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Evaluating sustainable practices in broiler production: A Life Cycle Analysis in Goiás, Brazil

Avaliação de práticas sustentáveis na produção de frangos de corte: uma análise do ciclo de vida em Goiás, Brasil

Valquiria Duarte Vieira Rodrigues[1], Alcido Elenor Wander[2], Valdiva Rossato de Souza[3]

ABSTRACT: This study analyzed the potential for implementing sustainable management practices in broiler chicken production in Goiás, focusing on the entire life cycle, from raw material acquisition to end-of-life. Using a case study approach, data from various stages - storage, distribution, production, and processing were integrated. Key findings include the importance of balanced feeding in raw material sourcing, with attention to grains, proteins, and supplements. Industrial-scale production was examined, emphasizing advanced technologies for optimal chicken development. Sustainability practices were highlighted in the use and end-of-life phases, including incineration, recycling, and composting. Limitations include the case study's scope and potential underestimation due to limited data. Future research should explore regions and production systems, conduct comparative studies, and incorporate sustainability indicators. Despite its limitations, the study provides valuable insights into sustainable poultry practices and emphasizes the need for broader, context-driven research.

Keywords: Sustainability; Poultry industry; Broiler chicken; Chicken fillet; Value chain

RESUMO: Este estudo analisou o potencial para implementar práticas de manejo sustentáveis na produção de frangos de corte em Goiás, com foco em todo o ciclo de vida, desde a aquisição da matéria-prima até o fim da vida. Usando uma abordagem de estudo de caso, dados de vários estágios - armazenamento, distribuição, produção e processamento foram integrados. Os principais resultados encontrados incluem a importância do suprimento balanceado no fornecimento de matéria-prima, com atenção aos grãos, proteínas e suplementos. A produção em escala industrial foi examinada, enfatizando tecnologias avançadas para o desenvolvimento ideal dos frangos. As práticas de sustentabilidade foram destacadas nas fases de uso e fim da vida, incluindo incineração, reciclagem e compostagem. As limitações incluem o escopo específico do estudo de caso e a potencial subestimação devido a dados limitados. Pesquisas futuras devem explorar diferentes regiões e sistemas de produção, conduzir estudos comparativos e incorporar indicadores de sustentabilidade. Apesar de suas limitações, o estudo fornece insights valiosos sobre práticas sustentáveis de aves e enfatiza a necessidade de pesquisas mais amplas e orientadas pelo contexto.

Palavras-chave: Sustentabilidade; Avicultura de corte; Carne de aves; Filé de frango; Cadeia de valor

Corresponding author: Alcido Elenor Wander
E-mail: alcido.wander@embrapa.br

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[1] PhD in Agribusiness from Federal University of Goiás (UFG), Goiania (GO), Brazil.
[2] PhD in Agricultural Sciences (Agricultural Economics) from Georg-August-University of Göttingen, Göttingen, Germany. Senior Researcher at Brazilian Agricultural Research Corporation (EMBRAPA), Santo Antonio de Goiás (GO), Brazil.
[3] PhD in Controlling and Accounting from University of São Paulo (USP), São Paulo-SP, Brazil. Professor at Mato Grosso State University (UNEMAT), Cuiaba (MT), Brazil.

1 INTRODUCTION

Brazil is a privileged nation with abundant natural resources and stunning landscapes. This natural gift plays a crucial role in driving economic growth, especially in the agricultural sector, which is a key pillar of the Brazilian economy.

Agriculture, a true economic engine of the country, is fueled by the vitality of its natural resources. Essential to agricultural production, these resources enable the cultivation of diverse crops across all regions of Brazil, contributing to consistent annual increases in production.

However, it is imperative to rethink the agricultural production model in favor of sustainability. The search for efficient use of natural resources becomes a priority. Initiatives such as conservation agriculture, which adopt practices such as direct planting and crop rotation, not only combat soil erosion but also promote the improvement of soil quality while saving water and energy.

In this scenario, an essential goal is to envision a future in which agricultural production prospers economically and preserves and optimizes natural resources. These practices safeguard our environment and ensure a sustainable legacy for future generations.

Regarding the specific case of poultry farming, several studies in Brazil have demonstrated different approaches to sustainable poultry farming. A project in Dourados implemented a semi-free-range organic system in a *quilombola*[4] community, resulting in increased income and improved weight gain of birds (Silva *et al.*, 2019). Research in Santa Catarina, evaluated environmental sustainability indices on poultry farms, identifying opportunities to improve soil slope and land-use practices (Heberle; Vogt, 2023). In Bahia, alternative feeding methods were introduced to reduce production costs for small-scale egg producers (Barboza *et al.*, 2020). In addition, poultry industry waste has the potential for sustainable biotechnological applications, such as extracting collagen and keratin for therapeutic materials and using fat for biodiesel production (Matos *et al.*, 2021).

However, when it comes to the poultry industry, the State of Goiás has stood out for presenting the most expressive performance in terms of slaughtering broiler chickens, as it grew 1,784% between 1997 and 2020, with chicken meat production reaching 932 thousand tons in the last year indicated in the survey (FIEG, 2023).

This analysis was structured based on the environmental diagnosis developed by Rodrigues, Wander, and Rosa (2023b), which examined the sustainability performance of Goiás's poultry industry. That baseline study quantified water use (7.5 liters/kg of chicken), energy consumption (0.42 kWh/kg), and estimated greenhouse gas emissions of 1.85 kg CO_2e per kilogram of chicken meat. These values served as reference parameters for interpreting the efficiency and environmental performance in the present life cycle analysis.

Regarding the disclosure of sustainability information to external users, studies by Rodrigues *et al.* (2023a) have already highlighted the crucial role of environmental accounting in assessing and managing environmental aspects in the poultry production chain. Such teachings align with the International Sustainability Standards Board (ISSB), which launched in June 2023 two global sustainability disclosure standards for business

[4] "A quilombola (Portuguese pronunciation: [kilõˈbɔlɐ]) is an Afro-Brazilian resident of quilombo settlements first established by escaped slaves in Brazil. They are the descendants of Afro-Brazilian slaves who escaped from slave plantations that existed in Brazil until abolition in 1888." (https://en.wikipedia.org/wiki/Quilombola).

entities, IFRS S1 and IFRS S2 (Köse; Çetin, 2023). IFRS S1 establishes general requirements for sustainability-related financial disclosures, while IFRS S2 focuses on climate-related disclosures (AVI, 2022). These standards aim to provide investors with information about companies' sustainability-related risks and opportunities (Köse; Çetin, 2023).

Through CVM Resolution 193, Brazil was the first country to mandate the adoption of these standards for publicly held companies, effective January 1, 2026, anticipating their translation.

Subsequently, the Federal Accounting Council (CFC) and the Brazilian Committee for Sustainability Pronouncements (CBPS) also offered a Joint Public Hearing on Technical Pronouncements CBPS 01 and CBPS 02 (translation of the original IFRS S1 and S2), which will culminate in the comprehensive adoption of the documents by all Brazilian entities.

Finally, on 10/17/2024, during the 1,112th Plenary Meeting of the Federal Accounting Council (CFC), the Brazilian Technical Accounting Standards for Disclosure of Sustainability Information (NBC TDS 01 and 02) were approved.

The poultry industry's sustainability has gained attention due to its environmental impacts and potential for improvement. Brazil is a leading exporter in the global poultry market, accounting for 59% of exports among major players in 2022. The industry's sustainability efforts focus on animal welfare, good practices, and quality control (Piccolo *et al.*, 2024).

However, the current scenario of the poultry industry requires increasing care when implementing and disseminating the requirements necessary for socio-environmental management in its production processes. In this sense, studies developed by Rodrigues *et al.* (2023b) focused on providing information on the physical environmental flows of the poultry production chain, analyzing actions such as "forestry diagnosis, waste generation, water resources, energy and emissions, environmental management and accounting" to demonstrate the sector's economic and financial performance.

Rodrigues *et al.* (2023b) emphasized the need to develop studies "on the need for organizations to implement environmental control", in a way that is connected to Environmental Accounting, when they detected that there is "a gap regarding its applicability in different production processes or in a set of processes (production chains)". Such observations align with the legal precepts issued in Brazil by Technical Pronouncements CBPS No. 01 and 02.

CBPS Technical Pronouncement No. 01 will now "require the entity to disclose information about its sustainability-related risks and opportunities that are useful to the main users of financial reports", to provide more assertive decision-making processes by external users of financial information (CBPS No. 01, 2024).

The adoption of Sustainability Technical Pronouncements aligns with long-standing concerns about the need for entities to record, measure, and disclose environmental accounting. Companies in various sectors, sizes, and segments have already prepared specific sustainability reports, such as the Sustainability Report and, more recently, the Integrated Report, but separately from their Financial Statements.

Aiming to alleviate this gap, CBPS Technical Pronouncements No. 01 and 02 present guidelines that will guide entities in aligning Sustainability-oriented Statements with their Financial Statements, with guidance pertinent to the materiality of risks and

opportunities related to corporate sustainability and Climate Change, which have reasonable expectations of affecting the entity's prospects (CBPS, 2024).

Another important point reached by Technical Pronouncements CBPS No. 01 concerns the requirement that information related to Sustainability be disclosed simultaneously with their respective Financial Statements. This will improve the decision-making process for external users and enhance the comparability of the information presented (CBPS No. 01 2024).

To this end, companies must pay attention to fundamental points presented in Technical Pronouncement CBPS No. 01, such as Governance, relevant to the processes, internal controls and procedures adopted by the entity; Strategies, to manage risks and opportunities related to sustainability; and Metrics and Targets, to allow users of financial reports to understand the entity's performance concerning its risks and opportunities related to sustainability (CBPS No. 01 2024).

Regarding the poultry industry, Technical Pronouncement CBPS No. 02, which explicitly addresses Climate-Related Disclosures, details the key risks that entities must disclose, including greenhouse gas emissions, energy management, water resource management, land use and ecological impacts, and the supply of animals and feed. These metrics demonstrate the magnitude of the need for risk points that deserve attention in this sector of activity due to its scope in terms of the production chain, involving several production phases, among which the following stand out: breeding, slaughter, processing, packaging, and transportation of products (CBPS No. 02 2024).

Given the needs listed here, this study will analyze the Process Flow of Chicken Breast Fillet Production in the poultry industry and present suggestions for implementing Sustainable Management during its production chain.

Therefore, this study is structured in four sections, complementing this introduction. The second section presents the theoretical framework, providing a conceptual basis for understanding the need to disclose sustainability information in the Brazilian poultry industry. The third section details the methodology used to collect and interpret the data, ensuring the robustness and accuracy of the analysis. Then, the fourth section presents the results and begins discussing their implications for sustainable management in broiler production. Finally, the conclusion summarizes the main findings and discusses possible directions for future research in this field.

2 MATERIALS AND METHODS

The methodological approach used in this study was the case study method. This method was motivated by the fact that case study is widely recognized as a commonly used research methodology in various areas, such as social sciences, business and education. This method is especially valuable when researchers seek to conduct an in-depth investigation into a specific situation in its real context, explore complex relationships, or examine elements that cannot be easily controlled, as Yin (2010) highlighted.

The selection of chicken breast fillet as the object of study was motivated by its recognition as a significant component in the global diet. According to ABPA (2023),

Brazilian chicken production is one of the largest in the world. In addition, the choice of chicken breast fillet is relevant for several reasons: it is a source of lean protein, containing less fat compared to other meats, such as red meat; chicken is an excellent source of high-quality protein; and it is considered versatile in global cuisine, factors that contribute to the complexity of the investigation carried out in this study.

It is important to highlight that the quantitative results presented in Rodrigues et al. (2023b) were obtained from field data and environmental accounting records of the same poultry industry analyzed herein. In the present study, these data serve as secondary inputs, enabling a life cycle interpretation consistent with the environmental management accounting perspective.

3 RESULTS AND DISCUSSION

Rodrigues *et al.* (2023b) outlined that the broiler production chain investigated comprises several segments. This chain includes a grain warehouse, two feed mills, four breeding and rearing breeders, a hatchery, two processing plants (slaughterhouse), a flour and oil factory, an industrialization facility (factory), two chemical treatment plants, and Distribution Centers.

The basic research carried out by Rodrigues *et al.* (2023b), which conducted a sustainability diagnosis of the broiler production chain using the Environmental Management Accounting (EMA) perspective, revealed critical gaps in the availability of detailed environmental information. Specifically, the EMA diagnosis highlighted the need for quantitative metrics on resource consumption and waste generation across the processing and end-of-life stages of the poultry value chain. The study, primarily exploratory and qualitative, identified specific environmental cost centers. Building upon these findings, the current research adopts the Life Cycle Assessment (LCA) methodology. This methodological shift enables the detailed quantification of potential environmental impacts (such as global warming potential and acidification), thereby providing the specific, data-driven insights identified as necessary by the initial diagnostic study of Rodrigues *et al.* (2023b).

Figure 1 graphically presents the flow of the broiler production processes, mapping the five fundamental stages: acquisition of materials and raw materials, production, distribution and storage, use, and end of life.

Throughout the various stages of the broiler production chain, it is essential to consider the interconnections and interdependencies among the different sectors. The grain warehouse ensures a continuous supply of raw materials to the feed mills. These, in turn, play a central role in producing balanced feed for the breeding and rearing breeders, thereby directly contributing to the quality of the final product. The hatchery plays a vital role in ensuring the continuity of the reproduction cycle. In contrast, processing plants, flour and oil factories, and industrial facilities play specific roles in transforming and preparing products for consumption. Chemical Treatment Plants and Distribution Centers represent important links in ensuring the quality and safety of the product until it reaches the final consumer. Understanding these interactions is essential for a comprehensive analysis of the sustainability and efficiency of broiler production.

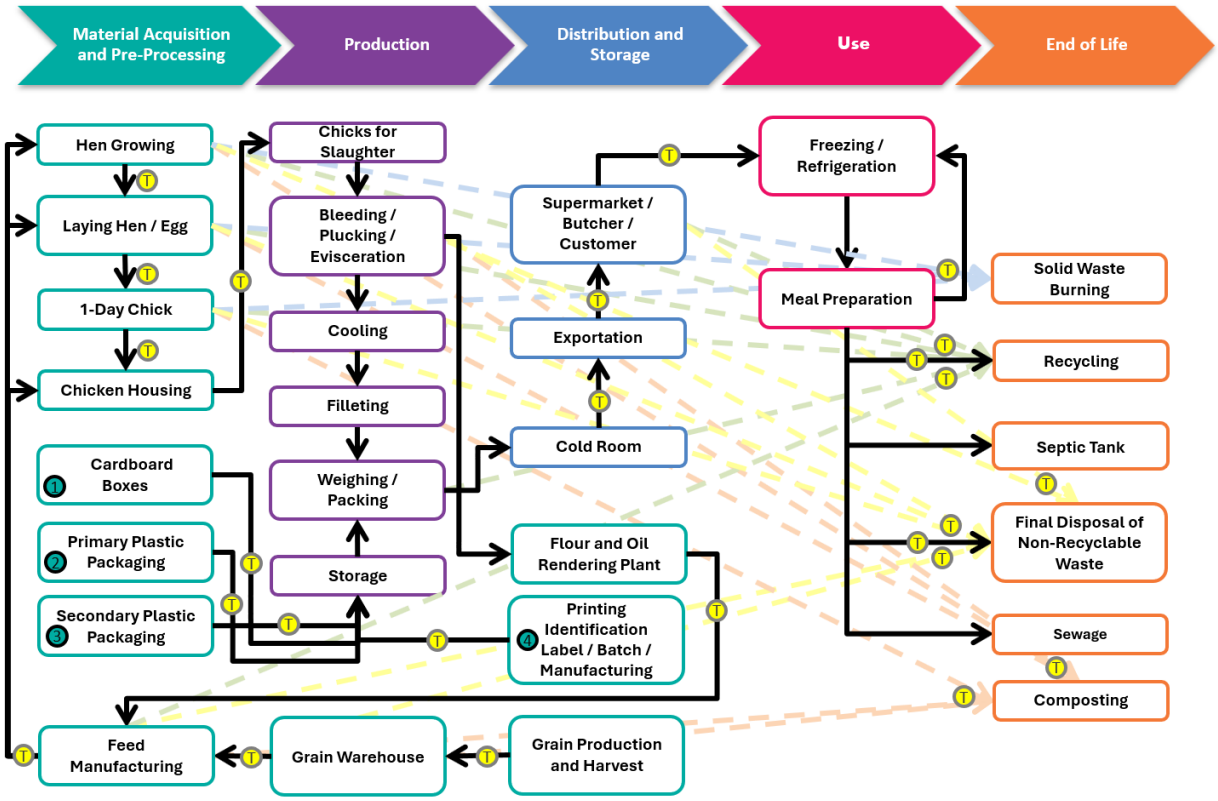

Figure 1. Process flow of 2 kg-breast fillet production

The life cycle of chicken breast fillets, shown in Figure 1, begins with the acquisition of raw materials, a process intrinsically linked to feeding chickens. Feeding, considered a crucial phase in the production of broiler chickens, plays a determining role in the quality of the final product. The fundamental ingredients in the feed composition include grains, proteins, minerals, vitamins and supplements. Among the most used grains and agricultural by-products, corn, soybeans, wheat and rice bran stand out. This careful selection of ingredients aims to ensure a balanced diet for chickens, directly influencing the healthy development of the birds and, consequently, the quality of the breast fillets produced.

The next step is processing, during which the birds are slaughtered and cut into various cuts, including breast fillets. Production, distribution and storage are essential parts of the life cycle, ensuring that the product reaches the end consumer with quality and safety. In this context, it is important to highlight that industrial-scale broiler chicken production plays a significant role in the global agricultural industry. The growing demand for chicken meat worldwide is driving large-scale poultry farming.

The facilities used for this industrial-scale production include air-conditioned warehouses equipped with advanced ventilation, heating, and cooling systems, providing an ideal environment for chicken growth. These are raised on floors with access to automated food and water, demonstrating the commitment to modern and sustainable practices throughout the entire production chain, from the initial phase to the proper disposal of the product, aiming to minimize environmental impacts.

Broiler chicken distribution and storage play a key role in the supply chain. Distribution is directly related to transporting broiler chicken from processing facilities to points of sale, such as supermarkets, restaurants, wholesalers and markets, using

refrigerated trucks. Refrigerated transport keeps the meat at safe temperatures to prevent deterioration of product quality.

Storage refers to the point at which chicken meat reaches the point of sale, where it is stored in cold rooms or freezers, depending on the product and demand. This process involves controlling temperature, using appropriate packaging, organization, hygiene, humidity and ventilation control, and health and food safety.

The broiler chicken production process ranges from the acquisition of materials and pre-processing to production, distribution and storage through to use and culminating in the final phase of the product's life cycle. This final stage involves practices such as incineration, recycling, use of septic tanks, disposal of non-recyclable waste, sewage treatment and composting, as shown in Table 1.

Table 1. Process flow of 2 kg-chicken breast fillet production

Action	Steps	Sustainable management
Obtaining raw materials and pre-processing	Planting and harvesting grains	1
	Grain storage in warehouses	2
	Manufacturing feed for different types of chickens	3
	Breeding of broiler breeders	4
	Laying chicken breeding	5
	Incubation of fertile eggs	6
	Accommodation of chicks by integrated producers	7
	Acquisition of materials that make up the packaging: Plastic, pigment and cardboard	8
	Production of plastic from petroleum	9
	Production of pigments and paints	10
	Production of cardboard and paper used	11
Production	Slaughter of live chicken	12
	Separation of non-consumable parts	13
	Cooling	14
	Separation of different cuts	15
	Thigh fillet packaging	16
	Packaging of boxes.	17
Distribution and storage	Road transport to the port	18
	Maritime transport of containers to other countries	19
	Road or rail transport to destination	20
	Packaging in refrigerated equipment	21
Use	Meal preparation	22
	Chilled meals for later consumption	23
End of life	Disposal of recyclable material for recycling	24
	Incineration of solid waste generated in the field	25
	Food waste and industrial processes for composting	26
	Plastic packaging and non-recyclable non-hazardous materials to landfill	27
	Human digestion waste to septic tank or municipal sewage	28

These approaches demonstrate the diversity of methods used to deal with the complete life cycle of broiler chicken responsibly, emphasizing the importance of sustainable and environmentally conscious practices.

Based on the previous diagnosis by Rodrigues *et al.* (2023b), the average environmental profile of Goiás's poultry sector includes feed efficiency of 1.7 kg of feed per kg of live weight, water consumption ranging between 6.8 and 8.2 liters/kg, and energy use of 0.4–0.5 kWh/kg of processed meat. Applying these baseline values, the sustainable management practices mapped in this study suggest potential reductions of up to 25% in water use and 18% in energy consumption through renewable energy adoption, better waste segregation, and circular management of organic residues.

To summarize the baseline environmental performance parameters that guided this study, Table 2 presents the key quantitative indicators reported by Rodrigues *et al.* (2023b), which served as reference data for the present life cycle analysis.

Table 2. Key environmental indicators from the baseline study were used as reference parameters for Life Cycle Analysis

Indicator	Unit	Value	Source
Feed conversion ratio	kg feed/kg live weight	1.7	Rodrigues *et al.* (2023b)
Water use	L/kg meat	7.5	Rodrigues *et al.* (2023b)
Energy use	kWh/kg meat	0.42	Rodrigues *et al.* (2023b)
GHG emissions	kg CO_2e/kg meat	1.85	Rodrigues *et al.* (2023b)

By analyzing the Chicken Breast Fillet Production Process Flow, twenty-eight steps and five actions were identified, from which suggestions for implementing Sustainable Management are presented. Sustainable management is a fundamental concept in natural resource management practices that aims to ensure the balanced and responsible use of environmental resources to meet current needs without compromising the ability of future generations to meet their own needs. This concept is widely applied in agriculture, forestry, fisheries, water management, and biodiversity conservation. This study mapped 25 management practices, as follows:

- **Sustainable management 1:** In organic farming, the aim is to reduce dependence on synthetic chemicals by implementing crop rotation and soil conservation practices. Certifications, technological innovations and social inclusion are adopted to create a more balanced agricultural model, environmentally, socially and economically.
- **Sustainable Grain Storage 2:** In sustainable grain storage, environmentally friendly practices include pest control without excessive chemicals, air quality monitoring, use of renewable energy, and traceability. Worker training and waste management ensure environmental sustainability and grain quality during storage.
- **Sustainable Management 3:** In chicken farming, sustainable management includes phases with specialized feed, diet adjustments, considerations for organic markets and quality control with low carbon footprint ingredients.
- **Sustainable Management 4:** Essential practices in the sustainable raising of broiler breeders include genetic selection, specific nutritional programs, animal welfare, reproductive management, health control, sustainable waste management, and technological innovations.

- **Sustainable Management 5:** In the sustainable raising of laying hens, sustainable housing, balanced feeding, efficient waste management, responsible use of antibiotics, search for animal welfare certifications and energy efficiency are adopted.
- **Sustainable Management 6:** Crucial practices are used to incubate fertile eggs, aiming to ensure high hatching rates and the health of the resulting chicks.
- **Sustainable Management 7:** In chick housing, sustainable practices include eco-efficient designs, low-impact building materials, energy efficiency, animal welfare, efficient waste management, and seeking sustainability certifications.
- **Sustainable Management 8:** When selecting packaging materials, priority is given to the use of recyclable, biodegradable and renewable materials to optimize the use of raw materials and reduce plastic.
- **Sustainable Management 9:** In sustainable plastic production, advanced strategies involve efficiency in oil extraction and refining, intensive recycling, research into biodegradable plastics and the use of renewable energy.
- **Sustainable Management 10:** In the production of pigments and paints for chicken breast, efficient practices include using sustainable raw materials, eco-efficient methods, and reducing toxic waste.
- **Sustainable Management 11:** In the production of cardboard and packaging paper, we seek materials from renewable or recycled sources, efficiency in resource use, energy-efficient technologies, and responsible waste management.
- **Sustainable Management 12:** When slaughtering a live chicken, sustainable practices seek to minimize environmental impacts, optimize efficiency and include animal welfare certifications and transparency in the supply chain.
- **Sustainable Management 13:** To separate non-consumable parts of broiler chicken, conscious and efficient practices involve the use of advanced technologies, responsible waste management, and transparency in the supply chain.
- **Sustainable Management 14:** In chicken breast chilling, sustainable practices include advanced technologies, responsible resource management and refrigeration methods with low greenhouse gas emissions.
- **Sustainable Management 15:** When separating different cuts of broiler chicken, sustainable management prioritizes efficient resource use, responsible waste management, sustainable packaging alternatives, and transparency in the supply chain.
- **Sustainable Management 16:** In the packaging of chicken breast fillets, sustainable management focuses on sustainable packaging materials, eco-efficient technologies, strategies for waste reduction and responsible management.
- **Sustainable Management 17:** When packaging chicken breast boxes, sustainable practices involve choosing sustainable packaging materials, eco-efficient technologies and strategies to reduce waste, and awareness and transparency in the supply chain.
- **Sustainable Management 18, 19 and 20:** In the road transport of chicken breast to the exporting port, efficient practices include route optimization, more sustainable vehicles, efficient fuel management, the search for reusable packaging and awareness in the supply chain.
- **Sustainable Management 21:** When storing chicken breasts in refrigerated equipment, sustainable management prioritizes the choice of equipment with eco-

efficient technologies, strategies to optimize storage space and responsible resource management.

- **Sustainable Management 22 and 23:** When preparing meals with broiler chicken, sustainable management adopts efficient practices, such as efficient use of energy, adequate waste management, selection of sustainable ingredients and transparency in the supply chain.
- **Sustainable Management 24:** When disposing of recyclable material for recycling, conscious practices involve adequate separation, effective collection methods, and the promotion of recycling as a sustainable alternative.
- **Sustainable Management 25:** In the incineration of solid waste generated in the field.

Given the above, the structural equation that represents the study's objective is to analyze the possibilities of carrying out sustainable management during the life cycle of broiler chicken production in the state of Goiás. The flowchart developed to illustrate this structural equation (Figure 2) focuses on environmental management and accounting, clearly highlighting the relationships between the concepts of "Environmental Accounting", "Contribution", "Sustainable Management" and "Broiler Production". This relationship is represented by the following sequence: Environmental Accounting → Contribution → Sustainable Management → Broiler Production.

The flowchart elements are described as follows: Environmental Accounting: Refers to the practice of recording, measuring and disclosing the environmental costs and benefits associated with an organization's activities; Contribution: Indicates the influence or impact that environmental accounting can have on other areas, especially in promoting sustainable practices; Sustainable Management: Refers to the management of resources and processes in a way that meets current needs without compromising the ability of future generations to meet their own needs; and Broiler Production: Refers to the raising and processing of chickens for consumption, with a focus on efficiency and sustainability throughout the life cycle.

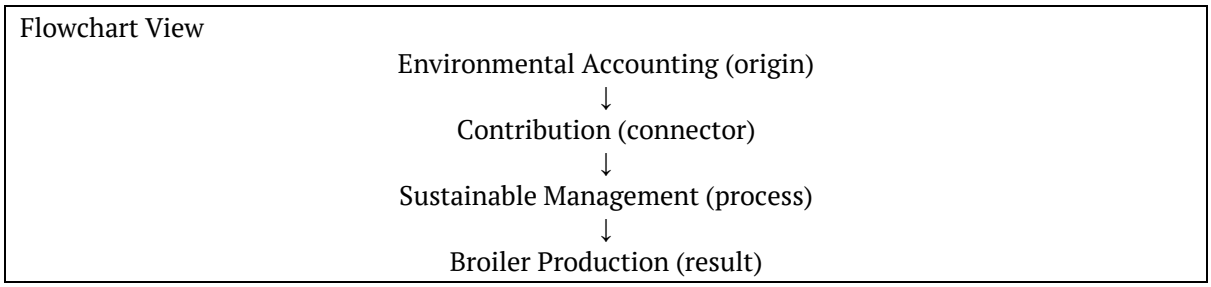

Figure 2. Structural flowchart

The integration of Environmental Accounting indicators with Life Cycle data allowed us to establish relationships between cost centers and environmental performance metrics reported by Rodrigues *et al.* (2023b), particularly in water, energy, and waste management. This approach supports the interpretation of Sustainable Management as both a managerial and accounting instrument.

In summary, the study meticulously mapped the broiler chicken production chain in Goiás state (Brazil), highlighting the complex interrelationship between the various stages, from obtaining the raw material to the end of the product's life cycle. Throughout

the broiler chicken life cycle, sustainable management emerges as a central element to ensure the efficiency and sustainability of the process. The structural flow chart (Figure 2) highlights the importance of environmental accounting and its contribution to sustainable management, reinforcing the need for responsible practices that integrate all links in the chain. By identifying twenty-five sustainable management practices, this study offers a valuable roadmap for improving broiler chicken production and promoting practices that balance economic needs with environmental responsibility. Adopting these sustainable practices enhances product quality and safety. It ensures that the poultry sector contributes positively to the preservation of natural resources, thus guaranteeing a more sustainable future for future generations. Therefore, the commitment to sustainability, evidenced through the mapped stages, is fundamental to driving the poultry industry towards a more responsible and conscious production model.

3.1 SUSTAINABLE PRACTICES IN THE POULTRY INDUSTRY

Sustainable industry practices refer to strategies and actions that aim to minimize industrial activities' environmental, social and economic impact, ensuring the preservation of natural resources and quality of life for future generations. These practices balance economic efficiency with environmental and social responsibility, promoting more conscious and responsible production.

- **Use of Renewable Energy**: The poultry industry is adopting renewable energy as one of the main practices to reduce its environmental impact. According to Rodrigues *et al.* (2023b), implementing solar panels on poultry farms has contributed significantly to reducing electricity consumption from non-renewable sources. This initiative not only reduces the carbon footprint but also generates savings for producers in the long term.
- **Waste Management**: Waste management is another critical aspect of sustainability in poultry farming. Rodrigues *et al.* (2023b) highlight that composting organic waste generated on farms is gaining popularity. This technique transforms waste into high-quality organic fertilizers, promoting a more efficient nutrient cycle and reducing the need for chemical fertilizers.
- **Animal Welfare**: Animal welfare is a growing concern within the poultry industry, with practices that seek to improve birds' living conditions. According to Rodrigues *et al.* (2023b), housing systems that provide more space and natural conditions for birds, such as access to the outdoors, are being implemented to improve animals' quality of life and meet consumer demands for more ethical products.
- **Reducing Antibiotic Use**: Reducing the use of antibiotics in poultry farming is an essential practice for sustainability. Rodrigues *et al.* (2023b) mention that the introduction of probiotics and other natural alternatives is helping to maintain the health of birds without the need for antibiotics, contributing to food safety and combating antimicrobial resistance.
- **Water efficiency**: Water efficiency is a sustainable practice increasingly being adopted in the poultry industry. As Rodrigues *et al.* (2023b) noted, implementing

rainwater collection and reuse systems on farms has significantly reduced potable water consumption, a crucial step in regions with limited water availability.

The poultry industry is moving towards a more sustainable and conscious production model. Adopting renewable energy sources, such as solar panels, reduces the carbon footprint and saves resources. In turn, composting waste promotes a more sustainable nutrient cycle and reduces the need for chemical fertilizers. Animal welfare practices, such as housing that mimics natural environments, respond to the demand for ethical and more humane products. Reducing antibiotic use and replacing it with probiotics improves bird health and combats antimicrobial resistance. Water efficiency, through the collection and reuse of rainwater, conserves essential resources. These practices demonstrate the balance between economic efficiency and environmental and social responsibility, ensuring the viability of operations and the preservation of natural resources for future generations.

4 CONCLUSIONS

This study analyzed sustainable practices in broiler chicken production in the state of Goiás, focusing on the life cycle of chicken breast fillets. Using a case study, the research covered all stages of the production chain, from obtaining the raw material to its final use and disposal, integrating data on storage, distribution, production and processing.

In the feeding phase, the study highlighted the importance of ingredients such as corn, soy, and supplements, which are essential for the birds' diet and the quality of the final product. Industrial farming used air-conditioned sheds and automated systems to improve efficiency and animal welfare.

Processing and distribution were analyzed with regard to logistics and sustainability. The research highlighted responsible disposal practices, such as composting, recycling and waste reduction. It was identified that 25 sustainable management practices were applied, including the use of renewable energy, such as solar panels, and composting waste to produce organic fertilizers.

Implementing practices such as using probiotics instead of antibiotics has improved bird health and combat antimicrobial resistance. With rainwater harvesting systems, water efficiency has reduced drinking water consumption, which is essential in regions with water shortages.

Despite its contributions, the study had limitations, including the restriction on generalizing the results to other contexts and the ongoing market evolution. Future research should explore different regions and deepen analyses of environmental impact and technological innovations.

Considering the above, the poultry industry in Goiás has progressed towards a more sustainable model, combining economic efficiency with environmental and social responsibility. The adoption of sustainable technologies and innovative practices has not only ensured economic viability but also preserved natural resources, thereby improving the quality of life for future generations.

By complementing the Life Cycle Analysis with the quantitative indicators from the 2023 environmental diagnosis, this study reinforces the empirical evidence that Goiás's poultry industry has advanced toward sustainable management. The integration of life-cycle data with Environmental Accounting benchmarks enhances methodological robustness and provides a replicable model for other agribusiness sectors.

REFERENCES

AVI, M. S. The Relationship Between Financial Reporting and Sustainability Report. **Journal of Economics, Finance and Management Studies**, v. 5, n. 4, p. 1013-1036, 2022. DOI: https://doi.org/10.47191/jefms/v5-i4-11.

BARBOZA, T. A.; SILVA, Y. G.; CAMPOS, G. V. Manejo sustentável na produção de aves caipiras de postura: experiência de estágio na comunidade de Salinas. **Agriculturae**, v. 1, n. 2, p. 18-24, 2019. DOI: https://doi.org/10.6008/CBPC2674-645X.2019.002.0002.

COMITÊ BRASILEIRO DE PRONUNCIAMENTOS DE SUSTENTABILIDADE. **Pronunciamento Técnico CBPS nº 01 – Requisitos Gerais para Divulgação de Informação Financeira relacionadas à Sustentabilidade**. 2024. Available at: https://www.facpcs.org.br/CBPS/Documentos-Emitidos/Pronunciamentos. Accessed: 28 Jul. 2024.

CONSELHO FEDERAL DE CONTABILIDADE. **Pioneirismo: CFC aprova Normas Brasileiras de Contabilidade sobre sustentabilidade**. 2024. Available at: https://cfc.org.br/noticias/pioneirismo-cfc-aprova-normas-brasileiras-de-contabilidade-de-asseguracao-de-sustentabilidade. Accessed: 28 Oct. 2024.

COMISSÃO DE VALORES MOBILIÁRIOS. **Resolução CVM 193, de 20 de outubro de 2023**. Dispõe sobre a elaboração e divulgação do relatório de informações financeiras relacionadas à sustentabilidade, com base no padrão internacional emitido pelo International Sustainability Standards Board – ISSB, 2023. Available at: https://conteudo.cvm.gov.br/legislacao/resolucoes/resol193.html. Accessed: 28 Jul. 2024.

FEDERAÇÃO DAS INDÚSTRIAS DO ESTADO DE GOIÁS. **Avicultura de corte**. 1 ed. Goiânia. 2023.

HEBERLE, É. L.; VOGT, K. Índice de sustentabilidade ambiental na atividade de avicultura na Região Extremo Oeste catarinense. **AOS – Amazônia, Organização e Sustentabilidade**, v. 12, n. 2, p. 177-195, 2023. DOI: https://doi.org/10.17648/aos.v12i2.2623.

KÖSE, T.; ÇETIN, Ö. O. Uluslararası Sürdürülebilirlik Açıklama Standartları IFRS S1 ve IFRS S2'nin Yayınlanmasının Ardından Sürece ve Standartlara İlişkin Bir Değerlendirme. **Uluslararası Yönetim Akademisi Dergisi**, v. 6, n. 4, p. 1145-1158, 2023. DOI: https://doi.org/10.33712/mana.1374381.

MATOS, F. A.; SILVA, N. F. B.; COSTA, B. A. M.; PORTO, A. L. F.; OLIVEIRAS, V. M. Agroindústria integrada a avicultura: uma mini-revisão focada na sustentabilidade. **II Congresso Internacional da Agroindústria**. 2021. DOI: https://doi.org/10.31692/IICIAGRO.0214.

PICCOLO, E. A.; DUVAL, H. C.; FERRAZ, J. M. G.; GALLO, Z. Sustentabilidade na avicultura brasileira: protagonismo no Mercosul e Principais Blocos Exportadores. **Revista de Estudos Interdisciplinares**, v. 6, n. 1, 2024. DOI: https://doi.org/10.56579/rei.v6i1.864.

RODRIGUES, V. D. V.; WANDER, A. E.; ROSA, F. S. Contabilidade de Gestão Ambiental: Revisão Sistemática da Literatura. **Revista Sociedade e Ambiente**, v. 4, n. 1, p. 18-40, 2023a.

RODRIGUES, V. D. V.; WANDER, A. E.; ROSA, F. S. Diagnóstico da Sustentabilidade da Avicultura de Corte sob a perspectiva da Contabilidade de Gestão Ambiental. **RGSA – Revista de Gestão Social e Ambiental**, v. 17, n. 1, p. 1-20, 2023b. DOI: https://doi.org/10.24857/rgsa.v17n1-021.

SILVA, S. V.; OLIVEIRA, E. R.; CARBONARI, V.; FARIAS, M. F. L.; PEREIRA, T. L.; GABRIEL, A. M. A.; MUNIZ, E. B.; GANDRA, J. R.; GANDRA, E. R. S.; PORDEUS, N. M. Sistema Sustentável de criação de aves na comunidade Quilombola de Dourados, Mato Grosso do Sul. **RealizAção**, v. 6, n. 11, p. 130-139, 2019. DOI: https://doi.org/10.30612/re-ufgd.v6i11.8918.

YIN, R. K. **Estudo de caso: planejamento e métodos**. 4th ed. Bookman, Porto Alegre. 2010.