



Broiler Product Quality: The Global Scientific Research Landscape and Implications for Marketing Performance

Dayfah Dinasarki^{1,*}, Vidyahwati Tennisanna² and A Amidah Amrawaty²

¹Graduate Student of Science and Technology in Animal Science, Faculty of Animal Science, Universitas Hasanuddin, Makassar, 90245, Indonesia

²Department of Socio-Economics in Animal Science, Faculty of Animal Science, Universitas Hasanuddin, Makassar, 90245, Indonesia

*Corresponding author: dayfahdinasarki24@gmail.com

ABSTRACT

Broiler product quality has become essential in marketing strategies in the global scientific research landscape. This research aims to explore the latest findings in scientific research on the quality of broiler chicken products and analyze their implications for marketing performance. The bibliometric analysis method was applied in this research using the Scopus database as a data source, focusing on the keywords "broiler" and "marketing" in the article title. This approach allowed the identification of 19 relevant documents, which were then analyzed comprehensively. Key findings from the analysis show increasing research interest in the marketing of broiler products over time, underscoring the importance of marketing strategies in the industry. Understanding the factors influencing product quality and marketing performance is essential in marketing. The implication for marketing performance is that a better understanding of the factors influencing product quality, such as heat stress management, industry regulations, feed management, and nutritional supplementation, can help manufacturers develop more effective marketing strategies. In addition, these findings also highlight the importance of further research that focuses on the role of retailers in the broiler product supply chain. This can improve understanding of distribution strategies and consumer perceptions, significantly contributing to the development of the broiler industry in a dynamic market.

Keywords: Broiler; Marketing; Stress management; Industry regulation; Retailer.

Article History

Article # 24-606

Received: 03-May-24

Revised: 14-Jun-24

Accepted: 10-Jul-24

Online First: 24-Jul-24

INTRODUCTION

The quality of broiler chicken products is an essential factor in the chicken farming industry because it is directly related to consumer satisfaction and the success of the livestock business (Serra et al., 2024; Wei et al., 2024). This quality includes size, weight, cleanliness, meat texture, and chicken health (Liu et al., 2023; Saleh et al., 2023). With the increasing demand for quality chicken meat products, farmers must ensure that the chicken produced meets high-quality standards, both in terms of nutrition and cleanliness, to meet consumer expectations and maintain their business reputation.

The quality of broiler chicken products is a crucial factor in the chicken farming industry because it is directly

related to consumer satisfaction and the success of the farming business. This quality includes various aspects such as size, weight, cleanliness, meat texture, and chicken health. With the increasing demand for quality chicken meat products, farmers must ensure that the chicken they produce meets high-quality standards, both in terms of nutrition and hygiene, to meet consumer expectations and maintain the reputation of their business.

Apart from that, the quality of broiler chicken products is also greatly influenced by livestock management factors, including providing balanced feed, good health care, and a clean and comfortable environment for chickens (Iwiński et al., 2023; Sharma et al., 2023). Technology and best practices in raising chickens also play an essential role in ensuring optimal

Cite this Article as: Dinasarki D, Tennisanna V and Amrawaty AA, 2024. Broiler product quality: the global scientific research landscape and implications for marketing performance. International Journal of Agriculture and Biosciences 13(3): 306-312. <https://doi.org/10.47278/ijab/2024.122>



A Publication of Unique Scientific Publishers

product quality (Roberts et al., 2015; Kanani et al., 2020). By maintaining the quality of broiler chickens, farmers gain better financial profits and contribute to providing a supply of safe and quality chicken meat for consumers.

Broiler chickens are a type of chicken that is raised explicitly for meat production purposes (Trevisani et al., 2024). Usually, broiler chickens are selected from certain breeds that have fast growth and efficiently produce quality meat (Zaremba et al., 2024). The rearing process includes providing nutrient-rich feed, regular health care, and appropriate environmental management so chickens can grow optimally. After reaching the desired weight, ped-aging chickens are usually processed for sale as fresh or processed meat products such as chicken strips, nuggets, or chicken sausages (Al-Abdullatif & Azzam, 2023; da Silva et al., 2023). The broiler industry is an integral part of the global livestock industry, which continues to grow along with the increasing demand for chicken meat products in the international market (Taiwo et al., 2013).

In markets and marketing, broiler chickens are essential as products that compete in the global meat products market. Marketing of broiler chicken products involves strategies related to competitive pricing, effective product promotion to attract consumers, and appropriate distribution to reach a broad market (Mohammed & Irhaim, 2023). In addition, product quality and safety are becoming a significant focus in marketing efforts as consumers increasingly know the importance of healthy, high-quality food (Al-Masad et al., 2010; Asbal et al., 2023). Marketing also plays a role in communicating the added value of ped-aging chicken products, such as cleanliness, food safety, and nutritional quality, so they can differentiate them from similar products on the market. With an effective marketing strategy, broiler producers can optimize market share and strengthen their position in the overall chicken meat industry.

The implication that broiler chickens are an essential product in the global meat market is that an effective marketing strategy is vital for broiler chicken producers. Manufacturers can reach a broader market and optimize their market share by considering competitive prices, effective product promotion, and appropriate distribution. Additionally, focusing on product quality and safety in marketing efforts provides significant added value as consumers increasingly realize the importance of healthy, high-quality food. By communicating added values such as cleanliness, food safety, and nutritional quality, marketing can help broiler chicken products to differentiate themselves from similar products on the market, strengthening their position in the overall chicken meat industry.

The quality of broiler chicken products is a crucial factor in the chicken farming industry, influencing consumer satisfaction and the reputation of the farming business and contributing to the supply of safe and quality chicken meat. Farm management factors, technology, and best practices in raising chickens are essential in ensuring optimal product quality. By maintaining product quality and implementing

effective marketing strategies, broiler chicken producers can maximize their market share and strengthen their position in the overall chicken meat industry.

Although many scientific studies have examined broiler products' quality from various aspects such as nutrition, cleanliness, and meat texture, more research is still needed that explicitly explores the direct implications of these research findings on the marketing performance of broiler products. This requires an in-depth examination of published literature and empirical research that integrates market data and consumer insights to provide more comprehensive insights into the relationship between product quality and marketing performance at a global level. The aim is to fill the research gap by investigating the direct relationship between broiler product quality and marketing performance in global markets using published research data.

MATERIALS & METHODS

This research applies bibliometric analysis methods using the Scopus database as a data source. The filter focused on the keywords in the article title, namely "broiler" and "marketing".

While searching in Scopus "broiler" and "marketing", this reviewer found 253 articles. This filtering does not limit certain subject areas, publication years, or author affiliations. This stage succeeded in identifying 19 documents that were relevant to the research topic, providing a solid basis for analyzing scientific research trends related to the marketing of broiler products at the global level.

In this analysis, all publication years and subject areas were included, with a total of 19 documents consisting of 15 articles, 2 conferences, 1 book chapter, and 1 review. This approach allows a comprehensive understanding of the development of scientific research related to the marketing of broiler products from various types of publications and relevant subject areas. By involving various document types, this analysis will provide a complete picture of the main debated themes and emerging research trends in the domain. The selection and data analysis stages are seen in Fig. 1.

After passing the data filter stage, the 19 documents were analyzed automatically in the Scopus Database to visualize the number of documents per year, subject area, affiliation, and citations. In addition, these documents were downloaded and transferred to the Vosviewer analysis tool for mapping and visualization of related research themes. This approach provides a comprehensive overview of scientific research trends related to the marketing of broiler products, including developments over time, subject focus, and citation networks between these documents. Thus, this review article will provide deeper insight into the direction and movement of research in this domain.

Research validation ensures that the bibliometric analysis method used has correctly identified and collected relevant documents from the Scopus database. Additionally, the use of various types of publications such

as articles, conferences, book chapters, and reviews provides a comprehensive picture of scientific research trends related to the marketing of broiler products. Data visualization through analytical tools such as Scopus Database and Vosviewer also makes it possible to deeply understand the patterns and trends that emerge from the analyzed documents. Thus, this research's validity is guaranteed through appropriate methods and comprehensive analysis of relevant data.

RESULTS

This section presents the results of the analysis in three relevant sub-chapters. First, research trends will be used to provide an overview of changes and research patterns related to the marketing of broiler chicken products from time to time. This includes analysis of publication trends per year, subject area, and citations. Second, the research theme contained in the document concerns the marketing of broiler chickens. This is useful for identifying subtopics or main focuses raised in the documents analyzed. Meanwhile, the implications for marketing performance are also raised by high-lighting the implications of these findings for the overall marketing strategy of broiler chicken products.

Research Trends: Marketing in Broiler Chickens

This section describes research trends related to the marketing of broiler products by considering several key factors. First, the number of documents analyzed annually shows how research interest in this topic has developed. Next, the dominant subject areas in this research are presented, identifying the fields of science that have contributed the most to research on the marketing of ped-aging chicken products. In addition, the author's affiliation with these documents can provide insight into the institutions or agencies most actively involved in this research. Finally, the number of citations received by these documents is also presented, which can reflect the impact and relevance of the research in the scientific community.

Fig. 2 shows the number of documents related to broiler product marketing based on publication year. The trend shows that research interest in this topic has increased, although fluctuating. The most recent decade has seen an increase in publications, particularly in 2023, with two documents identified. However, throughout the 1960s to 1990s, the number of publications tended to be low, with a significant increase occurring after the 2000s. These developments reflect a shift in interest and attention in scientific research on marketing strategies related to broiler products, along with changes in industry practices and trends.

Table 1 shows the distribution of documents regarding the marketing of broiler products by subject area. Most documents relate to the field of Agricultural and Biological Sciences, reflecting an intense research focus on aspects of agronomy and biological sciences in the context of broiler farming. In addition, significant subject areas are Economics, Economics and Finance, and Environmental Sciences, which reflect an interest in the

economic aspects and environmental impacts of broiler production and marketing. The existence of documents spread across various subject areas shows the complexity and multidisciplinary of issues related to the marketing of broiler products and their relevance to various scientific disciplines.

Table 1: Documents about broiler chickens and marketing based on subject area

Subject area	Documents
Agricultural and Biological Sciences	13
Economics, Econometrics and Finance	4
Environmental Science	4
Immunology and Microbiology	3
Veterinary	3
Biochemistry, Genetics and Molecular Biology	2
Business, Management and Accounting	2
Earth and Planetary Sciences	2
Medicine	2
Social Sciences	2
Health Professions	1
Agricultural and Biological Sciences	13
Economics, Econometrics and Finance	4

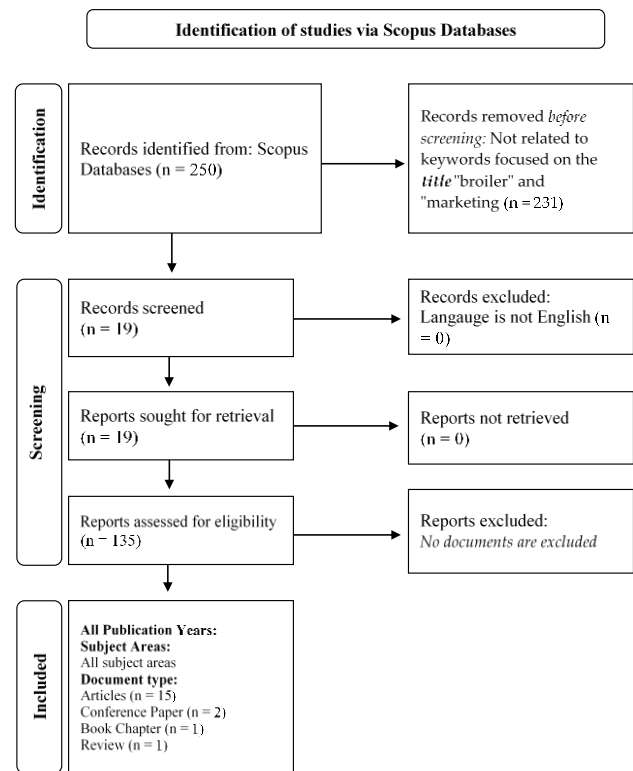


Fig. 1: Research data selection process.

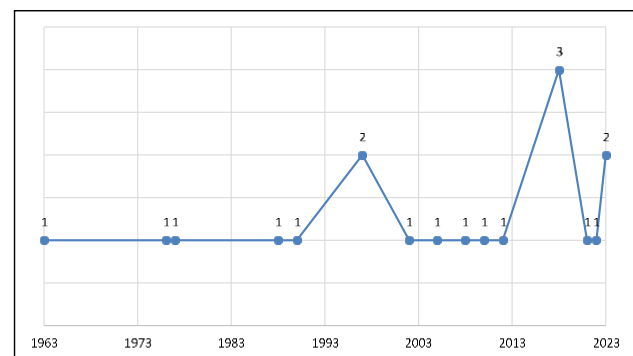


Fig. 2: Number of documents on broilers and marketing by year of publication.

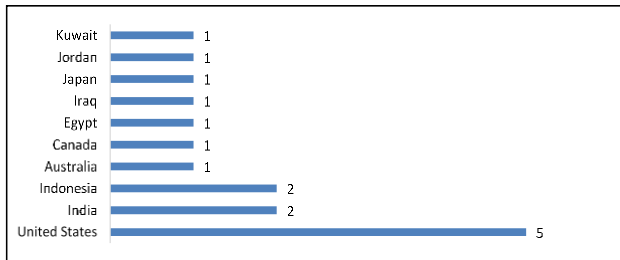


Fig. 3: Number of documents about broilers and marketing by affiliate.

Fig. 3 shows the number of documents related to the marketing of broiler products based on author affiliation from various countries or regions. The United States has the highest contribution, with five documents originating from authors affiliated with institutions there. Besides, India and Indonesia have contributed significantly with two documents each. Other countries, such as Australia, Canada, Egypt, Iraq, Japan, Jordan and Kuwait, also participated in research related to broiler marketing, although with smaller contributions. The distribution of author affiliations from different countries reflects the global interest and contribution to scientific research on the marketing of broiler products.

The main finding of the first document is that exposure to heat stress early in the life of broiler chickens at five days of age can significantly reduce mortality rates when the chickens are exposed to high environmental temperatures later in life. In addition, feed efficiency also increased significantly in chickens that experienced heat stress early in life, while body weight and weight gain were not significantly affected. These results suggest that introducing mild heat stress at an early age can positively impact the quality and performance of broiler chickens when they face harsh environmental conditions in the future. In the context of marketing broiler products, these findings highlight the importance of considering heat stress management in the early life stages of chickens as part of a holistic marketing strategy (Arjona et al., 1988). Producers can improve the quality of ped-aging chicken products by considering environmental management and animal welfare and strengthening their brand reputation.

The second document highlights the new challenges in limiting necrotic enteritis and maintaining broiler gut health and performance in the current marketing, food safety and regulatory climate. With the voluntary withdrawal or regulation of the use of antibiotics in broiler production, there will be significant changes in chicken-rearing practices over the last few decades. However, the withdrawal of these antibiotics could result in animal welfare problems, increased risk of disease, and more significant environmental impacts. The marketing of broiler products emphasizes the importance of adapting marketing strategies to address changes in rearing practices and industry regulations (Hofacre et al., 2018). With a deep understanding of the impact and implications of these regulatory changes, manufacturers can develop responsive and sustainable marketing strategies to maintain product quality and meet consumer expectations in the face of changes in the increasingly complex regulatory environment and consumer preferences.

The main finding of the third document is that exposure to heat early in the life of broiler chickens at five days of age results in changes in the physiological response to high temperatures later in life, as well as the behavioural patterns of the chickens. Although there was no significant difference in the increase in heat production between the heat-exposed and the control groups, heat-exposed chickens had lower body temperatures and higher activity levels. In addition, blood viscosity also decreased significantly in the group exposed to heat at an early age. These findings suggest that heat exposure early in the life of broiler chickens may improve their ability to deal with future heat stress by changing physiological responses and behavioral patterns, which may mitigate the impact of heat stress. In the context of marketing broiler products, these findings highlight the importance of considering heat stress management in the early stages of chicken life to improve product quality and future marketing performance by ensuring a better understanding of the impact of heat stress on broiler chickens as well as responsive marketing strategies for -to meet consumer expectations in the face of changes in the production environment (Zhou et al., 1997).

The findings of the fourth document are that premarketing feeding and fasting practices may influence Salmonella access to the cecum in broiler chickens. Treatments involving food and water restriction for 10 hours before and after intubation resulted in more caecum-associated Salmonella compared with treatments that allowed continuous access to food and water or restoration of food after fasting. These findings suggest that premarketing feed management practices may influence the risk of Salmonella contamination in broiler products. In the context of marketing broiler products, these findings highlight the importance of appropriate management practices prior to marketing to ensure optimal product quality and safety and minimize the risk of pathogenic microbial contamination (Moran & Bilgili, 1990). By considering these factors in marketing strategies, manufacturers can improve their brand reputation and meet higher food safety standards, which is critical to consumer confidence and the success of their business.

The findings of the fifth document explain that three experiments showed that Tryptophan (Trp) supplementation before marketing did not significantly impact broiler chicken carcass quality. Neither Trp administration via tablets nor Trp solution in drinking water nor in final feed showed a significant effect on chicken carcass defects. Although administration of Trp in drinking water succeeded in reducing water consumption compared to the control group, the practical implications for improving broiler carcass quality are unclear (Kerr et al., 2005). These findings indicate that further research is still needed to determine the level and duration of Trp supplementation needed to improve broiler carcass quality. In the context of marketing broiler products, these findings highlight the importance of conducting careful and focused research to understand the impact of nutritional supplements such as Trp on product quality. With a better understanding of the relationship between nutritional supplements and product quality, producers

can develop more effective and attractive marketing strategies for consumers increasingly concerned about broiler products' quality and nutritional value.

Research theme: Marketing in Broiler Chickens

This section presents a mapping of related themes that participate in discussing the topic of marketing and broiler chickens.

There are several research themes that influence discussions around broiler chickens and marketing. However, there is a topic that is still limited in research, namely re-tailers. This became the impetus for further research.

DISCUSSION

Research trends related to the marketing of broiler products show significant changes over time, as depicted in Fig. 2. Although there are fluctuations, there is a consistent increase in publications, especially in the last decade. This indicates increased interest and focus in understanding marketing strategies related to broiler products. However, in the 1960s to 1990s, the number of publications tended to be low, perhaps indicating a lack of attention to this topic in the scientific literature of that time. Significant changes occurred after the 2000s, which aligned with increasing awareness of the importance of marketing broiler products in the face of increasingly complex consumer demands and changes in industry practices.

The distribution of documents on the marketing of broiler products by subject area, as seen in Table 1, shows the multidisciplinary issues related to this industry. Most documents relate to the Agricultural and Biological Sciences field, reflecting vital research in agronomy and biological sciences that play an essential role in broiler farming. This includes understanding nutrition, animal health, and chicken genetics to improve production and animal welfare. In addition, the subject areas of Economics, Economics and Finance, and Environmental Sciences are also attracting interest, reflecting the importance of understanding the economic aspects and environmental impacts of broiler production and marketing. The implication is the importance of a multidisciplinary approach in overcoming challenges and exploiting opportunities in the ped-aging chicken industry. Collaboration between experts in various fields of science can help optimize marketing strategies that consider not only technical and biological aspects but also economic and environmental to achieve sustainability and sustainable competitiveness in this industry.

However, the spread across different subject areas highlights the complexities of marketing broiler products. In facing increasingly complex challenges in this industry, a holistic approach involving various scientific disciplines is becoming increasingly important. Policy, technology, and

consumer preferences changes require a deep understanding of multiple perspectives. This emphasizes the need for collaboration between researchers, breeders, marketing experts and policymakers to develop comprehensive and sustainable solutions. With this multidisciplinary approach, we can expect better innovation in marketing strategies for broiler products that not only consider technical and economic factors but also achieve the right balance between environmental sustainability and long-term business success.

From a series of findings in documents with high citations, as in Table 2, it can be concluded that factors such as heat stress management in the early stages of broiler life, adaptation to changes in industrial regulations, feed management before marketing, and nutritional supplementation such as Tryptophan (Trp) can have significant implications for broiler product quality and marketing performance (Arjona et al., 1988; Moran & Bilgili, 1990; Zhou et al., 1997; Kerr et al., 2005; Hofacre et al., 2018). Considering these factors in marketing strategies is crucial in facing challenges and changes in the broiler industry. The high number of citations to these documents also indicates that these findings have received widespread attention in the scientific community. The implication is that this research has the potential to make a significant contribution to increasing understanding of effective management practices in the broiler industry. Thus, this research can help guide decisions in developing more effective and sustainable marketing strategies.

In the context of marketing broiler products, it is essential to understand these findings so that producers can optimize their marketing strategies by considering factors influencing product quality and performance. By applying a holistic approach and being responsive to research findings, manufacturers can strengthen their brand reputation, meet consumer expectations, and ensure the sustainability of their business in the face of changes in an increasingly complex production and regulatory environment. The implication for marketing performance is that a better understanding of the factors influencing product quality, such as heat stress management, industry regulation, feed management, and nutritional supplementation, can help producers develop more effective marketing strategies. Producers can enhance their brand reputation by including these elements in their marketing strategies, meet consumer expectations, and achieve a competitive advantage in the increasingly complex broiler products market.

Other findings, as seen in Fig. 3, are that the United States is the dominant country in contributing research related to the marketing of broiler products, with five documents originating from authors affiliated with institutions there. This dominance indicates that the United States has excellent interest and sufficient resources to

Table 2: Frequently cited documents on broiler chickens and marketing.

Document title	Citations
Effect of heat stress early in life on mortality of broilers exposed to high environmental temperatures just prior to marketing	120
An optimist's view on limiting necrotic enteritis and maintaining broiler gut health and performance in today's marketing, food safety, and regulatory climate	36
Effects of early heat exposure on thermoregulatory responses and blood viscosity of broilers prior to marketing	24
Influence of feeding and fasting broilers prior to marketing on cecal access of orally administered Salmonella	21
Effect of supplementary tryptophan prior to marketing on carcass quality in broilers	9

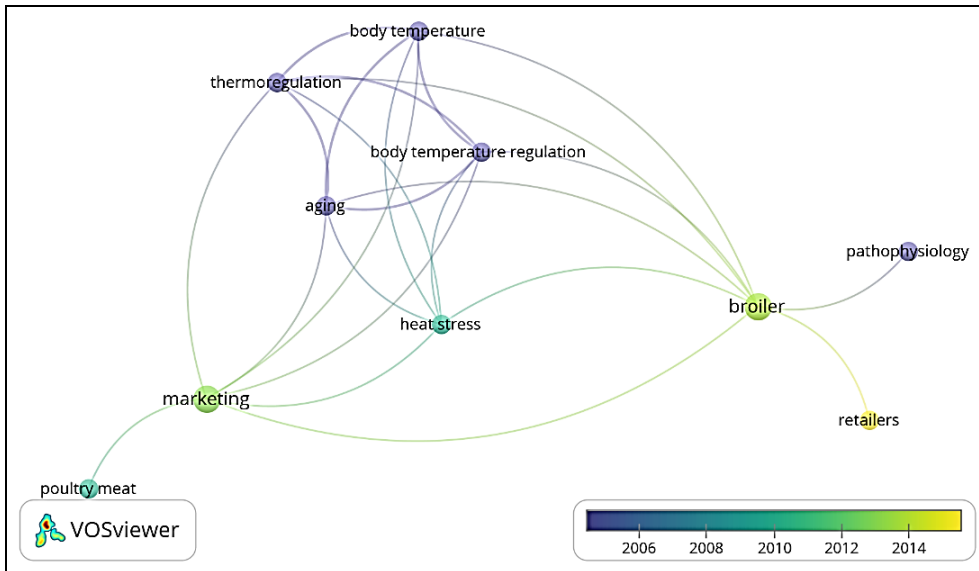


Fig. 4: Number of documents about broilers and marketing by affiliate.

support research. Although discussions around broiler chickens and marketing have been the focus of significant research, as in Fig. 3, there needs to be more research exploring the role of retailers in the broiler product supply chain. This research highlights the need to direct further attention to the role and influence of retailers in the marketing of broiler products. The identification that this topic still needs to be discussed shows excellent potential for further research in understanding how the role of retailers influences marketing strategies, distribution, and consumer perceptions of broiler products. Thus, future research in this area can provide valuable insights for producers, retailers and other stakeholders in the broiler industry to optimize marketing strategies and improve overall market performance.

From these findings, it can be concluded that management of essential factors such as heat stress management in the early stages of broiler life, adaptation to changes in industry regulations, feed management before marketing, and nutritional supplementation such as Tryptophan (Trp) have a significant impact on broiler product quality and marketing performance. Therefore, manufacturers must carefully consider these factors when developing future marketing strategies. Integrating findings from such research into marketing strategies can help manufacturers strengthen their brand reputation, meet consumer expectations, and ensure the sustainability of their business amidst a changing production environment and increasingly complex regulations.

In addition, the need for further emphasis on the role of retail in the broiler product supply chain highlights the importance of deepening understanding of the role and influence of retail in the marketing of broiler products. By further examining this role, manufacturers can better understand how retail influences marketing strategies, distribution, and consumer perceptions of broiler products. Thus, incorporating a retail perspective into marketing strategies can open new opportunities to improve overall market performance. Cross-disciplinary involvement in marketing strategy development is also crucial to future success. Producers can develop comprehensive and sustainable solutions by leveraging collaboration between

researchers, breeders, marketing experts, and policymakers. This includes considering technical and economic aspects and ensuring the right balance between environmental sustainability and long-term business success. Producers can gain a competitive advantage in the increasingly complex and dynamic broiler product market with this approach.

Limitations of this study include limited coverage in selecting keywords, namely "broiler" and "marketing", which may ignore other important aspects relevant to the broiler products industry. In addition, specific databases, such as Scopus, can limit access to broader information resources. In addition, a focus on publications already indexed in these databases may overlook the contribution of non-indexed research or research published in languages other than English. Therefore, future research could expand the scope by considering additional keywords, diverse information resources, and non-indexed publications to obtain a more complete picture of research trends in broiler product marketing.

Efforts that need to be made in the future include integrating industry perspectives and the needs of other stakeholders in research. This can be done through closer collaboration between academics, industry practitioners, and policy makers to identify and resolve real challenges in marketing broiler products. In addition, developing more innovative research methodologies, including extensive data analysis and machine learning approaches, can help unearth deeper and more detailed information about market behavior, consumer preferences, and overall industry dynamics. Thus, these efforts can strengthen the validity and relevance of research on broiler product marketing and help guide best practices and more effective policies in the future.

Conclusion

These findings highlight the evolution of research interest in this topic over time. There has been a consistent increase in publications, indicating increased awareness of the importance of marketing strategies related to broiler products. The distribution of documents by subject area also reflects the complexity of the industry, with an

emphasis on a multi-disciplinary approach involving multiple disciplines. A better understanding of the factors influencing product quality and marketing performance is crucial in marketing broiler products. The implication of these findings for overall marketing performance is that a better understanding of factors influencing product quality, such as heat stress management, industry regulation, feed management, and nutritional supplementation, can help manufacturers develop more effective marketing strategies.

By including these elements in their marketing strategy, manufacturers can enhance their brand reputation, meet consumer expectations, and achieve a competitive advantage in the increasingly complex broiler products market. In addition, these findings also suggest further research focusing on the role of retailers in the broiler product supply chain, given the great potential to improve understanding of distribution strategies and consumer perceptions. Thus, continued research in this area can significantly contribute to the development of the broiler chicken industry, ensuring its sustainability and competitiveness in a dynamic market.

Author Contributions Statement

Conceptualization, D.D. and V.T.; methodology, D.D., V.T. and A.A.A.; software, D.D.; validation, D.D., V.T. and A.A.A.; formal analysis, D.D.; investigation, D.D.; resources, V.T.; data curation, A.A.A.; writing—original draft preparation, D.D.; writing—review and editing, D.D.; visualization, D.D.; supervision, V.T. and A.A.A.; project administration, D.D.; funding acquisition, V.T. All authors have read and agreed to the published version of the manuscript.

Acknowledgment

We thank Universitas Hasanuddin Makassar and Lembaga Pengelola Dana Pendidikan (LPDP), Indonesia for funding the publication.

Competing Interests

The authors declare no competing interests.

Additional Information

The online version contains supplementary material available at <https://drive.google.com/file/d/1AEC7xZT9ogWBFefWY0SYB9yFdQHIXCpW/view?usp=sharing>

REFERENCES

- Al-Abdullatif, A., & Azzam, M.M. (2023). Effects of Hot Arid Environments on the Production Performance, Carcass Traits, and Fatty Acids Composition of Breast Meat in Broiler Chickens. *Life*, 13(6), 13061239. <https://doi.org/10.3390/life13061239>
- Al-Masad, M., Al-Sharafat, A., & Al-Deseit, B. (2010). Marketing margins in broiler production in Jordan industry. *Journal of Animal and Veterinary Advances*, 9(7), 1150–1155. <https://doi.org/10.3923/javaa.2010.1150.1155>
- Arjona, A.A., Denbow, D.M., & Weaver, W.D. (1988). Effect of heat stress early in life on mortality of broilers exposed to high environmental temperatures just prior to marketing. *Poultry Science*, 67(2), 226–231. <https://doi.org/10.3382/ps.0670226>
- Asbal, A.H., Siregar, A.R., & Sirajuddin, S.N. (2023). Roadmap for value chain analysis on broiler marketing in Makassar. *IOP Conference Series: Earth and Environmental Science*, 1230(1), 12021. <https://doi.org/10.1088/1755-1315/1230/1/012021>
- da Silva, V.L., Kovaleski, J.L., Pagani, R.N., & Gomes, M.A.S. (2023). Industry 4.0 implementations: a systematic review of approaches and main applicabilities in the broiler meat production chain. *World's Poultry Science Journal*, 79(3), 563–579. <https://doi.org/10.1080/00439339.2023.2205610>
- Hofacre, C.L., Smith, J.A., & Mathis, G.F. (2018). An optimist's view on limiting necrotic enteritis and maintaining broiler gut health and performance in today's marketing, food safety, and regulatory climate. *Poultry Science*, 97(6), 1929–1933. <https://doi.org/10.3382/ps/pey082>
- Iwiński, H., Chodkowska, K.A., Drabik, K., Batkowska, J., Karwowska, M., Kuroopka, P., Szumowski, A., Szumny, A., & Rózański, H. (2023). The Impact of a Phytobiotic Mixture on Broiler Chicken Health and Meat Safety. *Animals*, 13(13), 13132155. <https://doi.org/10.3390/ani13132155>
- Kanani, F., Heidari, M.D., Gilroyed, B.H., & Pelletier, N. (2020). Waste valorization technology options for the egg and broiler industries: A review and recommendations. *Journal of Cleaner Production*, 262, 121129. <https://doi.org/10.1016/j.jclepro.2020.121129>
- Kerr, B.J., Moran, E.T., & Kidd, M.T. (2005). Effect of supplementary tryptophan prior to marketing on carcass quality in broilers. *Journal of Applied Poultry Research*, 14(2), 306–314. <https://doi.org/10.1093/japr/14.2.306>
- Liu, J., Wang, Z., Li, C., Chen, Z., Zheng, A., Chang, W., Liu, G., & Cai, H. (2023). Effects of Selenium Dietary Yeast on Growth Performance, Slaughter Performance, Antioxidant Capacity, and Selenium Deposition in Broiler Chickens. *Animals*, 13(24), 13243830. <https://doi.org/10.3390/ani13243830>
- Mohammed, I.F., & Irhaim, F.I. (2023). Economic study of the marketing efficacy of broilers in Nineveh Governorate for the 2021 production season Al-Hamdaniyah district as a model. *Bionatura*, 8(2), 21931. <https://doi.org/10.21931/RB/CSS/2023.08.02.45>
- Moran, E.T., & Bilgili, S.F. (1990). Influence of feeding and fasting broilers prior to marketing on cecal access of orally administered Salmonella. *Journal of Food Protection*, 53(3), 205–207. <https://doi.org/10.4315/0362-028X-53.3.205>
- Roberts, T., Wilson, J., Guthrie, A., Cookson, K., Vancraeynest, D., Schaeffer, J., Moody, R., & Clark, S. (2015). New issues and science in broiler chicken intestinal health: Emerging technology and alternative interventions. *Journal of Applied Poultry Research*, 24(2), 257–266. <https://doi.org/10.3382/japr/pfv023>
- Saleh, N.A., Ayoub, M.A., Nossair, M.A., Alqhtani, A.H., Swelum, A.A., Khojah, H., Gamal, M., Imam, M.S., Khafaga, A.F., Arif, M., & Abd El-Hack, M.E. (2023). Influence of Water Quality and Pollution on Broiler's Performance, Vaccine and Antibiotic Efficiencies - A Review. *Annals of Animal Science*, 23(4), 1021–1036. <https://doi.org/10.2478/aoas-2023-0023>
- Serra, A., Foggi, G., Buccioni, A., Amarie, R.E., Tinagli, S., Scicutella, F., Casarosa, L., Secci, G., Mantino, A., Mele, M., & Mannelli, F. (2024). Dietary supplementation with natural antioxidants: assessment of growth performance and meat quality in broiler chickens. *Poultry Science*, 103(3), 103421. <https://doi.org/10.1016/j.psj.2023.103421>
- Sharma, R., Sehwat, R., Ahlawat, S., Sharma, V., Thakur, M.S., Mishra, A.K., Arora, R., & Tandia, M. S. (2023). Functional Quality Characteristics of the Meat from a Dual-Purpose Poultry Crossbreed Suitable for Backyard Rearing in Comparison to Commercial Broilers. *Foods*, 12(13), 12132434. <https://doi.org/10.3390/foods12132434>
- Taiwo, B.B.A., Adetayo, A.O., & Apata, S.E. (2013). An evaluation of consumers' preferences in Broiler meat production in some selected parts of Ogun State, Nigeria. *Ecology, Environment and Conservation*, 19(4), 963–966.
- Trevisani, M., Rosamilia, A., Micheli, M.R., Guidi, E., & Goga, B.T.C. (2024). Perspectives in the implementation of risk-based meat safety assurance system (RB-MSAS) in broiler meat production. *Food Control*, 160, 110308. <https://doi.org/10.1016/j.foodcont.2024.110308>
- Wei, C., Wang, S., Wang, C., Zhao, Y., & Zhang, Y. (2024). Meta-analysis of Selenium Effects on the Meat Quality of Broilers. *Poultry Science*, 103523. <https://doi.org/10.1016/j.psj.2024.103523>
- Zaremba, I., Grabowicz, M., & Biesek, J. (2024). Effects of feeding silage of beet pulp or maize on the growth performance, meat quality, and production economics of broiler ducks. *Poultry Science*, 103(3), 103441. <https://doi.org/10.1016/j.psj.2024.103441>
- Zhou, W. T., Fujita, M., Ito, T., & Yamamoto, S. (1997). Effects of early heat exposure on thermoregulatory responses and blood viscosity of broilers prior to marketing. *British Poultry Science*, 38(3), 301–306. <https://doi.org/10.1080/00071669708417991>