (revenues) over a specific time horizon are projected, forming the activity’s future cash flow (Dettruz, 2011). According to Figueiredo et al. (2006), using the values from the cash flow, the main indicators that determine the feasibility or infeasibility of the project are: Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and Payback.

Beef cattle production in the breeding phase involves various types of risk. Among the most common are: cattle theft; animal mortality caused by diseases or extreme weather conditions; fluctuations in input purchase prices; and fluctuations in market sale prices. The latter represents the risk with the highest probability of occurrence, since calf sale prices vary daily. Price oscillations are primarily affected by market conditions (supply and demand).

Given this context, the objective of this study was to analyze the economic viability of beef cattle production in the breeding phase on a rural property located in the state of Maranhão. It is noted that the study aims to analyze a project to be implemented over the next six years. Furthermore, the investor (the rural producer) involved in this analysis operates in other sectors, meaning that this project would serve as a potential risk-diversification strategy within his investment portfolio.

2 METHODOLOGY

To provide greater clarity regarding the methodological information in this study, this section is divided into three parts: Qualification of the research; Qualification of the research object; and, finally, the stages of research development.

2.1 QUALIFICATION OF THE RESEARCH

The research can be characterized as exploratory in nature and based on a quantitative approach (economic viability). Regarding its scope, it is a case study, examining specific conditions of the local market. To carry out this study, primary data (obtained through surveys in the local market) and secondary data (obtained from online databases such as the Brazilian Institute of Geography and Statistics – IBGE and the Center for Advanced Studies in Applied Economics – CEPEA) were used. The data for this study were collected between

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the second half of 2023 and the first half of 2024.

2.2 QUALIFICATION OF THE RESEARCH OBJECT

This study analyzes the economic viability of producing Nelore beef cattle in the breeding phase. Concerning the study site, the analysis was conducted based on the characteristics of a rural property of 2,200 hectares (1,540 hectares of production area (70%) and 660 hectares of legal reserve area (30%)), located in the southeastern region of the state of Maranhão. On this property, the technique used for the breeding process is FTAI.

2.3 STAGES OF RESEARCH DEVELOPMENT

The study was developed in seven stages. First, a brief market analysis was carried out. Next, the second stage was responsible for defining the project's technical characteristics. Then, in the third and fourth stages, respectively, the activity's expenses and revenues were surveyed. In the fifth stage, a cash flow statement was prepared using the information obtained in the previous stages. In the sixth stage, the economic viability indicators were calculated, considering the values presented in the standard cash flow. Finally, based on the results of the profitability indicators, a conclusion was drawn regarding the economic viability of beef cattle production in the breeding phase. Each stage of the study's development is described in detail below.

In the first stage, a brief market analysis related to the study object was carried out. For this purpose, historical data on cattle slaughter in Brazil and in the state of Maranhão were analyzed. In addition, historical data on calf sale prices were analyzed, considering the average for the state of São Paulo. Slaughter data were retrieved from the IBGE repository (IBGE Automatic Recovery System – SIDRA), and price data were accessed from the CEPEA repository.

Regarding the project's technical characteristics, the time horizon totals six years, and the source of financial resources consists of 100% equity capital. A real Minimum Attractive Rate of Return (MARR) of 8% per year was adopted, composed of 5.41% per year from the IPCA+2029 Treasury Bond plus a risk premium of 2.59% per year.

Concerning the productive/zootechnical characteristics adopted, the following parameters were used: the average stocking rate is 1.15 AU per hectare; the pregnancy rate is 80%, while the abortion and stillbirth rate is 4%. The birth rate reaches 76%, and the mortality rate is 1%. The weaning rate is 75%. The herd consists of 1,015 cows without calves

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at foot, 361 cows with calves at foot, 361 heifers aged 12 months, 13 bulls, and 16 working animals. In each cycle, 516 male calves and 155 female calves are marketed, totaling 671 animals. Annually, 17 cull heifers and 344 cull cows are sold.

For the survey of expenses, the first step was to map, together with the producer, all financial outflow items related to the activity. Next, the listed items were classified into investments, fixed costs, variable costs, expenses, and taxes. After this process, price quotations were collected from the local market. For the revenue survey, the sale of male and female calves was defined as the main product, and the sale of cull animals throughout the production process as a secondary product. Animal prices were defined based on local price surveys and analysis of historical *arroba* (15-kg unit) price data, considering the respective weight of each animal (Table 1). At the end of the project, the residual value of animals, machinery, and equipment was also considered.

Table 1

Weight considered for each type of animal

Type of Animal	Arrobas (@)	KG
Multiparous Cow	15	450
Primiparous Cow	13,5	405
Heifer	10	300
Heifer Calf (with dam)	4,5	135
Bull Calf (with dam)	4,5	135
Weaned Heifer	6,5	195
Weaned Bull Calf	7,5	225
Bulls	20	600

Source: Prepared by the authors.

The cash flow for the activity was defined for a six-year period. This period was chosen because the breeding herd (mother cows) has an average useful lifespan of six calvings, with one calving considered per year. The values for expenses and revenues were projected for the five subsequent years in order to complete the remaining cash flow. For this purpose, the inflationary process was not considered in the projected values, either for financial outflows or inflows.

After completing the cash flow, the following economic viability indicators were calculated: Net Present Value (NPV); Internal Rate of Return (IRR); Discounted Payback; and Profitability Index (PI). The conclusion of the study was based on the analysis of the

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results obtained from these economic viability indicators.

3 RESULTS AND DISCUSSION

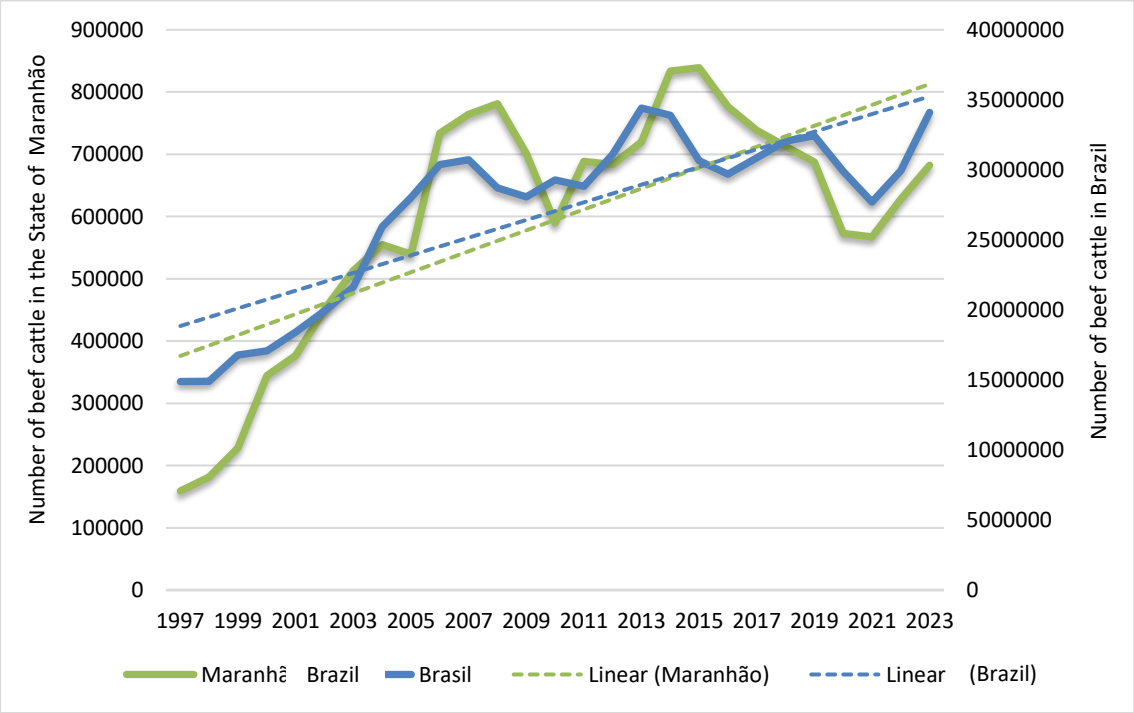
This section follows the same subdivision presented in Materials and Methods (Market Analysis; Technical Characteristics; Expense Survey; Revenue Survey; Cash Flow; and Economic Viability Indicators) in order to facilitate understanding of the results of this study.

3.1 MARKET ANALYSIS

In a supply-and-demand context, it is possible to state that the projected demand for the next decade is increasing, based on data from the report “Projections for Brazilian Agribusiness – 2022/23 to 2032/33” (MAPA, 2024). As a result of projected demand, an increase in the supply of beef is also expected. When analyzing the historical supply for the state of Maranhão and for Brazil between 1997 and 2023, a strong growth trend can be observed for both during this period (Figure 1).

Figure 1

Cattle slaughtered in Brazil and in the State of Maranhão between 1997-2023



Source: Prepared by the authors using data from PPM-IBGE (2024).

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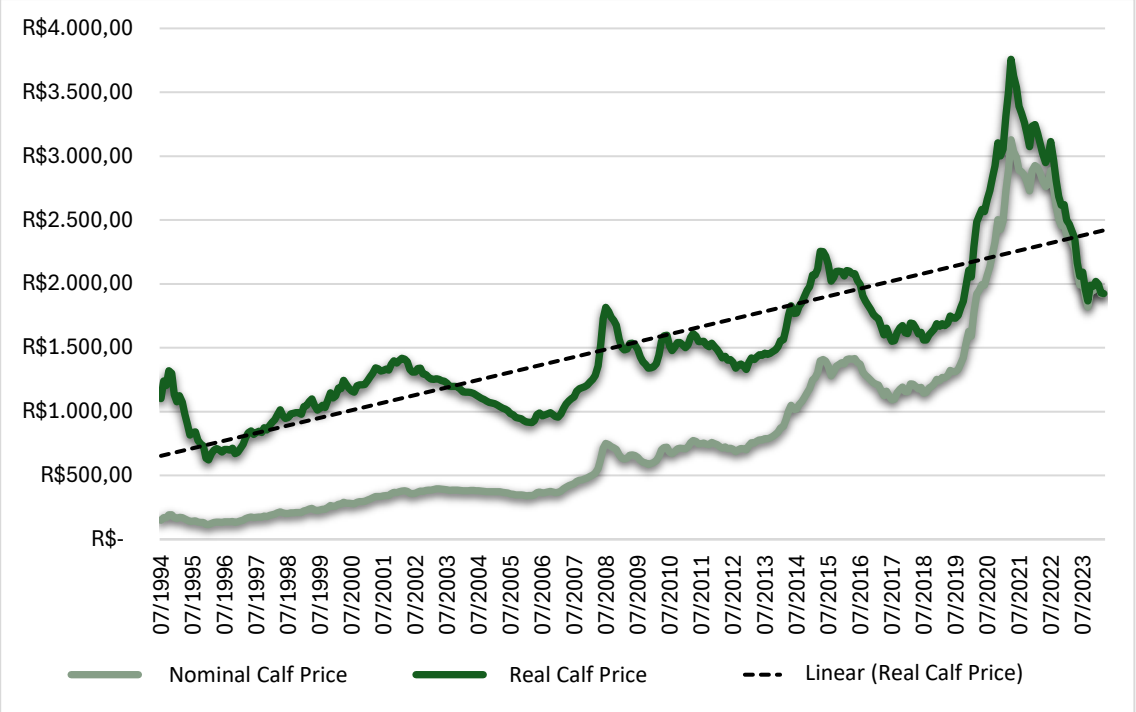
Figure 2 presents the historical nominal and real (adjusted by the Broad Consumer Price Index [IPCA]) calf prices for the State of São Paulo.

Figure 2

Historical nominal and real calf prices for the State of São Paulo between July 1994 and March 2024



Source: Prepared by the authors using data from CEPEA (2024a).

Based on what is shown in Figure 2, it is possible to observe that the trend line (based on the real price) demonstrates a positive slope in the historical calf price series. Furthermore, even if the COVID-19 pandemic period is excluded from the analysis, the trend line still maintains a positive upward trajectory.

3.2 TECHNICAL CHARACTERISTICS OF PRODUCTION

The project has an implementation period of six years, consisting of annual production cycles. At the beginning of the project, the initial configuration included: 344 primiparous cows (first-calving cows) without calves at foot; 258 primiparous cows with calves at foot; 774 multiparous cows (second calving or more) with calves at foot; 361 heifers; 516 male calves at foot; 516 female calves at foot; and 13 bulls. Throughout the year, as the project

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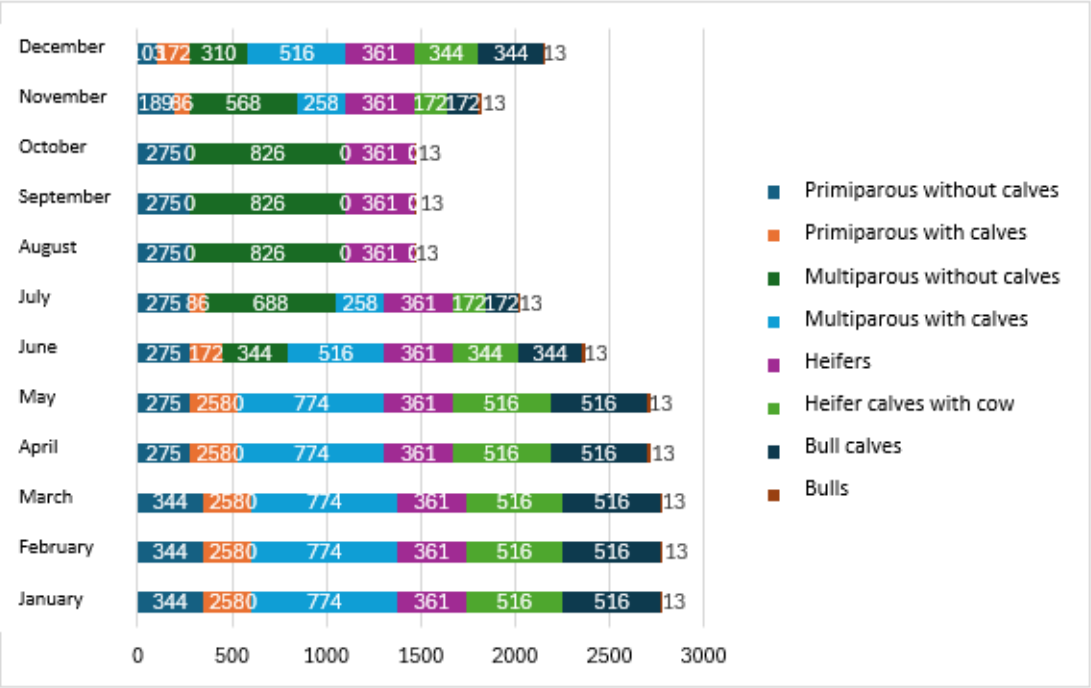
progresses, this initial configuration changes, modifying the number of animals in each category. Figure 3 shows the evolution of the herd from the first to the last year of the project.

Figure 3

Herd evolution between years 1 and 6 of the project



Source: Prepared by the authors.

The breeding system on the farm uses the Fixed-Time Artificial Insemination (FTAI) method and pasture-based management. In this system, despite the insemination process, it is still necessary in some situations to apply natural mating and direct cows that did not become pregnant to undergo backup mating with bulls. Therefore, considering the production scale, the acquisition of 13 bulls for backup mating was included.

Another important point in this case study concerns the sale of animals. The main product is the sale of male and female calves resulting from the breeding process. However, the number of male calves (516) marketed annually is considerably higher than the number of female calves (155). This occurs because the producer chooses to preserve high-quality genetics within the herd by retaining part of the weaned females so that, after a few months, these animals become heifers and later productive cows.

Due to fluctuations in the number of animals on pasture throughout the project, there is consequently variation in pasture stocking rate. This fluctuation was planned within a range

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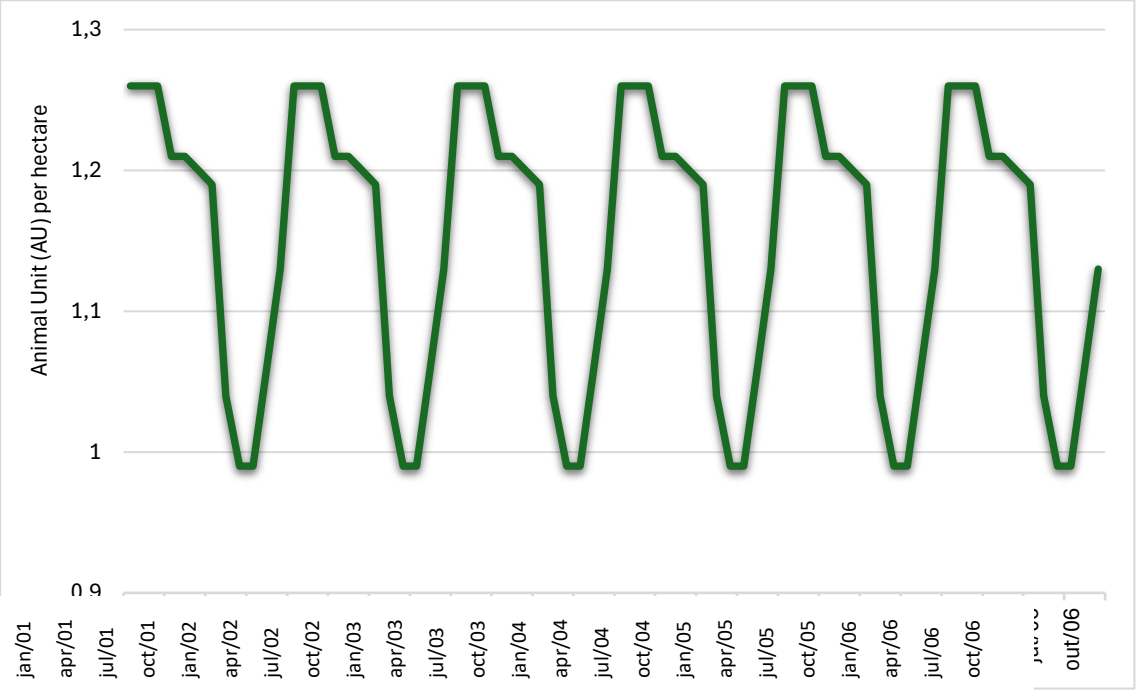
of 1.0 Animal Unit (AU) to 1.3 AU per hectare. Additionally, values close to 1.0 AU/hectare were planned for periods with lower pasture availability, while values close to 1.3 AU/hectare were planned for periods with greater pasture availability. Figure 4 below illustrates how this occurs.

Figure 4

Pasture stocking rate between years 1 and 6 of the project



Source: Prepared by the authors.

3.3 EXPENSE SURVEY

The expense survey was divided into four subgroups: investments, costs (fixed and variable), expenses, and taxes. Figure 5 below illustrates the composition of the project's investments (Year 0).

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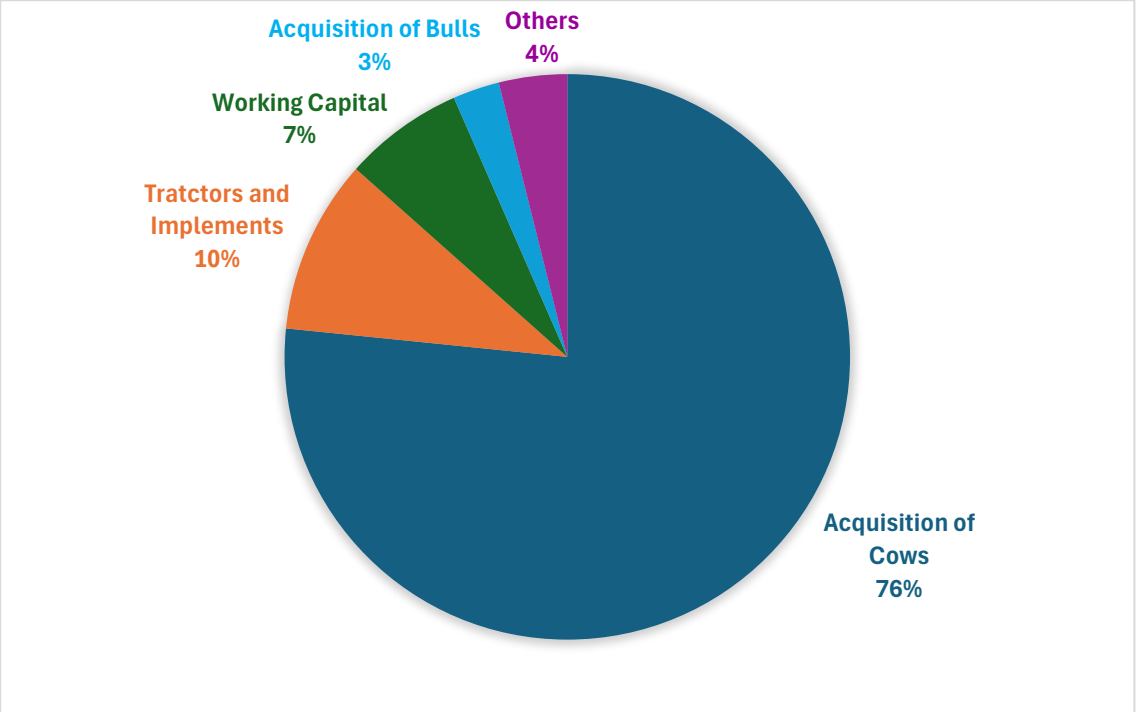
Figure 5

Project investments



Source: Prepared by the authors.

The investment required for the implementation of this project was estimated at R$ 7.3 million. In Figure 5, it is possible to see that the expenditure on the acquisition of cows accounts for a significant share of the project's total initial capital. This indicates that the unit price of purchasing these animals strongly affects the project's profitability. In this regard, within this economic activity, it becomes important for the producer to develop strategies to acquire animals at attractive market prices.

Another noteworthy point concerns the expenditure on tractors and implements, amounting to R$ 728,000 and representing about 10% of the initial capital. For a rural property dedicated to beef cattle production under a pasture-based system, this is a relatively high amount. However, in the region where the property analyzed in this study is located, there is a high incidence of pests in the pasture, making it necessary to use more robust tractors to combat them. Following the investments, Figure 6 presents the fixed costs for each year of the project.

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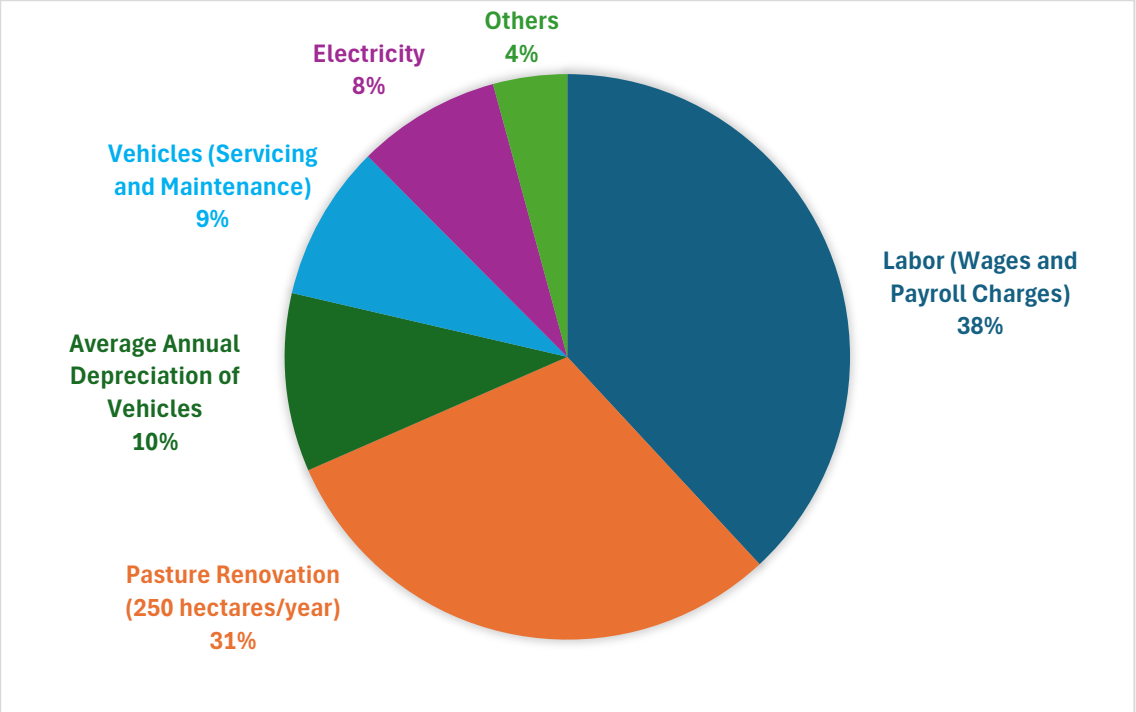
Figure 6

Fixed Costs of the Project



Source: Prepared by the authors.

Among the fixed costs observed, the most notable items are fixed labor and pasture renovation, which together account for 69% of the total. The pasture renovation category includes all items necessary for its execution, such as diesel fuel, seeds, labor, and others.

In Figure 7, the variable costs for each year of the project can be seen. Expenditures on salt (mineral, urea-enriched, and protein-enriched) stand out the most, representing 63% of the total variable costs, followed by the Fixed-Time Artificial Insemination (FTAI) protocol with 16%, and fuel (diesel) with 12%. The remaining items, like the gasoline (4.4%), vaccines and medication (4.0%) and working animals (0.6%) were responsible for 9% of the variable costs.

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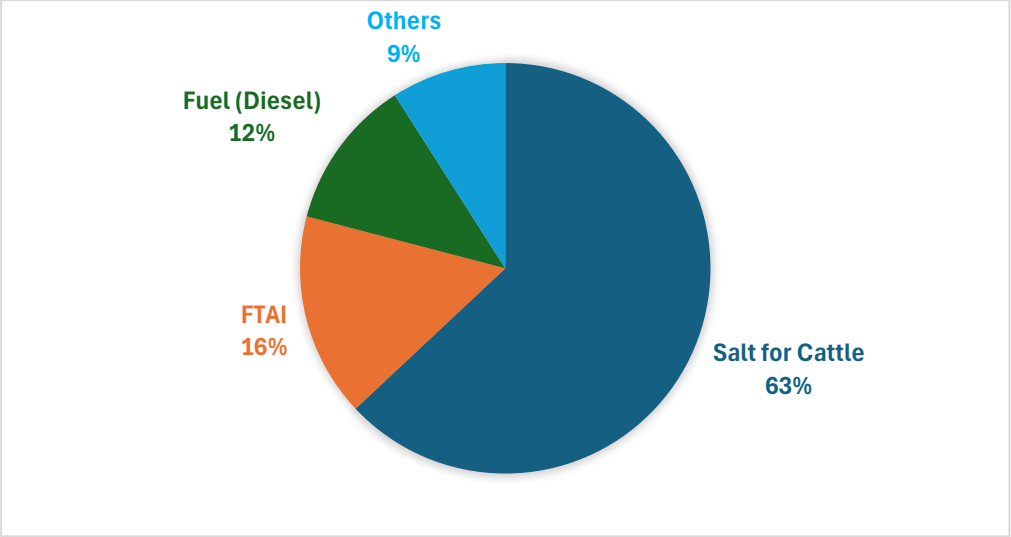
Figure 7

Variable Costs of the Project

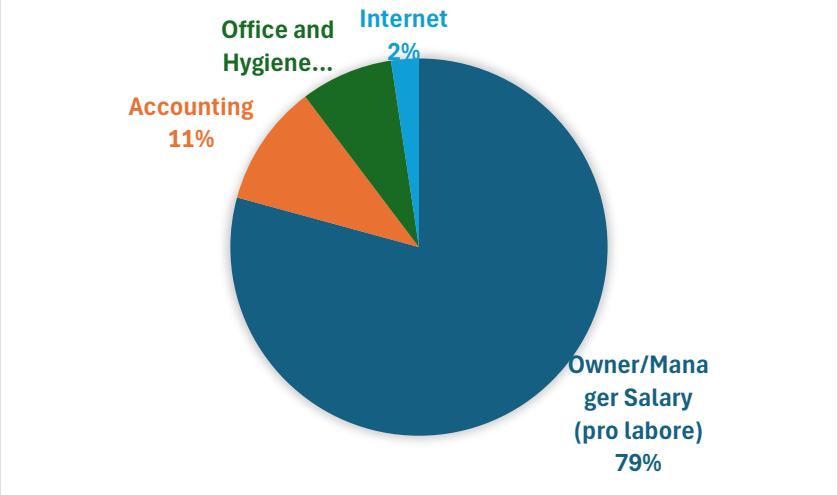


Source: Prepared by the authors.

In Figure 8, the composition of the standard annual expenses between the first and sixth year of the project is illustrated, with emphasis on pro labore, which accounts for 79% of the total.

Figure 8

Project Expenses



Source: Prepared by the authors.

In Figure 9, the taxes applicable between the first and sixth year of the project are presented, with the exception of the Individual Income Tax [IRPF]. The values attributed to IRPF are reported in the Cash Flow, after the Gross Profit line. The total amount of taxes

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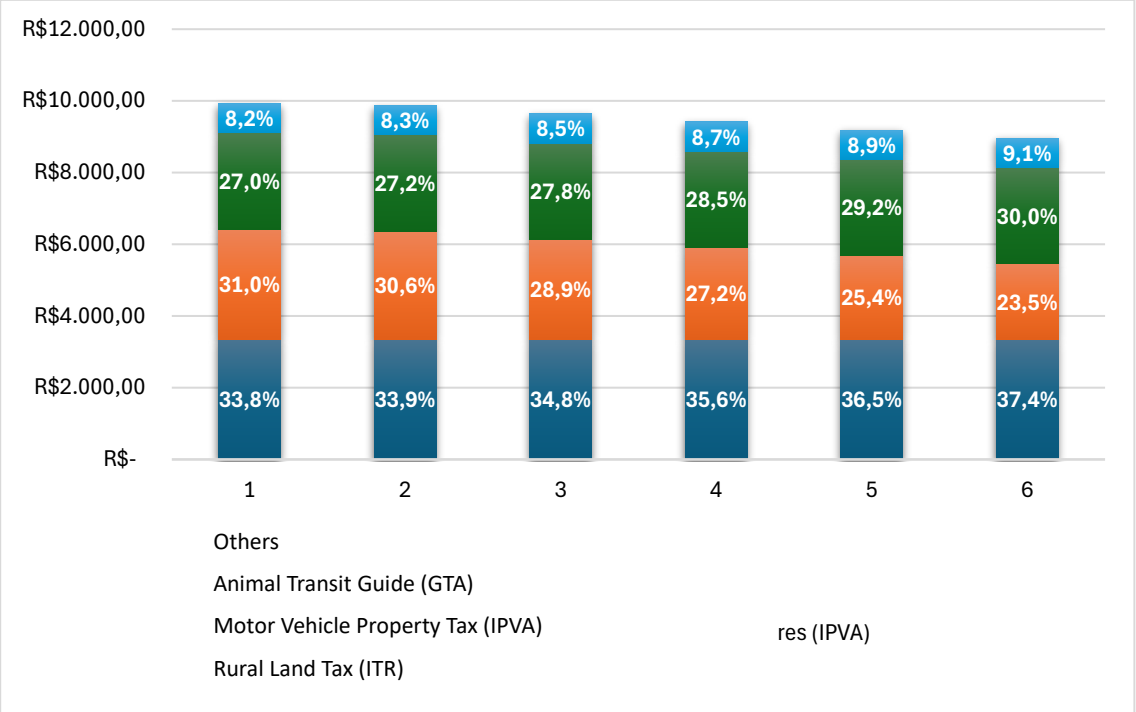
(excluding IRPF) has a low representativeness—approximately 0.7%—in the overall financial outflows of the activity.

Figure 9

Taxes (excluding IRPF) of the project



Source: Prepared by the authors.

Table 2 and Table 3 present the total financial outflows of the project between the first and sixth year, broken down by category (fixed costs, variable costs, expenses, and taxes (excluding IRPF)). Costs represent almost all expenditures, with fixed costs accounting for approximately 37.8% and variable costs for approximately 55.8%. Expenses and taxes (excluding IRPF), when combined, account for the remaining 6.4%.

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Table 2

Expenditures (excluding Investments) between Years 1 and 3

Expenditures	Year 1	Year 2	Year 3
Fixed Costs	R$ 510.977,50	R$ 510.977,50	R$ 510.977,50
Variable Costs	R$ 754.000,77	R$ 754.000,77	R$ 754.000,77
Expenses	R$ 75.720,00	R$ 75.720,00	R$ 75.720,00
Taxes (except IRPF)	R$ 9.926,19	R$ 9.871,49	R$ 9.641,79
Total Expenditure	R$ 1.350.624,46	R$ 1.350.569,76	R$ 1.350.340,06

Source: Prepared by the authors.

Table 3

Expenditures (excluding Investments) between Years 4 and 6

Expenditures	Year 4	Year 5	Year 6
Fixed Costs	R$ 510.977,50	R$ 510.977,50	R$ 510.977,50
Variable Costs	R$ 754.000,77	R$ 754.000,77	R$ 754.000,77
Expenses	R$ 75.720,00	R$ 75.720,00	R$ 75.720,00
Taxes (except IRPF)	R$ 9.412,09	R$ 9.182,39	R$ 8.952,69
Total Expenditure	R$ 1.350.110,36	R$ 1.349.880,66	R$ 1.349.650,96

Source: Prepared by the authors.

3.4 REVENUE ESTIMATION

For the revenue estimation of the project, a historical price analysis of the cattle *arroba* was conducted, covering the period from July 1997 to January 2024 (Figure 10). However, for the purpose of calculating the average price (the value used for projections), only the period from January 2008 to December 2019 (12 years) was considered, since before 2008 the real price behavior had a lower average that does not reflect current market conditions. The period after December 2019, in turn, was significantly affected by the COVID-19 pandemic. The average *arroba* price used in this study was R$ 200.00.

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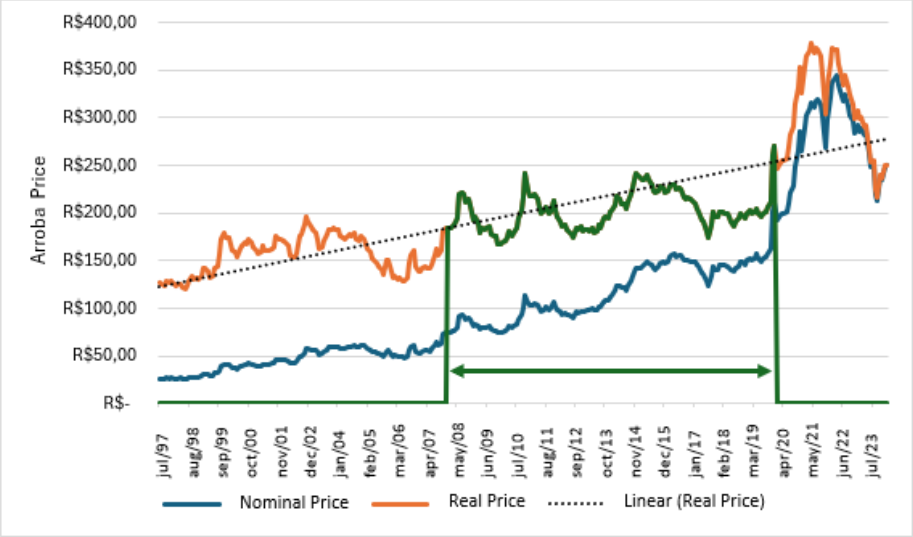
Figure 10

Nominal and real prices of cattle arroba in the State of São Paulo



Source: Prepared by the authors using data from CEPEA (2024b).

Figure 11 illustrates the percentage contribution of each revenue item throughout the years of the project. It is evident that the sale of male calves is the main source of financial inflow for the farm operation. The revenue from the sale of female calves is less representative, as part of these animals are retained to later become breeding cows. This practice is adopted to preserve the genetic quality of the herd.

Another revenue source that stands out in the project is the sale of cull cows. These animals are removed from the herd at different stages of the production process due to failing to become pregnant.

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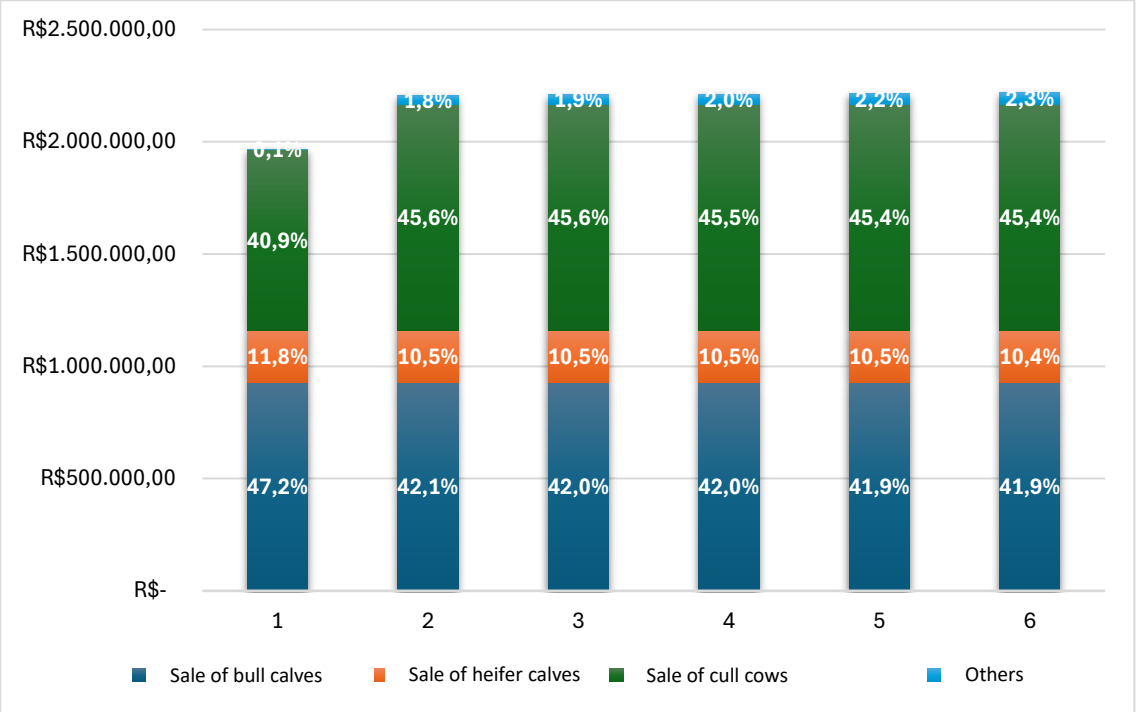
Figure 11

Project revenues



Source: Prepared by the authors.

3.5 CASH FLOW

Figure 12 and Table 4 present the financial inflows and outflows (cash flow) for all the years of the project. The first column (Year 0) consists of the initial capital (investment) of the activity. Starting from the first year, all revenues and expenditures (costs and expenses) are shown. The gross profit for each year is also displayed, calculated as the difference between revenues and expenditures.

A notable highlight is the high revenue value presented in the sixth year of the project. This occurs because, in the final year, in addition to the regular revenues generated by the cow-calf operation, the residual values of the project's assets—such as animals, vehicles, tractors, etc.—are also included.

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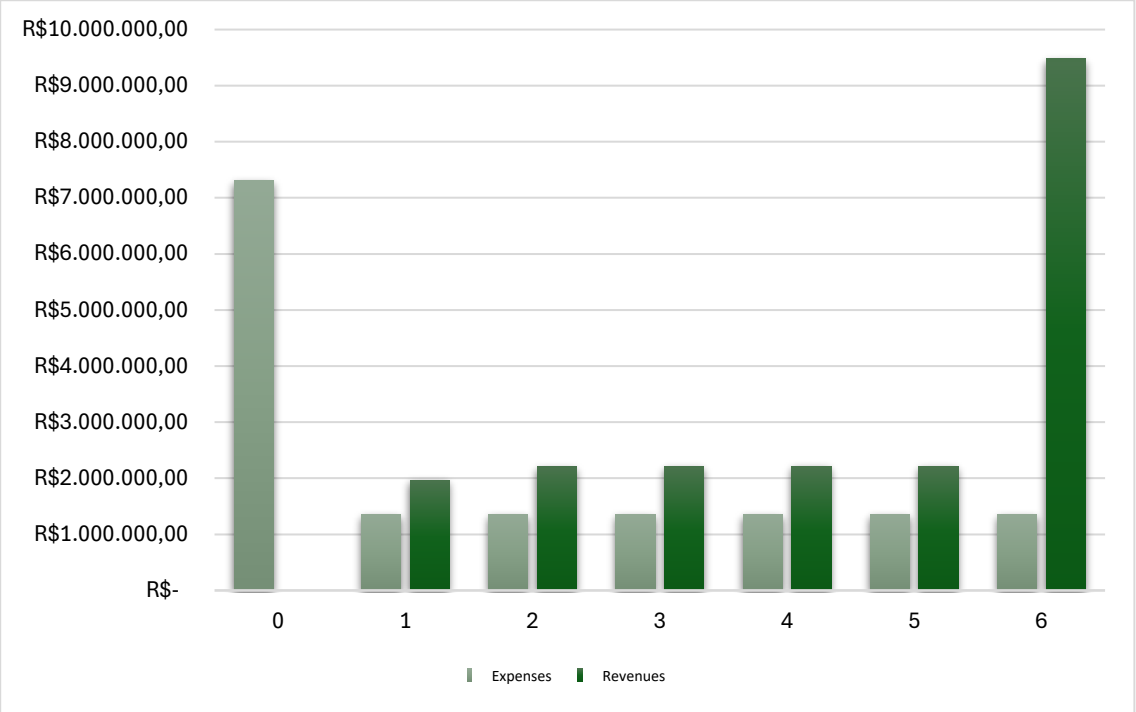
Figure 12

Cash Flow Outflows (Expenses) and Inflows (Revenues)



Source: Prepared by the authors.

Table 4

Cash Flow between Year 0 and Year 3

Description	Year 0	Year 1	Year 2	Year 3
Expenditures	R$ 7.307.792,80	R$ 1.350.624,46	R$ 1.350.569,76	R$ 1.350.340,06
Revenues	-	R$ 1.967.429,67	R$ 2.206.064,57	R$ 2.208.936,21
Gross Profit	-R$ 7.307.792,80	R$ 616.805,21	R$ 855.494,81	R$ 858.596,15
Individual Income Tax [IRPF]	-	R$ 158.869,43	R$ 224.509,07	R$ 225.361,94
Net Profit (Future Value)	-R$ 7.307.792,80	R$ 457.935,78	R$ 630.985,74	R$ 633.234,21
Accumulated Future Value	-R$ 7.307.792,80	-R$ 6.849.857,02	-R$ 6.218.871,29	-R$ 5.585.637,08
Cash Flow (Present Value)	-R$ 7.307.792,80	R$ 420.124,57	R$ 531.088,07	R$ 488.973,00
Accumulated Present Value	-R$ 7.307.792,80	-R$ 6.887.668,23	-R$ 6.356.580,16	-R$ 5.867.607,17

Source: Prepared by the authors.

Table 5

Cash Flow between Year 4 and Year 6

Description	Year 4	Year 5	Year 6
Expenditures	R$ 1.350.110,36	R$ 1.349.880,66	R$ 1.349.650,96
Revenues	R$ 2.211.951,44	R$ 2.215.117,43	R$ 9.476.000,09
Gross Profit	R$ 861.841,08	R$ 865.236,77	R$ 8.126.349,13
Individual Income Tax [IRPF]	R$ 226.254,30	R$ 227.188,11	R$ 228.165,46
Net Profit (Future Value)	R$ 635.586,78	R$ 638.048,66	R$ 7.898.183,67
Accumulated Future Value	-R$ 4.950.050,29	-R$ 4.312.001,64	R$ 3.586.182,04
Cash Flow (Present Value)	R$ 450.265,70	R$ 414.687,85	R$ 4.709.428,86

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Accumulated Present Value	-R$ 5.417.341,47	-R$ 5.002.653,62	-R$ 293.224,75

Source: Prepared by the authors.

3.6 ECONOMIC VIABILITY INDICATORS

Table 6 presents the economic viability indicators calculated for the present study. It is noteworthy that the Net Present Value (NPV) was positive and the Internal Rate of Return (IRR) exceeded the Minimum Attractive Rate of Return (MARR) established for the project. Based on these results, from a deterministic perspective, the project is considered economically viable. Additionally, the project's discounted payback period is six years, matching the project's execution period.

Table 6

Economic viability indicators of the project

Description	Value
Net Present Value (NPV)	R$ 38.488,02
Internal Rate of Return (IRR)	8,11%
Discounted Payback	6 years
Profitability Index (PI)	1,005

Source: Prepared by the authors.

It is important to note that this study did not take into account the cost of capital of the rural property, even though it constitutes part of the producer's assets. This decision was made because, in recent decades, throughout most of Brazil, especially in the MATOPIBA region, the price per hectare has shown considerable appreciation. Therefore, given this asset appreciation, the need to account for the cost of capital is nullified.

However, to complement the analysis, land lease expenses were added to the production costs, with the purpose of assessing the impact of renting land on the viability indicators. For this calculation, a value of R$ 50.00 per AU/month was considered, based on local market research. Table 6 shows the impact of leasing on the viability indicators. The results demonstrate that, if the project were carried out on rented rural land, it would not be economically viable, since the NPV becomes negative and the IRR falls below the MARR.

Table 7

Economic viability indicators of the project considering land leasing

Description	Value
Net Present Value (NPV)	-R$ 3.522.909,13
Internal Rate of Return (IRR)	-2,34%

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Discounted Payback	-
Profitability Index (PI)	0,51

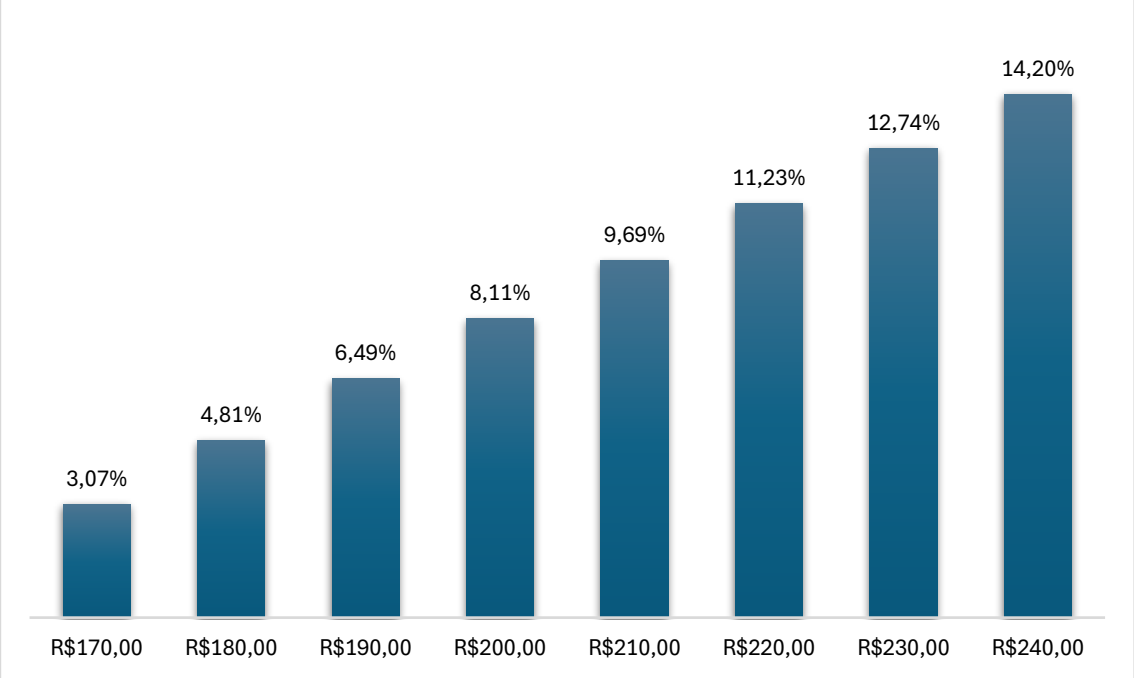
Source: Prepared by the authors.

3.7 SENSITIVITY ANALYSIS

To complement this study, a sensitivity analysis was conducted by varying the price of the cattle *arroba* (a variable that directly affects the project's main revenues) and measuring its impact on the IRR (Figure 13) and NPV (Figure 14). In both cases, the cattle *arroba* price was varied between R$ 170.00 and R$ 240.00.

Figure 13

Variation of the Internal Rate of Return (IRR) as a function of the cattle arroba value



Source: Prepared by the authors.

Based on the sensitivity analysis, considering only variations in the price of the cattle *arroba*, it was identified that the project is economically viable if the average real price throughout the project is at least R$ 199.30. In other words, if the price remains above this value, the IRR will exceed the MARR and the NPV will be positive. Figure 14 provides a more detailed visualization of the NPV fluctuations.

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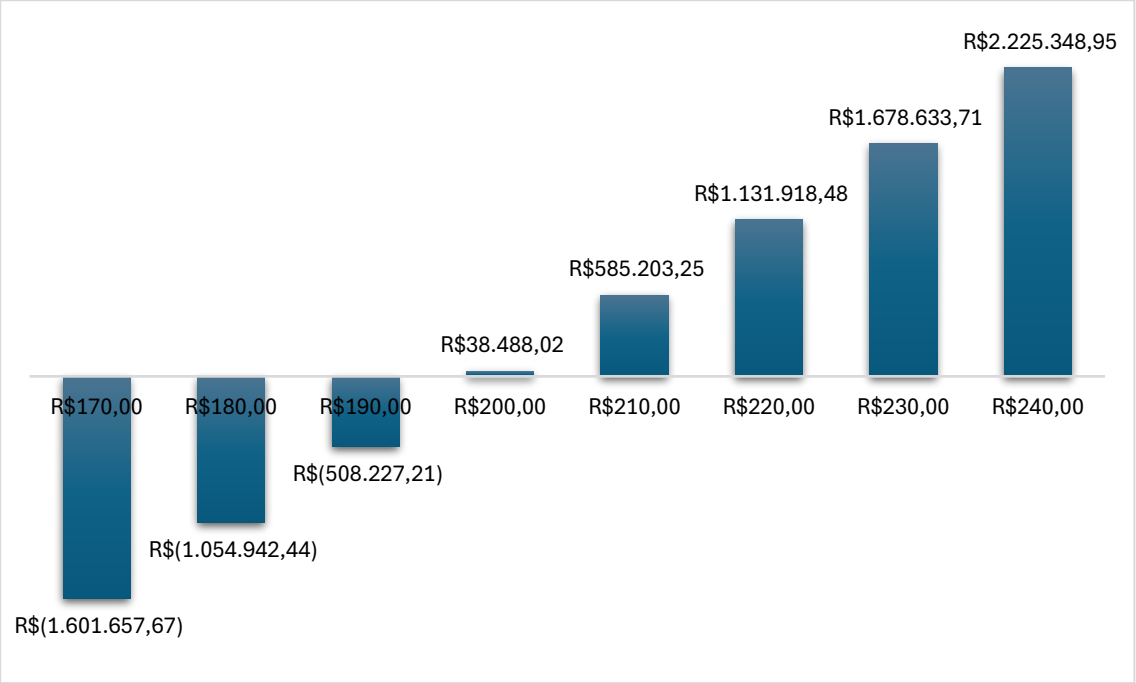
Figure 14

Variation of Net Present Value (NPV) as a function of the cattle arroba value



Source: Prepared by the authors.

4 CONCLUSION

Based on the results presented, beef cattle production in the breeding phase is considered economically viable for the case study in question. This conclusion was reached after analyzing the main profitability indicators evaluated in this study (NPV and IRR), which proved to be favorable within the context examined.

Considering the investor's profile for this project, the execution of the activity presents an attractive level of feasibility. Although beef cattle breeding is not among the most profitable agribusiness activities at the farm level, the project can be regarded as a strategy for diversifying the investor's capital (asset) risk. In this sense, the profitability results presented for the activity are acceptable.

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