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The Effect of Unproductive and Productive Chicken Ratio on the Feasibility of Laying Hens Business

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ABSTRACT

This study was conducted to determine the effect of unproductive and productive chickens ratio on the feasibility of laying hens business. This research was conducted in April – May 2022 in Kademangan District, Blitar Regency, East Java Province. This research is quantitative research and respondents in this study were 89 chicken farmers in Kademangan District, Blitar Regency, East Java Province. The material used in this research is primary and secondary data. The data obtained from the study were analyzed using interference analysis with a correlation test to determine the relationship between the dependent variable and the independent variable. Based on the results of statistical analysis, it was found that 40.91% of the respondents only had egg-laying chickens; 32.95% of respondents have layer and grower chickens; 22.73% of respondents have layer and starter chickens; and 3.41% of respondents have layer, grower and starter chickens. The ratio of unproductive chickens to productive chickens has a very strong effect on increasing production costs, decreasing profits, increasing BEP and decreasing R/C and having a strong effect on decreasing revenue with a correlation interval of 0.9461, respectively; -0.8772; 0.9727; -0.8818 and -0.7712. It can be concluded that the ratio of unproductive chickens to productive chickens has a very strong effect on the feasibility of laying hens business with an average R/C value of 1.14.

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1. Introduction

Indonesia is a large country where the population increase is around 1.49% per year. This provides a great opportunity for the development of the poultry business [1]. The poultry industry for Indonesia has an important role in the national economy. The poultry industry is one of the industries that absorbs 12 million workers [2], [3]. The laying hens business is one of the businesses that supplies the demand for eggs as a source of animal protein. Eggs are functional foods that have a high nutritional content in accordance with the nutrients needed by the human body [4]. An egg has a high lipoprotein content which is useful for supplying protein requirements in the body [5].

The laying hens business is one of the important poultry businesses in Blitar Regency. Blitar Regency is one of the regencies in East Java Province where the majority of the population uses the laying hens business as a source of income. Blitar is one of the centers for laying hens which supplies 32.41% of the total demand for eggs in East Java Province [6]. Kademangan District is the largest egg-producing area in Blitar Regency. Kademangan District is located in the southern part of Blitar Regency where the northern part is bordered by Sanan Kulon District, the western part is bordered by Tulung Agung District, the southern part is bordered by Bakung District and the eastern part is

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bordered by Sutojayan District. Chicken egg production in Kademangan District reached 25,697,097/day [7].

The problem that often occurs in the laying hens business is the difficulty of financial turnover caused by the presence of young chickens. In this case, the presence of young chickens does not increase revenue because young chickens are unproductive chickens because they have not been able to produce eggs but cause an increase in production costs, especially costs for purchasing feed and chicken maintenance. Feed is a factor that greatly influences the amount of production costs because 80% of the total production costs are obtained from the purchase of feed [8]. High production costs and low income have an impact on the low profits obtained by farmers. Therefore, this research is needed to determine the effect of unproductive and productive chickens ratio on the feasibility of laying hens business.

2. Method

This research was conducted in April – May 2022 in Kademangan District, Blitar Regency, East Java Province. This research is quantitative research. Quantitative research is research using data in the form of numbers through a hypothetical verification logic approach [9].

2.1. Data Types and Sources

The material used in this research is primary and secondary data. Primary data were obtained through questionnaires and interviews with laying hens farmers. Secondary data were obtained from government or private agencies and research journals related to the research theme.

2.2. Respondent

Respondents in this study were 89 chicken farmers in Kademangan District, Blitar Regency, East Java Province. The determination of the number of respondents was carried out using purposive sampling which was calculated by the Slovin formula [10]. The slovin formula used is as follows.

$$\mathbf{n} = \frac{\mathrm{N}}{1+\mathrm{N}\,(\mathrm{e})^2}$$

n = Number of samples
N = Number of population sampled
e = Allowance rate (10% for population > 1500; 15% for population 1000 – 1500 and 20% for population < 1000)

2.3. Variables

a. Production phase identification

The production phase is divided into egg-laying and unproductive phases. Unproductive chickens are chickens that have not been able to produce eggs. Unproductive chicks are divided into 2 phases, namely starter period chickens (1 day-5 weeks old) and grower period (6-18 weeks) [11]. The ratio of unproductive and productive chickens (U/P ratio) can be calculated as follows.

$$\boldsymbol{U/P\ Ratio} = \frac{\boldsymbol{Total\ unproductive\ chicken}}{\boldsymbol{Total\ produktive\ chicken}}$$

b. Production costs

Production cost analysis serves to determine the amount of expenses made by the laying hens business in managing the business. Production costs are the total of fixed costs and variable costs [12].

$$\boldsymbol{Total\ Cost = Total\ fix\ cost + Total\ variable\ cost}$$

Fix cost

Fixed costs are costs that are not affected by the amount of production. Costs that are included in fixed costs include salaries, rent, interest on bank loans, taxes, depreciation of equipment [13].

$$\boldsymbol{Total\ Fix\ Cost = Fix\ cost\ x\ Number\ of\ inputs}$$

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Depreciation costs include depreciation of equipment, cages, warehouse, taxes and interest. The amount of depreciation expense can be calculated as follows.

$$\textbf{\textit{Depreciation}} = \frac{\textbf{\textit{Purchase price of goods} - \textit{Selling price of goods}}}{\textbf{\textit{Usage period}}}$$

Variable cost

Variable costs are costs that follow the amount of production. The components of variable costs include: feed, vitamins, drugs, vaccines and others [13].

$$\textbf{\textit{Total Variable Cost} = \textit{Variable cost x Number of units}}$$

c. Revenue

Revenue is the overall total income obtained in a business activity. Revenue is calculated by multiplying the price with the units produced or produced [13], [14].

$$\textbf{\textit{Total Revenue} = \textit{Price perunit x Quantity} (\textit{total production})}$$

d. Profits

Profit is income derived from business activities after deducting the total cost of production [13].

$$\textbf{\textit{Profit} = \textit{Total revenue} - \textit{Total cost}}$$

e. Break event point (BEP)

Break event point (BEP) is the point at which a business activity does not make a profit but also does not suffer a loss. The break-even point has been calculated as a whole from production costs and human resource costs incurred in business activities [13].

$$\textbf{\textit{Break Event Point}} (\textbf{\textit{Price}}) = \frac{\textbf{\textit{TFC}}}{1 - \frac{\textbf{\textit{TVC}}}{\textbf{\textit{TR}}}}$$

$\textbf{\textit{TFC}}$ = Total fix cost

$\textbf{\textit{TVC}}$ = Total variable cost

$\textbf{\textit{TR}}$ = Total revenue

f. Revenue cost ratio (R/C)

Revenue cost ratio is a comparison between revenues and costs incurred. Revenue cost ratio is a comparison between revenues and costs incurred. The higher the R/C number, the higher the profit obtained from business activities and it is feasible to continue [13].

$$\textbf{\textit{Revenue Cost Ratio}} = \frac{\textbf{\textit{Total revenue}}}{\textbf{\textit{Total cost}}}$$

The criteria for the value of this R/C ratio are if the value of the R/C ratio < 1 means that the business is not feasible; if the value of R/C ratio = 1, it means that the business is at the break event point, which is neither profit nor loss; if the R/C ratio > 1 means the business is feasible [15], [16].

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2.4. Statistic Analysis

The data obtained from the study were analyzed using interference analysis with a correlation test to determine the relationship between the dependent variable and the independent variable [9]. The correlation calculation formula is as follows and The assessment for the coefficient interval is presented in the Table 1 [17].

$$rs = 1 - \frac{6\sum [R(X_i) - R(Y_i)]^2}{n(n^2-1)}$$

rs = Correlation coefficient value
$R(X_i)$ = Observation ranking X_i
$R(Y_i)$ = Observation ranking Y_i
n = Number of observations

Table 1. Correlation measurement category

Number	Coefficient Interval	Correlation Level
1	0.00 – 0.19	Very weak correlation
2	0.20 – 0.39	Weak correlation
3	0.40 – 0.59	The correlation is quite strong
4	0.60 – 0.79	Strong correlation
5	0.80 – 1.00	Very strong correlation

3. Results and Discussion

The results of the average calculation from the economic analysis obtained in this study for every 1000 laying hens are presented in Table 2 and the results of the calculation of the correlation analysis of the ratio of unproductive and productive chickens are presented in Table 3.

Table 2. Economic analysis of laying hens (calculation for 10000 laying hens/month)

Description	Value (IDR)	Contribution (%)
A. Fix cost (FC)		
1. Labor salary	929,545.45	3.19
2. Cost of depreciation		
a. Laying Hens	3,000.00	0.01
b. Cage	279,599.49	0.96
c. Equipment	166,666.67	0.57
Total fixed cost	**1,378,811.61**	
B. Variabel cost (VC)		
1. Feed cost	27,380,811.15	94.03
2. Medicines and vaccines	200,000.00	0.69
3. Electricity cost	160,819.09	0.55
Total variable cost (TVC)	27,741,630.24	
Total cost (TC)	**29,120,441.85**	**100.00**
C. Revenue		
1. Revenue from selling eggs	31,941,799.90	99.78
2. Revenue from the sale of used sacks	51,698.46	0.16
3. Revenue from other sources	19,160.88	0.06
Total revenue	**32,012,659.24**	**100.00**
D. Profits	2,892,217.39	
E. Break event point (BEP)	23,988.98	
F. Revenue cost ratio (R/C)	1.14	
G. The highest ratio of unproductive and productive chickens	2.00	
H. The lowest ratio of unproductive and productive chickens	0.00	
I. The average ratio of unproductive and	0.21	

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productive chickens

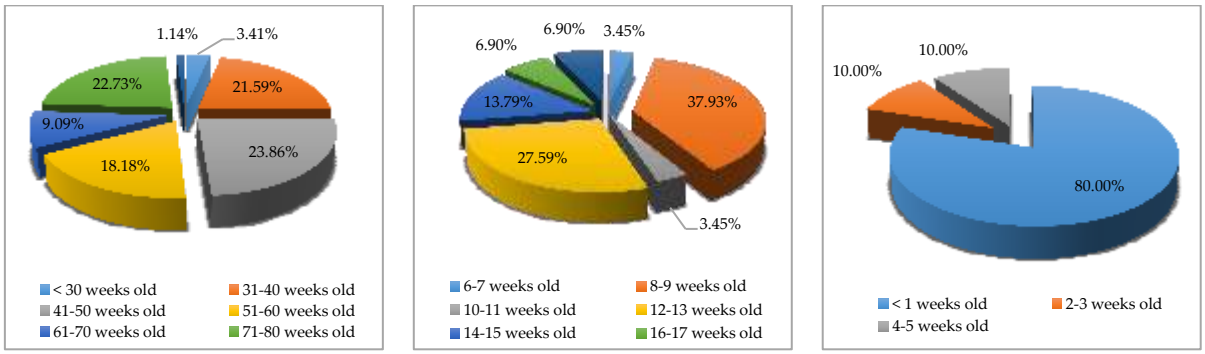
Table 3. The correlation between the ratio of unproductive and productive chickens with production costs, revenues, profits, BEP and R/C

Variable	Coefficient Interval	Correlation Level
Cost production	0.9461	Very strong correlation
Revenue	-0.7712	Strong correlation
Profits	-0.8772	Very strong correlation
Break event point (BEP)	0.9727	Very strong correlation
Revenue cost ratio (R/C)	-0.8818	Very strong correlation

3.1 Production phase identification

Based on the results of statistical analysis, it was found that 44.32% of respondents only had egg-laying chickens; 32.95% of respondents have chickens laying eggs and growers; and 22.73% of respondents have chickens laying and starter period. While respondents who have chickens with three production phases, namely the period of laying eggs, grower and starter are 3.41% [15].

Laying hens are classified into 3 types of age categories based on the maintenance phase including the starter phase, grower phase and layer phase. The starter phase is the initial phase in the maintenance of chickens, this phase begins when the chickens are 1 day to 5 weeks old. The grower phase is the phase where the chickens are 6-18 weeks old and the layer phase is the phase where the chickens are 19 weeks old until they drop out [11]. The variation in the age of laying hens based on the maintenance period obtained in the research in the laying hens business in Kademangan District, Blitar Regency is presented in Figure 2.



(a) (b) (c)

Figure 1. (a) Egg-laying period; (b) Grower period; (c) Starter period

Based on Figure 2, the age distribution of laying hens in the laying period varies greatly where 23.86% of productive chickens are 41-50 weeks old. The age distribution of laying hens in the grower period was dominated by chickens aged 8-9 weeks at 37.93%. In the grower period 80% of chickens are less than 1 week old. Table 2 shows that in the laying hens business in Kademangan District, the ratio of unproductive and highly productive chickens is 2.00; the lowest was at 0.00 and the average was found at 0.21. The higher the ratio value indicates that the unproductive chicken is higher than the productive chicken. There needs to be an arrangement related to the production cycle in a laying hens business in order to get the right balance between the number of productive chickens and unproductive chickens to maintain the profitability of the business [18].

3.2 Production Costs

Based on the results of statistical analysis, it was found that production costs have a very strong correlation with the ratio of unproductive and productive chickens where the coefficient interval

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value is 0.9461. This shows that the increase in the ratio of unproductive and productive chickens has a very strong impact on increasing production costs. Table 2 shows that the cost of purchasing feed contributed 94.03% to the total production cost. In this study, the average cost for purchasing feed is IDR. 27,741,630.24/month/1000 laying hens with an average ratio of unproductive and productive chickens of 0.21.

In the laying hens business in the starter and grower periods, the output produced is pullets or chickens ready to produce, while in the layer phase the output produced is eggs [15]. Laying hens business with a higher number of starter and grower period chickens than laying hens has an impact on increasing production costs because feed is the biggest cost that must be incurred [19]. The large variable cost component comes from the cost of feed. The percentage of feed costs incurred for laying hens reached 95.91%; grower period is 78.40% and chicken starter period is 90.07% [15].

3.3 Revenue

Based on statistical analysis, it was found that revenue has a strong negative correlation with the ratio of unproductive and productive chickens where the coefficient interval value is -0.7712. This shows that the higher the ratio value of unproductive and productive chickens will have an impact on decreasing the amount of revenue. The average total revenue obtained in this study is IDR. 32,012,659.24/month/1000 laying hens.

Revenue from laying hens is influenced by several factors including the number of egg production, the number of old chickens and the number of unproductive chickens (chickens in the starter and grower periods) [15]. A high ratio of unproductive and productive chickens indicates that in a laying hens business the number of unproductive chickens is higher than that of productive chickens. Unproductive chickens have not yet produced eggs, so the low number of productive chickens has an impact on the low number of eggs produced. Revenue from the laying hens business is obtained from several sources but the main revenue is obtained from the sale of chicken eggs. Other sources of income from the laying hens business include sales of manure, sales of sacks of feed and others [20]. The amount of revenue from egg sales is influenced by the number of eggs, egg quality and fluctuations in egg prices in the market [19].

3.4 Profits

Based on statistical analysis, it was found that profit has a very strong negative correlation with the ratio of unproductive and productive chickens where the coefficient interval value is -0.8772. This shows that the higher the ratio value of unproductive and productive chickens will have an impact on decreasing the amount of profit because a high ratio value indicates a high number of unproductive chickens. The average profit obtained in this study is IDR. 2,892,217.39/month/1000 laying hens.

Unproductive chickens have not yet produced eggs but need feed. Feed has an important role in the survival of laying hens [5]. The condition of the financial cycle will be complicated if the number of chickens is not yet high production because the feed required is getting higher. This has an impact on the imbalance between high production costs and the revenue obtained from selling eggs. Therefore, it is necessary to regulate the production cycle in a laying hens business so that the business gets high profits [18]. Profit in a laying hens business is an encouragement for farmers in running their business. Farmers hope to get as much profit as possible from the resources they manage [21].

3.5 Break Event Point (BEP)

Based on statistical analysis, it was found that profit has a very strong correlation with the ratio of unproductive and productive chickens where the coefficient interval value is 0.9727. This shows that the higher the ratio value of unproductive and productive chickens will have an impact on increasing BEP.

BEP calculation is done to calculate the minimum selling price of eggs. This calculation aims to make the laying hens business profitable and feasible to continue [22]. The In this study, the average BEP of chicken eggs was IDR. 23,988.98/kg. The high value of the ratio of unproduced chickens and production has an impact on the high price of BEP eggs. This is because there are more unproductive chickens than productive chickens. The high price of BEP for eggs is due to the high cost of production and low egg production [1].

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3.6 Revenue Cost Ratio (R/C)

Based on statistical analysis, it was found that revenue cost ratio (R/C) has a very strong negative correlation with the ratio of unproductive and productive chickens where the coefficient interval value is -0.8818. This shows that the higher the ratio value of unproductive and productive chickens will have an impact on decreasing revenue cost ratio (R/C).

The size of a laying hens business or the amount of revenue is not a parameter that can reflect that the business is efficient. The calculation of the value of the revenue cost ratio (R/C) is one of the methods used to identify the efficiency of a laying hens business [15]. The In this study, the average revenue cost ratio (R/C) of chicken eggs was 1.14. This indicates that the laying hens business in Kademangan District is profitable because the R/C is more than 1 [21].

4. Conclusions

The conclusion of this study is that the ratio of unproductive chickens to productive chickens has a very strong effect on the feasibility of laying hens with an average R/C value of 1.14.

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