UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ
PROGRAMA DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO
MESTRADO PROFISSIONAL

WESTERN PARANÁ STATE UNIVERSITY
PROFESSIONAL MASTER'S IN ADMINISTRATION

Viabilidade financeira de uma granja produtora de ovos, pintainhos e ração: estudo de caso

Financial viability of an egg, chick and feed producing farm: case study

[TRADUÇÃO INGLESA]

NESTOR ELIAS LANGE

CASCAVEL/PR

2024

Nestor Elias Lange

Viabilidade financeira de uma granja produtora de ovos, pintainhos e ração: estudo de caso

Financial viability of an egg, chick and feed producing farm: case study

[TRADUÇÃO INGLESA]

Dissertation presented in partial fulfilment of the requirements for the degree of Master of Science in Administration in the Department of Administration, Western Paraná State University. Dissertation Supervisor: Dr. Ronaldo Bulhões

Dissertação apresentada ao Programa de Pós-Graduação em Administração (PPGAdm) – Mestrado Profissional da Universidade Estadual do Oeste do Paraná, como requisito parcial para obtenção do grau de Mestre em Administração.
Orientador: Professor Dr. Ronaldo Bulhões

CASCAVEL/PR

2024

Ficha de identificação da obra elaborada através do Formulário de Geração Automática do Sistema de Bibliotecas da Unioeste.

LANGE, NESTOR ELIAS
Viabilidade financeira de uma granja produtora de ovos, pintainhos e ração: estudo de caso / NESTOR ELIAS LANGE; orientador RONALDO BULHÕES. -- Cascavel, 2024.
89 p.

Dissertação (Mestrado Profissional Campus de Cascavel) -- Universidade Estadual do Oeste do Paraná, Centro de Ciências Sociais Aplicadas, Programa de Pós-Graduação em Administração, 2024.

1. Viabilidade . 2. Financeira. 3. Pintainhos . 4. Ovos. I. BULHÕES, RONALDO, orient. II. Título.

unioeste
Universidade Estadual do Oeste do Paraná
Reitoria
CNPJ 78.680.337/0001-84
Rua Universitária, 1619, Jardim Universitário
Tel.: (45) 3220-3000 - www.unioeste.br
CEP: 85819-110 - Cx. P.: 701
Cascavel - PARANÁ

PARANÁ
GOVERNO DO ESTADO

Programa de Pós-Graduação em Administração

ATA DA DEFESA PÚBLICA DA DISSERTAÇÃO DE MESTRADO DE NESTOR ELIAS LANGE, ALUNO(A) DO PROGRAMA DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO DA UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ - UNIOESTE, E DE ACORDO COM A RESOLUÇÃO DO PROGRAMA E O REGIMENTO GERAL DA UNIOESTE.

Ao(s) 6 dia(s) do mês de agosto de 2024 às 14h00min, na modalidade remota síncrona, por meio de chamada de videoconferência, realizou-se a sessão pública da Defesa de Dissertação do(a) candidato(a) Nestor Elias Lange, aluno(a) do Programa de Pós-Graduação em Administração - nível de Mestrado, na área de concentração em Competitividade e Sustentabilidade. A comissão examinadora da Defesa Pública foi aprovada pelo Colegiado do Programa de Pós-Graduação em Administração. Integraram a referida Comissão os(as) Professores(as) Doutores(as): Marcelo Roger Meneghatti, Ronaldo Bulhões, Sergio Luiz Kuhn, Tiago Fernando Hansel. Os trabalhos foram presididos pelo(a) Ronaldo Bulhões. Tendo satisfeito todos os requisitos exigidos pela legislação em vigor, o(a) aluno(a) foi admitido(a) à Defesa de DISSERTAÇÃO DE MESTRADO, intitulada: "Viabilidade Financeira de uma Granja Produtora de Ovos, Pintainhos e Ração: Estudo de Caso". O(a) Senhor(a) Presidente declarou abertos os trabalhos, e em seguida, convidou o(a) candidato(a) a discorrer, em linhas gerais, sobre o conteúdo da Dissertação. Feita a explanação, o(a) candidato(a) foi arguido(a) sucessivamente, pelos(as) professores(as) doutores(as): Marcelo Roger Meneghatti, Sergio Luiz Kuhn, Tiago Fernando Hansel. Findas as arguições, o(a) Senhor(a) Presidente suspendeu os trabalhos da sessão pública, a fim de que, em sessão secreta, a Comissão expressasse o seu julgamento sobre a Dissertação. Efetuado o julgamento, o(a) candidato(a) foi **aprovado(a)**. A seguir, o(a) Senhor(a) Presidente reabriu os trabalhos da sessão pública e deu conhecimento do resultado. E, para constar, o(a) Coordenador(a) do Programa de Pós-Graduação em Administração, da Universidade Estadual do Oeste do Paraná – UNIOESTE - Campus de Cascavel, lavra a presente ata, e assina juntamente com os membros da Comissão Examinadora e o(a) candidato(a).

gov.br Documento assinado digitalmente
RONALDO BULHOES
Data: 16/08/2024 09:53:29-0300
Verifique em https://validar.iti.gov.br

Orientador(a) - Ronaldo Bulhões
Universidade Estadual do Oeste do Paraná - Campus de Cascavel (UNIOESTE)

gov.br Documento assinado digitalmente
MARCELO ROGER MENEGHATTI
Data: 14/08/2024 17:45:59-0300
Verifique em https://validar.iti.gov.br

Marcelo Roger Meneghatti
Universidade Estadual do Oeste do Paraná - Campus de Cascavel (UNIOESTE)

unioeste
Universidade Estadual do Oeste do Paraná
Reitoria
CNPJ 78.680.337/0001-84
Rua Universitária, 1619, Jardim Universitário
Tel.: (45) 3220-3000 - www.unioeste.br
CEP: 85819-110 - Cx. P.: 701
Cascavel - PARANÁ

PARANÁ
GOVERNO DO ESTADO

Programa de Pós-Graduação em Administração

ATA DA DEFESA PÚBLICA DA DISSERTAÇÃO DE MESTRADO DE NESTOR ELIAS LANGE, ALUNO(A) DO PROGRAMA DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO DA UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ - UNIOESTE, E DE ACORDO COM A RESOLUÇÃO DO PROGRAMA E O REGIMENTO GERAL DA UNIOESTE.

Documento assinado digitalmente
gov.br
SERGIO LUIZ KUHN
Data: 21/08/2024 13:46:16-0300
Verifique em https://validar.iti.gov.br

Sergio Luiz Kuhn
Universidade Tecnológica Federal do Paraná (UTFPR)

Documento assinado digitalmente
gov.br
TIAGO FERNANDO HANSEL
Data: 14/08/2024 08:36:44-0300
Verifique em https://validar.iti.gov.br

Tiago Fernando Hansel
Universidade Estadual do Oeste do Paraná - Campus de Foz do Iguaçu (UNIOESTE)

Documento assinado digitalmente
gov.br
NESTOR ELIAS LANGE
Data: 14/08/2024 23:05:44-0300
Verifique em https://validar.iti.gov.br

Nestor Elias Lange
Aluno(a)

Documento assinado digitalmente
gov.br
IVANO RIBEIRO
Data: 22/08/2024 17:30:02-0300
Verifique em https://validar.iti.gov.br

Coordenador(a) do Programa de Pós-Graduação em Administração

DEDICATION

I dedicate this work first and foremost to God, for being essential in my life, the author of my destiny, my guide, and a present help in times of distress; to my wife Iara Maria Lange; and to my children Dayélis Nayara Lange and Lothar Matheus Lange, for their support and understanding, who spared no effort for me to reach this stage of my life.

ACKNOWLEDGMENTS

I would like to thank my friends Mr. Josue Soares Coelho, Mrs. Adriana Ackermann Coelho, Mr. Itamar Ackermann, and Mrs. Luci Terezinha Sviserski Ackermann, who believed in me and placed their trust in me.

I am grateful to my colleague and supervisor, Mrs. Sue Liza Seefeld Saatkamp, for always allowing me to take time off to engage in my master's activities, for her support, trust, flexibility, and balance in handling daily challenges.

I extend my thanks to my friend and supervising professor, Dr. Ronaldo Bulhões, who guided me with patience and wisdom, helping me refine my critical thinking and develop this research. His tips and advice were undoubtedly essential for the study.

I also thank my professors and colleagues for the moments and knowledge shared, especially my colleague Ricardo Schrattner for our collaborative work and for alternating our nightly trips to the university.

Finally, I thank all the research participants, whose contributions were essential for the realization of this study. Without your collaboration, this work would not have been possible.

RESUMO

Lange, Nestor Elias (2024). Viabilidade financeira de uma granja produtora de ovos, pintainhos e ração: estudo de caso (Dissertação). Programa de Pós-Graduação em Administração (PPGA), Universidade Estadual do Oeste do Paraná – UNIOESTE, Cascavel, PR, Brasil.

Este trabalho teve como objetivo analisar a viabilidade financeira da produção de ovos, criação de pintainhos e fabricação de ração na Granja X. A metodologia empregada envolveu a coleta de dados na Granja X, que foram analisados utilizando os métodos de matemática financeira VPL, IL, TIR e *Payback*. A coleta de dados ocorreu entre março e abril de 2023. Os resultados apontaram para a viabilidade financeira das atividades da Granja X, sendo que a produção de ovos, a criação de pintainhos e a fabricação de ração mostraram-se promissoras em termos de retorno financeiro. Para projetos futuros, recomenda-se priorizar a implementação de sistemas de registro e monitoramento das transações financeiras e de custos, simplificando assim a condução de análises de viabilidade financeira.

Palavras-chave: Financeira; Gestão; Estratégia; Avicultura;

ABSTRACT

Lange, Nestor Elias (2024). Financial viability of an egg, chick and feed producing farm: case study (Dissertation). Postgraduate Program in Administration (PPGA), Western Paraná State University – UNIOESTE, Cascavel, PR, Brasil.

This study aimed to analyze the financial feasibility of egg production, chick rearing, and feed manufacturing at Granja X. The methodology employed involved data collection at Granja X, which was analyzed using financial mathematics methods such as NPV, PI, IRR, and Payback. Data collection took place between March and April 2023. The results indicated the financial viability of Granja X's activities, with egg production, chick rearing, and feed manufacturing showing promise in terms of financial return. For future projects, it is recommended to prioritize the implementation of systems for recording and monitoring financial transactions and costs, thereby simplifying the financial feasibility analysis process.

Keywords: Financial; Management; Strategy; Aviculture;

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

ABPA	Associação Brasileira de Proteína Animal (Brazilian Association of Animal Protein)
FC	Fluxo de Caixa (Cash Flow)
IL	Índice de Lucratividade (Profitability Index)
ONU	Organização da Nações Unidas (United Nations Organization)
TIR	Taxa Interna de Retorno (Internal Rate of Return)
TIR-M	Taxa Interna de Retorno Modificada (Modified Internal Rate of Return)
TMA	Taxa Mínima de Atratividade (Minimum Acceptable Rate of Return)
VPL	Valor Presente Líquido (Net Present Value)

SUMMARY

1 INTRODUCTION

Poultry farming, specifically for egg production, is an activity experiencing continuous growth in both the global and Brazilian markets, thanks to investment in genetic improvement of hybrid birds and technology (Albino et al., 2014). According to data released by the Brazilian Association of Animal Protein (ABPA, 2021), Brazilian egg production exceeded 53 billion units in 2020, with national consumption reaching 251 eggs per capita.

In Brazil, egg production plays an important role in the social and economic development of the country, as it is generally produced on small farms (Albino et al., 2014). Within the context of Brazilian egg production, the western region of Paraná stands out for its production, job creation, and income generation through rural establishments. In this region, there are both integrated egg producers (who receive support from integrators) and autonomous producers who operate independently.

The financial analysis of rural properties, as well as the feasibility of investments in rural areas, allows managers to identify the time required for return on investment, forecast cash flow generation, and compare the performance across various activities. As in any business or enterprise, in rural areas, the feasibility and shorter return on invested capital should be key factors for managers to analyze (Kruger et al., 2017).

In this context, optimizing revenue and costs is crucial to achieving greater efficiency on a rural property, particularly for properties with layer hens. According to Andriguetto (1983), the energy-to-protein ratio must be tailored to different development stages. Prado (2016) further adds that eggs are produced by layer hens in poultry farming, where quality can be influenced by various factors, including nutritional and environmental conditions, management practices, and infrastructure.

This is the case for Granja X, an autonomous egg producer since 2001, located in the municipality of Céu Azul, PR. In addition to egg production, in 2018, the farm began developing other activities directly related to egg production: raising chicks and producing its own feed for in-house use.

The rearing and pullet stages of layer hens encompass the period from receiving day-old chicks until they begin laying eggs at around 18 weeks, with feed being the primary cost component. These stages are extremely important, as they determine the animal's full productive potential during the egg-laying period. Other significant costs include chick

acquisition and labor. Additional costs comprise energy, packaging, storage, specialized labor, fuel, maintenance, and more.

Given these developments, the new activities have led to increased infrastructure requirements for machinery, equipment, labor, and, most importantly, costs. This new structure demands more time from the owners and requires better financial control. The farm's approach to financial control essentially involves monitoring inflows and outflows in its bank accounts and internally recording these transactions. This control is periodically performed using bank statements, various notes, and disconnected control spreadsheets. A financial management system is in place, although it is outdated, lacks full integration of the developed activities, and is poorly maintained.

Regarding spreadsheets for tracking inflows and outflows, forecasting transactions, and noting completed payments, different spreadsheets are used for similar records. Despite archived records in different formats, many figures had to be averaged throughout the year due to difficulty in obtaining accurate data.

Finally, the farm lacks separate controls for its three activities and is unaware of whether the investments made are yielding financial returns. According to Zago et al. (2009), financial feasibility analysis emerges as an appropriate tool since it assesses the profitability and stability of investments. Thus, evaluating the investments made at Granja X becomes relevant to determine if the results indicate a positive return.

1.1 THE RESEARCH PROBLEM

Layer poultry farming has shown continuous growth in both the global and Brazilian markets, driven by investments in the genetic improvement of hybrid birds and technology (Albino et al., 2014). According to data from the Brazilian Association of Animal Protein (ABPA, 2021), Brazilian egg production exceeded 53 billion units in 2020, with national consumption reaching 251 eggs per capita.

In Brazil, egg production plays a crucial role in social and economic development, as it is often carried out on small farms (Albino et al., 2014). The western region of Paraná stands out in this scenario, not only for high egg production but also for the creation of jobs and income in rural areas. In this region, there are both integrated producers, who receive assistance from integrators, and autonomous producers, who manage their own operations.

Investment and expense control and planning are essential for the financial viability of rural properties (Marion, 2012). Financial analysis of these properties and investment feasibility evaluation allow managers to identify the time required for return on investment, project cash flow, and compare the performance of different activities. As with any business, in rural areas, feasibility and quick capital return are crucial factors for decision-making (Kruger et al., 2017).

In this context, optimizing revenue and costs is critical for the efficiency of rural properties, especially those raising layer hens. According to Andriguetto (1983), the energy-to-protein ratio in feed must be appropriate for the different developmental stages of birds. Additionally, Prado (2016) emphasizes that egg quality can be influenced by various factors, such as nutritional and environmental conditions, management practices, and infrastructure.

A practical example is Granja X, located in Céu Azul, PR, which has been operating as an autonomous egg producer since 2001. In 2018, the farm expanded its activities to include raising its own chicks and producing feed for its own use. The rearing and pullet stages for layer hens, from receiving the chicks until they begin laying, are critical for the animals' productive potential, with feed being the primary cost in these stages. Other important costs include chick acquisition, labor, energy, packaging, storage, fuel, and maintenance.

With the implementation of these new activities, Granja X increased its infrastructure for machinery, equipment, and labor, which also resulted in higher operational costs. This growth requires more time and greater financial control from the owners. The current financial control at the farm involves monitoring bank account inflows and outflows and internally recording these transactions periodically using bank statements, notes, and disconnected control spreadsheets. The financial management system in use is outdated, failing to integrate all developed activities and poorly maintained with information.

The spreadsheets for tracking inflows and outflows, transaction forecasts, and payment records are dispersed and often redundant, making it challenging to obtain accurate data. Additionally, the farm does not separate control of the three activities it carries out, and it is unclear whether the investments are yielding financial returns. In this sense, financial feasibility analysis, as noted by Zago et al. (2009), is an essential tool for evaluating the profitability and solidity of investments. Thus, it is necessary to evaluate the investments made at Granja X to determine if they are generating positive results.

1.2 GOALS

1.2.1 General

To analyze the financial viability of egg production, chick breeding and feed manufacturing at Granja X.

1.2.1 Specific

a) To characterize the activities carried out at Granja X;
b) To Collect and detail the revenues and costs of Granja X's activities;
c) To carry out the financial analysis of the activities carried out at Granja X.

1.3 JUSTIFICATION

Layer poultry farming plays a crucial role in the food industry, providing an essential source of protein for the global population. However, efficient management and economic sustainability of this activity have become increasingly complex challenges. In this context, Granja X stands out by producing eggs, its own feed, and chicks, thereby facing both a significant opportunity and a complex set of financial and economic considerations.

By producing feed and chicks in-house, the farm encounters a certain level of operational complexity. This integration offers advantages in terms of quality and cost but also introduces risks associated with managing multiple operations. A thorough analysis is fundamental to optimizing these processes and ensuring efficient production, as noted by Zago et al. (2009).

To ensure long-term financial viability, it is essential for the enterprise to evaluate the costs and benefits of internally producing feed and chicks. Identifying opportunities for cost reduction, revenue maximization, and efficient resource allocation thus becomes a crucial element, as highlighted by Zago et al. (2009).

Since control over feed and chick quality has a direct impact on egg production, this endeavor helps ensure that quality standards are maintained and improved.

Another significant aspect of this effort for the farm is mitigating risks associated with integrated production. In this regard, financial and economic analysis aids in the development of more effective risk management strategies.

With solid financial data, the farm will be better positioned to make informed and strategic decisions. This involves decisions about investments in technology, expansion, product diversification, or other aspects that affect the business's growth and competitiveness, as emphasized by Taborda (2018).

Thus, the justification of this study contributes to advancing research on layer poultry farming. As noted by Taborda (2018), poultry farming is a strategic sector for Brazilian agribusiness, contributing to new markets, job creation, and the provision of quality products. Ensuring the sustainability and success of an integrated layer farm requires essential information for effective operations management, cost control, risk management, and strategic decision-making. This not only benefits the farm but also contributes to food security and the quality of products offered to consumers, thereby strengthening the farm's position in the poultry market.

1.4 DISSERTATION STRUCTURE

This dissertation is structured as follows: the first chapter contains the introduction, the description of the research problem, the research question, the general and specific objectives, and the justification and structure of the dissertation. The second chapter covers theoretical and practical references from the literature, providing the theoretical framework guiding the study, including topics such as layer poultry farming, Brazilian egg production, financial management, and controls on rural properties, costs and revenues (concepts and applications), cost classification by identification, direct and indirect costs, cost classification by production volume, fixed and variable costs, revenue and expenses, financial feasibility analysis, cash flow, minimum attractive rate, cash flow projection, uncertainty and risk, and risks in layer poultry farming.

The third chapter presents the methodological procedures, including the research design, unit of analysis (Granja X), approach to the problem, data collection procedures, data collection plan, data analysis procedures, net present value, internal rate of return, modified internal rate of return, profitability index, discounted payback, and limitations of the methods and techniques used.

The fourth chapter provides the project context, including the characterization of Granja X. The fifth chapter presents intervention methodologies. The sixth chapter includes the analysis and interpretation of results, covering revenue analysis, variable costs, and contribution margin, analysis of Granja X's fixed costs, a summary of the results, and financial feasibility analysis.

The seventh chapter discusses practical contributions, and finally, the eighth and last chapter presents the final considerations.

2 THEORETICAL AND PRACTICAL REFERENCES

2.1 LAYING POULTRY FARMING

Eggs are widely consumed worldwide and are among the most nutritionally complete foods in human diets. Their nutritional composition, in terms of meeting human needs, is only comparable to human breast milk (Avila & Soares, 2010). They are a natural food source, accessible and packed with high-quality protein, along with essential vitamins, minerals, and a low-calorie profile. Eggs provide a significant reserve of nutrients that promote health and help prevent diseases, with proven antiviral, antibacterial, and immune-modulating properties. In children up to three years old, a daily egg provides approximately 50% of their protein needs, directly linking its consumption to food security (Amaral et al., 2016).

The top 10 egg-producing countries are: China (40%), the United States (8%), India (5%), Japan (3.4%), Mexico (3%), Brazil (3%), Russia (3%), Indonesia (2%), Ukraine (2%), and Turkey (1%). Together, these countries account for about 70% of the world's total egg production. The top consumers include Mexico, Japan, Paraguay, and China, where per capita consumption exceeds 300 eggs annually (Lucas, 2021).

In Brazil, poultry farming started on rural properties, such as small farms, around 1900. However, it was only recognized as a profitable business in 1930, when poultry farming for eggs and meat production gained attention. Thus, Brazil’s poultry farming history dates back to the 1930s, when small farmers began raising free-range chickens (Silva, 2019). Significant professionalization in the poultry sector, however, came in the 1970s with the introduction of advanced techniques in broiler production. Driven by economic opportunities, producers started experimenting with crossbreeding different breeds to improve quality (Lopes, 2011). Eggs, though not new to the market, are attracting new segments for commercialization, including food chains, the food industry, and the fitness sector, reflected in record egg production in Brazil (Silva, 2019).

Layer poultry farming offers vast growth opportunities in both Brazilian and global markets. This sector is a continuously expanding production chain, showing significant year-over-year growth driven by ongoing investments in hybrid bird genetic improvement and technology (Albino et al., 2014).

Commercial egg production encompasses a range of activities, including producing and trading supplies such as vaccines, equipment, disinfectants, and medicines. Current poultry

breeds not only generate direct and indirect employment but also ensure consistent productivity extending over 110 weeks, with laying peaks above 95% if fed a balanced diet, housed in recommended densities, and properly managed (Moraes, 2018).

Commercial egg production represents an extensive production chain within the poultry industry, covering supply production and commercialization, including materials, vaccines, equipment, disinfectants, and medications, among others. These production lines not only create direct and indirect job opportunities but also maintain high productivity over the birds' 110-week lifespan. Birds can reach laying peaks above 95% with a balanced diet and ideal housing conditions, ensuring optimum performance when animals are housed at recommended densities and receive proper management (Moraes, 2018).

Egg-laying hens go through two main life stages: rearing and laying. Hens are not housed together if they are of different ages. The breeding, rearing, and egg production aviaries are separated, reducing disease and mortality rates and facilitating vaccine organization (Silva, 2019).

The egg-laying segment in Brazil has advanced towards better adaptation for egg production conditions. This sector is noted for its ability to reassess, implement, and progress according to domestic and global needs, aiming to provide an ethical, sustainably produced food with unique health characteristics throughout the egg production process (Silva, 2019).

2.2 BRAZILIAN EGG PRODUCTION

The growth of the world population drives demand for affordable foods, such as eggs, recognized not only for their completeness but also as a benchmark in terms of nutrition (Moraes, 2018). Projections indicate that the global population will exceed 8 billion in 2024 and reach 9.5 billion by 2050 (United Nations [UN], 2012).

According to data released by the Brazilian Association of Animal Protein [ABPA], 2021 commercial laying hen production reached approximately 114,637,958 in 2021. This milestone represents a new record for the poultry industry, showing a growth of 31.58% over the past 10 years, with an average annual growth rate of 3.16%.

To improve technical production indicators, specialized commercial brands or poultry lines were developed for egg and meat production by selecting the best available breeds. Aiming to increase production and reduce costs, the industry continuously seeks to improve the

characteristics of individual lines, eliminating undesirable hereditary traits from the genotype and prioritizing those considered beneficial (Lopes, 2011).

The main lines of laying hens are Lohman, Isa, Hy-Line, and Hissex. Regardless of the type of line, the breeder must choose the type of bird to be raised to sell white and brown eggs. Light layers produce white eggs, while heavy layers produce brown eggs. In selecting a line, it is essential to consider that laying hens should have a low mortality rate and produce a high number of eggs per year (Semagro, 2015). Data on Brazil's production of housed commercial laying hens (heads) are presented in Figure 1.

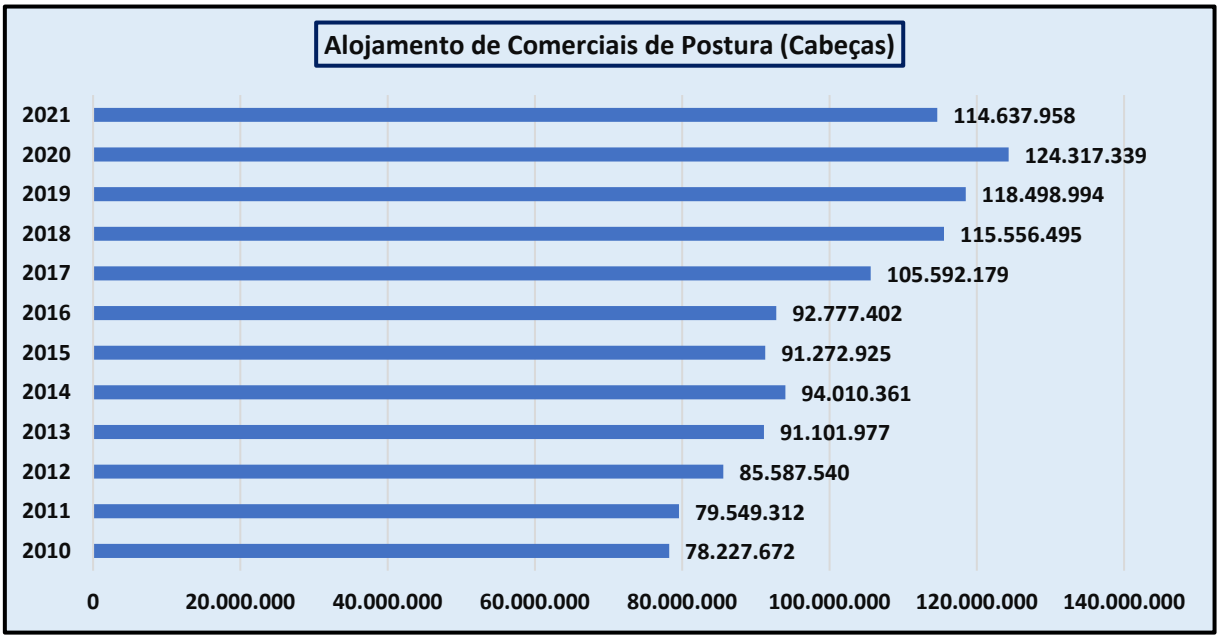

Figure 1. Chart of Commercial Laying Hens Housing (Heads).
Source: Adapted from ABPA data (2022).

Figure 1 presents annual data on housed commercial laying hens, measured in number of heads, from 2010 to 2021, with information provided by the Brazilian Association of Animal Protein [ABPA] (2022). In this figure, 2015 marks a reversal in the growth trend, with a significant decrease in the number of housed heads. This drop could be the result of various factors, such as adverse weather conditions, health challenges in the poultry sector, or shifts in market preferences.

The period between 2018 and 2021 showed a consistent growth trend. This increase can be attributed to several positive factors, such as investments in technology, improvements in animal health management, or expansion of consumer markets.

Analysis of the data in Figure 1 shows that the commercial laying sector experienced fluctuations over the years but maintained an overall growth trend. The sector's resilience in the face of health and climate challenges highlights its importance and demonstrates the adaptability and innovation capacity of Brazil's commercial poultry industry.

Production intensification has been made feasible through the modernization of conventional tools and mechanization, improving production processes, enhancing food distribution, ensuring adequate water supply, optimizing egg collection, and implementing proper waste management practices that improve hygiene (Reis, 2019).

With advances in genetic improvement and the modernization of egg production systems, there is a continuous search for information and innovative changes in systems working with commercial layers (Oliveira Filho, 2018). According to Moura (2018), Brazil has shown a steady increase in egg consumption and production.

Egg consumption has risen in recent years (Duarte & Cavichioli 2017), driven by diverse forms of consumption as well as other food production uses. Laying poultry farming is developing and gradually increasing egg production in Brazil, linked to different breeding and production practices (Silva et al., 2019).

Brazilian production data for commercial laying eggs (units) are presented in Figure 2.

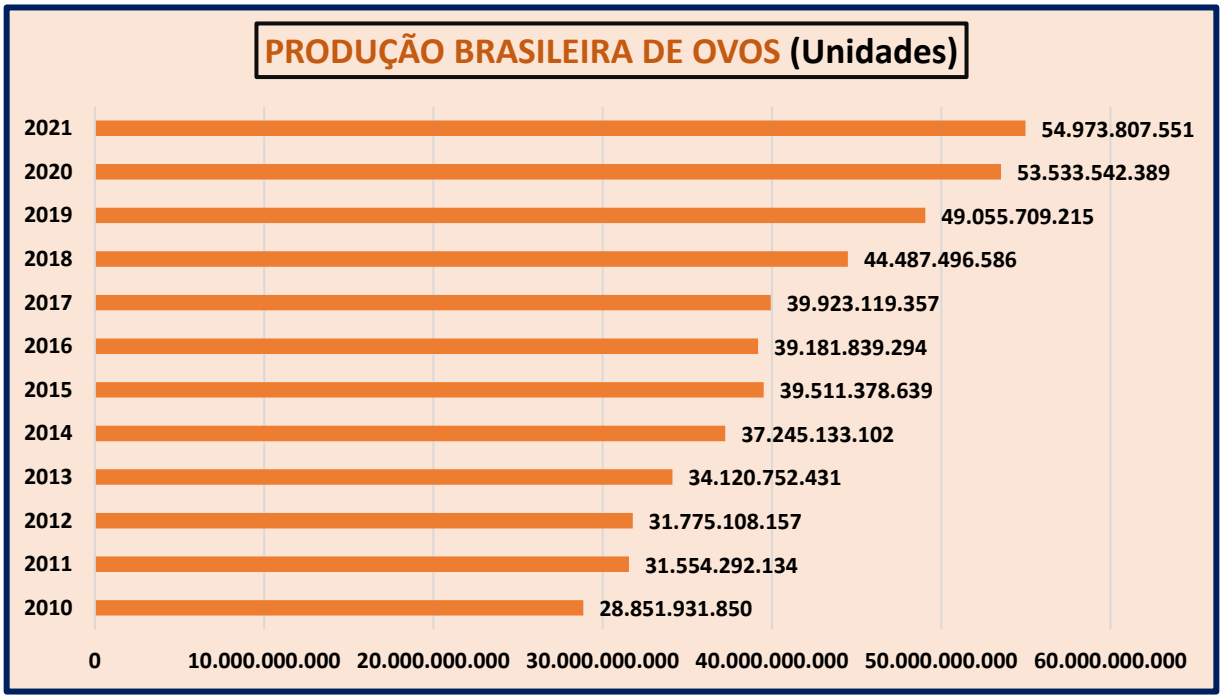

Figure 2. Chart of Brazilian Egg Production (Units).
Source: Adapted from ABPA data (2022).

Figure 2 presents annual data on Brazilian egg production, expressed in units, from 2010 to 2021, with information provided by the Brazilian Association of Animal Protein [ABPA] (2022). According to Figure 2, egg production in Brazil experienced continuous growth over the years, highlighting the importance and resilience of the poultry sector. The gradual increase from 28.8 billion in 2010 to 54.9 billion in 2021 represents a notable doubling over the decade.

Despite some fluctuations, especially in 2015 and 2016, production remained relatively stable. This stability can be attributed to a combination of factors, such as improvements in production technology, efficient management practices, and adaptation to market conditions.

Analysis of the data in Figure 2 reveals a positive outlook for egg production in Brazil, emphasizing steady growth and the sector's resilience. Brazil's commercial poultry industry demonstrates its ability to respond to challenges and opportunities, remaining a vital component of both the economy and the global animal protein market.

According to Figure 2, Brazilian egg production increased from approximately 29 billion in 2010 to around 55 billion in 2021, of which, according to ABPA (2022), 99.54% was destined for the domestic market, as seen in Figure 3.

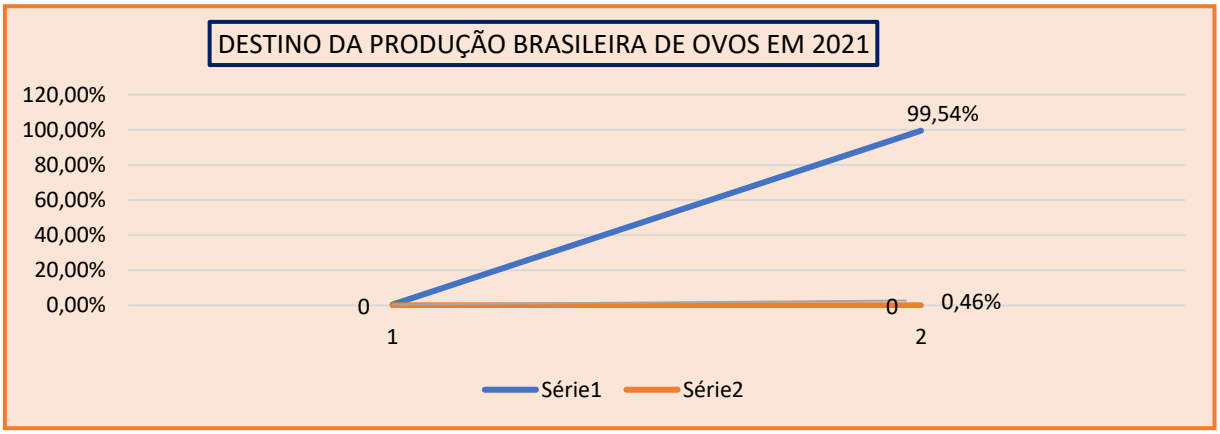

Figure 3. Chart of the Destination of Brazilian Egg Production.
Source: Adapted from ABPA data (2022).

The per capita egg consumption in Brazil (units/person/year) increased from 148 to 257 between 2010 and 2021. From 2010 to 2021, per capita egg consumption among Brazilians continued to rise, reaching 257 eggs (ABPA, 2022). This increase can be attributed to the fact that eggs are a less costly food source compared to other proteins. Data on per capita consumption of commercial laying eggs (units/person) are presented in Figure 4.

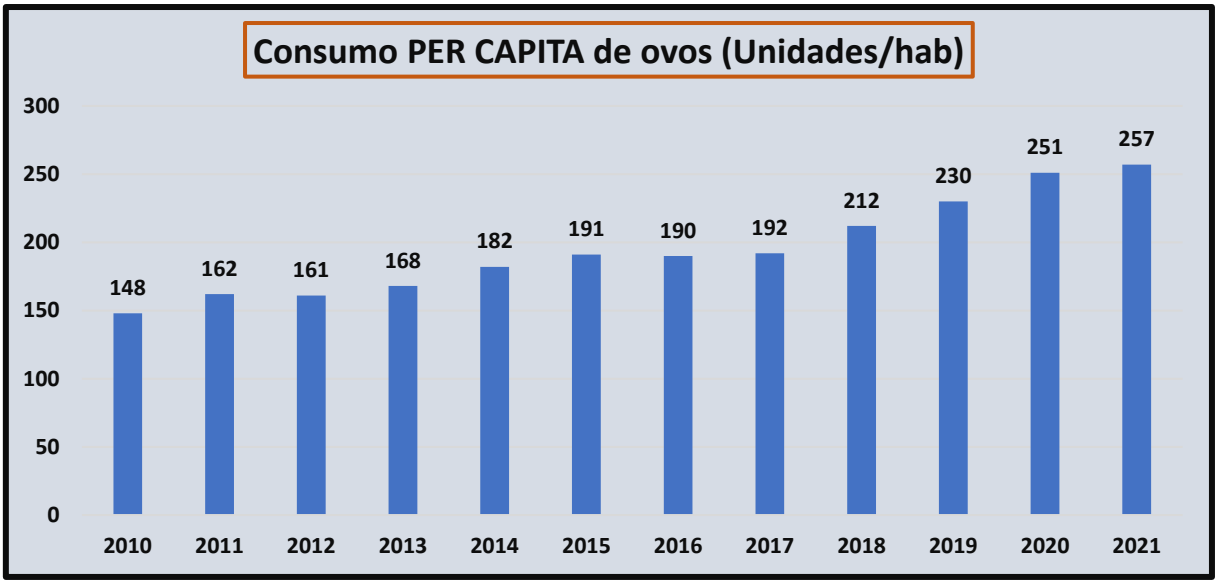

Figure 4. Chart of *Per Capita* Egg Consumption (Units/inhabitant)
Source: Adapted from ABPA data (2022).

Figure 4 presents annual data on per capita egg consumption in Brazil, measured in units per inhabitant, from 2010 to 2021, with information provided by the Brazilian Association of Animal Protein [ABPA] (2022). The data reveal a steady growth in per capita egg consumption throughout the decade. The increase from 148 units per inhabitant in 2010 to 257 units in 2021 highlights a positive shift in dietary habits, indicating a growing preference for eggs as a source of protein.

Several factors may have contributed to this increase, such as increased awareness of the nutritional benefits of eggs, educational campaigns promoting a healthy diet, and the economic accessibility of the product, all of which could have played significant roles in this growth.

The observed growth up to 2021 suggests ongoing potential for market expansion in the Brazilian egg industry. The rise in per capita consumption presents an opportunity for the poultry industry to explore marketing strategies and innovations in egg-derived products to meet the evolving demands of consumers.

Analysis of per capita egg consumption data reveals a positive trend, indicating a growing preference for eggs in the diets of Brazilians. The poultry sector has the opportunity to capitalize on this continuous growth by adapting to consumer preferences and promoting the nutritional benefits of eggs.

In conclusion, it can be stated that despite the reduction in housed laying hens in 2021, egg production still experienced a growth of around 2.62%. Additionally, there was an increase in domestic egg consumption, rising from 251 units in 2020 to 257 units in 2021.

2.3 FINANCIAL MANAGEMENT AND CONTROLS ON RURAL PROPERTY

The objective of financial management and controls on properties, according to Marion (2012), is to examine, oversee, plan, and control the assets of entities through the recording and analysis of events, as well as the determination of profit or loss.

One way to achieve this control is through accounting records, which become an important ally in decision-making and business management, applicable to both legal entities and individuals. Accounting focused on the rural sector aims to assist in measurement, control, and planning, with the goal of managing the assets of rural entities and enabling the analysis of results (Kruger et al., 2014; & Kruger et al., 2015).

Among the purposes of accounting controls, the following can be highlighted: guiding operations carried out in the rural sector; the ability to measure the performance of each productive activity individually; supporting decision-making regarding investments or resource needs; controlling financial transactions; conducting comparative analysis of results; and assisting in controlling personal expenses and providing information for income tax (Crepaldi, 2011). According to Zanin et al. (2015) and Kruger et al. (2014), accounting applied in the rural sector is an important tool for control and planning, making its use and recognition essential by managers of rural production units.

In the development of rural activities, especially in entities with family structures, where the owner of the rural property is often also the administrator, the accounting principle becomes relevant for separating family expenses from those of the business (Dal Magro et al., 2016). Accounting records also aid in the financial and economic analysis of the property.

Financial and economic viability helps determine whether a particular activity will yield a return on investment and generate profit. Furthermore, if executed in a planned manner, it can ensure the continuity of the business. For Greca et al. (2014), applying financial and economic viability analysis is essential, as it allows for the evaluation of whether the invested capital will return and helps identify whether investment conditions are favorable. There are several indicators that can assist in this process, including the Internal Rate of Return (IRR), Minimum Attractive Rate (MAR), Net Present Value (NPV), and Payback period.

Economic and financial indicators aim to evaluate and interpret the performance of a given organization. However, special attention is needed to analyze them prudently. The relevance of these indicators lies in demonstrating the economic and financial reality of the entity to its managers (Diel et al., 2014). Economic viability considers the time value of money and opportunity costs, meaning that when investing in a particular activity, it is necessary to compare it with others to see if it will yield higher profitability. Financial viability, on the other hand, shows whether the activity will result in profit or loss and how long it will take to recover the investment. Thus, it becomes apparent that economic viability presents results closer to the projected perspective.

In general terms, this process can become more efficient when there is effective control over costs and revenues to assist in the administration and management of the enterprise.

2.4 COSTS AND REVENUES: CONCEPTS AND APPLICATIONS

Costs refer to the expenditures associated with the production of a specific good or service or the acquisition of a good or service intended for the manufacture of another good. In other words, they encompass all expenses incurred during the process of creating a product, being classified as costs only at the moment of their use, as highlighted by Megliorini (2001).

According to Ferreira (2007), cost can be understood as a type of expenditure that is recognized as such at the moment when the production factors (goods or services) are actually utilized in the manufacturing of a product or the execution of a service. When raw materials are purchased with the intent of transforming them into merchandise, they only become a cost at the moment of use; prior to that, they are considered an investment.

Costs exhibit a variety of behaviors and can vary depending on the activities performed. The classification of costs occurs based on different criteria, such as variations in production volume, methods of identification, and product allocation, among others. In this context, costs can be categorized as direct, indirect, fixed, and variable.

2.4.1 Classification of Costs Based on Identification.

Costs can be classified according to their nature, as direct and indirect, or fixed and variable.

2.4.1.1 Direct costs

The elements of production costs can be categorized according to their identification, being divided into direct costs and indirect costs.

Direct costs are readily identifiable and do not require allocation criteria. They relate to the method of identification and appropriation of products, allowing for direct and simple attribution. They can be controlled through individual measurements and controls, enabling assessment concerning a specific activity or product (Wernke, 2005).

More broadly, direct costs are those that can be directly attributed (without the need for allocation) to the product, requiring only a unit of measurement for consumption. An illustrative example of these direct costs is direct labor, where workers are directly employed in the production of a specific commodity (Crepaldi, 2009).

It is important to note that in situations where only one product is being manufactured, all costs are considered direct. Therefore, the distinction between direct and indirect costs becomes relevant only when it involves two or more products (Ferreira, 2007).

Crepaldi (2009) provides an illustrative example of a direct cost: in a rural property, the acquisition of inputs for planting represents direct costs, as the quantity and location of use are clearly identifiable.

It is observed that direct costs are easily associated with the product. When it is possible to identify the amount of expenditure used per product, it is considered a direct cost. If it is not feasible to identify the amount of expenditure attributed to the product, it is characterized as an indirect cost (Megliorini, 2001).

2.4.1.2 Indirect costs

Indirect costs encompass expenses related to indirect materials and are not directly incorporated into production. Generally, it is challenging to associate them directly with a product, necessitating the application of some allocation criterion for their aggregation. Examples of indirect costs include administrative expenses and indirect labor (Martins, 2003).

For these costs to be part of the production process, they must be subjected to an allocation criterion, which involves calculations or estimates for their distribution across different products. The parameter used to estimate the amount of expenditure attributed to each product is referred to as the allocation base or criterion (Crepaldi, 2006).

The allocation criterion is applied to expenditures incurred in the production process that do not have a direct relationship with the manufactured product or provided service, as they are associated with multiple products during the same time period (Wernke, 2005).

The allocation criterion for these indirect costs must consider the nature of the operation. For instance, in agricultural activities, costs such as labor, fuel, maintenance, and repair of machinery, among others, are classified as indirect costs.

In this context, the allocation base can be established concerning the number of hectares of each crop (Armelin Filho, 2011). Indirect costs lack a direct method of identification; all costs not attributed to a specific crop are accumulated until the end of the period, at which point the appropriate allocation criterion for the different crops is applied.

2.4.2 Classification of Costs According to the Volume Produced

2.4.2.1 Fixed costs

The terms fixed costs and variable costs have been assigned to the classification of costs according to the volume produced. Fixed costs are of a constant nature and do not have a proportional relationship with production or the volume produced. Regardless of these factors, they maintain an unchanged value over time. They include expenses such as salaries and charges for administrative personnel, rent, taxes, fees, and depreciation (Armelin Filho, 2011).

It is important to emphasize that, although fixed costs are stable in relation to the volume of production, their value can change over time. For example, the rent for a pasture, even if adjusted in a given month, remains a fixed cost since it retains the same amount regardless of production in that corresponding month (Crepaldi, 2011).

A cost is considered fixed when its total amount does not vary with the volume of production, remaining constant whether the company is in operation or idle (Stark, 2007). In contrast, variable cost is the opposite of fixed cost.

2.4.2.2 Variable costs

Variable costs are those that are related to the quantity produced, as the name suggests, varying with increases or decreases in production. They include expenses such as seeds, fertilizers, pesticides, fuels, lubricants, transportation, labor, and charges, as well as maintenance and repairs (Armelin Filho, 2011). A cost is considered variable when its estimation depends on production: if production increases, costs increase; if production decreases, costs tend to decrease as well.

Variable costs fluctuate according to the quantity produced (Crepaldi, 2011). In other words, indirect inputs consumed and the depreciation of agricultural machinery used determine that the greater the production, the higher the costs and wear, and the less the use, the lower the costs and wear.

In summary, Fernandes (2012) defines the two types of costs: variable costs change according to the volume produced, while fixed costs remain unchanged regardless of the volume produced. Thus, fixed costs are constant and independent of production, while variable costs fluctuate with production levels.

2.4.3 Revenues and Expenses

Revenues represent a company's efforts to obtain resources, resulting in an increase in net worth. They can arise from the delivery of products (sales), calculated by multiplying the quantity of products by the unit price, and from the provision of services (Hoss et al., 2012).

Revenues can be categorized as gross revenues and net revenues. Gross revenue occurs at the point of product sale, representing a value without deducting production costs. In contrast, net revenue is the result of gross revenue minus fixed and variable costs (Markus, 2014).

Expenses refer to the necessary expenditures to transform raw materials into goods or services (Martins, 2003). In other words, they are expenditures not identified during the production of a product, involving the sale of merchandise or the administration of the company.

According to Filho and Bruni (2012), expenses are the monetary realization of efforts to generate revenue. Although expenses decrease the company's net worth, this is justified by the promise of future revenue generation. Expenses are disbursements made, representing amounts withdrawn from the cash register for payments, as stated by Oliveira and Perez Jr. (2000), due to immediate purchasing needs or obligations.

Moreover, Swerts and Cardoso (2000) indicate that the recognition of an expense should coincide with the recognition of the corresponding revenue within a specific period since expenses are linked to the revenues that are initially recorded. Revenues come from product sales, documented by receipts such as invoices, while expenses are the necessary costs to generate revenue.

2.5 FINANCIAL VIABILITY ANALYSIS

2.5.1 Cash flow

Cash flow is a record of a company's financial movements over time, providing insights into the viability and profitability of a project, as well as revealing the capacity to settle debts (Samanez, 2009). It's important to emphasize that cash flow does not necessarily reflect accounting profits, as these can vary without changes in cash flow.

Cash flow, also known as cash budgeting, is a fundamental financial tool, as it directly deals with the liquidity of the company (Camloffski, 2014). The quality of the results of an investment is intrinsically linked to the accuracy and precision of cash flow projections (Kassai et al., 2000).

Cash flows can be classified into two categories: certain or deterministic and uncertain or stochastic. In the first case, cash flow formation is characterized by high predictability and reliability (Abensur, 2012). In the second case, when preparing the cash flow, risks that may affect its behavior over time are considered.

According to Hirschfeld (2012), cash flow can be represented by a diagram (Figure 1).

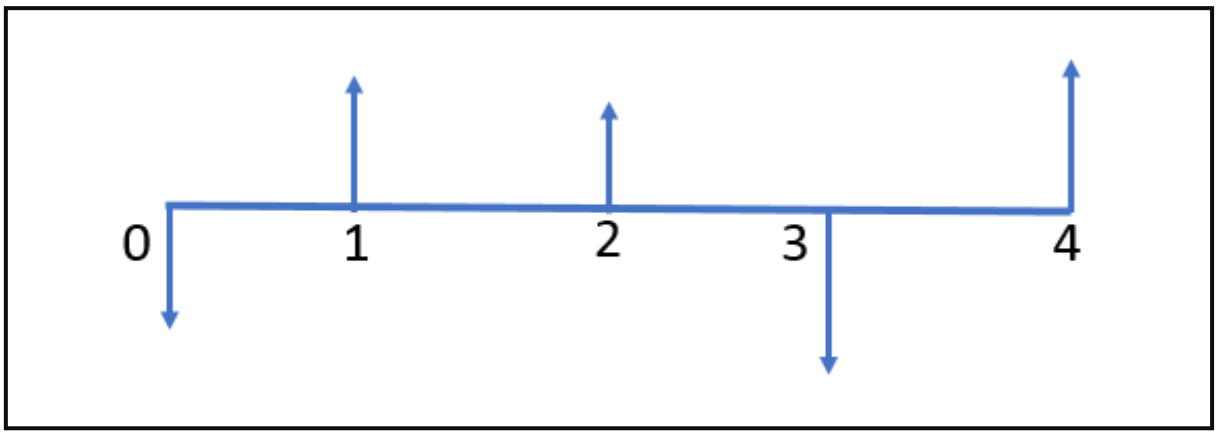

Figure 5. Cash Flow Diagram
Source: Adapted from Hirschfeld (2012).

It is observed, based on Figure 5, that: the horizontal axis represents the passage of time, spanning from the beginning to the end of the investment period; and the ascending portions of the horizontal axis represent positive periods, indicating dividends, savings, or revenues obtained. Conversely, the descending portions represent negative periods, denoting expenses, resource contributions, costs, or outstanding payments.

Traditional cash flow begins with an initial cash outflow, followed by inflows (positive), resulting in the first axis of the diagram being negative and subsequent ones being positive (Kassai et al., 2000). According to these authors, unconventional cash flow involves an initial cash outflow, followed by both inflows and outflows, which can complicate project evaluation.

Camloffski (2014) emphasizes the dynamic nature of the market, arguing that when preparing the cash budget, managers must consider economic, political, tax, environmental, and legal variables. Otherwise, they will be neglecting crucial data in the decision-making process.

Cash flow can be prepared in various ways; however, by following certain principles and conventions, the analyst can achieve more accurate results (Samanez, 2009). Furthermore, he highlights that when constructing cash flow, it is essential to consider the following aspects: a) Only cash flows resulting from the acceptance of the project are relevant; b) Opportunity costs should be allocated based on the best use of the asset; c) Changes in working capital must be included, as they affect decisions and are incremental; d) Tax savings and other effects should be taken into account; e) The effects of the investment, such as its impact on other areas of the company, should be incorporated; f) Sunk costs that are irrecoverable if the investment is not made should not be included in the projection; g) Only incremental costs should be considered; h) Financing flows should not be part of the free cash flow; i) Inflation must be

appropriately addressed in both cash flow and evaluation; and j) The residual value of the investment should be estimated based on consistent criteria.

According to Camloffski (2014), the final cash balance is determined by the interaction between projected receipts and payments, as illustrated in Table 1.

Table 1
Final Cash Balance Table

	Month 01	Month 02	Month 03	Month 04
Receipts				
(-) Payments				
(=) Net Cash Flow				
(+) Opening Cash Balance				
(=) Closing Cash Balance				

Note. Source: Adapted from Camloffski (2014).

For the development of investment analyses, the detailed presentation of cash flow is essential for creating projections and for the calculations made to arrive at the Net Present Value (Moraes & Silva, 2020).

2.5.2 Minimum Attractiveness Rate (*Taxa Mínima de Atratividade* – TMA)

The Minimum Acceptable Rate of Return, also known as TMA (Taxa Mínima de Atratividade), represents the minimum return an entrepreneur expects to obtain when executing a project, as explained by Camloffski (2014). It is important to note that this rate can vary significantly depending on the investor's profile. The bolder the entrepreneur, the higher the TMA they may establish for the project. The TMA is determined based on the best available investment alternative with an acceptable level of risk.

Various factors influence the TMA, particularly the following rates: Basic Financial Rate (TBF), Reference Rate (TR), Long-Term Interest Rate (TJLP), and the rate of the Special System for Liquidation and Custody (SELIC), as indicated by Souza & Clemente (2004).

When analyzing an investment opportunity, the Minimum Acceptable Rate of Return (TMA) considers the opportunity cost of obtaining returns by allocating the same capital to different investment alternatives. For a proposal to be considered attractive, it must, at a

minimum, match the interest rate associated with current low-risk investments, as highlighted by Casarotto & Kopittke (2010).

For average individuals, the TMA typically corresponds to the return offered by low-risk, high-liquidity investments, such as savings accounts or fixed-income applications. However, in the context of companies, determining the TMA is more complex and is subject to variables such as the investment horizon and the strategic importance of available options, as explained by the same authors in 2010.

When determining the Minimum Acceptable Rate of Return (TMA), the manager faces the task of examining various factors, including market analysis, current economic conditions, the profitability presented by similar projects, and compensation for the risks associated with investments in the productive sector compared to the financial market. As a fundamental guideline, it is important to observe that as risk increases, the TMA tends to be higher, as noted by Camloffski (2014).

The TMA can be established by the company according to its internal policy. However, it is crucial to emphasize that this rate has a significant impact on decisions related to investment projects, as highlighted by SCHROEDER et al. (2005).

The concept of cost of capital encompasses the compensation required due to the invested capital. In other words, it represents the intrinsic cost of capital, reflecting the value that the investor foregoes by not allocating their capital in the financial market or other investments. Additionally, this cost includes the interest incurred on the invested capital and a risk premium associated with the investment, according to Camloffski (2014). It is important to note that the TMA and the cost of capital are interconnected concepts, with the cost of capital often used as the TMA itself, as highlighted by the same author.

The cost of capital represents the compensation the company offers to the providers of the resources it needs, as explained by Zago & Pinto (2005). They also emphasize that if the company opts for investments with returns below the cost of capital, it will result in a depreciation of the company.

The concept of opportunity cost is related to the return that could be obtained through a second investment option, as mentioned by Camloffski (2014). Even though investment alternatives in the productive market may be limited, money always has the option to be invested in the financial market, as pointed out by the same author.

Opportunity cost refers to the costs incurred by the organization when implementing a project that requires financing, as outlined by Frezatti (2008). This opportunity cost is linked to the investor's decision to choose the option with lower returns, resulting in the difference

between the unchosen alternative (with higher returns) and the chosen alternative (with lower returns), as clarified by Zago & Pinto (2005). They further add that opportunity cost represents the return that the unchosen investment would indicate.

It is important to note that the TMA, cost of capital, and opportunity cost are interconnected, as emphasized by Camloffski (2014), forming a complementary set of concepts.

2.5.3 Cash Flow Projection

There are two types of Cash Flow (CF): historical and projected. The Historical Cash Flow presents past performance, serving as a complement to other financial statements, such as the Balance Sheet and the Income Statement. This record provides traceability of past activities, aiming to analyze critical aspects of organizational performance, with the purpose of aiding decision-making, correcting trajectories, and maximizing results. Additionally, it plays a fundamental role in the preparation of the Projected Cash Flow (Couto, 2015).

The Projected Cash Flow, also known as cash budget, anticipates future cash situations, allowing for the prediction of cash shortages or surpluses (Couto, 2015). These reports are prepared with specific criteria, incorporating business information and utilizing mathematical and statistical models. However, it is crucial to exercise caution in preparing these projections, as they are not immune to subjectivity (Couto, 2015).

Making projections, including those related to cash flow, is a challenging task that requires discipline and deep knowledge of the subject being forecasted (Correia et al., 2002). Despite the complexity, projection is essential because by anticipating possible scenarios, the manager reduces the likelihood of problems and facilitates the construction of a contingency plan. Thus, projections are crucial tools for avoiding unfavorable situations and maximizing beneficial opportunities (Correia et al., 2002).

Oliveira et al. (2009) emphasize that results simulations should be prepared to evaluate future potential and anticipate imminent risks. Camloffski (2014) highlights that the main complexity in a cash flow does not lie in its operationalization, but rather in developing scenarios for projection.

The projection of cash flow plays a crucial role in assessing an organization's ability to generate resources to pay taxes, compensate both equity and debt capital, and meet the operational working capital needs (Couto, 2015).

It is important to recognize that every projection carries risks, as predicting the future inherently involves dealing with uncertainty. These risks represent the probability that projections will not materialize as expected, necessitating risk measurement and evaluation to support contingency decisions in the face of deviations from the planned budget (Correia et al., 2002).

In deterministic analyses, which adopt static perspectives, risk is often neglected, whereas in probabilistic analyses, risk consideration is intrinsic, outlining the probability of occurrence for each event (Correia et al., 2002). After completing the project's cash flow, it is possible to employ investment analysis tools (Kassai et al., 2000).

2.6 IUNCERTAINTY AND RISK

Business decisions involve components of risk, certainty, and uncertainty, all directed toward the future. How decision-makers interpret the future plays a crucial role in determining success or failure, as highlighted by Brom & Balian (2007). According to them, it is important to understand that the pursuit of mathematical perfection should not be confused with accuracy in interpreting reality. In the financial market, there are numerous examples of operations considered to be of very low risk that nonetheless result in significant losses.

Entrepreneurs face the need to make estimates, and although these data can be projected with high quality, there is no absolute guarantee regarding the realization of the forecasted values, as argued by Kassai et al. (2000).

It is important to note that, according to Samanez (2009), the term "risk" refers to a situation where the probability associated with a random variable is known, while "uncertainty" occurs when this probability distribution is unknown. However, the author also emphasizes that in practice, these terms are often used interchangeably.

In scenarios where future states or possible events can be known and measured with some degree of accuracy, these are referred to as "risks," as explained by Kassai et al. (2000). Conversely, when the probability distribution cannot be assessed, we are dealing with "uncertainty," as also mentioned by the same authors.

Although investors generally associate risk with the financial market, it is essential to understand that, in the analysis of investments in real assets, risk is related to the possibility of the investor receiving returns lower than expected, as noted by Samanez (2009). Therefore, effectively measuring this risk is crucial.

The classification of risk into "unsystematic risk" (or diversifiable) and "systematic risk" is presented by Brom & Balian (2007). Unsystematic risk refers to factors specific to the project, an individual or legal entity, arising from deficiencies and weaknesses. Examples include management errors or business decisions, low productivity, inadequate product line development, and competition. For individuals, this may involve risks related to professional deficiencies and the consequent loss of employment.

On the other hand, systematic risk is associated with macroeconomic, social, political, and other factors that occur independently of the actions of the company or individual, as explained by Brom & Balian (2007). This means that systematic risk is characterized by variables that are beyond control and are of an external nature.

It is important to emphasize that systematic risk affects all types of investments, including financial securities, as also mentioned by Brom & Balian (2007). As the same authors explain, unsystematic risks depend on the specific circumstances of each investment, and generally, the higher the risk, the greater the potential return should be.

In this same context, Vanderlei & Carmona (2008) developed a framework that highlights the differences between technical uncertainties or private risk and economic uncertainty or market price risk in Table 2. Despite the different terminologies used, the concepts are similar to those presented by Brom & Balian (2007).

Table 2
Table of Differences Between Technical and Economic Uncertainty

Technical Uncertainty - Private Risk	Economic Uncertainty - Market Price Risk
Endogenous to the decision-making process.	Exogenous to the decision-making process.
Not influenced by the postponement decision.	Correlates with economic movements (relative prices and costs).
Guides investment toward a phased implementation with inter-scale adjustments.	Directly influences the propensity to invest in a given project.
Examples: innovation and technological diffusion, oil well volume, technical and production performance, agricultural yield fluctuations.	Examples: regulatory frameworks, sectoral charges, price variations, exchange rates, interest rates, etc.

Note. Source: Vanderlei & Carmona, 2008, p. 126.

Just as in the financial market, risk management can be optimized when investment is treated as part of a portfolio. This means that risk should be assessed in relation to the overall

set of investments, rather than being analyzed in isolation for each asset, as highlighted by Brom & Balian (2007). The authors also emphasize that risk reduction occurs when the assets that make up the investment portfolio react differently to variations in macroeconomic factors, which typically happens when there is diversification of assets.

Risks can be categorized into various groups, including market risks, credit risks, operational risks, and legal risks, as indicated by Cavalcanti & Plantullo (2007). According to these authors: Credit risk refers to the uncertainty of receiving a contracted or committed amount to be paid by the borrower of a loan due to a contract or security, discounted by expectations of recovering and realizing guarantees. The main subareas of credit risk refer to: a) Default risk, credit degradation risk, collateral degradation risk, sovereign risk, lender risk, and concentration risk. Operational risk refers to the uncertainty of returns if systems, practices, and controls are unable to withstand human failures, infrastructure damage, misuse of mathematical models, or changes in the market.

Among the subsystems are: a) Obsolescence risk – involves the possibility of losses due to the inadequate replacement of old equipment when necessary. b) Timeliness and reliability risk – concerns the risk of losses in situations where information is not received, processed, stored, and transmitted in a timely and reliable manner. c) Equipment risk – refers to the risk arising from failures in electrical equipment and data transmission systems. d) Unintentional error risk – encompasses the risk of losses due to unintentional mistakes, such as errors, omissions, negligence, or distractions by employees. e) Fraud risk – involves the risk of losses due to fraudulent activities, such as tampering and embezzlement. f) Qualification risk – pertains to the risk of losses due to the lack of qualification of employees to perform their specific functions. g) Product & Service risks – includes the risk of losses resulting from inadequate sales that do not meet customer demands. h) Regulatory risk – relates to the risk of losses due to changes, inadequacies, or absence of regulatory standards related to internal and external controls. i) Modeling risks – involves the risk of losses due to the incorrect use, development, or interpretation of results obtained through models, as well as the use of incorrect data. j) Financial settlement risks – encompasses the risk of losses due to failures in procedures and controls related to payments and financial settlements. k) Systemic risk – refers to the risk of losses due to changes in the operational environment that affect the functioning of systems and processes. l) Concentration risk (operational) – concerns the risk of losses due to excessive dependence on a few products, customers, and/or markets. m) Reputation risk – involves the risk of losses related to the organization’s reputation with customers, competitors, and other stakeholders. n) Catastrophe risk – refers to the risk of losses resulting from natural disasters or

extraordinary events. Legal risk – risks due to uncertainty about returns if contracts cannot be legally supported due to lack of representation by a negotiator, insufficient documentation, insolvency, or illegality. The main subareas are: legislative risk, tax risk, and contract risk.

2.6.1 Risk in Layer Poultry Farming

The literature on the risks affecting the poultry supply chain is limited, making it challenging for those involved in the field to identify these risks, as noted by De Oliveira (2018).

Although the contract for integrating poultry is advantageous for both the integrator and the integrated party, it is important to highlight that it does not eliminate the risks associated with this activity. According to Melo et al. (2008), the most significant source of risk in this context is the price of the product, followed by variable costs such as feed and the acquisition of chicks. The authors also emphasize that the types of production and the characteristics of the facilities present distinct risks.

The feed for poultry mainly consists of a mixture of corn and soybean meal, with a ratio of 3 to 1. Frequent fluctuations in the prices of these inputs result in uncertainty in the production costs of chicken meat in Brazil, as highlighted by Bordin & Bergweiler (2012).

It is important to note that the price of corn has a significant impact on the final price of egg production, while the price of soybean affects more than half of the formation of the price of in natura egg production in the market, as observed by Oliveira et al. (2016). When the costs of feed inputs rise without a corresponding increase in the price of meat, it increases the need to adjust the supply of meat to maintain balanced prices, as emphasized by Bordin & Bergweiler (2012).

Table 3 presents the inherent risks of egg production, according to various authors.

Table 3
Risks Inherent to Egg Production

Production Infrastructure	Losses may occur due to issues with machinery, equipment, and obsolescence, as mentioned by Marques et al. (2011).
Overcrowding in the Barn	Can harm feed conversion (weight gain/feed consumed), causing losses for the producer.
Feed Contamination	Contaminated products, water, or toxins in the feed can lead to losses.
Investment-Related Risk	When it comes to financing the barn, the responsibility lies with the producer, who may consider using lines of credit. However, it is important to note that there is no guarantee of return, as highlighted by Oliveira (2015).
Less Resilient Breeds	These breeds are more susceptible to disease transmission and have a higher likelihood of mortality (Moraes & Capanema, 2012).
Electrical Grid Issues	The equipment and machinery operate on electricity. Power-related issues can negatively impact the supply of raw materials, as noted by Oliveira (2015).

Some risks in layer poultry production are: a) difficulty in calculating the productivity index; d) unpredictability and inefficiency in management; e) operational management issues; f) uncertainties in long-term planning; complexity and low adherence to the implementation of vision, mission, and values; j) technological obsolescence; k) sanitary barriers; l) unfavorable exchange rates, hindering the acquisition of inputs; n) exclusion from the integration network; p) reduction or restriction of credit.

3. RESEARCH METHOD AND TECHNIQUE OF TECHNICAL PRODUCTION

Methods are systematic activities that allow scientists to produce valid and reliable knowledge.

According to Mota-Roth & Hendges (2010), the purpose of research methodology is to expose both the data and the methods that will be employed in addressing the research problem. This component describes the stages of data collection and analysis, as well as the instruments and materials used in the process, culminating in the attainment of results.

Scientific knowledge differs from other types of knowledge in that it can be verified, and this is only possible because the researcher uses methods in their inquiry. It also incorporates the fact that the method can be understood as a direction to achieve a specific objective. The method can be defined as a pathway, a coherence of thought, or a way of seeking knowledge (Vergara, 2016 & Andrade, 2010). The case study is characterized by an in-depth and exhaustive study of one or a few objects, allowing for broad and detailed knowledge, a task that is practically impossible with other types of considered designs.

For Yin (2005, p. 32), the case study is an empirical investigation that "investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly defined."

Alves-Mazzotti (2006) states that by defining the object of the case study as a contemporary phenomenon (Yin, 2005), it seeks to distinguish it from historical studies, in which the temporal evolution is the focus of interest, which does not mean that, in case studies, one does not refer to past facts to understand the present.

According to Yin (2005), case study research faces a technically unique situation in which there will be far more variables of interest than data points, and as a result, it relies on multiple sources of evidence, with the data needing to converge in a triangular format, and, as another result, benefits from the prior development of theoretical propositions to guide data collection and analysis.

The case study is a comprehensive description that denotes a variety of studies that collect and record information from a specific case or different cases with the aim of preparing a structured and analytical report of an experience or critically evaluating it, aiming to make decisions about it or suggest a significant change.

It is clear, therefore, that this method of investigation has always sought precision in results to prevent errors in the evaluation and understanding of data, providing greater

confidence in the conclusions obtained. Its use is common in descriptive research that seeks to identify correlations between variables in order to uncover the particularities of a phenomenon (Richardson, 2008).

The characteristics of the next chapter include the presentation of the methods used to conduct the study, such as the research design, approach to the problem, data collection procedures, unit of analysis – Granja X, professional competencies employed in solving the problem, and the limitations of the research methods and techniques.

3.1 RESEARCH DESIGN

The case study is configured as a comprehensive and versatile methodological approach, applied in a variety of research endeavors that seek to collect and record data from a particular case or multiple cases. This strategy is especially valuable for constructing a structured and critical report of a specific experience, allowing for in-depth analytical evaluation (Vergara, 2016).

According to Vergara (2016), descriptive research provides a detailed description of the characteristics of populations or phenomena, allowing for the establishment of relationships between variables and the definition of their nature. Furthermore, it serves as a foundation for explaining the phenomena it describes, although it is not required to provide detailed explanations (Beuren, 2013 & Vergara, 2016).

Descriptive research occupies an intermediate position between the superficiality of exploratory research and the depth of explanatory research (Beuren, 2013). The author emphasizes that in this type of research, data collection techniques are standardized, and there is no interference from the researcher in the phenomena. Additionally, she highlights that statistical techniques are generally employed in this context.

According to Goldenberg (2011), there is no possibility of establishing rules and techniques used in case studies, as each interview, observation, and discovery is unique and necessarily depends on the research object, the researcher’s conceptions, and their subjects. There are no specific rules for standardizing data or time for conducting this type of research.

The researcher must be prepared to deal with theoretical problems and unexpected discoveries so that they can guide or reorient their study whenever necessary. The reorientation phase can occur primarily during the exploratory period when the main decisions regarding objectives, frameworks, collection instruments, and analysis are made by the researcher. In this

perspective, new problems may emerge that are as relevant or more relevant than the initially considered issues (Goldenberg, 2011).

This study addresses a specific undertaking in which there was no intervention by the researcher in the phenomena. Various indicators were calculated, probabilities established, and relationships defined among them. Therefore, this study is classified as a case study. Following this, the unit of analysis is presented.

3.1.1 Analysis Unit – Granja X

The unit of analysis, as defined by Creswell (2010), refers to the participants in the study. Farias Filho & Arruda Filho (2015) expand on this concept, explaining that the unit of analysis, as the terminology itself suggests, is the entity in which the researcher will conduct their investigation. The authors highlight that a case study can focus on a single individual, organization, group, or program, resulting in a single unit of analysis. Figure 6 presents Granja X, the object of this study.

Figure 6. Aerial View of Granja X
Source: Google Maps (2024).

In the context of this study, the unit of analysis is Granja X, located in the municipality of Céu Azul – PR. The choice to analyze this property was motivated by the fact that the enterprise presents potential risks and uncertainties, as well as the family's intention to make future investments in layer poultry production. After the presentation of the unit of analysis, we proceed to the description of the data collection.

3.2 APPROACH TO THE PROBLEM

In a broad sense, there are two research methods: quantitative and qualitative. The distinction between these methods relates to the approach to the problem (Matias & Pereira, 2016). The authors emphasize that the choice of method is determined by the nature of the problem or the level of depth of the investigation.

The author highlights the importance of analytical induction in case studies, that is, the construction of theories from the data, rather than simply testing pre-existing theories.

Eisenhardt (1989) proposes a detailed roadmap for theory building from case studies, which includes defining research questions, data collection, data analysis, and constructing theoretical propositions.

The author underscores the importance of understanding the dynamics of a phenomenon over time, rather than focusing only on a specific point in time (Eisenhardt, 1989).

Unlike other authors who view the case study as a way to test existing theories, Eisenhardt (1989) uses it as a means to generate new theories.

Eisenhardt's (1989) approach has been widely utilized in management research, particularly in areas such as strategy, innovation, and entrepreneurship.

For the present study, the approach will be qualitative, given that the cash flows were presented numerically and that calculations were used in the analysis and evaluation of capital investment to determine NPV, IRR, simple payback, and discounted payback, which express numbers and percentages obtained through calculations.

3.3 DATA GATHERING PROCEDURES

Data collection is the stage of the research where the chosen instruments and techniques are used to gather the planned information. Good planning for this phase is essential, as it saves the researcher time and facilitates the progression of the study. According to Aliaga & Gunderson (2002), quantitative research can be defined as the explanation of phenomena through the collection of numerical data, which is analyzed using mathematical and statistical methods.

Additionally, they assert that the application of research instruments must be rigorous in order to avoid errors and defects. The data will be collected directly from the owner of Granja X through the collection of existing spreadsheets.

3.3.1 Data Gathering Plan

In quantitative studies, the researcher develops their work based on a well-structured and predetermined plan, formulating hypotheses about what they intend to study, with clearly defined variables. Moving on to data collection, it is possible to deduce a list of consequences (Dalfovo et al., 2008).

The characteristics of quantitative research are: deductive inference; the investigated reality is objective; the sample is usually large and determined by statistical criteria; generalization of results; use of data that represents a specific population; use of structured questionnaires with closed-ended questions, tests, and checklists (Alves-Mazzotti & Gewandsznajder, 2005).

The authors also emphasize that the rigorous application of research instruments is essential to avoid errors and defects. In this context, the data was obtained directly from the entrepreneurs.

Data collection began in January 2023, with visits to Granja X aimed at understanding the main activities carried out, getting to know the various sectors, and the responsibilities of each employee, as well as the difficulties faced by the owners in monitoring the flow of operations in the feed production, chick rearing, and egg classification sectors, among others. To deepen the understanding of the farm's operations in January, March, April, and May 2023, various strategies were adopted, and data was collected from the egg-producing farm. Problems were identified in the integration of the different production sectors of the farm, such as feed production, chick rearing, and egg classification, whose financial information was analyzed.

To assist in the financial analysis of the Farm, an Excel spreadsheet was developed in the format of a Statement of Income (DRE) to record the information on Revenues, Variable Costs, and Fixed Costs, which will be used until a more appropriate tool is acquired. This spreadsheet allowed for the categorization of revenues according to the invoices from each supplier (contract) and expenses according to specific categories, distinguishing fixed costs from variable ones and providing a clearer view of the financial health of Granja X.

To ensure the correct filling of the revenue and expense spreadsheets, detailed guidelines were provided regarding the appropriate categories for entries and exits, as well as the specific classification for each type of expense or revenue.

3.4 DATA ANALYSIS PROCEDURE

The observation of the economic and financial situation of rural properties is important for managers to be aware of the results and financial condition regarding cash generation and the payback period of investments in the rural activities they develop. According to Assaf & Lima (2009), among the performance evaluation methods used are the Net Present Value (NPV), the Internal Rate of Return (IRR), and the payback period indicated by the payback method.

The Internal Rate of Return (IRR) represents the implicit interest rate in a series of receipts (inflows) and payments (outflows). Its purpose is to discount a future value or calculate the interest factor associated with a present value (Hoji, 2003). Furthermore, the concept of IRR is used to calculate the rate 'i' when there are multiple payments and multiple receipts, regardless of whether the installments are uniform or not (Hoji, 2003). According to Groppelli & Nikbakht (2005), IRR is one of the most widely used methods in property budgeting. Additionally, it can be said that IRR is a discount rate that equates the NPV to zero. However, to analyze whether the IRR is viable, that is, whether the investment provides an acceptable rate of return, the IRR should be compared with a Minimum Attractive Rate (MAR) to identify the desired return against the achieved return (Groppelli & Nikbakht, 2005).

Regarding NPV, it allows for the identification of the sum of inflows and outflows of a cash flow at the initial date (Hoji, 2003). In this sense, for the investment to be financially viable, the present value of future cash flows must be greater than the initial cost. Thus, NPV analysis shows whether the investment is viable (NPV greater than cost) or unviable (NPV less than cost), highlighting the importance of this analysis that allows for the recognition of money over time (Groppelli & Nikbakht, 2005).

Furthermore, concerning the analysis of the payback period for investments, the payback method allows for the identification of the time required to recover a specific investment (Hoji, 2003). From the simple or discounted payback, it is possible to assess the financial viability of the invested resources. In this context, it can be seen that analyzing the economic and financial structure provides knowledge of the company's financial solidity level (Hoji, 2003).

Finally, there is the Modified Internal Rate of Return (MIRR). Like the Internal Rate of Return (IRR), it is used to analyze the economic viability of a project, allowing investors to know which actions will guarantee higher financial returns. In the IRR calculation, the positive cash flows generated by the project are reinvested at the IRR itself, which often does not reflect

reality. In the case of MIRR, it is possible to determine this reinvestment rate—typically, the Minimum Attractive Rate (MAR) is used.

2.1.1 3.4.1 Net Present Value (*Valor Presente Líquido* – VPL)

The Net Present Value, also known as the Present Value Method, aims to establish a value at a considered starting point, based on a cash flow composed of a succession of inflows, outflows, and expenses (Hirschfeld, 2010).

The interpretation of Net Present Value (NPV) involves identifying the positive difference between revenues and costs, which are adjusted for a specific discount rate. A project is considered viable when the result obtained through this method is greater than zero (Rezende & Oliveira, 2008). The NPV consists of the sum of inflows and outflows of a cash flow at the starting date (Hoji, 2012). Formula for calculating NPV:

$$VPL = -1 + \sum_{t=1}^{n} \frac{FC_t}{(1+k)t}$$

Where:

VPL = Net Present Value;

I = Initial Investment;

FC_t = Cash Flow for the analyzed period;

K = Discount Rate used;

t = Time, which varies from 1 to n.

Thus, any investment project that presents:

VPL > 0 i s a viable project;

VPL = 0 is the project's break-even point; and

VPL < 0 is a non-viable project.

The greater the VPL, the more attractive the project.

3.4.2 Internal Rate of Return (*Taxa Interna de Retorno* – TIR)

The Internal Rate of Return (IRR) is the discount rate (or interest rate) that equates, at a given moment, the inflows to the outflows. This is the interest rate that results in a Net Present Value (NPV) equal to zero. Generally, the IRR is interpreted under the premise that all cash values are updated to the zero moment (Assaf, Lima, 2009).

The Internal Rate of Return (IRR) aims to determine a value that encapsulates the relevance of a project. This value is not subject to the prevailing interest rate in the capital market; thus, it is termed "internal," as it is intrinsic to the project itself. The result obtained is characterized as internal and independent of other instruments, based solely on cash flow (Ross et al., 1995).

The rate provided by the IRR will be appropriate as long as all cash flows from the project are automatically reinvested at the same internal rate of return, continuing until the end of the project's life. Thus, when reinvestments are made at interest rates lower than the obtained internal rate of return, which can frequently occur, this results in a decrease in the IRR.

Formula for the equation to calculate the IRR:

$$TIR = \sum_{j=1}^{n} \frac{FC_j}{(1+i)^j} - FC_0$$

Where:

FC0 = Cash Flow at the Initial Moment;

FCj = Forecasted Cash Flows for Each Period;

i = Discount Rate;

n = Time Period.

The IRR criterion states that a project is viable if its IRR is equal to or greater than the opportunity cost of the resources for its implementation. The criterion also states that the higher the IRR, the more attractive the project. That is, the IRR should be considered as it stands for any investment:

IRR > Minimum Attractive Rate (TMA): the project is viable;

IRR = TMA: reflects the project's break-even point; and

IRR < TMA: the project is unviable.

3.4.3 Modified Internal Rate of Return (*Taxa Interna de Retorno Modificada* – TIR-M)

The Modified Internal Rate of Return (MIRR) is an enhanced analysis method compared to the conventional IRR, overcoming its limitations. In this method, positive cash flows are projected into the future, reinvesting the original IRR, while bringing negative cash flows to the present. This process results in a new cash flow composed of various rates (Casarotto et al., 2010), providing a more refined and comprehensive view of financial projections. Formula for calculating MIRR:

$$TIRM = \frac{\sum_{j=0}^{n} \left[\frac{Yj}{(1+i)^{n-j}}\right]}{\sum_{j=0}^{n} \left[\frac{Cj}{(1+i)^{j}}\right]} = (1 + TIRM)^{n}$$

Where:

Vt = Yj = Positive Cash Flow in Period j;

Cj = Negative Cash Flow in Period j;

***i* =** Discount Rate of the Project.

3.4.4 Profitability Index (Í*ndice de Lucratividade* – IL)

This index is calculated as the ratio between the present value of net cash benefits and the present value of capital expenditures. In other words, it represents the division of the present value of cash inflows by the present value of cash outflows (Ross et al., 1995). The Profitability Index (PI) is simply the ratio between the sum of the Net Present Value (NPV) of the Cash Flow and the absolute amount invested in the project's implementation. Formula for calculating the Profitability Index:

$$IL = \frac{\frac{FC1}{(1+TMA)^1} + \frac{FC2}{(1+TMA)^2} + \frac{FC3}{(1+TMA)^3} + \ldots + \frac{FCn}{(1+TMA)^n}}{Investimento\ Inicial\ Absoluto\ (IIA)} = \frac{\sum_{t=1}^{t=n} \frac{FCt}{(1+TMA)^t}}{IIA}$$

Where:

FC = Cash Flow;
TMA = Interest Rate = K;
t = periods ranging from 1 to n;
IIA = Absolute Initial Investment.

As a decision criterion using the IL (Investment Level), a project must present an IL greater than one to be viable, that is:
IL > 1 the project is viable;
IL = 1 break-even point of the project; and
IL < 1 the project is unviable, as it does not cover the company's capital cost.

The higher the IL, the more attractive the project.

3.4.5 Simple Payback

The simple payback is a direct method used to determine the time required until the accumulated revenues equal the amount of capital invested. Although it is praised for its ease of application, understanding, and interpretation, it has significant limitations. This method is deficient because it does not take into account the time value of money and neglects the cash flows that occur after the payback period ends (Lapponi, 2000).

3.4.6 Discounted Payback

To determine the period required for the recovery of the initial investment, the Payback method is employed, as this method indicates the number of years needed for future cash flows

to equal the value of the initial investment (Serafim, 2018). Formula for calculating the Discounted Payback:

$$Payback = mínimo\{j\} \sum_{k=1}^{j} \frac{FC_k}{(1+TMA)k} \geq FC_0$$

ou

$$PayBack = \frac{InvestimentoInicial}{GanhonoPeríodo}$$

Where:

FCk = Cash Flow in Time Interval *k* (Fluxo de Caixa no Intervalo de Tempo *k*)
TMA = Minimum Rate of Return (Taxa Mínima de Atratividade)
FC0 = Cash Flow at Zero Time (Fluxo de Caixa no Instante Zero)

Here, only investments and an initial outflow of cash followed by inflows are considered.

As highlighted by Lemes Junior et al. (2005), the discounted payback takes into account the discounted cash flows, thereby considering the time value of money. This approach allows for a more accurate approximation of the results to reality. The shorter the payback period, the more attractive the project will be.

3.5 RESEARCH METHODS AND TECHNIQUES LIMITATIONS

All research has limitations, as reality is more extensive than the researcher's perception and the methods they employ to understand it (Farias Filho & Arruda Filho, 2015). Despite the effort and precision in the analyses and procedures adopted in the study, it is crucial for the researcher to highlight the limitations of the work to the reader (Matias-Pereira, 2016).

Among the limitations of the method used in this study, the possibility of obtaining incoherent and incomplete responses during the data collection at the farm stands out, as well as potentially inconsistent interpretations by the researcher (Matias-Pereira, 2016). This variation in responses can compromise the validity of the collected data, introducing biases that may distort the study's conclusions.

The main limitations include incomplete information or the absence of some data. That is, some spreadsheets did not have records of all the data and information related to the farm's activities.

Another limitation was the lack of accurate records of inputs and outputs, based solely on purchase and sale invoices, which compromised the ability to accurately trace the transactions of receipts and sales of each item produced and marketed by Granja X.

3 PROJECT CONTEXT

4.1 CHARACTERIZATION OF GRANJA X

In 2001, a couple began egg production at Granja X with a system of free-range hens, starting with 8,000 laying hens. In 2004, after three years of production, they built their first semi-confined aviary with cages.

From 2004 to 2010, the couple also engaged in agricultural activities, but in 2010 they abandoned this pursuit to dedicate themselves entirely to livestock, specifically layer poultry—egg production. That same year, another owner joined the venture, forming a partnership that remains active. Additionally, in 2010, the number of laying hens increased to 24,000.

With exclusive dedication to the activity and always prioritizing quality in egg production, they expanded their production to 70,000 laying hens by 2015. The current owners had been running the business without any specific financing, relying on their working capital whenever they needed to make improvements. However, starting in 2016, they gained access to financing tailored for their activity and began to invest heavily. By 2018, they increased their flock to 120,000 laying hens.

During the COVID-19 pandemic, there was a decline in egg consumption. Nevertheless, the owners continued to ramp up their production despite incurring losses during this period, and by 2020, they had increased their flock to 240,000 laying hens, with a projection to reach 290,000 by 2023, which represents an increase of 50,000 hens. Figure 7 illustrates the egg production system at Granja X.

Figure 7. Egg Production at Granja X
Source: Research data (2024); Own elaboration (2024).

The investments have allowed Granja X to increase its egg production capacity over time, maintaining a consistent growth. In 2010, it produced 45 boxes per hour. By 2017, production had risen to 95 boxes per hour, and by 2022, it reached an impressive 300 boxes per hour.

In addition to egg production, in 2018, the farm began developing other activities directly related to egg production: raising its own chicks and producing its own feed for the operation. The goal of raising chicks is to create a rotational flock to replace the laying hens, ensuring strict age control and thereby achieving high productivity and better egg quality.

As of 2023, its installed production capacity includes the following data: the capacity to house laying hens is comprised of 16 barns, totaling 9,458 square meters, housing approximately 270,000 laying hens. For the housing and development of chicks, 4 barns with 1,800 square meters are reserved, accommodating 75,000 chicks.

The farm has a monthly egg production capacity of 7,128,000 eggs. To achieve this production level, the farm maintains 270,000 laying hens.

To meet this production demand, Granja X employs 40 registered staff members, distributed across various production and egg handling activities.

Granja X also has its own feed production capability. In 2018, it installed its own feed factory with a plant size of 300 square meters, with a production capacity of 56 tons per day.

The feed produced is exclusively for the laying hens and the chicks. In 2023, there was a forecasted increase to 90 tons per day of feed, focused on quality nutrition to achieve a high-quality final product. The feed formulations for the birds are based on processed corn and soybeans. Corn serves as the energy source, while soybeans provide the protein, both of which are acquired directly from cooperatives or agricultural companies.

The rearing and replacement phases of the laying hens encompass the period from receiving the day-old chick to the start of laying at 18 weeks of age, with feed being the main cost component. These phases are crucial as they determine the animal's overall production potential during the egg production period. Other significant costs include the acquisition of chicks and labor. Additional costs comprise energy, packaging, storage, specialized labor, fuel, maintenance, among others.

Granja X symbolizes a commitment to excellence, environmental preservation, and animal welfare. The organization is dedicated to the responsible care of laying hens, providing them with ideal conditions for growth and ensuring the production of high-quality eggs.

5. TYPE OF INTERVENTION AND MECHANISMS ADOPTED

The intervention took place as a consultancy in which there was an exchange of information and complete trust from the owner of Granja X, with the aim of achieving the specific objectives of this work. The information that guided the study was obtained through informal conversations, visits to the property, semi-structured interviews, and the collection of documentary data contained in the financial and management spreadsheets of Granja X. With this data in hand and using more traditional methods, a set of analyses was conducted to determine whether Granja X demonstrates economic and financial viability in developing its own feed production activities and the raising of chicks.

5.1 INTERVENTION METHODOLOGY

The intervention methodology was carried out through a structured consulting approach, characterized by a transparent exchange of information and a relationship of total trust with the owner of Granja X. This collaborative approach was crucial for achieving the specific objectives of the study.

To collect the necessary information, we utilized various methods:

Informal conversations: We established an open dialogue with the owner and employees of Granja X, allowing for a contextual understanding of the business and its challenges.

Site visits: We conducted visits to Granja X, located in the municipality of Céu Azul in the western region of the state of Paraná, to closely observe the activities and production processes, gaining a more complete view of the company's reality.

Data collection with the owner and collaborators, exploring in detail aspects such as costs, revenues, performance indicators, and business strategies.

We analyzed spreadsheets of financial and managerial information from Granja X, extracting relevant data on production costs, sales revenues, investments, expenses, and financial indicators.

5.2 PROCEDURE 1: DRE SPREADSHEET

Objective: To collect the entries and exits of revenues and expenses and create the Cash Flow Statement for Granja X. The Income Statement (DRE) is an accounting document that summarizes the movement of all revenues and expenses occurring over a specific period (Hoji, 2008). The statement of results was prepared based on the survey of revenues, expenses, and costs of Granja X.

Thus, the development of the cash flow statement was carried out, which integrates the financial transactions resulting from payments, receipts, revenue generation, and investment application.

5.3 PROCEDURE 2: INTERPRETATION OF FINANCIAL RATIOS

Objective: To conduct a financial assessment of Granja X through the Cash Flow.

In this assessment, the analyzed financial indicators were: Net Present Value (NPV), Profitability Index (PI), Internal Rate of Return (IRR), and the Payback Period, which refers to the time required to recover the invested capital.

The NPV allows for the verification of how much future cash flows, discounted to present value according to an appropriate opportunity cost for the risk, exceed the initially invested amount. Therefore, it can be said that an asset or business is valuable if the NPV is positive, as it adds resources to the business. Conversely, if the NPV is negative, it should be discarded, as it indicates that it is using Granja X's resources.

The Profitability Index (PI) shows how much the company is profiting in relation to total sales as a percentage. However, it is important to emphasize that a profitable company is not always synonymous with profitability, so it is essential to evaluate this indicator alongside other available metrics.

The Internal Rate of Return (IRR) corresponds to the discount rate that makes the initial investment equal to the present value of future cash flows. Like the Net Present Value (NPV), it considers the importance of time in financial values, but with a distinction: NPV is an absolute measure, while IRR is relative, as it requires comparison with a benchmark value.

The time to obtain a return on the investment is known as Payback. This method is used to calculate the time needed to recover an investment, meaning when the invested capital returns to the investor after a certain period.

Cost of Manufacturing: There are various ways to approach production costs, depending on the main objective. Costs can be classified as fixed costs and variable costs.

Fixed costs remain stable and do not change even with variations in production quantity. These costs include expenses such as taxes, agricultural insurance, equipment rental, among others.

The variable costs of the farm are those that change according to production levels. They may include inputs, water and electricity consumption, payment of overtime to employees, and hiring temporary labor, among others.

Gross Margin: The gross margin assesses the profitability of your business, meaning the percentage of profit you obtain from each transaction. For example, if you sell your products for R$ 50 but incur expenses of R$ 30 to make them available in the market, your profit is only R$ 20.

It is interesting to investigate your margin, as you may find that a certain item has a significantly lower gross profitability than another, suggesting the need for adjustments in your strategic approach.

At this point, it is not mandatory to prioritize products with the highest profit margin, as this can vary based on your strategy.

If the Gross Profit Margin shows a negative value, this indicates that Granja X or the activity is not economically sustainable, as it is not even covering variable costs.

Net Margin: Exploring the concept of margin leads to another significant indicator: the net margin. The net margin represents the net profit obtained by the company for each unit of revenue generated. This indicator demonstrates the monetary value that the company earns for each unit of revenue after paying all its expenses and taxes. If a company's net profit margin is 10%, it means that for every R$ 100 collected, the company obtains a net profit of R$ 10.

Contribution Margin: The concept of contribution margin is a crucial piece of information related to the value of an item. The contribution margin reveals the amount of resources that the company can generate to cover its fixed costs and achieve profit.

If it is necessary to acquire the sold product and bear some expenses related to the sale, such as taxes and sales commissions, what is the remaining value for the company to cover fixed costs and make a profit? The contribution margin answers this question.

If the difference between total sales and variable costs is greater than total fixed costs, the organization will be profitable. Conversely, if it is less, this indicates an immediate loss.

With this analysis completed, it becomes simple to assess the performance of your ventures and accurately monitor the financial return of each product or service.

5.4 PROCEDURE 3: PRESENTING THE STUDY TO THE OWNER

Presenting the research results to the owner through an analysis of the environment and the Cash Flow. Based on the Income Statement (DRE), critical aspects were identified, and corrective measures were recommended for improvement.

The activities of feed production, the in-house raising of chicks, and the final production of eggs were mapped, analyzing the possible directions for Granja X, considering the prices practiced and the quantities to be produced.

6. ANALYSIS AND INTERPRETATION OF RESULTS

This section will present the results obtained during the conduct of this research at Granja X, aimed at assessing the feasibility of investments.

Starting in 2018, significant investments were made to develop Granja X as a poultry layer operation, with an initial total investment of R$ 21,500,000. This amount was strategically distributed as shown in Table 4:

Table 4
Investments Made in Granja X

Item Invested	**Amount (R$)**
Feed Factory	4.000.000,00
Chick Rearing Sector	2.000.000,00
Egg Grading Sector	3.000.000,00
Construction of Barns and Acquisition of Poultry Equipment	12.500.000,00
Total	**21.500.000,00**

R$ 4,000,000 was invested in the construction and equipment of the feed mill. This facility is crucial for ensuring a balanced and high-quality diet for the birds throughout the entire production cycle. Another investment of R$ 2,000,000 was made in the chick-rearing sector. This segment includes modern facilities and specialized equipment to ensure the healthy and vigorous growth of the birds from the initial phase.

Additionally, R$ 3,000,000 was allocated to the egg grading sector, where advanced technologies and adequate infrastructure are employed to ensure precise selection and quality of the produced eggs.

The remaining R$ 12,500,000 was applied to the construction of barns and the acquisition of poultry equipment. These facilities were designed to provide a comfortable, safe, and hygienic environment for the birds, thereby optimizing egg production.

These initial investments were fundamental in establishing a solid foundation for the farm, allowing for efficient and sustainable operations over the years.

Data regarding the revenue categorization, variable costs, contribution margin, fixed costs, and exercise results can be found in the Income Statement (DRE) presented in Table 5. The calculations were estimated for one year and subsequently projected for a five-year horizon.

The DRE spreadsheet was broken down into items to facilitate analysis and also to improve its distribution throughout the text.

6.1 REVENUE ANALYSIS, VARIABLE COSTS AND CONTRIBUTION MARGIN

Through Table 4, it can be seen that the total revenue of Granja X was, on average, R$ 31,610,885.52 per year. It is observed that the main source of revenue is from the sale of eggs, which contributes R$ 30,008,285.04, representing 94.93% of the total revenue, highlighting the importance of this product for the farm. However, this dependence may also pose a risk in the event of market fluctuations or production issues.

The revenue from manure contributes R$ 700,000.44, which corresponds to 2.21% of the total revenue. This revenue demonstrates the efficiency of the company in utilizing by-products of the production process, turning waste into a significant source of income.

The revenue from delivery freight amounts to R$ 460,800.00 (1.46% of the total revenue), indicating that the company not only sells its products but also offers delivery services, adding value and convenience for customers. This strategy not only enhances the customer experience but also adds a substantial source of income.

The sale of post-laying birds reaches R$ 245,000.04 (0.78% of the total revenue). This amount shows that the company maximizes the use of its resources by selling birds that are no longer at peak production but still hold market value.

Revenue from return freight, amounting to R$ 120,000.00, represents 0.38% of the total revenue and demonstrates the logistical efficiency of the company, which is able to monetize return transport, reducing costs and optimizing operations.

Finally, solar energy production contributes R$ 76,800.00 (0.24% of the total revenue). This figure not only represents diversification of revenue sources but also highlights the company's commitment to sustainability and reducing operational costs through renewable energy, which could further increase revenue in this sector.

It can be stated that Granja X has a robust and diversified revenue structure. While egg sales are the main source of income, other areas also contribute

significantly, demonstrating the farm's ability to explore various market opportunities and optimize its resources. This diversification not only enhances the company's financial stability but also prepares it to face potential future challenges with greater resilience. These values are distributed in the following spreadsheets, starting with Revenues, Variable Costs, and Contribution Margin, as shown in Spreadsheet 1.

Table 5
Revenues, Variable Costs, and Contribution Margin of Granja X

Apuração de Resultado - DRE	PERÍODO									
	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9
1 - Receita										
1.1 Venda de Ovos	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04	30.008.285,04
1.2 Venda Aves Pós Postura	245.000,04	245.000,04	245.000,04	245.000,04	245.000,04	245.000,04	245.000,04	245.000,04	245.000,04	245.000,04
1.3 Produção Energia	76.800,00	76.800,00	76.800,00	76.800,00	76.800,00	76.800,00	76.800,00	76.800,00	76.800,00	76.800,00
1.4 Receita - Frete Retorno	120.000,00	120.000,00	120.000,00	120.000,00	120.000,00	120.000,00	120.000,00	120.000,00	120.000,00	120.000,00
1.5 Receita - Frete Entrega	460.800,00	460.800,00	460.800,00	460.800,00	460.800,00	460.800,00	460.800,00	460.800,00	460.800,00	460.800,00
1.6 Receita do Esterco	700.000,44	700.000,44	700.000,44	700.000,44	700.000,44	700.000,44	700.000,44	700.000,44	700.000,44	700.000,44
Total de Receita	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52
2 - Custo Variável										
2.1 Milho	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00	8.582.400,00
2.2 Farelo Soja	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68	5.597.107,68
2.3 Farelo Trigo	2.940,00	2.940,00	2.940,00	2.940,00	2.940,00	2.940,00	2.940,00	2.940,00	2.940,00	2.940,00
2.4 Calcário 38%	343.095,08	343.095,08	343.095,08	343.095,08	343.095,08	343.095,08	343.095,08	343.095,08	343.095,08	343.095,08
2.5 Fosf. Bicálcico	649.682,04	649.682,04	649.682,04	649.682,04	649.682,04	649.682,04	649.682,04	649.682,04	649.682,04	649.682,04
2.6 NaCl	30.957,96	30.957,96	30.957,96	30.957,96	30.957,96	30.957,96	30.957,96	30.957,96	30.957,96	30.957,96
2.7 Allmix AMX 2.1	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96	1.170.759,96
2.8 Metionina 98%	219.319,80	219.319,80	219.319,80	219.319,80	219.319,80	219.319,80	219.319,80	219.319,80	219.319,80	219.319,80
2.9 Colina Pó 60	49.599,96	49.599,96	49.599,96	49.599,96	49.599,96	49.599,96	49.599,96	49.599,96	49.599,96	49.599,96
2.10 Mold Zap	15.523,20	15.523,20	15.523,20	15.523,20	15.523,20	15.523,20	15.523,20	15.523,20	15.523,20	15.523,20
2.11 Notox	48.361,56	48.361,56	48.361,56	48.361,56	48.361,56	48.361,56	48.361,56	48.361,56	48.361,56	48.361,56
Custo Variável TOTAL	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24
3 - Margem de Contribuição	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28

Note. Translation of terms: Result Calculation - Income Statement (DRE), Period, Year 1, Year 2, Year 3, Year 4, Year 5, Year 5, Year 6, Year 7, Year 8, Year 9, 1- Revenue, 1.1 Egg Sales, 1.2 Sales of Post-Laying Birds, 1.3 Energy Production, 1.4 Revenue - Freight Return, 1.5 Revenue - Freight Delivery, 1.6 Manure Revenue, Total Revenue, 2 -Variable Costs, 2.1 Corn, 2.2 Soybean Meal, 2.3 Wheat Bran, 2.4 Limestone 38%, 2.5 Dicalcium Phosphate, 2.6 NaCl, 2.7 Allmix AMX 2.1, 2.8 Methionine 98%, 2.9 Choline Powder 60, 2.10 Mold Zap, 2.11 Notox, Total Variable Costs, 3- Contribution Margin.

Through Figure 8, it is possible to better visualize the distribution of Granja X's revenues, arranged from the highest to the lowest revenue generated by the farm in its egg production activities.

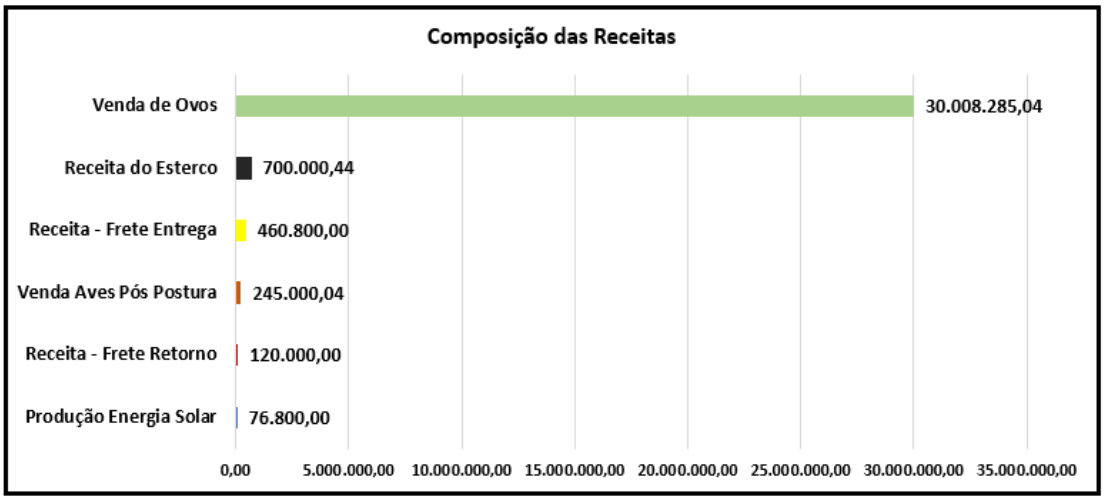

Figure 8. Revenue Composition Chart - Income Statement (DRE)
Note. Translation of Terms: Revenue Composition: Egg Sales, Manure Revenue, Revenue - Freight Delivery, Sales of Post-Laying Birds, Revenue - Freight Return, Solar Energy Production.

In Item 2 of Table 5, the variable costs of Granja X are listed, averaging R$ 16,709,747.24 per year. Of this amount, notable costs include corn (R$ 8,582,400.00), soybean (R$ 5,597,107.68), and mineral compound Almix (R$ 1,170,759.96), which together total R$ 15,350,267.60, approximately 91.86% of the total variable cost.

The analysis of the variable cost data and contribution margin contained in the table above focuses on identifying the main variable costs and the items that most significantly impact production costs.

The Contribution Margin consists of the revenue from sales minus the Variable Costs, representing how much of the revenue is spent on Variable Costs and what amount remains to be allocated to Fixed Costs and Profit. In this case, the Margin was R$ 14,901,138.28 per year. The contribution margin enables the identification of optimization opportunities in areas where Granja X can reduce costs, thereby increasing the contribution margin.

6.2 ANALYSIS OF FIXED COSTS OF GRANJA X

Tables 6, 7, and 8 display the fixed costs of Granja X. These were extracted from the Income Statement (DRE) and broken down to facilitate analysis, as they could not fit into a single spreadsheet in the text.

Table 6
Fixed Costs: **Feed Factory**, **Branch Expenses**, **Head Office Expenses**

4 - Custo Fixo										
FAB-RAÇÃO	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80
4.1 Pró-Labore - Salarios	87.168,96	87.168,96	87.168,96	87.168,96	87.168,96	87.168,96	87.168,96	87.168,96	87.168,96	87.168,96
4.2 Energia	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00
4.3 Soprador Ar-Comb.	158,16	158,16	158,16	158,16	158,16	158,16	158,16	158,16	158,16	158,16
4.4 Gerado Energia-Comb.	1.550,04	1.550,04	1.550,04	1.550,04	1.550,04	1.550,04	1.550,04	1.550,04	1.550,04	1.550,04
4.5 Busca Insumos-Comb.	124.677,00	124.677,00	124.677,00	124.677,00	124.677,00	124.677,00	124.677,00	124.677,00	124.677,00	124.677,00
4.6 Distribui Ração-Comb.	270.000,00	270.000,00	270.000,00	270.000,00	270.000,00	270.000,00	270.000,00	270.000,00	270.000,00	270.000,00
4.7 Empilhadeira-Comb.	2.003,64	2.003,64	2.003,64	2.003,64	2.003,64	2.003,64	2.003,64	2.003,64	2.003,64	2.003,64
4.8 Manutenção Geral	45.693,00	45.693,00	45.693,00	45.693,00	45.693,00	45.693,00	45.693,00	45.693,00	45.693,00	45.693,00
DESP-FILIAL	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04
4.1 Pró-Labore - Salarios	148.800,00	148.800,00	148.800,00	148.800,00	148.800,00	148.800,00	148.800,00	148.800,00	148.800,00	148.800,00
4.2 Energia	72.200,04	72.200,04	72.200,04	72.200,04	72.200,04	72.200,04	72.200,04	72.200,04	72.200,04	72.200,04
4.3 Manutenção de Maquinas	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00
4.4 Gerador Energia	3.999,96	3.999,96	3.999,96	3.999,96	3.999,96	3.999,96	3.999,96	3.999,96	3.999,96	3.999,96
4.5 Trator Comb.	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00
4.6 Lenha	4.200,00	4.200,00	4.200,00	4.200,00	4.200,00	4.200,00	4.200,00	4.200,00	4.200,00	4.200,00
4.7 Invasores	500,04	500,04	500,04	500,04	500,04	500,04	500,04	500,04	500,04	500,04
DESP-MATRIZ	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96
4.1 Pró-Labore - Salarios	192.000,00	192.000,00	192.000,00	192.000,00	192.000,00	192.000,00	192.000,00	192.000,00	192.000,00	192.000,00
4.2 Energia	54.000,00	54.000,00	54.000,00	54.000,00	54.000,00	54.000,00	54.000,00	54.000,00	54.000,00	54.000,00
4.3 Manutenção de Maquinas	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00	9.000,00
4.4 Gerador Energia	4.299,96	4.299,96	4.299,96	4.299,96	4.299,96	4.299,96	4.299,96	4.299,96	4.299,96	4.299,96
4.5 Trator Comb.	10.779,96	10.779,96	10.779,96	10.779,96	10.779,96	10.779,96	10.779,96	10.779,96	10.779,96	10.779,96
4.6 Invasores	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00	3.000,00
4.7 BobCat	2.900,04	2.900,04	2.900,04	2.900,04	2.900,04	2.900,04	2.900,04	2.900,04	2.900,04	2.900,04
4.8 Desitrator	14.400,00	14.400,00	14.400,00	14.400,00	14.400,00	14.400,00	14.400,00	14.400,00	14.400,00	14.400,00
4.9 Manutençã Limpeza	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00	28.200,00

Note. Translation of terms: 4. Fixed Costs - Production, 4.1 Salaries - Pró-Labore, 4.2 Energy, 4.3 Air Blower - Fuel, 4.4 Power Generator - Fuel, 4.5, Supply Collection - Fuel, 4.6 Feed Distribution - Fuel, 4.7 Forklift - Fuel, Branch Expenses (DESP-FILIAL), 4.1 Salaries - Pró-Labore, 4.2 Energy, 4.3 Machine Maintenance, 4.4 Power Generator, 4.5 Tractor - Fuel, 4.6 Firewood, 4.7 Pest Control
Head Office Expenses (DESP-MATRIZ), 4.1 Salaries - Pró-Labore, 4.2 Energy, 4.3 Machine Maintenance, 4.4 Power Generator, 4.5 Tractor - Fuel, 4.6 Pest Control, 4.7 Bobcat, 4.8 Dehydrator, 4.9 Cleaning Maintenance

The data indicate that the total cost of the feed mill of Granja X is R$ 559,450.80. This amount represents 6.60% of the company's total fixed costs and impacts 1.77% of the total annual revenue. The feed mill is an essential component for producing high-quality eggs and other poultry activities.

The fixed costs of the branch of the farm total R$ 240,200.04 per year, representing 2.83% of the total fixed costs. These costs impact 0.76% of the total revenue. This branch plays a fundamental role in the final production of eggs.

The fixed costs of the headquarters amount to R$ 318,579.96 per year, corresponding to 3.76% of the total fixed costs and impacting 1.01% of the total revenue. The headquarters is the operational center of Granja X, coordinating all strategic, operational, and administrative activities.

Table 7 presents the annual fixed costs of expenses related to chicks, which total R$ 645,560.04. This amount represents 7.61% of the total fixed costs of Granja X and impacts 2.04% of the total annual revenue, which amounts to R$ 31,610,885.52. The chicks are fundamental to the farm's production cycle, being essential for replenishing the flock and, consequently, for the continuity of egg production.

Table 7
Fixed Costs: Chick Rearing Expenses; Grading Expenses

DESP-PINTAINHAS	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04
4.1 Aquisição Qdt. Pintainhas	231.000,00	231.000,00	231.000,00	231.000,00	231.000,00	231.000,00	231.000,00	231.000,00	231.000,00	231.000,00
4.2 Pró-Labore - Salarios	59.985,00	59.985,00	59.985,00	59.985,00	59.985,00	59.985,00	59.985,00	59.985,00	59.985,00	59.985,00
4.3 Energia	43.670,04	43.670,04	43.670,04	43.670,04	43.670,04	43.670,04	43.670,04	43.670,04	43.670,04	43.670,04
4.4 Trator - Comb.	399,96	399,96	399,96	399,96	399,96	399,96	399,96	399,96	399,96	399,96
4.5 Lenha- DESIDRATADOR	4.800,00	4.800,00	4.800,00	4.800,00	4.800,00	4.800,00	4.800,00	4.800,00	4.800,00	4.800,00
4.6 Pelits	4.500,00	4.500,00	4.500,00	4.500,00	4.500,00	4.500,00	4.500,00	4.500,00	4.500,00	4.500,00
4.7 Batedor Cama-Comb.	300,00	300,00	300,00	300,00	300,00	300,00	300,00	300,00	300,00	300,00
4.8 Tres Fornos	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00
4.9 Lampadas	2.375,04	2.375,04	2.375,04	2.375,04	2.375,04	2.375,04	2.375,04	2.375,04	2.375,04	2.375,04
4.10 Mnt. Maq. / Equi.	15.170,04	15.170,04	15.170,04	15.170,04	15.170,04	15.170,04	15.170,04	15.170,04	15.170,04	15.170,04
4.11 Gerador Energia-Comb.	279,96	279,96	279,96	279,96	279,96	279,96	279,96	279,96	279,96	279,96
4.12 Cal Virgem	1.680,00	1.680,00	1.680,00	1.680,00	1.680,00	1.680,00	1.680,00	1.680,00	1.680,00	1.680,00
4.13 Controle de Invasores	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00
4.14 Vacinas-Debicagem	93.000,00	93.000,00	93.000,00	93.000,00	93.000,00	93.000,00	93.000,00	93.000,00	93.000,00	93.000,00
4.15 Aluguel	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00
DESP-CLASIF	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08
4.1 Pró-Labore - Salarios	364.800,00	364.800,00	364.800,00	364.800,00	364.800,00	364.800,00	364.800,00	364.800,00	364.800,00	364.800,00
4.2 Energia	30.840,00	30.840,00	30.840,00	30.840,00	30.840,00	30.840,00	30.840,00	30.840,00	30.840,00	30.840,00
4.3 Produtos de Limpeza	31.693,68	31.693,68	31.693,68	31.693,68	31.693,68	31.693,68	31.693,68	31.693,68	31.693,68	31.693,68
4.4 Mnt. Esteiras	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00	1.200,00
4.5 Embalagem primária	765.303,96	765.303,96	765.303,96	765.303,96	765.303,96	765.303,96	765.303,96	765.303,96	765.303,96	765.303,96
4.6 Embalagem secundária	771.552,00	771.552,00	771.552,00	771.552,00	771.552,00	771.552,00	771.552,00	771.552,00	771.552,00	771.552,00
4.7 Fita Adesiva	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00
4.8 Palet	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00	1.500,00
4.9 Etiqueta	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00	11.844,00
4.10 Tinta impressão ovo	30.000,00	30.000,00	30.000,00	30.000,00	30.000,00	30.000,00	30.000,00	30.000,00	30.000,00	30.000,00
4.11 Mnt. impressora expediente	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04
4.12 Lavanderia	16.407,00	16.407,00	16.407,00	16.407,00	16.407,00	16.407,00	16.407,00	16.407,00	16.407,00	16.407,00
4.13 Perca de ovos	30.200,04	30.200,04	30.200,04	30.200,04	30.200,04	30.200,04	30.200,04	30.200,04	30.200,04	30.200,04
4.14 Uniformes	12.402,36	12.402,36	12.402,36	12.402,36	12.402,36	12.402,36	12.402,36	12.402,36	12.402,36	12.402,36
4.15 Cam. recolha ovos MNT e COMB	20.100,00	20.100,00	20.100,00	20.100,00	20.100,00	20.100,00	20.100,00	20.100,00	20.100,00	20.100,00

Note. Translation of terms: **Chick Rearing Expenses (DESP-PINTAINHAS):** 4.1 Purchase of chicks; 4.2 Salaries - Pró-Labore; 4.3 Energy; 4.4 Tractor - Fuel; 4.5 Firewood - Dehydrator; 4.6 Pellets; 4.7 Bedding Beater - Fuel; 4.8 Three Furnaces; 4.9 Lamps; 4.10 Machinery/Equipment Maintenance; 4.11 Power Generator - Fuel; 4.12 Quicklime; 4.13 Pest Control; 4.14 Vaccines - Beak Trimming; 4.15 Rent. **Grading Expenses (DESP-CLASSIF):** 4.1 Salaries - Pró-Labore; 4.2 Energy; 4.3 Cleaning Products; 4.4 Conveyor Belt Maintenance; 4.5 Primary Packaging; 4.6 Secondary

Packaging; 4.7 Adhesive Tape; 4.8 Pallet; 4.9 Label; 4.10 Egg Print Ink; 4.11 Office Printer Maintenance; 4.12 Laundry; 4.13 Egg Losses; 4.14 Uniforms; 4.15 Egg Collection Cart Maintenance and Fuel.

The annual fixed costs for the classification and quality control of eggs total R$ 2,107,687.08. This amount represents 24.86% of the total fixed costs of the farm and impacts 6.67% of the total revenue. The classification and quality control of eggs are vital steps in the production process, ensuring that the marketed eggs meet the quality standards required by the market. This process not only ensures customer satisfaction and maintains the brand's reputation but can also directly influence the selling price of the products.

In Table 8, the annual fixed costs of administrative expenses can be seen, totaling R$ 3,712,035.96. This amount represents 43.78% of the total fixed costs of the farm and impacts 11.74% of the total revenue. Administrative expenses include costs related to the management of the farm, such as salaries of the administrative staff, office expenses, accounting services, and other general operational costs.

Table 8
Administrative Expenses; Transportation Expenses; Manure Expenses.

DESP-ADM	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96
4.1 Pró-Labore - Salarios	608.880,00	608.880,00	608.880,00	608.880,00	608.880,00	608.880,00	608.880,00	608.880,00	608.880,00	608.880,00
4.2 IPI - Complexo Granja	17.556,00	17.556,00	17.556,00	17.556,00	17.556,00	17.556,00	17.556,00	17.556,00	17.556,00	17.556,00
4.3 Material Expediente	5.820,00	5.820,00	5.820,00	5.820,00	5.820,00	5.820,00	5.820,00	5.820,00	5.820,00	5.820,00
4.4 Despesas Cozinha	69.780,00	69.780,00	69.780,00	69.780,00	69.780,00	69.780,00	69.780,00	69.780,00	69.780,00	69.780,00
4.5 Depreciação	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96	3.009.999,96
DESP-TRANSP	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76
4.1 Pró-Labore - Salarios	108.000,00	108.000,00	108.000,00	108.000,00	108.000,00	108.000,00	108.000,00	108.000,00	108.000,00	108.000,00
4.2 Caminhões - IPVA	15.606,72	15.606,72	15.606,72	15.606,72	15.606,72	15.606,72	15.606,72	15.606,72	15.606,72	15.606,72
4.3 Seguro	84.999,96	84.999,96	84.999,96	84.999,96	84.999,96	84.999,96	84.999,96	84.999,96	84.999,96	84.999,96
4.4 Licenciamento	356,04	356,04	356,04	356,04	356,04	356,04	356,04	356,04	356,04	356,04
4.5 Seguro Privado	37.500,00	37.500,00	37.500,00	37.500,00	37.500,00	37.500,00	37.500,00	37.500,00	37.500,00	37.500,00
4.6 Seguro de Vida	660,00	660,00	660,00	660,00	660,00	660,00	660,00	660,00	660,00	660,00
4.7 Rastreador	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04	8.000,04
4.8 Desp. Ccomb. Distribuição	180.000,00	180.000,00	180.000,00	180.000,00	180.000,00	180.000,00	180.000,00	180.000,00	180.000,00	180.000,00
4.9 Desp. Alimentação Motorista	24.000,00	24.000,00	24.000,00	24.000,00	24.000,00	24.000,00	24.000,00	24.000,00	24.000,00	24.000,00
4.10 Dep-Comb. Caminhão-Local	11.316,00	11.316,00	11.316,00	11.316,00	11.316,00	11.316,00	11.316,00	11.316,00	11.316,00	11.316,00
DESP-ESTERCO	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00
4.1 Pró-Labore - Salarios	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00	60.000,00
4.2 Caminhão Mnt-Comb.	34.800,00	34.800,00	34.800,00	34.800,00	34.800,00	34.800,00	34.800,00	34.800,00	34.800,00	34.800,00
4.3 Pá Carregadeira-Comb.	33.600,00	33.600,00	33.600,00	33.600,00	33.600,00	33.600,00	33.600,00	33.600,00	33.600,00	33.600,00
4.4 Mnt. Maquina - Revolvedor	3.600,00	3.600,00	3.600,00	3.600,00	3.600,00	3.600,00	3.600,00	3.600,00	3.600,00	3.600,00
4.5 Energia	36.000,00	36.000,00	36.000,00	36.000,00	36.000,00	36.000,00	36.000,00	36.000,00	36.000,00	36.000,00
4.6 Pó de Serra	257.040,00	257.040,00	257.040,00	257.040,00	257.040,00	257.040,00	257.040,00	257.040,00	257.040,00	257.040,00
Custo Fixo Total	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64
5 - Lucro Operacional Bruto	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64
6 - IR (20%) Lucro Real	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13
7 - Lucro Operacional Líquido	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51
8 - Lucro Operacional Liquido Anual	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51

Note. Translation of terms: **Administrative Expenses (DESP-ADM):** 4.1 Salaries - Pró-Labore; 4.2 IPI - Farm Complex; 4.3 Office Supplies; 4.4 Kitchen Expenses; 4.5 Depreciation. **Transportation Expenses (DESP-TRANSP):** 4.1 Salaries - Pró-Labore; 4.2 Trucks - Vehicle Tax (IPVA); 4.3 Insurance; 4.4 Licensing; 4.5 Private Insurance; 4.6 Life Insurance; 4.7 Tracker; 4.8 Distribution Fuel Expenses; 4.9 Driver Food Expenses; 4.10 Local Fuel Deposit - Truck. **Manure Expenses (DESP-ESTERCO):** 4.1 Salaries - Pró-Labore; 4.2 Truck Maintenance - Fuel; 4.3 Loader - Fuel; 4.4 Machine Maintenance - Turner; 4.5 Energy; 4.6 Sawdust. **Total Fixed Costs**, 5 - Gross Operating Profit, 6 - Income Tax (20%) - Real Profit, 7 - Net Operating Profit, 8 - Annual Net Operating Profit.

The annual fixed costs for transporting eggs and supplies to support the property total R$ 470,438.76. This amount represents 5.55% of the total fixed costs and impacts 1.49% of the total revenue. Transportation is an essential part of the operation, ensuring that products reach the market efficiently and that the necessary supplies for production are always available.

We also have the annual fixed costs related to the management of manure produced by the laying hens, which total R$ 425,040.00. This amount represents 5.01% of the total fixed costs and impacts 1.34% of the total revenue. Proper management of manure is essential for maintaining the sanitary and environmental conditions of the farm, and it can also be used as a natural fertilizer, contributing to the sustainability of the operation.

6.3 SUMMARY DETERMINATION RESULT – DRE

Table 9
Summary of Incomes Statement Analysis – DRE

Apuração de Resultado - DRE	PERÍODO									
	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
1 - Receita										
Total de Receita	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52
2 - Custo Variável										
Custo Variável TOTAL	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24
3 - Margem de Contribuição	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28
4 - Custo Fixo										
FAB-RAÇÃO	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80
DESP-FILIAL	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04
DESP-MATRIZ	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96
DESP-PINTAINHAS	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04
DESP-CLASIF	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08
DESP-ADM	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96	3.712.035,96
DESP-TRANSP	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76
DESP-ESTERCO	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00
Custo Fixo Total	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64	8.478.992,64
5 - Lucro Operacional Bruto	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64	6.422.145,64
6 - IR (20%) Lucro Real	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13	1.284.429,13
7 - Lucro Operacional Líquido	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51
8 - Lucro Operacional Liquido Anual	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51	5.137.716,51

Note. Translation of terms: **Income Statement Analysis - DRE:**, 1 – Revenue, Total Revenue, 2 - Variable Costs, Total Variable Costs, 3- Contribution Margin, 4 - Fixed Costs, Feed Factory Expenses (FAB-RAÇÃO), Branch Expenses (DESP-FILIAL), Headquarters Expenses (DESP-MATRIZ), Expenses for Chicks (DESP-PINTAINHAS), Classification Expenses (DESP-CLASIF), Administrative Expenses (DESP.ADM), Transportation Expenses (DESP-TRANSP), Manure Expenses (DESP-ESTERCO), Total Fixed Costs, 5 - Gross Operating Profit, 6 - Income Tax (20%) - Real Profit, 7 - Net Operating Profit, 8 - Annual Net Operating Profit, **Period:**, Year 1, Year 2, Year 2, Year 4, Year 5, Yeae 6, Year 7, Year 8, Year 9, Year 10.

In this section, a detailed analysis of the total revenue of Granja X will be presented. Additionally, variable and fixed costs will be examined, detailing their impact by category and comparing them with other cost centers, highlighting areas of efficiency and potential opportunities for cost reduction.

Table 9 presents a summary of the results involving Revenue, Variable Costs, Contribution Margin, Fixed Costs, and Profit. Graph 6 displays the results graphically, allowing for better visualization.

Figure 9 allows for a clearer visualization of the result calculation—DRE of Granja X—over a period of 5 years, showing the different impacts on the revenue generated by the farm in its egg production activities.

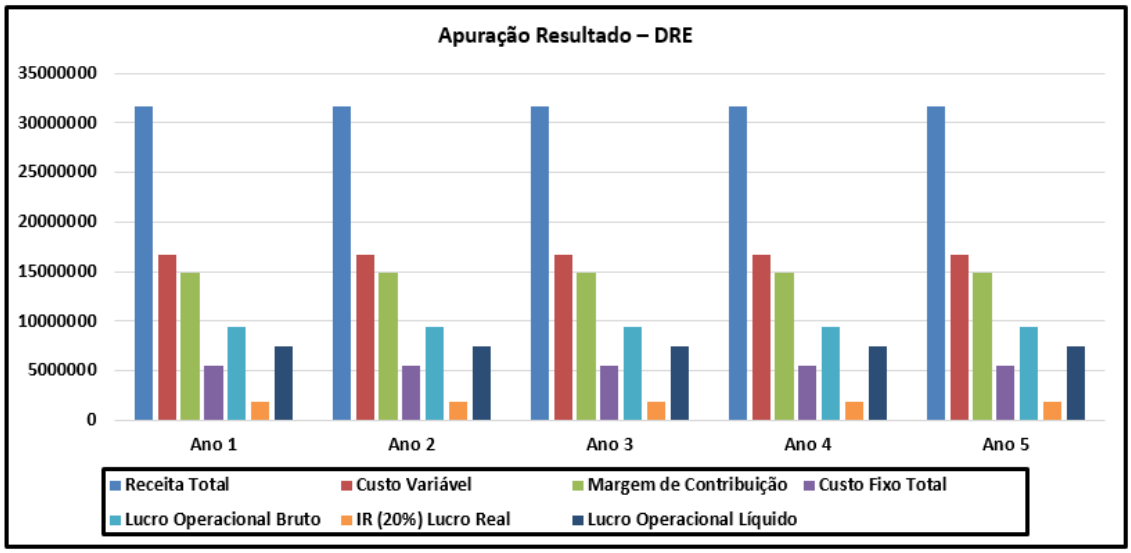

Figure 9. Income Statement Analysis Chart - DRE
Source: Own elaboration (2024).

Table 10 presents the proportional data in percentages regarding Granja X's revenue. Considering the data from the first year, the constant annual revenue is R$ 31,610,885.52. The variable costs total R$ 16,709,747.24 annually, representing 52.86% of the revenue, while the contribution margin of R$ 14,901,138.28 corresponds to 47.14% of the revenue. These figures indicate a significant contribution margin for maintaining the operations of Granja X.

Table 10
Overview of Impacts on Revenue and Costs

Items	Costs (R$)	Cost Impact	Revenue Impact
Total Revenue	**31.610.885.52**		
Variable Cost	**16.709.747,24**	**52,86%**	
Contribution Margin	**14.901.138.28**		**47,14%**

Feed Factory	559.450,80	6,60%	1,77%
Branch Expenses	240.200,04	2,83%	0,76%
Head Office Expenses	318.579,96	3,76%	1,01%
Chick Expenses	645.560,04	7,61%	2,04%
Classification Expenses	2.107.687,08	24,86%	6,67%
Administrative Expenses	3.712.035,96	43,78%	11,74%
Transportation Despenses	470.438,76	5,55%	1,49%
Manure Expenses	425.040,00	5,01%	1,34%
Total Fixed Cost	**8.478.992,64**	**26,82%**	
Income Tax (IR)	**1.284.429,13**	**4,06%**	

The fixed costs of the company are detailed as follows: Feed Mill: R$ 559,450.80 (1.77% of revenue); Branch Expenses: R$ 240,200.04 (0.76% of revenue); Headquarters Expenses: R$ 318,579.96 (1.01% of revenue); Chicks Expenses: R$ 645,560.04 (2.04% of revenue); Classification Expenses: R$ 2,107,687.08 (6.67% of revenue); Administrative Expenses: R$ 3,712,035.96 (11.74% of revenue); Transportation Expenses: R$ 470,438.76 (1.49% of revenue); Manure Expenses: R$ 425,040.00 (1.34% of revenue). The total fixed cost is R$ 8,478,992.64 per year, which represents 26.82% of the total revenue. The income tax for Granja X corresponds to 20% of the revenue, totaling R$ 1,284,429.13, representing 4.06% of net sales revenue.

In Table 8, it is possible to visualize the final result of Granja X. The gross operating profit of the company is R$ 6,422,145.64 annually. The net operating profit is the profit generated solely from business operations, after deducting administrative, commercial, and operational expenses. Considering the income tax of 20% on the actual profit, which totaled R$ 1,284,429.13, the net operating profit of Granja X was R$ 5,137,716.51, representing 16.25% of net sales revenue. This amount reflects the effective profit of the operation after tax deductions.

Table 11
Analysis of Total Values of Granja X

Apuração de Resultado - DRE	PERÍODO									
	ANO 1	ANO 2	ANO 3	ANO 4	ANO 5	ANO 6	ANO 7	ANO 8	ANO 9	ANO 10
1 - Receita										
Total de Receita	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52	31.610.885,52
2 - Custo Variável										
Custo Variável TOTAL	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24	16.709.747,24
3 - Margem de Contribuição	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28	14.901.138,28
4 - Custo Fixo										
FAB-RAÇÃO	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80	559.450,80
DESP-FILIAL	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04	240.200,04
DESP-MATRIZ	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96	318.579,96
DESP-PINTAINHAS	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04	645.560,04
4.15 Aluguel	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00	127.200,00
DESP-CLASIF	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08	2.107.687,08
DESP-ADM	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00	2.852.036,00
DESP-TRANSP	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76	470.438,76
DESP-ESTERCO	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00	425.040,00
Custo Fixo Total	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68	7.618.992,68
5 - Lucro Operacional Bruto	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56	7.282.145,56
6 - IR (20%) Lucro Real	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11	1.456.429,11
7 - Lucro Operacional Líquido	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44
8 - Lucro Operacional Liquido Anual	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44	5.825.716,44

Note. Translation of terms: Result Calculation - Income Statement (DRE), 1 - Revenue, Total Revenue, 2 - Variable Cost, Total Variable Cost, 3 - Contribution Margin, 4 - Fixed Cost, Production, Headquarters Expenses, Chick Expenses, Rent, Classification Expenses, Administrative Expenses, Transport Expenses, Manure Expenses, Total Fixed Cost, 5 - Gross Operating Profit, 6 - Income Tax (20%) Actual Profit, 7 - Net Operating Profit, 8 - Annual Net Operating Profit. Period: Year 1, Year 2, Year 3, Year 4, Year 5, Year 6, Year 7, Year 8, Year 9, Year 10.

Figure 10 provides a better visualization of the results from Table 11.

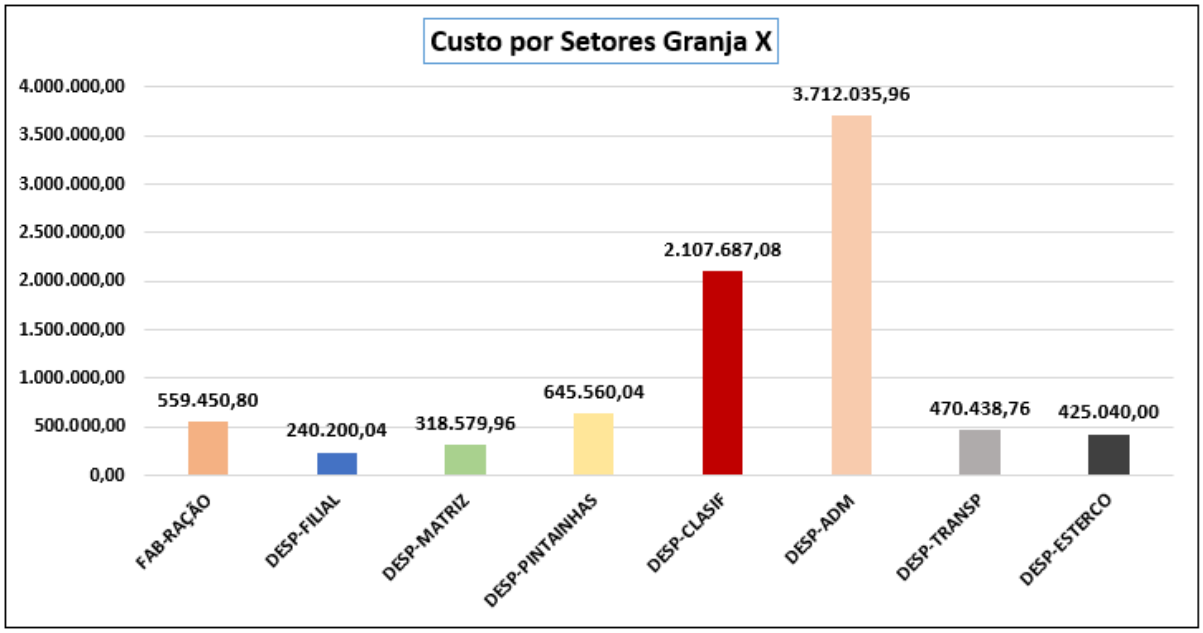

Figure 10. Chart of Total Costs for Granja X

Note. Fonte: Elaboração própria (2024). Translation of terms: **Cost by Sectors Granja X**: Production, Branch Expenses, Headquarters Expenses, Chick Expenses, Classification Expenses, Administrative Expenses, Transport Expenses, Manure Expenses.

Continuous analysis and strategic management of these costs will be crucial for long-term financial success.

6.4 FINANCIAL VIABILITY ANALYSIS

The financial evaluation was conducted considering the projected Cash Flow for five years, as demonstrated in Table 11 (Annual Net Operating Profit of **R$ 5,137,716.51**), including the initial investment of R$ 21,500,000.00.

After projecting the DRE of the company, a financial viability analysis of the investments was carried out, calculating the Net Present Value (NPV), Profitability Index on Revenue (PIR), Internal Rate of Return (IRR), and discounted Payback, as presented in Table 12.

Table 12
Financial Indicators of Granja X

INVESTMENT	-R$ 21.500.000,00
TMA	10,25%
VPL	R$31.232.831,13
VPL	R$9.732.831,13
IL	1,45
TIR	20%
PAY BACK	5 anos

Note. Translation of terms: TMA - Annualized Minimum Rate (Taxa Mínima Anual). VPL - Net Present Value (Valor Presente Líquido), IL - Internal Rate of Return (Taxa Interna de Retorno), TIR - Internal Rate of Return (Taxa Interna de Retorno), PAY BACK, 5 years.

The calculations for NPV, PIR, and Payback were made considering an opportunity cost or interest rate of 10.25% per year, equivalent to the approximate Selic rate.

The NPV, calculated at this rate, resulted in R$ 9,732,831.13. According to the evaluation criteria, projects with a positive NPV should be accepted. This NPV indicates that the invested capital was recovered at a rate of 10.25% per year, in addition to generating an additional appreciation of R$ 9,732,831.13.

The Profitability Index (PIR) was also calculated at a rate of 10.25% per year, resulting in 1.45. According to the acceptance criteria, projects with a PIR above 1 are viable. A PIR of 1.45 means that the invested capital has been fully recovered.

The IRR found was 20%. According to the rule, projects with an IRR higher than the discount rate used in the NPV and preferably above the market rate (10.25% per year) should be accepted.

The Discounted Payback, which represents the time for the return of the invested capital considering the rate of 10.25% per year, was 5 years.

The evaluation criterion states that the shorter the payback period, the better. Therefore, the indicators presented suggest that the activities of Granja X demonstrate high profitability. However, it is important to note that the viability of the business depends on the proposed economic scenario. Changes in the economic environment, such as fluctuations in population income, changes in the national egg production structure, rising interest rates, and inflation, among other factors, can affect the obtained indices and jeopardize the business. These risks are inherent to any activity, as Granja X has no control over these variables.

Considering the investment evaluation criteria of NPV, where only projects with a value above zero should be validated (Ross et al., 2015); of PIR, which states that only projects with a rate above 1 should be accepted; and of IRR, which requires a positive rate greater than the

minimum attractive rate (Neto, 2014), the presented indices confirm the financial viability of Granja X, located in the municipality of Céu Azul, PR.

7. CONTRIBUTIONS TO PRACTICE

During the intervention, it was initially possible to identify the present risks and gain a detailed understanding of Granja X through visual studies and personal conversations with the owner. By detecting issues such as the absence of specific spreadsheets and the lack of an integrated management system for all sectors of the farm, a new perspective on the enterprise emerged. It became clear how important it was to raise awareness about the costs and profitability of the products offered by the farm.

Significant changes were suggested, including stricter record-keeping of expenses and organizing accounts by specific sectors. These measures were implemented, facilitating the analysis of results after a period of more accurate records. During meetings with employees, questions arose that led the owner to reconsider aspects of the business, such as the management of the egg classification sector and the optimization of administrative expenses and the feed factory, both of which had high production costs.

Throughout the operational development, Granja X made progress in the meticulous categorization of expenses, costs, and revenues by specific sectors, introducing a dedicated spreadsheet for detailed analysis of its financial flows. Additionally, the farm adopted a systematic approach to document its processes and methods, clearly establishing the responsibilities and roles of each employee in every operational area. These initiatives not only strengthened internal management but also facilitated a deeper and more efficient understanding of the farm's business model.

In early 2023, Granja X launched a new egg classification strategy aimed at increasing profits and consolidating its position in the Brazilian market. After several months of adjustments and implementations to improve operations as needed, the owner analyzed quantitative data and found that under the best conditions, the farm achieves significant profits, despite fluctuations in the costs of feed ingredients. This analysis led to the conclusion that maintaining strict cost control is crucial, especially during periods of economic instability and high inflation, which pose substantial risks to the business.

Through the information collected, systematized, and analyzed, the results of the financial viability study were presented to the owners of Granja X, who were surprised and grateful to learn about the farm's financial results.

This outcome not only bolstered the owners' confidence in the farm's strategic direction but also established a starting point for future analyses and adjustments that promote sustainable and profitable growth.

To further enhance management and cost control, it was suggested that Granja X implement a computerized poultry management system for egg production. This system will automate the recording of all expenses, revenues, and operational processes, facilitating detailed data analysis. With this technology, it will be possible to monitor production costs in real time, promptly identify budget deviations, and make more informed and rapid decisions. Moreover, the system will integrate all areas of the farm, from the procurement of supplies, the raising of chicks, to the marketing of eggs, providing a comprehensive view of the business and driving efficiency and profitability. Ultimately, the intervention at Granja X not only revealed opportunities for operational and financial improvement but also strengthened the fundamental pillars of strategic management.

8. FINAL CONSIDERATIONS

This work aimed to analyze the financial viability of egg production, chick rearing, and feed manufacturing at Granja X. Initially, an investment of R$ 21,500,000.00 was identified for strategic sectors to operationalize the farm. After suggesting the implementation of revenue and cost records, an annual cash flow of R$ 4,105,716.41 was generated. Based on the investment and cash flow, the financial viability indices of NPV (Net Present Value), PI (Profitability Index), IRR (Internal Rate of Return), and Payback were calculated, all yielding positive results at a Minimum Attractive Rate of 10.25%, confirming the investment's financial viability.

This study significantly contributed to demonstrating how improvements in monitoring and analysis processes can transform management, enhancing the effectiveness of strategic decisions. This was evident in the owner's expression of gratitude during the presentation of the work's results to the owner of Granja X.

It is important to emphasize that every owner should understand their company's cost structure and the financial viability of their enterprise. In this case, rural property management still leaves much to be desired. Thus, the relevance of conducting analyses that bring improvements to processes and knowledge to the owners about their business became apparent, as many of them do not comprehend the minimum necessary about the functioning of their rural property in practice.

For future projects, it is recommended to prioritize the implementation of systems for recording and monitoring financial transactions and costs, thereby simplifying the conduction of financial viability analyses. Ultimately, this study not only validated the financial viability of Granja X but also provided valuable insights to enhance its financial and operational management.

BIBLIOGRAPHY

Albino, L. F. T., Carvalho, B. R., Maia, R. C., & Barros, V. R. S. M. (2014). *Galinhas poedeiras: Criação e alimentação*. Viçosa, SP: Aprenda Fácil.

Alves-Mazzotti, A. J. A. (2006). Usos e abusos dos estudos de caso. *Cadernos de Pesquisa*, 36(129), 637-651.

Amaral, G. F., Guimarães, D., Nascimento, J. C., & Custodio, S. (2016). Avicultura de postura: estrutura da cadeia produtiva, panorama do setor no Brasil e no mundo e o apoio do BNDES. *BNDES Setorial*, 43, 167-207.

Andrade, M. M. (2010). *Introdução à metodologia do trabalho científico: Elaboração de trabalhos na graduação*. São Paulo: Atlas.

Andriguetto, J. M. (1983). *Nutrição animal: Alimentação animal*. São Paulo: Nobel.

Assaf Neto, A., & Lima, F. G. (2009). *Curso de administração financeira.* São Paulo: Editora Atlas.

Associação Brasileira de Proteína Animal, ABPA. (2022). *Relatório anual 2022.* Disponível em: http://abpa-br.org/abpa-lanca-relatorioanual-2022/.

Associação Brasileira De Proteína Animal, ABPA. (2021). *Relatório anual 2021*. Disponível em: http://abpa-br.org/abpa-lanca-relatorioanual-2021/.

Avila, V. S.; Soares, J. P. G. (2010). Produção de ovos em sistemas orgânicos. Concórdia, SC: Embrapa Suínos e Aves.

Beuren, I. M. (2013). *Como elaborar trabalhos monográficos em contabilidade: Teoria e prática*. São Paulo: Editora Atlas.

Camloffski, R. (2014). *Análise de investimentos e viabilidade financeira das empresas*. São Paulo: Editora Atlas.

Crepaldi, S. A. (2006). *Contabilidade Rural: uma abordagem decisorial.* 4ª ed. São Paulo: Atlas.

Crepaldi, S. A. (2009). *Contabilidade Rural: uma abordagem decisorial.* 5ª ed. São Paulo: Atlas.

Crepaldi, S. A**.** (2011). *Contabilidade rural: uma abordagem decisorial,* 7ª ed. São Paulo: Atlas.

Creswell, J. W. (2010). *Projeto de Pesquisa: Métodos qualitativo, quantitativo e misto*. Porto Alegre, RS: Artmed.

Dal Magro, C. B.; Vogt, M.; Degenhart, L.; Cunha, L. C. & Rosa, F. S. (2016). Contabilidade rural e de custos aplicada à atividade leiteira. ABCustos: Associação brasileira de custos,11(2), 96-125.

Diel, F. J.; Diel, E. H.; Schulz, S. J.; Chiarello, T. C.; & Silva, T. P. (2014). Análise da eficiência econômico-financeira das empresas pertencentes ao agronegócio brasileiro. *Contextus – Revista Contemporânea de Economia e Gestão*, 12(2), 116–133.

Farias Filho, M. C.; Arruda Filho, E. J. M. (2015). *Planejamento da Pesquisa Científica.* São Paulo: Editora Atlas.

Fernandes, E. M. (2012). *Análise de custo na agroindústria: um estudo de caso aplicado em uma empresa do ramo avícola* (Trabalho de Conclusão de Curso). Universidade do Extremo Sul Catarinense, Criciúma, SC.

Ferreira, R. J. (2007). *Contabilidade de custos: teoria e questões comentadas.* 4ª ed. Rio de Janeiro: Editora Ferreira.

Armelin Filho, J. (2011) *Contabilidade rural: metodologia para registros das atividades de pequenas propriedades rurais* (Monografia de Especialização). Faculdade Estadual de Ciências Econômicas de Apucarana, Apucarana, PR.

Lima Filho, R. N., & Bruni, A. L. (2012). Percepção dos Graduandos em Ciências Contábeis de Salvador (BA) Sobre os Conceitos Relevantes da Teoria da Contabilidade. *Revista De Educação E Pesquisa Em Contabilidade*, 6(2), 187-203.

Greca, F. M.; Barddal, R. L.; Ravache, S. C.; Silva, D. G.; Catapan, A.; & Martins, P. F. (2014). Análise de um projeto de investimento para minimização de quebras de estoque com a utilização da metodologia multi-índices e da simulação de Monte Carlo. *Gestão, Inovação e Tecnologias*, 4(3), 1092-1107.

Groppelli, A. A, & Nikbakht, E. (2005). *Administração financeira.* São Paulo: Editora Saraiva.

Hirschfeld, H. (2012). *Engenharia econômica e análise de custos: aplicações práticas para economistas, engenheiros, analistas de investimentos e administradores*. São Paulo: Editora Atlas.

Hoji, M. (2003). *Administração financeira uma abordagem prática.* São Paulo: Editora Atlas.

Hoss, O., Casagrande, L. F., Vesco, D. G. D., & Metzner, C. M. (2012). *Introdução a Contabilidade.* São Paulo: Editora Atlas.

Kassai, J. R., Kassai, S., Santos, A., & Assaf Neto, A. (2000). *Retorno de investimento: abordagem matemática e contábil do lucro empresarial*. São Paulo: Editora Atlas.

Kruger, S. D.; Glustak, E.; Mazzioni, S.; Zanin, A. (2014). A contabilidade como instrumento de gestão dos estabelecimentos rurais. *Revista De Administração Contabilidade E Sustentabilidade*, 4(2), 134-153.

Kruger, S. D.; Ortolan, C.; Diel, E. H.; Diel, F. J.; Mazzioni, S. (2015). Análise dos resultados da atividade leiteira: custo histórico versus valor justo dos ativos biológicos. *Extensão Rural*, 22(3), 68–88.

Kruger, S. D., Ceccatto, L., Mazzioni, S., Di Domenico, D., & Petri, S. M. (2017). Análise Comparativa da Viabilidade Econômica e Financeira das Atividades Avícola e Leiteira. *Revista Ambiente Contábil*, 9(1), 37–55.

Lapponi, J. C. (2000). *Projetos De Investimento: Construção E Avaliação Do Fluxo De Caixa.* São Paulo: Lapponi Treinamento e Editora.

Lemes Junior, A. B., Rigo, C. M., & Cherobim, A. P. (2005). *Administração financeira. Princípios, fundamentos e práticas brasileiras.* Rio de Janeiro: Elsevier.

Lopes, J. C. O. (2011). *Técnico em Agropecuária - Avicultura.* São Paulo, Rede e-Tec Brasil.

Luz, J. C. (2020). *Análise de Comércio Internacional: a relação sino-brasileira de commodities agrícolas*. Monografia apresentada à faculdade de Ciências Jurídicas e Sociais do Centro Universitário de Brasília, Brasília.

Máquinas Agrícolas Jacto S/A. (2019). *Conheça os principais países líderes em produção agrícola*. Disponível em: <https://blog.jacto.com.br/agricultura-mundial/>.

Marion, J. C. (2012). *Contabilidade rural: contabilidade agrícola, contabilidade da pecuária, imposto de renda – pessoa jurídica*. São Paulo: Editora Atlas.

Markus, E. (2014). Estudo da viabilidade financeira da implantação de equipamentos, visando a modernização de uma pequena propriedade rural avícola integrada de matrizes pesadas (Trabalho de Conclusão de Curso). Centro Universit´rario Univates. Lajeado-RS.

Martins, E. (2003). *Contabilidade de custos.* São Paulo: Editora Atlas.

Matias-Pereira, J. (2016). *Manual de metodologia da pesquisa científica.* São Paulo: Editora Atlas.

Megliorini, E. (2001). *Custos.* **S**ão Paulo: Editora Atlas.

Moraes, J. E. (2018). *Indicadores de bem-estar de linhagens de poedeiras comerciais leves alojadas em cinco densidades no sistema convencional de produção de ovos* (Tese de Doutorado). Universidade de São Paulo, Pirassununga, SP.

Moraes, R. C., & Da Silva, J. C. C. (2020). Análise da viabilidade econômico-financeira de um terminal de contêineres para o Porto de São Sebastião. *Revista Fatec Zona Sul*, 6 (4), 1-14.

Mota-Roth, D., & Hendges, G. H. (2010). *Produção Textual na Universidade*. São Paulo: Parábola Editorial.

Moura, J. B. (2018). *Produção e exportação de ovos de poedeiras comerciais no Brasil* (Dissertação de Mestrado). Universidade Brasil, Descalvado, SP.

Oliveira, L. M., & Perez Jr, J. H. (2000). *Contabilidade de custos para não contadores.* São Paulo: Editora Atlas.

Oliveira Filho, P. A., (2018). Inovações na formação e manejo dos ciclos de produção das poedeiras. *Revista Científica de Avicultura e Suinocultura*, 4(1), 1-11.

Reis, T. L. (2019). Influência do sistema de criação em piso sobre cama e gaiola sobre as características ósseas e a qualidade físico-química e microbiológica de ovos de galinhas. Arquivo Brasileiro de Medicina Veterinária e Zootecnia, 71 (5), 1623-1630.

Richardson, R. J. (2008). *Pesquisa Social - Métodos e Técnicas*. São Paulo: Editora Atlas.

Samanez, C. P. (2009). *Engenharia econômica.* São Paulo: Pearson Prentice Hall.

Secretaria de Estado de Meio Ambiente, Desenvolvimento Econômico, Produção e Agricultura Familiar - SEMAGRO. *Como ter uma criação de poedeiras.* **(**2015). Disponível em: https://www.semadesc.ms.gov.br/como-ter-uma-criacao-de-galinhas-poedeiras/

Serafim J. (2018). Energia fotovoltaica residencial: uma análise econômico financeira de viabilidade. *Revista de Ciências Empresariais da UNIPAR*, 19 (2), 273-290.

Silva, M. G. (2019). Análise da rentabilidade em avicultura: uma avaliação do setor de produção avícola no IFPB-Campus Sousa. *Agropecuária Científica no Semiárido*, 14 (4), 339-344.

Stark, J. A. (2007). *Contabilidade de custos.* São Paulo: Pearson Prentice Hall,

Swerts, G. B. A., & Cardoso, R. L. (2013). A Teoria das Receitas e Despesas. *Revista De Contabilidade Do Mestrado Em Ciências Contábeis Da UERJ*, 5(2), 48–60.

Taborda, J. V. S. (2018). Viabilidade econômica do sistema cage-free para poedeiras comerciais. *Research, Society and Development*, 11 (1), 1-13.

Vergara, S. C.(2016). *Projetos e Relatórios de Pesquisa em Administração*. São Paulo: Editora Atlas.

Wernke, R. (2005). *Análise de custos de venda: ênfase em aplicações e casos nacionais.* São Paulo: Saraiva.

Yin, R.K. (2005). *Estudo de caso: planejamento e métodos*. Porto Alegre, RS: Bookman.

Zago, C. A., Weise, A. D., & Hornburg, R. A. (2009). *A importância do estudo de viabilidade econômica de projetos nas organizações contemporâneas.* In: Anais do VI CONVIBRA - Congresso Virtual Brasileiro de Administração, p. 1-15.

Zanin, A., Favretto, J., Possa, A., Mazzioni, S., & Zonatto, V. C. S. (2015). Apuração de custos e resultado econômico no manejo da produção leiteira: Uma análise comparativa entre

o sistema tradicional e o sistema freestall. *Organizações Rurais & Amp; Agroindustriais*, 17(4), 431-444.

Zanin, A., Oenning, V., Tres, N., Kruger, S. D., & Gubiani, C. A. (2014). Gestão das propriedades rurais do Oeste de Santa Catarina: as fragilidades da estrutura organizacional e a necessidade do uso de controles contábeis. *Revista Catarinense Da Ciência Contábil*, 13(40), 9–19.