

# Financial risk management strategy for broiler farmers in facing fluctuations in prices of feed and products

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**Abstract.** This study investigates financial risk management strategies for broiler chicken farmers, focusing on price fluctuations of feed and livestock products. We examined a 46,000-animal farming operation, analyzing aspects from cage preparation and chick reception to feed provision, environmental maintenance, and waste management. Marketing processes and results were also scrutinized. Primary data, including production costs (cage and feed preparation), livestock performance (efficiency indicators), management data, and potential waste income, were collected through observation and in-depth interviews. Marketing data, such as selling prices, trade chains, and profit/loss, were also gathered. We used quantitative descriptive analysis to identify cost patterns, production efficiency, and marketing outcomes. Using sensitivity analysis, the study reveals that fluctuations in feed costs and selling prices have a substantial impact on farm profitability, with feed price increases being the most critical determinant of financial outcomes. This underscores the importance of adaptive risk management strategies within broiler partnership models. Recommended risk management strategies include diversifying feed sources and improving feed efficiency. This study offers insights into effective strategies for broiler farmers to manage financial risks from price volatility, ultimately enhancing farm resilience.

## 1 Introduction

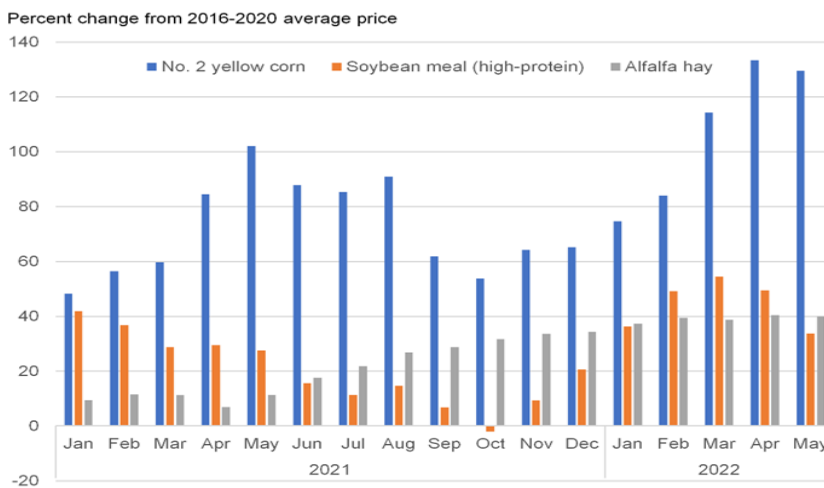
Indonesia's agricultural economy relies heavily on poultry farming, which provides both national food security and rural livelihoods. The poultry subsector, particularly the broiler chicken industry, is crucial for supplying affordable animal protein to meet rising domestic demand. Despite its growth, the industry faces significant challenges from volatile input and output prices. Feed costs, which make up the majority of production expenses, and fluctuating

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live chicken selling prices severely impact profit margins and pose substantial risks to the financial stability of broiler farms, especially for small and medium enterprises (SMEs) [1].

In this context, financial risk management becomes crucial to safeguard the operational continuity and economic resilience of poultry enterprises. Risk management efforts encompass various strategies, including input price stabilization, production efficiency improvements, and market diversification [2]. This study focuses on analyzing the financial risk management practices employed by a broiler chicken farm with a flock size of 46,000 birds operating under a partnership model commonly known as *kemitraan*. This integrated scheme between core companies and contract growers has become increasingly prevalent in Indonesia and offers a unique lens through which to examine how collaborative farming models cope with economic uncertainties. By exploring the financial strategies adopted under this arrangement, this research seeks to generate insights that can inform policy and operational improvements to strengthen the long-term viability of the broiler sector.



**Fig. 1.** Changes to animal feed prices from five-year average price, between January 2021 and May 2022 (USDA, Economic Research Service, Feed Grains database)

The profitability and sustainability of livestock farming particularly in the broiler chicken industry are highly sensitive to fluctuations in animal feed costs, which typically account for 60–70% of total production expenses [3]. As shown in the Fig 1 “Changes to animal feed prices from five-year average price”, the period between January 2021 and May 2022 experienced significant and volatile changes in the prices of essential feed components: No. 2 yellow corn, high-protein soybean meal, and alfalfa hay. According to data from the USDA Economic Research Service, No. 2 yellow corn prices surged over 100% above the five-year average in May 2021, peaking at nearly 140% in April–May 2022. Soybean meals also demonstrated notable volatility, exceeding 50% above average in March 2022, while alfalfa hay showed more moderate yet still impactful increases.

These sustained feeding price increases directly elevate production costs, posing significant financial risks for broiler farmers and putting pressure on profit margins. Without adequate risk mitigation, such volatility threatens the financial viability of farming operations. Consequently, the implementation of robust financial risk management strategies is critical. Although prior studies have addressed general risk mitigation tools in agriculture such as diversification, insurance, and contract farming, many lack specificity concerning the broiler sector, particularly large-scale operations under partnership schemes. Moreover, limited research has employed data-driven methodologies like sensitivity analysis to precisely quantify the financial consequences of key risk drivers such as feed price volatility.

To address these gaps, this study has two main objectives. First, it aims to comprehensively analyze the financial risk management strategies currently employed by broiler farmers, with a case study of a partnership-based farm managing 46,000 birds. The analysis will cover practices related to input procurement, production processes, waste utilization, and marketing. Second, the study will formulate evidence-based strategic recommendations to strengthen financial resilience in broiler production. These recommendations will be grounded in quantitative descriptive analysis and supported by sensitivity analysis to assess the impact of price volatility on profitability, thereby contributing to a more sustainable and economically robust broiler industry.

## **2 Research methods**

This study adopted a case study approach to comprehensively analyze financial risk management strategies in a broiler farm operating under a contract farming system. The research was conducted at PT ABC as Partner Farmers in West Java, from January to April 2024. This specific time frame allowed for the capture of current operational dynamics and market conditions. The methodology employed a mixed-methods approach, integrating both qualitative and quantitative data collection and analysis. Primary data were meticulously gathered through direct observation of farm activities and in-depth interviews with key personnel, including farmers and management, to gain nuanced insights into their daily operations and decision-making processes. Detailed production cost data, encompassing expenditures on feed, cage preparation, and labor, were systematically collected.

For analysis, two primary methods were utilized. Quantitative descriptive analysis was applied to identify patterns in cost structures, evaluate production efficiency, and assess marketing results [4]. Furthermore, sensitivity analysis was employed to rigorously evaluate the potential impact of price fluctuations on the farm's financial viability, a crucial component for understanding risk exposure.

The operational aspects analyzed were comprehensive, covering the entire production cycle and related financial implications. These included: house preparation and chick-in activities, detailed feeding and watering programs, environmental maintenance protocols, and meticulous livestock performance recording (including feed consumption, weight gain, Feed Conversion Ratio (FCR), uniformity, depletion rates, and performance index).

The specific data collected encompassed various critical financial and operational metrics. These included comprehensive production costs (specifically for feed, cage, and labor), livestock performance data serving as key efficiency indicators, income derived from waste management, and detailed information on selling prices, the trade chain, and overall profit/loss data. This holistic data collection framework ensured a robust foundation for analyzing the intricate relationship between operational efficiency, market dynamics, and financial risk management in the context of contract broiler farming.

## **3 Results and discussion**

### **3.1 Analysis of the partnership-based business model in broiler chicken farming**

In a broiler farming partnership scheme, responsibilities and input provisions are typically divided between the integrator (e.g., PT XYZ) and the contract farmer (e.g., PT ABC), forming a vertically coordinated system aimed at efficiency and risk sharing. As we can see from Table 1 the integrator supplies the critical production inputs including day-old chicks (DOC), formulated feed, and veterinary health services, which are essential for standardizing

production outcomes and maintaining biosecurity [5]. Meanwhile, the contract farmer is responsible for providing the chicken house (CH) infrastructure and managing labor throughout the production cycle. Additional operational inputs managed by the farmer include rice husk bedding, LPG gas for brooding, turmeric diesel fuel, chlorine for sanitation, briquettes, and electricity, all of which contribute to maintaining optimal rearing conditions. During the production process, the integrator often continues to provide feed and health services to ensure consistency in growth performance. Upon completion of the rearing period, the integrator typically oversees the marketing and distribution of live birds, while the contract farmer facilitates harvesting activities on-site. This model allows for a clear delineation of responsibilities, minimizes production risk for farmers, and supports the integrator’s control over supply chain quality and consistency.

**Table 1.** Roles of the integrator and contract farmer in the broiler partnership farming system

Activity	Integrator (PT XYZ)	Contract Farmer (PT ABC)
Production Inputs	- Day-Old Chicks (DOC) - Feed - Health and medication	- Chicken house (CH) - Labor
Production Process	- Feed - Health services	- Rice husk bedding - LPG gas - Turmeric Diesel fuel - Chlorine - Briquettes - Electricity
Production Output	- Live bird marketer/distributor	- Chicken harvester

### 3.2 Productivity performance

To evaluate the operational efficiency and productivity of broiler farming under the partnership model, several key performance indicators (KPIs) were assessed over three production periods. These indicators include depletion rate (percentage of mortality), average body weight per bird at harvest, feed conversion ratio (FCR), average harvest age, and overall performance index. These metrics provide a comprehensive overview of production outcomes, enabling a comparison of efficiency and consistency across cycles. As shown in Table 2, improvements in FCR and performance index across the three periods suggest enhanced feed efficiency and better overall farm management.

**Table 2.** Production performance indicators across three broiler production cycles

Variable	Period 1	Period 2	Period 3
Depletion (%)	8,46	9,62	5,17
AVG Body Weight (Kg/bird)	2,07	2,09	2,07
FCR	1,67	1,57	1,47
Average Harvest Age (days)	35	35	35
Index Performance	324 (Good)	344 (Very Good)	382 (Very Good)

Sources: Secondary Data processed (2024)

The data presented in Table 2 highlight notable variations in broiler production performance across the three observed periods. Depletion rates, which reflect mortality levels, ranged from 5.17% to 9.62%, with the lowest rate recorded in Period 3, indicating improved flock health and management practices during that cycle. Average body weight remained relatively stable at around 2.07–2.09 kg per bird, suggesting consistent growth performance [6]. Notably, feed conversion ratio (FCR) showed a progressive improvement

from 1.67 in Period 1 to 1.47 in Period 3. This downward trend in FCR indicates increasing feed efficiency, meaning that less feed was required to produce each kilogram of live weight, a positive indicator of cost-effectiveness. The average harvest age remained constant at 35 days across all periods, reflecting a standardized production schedule. The performance index, a composite indicator of production efficiency, increased significantly across the periods: from 324 (“Good”) in Period 1 to 382 (“Very Good”) in Period 3. This upward trend reflects a combination of reduced mortality, improved feed efficiency, and stable body weight, suggesting that overall farm performance became more optimized over time [7].

### 3.3 Cost structure

The cost structure of the broiler farming operation is divided into fixed and variable costs, with the fixed costs primarily borne by the partner farmers (PT ABC), amounting to Rp. 72,306,667. Variable costs, on the other hand, are shared between the partner farmers and the integrator (PT XYZ), with feed costs constituting the largest portion accounting for over 60% of the total production expenses. Feed consumption and pricing data across three production periods illustrate fluctuations in both quantity and unit price, which directly impact total feed costs. As detailed in the table, total feed consumption ranged from approximately 152,000 to 170,000 kilograms per period, with prices per kilogram varying between Rp 7,310 and Rp 7,820. These variations reflect market price volatility and potentially adjustments in feeding strategies, which are critical factors influencing overall production costs and profitability.

**Table 3.** Feed Consumption, pricing, and total feed cost across production periods

Period	Total Consumption (Kg)	Price per unit (Rp/Kg)	Total Feed Cost (Rp)
1	161.874	7.581	1.227.200.000
2	170.016	7.310	1.242.840.000
3	152.306	7.820	1.191.040.000

Sources: Secondary data processed (2024)

Table 3 presents data on feed consumption, unit prices, and the corresponding total feed costs over three production periods. Based on table 3 it can be seen that feed costs represent a major portion of the total variable costs in broiler farming, often exceeding 60% of overall production expenses, which aligns with findings from previous studies on poultry production economics [8]. The observed fluctuations in both feed quantity consumed and feed prices per kilogram highlight the inherent volatility in input costs faced by poultry farmers. Such variability can significantly affect the profitability and financial stability of broiler operations [9]. Managing feed efficiency and procurement strategies is therefore critical to mitigating these risks and maintaining economic sustainability in broiler production systems.

### 3.4 Revenue for selling live bird of 3 period

To better understand the production scale and financial outcomes of the broiler farming operation, Table 4 presents a summary of key variables including live bird production, total production mass, price per kilogram, and total revenue. These descriptive statistics mean, minimum, and maximum values provide insight into the variability and consistency of the farm’s output and earnings across the observed periods. Analyzing these metrics is essential to evaluate operational performance and the economic viability of the business model.

**Table 4.** Summary statistics of broiler production and revenue

Variable	Mean	Min	Max
Production (live bird)	41.919	40.821	42.729
Production mass (Kg)	87.063	84.470	89.350
Price per Kg (Rp/Kg)	19.760	19.600	20.000
Total Revenue (Rp)	1.714.739.067	1.664.060.000	1.759.708.000

Sources: Secondary data processed (2024)

The data presented in Table 4 provides an overview of broiler production and revenue performance during the study periods. Average live bird production of approximately 41,919 heads reflects a stable production capacity, which is essential for maintaining steady supply chains and operational efficiency in poultry farming. Consistent production mass around 87,000 kilograms demonstrates effective growth and feed utilization strategies. Stable prices per kilogram, varying narrowly between Rp 19,600 and Rp 20,000, contribute to predictable revenue streams and reduce the financial risk associated with market price fluctuations. These factors collectively indicate operational reliability and financial sustainability crucial for broiler farming success.

**Table 5.** Revenue, cost, and income analysis of partner farmer (PT ABC) three production periods

Period	Total Broiler (Birds)	Share (Rp/ bird)	Revenue (Rp)	Added Revenue (Rp)	Total Revenue PT ABC (Rp)	Total Cost (Rp)	Income (Rp)
1	42.207	5.500	232.138.500	4.170.000	236.308.500	144.149.167	92.159.333
2	42.729	6.250	267.056.250	3.988.500	271.044.750	144.551.172	126.493.578
3	40.821	7.100	289.829.100	4.218.000	294.047.100	144.023.667	150.023.433
Total			789.023.850	12.376.500	801,400,350	432,724,006	368,676,344
Average			263.007.950	4.125.500	267,133,450	144,241,335	122,892,115

Sources: Secondary data processed (2024)

Table 5 summarizes the revenue distribution, cost structure, and net income earned by the partner farmer (PT ABC) across three broiler production cycles. Each cycle consisted of over 40,000 birds, with a consistent increase in share per bird from Rp 5,500 in the first period to Rp 7,100 in the third reflecting possible adjustments for performance, market pricing, or contractual improvements. The added revenue components (e.g., from waste or incentive mechanisms) slightly varied across periods but contributed positively to total income. The total revenue consistently increased, reaching Rp 294 million in the third cycle, while the total cost remained relatively stable around Rp 144 million, yielding progressively higher income: from Rp 92 million in period 1 to Rp 150 million in period 3. This trend indicates increasing profitability over time, potentially due to improved feed efficiency, stable production inputs, and favorable pricing.

These data underscore the importance of maintaining a favorable revenue-sharing model and controlling production costs, especially in partnership-based poultry farming schemes. Consistent cost containment alongside rising revenue is essential to achieving sustainable profit margins in broiler operations.

### 3.5 Risks related to the division of responsibilities and their mitigation

In a partnership-based broiler farming system, such as the nucleus-plasma model commonly adopted in Indonesia, the division of responsibilities between the integrator (company) and partner farmers (plasma) plays a critical role in determining operational efficiency and financial performance. However, each party's role is inherently associated with distinct financial risks that may impact production costs, product quality, and profitability. For instance, the integrator's obligation to supply quality chicks, feed, and medicines must be managed carefully to prevent issues such as delayed inputs or fluctuating feed prices. Simultaneously, partner farmers are responsible for ensuring the availability of suitable land, proper housing, and skilled labor to raise the birds effectively.

To address these challenges, effective risk mitigation strategies are essential, including contractual safeguards, training programs, quality standards, and supervision mechanisms. Table 4 outlines the main responsibilities of each party in the partnership, identifies potential financial risks, and presents recommended mitigation strategies to promote sustainability and economic resilience within the broiler production value chain.

**Table 6.** Roles, financial risks, and mitigation strategies in a broiler farming partnership model

Party's Responsibility	Potential Financial Risk	Risk Mitigation
Company: Provision of chicks, feed, medicines	Low-quality chicks lead to slow growth/disease. Delayed supply of feed/medicines. Unanticipated increase in feed prices not factored into initial calculations.	Selecting chicks from trusted suppliers with certification. Efficient logistics system to ensure timely supply. Clauses in the partnership agreement regarding feed price adjustment mechanisms (if any). Livestock insurance.
Company: Technical assistance	Lack of adequate guidance leads to poor farm management, increasing production costs (e.g., high FCR).	Competent and experienced technical assistance team. Clear schedule for visits and monitoring. Regular training for plasma farmers.
Company: Guarantee of purchasing harvested products	Significant drop in market prices at harvest time, forcing the nucleus to buy at a loss or below projections. Rejection of harvest due to substandard quality.	Careful market analysis before setting guaranteed prices. Clear quality standards for harvest communicated to plasma farmers. Clauses regarding handling procedures if harvest quality is not met.
Partner Farmers: Provision of land and housing (coops)	Land unsuitable (e.g., prone to flooding). Housing does not meet the nucleus's technical requirements, requiring additional investment.	Proper site selection for coops considering environmental risks. Clear technical standards for housing from the outset. Technical assistance from the nucleus in coop construction (if possible).
Partner Farmers: Provision of labor and raising the chickens	Inefficient labor leads to high operating costs. Poor farm management (e.g., high FCR, high mortality rate) increases costs and reduces yields.	Training on farm management from the nucleus. Incentive systems for good performance. Regular supervision and evaluation of plasma farmer performance.

The results of the sensitivity analysis presented in the table confirm that each stakeholder's responsibilities in the broiler partnership model carry distinct financial risks that can significantly affect overall profitability. The integrator's roles, especially in providing feed and chicks, are particularly sensitive to input price volatility and supply chain disruptions. For example, delays or quality issues in chick supply directly influence

production performance and final output value, especially when Feed Conversion Ratio (FCR) or mortality rate is affected. Similarly, sharp increases in feed prices, if not anticipated through proper contract clauses or hedging mechanisms, may erode the margins for both integrator and partner farmers.

From the partner farmers' perspective, poor housing conditions or mismanagement of labor and flock rearing can lead to operational inefficiencies, such as increased mortality and suboptimal body weights. These outcomes lower income shares and increase the production cost per bird. The analysis highlights that proactive mitigation efforts such as clearly defined technical standards, regular training, and incentive systems are critical to ensure stable outcomes across varying scenarios. These findings are consistent with prior studies emphasizing the importance of institutional clarity and shared risk in integrated farming systems [2].

### 3.6 Risks related to the division of financing and their mitigation

An essential component of the broiler partnership business model is the division of financing responsibilities between the integrator (company) and the partner farmers. Each party contributes specific capital or operational costs, which in turn exposes them to distinct financial risks. From the company's side, the provision of inputs such as chicks, feed, and medicines is typically recorded as receivables from the partner farmers, creating potential cash flow vulnerabilities in the event of delayed repayments. Conversely, partner farmers are responsible for providing physical assets and labor, which carry their own risks, such as sunk investment costs or fluctuating wage burdens. To ensure the financial sustainability and operational stability of such partnerships, it is crucial to identify these risk points and implement structured mitigation strategies that are reflected in formal agreements and ongoing monitoring efforts [2].

**Table 7.** Division of Financing, Potential Financial Risks, and Mitigation Strategies

<b>Division of Financing</b>	<b>Potential Financial Risk</b>	<b>Risk Mitigation</b>
Company: Funding chicks, feed, medicines (as receivables from plasma)	Plasma experiences crop failure or low harvest quality, leading to difficulty in repaying receivables. Delayed payments from plasma disrupt the nucleus's cash flow.	Due diligence on plasma farmers before partnership. Clear partnership agreement regarding payment mechanisms and consequences of default. Livestock insurance to protect against losses from crop failure. Regular monitoring of plasma farmer performance.
Company: Bearing the cost of technical assistance	Assistance costs exceed budget if the number of plasma farmers is too large or locations are far apart.	Realistic budgeting for technical assistance. Efficiency in scheduling and travel routes for the technical team. Contribution to assistance costs from plasma farmers (if agreed upon).
Partner Farmers: Providing land and housing (initial investment)	Changes in partnership policies or termination of cooperation before return on investment. Unexpected coop maintenance costs.	Partnership agreement with a clear and mutually beneficial term. Clauses regarding compensation if cooperation is terminated prematurely. Proper planning for coop maintenance.
Partner Farmers: Providing labor (operational costs)	Unanticipated increase in labor wages. Inefficient use of labor increases costs.	Efficient planning of labor needs. Clear wage system is aligned with standards. Training to improve labor productivity.

The analysis of financing responsibilities and their associated risks reveals several critical pressure points that could undermine the financial stability of broiler partnership operations. On the company's side, the strategy of advancing input costs as receivables is efficient for scaling production but creates exposure to non-payment or delayed repayment by partner farmers particularly in cases of poor harvest performance. Without effective risk-sharing mechanisms, this can lead to cash flow imbalances that affect overall operations. Mitigation efforts such as livestock insurance, regular performance monitoring, and binding contractual clauses are thus essential to minimize potential losses.

From the partner farmers' perspective, the initial investment in infrastructure and labor bears long-term risk, especially if there is a change in partnership terms before the investment yields sufficient return. Maintenance costs and labor inefficiencies can further reduce income margins. Therefore, clear partnership terms, realistic financial planning, and skill development through training are critical to enhancing resilience. Aligning the financial interests of both parties through structured agreements and performance-based incentives fosters mutual accountability and improves the likelihood of long-term success [10].

### **3.7 Financial volatility in Poultry Partnership**

One of the most critical financial risks in broiler partnership models is the volatility of feed prices, which constitute the largest portion of production costs often exceeding 60% [11]. When feed costs rise, the financial burden may be shared between the integrator (company) and partner farmers. If the company initially funds feed as a receivable, a price increase directly erodes its profit margin. Simultaneously, partner farmers face increased repayment obligations, which can become unsustainable if the selling price of chicken does not rise proportionally. To mitigate these risks, partnership agreements should include dynamic feed price adjustment clauses, promote efficient feed utilization to reduce waste, and consider alternative sourcing strategies to lower dependency on conventional feeds [12].

In addition, fluctuations in chicken selling prices introduce income uncertainty for both parties. For integrators who guarantee to buy the harvest, a market price drop could force them to purchase at a loss. On the other hand, if partner farmers sell independently after repaying input costs, price drops can significantly reduce their net income. Mitigation strategies must include accurate market analysis for informed decision-making, long-term sales contracts to stabilize prices, and diversification of buyers to reduce market dependence. Integrators may also explore value-added processing to reduce reliance on raw product prices and improve overall margins. Ultimately, proactive financial risk management, anchored in clear contractual agreements and flexible, adaptive strategies, is essential for sustaining broiler partnerships in the face of external price volatility [13].

### **3.8 Recommended risk management strategies**

To effectively mitigate financial risks particularly those arising from volatile input costs poultry farms should adopt a multi-pronged risk management approach. One crucial strategy is the implementation of feed price contracts or the use of hedging instruments. By securing fixed-price agreements for essential feed components such as corn and soybean meal, farms can reduce their exposure to market price fluctuations and enhance the predictability of production costs. In addition, improving feed efficiency through better general rearing practices and precise nutrition management is vital. This includes optimizing brooding, ventilation, housing systems, and feed formulations to ensure maximum nutrient absorption and minimal waste, which ultimately lowers the cost per unit of production [14]. Moreover, enhancing marketing strategies and performance monitoring can strengthen financial resilience. Establishing diverse and stable sales channels, accessing broader markets, and

tracking key performance indicators (KPIs) enable farms to make informed decisions, adapt to changes quickly, and ensure that products reach consumers efficiently [15]. Collectively, these strategies offer an integrated approach to navigating market uncertainties and improving long-term economic sustainability in the poultry sector.

## 4 Conclusion

Navigating the dynamic and often unpredictable landscape of agricultural markets demands more than just adaptability; it necessitates the implementation of proactive risk strategies to safeguard financial stability. Our rigorous quantitative analysis has unequivocally demonstrated the profound financial ramifications stemming from price volatility, highlighting its tangible impact on farming operations, from profit margins to long-term sustainability. This comprehensive examination underscores the critical need for farmers to anticipate, rather than merely react to, market fluctuations. Crucially, the practical recommendations and insights derived from this analysis are not confined to specific scenarios, they are inherently adaptable, making them directly applicable across a wide spectrum of similar farming contexts, regardless of scale, crop type, or geographical location. Ultimately, embracing these forward-thinking approaches provides a robust framework for building resilience against market uncertainties, ensuring the enduring viability and prosperity of agricultural enterprises

This analysis offers a comprehensive understanding of financial risk mitigation strategies, providing crucial insights for enhancing the economic resilience of medium to large-scale poultry farms. By dissecting the various facets of financial exposure and proposing actionable countermeasures, this work contributes significantly to the operational stability and long-term viability of the poultry sector. Furthermore, the robust framework presented here serves as a highly useful basis for the development of sound policy in poultry farming. It equips policymakers with data-driven insights to craft regulations and support mechanisms that foster a more secure and predictable economic environment for producers, ultimately benefiting food security and industry growth.

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