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The Income Comparison of Broiler Farming that Used Closed House System and Open House System

Ida Ayu Putri Lingga Sari, Ketut Budi Susrusa, Ida Ayu Listia Dewi
Agribusiness Study Program, Faculty of Agriculture, Udayana University
Correspondence Email: idaayuputri43@gmail.com¹

Submitted : March 2nd, 2021 ; Revised : March 18th, 2021; Accepted: April 26th, 2021

Abstract

Keywords:

Farming;
Income;
Closed house
System;
Open House
System.

One of the important elements in a broiler farming business was the cage. The types of broiler chicken cages based on the type of the wall can be divided into closed house cages and open house cages. This research was conducted on farmers who partnered with UD Bagus Ternak with the aim of knowing the comparison of costs, FCR, production, and income of broiler farming that used a closed house system and an open house system. The selection of location was done intentionally and the respondents were selected by census, which was five farmers that used the closed house system and 22 farmers use the open house system. The results showed that the costs and income of broiler farming that used a closed house system were Rp. 224,615,108/500m² and Rp. 17,301,892/500m², while the costs and income of broiler farming that used an open house system were Rp. 126,478,036/500m² and Rp.5,146,964/500m². The results of the Mann-Whitney test on the average cost and income of the two broiler farm cage systems, statistically were significantly different. The FCR of broiler farming that used the closed house system (1.62) was less than the open house system (1.73) and statistically, significantly different. The results of broiler farm production that used the closed house system (1.86kg/head) were greater than the open house system (1.82kg/head) and statistically there was no difference.

How to Cite (APA 6th Style):

Sari, I. A. P. L., Susrusa, K. B., & Dewi, I. A. L. (2021). The Income Comparison of Broiler Farming that Used Closed House System and Open House System. *SOCA: Jurnal Sosial Ekonomi Pertanian*, 15(2), 370-378.
<https://doi.org/https://doi.org/10.24843/SOCA.2021.v15.i02.p12>

INTRODUCTION

Broilers are a group of poultry species that are presented as a food source, especially for providing animal protein (Prastyo & Kartika, 2017). According to Utomo et al (2015) broiler was one of the livestock products that has a big enough contribution to meet the needs of domestic animal products. The increasing population, income level, and community education will result in increasing demand for animal products, especially meat. This caused a need for an increase in the amount of meat production to meet this demand.

The broiler business was an interesting business to be researched from the livestock sub-sector. Broiler was a type of poultry group that was available as a food source, especially as animal protein providers. Broiler was a type of chicken with high productivity in producing meat (Hadini et al., 2012). The cage was one of the important elements in the broiler farming business, because the cage was used from the beginning of maintenance to harvest. Especially the temperature in Indonesia which was not suitable for the growth of broilers. Therefore, it was necessary to have a cage that can avoid this. Types of broiler cages can be divided into two types cages, which were closed house cages and open house cages (Suryana et al., 2017).

A livestock business in Tabanan Regency that partnered with broiler farmers with a closed house system and an open house system, which was UD Bagus Ternak. The used of closed house systems and open house systems was related to the allocation of costs that will affect the income of broiler farmers. Thus, it was necessary to study the cost structure used and the income received by broiler farmers with a closed house system and an open house system.

Until now, research on the comparison of broiler business income with the closed house system and open house system only focused on the structure of costs, revenues, and income. In this research, we will examine more deeply about the income of broiler farming in terms of feed needed and broiler production results.

The aims of this research were 1) to analyze the cost comparison of broiler farming in the closed house system and open house system. 2) to analyze the comparison of FCR and production in broiler farms that using a closed house system and an open house system, and 3) to analyze the comparison of broiler farm income with a closed house system and an open house system.

RESEARCH METHODS

This research was conducted from August to October 2020 in Tabanan Regency on breeders who partnered with *UD Bagus Ternak*. The determination of the research location was done intentionally (purposive sampling). The types of data in this research were qualitative and quantitative. The qualitative data in this research was about the identity of the breeders, while the quantitative data in this research was the number of chicken populations in closed and open house cages, unfixed costs (labor wages, DOC costs, feed costs, health costs, and maintenance costs), fixed costs (taxes), depreciation costs (cage equipment and cage depreciation) in broiler farming businesses.

The data collection methods in this research were interviews, surveys, and literature studies. The population was the total number of broiler breeders that using a closed house system and an open house system, that in collaboration with *UD*.

Bagus Ternak in Tabanan Regency in which five closed house system breeders and 22 open house system breeders. The respondents determined by the census method.

The variables used in this research included revenues, cash costs, and non-cash costs. Furthermore, each variable consisted of several indicators. The revenue variable consisted of the products sold and the selling price, the calculated cost variable consisted of fixed and unfixed costs, and the unaccounted cost variable consisted of depreciation costs. The measurement for each variable used rupiah/cycle.

In detail, the data analysis method used for each objective was described as follows:

1. Analysis of the first objective (analyzing the comparison of the cost structure of broiler farming on closed house system and open house system cage). In the first objective analysis, it was analyzed quantitatively by using production cost analysis to determine the total production costs incurred and the data obtained will be compared with the different test (Mann-Whitney test).
2. Analysis of the second objective (analyzing the comparison of FCR and production in broiler farming that used a closed house system and an open house system). In the second objective analysis, it was analyzed quantitatively by using FCR analysis to determine the comparison between the feed used and the final weight production. Furthermore, the data obtained will be compared with a different test (Mann-Whitney test).
3. Analysis of the third objectives (analyzing the comparison of income in broiler farming with closed house systems and open house systems). In the third objective analysis, it was analyzed quantitatively by using income analysis to find out the amount of income generated by the broiler farming business that using a closed house system and an open house system. Furthermore, the data obtained will be compared with a different test (Mann-Whitney test).

RESULT AND DISCUSSION

1. The Comparison of Broiler Farming Cost Structure on Open House System and Closed House System

Suwarta et al., (2012) explained that the costs in broiler farming were categorized into three, which were equipment costs, production tool costs, and operational costs.

Fixed cost was cost that the value remained within the range of a certain volume of activities, otherwise fixed costs per unit was change when the volume of activities changed (Winarso, 2014). Fixed costs of broiler farming in the closed house system were cage tax and depreciation of cage equipment (Closed House Cages, Automatic Feeding Places, Nipple Drinkers, Chicken Heating Stoves, Electric Generators, Cooling Pads, Blowers Exhaust, and Lights).

Unfixed cost was cost that the amount always changed proportionally (comparable) to the volume mutation of the company's activities (Rustami et al., 2014). Unfix costs in this research were including the cost of purchasing chicks, feed, medicines, gas, labor, electricity, water, and husks. The total cost of broiler farming that used closed house system for a cage area of 500m² was Rp.226,744,018/cycle consisted of fixed costs of Rp.5,525,667/cycle and unfixed costs of Rp.221,218,351/cycle.

Fixed costs of broiler farming that use the open house system were cage tax and depreciation of cage equipment (Open House Cages, Feed Places, Drinking Places, Chicken Heating Stoves, Electric Generators, and Lights). Meanwhile, unfixed costs were including the cost of purchasing DOC, feed, medicines, gas, labor, electricity, water, and husks. The total cost of broiler farming that use an open house system for a cage area of 500m² was Rp128,334,270/cycle consisted of fixed costs of Rp1,593,625/cycle and unfixed costs of 126,740,645/cycle.

a. The Mann-Whitney U test

Table 1 The Mann-Whitney Ranking of Broiler Farming Cost on closed house system and open house system per 500 m² Year 2019

	Cage System	N	Mean Rank	Sum of Rank
Mann-Whitney U test ranking	Closed House System	5	25.00	125.00
	Open House System	22	11.50	253.00
	Total	27		

On the table 1. it can be seen that average rank of broiler farming cost on *closed house system* was 25,00 with total rank of 125,00 and broiler farming cost on *open house system* was 11,50 with total rank of 253,00. It can be concluded that the average cost of broiler farming on *closed house system* was higher than cost of broiler farming on *open house system*.

Table 2. The Mann-Whitney Statistic Test of Broiler Farming Cost on Closed House System and Open House System per 500 m²/cycle

	Broiler Farming Cost
Mann-Whitney U	.000
Wilcoxon W	253.000
Z	-3.434
Asymp.Sig (2-tailed)	.001
Exact Sig. [(2*(1-tailed Sig.)]	.000 ^b

In table 2. it can be seen that the Mann-Whitney Statistic Test showed that the U value was .000, the W value was 253,000 and the Z value was -3.434 with Asymp. Sig or P value of 0.001 which means <0.05 or less than 0.05. So it can be concluded that H₁ was accepted and H₀ was rejected, which means that there was a difference between the average cost of broiler farming in the closed house system and open house system per 500 m² per cycle.

Based on the test results on both cage systems, it can be seen that the cost of the closed house system was higher than the open house system. The results of this research were in line with the research of Ismail et al., (2014) regarding the economic analysis of broiler farming businesses that used two different types of cages with a total cost of broiler farming by using a closed house system, which was Rp. 131,482,676/cycle consisted of a fixed cost of Rp. Rp4,069,460/cycle and unfixed costs of Rp127,413,216/cycle, while the total cost of broiler farming that used an open house system was Rp126,592,241/cycle consisted of fixed costs of Rp4,444,968/cycle and unfixed costs of Rp122. 147,273.

2. The Comparison of Feed Conversion Ratio and Production on Broiler Farming that Used Closed House System as well as Open House System

Feed conversion (FCR) was a standard for comparing the amount of feed consumed by chickens and the production of meat produced in the same unit of time. Feed conversion was mostly used by farmers to calculate the ability of livestock to exploit feed into good products, which was meat. Feed conversion in broilers was the amount of feed consumed by chickens in a certain time to produce meat (Susanti et al., 2016).

In this research, the average FCR obtained in broiler farming that used a closed house system was 1.62 kg and the broilers weight that produced per head was 1.86 kg. While the average FCR obtained in broiler farming that used an open house system was 1.73 kg and the broilers weight that produced per head was 1.82 kg. The data were presented in Table 3.

Table 3 The FCR Average and Broiler Farming Production that Used Closed House System and Open House System Year of 2019

Cage System	FCR Average (Kg)	Production Average (Kg)
<i>Closed House</i>	1,62	1,86
<i>Open House</i>	1,73	1,82

Based on Table 3. The FCR of closed house system cage spent less feed than open house system in producing 1kg of meat. This was in line with research by Marom et al., (2018) which described that FCR average of *closed house* cage was 1,554, while in *open house* cage was 1,578. The FCR on *open house* cage tended to be higher than *closed house* cage.

a. Mann-Whitney U Test

Table 4 Mann-Whitney FCR Ranking of Broiler Farming that Used closed house system and open house system Year of 2019

	Cage System	N	Mean Rank	Sum of Rank
Broiler FCR	<i>Closed House</i>	5	6.10	30.50
	<i>Open House</i>	22	15.80	347.50
	Total	27		
Broiler Production	<i>Closed House</i>	5	16.50	82.50
	<i>Open House</i>	22	13.43	295.50
	Total	27		

In Table 4. it can be seen that the FCR ranking for broiler farming that used closed house system was 6.10 with a total ranking of 30.50 and the FCR for broiler farming that used open house system was 15.80 with a total ranking of 347.50. It can be concluded that the average FCR of broiler farming that used an open house system was greater than the cost of broiler farming that used a closed house system.

The production ranking of broiler farming that used closed house system was 16.50 with a total ranking of 82.50 and the production of broiler farming that used open house system was 13.43 with a total ranking of 295.50. It can be

concluded that the average production of broiler farming that used a closed house system was greater than the production of broiler farming that used an open house system.

Table 5 Mann-Whitney FCR Statistical Test and Production of Broiler Farming that Used Closed House System and Open House System

	Broiler FCR	Broiler Production
Mann-Whitney U	15.500	42.500
Wilcoxon W	30.500	295.500
Z	-2.470	-.786
Asymp.Sig (2-tailed)	.013	.432
Exact Sig. [(2*(1-tailed Sig.)]	.010 ^b	.447 ^b

In table 5. it can be seen that the Mann-Whitney FCR Statistical Test showed that the U value was 15,500, the W value was 30,500 and the Z value was -2.470 with Asymp. Sig or P value of 0.013 which means <0.05 or less than 0.05. Therefore, it can be concluded that H_1 was accepted and H_0 was rejected, which means that there was a difference between the average FCR of broiler farming that used a closed house system and an open house system.

The Mann-Whitney statistical test of broiler production showed that the U value was 42.500, the W value was 295.500 and the Z value was -.786 with Asymp. Sig or P value of .432 which means > 0.05 or greater than 0.05. Therefore, it can be concluded that H_0 was accepted and H_1 was rejected, which means that there was no difference between the average production of broiler farming with the closed house system and open house system.

Based on the test results on both cage systems, it can be seen that the FCR of the closed house system was lower at 1.62kg/head compared to the open house system, which was 1.73kg/head. This was different from the research of Nuryati (2019) which stated that the FCR in the closed house cage was 2.53 kg/head higher than the open house cage of 2.24 kg/head.

3. The Income Comparison of Broiler Farming with Closed House System and Open House System

According to Prosperity et al (2018), revenue was the multiplication result of the production obtained and the sale value. Alfa et al., (2016) stated that income was the result of product sale minus product price or minus production mechanism price, so that net profits were reduced during maintenance and marketing.

The average livestock income earned by the broiler business respondents with a closed house system was Rp. 11,470,382/500m²/cycle with an R/C Ratio of 1.05, which was greater than the respondents in broiler farming with a closed house system, which was Rp. 3,310,230/500m²/cycle with an R/C Ratio of 1.02. The data can be seen in Table 6.

Table 6 The Comparison of Average Income of Broiler Farming that Used Closed House System and Open House System Year 2019

No.	Description	Closed House System	Open House System
1	Production (Kg)	12.407	6.751
2	Price (Rp)	19.200	19.500
3	Revenue (Rp)	238.214.400	131.644.500
4	Total Fixed Cost (Rp)	5.525.667	1.593.625
5	Total Unfixed Cost (Rp)	221.218.351	126.740.645
6	Total Cost (Rp)	226.744.018	128.334.270
Farming Income (Cycle)		11.470.382	3.310.230
R/C Ratio (Cycle)		1,05	1,02

The average income obtained by respondents of broiler farming with *closed house system* was Rp11.470.382/500m²/cycle higher than *open house system* which was Rp3.310.230/500m²/cycle. (Pakage et al., 2018) also stated that broiler farming with *closed house system* obtained the higher income per production, which was Rp. 15.866.334 if compared to the farmer with *open house system*, which was Rp. 15.185.370.

a. Mann-Whitney U Test

Table 7 Mann-Whitney Income Ranking of Broiler Farming with closed house system and open house system per 500 m² Year 2019

	Cage System	N	Mean Rank	Sum of Rank
Mann-Whitney U Test Ranking	Closed House System	5	25.00	125.00
	Open House System	22	11.50	253.00
	Total	27		

In Table 7. It can be seen that the average of income ranking of broiler farming with closed house system was 25,00 with a total ranking of 125,00 and the income of broiler farming with open house system was 11,50 with a total ranking of 253,00. It can be concluded that the average income of broiler farming with closed house system was greater than the income of broiler farming with open house system.

Table 8 Mann-Whitney Statistical Test of the Income of Broiler Farming with Closed House System and Open House System per 500 m²/cycle

	Broiler Farming Cost
Mann-Whitney U	3.000
Wilcoxon W	253.000
Z	-3.433
Asymp.Sig (2-tailed)	.001
Exact Sig. [(2*(1-tailed Sig.)]	.000 ^b

The Mann-Whitney statistical test showed that the U value was .000, the W value was 253,000 and the Z value was -3.433 with Asymp. Sig or P value of 0.001 which means <0.05 or less than 0.05. Therefore, it can be concluded that H₁ was accepted and H₀ was rejected, which means that there was a difference between the

average income of broiler farming business with closed house system and open house system per 500 m² per cycle.

The real difference in this case can be interpreted that income in broiler farming that used a closed house system produced greater income than income in broiler farming that used an open house system, whereas in a closed house system the number of chickens that can be maintained in a cage area of 500 m² was 7,000 of chickens, while with the open house system the number of chickens that can be maintained in a 500 m² cage area was only 4,000. So that, the income produced by using the closed house system was greater because the production was more abundant than the open house system. In addition, the average production weight of chickens produced per head in closed house system and open house system cages was the same, but the amount of feed conversion (FCR) that spent in closed house system cages was lower. Thus, it can reduce costs and lead income in broiler farming with closed house system higher.

This was in line with Mukminah and Purwasih's research (2020) stated that the income per term of 1,000 closed house cages was higher (Rp. 30,606,931.-) compared to open house cages (Rp. 25,788,618.-). The profit of farmers who used closed house cages was higher (Rp. 2,621/period/head) than open house cages (Rp417.-).

CONCLUSION

Based on the research results and discussion, it can be concluded that the cost of broiler farming that used a closed house system was greater than broiler farming that used an open house system, the FCR of broiler farming in a closed house system was lower than broiler farming that used an open house system, the production results of broiler farming that used a closed house system was greater than broiler farming that used open house system, and the income of broiler farming that used a closed house system was higher than broiler farming that used an open house system on farmers who partnered with *UD Bagus Ternak*.

RECOMMENDATION

The suggestions that can be given to farmers who want to start a broiler farming business, it is recommended to use a closed house system cage in order to obtain maximum income, but it is possible for farmers who have low capital to use the open house system cage.

THANK YOU NOTE

The authors would like to thank those who helped in this research. Hopefully this research can be as useful as it should be.

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