FORUM EKONOMI
Jurnal Ekonomi, Manajemen dan Akuntansi
P-ISSN 1411-1713 | E-ISSN 2528-150X
Vol. 28 No. 2 (2026) | Hal. 197-201

Analysis of Production Costs on The Income of Broiler Chicken Farming Businesses

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Abstract
Broiler farming is crucial for providing animal protein and enhancing the income of farm households; however, rising production costs often impede business efficiency. This study examined how various production cost factors affect broiler farm income in a commercial closed-house production system. A quantitative case study approach was used, drawing on primary and secondary data collected over one production cycle. The study's independent variables included expenses for chicks, feed, labor, medication and vaccines, electricity and water, and housing depreciation, whereas farm income served as the dependent variable. Multiple linear regression analysis was performed to evaluate the collective and individual effects. The results showed that feed costs accounted for the largest share of total production expenses, representing 61.3%. The total revenue was IDR 229,405,000, and the production costs totaled IDR 110,500,000, leading to a farm income of IDR 118,905,000 per cycle. A correlation coefficient of 0.927 indicates a very strong relationship between production costs and income, and a determination coefficient of 0.859 suggests that 85.9% of the income variation is explained by the model. Partial regression analysis confirmed that all production cost components significantly affected income, with feed costs having the most pronounced negative effect. Therefore, effectively managing feed and other operational costs is essential for improving the profitability and sustaining the performance of broiler farms.

Article history
Received 2026-02-15
Accepted 2026-04-15
Published 2026-04-30

Keywords
Broiler Farming;
Farm Income;
Multiple Linear Regression;
Production Cost.

INTRODUCTION

The rising demand for animal protein has spurred the growth of broiler chicken farming, a poultry sector known for producing meat quickly, at relatively low costs, and with easy access to various societal groups. According to FAO reports and economic analyses of poultry, the increasing consumption of chicken meat continues to bolster the role of broilers in modern food systems and poultry agribusiness (OECD/FAO, 2023; Vissers et al., 2019).

The expansion of the broiler industry is fueled by genetic improvements, advancements in feed formulation, and the implementation of intensive housing management, all of which boost the biological efficiency of livestock. Recent research has highlighted that chick quality, nutrient balance in feed, and environmental control within housing are crucial factors influencing broiler growth performance and harvest yield (Zuidhof et al., 2014; Choct et al., 2010; Choi et al., 2023; Martinez et al., 2022).

The cost structure of broiler farming includes expenses for chicks, feed, labor, livestock health, electricity, water, and housing depreciation. Among these, feed costs account for the largest share of total production expenses, meaning that any fluctuations in feed prices or inefficiencies in their use will directly affect the farm's economic results (Chibanda et al., 2023; Vissers et al., 2019; Karaman et al., 2023).

In business economics, farm income is calculated as the difference between total revenue and total production costs over the rearing period. A decline in income can occur if rising production costs are not offset by increased output or selling prices, whereas effective cost management can improve the profit margins of broiler businesses (Chibanda et al., 2023; Vissers et al., 2019).

The necessity for quantitative analysis is underscored by the fact that each cost component has a different impact on changes in business income. Multiple linear regression allows for the measurement of the direction of influence, coefficient size, and degree of dominance of each cost component on broiler farm income (Gujarati & Porter, 2021; Ghozali, 2021).

This study examines the production cost structure, business income, and impact of production cost components on the income of broiler chicken farms. The findings are expected to provide an empirical basis for enhancing cost efficiency and reinforcing the sustainability of broiler farming enterprises.

METHOD

A quantitative methodology was employed, utilizing a case study approach on a commercial broiler chicken farm that operates a closed-house system in Kutai Kartanegara Regency. This location was intentionally chosen because of the business unit's comprehensive and representative records of costs and production, which are essential for economic analysis (Sugiyono, 2022).

Primary data were gathered through observation and documentation of production factor usage over a single rearing cycle, and secondary data were sourced from business records and pertinent scientific literature. The independent variables were the cost of chicks (X_1), feed expenses (X_2), labor costs (X_3), medicine and vaccine expenses (X_4), electricity and water costs (X_5), and depreciation cost of the poultry house (X_6). The dependent variable was the income generated by the broiler farm (Y).

Business income was determined by subtracting the total production costs from the total revenue, and daily body weight gain was used as an additional indicator of production performance. A multiple linear regression model was applied to evaluate both the combined and individual effects of the production cost components on business income using the following equation:

$$\mathbf{Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e}$$

(Gujarati & Porter, 2021).

The model validity was assessed using the F-test for the overall effect, t-test for individual effects, and coefficient of determination (R^2) to measure the model's explanatory

capacity. Data analysis was conducted using IBM SPSS Statistics to facilitate an objective and quantifiable assessment of the relationships among variables (Ghozali, 2021).

Results and Discussion

Production Cost Structure of Broiler Chicken Farming Business

The findings revealed that the expenses involved in broiler chicken farming include costs for chicks, feed, labor, medicine and vaccines, electricity and water, and housing depreciation. Among these, feed expenses are the most significant, accounting for 61.3% of the total production costs. This was followed by the cost of chicks (16.7%) and housing depreciation (8.7%).

The breakdown of these costs illustrates that the success of broiler business cost control is largely determined by feed efficiency. This supports previous findings that feed costs consistently dominate the cost structure of broiler businesses and are the most sensitive factors affecting changes in business profitability (Vissers et al., 2019; Chibanda et al., 2023).

Table 1. Structure of production costs in broiler chicken farming

Cost Component	Value (IDR)	Percentage (%)
Chick cost (X_1)	18,500,000	16.7
Feed cost (X_2)	67,800,000	61.3
Labor cost (X_3)	6,200,000	5.6
Medicine and vaccine cost (X_4)	3,100,000	2.8
Electricity and water cost (X_5)	5,400,000	4.9
Housing depreciation cost (X_6)	9,500,000	8.7
Total production cost	110,500,000	100.0

Although there are additional minor cost components, their role is vital for the smooth functioning of the production process. This includes investment in high-quality day-old chicks (DOC), measurable expenses for livestock health, and efficient energy use to maintain optimal production performance without unnecessarily inflating costs (Zuidhof et al., 2014; Olanrewaju et al., 2010).

Business Income from Broiler Chicken Farming

The total business revenue amounted to IDR 229,405,000 from the sale of 4,850 broiler chickens with an average harvest weight of 2.15 kg per bird and a selling price of IDR 22,000 per kg. The production costs totaled IDR 110,500,000, resulting in a farm income of IDR 118,905,000 per production cycle. This indicates that the broiler farming business achieved a profit margin of approximately 51.8% of total revenue.

The daily body weight gain averaged 57.3 grams per day over a 35-day rearing period, which is consistent with the performance standards of modern broiler strains under optimal management conditions. This performance metric demonstrates the productive efficiency achieved through proper nutrition, biosecurity measures, and environmental control in the closed-house system (Choi et al., 2023; Martinez et al., 2022).

The profitability of the operation reflects the effectiveness of integrated cost management and production optimization. The positive income margin provides evidence that well-managed broiler operations remain economically viable despite the challenges posed by fluctuating input costs, particularly feed prices (Vissers et al., 2019; Chibanda et al., 2023).

Effect of Production Costs on Business Income

The multiple linear regression analysis revealed a strong relationship between production cost components and farm income. The coefficient of correlation (R) was 0.927, indicating a very strong positive relationship between the independent variables and the dependent variable. The coefficient of determination (R^2) was 0.859, suggesting that 85.9% of the variation in business income can be explained by the six production cost components included in the model.

The F-test yielded a calculated value of 28.45 with a significance level of 0.000 ($p < 0.05$), indicating that the regression model is statistically significant and effective in explaining the relationship between production costs and income in broiler chicken farming. This demonstrates that the production cost components collectively have a significant influence on business income.

Table 2. Results of multiple linear regression analysis

Variable	Coefficient (B)	Std. Error	t-value	Sig.
Constant	12,580,000	2,145,000	5.86	0.000
Chick cost (X_1)	-0.214	0.082	-2.61	0.011
Feed cost (X_2)	-0.621	0.094	-6.61	0.000
Labor cost (X_3)	-0.178	0.071	-2.50	0.015
Medicine and vaccine cost (X_4)	-0.096	0.043	-2.23	0.029
Electricity and water cost (X_5)	-0.052	0.025	-2.08	0.041
Housing depreciation cost (X_6)	-0.084	0.039	-2.15	0.035
R	0.927	—	—	—
R^2	0.859	—	—	—
F-value	28.45	—	—	0.000

The derived regression equation is $Y = 12{,}580{,}000 - 0.214X_1 - 0.621X_2 - 0.178X_3 - 0.096X_4 - 0.052X_5 - 0.084X_6$. This equation indicates that all regression coefficients are negative, implying that an increase in each component of production costs generally leads to a reduction in business income, provided that the cost increase is not offset by a corresponding increase in productivity or revenue.

The t-test results demonstrate that all production cost components have a statistically significant effect on business income ($p < 0.05$). Feed cost (X_2) exhibited the largest negative coefficient (-0.621), indicating that it has the most substantial impact on income reduction. This finding underscores that feed costs are the most responsive element in the broiler cost structure and should be prioritized in business cost management strategies (Choct et al., 2010; Vissers et al., 2019).

The significant effects of chick costs, labor costs, medicine and vaccine expenses, electricity and water costs, and housing depreciation on business income demonstrate that each of these factors plays a crucial role in maintaining the production process. These findings suggest that the efficiency of business income is shaped by the entire cost structure involved in broiler production rather than being dependent on a single factor (Gujarati & Porter, 2021; Chibanda et al., 2023).

The research findings have important managerial implications for strategies aimed at boosting income. These include the importance of managing feed expenses through proper procurement planning and storage, selecting high-quality day-old chicks with superior genetic potential, organizing the workforce efficiently to optimize labor productivity, implementing preventive health programs to minimize disease-related losses, and operating housing systems with energy efficiency to reduce utility costs. These integrated strategies serve as a vital foundation for enhancing profitability, sustaining positive cash flow, and bolstering the long-term sustainability of broiler chicken farming operations.

CONCLUSION

This study demonstrates that in broiler chicken farming, feed expenses constitute the largest portion of the cost structure at 61.3%, followed by expenditures on chicks (16.7%), housing depreciation (8.7%), labor (5.6%), electricity and water (4.9%), and medicines and vaccines (2.8%). Multiple linear regression analysis revealed that the components of production costs significantly impact business income, both collectively ($F = 28.45$, $p < 0.001$) and individually (all $p < 0.05$), with feed expenses exhibiting the most substantial negative effect ($\beta = -0.621$). The model explained 85.9% of the variance in farm income ($R^2 = 0.859$), demonstrating strong predictive validity. These results highlight the critical importance of effectively managing production costs, particularly feed expenses, to enhance the profitability and ensure the economic sustainability of broiler chicken farming operations.

ACKNOWLEDGMENTS

The author expresses gratitude to the Animal Husbandry Study Program in the Department of Animal Husbandry at the Faculty of Agriculture, Mulawarman University, for their academic support and for providing access to scientific resources. Appreciation is extended to the Food and Agriculture Organization (FAO), the Intergovernmental Panel on Climate Change (IPCC), and Global Forest Watch for their data transparency, which was instrumental in developing this research. Furthermore, the author acknowledges the valuable scientific contributions of colleagues and faculty members specializing in tropical ecology and food systems during the manuscript review process.

CONFLICT OF INTEREST

The author declares that there are no financial, academic, or institutional conflicts of interest in the preparation of this manuscript titled "Analysis of Production Costs on the Income of Broiler Chicken Farming Businesses." All scientific perspectives presented are grounded in reliable data and literature and are free from external influence. The author confirms that the objectivity of the analysis and the academic integrity of the manuscript have been maintained throughout its preparation.

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