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RISK MANAGEMENT ANALYSIS OF BROILER FARMING IN WEST ACEH DISTRICT

Keumala Fadhiela ND[1]*, Rosa[2]
[1,2] Universitas Teuku Umar, Meulaboh
Corresponding E-mail: keumalafadhiela@utu.ac.id* , rosameilinda2@gmail.com[2]

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Abstract

This study is to examine risk management techniques in broiler chicken production within West Aceh Regency. Broiler production is a rapidly yielding agricultural enterprise, although it is susceptible to production and financial hazards, such as disease outbreaks, fluctuations in feed prices, and mortality rates. Employing a case study methodology, primary data were gathered via field observations, structured interviews, and documentation from one of the largest independent broiler farms in the area. Data were examined with descriptive techniques, income assessment, and quantitative risk metrics including Coefficient of Variation (CV) and Feed Conversion Ratio (FCR). The analysis demonstrated that the average mortality rate (8,1%) beyond the industry tolerance threshold (3–5%), and the FCR value (2,3) suggested diminished feed efficiency, highlighting operational difficulties. The financial analysis indicated that the business is viable, evidenced by a coefficient of variation of 0,35 and a positive lower-bound income, implying modest risk yet sustained returns. The study highlights the significance of systematic risk management strategies—particularly in illness prevention, feed optimization, and DOC quality control—to guarantee farm resilience and profitability. These findings offer practical insights for smallholder farmers and policymakers aiming to enhance the broiler sector in rural Indonesia.

Keywords: ***broiler farming, feed efficiency, financial risk, mortality***

INTRODUCTION

Broiler chicken farming constitutes a prominent subsector within Indonesia's livestock industry. This enterprise possesses significant potential for growth, both commercially and among smallholders. One of its primary advantages is the comparatively brief production cycle—approximately 30 to 40 days—enabling farmers to achieve rapid capital turnover and expedited profit realization (Amalia, 2012). In accordance with population expansion and heightened knowledge of the significance of animal protein, the demand for chicken meat in Indonesia persists in its upward trajectory. The trend is further reinforced by economic growth and increased purchasing power among the populace. In Aceh Province, broiler production has seen promising growth, notwithstanding the prevailing difficulties. Three prevalent business strategies include self-funded farms, government-supported initiatives, and collaborations (Jamilah, 2018). Among them, the partnership model is regarded as the most profitable and sustainable option, particularly for smallholder farmers who often face constraints in capital and access to markets (Jamilah, 2018; Nazli et al., 2019). According to data from the Animal Husbandry Department of West Aceh Regency (2022), broiler chicken production has increased significantly over recent years, as shown in Table 1:

Table 1. Broiler Chicken Production in West Aceh Regency (2019–2021)

Year	Production (birds)
2019	48.743
2020	55.136
2021	187.021

Source: Animal Husbandry Department of West Aceh Regency, 2022

The table clearly indicates that production had a substantial increase of 239.3% in 2021 over to the prior year. This expansion signifies both the increasing demand and the unexploited potential of the broiler business in the

area. A case study in West Aceh indicated that production costs, marketing expenditures, and labor wages substantially impacted the farm's total success, collectively representing 80% of the difference in sales results (Baiza, 2021). These insights underline the importance of cost efficiency and well-structured partnerships in ensuring sustainable production. However, beneath these opportunities exist numerous obstacles. Broiler chicken farming is significantly susceptible to commercial risks, including fluctuating input and output prices, disease outbreaks, and weather-related disturbances. Input costs, especially for Day Old Chicks (DOC), feed, and pharmaceuticals, are subject to variability. The market price for live chickens frequently fluctuates due to variable supply and demand. In West Aceh, prevalent concerns encompass elevated feed costs, avian mortality, and volatile market prices (Jamilah, 2018). Moreover, production risks resulting from weather, stress, and disease remain major threats, leading to significant financial losses when not managed effectively (Alam et al., 2024).

Moreover, market-related concerns include payment delays, price reductions during concurrent harvests, and water shortages amid excessive heat present additional obstacles for farmers. To address these risks, numerous farmers depend on partnership systems and implement risk management strategies, encompassing planning, handling, monitoring, and evaluation (Riptanti, 2016). In this setting, efficient risk management is essential to guarantee the sustainability and resilience of broiler farming. It offers a systematic framework for discovering, analysing, evaluating, and mitigating risks that may jeopardise company continuity. Through effective risk management, farmers may make educated and strategic decisions to improve productivity and mitigate losses. This study aims to investigate the particular risks associated with broiler farming and analyse the implementation of risk management measures in West Aceh Regency. The primary research inquiry is: How is risk management executed in broiler chicken farming within West Aceh Regency? The objectives of this study are: (1) to identify the types of risks encountered by broiler chicken farmers; (2) to analyse the risk management strategies employed; and (3) to offer practical recommendations to aid farmers in planning, organising, directing, and controlling potential risks. This project seeks to enhance academic understanding while providing practical insights for broiler farmers to establish a more sustainable and resilient agricultural operation.

LITERATURE REVIEW

Risk is an intrinsic element of all agricultural enterprises, including broiler farming. Broiler production, characterised by biological processes, market dynamics, and climate unpredictability, is particularly vulnerable to numerous uncertainties. To maintain company sustainability, it is essential for farmers to comprehend the many risks they encounter and to implement suitable risk management measures. Broiler farms face three primary forms of risk: production risk, market risk, and financial risk. Production risk arises from unforeseen biological and environmental variables, including disease outbreaks, feed quality, and climatic irregularities. Prevalent avian diseases—such as Newcastle Disease, Infectious Bursal Disease (IBD), and gastrointestinal disorders—significantly contribute to mortality, especially in regions with inadequate biosecurity measures (Alam et al., 2024). In Indonesia, production risks are intensified by inadequate farmer knowledge, substandard DOC quality, and infrastructural limitations. A new study in Sanggau, West Kalimantan, establishes that production and pricing risks are paramount, particularly when the coefficient of variation (CV) surpasses 0.5, signifying a substantial likelihood of financial loss in each cycle (Andriani et al., 2024). Small-scale farmers often lack access to proper vaccination, veterinarians, or technical assistance, which increases vulnerability to production losses (Nazli et al., 2019).

Market risk emerges mainly from volatile chicken prices, especially during periods of supply glut or weak demand. Jamilah (2018) noted that Agricultural producers frequently encounter significant losses resulting from price declines during concurrent harvests. Furthermore, postponed payments from intermediaries exacerbate financial risk, particularly for individuals dependent on short-term borrowing. Feed prices, accounting for more than 60% of overall production costs, represent a significant economic risk (Baiza, 2021). This is consistent with studies in Nigeria showing that a shortage of feed and price hikes are the top-ranked risks faced by broiler farmers (Olohungbebe & Ellah, 2024). In the global context, pricing collusion in the US broiler business, as revealed by Sheng & Vukina, (2025) worsens inequality by limiting small farmers' ability to compete fairly. Hagerman et al., (2025) discovered that minority and veteran farmers face restricted access to crop insurance, despite the fact that legislative assistance from the 2018 Farm Bill enhanced adoption rates and resilience. Risk management in broiler production comprises four primary steps: risk identification, risk analysis, strategy implementation, and evaluation (Sekarrini et al., 2016)**.** Common strategies encompass diversifying income streams, executing fixed-price contracts, enforcing stringent biosecurity measures, and monitoring market and input pricing. Government policy is essential. Regulating DOC and feed prices, along with promoting business collaborations, can mitigate agricultural risk and enhance farmer protection (Suwarta, 2021).

Agricultural insurance is an essential instrument for risk mitigation. Research on broiler farms in Iran indicated that insurance is favorably associated with risk mitigation, particularly in aspects such as sanitation, temperature regulation, and disease management (Habibi et al., 2018). Furthermore, simulation-based tools are on the rise. Monte Carlo Simulations were employed in Oman to assess the effects of climate and price shocks on profitability. This methodology facilitated the evaluation of various production and marketing strategies under stress conditions (Ishag, 2022). Nwaogwugwu et al., (2024) showed that Nigerian small-scale farmers use a mix of real-time market monitoring, direct sales, and safety protocols to cope with risk—strategies relevant to Indonesian contexts. Similarly, studies in Sumatra highlight the importance of farmer competence and technical support in applying effective mitigation, especially under partnership schemes (Tanjung et al., 2023).

METHOD

This study was performed in Ranto Panyang Timur Village, Meureubo District, West Aceh Regency. This site was intentionally chosen, particularly at a broiler chicken farm that benefits from comprehensive historical data accessibility over the previous two years and possesses a substantial output capacity of 10,000 birds. This aids researchers in detecting and comparing different sources of risk faced during the production process. The research is qualitative descriptive, focused on delineating and analyzing production hazards and alternative management strategies in broiler chicken farming. The research concentrates on identifying dangers and risk management solutions derived from actual field data. The data collected comprises primary data, acquired directly through field observations and structured interviews with farmers (owners and workers), specifically concerning production hazards, marketing, and decision-making in broiler chicken enterprises. Concurrently, Secondary Data is sourced from pertinent institutions, including livestock services, literature, yearly reports, and livestock business paperwork. Data gathering methodologies employing observation to monitor actual activities and hazards in the field, including poultry mortality, price variations, and cage conditions. Concurrently, structured interviews are administered to business owners and employees utilizing methodically crafted questionnaires to gather comprehensive information on risk management practices. Documentation entails the compilation of photographs, daily business records, and pertinent papers as visual corroboration and substantiation for the outcomes of observations and interviews.

a. Descriptive analysis. This method is used to understand the patterns and characteristics of risk management practices applied by the poultry farmer. According to Sugiyono (2012), descriptive analysis aims to describe the object of research factually and systematically as it is found in the field.
b. Income analysis. Calculates the cost structure, revenue, and profit of the broiler farming business using the following formulas:

Total Production Cost : $TC=TFC+TVC$

Where:
TC = Total Cost (IDR)
TFC = Total Fixed Cost (IDR)
TVC = Total Variable Cost (IDR)

Total Revenue: $TR=Y\times Py$

Where:
TR = Total Revenue (IDR)
Y = Production Quantity (units)
Py = Selling Price per Unit (IDR)

Profit (Income) $Pd=TR-TC$

c. Quantitative Risk Analysis. This analysis quantifies the level of business risk using statistical approaches, including:

Expected Return (Average Income)

$$\text{Ri} = \frac{\sum_{j=1}^{m} Rij}{n}$$

Where:
Ri = Average Income per Period
Rij = Income in period *j*
n = Number of observations

Variance (σ²)

$$\sigma i2 = \frac{\sum_{j=1}^{n}(Rij - Ri)2}{n-1}$$

Where:
$\boldsymbol{\sigma}$i = variance per period
Rj = Expected Return

Standard Deviation (σ): $\boldsymbol{\sigma} = \sqrt{\boldsymbol{\sigma}^2}$
Coefficient of Variation (CV): $\text{CV} = \frac{\sigma}{Ri}$
Lower Bound Income (L): $\text{L} = \text{Ri} - 2\boldsymbol{\sigma}$

Table 2. Interpretation of CV and L:

CV Value	L Value	Interpretation
CV > 0.5	L < 0	High business risk (possibility of financial loss)
CV < 0.5	L > 0	Low risk business (stable profit potential)
CV = 0	L = 0	Break-even condition (no loss, no profit)

Feed Conversion Ratio (FCR)
This measures feed efficiency by comparing total feed consumed to the total body weight of the broilers:
FCR=Total Feed (kg)/Total Weight Gain (kg)

RESULTS AND DISCUSSION

The broiler farm being examined is situated in Gampong Ranto Panyang Timur, West Aceh Regency, and is autonomously operated by a private farmer without corporate affiliation. The facility covers roughly 3 hectares and contains a closed system poultry house spanning 175 by 25 meters, accommodating 24,000 to 25,000 birds per cycle. The respondent has managed the farm since mid-2021, expending around Rp 2 billion to develop the infrastructure.

A. Examination of Broiler Chicken Business Revenue

Costs are the expenditures paid by cultivators for acquiring equipment, encompassing both goods and services, throughout the execution of their commercial operations. Fixed costs refer to a specific sum of expenditures allocated for the acquisition of products and equipment that are not depleted in a single production cycle but can be utilized again over an extended duration.

Table 3. Fixed Costs in Broiler Chicken Farming Business

Item Description	Depreciation/Production Cost (Rp)
Construction of chicken coop	125.000.000
Feed containers, plower, water nipples	33.333.333
Light bulbs	4.250.000

Item Description	Depreciation/Production Cost (Rp)
Water pump	366.666
Generator set (Genset)	33.333.333
Total	**196.283.333**

Table 03 above delineates the fixed costs incurred by Mr. Jauhari in a singular production, totaling Rp 196,283,333. This amount encompasses expenses related to the construction of cages, feeding stations, light bulbs, water pumps, and generator sets, with the aggregate cost of each item apportioned according to its economic value. Variable costs are expenditures incurred by Mr. Jauhari that fluctuate with the level of production output. Consequently, an increase in production volume correlates with an escalation in variable costs. The elements comprising variable costs in broiler chicken production are Day-Old Chicks (DOC), small feed size 5.00, feed 5.11, feed 5.12, pharmaceuticals and vitamins, electricity expenses, and labor wages. The components of variable costs are presented in the table below:

Table 4. Variable Costs in Broiler Chicken Farming Business

Item Description	Average Cost (Rp)
Day-Old Chicks (DOC)	224.875,000
Feed 5.00	103.010.000
Feed 5.11	175.466.250
Feed 5.12	161.246.000
Medicines & Vitamins	14.375.000
Electricity Bill	8.625.000
Labor	9.600.000
Total	**697.197.250**

To calculate and determine the total cost, it is done by adding fixed costs to variable costs for each effort made by Subangkit et al., (2021). The total cost that Mr. Jauhari must incur in each production period can be seen in Table 5 below.

Table 5. Total Costs in Broiler Chicken Farming

Production Period	Fixed Costs (Rp)	Variable Costs (Rp)	Total Costs (Rp)
Period I	196.283.333	757.000.000	953.283.333
Period II	196.283.333	609.430.000	805.713.333
Period III	196.283.333	661.129.000	857.412.333
Period IV	196.283.333	761.230.000	957.513.333
Average	196.283.333	**697.197.250**	**893.480.583**

Table 5 above illustrates the cumulative expenses of broiler chicken farming across four seasons, average Rp 893,480,583, with the total cost in the fourth period exceeding that of the preceding period. The total cost is the aggregate of fixed expenses and variable costs. The average fixed cost is Rp196.283.333 while the variable cost amounts to Rp. 697,197,250, indicating that the variable cost is the predominant expenditure in a single production cycle. Revenue is the product of the quantity produced and the selling price of the product. Revenue is defined as the entire income generated from agricultural activities within a specific period, derived from product sales.

Table 6. Revenue in Broiler Chicken Farming Business

Production Period	Production Volume (Kg)	Selling Price (Rp)	Revenue (Rp)
Period I	50.900	21.850	1.112.165.000
Period II	46.250	21.850	1.010.562.500
Period III	44.829	21.850	979.513.650
Period IV	49.427	21.890	1.081.957.030

Production Period	Production Volume (Kg)	Selling Price (Rp)	Revenue (Rp)
Average	**47.851**	**21.860**	**1.046.049.545**

Table 06 above presents the harvest data, indicating a production volume of 47.851 kg across four times, with an average selling price of Rp 21.860, culminating in an average income of Rp 1.046.049.545 for Mr. Jauhari. The price of the hens is contingent upon their weight. Revenue is derived from total receipts subtracted by capital costs in a production process. The revenue or profit generated by Mr. Jauhari's broiler chicken farming enterprise is presented in Table 06 below. The chart indicates that the average income derived from broiler chicken farming is Rp 152,568,962 over a period of 45 to 50 days.

Table 7. Income from Broiler Chicken Farming Business

Production Period	Revenue (Rp)	Capital Cost (Rp)	Income (Rp)
Period I	1.112.165.000	953.283.333	158.881.667
Period II	1.010.562.500	805.713.333	204.849.167
Period III	979.513.650	857.412.333	122.101.317
Period IV	1.081.957.030	957.513.333	124.443.697
Average	**1.046.049.545**	**893.480.583**	**152.568.962**

B. Risk Analysis in Broiler Poultry Farming

In commercial broiler farming, risk is a crucial factor that may be broadly categorised into operational risks and financial concerns. Operational risks arise from non-financial variables, including human errors, technical failures, environmental circumstances, and biological threats (Ishag, 2022). Conversely, financial risks encompass variations in input and product pricing, capital accessibility, and return volatility (Achoja, 2014). Broiler chickens are especially vulnerable to operational hazards owing to their rapid growth cycles and sensitivity to environmental stressors and infections. If not properly addressed, these difficulties can substantially diminish flock productivity, elevate mortality rates, and ultimately jeopardize economic viability (Van Limbergen et al., 2020)

a. Analysis of Mortality as a Production Risk

Mortality rate is one of the most direct indicators of operational performance in broiler farming. Based on the primary data from Mr. Jauhari's farm, the following mortality pattern was observed:

Table 8. The mortality rate due to disease attacks

Production Period	Total Birds	Mortality (birds)	Mortality (%)
I	24.000	2.000	8,3%
II	20.000	1.500	7,5%
III	20.000	1.321	6,6%
IV	25.000	2.533	10,1%
Total	89.000	7.354	**8,1% Avg**

A mortality rate of 8.1% substantially exceeds the acceptable threshold of 3%, frequently referenced by integrator firms and industry standards (Kusumawati, 2018). According to Arianti (2019) identifies low-quality Day-Old Chicks (DOCs) as the principal cause of increased mortality, as they are particularly susceptible to viral and bacterial infections. Mr. Jauhari observed that substandard DOC quality increases the susceptibility of birds to Chronic Respiratory Disease (CRD), Avian Influenza (AI), Mycoplasma gallisepticum (which causes ocular infections), and Tenosynovitis (resulting in lameness and eventual mortality). This finding aligns with extensive

research in Asia and Africa, highlighting that death rates exceeding 5% substantially undermine broiler profitability and elevate the financial risk of the venture (Khan et al., 2023; Olohungbebe & Ellah, 2024). Furthermore, research in Indonesia and Nigeria has revealed that substandard DOC quality, biosecurity deficiencies, and insufficient disease management are the primary factors contributing to elevated avian mortality rates (Andriani et al., 2024; Fauzan et al., 2022).

b. Feed Conversion Ratio (FCR) and Efficiency

Feed efficiency is another critical determinant of broiler farm performance. Mr. Jauhari's records over four production cycles are summarized as follows:

Table 9. The mortality rate due to disease attacks

Period	Feed Used (kg)	Birds Survived	FCR
I	42.500	20.000	2,1
II	40.900	18.500	2,2
III	45.750	18.679	2,4
IV	52.150	22.467	2,3
Average	45.325	19912	**2,3**

The average Feed Conversion Ratio (FCR) was 2.3, signifying that 2.3 kilograms of feed was necessary to yield 1 kg of live chicken weight. This figure is within the allowed efficiency range (2.0–2.3), but it is at the upper limit. Deviations over 2.3 are frequently attributed to stress, illness, or inadequate nutritional management (Van Limbergen et al., 2020). Research by (Mendes et al., 2014) and SciELO demonstrate that variations in Feed Conversion Ratio (FCR) are significantly correlated with alterations in housing conditions, feed quality, and illness prevalence. Periods of elevated FCR at Mr. Jauhari's farm seem to correspond with increased mortality and diminished returns, highlighting the interrelatedness of these risk factors.

C. Financial Risk

Expected Return and Volatility

Financial performance is best captured by analyzing expected return, variance, standard deviation, and coefficient of variation.

Table 10. The mortality rate due to disease attacks

Production Period	Flock Size	Net Return (Rp)	Return/Bird (Rp)
I	24.000	158.881.667	6.620
II	20.000	204.849.167	10.242
III	20.000	122.101.317	6.105
IV	25.000	124.443,697	4.978
Total	89.000	610.275.848	**6.986 Avg.**

The anticipated return per bird is Rp 6.986. Based on this number, financial risk measures were calculated as follows:

- Variance = Rp 6.004.093
- Standard deviation (σ) = Rp 2.450
- Coefficient of Variation (CV) = 0,35

Lower Bound Income = Ri − 2σ = 7,076 − 2(2.450) = Rp 2,176

A CV of 0.35 indicates that 35% of the return is exposed to risk, which, while significant, is still below the crucial CV of 0.50—a level at which losses become more probable than profits (Arianti, 2019). Moreover, the minimum income of Rp 2.176 signifies that even during adverse oscillations, Mr. Jauhari's farm would continue to function above the breakeven point. These findings correspond with extensive financial research in Delta State, Nigeria, indicating that the financial risk threshold in broiler farming is approximately 15%, comfortably within the acceptable limits for Mr. Jauhari's existing enterprise (Achoja, 2014). The risk assessment of Mr. Jauhari's broiler farm indicates that, although the venture is profitable, it encounters moderate to high production and financial risks.

The mortality rate of 8.1% and a feed conversion ratio of 2.3 indicate fundamental deficiencies in chick quality and health management. The computed coefficient of variation of 0.35 and the positive lower-bound income indicate that the enterprise is viable yet susceptible. Implementing proactive, evidence-based strategies—such as improved biosecurity, superior DOC sourcing, and systematic financial risk mitigation—can stabilize income and ensure long-term survival.

CONCLUSION

From the research results on the analysis of broiler chicken production income, the following conclusions were obtained:

1. The disease control measures implemented at Mr. Jauhari's farm include maintaining the cleanliness of feeding and drinking areas as well as the coop, regulating the coop temperature, and providing regular vaccinations to boost the immune system so that the broiler chickens are not easily affected by diseases.

2. The broiler chicken farming business in West Aceh in one production period (50 days) incurs an average total cost of Rp 893.480.583,- and receives an average revenue of Rp. 1.046.049.545,- with an average income level of Rp 152.568.962,-. From these costs, an average of 24.000 broiler chickens can be produced, with a total average weight of 47.851 kg and an average weight per chicken of 2,12 kg, so the price of broiler chicken per kg is Rp 21.860,-/kg, based on the contract price set by the partner owner.

Suggestion

Post-harvest handling of the cage should be taken seriously, as there are still many other sources of disease that remain alive and develop in the cage. These diseases can lead to a decline in health and production levels in the next period. The company should be more punctual in the delivery of DOC. This is to prevent the cages from being empty for too long, thereby not significantly reducing the production period. The company should be more punctual during the harvest period. This is to prevent farmers from incurring losses due to increased feed consumption.

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