Research Article

Economic Contribution of Native Chicken Farming to Household Income in West Papua, Indonesia: Farm Scale and Determining Factors

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Abstract |Native chicken farming plays an important role in supporting the livelihoods of rural households in many developing regions. This study aimed to analyze the contribution of native chicken farming to household income and to identify factors influencing farmers' income from native chicken farming in Fakfak Regency, West Papua, Indonesia. This study addresses limited empirical evidence on the economic role of native chicken farming in remote areas of eastern Indonesia. Data were collected from 44 semi-commercial farmers owning at least 20 adult native chickens. Descriptive statistics, one-way ANOVA followed by Tukey's HSD test, multiple regression analysis, and Pearson correlation analysis were applied. The results showed that income from native chicken farming differed significantly across farm scale ($p < 0.05$), with farmers raising more than 60 chickens obtaining the highest income. However, total household income and the percentage contribution of native chicken farming to household income did not differ significantly among farm scales ($p > 0.05$). Native chicken farming contributed 7.90%-14.30% of total household income, indicating its role mainly as a supplementary livelihood activity. Regression analysis revealed that the number of chickens sold and selling price significantly increased farmers' income ($p < 0.01$), while the number of breeding hens, feed costs, and farming experience had no significant effect. Pearson correlation showed no significant relationship between farmer age and farming experience ($r = 0.105$; $p = 0.499$). These findings indicate that improving productivity and market access is essential to strengthen the economic role of native chicken farming in remote areas.

Keywords: Farm scale, Household income, Income determinants, Native chicken Farming, West Papua

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INTRODUCTION

Native chickens are one of the genetic resources of poultry that play an important role in small-scale farming systems in various developing countries. Compared to commercial breeds, native chickens are known for their high adaptability to diverse environmental conditions, better disease tolerance, and the ability to utilise the availability of feed resources naturally in their surroundings. These characteristics make native chickens widely kept by rural households in extensive or semi-intensive systems with relatively low production inputs (Kebede *et al*., 2025; Loengbudnark *et al*., 2024). In practice, the native chicken husbandry system generally relies on natural mating, uses household waste or agricultural by-products as feed, and traditional hatching methods, while the application of modern production technologies such as vaccination and livestock health management remain limited (Liswaniso *et al*., 2024; Lopez *et al*., 2015).

Although the productivity of native chickens is generally lower compared to commercial breeds, these livestock hold significant economic and social value for rural communities. In addition to providing a source of animal protein through the production of meat and eggs, native chickens also serve as an economic asset for households that can be easily traded and also part of savings that can be sold at any time. Several studies also show that native chickens have added value in the socio-cultural context of the community and contribute to the conservation of local livestock biodiversity (Camus *et al*., 2020; Franzoni *et al*., 2021; Padhi, 2016).

In rural production systems, native chickens are typically raised in small flocks, yet still contribute meaningfully to household economies. Previous studies report that the average flock size ranges from approximately 10-13 birds per household in Kenya, 7-24 birds in Ethiopia, and around 12-17 birds in Zambia and Algeria, while in some regions such as Burkina Faso, flock size commonly reach 5-50 birds per household (Otiang *et al*., 2020; Desta and Wakeyo, 2024; Liswaniso *et al*., 2024; Dione *et al*., 2025). Even at these relatively small scales, native chicken production has been shown to provide regular income, support household consumption, and contribute to financial resilience in rural communities. This indicates that even small-scale ownership can play a meaningful economic role in smallholder systems.

With improvements in management practices such as enhancing feed quality, upgrading housing, and selecting breeding stock, the productivity of native chickens can be increased without compromising their adaptive capacity in native environmental conditions (Liswaniso *et al*., 2024; Loengbudnark *et al*., 2024).

Globally, native chicken farming has proven to provide significant economic contributions to rural communities. Singh *et al*. (2023) reported that native chicken production contributes about 18% of household income in the Indian Himalayan Region, while in various regions of Africa such as Burkina Faso and KwaZulu-Natal, this livestock serves as a primary source of income and a pillar of food security, despite being hindered by livestock health issues and sub-optimal management (Dione *et al*., 2025; Nontu *et al*., 2025; Mujyambere *et al*., 2021). A similar phenomenon is also found in Indonesia, particularly in its eastern regions where small-scale farming systems still dominate the household economy of farmers (Prabowo *et al*., 2023; Asnawi *et al*., 2023).

However, despite the recognised potential of native chickens in Indonesia, studies examining their contribution in areas with unique geographical characteristics such as Fakfak Regency, West Papua, remain limited. Fakfak Regency was selected due to its unique geographical characteristics as a remote and less-developed region in eastern Indonesia, where traditional livestock systems remain dominant. Despite these constraints, native chicken farming continues to support local market activities, including regular slaughtering and sale, driven by strong local demand and limited access to commercial poultry product. Data from the Indonesian Central Bureau of Statistics (BPS) show that the native chicken population in Fakfak Regency increased from approximately 52,406 birds in 2018 to 416.288 birds in 2021 and 432.939 birds in 2022. This substantial increase suggests that the availability of native chickens is sufficient to sustain ongoing slaughtering activities and contributes significantly to household food supply and local market circulation.

So far, livestock research in eastern Indonesia has been more focused on commercial breed chickens (broilers) that are highly dependent on external inputs and have a high mortality risk (Adi *et al*., 2024). Empirical studies examining the economic contribution of native chicken farming at the household level in specific remote areas such as Fakfak Regency remain scarce. More importantly, previous studies have rarely integrated farm scale differentiation with an analysis of income contribution and its determining factors within traditional smallholder systems. As a result, there is still limited evidence on how farm scale and management constraint jointly influence the economic role of native chickens in remote areas of eastern Indonesia.

Therefore, this study aims to analyze the contribution of native chicken farming to household income in Fakfak Regency and to identify the key factors influencing that income across different farm scales. This study offers a novel contribution by providing an integrated analysis of farm scale, income contribution, and its determining factors in geographically isolated smallholder system, which has been largely overlooked in previous studies.

MATERIALS AND METHODS

Research location

The research was conducted in the Fakfak and Pariwari Districts, Fakfak Regency, West Papua Province. The selection of this location was carried out through purposive sampling with the criterion that the location has households actively raising native chickens.

Sample determination

The respondent sample was determined through purposive sampling with strict criteria: farmers who own at least 20 adult native chickens and are actively engaged in sales. This criterion is deliberately applied to filter out farmers

who are semi-commercially orientated, not just hobbyists or pure subsistence keepers. Based on this criterion, 44 respondents of native chicken farmers were selected as respondents. Given the archipelagic geography and challenging topography of Fakfak Regency, as well as the limited and scattered population of semi-commercial farmers in this region, the sample size of 44 respondents represents the majority of the active population that could be reached. The sample size of 44 respondents reflects the practical limitation of identifying semi-commercial native chicken farmers in Fakfak Regency, where most farmers raise native chickens only as a small-scale supplementary activity. Although the number of respondents in each farm-scale category is relatively small, the sample represents more than 50% of the active semi-commercial native chicken farmers accessible in the study area. Therefore, this study provides a representative exploratory assessment of native chicken farming under the local conditions of Fakfak Regency. Nevertheless, the relatively small sample size may limit the statistical power to detect small to moderate effects, and non-significant findings should be interpreted cautiously. The respondents were grouped into three business scales: a scale of 20-40 birds, a scale of 41-60 birds, and a scale of more than 60 birds, with the distribution of respondents for each scale being 16, 15, and 13 respondents, respectively.

Data collection

The data collected in this study are primary data obtained through interviews with the help of structured questionnaires and secondary data obtained from the documents of Fakfak Regency in Figures, as well as West Papua in Figures. The primary data collected include the characteristics of the farmer respondents (age, education level, main occupation, farming experience, scale of business, labour utilization), details of native chicken ownership (adult males, breeding hens, young chickens, and chicks), costs of building chicken coops, additional feed costs per year, medicine and vitamin costs per year, labour wages per year, main job salary per year, chicken selling price, and number of chickens sold per year.

Respondent characteristic data was analysed using descriptive statistical analysis (means, frequencies, and percentages). Characteristic data is presented in the form of graphs to provide an easily understandable overview. The contribution of income from the native chicken farming to farmers' household income per year was calculated by first determining income using the formula (Munawaroh *et al.*, 2021):

$$Pd = TR - TC$$

Where: Pd = Income from the native chicken farming (IDR per year); TR = Total revenue (IDR per year) ;TC = Total cost (IDR per year); IDR= Indonesian Rupiah; TR = Py x Q

Where: Py = Price of the chicken sold (IDR per bird); Q = Number of chickens sold per year (birds). In this study, income calculation focused only on the sale of live chickens because the majority of farmers (86%) did not sell eggs and used them mainly for household consumption. Detailed quantitative data on egg consumption were not available; therefore, the imputed economic value of eggs for household consumption was not included in the analysis. As a result, the estimated contribution of native chicken farming to household welfare may be slightly underestimated.

TC = FC + VC

Where: FC = Fixed Costs per year (IDR); VC = Variable Costs per year (IDR); The contribution of the native chicken income to the household income is calculated using the formula:

$$\text{Contribution (\%)} = \frac{\text{Total Income from native chickens farming}}{\text{Total Household Income}} \text{ x } 100\%$$

Total Household Income is the total of income received by farmer for one year, which includes both income from native chicken farming and other sources.

The average income of farmers, the average total cost of maintaining native chickens, and the average income contribution of each business scale were analysed using one-way analysis of variance (ANOVA). The F-test is used to determine whether there are significant differences between groups with significance level set at $p < 0.05$. If the F test is significant, it was followed by Tukey's Honestly Significant Difference (Tukey HSD) test to determine pairwise differences among business scales.

To evaluate the potential confounding effect between farmer age and farming experience, a Pearson correlation analysis was conducted to examine the relationship between these two variables. The correlation coefficient (r) and significance level ($p < 0.05$) were used to determine whether a significant association existed.

Meanwhile, to determine the factors affecting the income of native chicken farming in Fakfak Regency, multiple regression analysis was conducted using Minitab Statistical Software version 15 (Minitab Inc., 2007). Before conducting multiple regression analysis, classical assumption tests were carried out, including normality, multicollinearity, and heteroscedasticity tests. Normality was tested using the Shapiro-Wilk test, where residuals were considered normally distributed if the significance

value (p-value) was greater than 0.05. The test showed that the residuals were normally distributed ($p > 0.05$), which further supported by the normal (Q-Q) plot.

Multicollinearity was evaluated using the Variance Inflation Factor (VIF), where VIF values below 10 indicated no serious multicollinearity among independent variables (Kalnins and Hill, 2024). Heteroscedasticity was assessed using a residual scatter plot by plotting fitted value against standardized residuals. A random distribution of points without a specific pattern indicated homoscedasticity.

The mathematical model for Multiple Regression Analysis is as follows:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \varepsilon$$

where Y: Net income from native chicken farming, X_i: the i-th independent variable: (X_1 = number of chickens sold per year (birds); X_2 = number of breeding hens (birds); X_3 = selling price (IDR); X_4 = feed costs (IDR); X_5 = farming experience (years)), β_0: the constant, β_i: the partial regression coefficient indicating the effect of each independent variable on the dependent variable, ε: the error term. Feed costs were included in the regression model because they represent one of the main and most consistent production performance and management decisions, it serves as an important variable in explaining variations in farmers' income.

After the classical assumptions were satisfied, the analysis proceeded with the interpretation of the regression results, which included the following:

- Coefficient of determination (R^2 and Adjusted R^2). The R^2 value ranges from 0 to 1 (or 0% to 100%) and indicates the proportion of variance explained by the model. In addition, the adjusted R^2 was reported to provide a more accurate measure of the model's explanatory power.
- F-test. The F-test was used to determine whether all independent variables simultaneously have a significant effect on the dependent variable. Statistical significance was accepted at $p < 0.05$. The hypotheses tested were as follows:

H_0: The independent variables do not have a significant effect; H_1: The independent variables simultaneously have a significant effect.

3. Partial significance test (t-test). The t-test was used to determine whether each independent variable individually has a significant effect on the dependent variable. Statistical significance was accepted at $p < 0.05$. Some independent variables in this study, particularly the number of chickens sold per year and selling price, are directly related to income formation and may introduce potential endogeneity. Therefore, the regression results should be interpreted as indicating associative relationship rather than strict causal effects.

The partial hypotheses were as follows:
H_1: The number of chickens sold per year has a significant effect on income from native chicken farming ;H_2: The number of breeding hens has a significant effect on income from native chicken farming; H_3: Selling price has a significant effect on income from native chicken farming ; H_4: Feed cost have a significant effect on income from native chicken farming.; H_5: Farming experience has a significant effect on income from native chicken farming.

RESULTS

Research location

Fakfak Regency is one of the seven regencies in West Papua Province, Indonesia, with an area of 14,320 km², ranking third in size after Bintuni Bay Regency and Kaimana Regency (BPS-Statistics of West Papua Province, 2025). Fakfak Regency is located below the Equator, between 131°30' - 138°40' East Longitude and 2°25' - 4° South Latitude. Based on its geographical position, Fakfak Regency borders Bintuni Bay Regency to the north, the Arafura Sea to the south, the Seram Sea and Berau bay to the west, and Kaimana Regency to the east (BPS Fakfak Regency, 2025). Since 2018, Fakfak Regency has been divided into 17 districts, consisting of 7 urban villages and 142 rural villages. Fakfak and Pariwari Districts are 2 out of the 17 districts that have an area of 233 km² and 587 km² respectively, or 1.63% and 4.10% of the total area of Fakfak Regency. The centre of Fakfak Regency is located in Fakfak District, so even though it does not rank first in terms of area, the population is concentrated in these two districts. The population in Fakfak District is 24.64% of the total population of Fakfak Regency, while the population in Pariwari District is 18.81% of the total (BPS Fakfak Regency, 2025). Based on these conditions, it is not surprising that native chicken farming is commonly found in these two districts because the locations of these districts provide ease in the availability of production inputs (feed, vitamins, medicines) for raising native chickens. The research location can be seen in Figure 1.

Respondent characteristics

The characteristics of respondents, which include age, education level, main occupation, farming experience, scale of business, and labour utilization, are presented in Figure 2.

Figure 1: Research areas in Fakfak District and Pariwari District, Fakfak Regency.

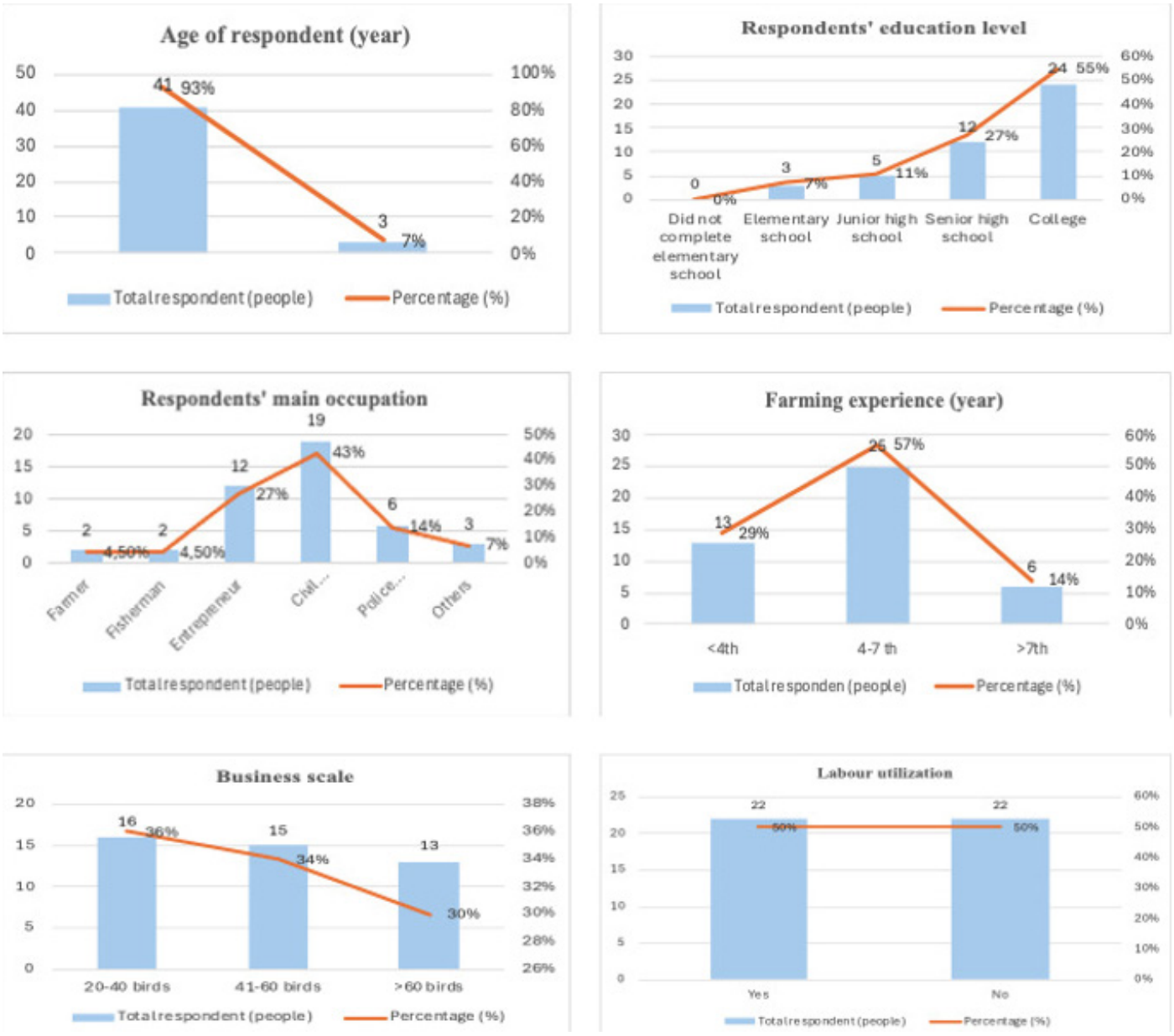

Figure 2: Characteristics of respondents in Fakfak Regency.

In general, the research respondents were dominated by farmers in their productive age (93%). In terms of education level, the majority of respondents have a background in secondary to higher education, with the largest proportion being college and high school graduates (82%). Based on their main occupation, the majority of respondents are civil servants (43%), followed by those working as entrepreneurs (27%) and police officers/police retirees (14%). Meanwhile, a small portion of the respondents work in the primary sector, such as farmers and fishermen.

From the perspective of business experience, the majority of respondents have medium-level livestock farming experience, indicating a significant level of involvement in livestock farming activities. The distribution of business scale shows that the respondents' livestock ownership is relatively varied but tends to fall within the small to medium scale (70%). Meanwhile, the utilization of labour in livestock farming shows a relatively balanced pattern between farmers who utilise additional labour and those who manage their livestock operations independently without labour involvement. Based on interviews, the labour force comes from family members. The maintenance system implemented by the respondents of the native chicken farmers in this study entirely adheres to a semi-intensive maintenance system.

Contribution of income from native chicken farming to farmers' household income

population structure

The population structure of native chickens owned by farmers in Fakfak Regency is presented in Table 1.

The native chicken population maintained by 44 farmers in Fakfak Regency showed variations in population composition based on the scale of the farming operation (Table 1). The respondents in this study were divided into three categories of business scale, namely livestock ownership of 20–40 birds, 41–60 birds, and more than 60 birds, with a relatively even distribution of farmers in each category.

In general, an increase in the scale of operations was accompanied by an increase in the average number of chickens maintained by farmers. Farmers in the smallest-scale group had a smaller flock size, with the population composition still dominated by chicks and adult chickens. In the medium-scale group, the livestock population increases with a more balanced composition among male chickens, breeding hens, young chickens, and chicks. Meanwhile, in the largest-scale group, the livestock population showed the highest number, with a substantial increase in the number of young chickens and chicks. The standard deviation of the population structure data (e.g., an average of 21 ± 17 adult male chickens) indicated high variation among farmers, suggesting that the management practices were still highly diverse.

Revenue from live chicken sales

Based on Table 2, the average income of farmers from the sale of live chickens showed differences among business scales. The highest income was obtained at a scale of >60 birds, followed by a scale of 41–60 birds, and the lowest at a scale of 20–40 birds. The average income per farmer per year was 7,140,625 at a scale of 20–40 birds, 8,611,667 at a scale of 41–60 birds, and 12,905,769 at a scale of >60 birds. The results of the ANOVA test showed that the difference was significant ($p < 0.01$). The Tukey post hoc test showed that there was no significant difference between the 20–40 birds and 41–60 birds business scales, while the >60 birds business scale was significantly different from both groups.

Average total maintenance costs of native chickens farming in Fakfak Regency

The average total maintenance costs of native chickens per year for farmer respondents in Fakfak Regency based on business scale are presented in Table 3. The average fixed costs per year include the sum of the average annual depreciation costs of the coop, the average annual costs of coop equipment (feed and water containers), and the average annual depreciation costs of the breeding hens (as the production machine). The depreciation costs of the coop, coop equipment, and breeding hens were calculated using the straight-line method based on their economic lifespan without considering residual value. The average variable costs per year consist of the sum of the average additional feed costs per year, the average medicine and vitamin costs per year, and labour wage costs per year.

The labor used in the native chicken farming in Fakfak Regency came entirely from family members and was not paid in cash. This is consistent with the characteristics of smallholder farming systems in Indonesia. Therefore, labor costs were calculated using the imputed cost approach, which is a commonly used in family farming analysis to assess the contribution of unpaid labor. In this study, the imputed cost of family labor was estimated based on food and drink consumption provided to family members while helping on the farm. The calculation of labour wages was based on PWD (Person Work Days), assuming a total working time of 0.75 hours/day and 1 PWD equivalent to 8 hours. Thus, in one year, the total working hours amounted to 274 hours or were equivalent to 34.25 PWD. Assuming a daily wage of IDR 75,000, equivalent to two meals, the labor cost for one worker per year was IDR 2,600,000.

The average fixed cost per respondent per year increased along with business scale, from IDR 1,146,458 in the

Table 1: Population of native chickens by business scale (Mean ± SD).

Business scale (birds)	Respondents (farmers)	Average adult male chickens (birds)	Average breeding hens (birds)	Average young chickens (birds)	Average chicks (birds)	Average total chickens (birds)
20-40	16	8 ± 4	7 ± 2	4 ± 3	14 ± 4	34 ± 7
41-60	15	12 ± 7	11 ± 5	10 ± 5	17 ± 7	50 ± 5
>60	13	21 ± 17	17 ± 8	19 ± 15	27 ± 12	84 ± 15
Total	44	598	501	463	827	2389

Source: Primary data analysis (2026).

Table 2: Total and average revenue from live chicken sales by business scale.

Business scale (birds)	Number of chickens sold per year (birds)	Total revenue per year*(IDR)	Total respondents	Average total revenue per respondent per year (IDR)
20-40	667	114,250,000	16	7,140,625[a]
41-60	795	129,175,000	15	8,611,667[a]
>60	1,106	167,775,000	13	12,905,769[b]

*Given the variation in selling prices, total revenue was calculated using actual price data rather than average prices to avoid bias; [a,b]Mean values within a column bearing different superscripts differ significantly ($p < 0.01$).

Table 3: Average maintenance cost per year by business scale.

Business scale (birds)	Average fixed cost per respondent per year (IDR)	Average variable cost per respondent per year (IDR)	Average total cost per respondent per year (IDR)
20-40	1,146,458	2,354,688	3,501,146[a]
41-60	1,759,000	2,712,000	4,471,000[ab]
>60	2,708,782	2,485,154	5,193,936[b]

[a,b,c]Mean values within a column bearing different superscript differ significantly ($p < 0.05$).

20–40 bird scale to IDR 2,708,782 in the >60 bird scale. This increase mainly reflects larger housing facilities, equipment depreciation, and a greater number of breeding hens maintained in larger-scale farms.

Variable costs showed a slightly different pattern, with the highest average observed in the 41–60 bird scale category (IDR 2,712,000), followed by the >60 bird scale (IDR 2,485,154) and the 20–40 bird scale (IDR 2,354,688). This variation may be related to differences in feed use efficiency, labor allocation, and the use of supplementary inputs among farmers.

Total production costs differed significantly among business scales ($p < 0.05$), with farmers maintaining more than 60 birds having significantly higher total costs compared to the 20–40 bird group.

Based on Table 2 and Table 3, the average contribution of income from the native chicken farming is presented in Table 4.

The results of the statistical analysis showed that income from native chicken farming differed significantly across business scales ($p < 0.05$), with the highest average net income observed in the >60 birds group (IDR 7,711,833 per year), followed by the 41-60 birds group (IDR 4,140,667 per year) and the 20-40 bird group (IDR 3,639,479 per year).

However, the total household income of the farmers did not differ significantly among business scales ($p > 0.05$). Farmers in the 41-60 bird category had the highest average total household income compared to the other groups.

The contribution of native chicken farming to total household income ranged from 7.90% to 14.30%, with the highest contribution observed in farms with more than 60 birds. Although the percentage contribution was numerically higher in larger-scale farms, the difference was not statistically significant ($p > 0.05$).

Factors affecting income from native chicken farming

The Shapiro–Wilk test showed that the residuals were normally distributed ($p > 0.05$). This result was supported by the Q-Q plot and residual scatterplot, which showed no severe deviation from normality and no clear heteroscedasticity pattern.

The results of the multiple linear regression analysis yielded the following regression equation:

$$Y = -16{,}180{,}000 + 163{,}500\ X_1 - 74{,}040\ X_2 + 83.02\ X_3 - 0.599\ X_4 - 40{,}276.4\ X_5$$

Table 4: Average contribution of income from native chicken farming to household income.

Business scale (birds)	Total respondents	Average total revenue per respondent per year (IDR)	Average total cost per respondent per year (IDR)	Average income from native chicken farming per respondent per year (IDR)	Average farmer's total income per year (IDR)	Average contribution of native chickens' income per respondent per year (%)
20-40	16	7,140,625[a]	3,501,146[a]	3,639,479[a]	48,339,480	8,74
41-60	15	8,611,667[a]	4,471,000[ab]	4,140,667[a]	56,620,670	7,90
>60	13	12,905,769[b]	5,193,936[b]	7,711,833[b]	52,204,140	14,30
p-value		**	*	*	NS	NS

* $p < 0.05$, ** $p < 0.01$, NS = Not significant. [a,b,c]Mean values within a column bearing different superscript differ significantly.

Table 5: Regression results of factors affecting farmers' net income from native chicken farming.

Variable	Coefficient	Std. Error	t-Statistic	p-value	Significance
C	-16,180,000	4,277,197	-3.782	0.001	**
Number of chickens sold per year	+163,500	11,624	14.067	0.000	**
Number of breeding hens	-74,040	45,567	-1.625	0.112	NS
Selling price	+83.02	23.05	3.601	0.001	**
Feed costs	-0.599	0.712	-0.841	0.406	NS
Farming experience	-40,276.4	176,814	-0.772	0.445	NS
Statistic		Value	Statistic		Value
R^2		0.877	Mean of dependent variable		5,013,534
Adjusted R^2		0.861	S.D of dependent variable		4,306,575
F-statistic		54.29	Durbin-Watson stat		2.079
Prob (F-statistic)		0.0000			

Note: NS= not significant, * $p < 0.05$, ** $p < 0.01$

Where: Y = Net income from native chicken farming per year (IDR); X_1 = Number of chickens sold per year (birds); X_2 = Number of breeding hens (birds); X_3 = Selling price (IDR); X_4 = Feed costs (IDR); X_5 = Farming experience (years)

The results of the regression analysis of factors affecting farmers' net income from native chicken farming are presented in Table 5.

The multiple regression analysis showed that the model was statistically significant ($F = 54.29$; $p < 0.001$) with an R^2 value of 0.877, indicating that 87.7% of the variation in native chicken farming income could be explained by the independent variables included in the model.

The number of chickens sold per year (X_1) and selling price (X_3) had a positive and significant effect on farmers' income ($p < 0.01$). In contrast, the number of breeding hens (X_2), feed costs (X_4), and farming experience (X_5) did not show a statistically significant effect on income ($p > 0.05$).

DISCUSSION

The research results indicate that native chicken farming in Fakfak Regency is generally conducted on a small to medium scale with a semi-intensive maintenance system that still relies on family labour. This condition aligns with the general characteristics of native chicken farming in various rural areas of developing countries, where it often functions as a side business that complements the main household income sources (Lopez *et al*., 2015; Camus *et al*., 2020). The dominance of respondents who are of productive age and have a secondary to higher education level indicates that the native chicken farming is not only managed by people working in the agricultural sector but also by individuals with primary jobs in the formal sector, such as civil servants and entrepreneurs. This indicates that the native chicken farming in the context of the research area plays a more significant role as an additional source of income rather than as the main source of household income.

The structure of the livestock population shows that an increase in the scale of the business correlates with an increase in the number of chickens being raised. The composition of the population, which consists of adult male chickens, breeding hens, young chickens, and chicks, indicates the continuity of the reproductive cycle in the native chicken farming system practiced by the farmers. The relatively large proportion of chicks at each scale of operation indicates that reproductive activities are continuously carried out through a natural mating system. This pattern is commonly found in local household-scale poultry farming systems where the production process occurs naturally without intensive reproductive technology intervention. The presence of a high chick's population also reflects the potential for an increase in livestock population

in the next production period.

Analysis of revenue from the sale of live chickens shows that the average income of farmers increases with the scale of the business (Bao *et al*., 2020; Tsegaye *et al*., 2024). This reflects a positive relationship between the number of chickens sold and the total revenue obtained by the farmers. However, further tests indicate that the average income at the 20–40 birds and 41–60 birds business scales is not significantly different. This phenomenon can be caused by several factors, including variations in chicken selling prices influenced by the size of the livestock, uneven sales frequency among farmers, and differences in reproductive productivity within each scale of operation group (Desha *et al*., 2016; Loengbudnark *et al*., 2024; Liswaniso *et al*., 2024). In the relatively traditional system of raising native chickens, variations in production performance among farmers often occur due to differences in feed management, livestock health, and the quality of breeding stock used.

The average total maintenance cost of native chickens shows significant differences across business scales. Maintenance costs increase with the number of livestock kept, especially in fixed cost components such as depreciation of chicken's coop and breeding hens, as well as variable costs like additional feed, medicine, and vitamins. This increase in costs is a logical consequence of the scale of production, as the more livestock are kept, the greater the need for production inputs (Bahari *et al*., 2024). Nevertheless, the maintenance system that still utilises family labour and local feed sources allows farmers to reduce some production costs, enabling livestock businesses to be operated with relatively low investment levels (Loengbudnark *et al*., 2024; Kebede *et al*., 2025).

The income from native chicken farming shows significant differences between scales of operation, where farmers with more than 60 birds earn higher incomes compared to those with smaller-scale operations. However, the relationship between farm scale and income should not be interpreted as strictly causal. Farmers with higher household income from non-livestock activities or stronger entrepreneurial motivation may also be more likely to maintain larger flocks. Therefore, larger farm size may reflect both production capacity and pre-existing household economic conditions. These findings indicate the presence of economies of scale in the native chicken farming business, where an increase in the scale of operations tends to enhance efficiency and business income (Bao *et al*., 2020; Wilson *et al*., 2022).

The income from native chicken farming at a scale of >60 birds is IDR 8,069,526 per farmer per year. This result is nearly three times higher than that reported by (Wantasen *et al*., 2024) in the maintenance of native chickens in Kakas District, Minahasa Regency, Indonesia. This condition is not surprising because the regions of Papua and West Papua are known for their high prices compared to other provinces in Indonesia.

However, when the income from native chicken farming is combined with the main household income of the farmers, the total household income does not show significant differences between the scales of the business. This condition indicates that the economic contribution of native chicken farming to the total household income is still relatively limited. Most respondents have their main source of income from other sectors such as formal employment or non-agricultural business activities, so the increase in income from the native chicken farming does not directly result in a significant difference in total household income.

The contribution of native chicken farming to farmers' household income ranged from 7.90% to 14.30%, since most respondents considered native chicken farming as a supplementary activity rather than their primary source of income, with higher contributions observed at larger farm scales. These results are lower than those reported by Singh *et al*. (2023), who found a contribution of 18%. In this study, eggs were excluded from income calculation because most farmers did not sell eggs and used them mainly for household consumption. However, eggs consumed by households still provide imputed economic value by reducing the need to purchase eggs from the market. Therefore, the actual contribution of native chicken farming to household welfare may be slightly underestimated. Thus, although its financial contribution is relatively smaller compared to the main income source, native chicken farming still holds strategic value in supporting household economic stability (Mujyambere *et al*., 2021; Singh *et al*., 2023).

The results of the regression analysis show that simultaneously, all variables in the model significantly affect the income from the native chicken farming. A high coefficient of determination indicates that the variation in the income from native chicken farming can largely be explained by the variables of number of chickens sold per year, number of breeding hens, selling price, feed costs, and farming experience. These findings are in line with the research on native chickens in Swaziland (Siyaya and Masuku, 2013) that factors such as selling prices, and the quantity of products sold affect the income of native chicken farming. Partially, the number of chickens sold per year is the most dominant factor affecting the income of farmers (Siyaya and Masuku, 2013). This indicates that the increase in the number of chickens successfully produced and sold is the main factor determining the economic

success of the native chicken farming. The selling price of chickens also has a positive and significant impact on the income of farmers (Desha *et al*., 2016; Loengbudnark *et al*., 2024; Liswaniso *et al*., 2024). This indicates that market price fluctuations have a direct impact on the profit levels obtained by farmers. In the native chicken marketing system, which is generally still informal, the selling price is often influenced by the size of the chicken, local market demand, and the timing of the sale. Therefore, improving production quality to produce chickens with higher body weight can be an important strategy to increase farmers' income (Singh *et al*., 2023).

Feed costs did not show a statistically significant effect on farmers' income. This may indicate that variations in feed expenditure among farmers were not directly associated with income differences, possibly because many farmers relied partly on local feed resources and household food waste rather than fully commercial feed. In small-scale native chicken farming systems, feed management is often highly variable and not always closely linked to productivity outcomes. Nevertheless, feed remains one of the main production inputs, and improving feed efficiency is still important for supporting better farm performance (Kafle *et al*., 2024; Kpomasse *et al*., 2023).

Interestingly, the number of breeding hens did not show a significant effect on farmers' income. This condition may be caused by the high cost of maintaining breeding hens and the suboptimal reproductive productivity among some farmers. In traditional farming systems, not all hens are able to consistently produce chicks, so an increase in the number of breeding hens does not always lead to a significant increase in chick production. Additionally, some older breeding hens may still be retained in the flock, increasing maintenance costs without providing optimal production contributions (Padhi, 2016). The economic burden of maintaining unproductive breeding hens may be more critical because these hens continuously consume resources without necessarily contributing to chick production. In addition, data on reproductive activity such as chicks produced per hen per year were not available in this study, which limits deeper interpretation of breeding efficiency.

Farming experience also did not show a significant effect on income. This indicates that longer involvement in native chicken farming does not necessarily lead to better productivity or higher income, especially under traditional management systems where innovations and improved practices remain limited. A Pearson correlation analysis showed no significant relationship between farmer age and farming experience ($r = 0.105$; $p = 0.499$), indicating that farming experience in this study does not simply reflect chronological age. Younger farmers may also have relatively long farming experience if they have been involved in native chicken farming since an early age. This result is not in line with previous research where farming experience greatly affects the income from the native chicken farming (Haruna *et al*., 2025; Monira *et al*., 2025; Setiana *et al*., 2020). The characteristics of the respondents in this study, who consider raising native chickens as a supplementary business, are suspected to be the reason why the level of farming experience does not always correlate with the intensity of business management or profitability (Tsikai *et al*., 2022). Furthermore, the insignificant and negative coefficient of farming experience indicates a phenomenon of 'static management'. Long-term experience in this area is likely to only represent the repetition of traditional low-input practices, rather than the accumulation of increased managerial expertise. Unlike commercial systems, where experience is often associated with greater efficiency, in this semi-intensive native chicken system, farmers with longer farming experience may be less likely to adopt new management practices such as vaccination programs or improved feed formulation. As a result, profitability tends to stagnate regardless of how long they have been engaged in farming

Several potentially relevant variables, including mortality rate, access to veterinary services, distance to market, improved feeding practices, and household size, were not included in the regression model due to data limitations and measurement consistency. These factors may also influence farmers' income and should be considered in future studies.

Overall, the results of this study indicate that native chicken farming in Fakfak Regency has considerable economic potential as an additional source of income for farming households. However, its economic contribution remains relatively limited because most farmers manage the business on a small scale and treat it as a supplementary activity rather than a primary livelihood source. Therefore, improving productivity through better management practices, enhanced feed quality, and strengthened market access has strong potential to strengthen the economic role of native chicken farming in supporting household welfare.

CONCLUSIONS

In conclusion, native chicken farming contributes 7.90% to 14.30% to farmers' households income in Fakfak Regency and primarily functions as an additional source of income rather than the main livelihood. The highest contribution and net income were observed in farmers maintaining more than 60 chickens, indicating that larger farm scales tend to be more profitable. Multiple regression analysis

showed that the number of chickens sold per year (X_1) and selling price (X_3) significantly affected income from native chicken farming, while the number of breeding hens (X_2), feed costs (X_4), and farming experience (X_5) did not show a significant effect.

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NOVELTY STATEMENT

This study provides an integrated farm-scale assessment of native chicken farming's contribution to household income in the geographically isolated smallholder setting of Fakfak Regency, West Papua. It uniquely combines farm-scale comparisons with regression analysis. The findings show that farms with >60 chickens generate the highest-chicken income, and that the number of chickens sold and selling price are the main income-related factors.

AUTHOR'S CONTRIBUTION

Sri Hartini: Conceptualization, Methodology, data validation, data curation, formal analysis, data interpretation, writing – original draft. Perdana Wahyudi Gultom: Methodology, Investigation, Data acquisition, Data validation. Elfira Kariane Suawa: Conceptualization, Methodology, Investigation, Data acquisition. Iriani Sumpe: Methodology, Data validation, Data curation, Formal analysis, Data interpretation. All authors have read and agreed to the published version of the manuscript.

Generative AI and AI assisted technology statement

The authors declare that no generative AI and AI assisted technology was used in the creation of this manuscript.

Conflict of interest

The authors declare that there is no conflict of interests regarding the publication of this article.

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