

Factors Affecting Broiler Production in Wonogiri Regency

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Abstract

This research aimed to determine factors-factors affecting the production of broilers, income levels of broilers and broiler chicken farming efficiency in Wonogir Regency. The research method is a survey method. The study was conducted in Wonogiri. Sampling with simple random sampling method. The results showed that the correlation factors with broiler production expressed in cobb douglas production function models, namely: $\ln Y = 1.4207 + 0.3312 + 0.2815 \ln X_1 \ln X_3 \ln X_2 + 0.0021 + 0.0080 + 0.0307 \ln X_4 \ln X_5 + 0.1732 + 0.1460 \ln X_6 \ln X_7 - 0.1081 \ln X_8 + e$. Regression analysis showed that the DOC, feed, labor, vaccines, drug, vitamins and mortality jointly significant effect on broiler production. Individual factors DOC, feed, vitamins and mortality significantly affect to broilers production, while labor, vaccines and drugs did not significantly affect the broilers production. Income levels of broiler chicken farming is IDR 10.563.345, - per period. While the calculation of R/C ratio is 1.06, which means the business of broiler chickens is already profitable.

Keywords: Production; Factors affecting; broilers.

1. Introduction

Livestock is one of the agricultural sub-sector which has a significant role and greatly contributing to the economy of this country. Livestock sub-sector accounted for 146.1 trillion rupiah, or 1.85% to Indonesia's GDP in 2010 [8].

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Livestock sub-sector is part of the agricultural sector with huge potential to be developed to provide food such as meat, milk, and eggs which has high nutrition value. Livestock sub-sector could increase people's income, especially farmers, and expanding employment opportunities. One farm commodities consumed by many people in order to meet the needs of protein is meat. The social demand for meat as well as other livestock products has increased in line with population growth, income and standard of living. In an effort to fulfill the animal protein need and increase farmer's income, the government has been working to increase production which are sourced from livestock enterprises, including the broiler chicken. Broiler chicken farm is one of the mainstays in the livestock subsector in Indonesia. Broiler chicken farms have excellent prospects to be developed, both in large-scale farms and small-scale farms (people's farm). The population of broiler chickens (broilers) within the past few years is increasing rapidly. The population of broiler chickens in Indonesia is currently at 1,355,288,419, an increase of approximately 33% of the population five years ago that only at the 1.026379 billion [2]. The government is also trying to improve the performance of the poultry by improving the investment climate, increase infrastructure development, and the availability of trained resources. This is what can be an attraction for the public and investors to be involved in broiler chicken farming.

Wonogiri District is one district that has a population of broiler chickens that quite a lot and always increase the population every year. According to data from the Department of Animal Husbandry, Fisheries and Marine Wonogiri broiler chicken population in Wonogiri in 2013 amounted to 2.2095 million and in 2014 increased to 2.3435 million with farmers as many as 312 people.

Many factors affect the production of broiler chickens in Wonogiri. These factors include the number of DOC, feed, labor, vaccines, drugs, vitamins, heat and mortality. Farmers must be able to manage the factors of production in order to achieve maximum production.

Based on the above background, the aim of this study are: (1). To determine the factors affecting broiler production in Wonogiri; (2) to determine the efficiency of poultry production broiler in Wonogiri; (3). To find out how much revenue broiler chicken farming in Wonogiri; and (4). Knowing the level of efficiency of broiler chicken farming in Wonogiri.

Broiler Chickens

Mulyantini in [7] states that, the type of broiler chicken is a type of chicken featured race as a results of a cross from the chicken that has high productivity, especially in meat production. Type strain broilers with good productivity on the market, including: CP 707, Hyline, Hubbard, Missouri, Hybro, Shaver Starbo, Super 77, Arbor acrest, Tegel 70, Cornish, ISA brown, Hypeco, Sussex, Cobb, Bromo Kim Cross, Wonokoyo, Ross Marshall, Lohman, and Euribird. The new broiler chickens known in Indonesia since the 1980s, and has been developed rapidly in some countries. The benefits of maintaining broilers are: (1) providing animal protein needs, (2) provide the job opportunities, (3) investment, (4) fulfill the needs of the family, and (5) the form of feces that can used for fertilizer as additional income from farming of broiler chickens.

Farm Science

Farm science is the study of how a managing and coordinating the factors of production such as land and natural surroundings as capital to provide the best possible benefits. As a science, the farmscience is a science that studies the ways farmers determine, organize and coordinate the use of production factors as effectively and efficiently as possible so that the business provides income as high as possible [14].

Analysis of Farming

Boediono in [1] said that the cost includes a measurement of the value of resources to be sacrificed as a result of activities that aim for profit. Based on the volume of activity differentiated charges on fixed costs and variable costs. Fixed costs are costs which is spend in production activities which its total volume fixed on certain activities, while variable costs (variable costs) are costs that the total change in proportion to changes in the volume of activity. Components of fixed costs include rent, depreciation, taxes and so forth. Cost of this type always the same, or had not been changed in relation to the number of units produced. Furthermore it is said that the components of the variable costs include costs of raw materials and direct labor. These costs amount to grow in accordance with the increase in the volume of production so that costs per unit tend to change as well.

Farming revenue is income from all sources of farming that include the number of additional inventory, the sales value and the value of the results of the use of the home and consumed. Farming revenue can be divided into two, the cash revenue and account revenue. The cash revenuebased onfrom the sale of farming production, either crops or livestock, while account revenues are calculated including the value of farm consumed, the final value of livestock and livestock value [5].

According Tohir in [16] revenues are all results of income for one year minu the production cost. In farming the difference between total revenue and expenditure called net farm income or "net farm income"[12]. Meanwhile, according to Rasyaf in [9] the amount of income from broiler chicken farming is one value that is important to know how far the broiler breeding business success. Revenue is the net profit results received breeders which is the difference between revenue and production costs.

Theory of Production

According to Sudarsono in [13], the production function is a technical relationship that connects the factors of production (input) and producing results (output). Known factors of production as absolute, so that production can be run to produce the product. A production function technically efficient in the sense of using the quantity of raw material, labor, and other capital goods to a minimum. Systematically, the form of the production function equation is as follows:

$$Y = Af(K, L)$$

Where:

A technology or engineering change index,

K is input capacity or capital, and

L is labor input [3].

Characteristics of the production function according to Dernberg in [3] are as follows:

- a. The production follows the revenue on a constant scale (Constant Return to Scale), meaning that if the input is doubled then the output will be doubled.
- b. Marginal production, from each of the inputs or factors of production are positive but decreased with the addition of one factor of production on other factors that fixed or otherwise subject to the law of diminishing returns (The Law of Return Deminishing).

Production Efficiency

Efficiency is the amount of physical production results that can be obtained from all of the factors of production or inputs. This kind of situation will happen if the farmer is able to make an effort so that the marginal product value (NPM) for an input or input equals input prices (P) or can be written as follows [12]:

$NPM_x = P_x$; or

$NPM_x / P_x = 1$

In fact many NPM_x not always the same as P_x , and what often happens is the following circumstances:

1. $(NPM_x / P_x) > 1$; means that x is not efficient use of inputs. To achieve efficiency levels of the input should be added.
2. $(NPM_x / P_x) < 1$; means the use of inputs x inefficient. to achieve or become efficient then the input must be reduced.

2. Material And Method

The research was conducted by survey method, the research took samples from a population and using questionnaires as the main data collection tool [10].

Locations were selected Wonogiri intentionally (purposive sampling) with the consideration that this region has a population of broiler chickens that quite a lot and always increase every year. Research was conducted during a two-month high of Month May 2016 and June 2016.

Samples of this research were determined as 60 farmers selected from three districts with the criteria of high, medium and low. Samples were selected from districts that have the largest breeder of the three criteria. Sub district that elected to sample is Subdistrict Girimarto, Subdistrict Selogiri and Subdistrict Tirtomoyo.

Sampling for each district is done by proportionally using the formula:

$$N_i = \frac{Nk}{N_i} \times 60$$

Where:

N_i : Number of samples of broiler breeders on the i-th Subdistricts.

N_k : The number of broiler breeders in each Subdistrict.

N : The number of broiler breeders from all Subdistricts [6].

Determination of samples in each subdistrict using simple random sampling method, by simple random sampling, each farmer has an equal opportunity to be selected.

For data collection used three kinds of techniques are: (1). Observation, this technique is done by holding direct observation of the object to be examined to obtain a clear view of the area to be studied; (2). interview, the technique is used to obtain primary data through direct interviews with respondents based on a questionnaire containing a list of questions prepared in advance; and (3). Note taking, this technique is used to collect primary and secondary data, by recording interviews with respondents and data available on government agencies or institutions concerned with the study.

To determine the factors affecting broiler production is done with the production function approach that is the Cobb Douglas production function model, a model commonly used in economic research [15]. Cobb Douglas production function model for broiler chicken farming is considered mathematically be written as follows:

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 + u$$

Where:

Y = The production of broilers (kg)

β_0 = Intercept / constants

$\beta_1 \dots \beta_8$ = coefficient of regression toward each variable $X_1 \dots X_8$

X_1 = Total DOC (tail)

X_2 = feed (kg)

X_3 = Labor (HKP)

X_4 = Vaccine (ml)

X5 = Drug (g)

X6 = Vitamin (g)

X7 = Heating (kg)

X8 = Mortality (%)

e = Numbers natural

u = Error

To assess whether the use of production factors has achieved economic efficiency, to use the ratio between the value of marginal production with the price of each factor of production with the following formula:

$$\frac{NPMX_1}{PX_1} = \frac{NPMX_2}{PX_2} = \frac{NPMX_3}{PX_3} = \frac{NPMX_4}{PX_4} = \frac{NPMX_5}{PX_5} = \frac{NPMX_6}{PX_6} = \frac{NPMX_7}{PX_7} = 1$$

Where:

NPMXi : marginal product value to factors of production Xi

PXi : The price of production factors Xi.

According Soekartawi in [12] that in reality does not always equal $NPM_x P_x$. What often happens is as follows:

- a. $(NPM_x / P_x) > 1$ means the efficient use of inputs X yet, to achieve efficiency of the input X should be increased.
- b. $(NPM_x / P_x) < 1$ means inefficient use of inputs X, to be efficient, the use of inputs X needs to be reduced.

NPMXi calculated using the first derivative of the Cobb-Douglas production function:

$$NPM X_1 = b_1 \frac{P_y \cdot Y}{X_1}$$

Where:

NPMXi = Marginal Product Value Xi

bi = regression coefficient Xi

Y = Total production

PY = price of the product

To determine the broiler chicken farming income used the formula:

$$\pi = TR - TC$$

π : Income from broiler chicken farming (IDR).

TR : Admission total broiler chicken farming (IDR).

TC : Total cost broiler chicken farming (IDR) [12].

With decision rules if $TR > TC$, the broiler chicken farming is done profitability.

Analysis of the efficiency of broiler chicken farming in Wonogiri used R/C ratio (Revenue-Cost Ratio) to compare the level of benefits and costs of farming:

$$R/C \text{ ratio} = \frac{\text{Revenue}}{\text{Cost}}$$

R : Admission total broiler chicken farming (IDR).

C : The total cost of broiler chicken farming (IDR).

If the R / C ratio > 1 it can be said farming is profitable, while the R / C ratio < 1 then it can be said that farming is detrimental because the cost is greater than the revenues received.

3. Results and Discussion

3.1. Characteristics of Respondents

Respondent characteristics include gender, age, level of education, experience in farming and livestock business status. Most of broiler breeders male sex, which amounted to 55 people or 92.67 percent, while female only 8:33 of 5 percent. This shows that men are still dominant in the poultry business broiler, however there is still a woman's role in the livestock business. Livestock business conducted in Wonogiri, if the husband works as a farmer then together with their wives performing work in the field of animal husbandry since the beginning of the process until after harvest. It aims to reduce the workforce and reduce the cost of labor.

Farmer respondents mostly in the productive age with age between 15-64 years by 95 percent. At age so physically breeders have the ability to handle his business. At the age of productive farmers are expected to be able to absorb new technologies, especially concerning the maintenance of broiler chickens.

The education level of respondents varied from elementary to college. All respondents experienced this level of formal education. The majority of the formal education of farmers is high school. Breeders who have the education level is high school graduate as many as 54 or 90 percent. Average broiler breeders has a background that is higher than other livestock enterprises for chicken farming broiler required treatment more complicated and should always seek information.

Most of the respondent farmers have farming experience between 6-15 years that is equal to 78.33 percent of farmers. That is, most farmers are already experienced in broiler chicken farming.

The majority of broiler chicken farming in Wonogiri as the main job, which amounted to 61.67 percent. Status as a business venture breeder cattle byproducts of 48.33 percent for. Business status affect the sustainability of the livestock business respondents. When there is a price risk, such as the drop in chicken prices or rising prices of production inputs, respondents with farming as a side job tend to choose to not produce until prices stabilized. Ranchers with the cattle business status as a major job prefer continued business.

3.2. Factors affecting broiler production in Wonogiri

Once the data is processed using software Eviews 9.0, then the general equation as follows:

$$\text{LnY} = 1,4207 + 0,3312 \text{ LnX}_1 + 0,2815 \text{ LnX}_2 + 0,0021 \text{ LnX}_3 + 0,0080 \text{ LnX}_4 + 0,0307 \text{ LnX}_5 + 0,1732 \text{ LnX}_6 + 0,1460 \text{ LnX}_7 - 0,1081 \text{ LnX}_8 + e$$

Table 1: Result of regression analysis several factor affecting broiler Chicken in Wonogiri Regency

No	Variable	Regression coefficient	t-stat	Significance
1.	DOC (X ₁)	0.3312	2.7346	0.0086 ^{***}
2.	Feed (X ₂)	0.2815	3.8515	0.0003 ^{***}
3.	Labor (X ₃)	0.0021	0.0258	0.979 ^{ns}
4.	Vaccine (X ₄)	0.0080	0.1326	0.8950 ^{ns}
5.	Drug (X ₅)	0.0307	0.8691	0.3888 ^{ns}
6.	Vitamin (X ₆)	0.1732	4.4987	0.0000 ^{***}
7.	Heater (X ₇)	0.1460	2.9341	0.0050 ^{***}
8.	Mortality (X ₈)	-0.1081	-6.3328	0.0000 ^{***}
	<i>Adjusted R-Square</i>	0.9932		
	F-Stat	1073.960		
	F-Sig	0.0000		

Source: Primary data analysis, 2016.

Information: ^{**}) : significantly affecting on 95 % confident level

^{***}) : significantly affecting on 95 % confident level

^{ns}) : non-significantly affecting on 95 % or 99% confident level

The Coefficient of Determination (R^2).

R^2 is intended to calculate how much of the variation of the dependent variable can be explained by the variation of the independent variable. Statistical value was adjusted coefficient of determination (adjusted R-squared) were obtained from the estimate is for 0.993. This means that 99.3 percent of broiler production variable variation can be explained by the variation of the independent variable in the model that is intended, while the remaining 0.7 percent is explained by the variation of other variables not included in the model. According to Santoso (2000) that for regression with more than two independent variables used as the adjusted R-squared coefficient of determination.

F Test

The estimation results by OLS method F-count value of 1073.96 with a probability significantly for 0.000, larger than the F-table value of 2.04 at a rate of 5%. It shows that all independent variables simultaneously significantly influence the dependent variable at a rate of 5% or 95% confidence.

t-Test.

Parameter DOC turned out statistically significant variable affecting broiler production with significance probability value of 0.008. At coefficient DOC parameter indicates the number (0.3312). This figure, indicating a positive influence or relationship between the amounts of DOC broiler production in Wonogiri. This means that each increase of one percent, the DOC broiler production will increase by 0.3312 percent. That is because poultry are kept farmers in Wonogiri is DOC which has been provided by the core, so that the DOC has been through the process of selection of seeds by the core. According to Fadillah (2004), the commercial broiler chicken breeding success depends on the quality of the DOC maintained. If the DOC maintained during maintenance, the quality will not experience significant obstacles so that the resulting performance depends on environmental factors. Conversely, if maintained DOC poor quality, production reached will not be optimal given although environmental factors is maximal.

Feed parameter turns statistically significant effect on broiler production variables with significance probability value of 0.0003 and has a positive influence. In feed parameters coefficient indicates the number 0.2814. This means that every one percent increase in feed for broiler chickens, the production will be increased by 0.2814 percent. Feed used in the maintenance of broiler chickens in Wonogiri already meet the nutritional needs and feeding was appropriate recommendations that can significantly increase the production of broiler chickens

Labor parameter turned out to be statistically no effect on broiler production variables with significance probability value of 0.9795. In the maintenance of broiler chickens in Wonogiri is still a labor farm people so underestimated, if spare the family the family participated in the cattle business, but when busy farmers to use labor from outside.

Vaccine parameter turned out to be statistically no effect on broiler production variables with significance probability value of 0.895. Giving the vaccine had no significant effect because basically the only vaccine used

for the prevention of disease in early infancy, but if the vaccine is not done and the chicken had been infected and spreads it will be causing mass deaths from the disease cannot be cured but only prevented.

Drug parameter turned out to be statistically no effect on broiler production variables with significance probability value of 0.3888. The drug is administered in the event of signs of disease in broiler chickens. If not given the drug to be feared disease that will cause death in chickens

Vitamin parameter turned out to be statistically significant effect on broiler production variables with significance probability value of 0.0000 and has a positive influence. In coefficient of vitamin parameter indicates the number 0.1733. This means that each increase of one percent, the vitamin broiler production will increase by 0.1733 percent. Vitamin as one part of micronutrients, have a role that is no less than with other types of nutrients. When viewed quantitatively, the percentage of vitamins in chicken rations need definitely smaller compared with other nutrients such as carbohydrates, proteins and fats. Nevertheless, vitamin remains obliged to provide as its function as a catalyst macronutrient metabolism. In another sense, when no vitamin then macronutrient metabolism is inhibited. Barriers metabolism will cause the growth of chickens are not optimal, limited the formation of energy to move and there is no regeneration of damaged cells in the body.

Heater parameter turns statistically significant effect on broiler production variables with significance probability value of 0.0050 and has a positive influence. At coefficient heater parameter indicates the number 0.1480. This means that each increase of one percent, the heating broiler production will increase by 0.1480 percent. Heating at the beginning of the growth is very influential on the next phase of growth of chickens. If the temperature is less than the requirement chicken growth will be disturbed. Mortality parameter turned out to be statistically significant effect on broiler production variables with significance probability value of 0.0000 and has a negative influence. On the coefficient of mortality parameter indicates the number 0.1082. Part of the success of farmers can be seen from the mortality rate. If the mortality is small means that the maintenance of these farms have been successful because mortality can occur from the initial maintenance and harvest. To avoid mortality farmer should manage the factors of production than before DOC came to harvest.

3.3. *Economic Efficiency*

The economic efficiency of broiler chicken farm in Wonogiri Regency can be seen in Table 2.

Table 2: Economic efficiency of broiler farm in Wonogiri Regency

No	Variable	Regression coefficient	Variable cost	MPV	MPV/X	Efficiency
1.	DOC (X ₁)	0.3312	6.286,-/tail	10.374	1,650	Not efficient yet
2.	Feed (X ₂)	0.2815	6.520,-/kg	2.598	0,398	Not efficient
3.	Vitamin (X ₆)	0.1732	175,-/gr	15.157	86,614	Not efficient yet
4.	Heater (X ₇)	0.1460	6.000/kg	103.099	17,183	Not efficient yet

Source: Primary Data Analysis, 2016.

From the table above it can be seen that the use of production inputs DOC, feed, vitamins and heating there is nothing equal to one, so that:

$$\frac{NPMx1}{Px1} \neq \frac{NPMx2}{Px2} \neq \frac{NPMx3}{Px3} \neq \frac{NPMx4}{Px4} \neq 1$$

The efficiency value of the DOC, vitamins and heating more than one, which means the use of factors of production will not achieve the highest efficiency. While the value of the feed efficiency of less than one, which means the use of factors of production is not efficient. NPM ratio of production factors per tail DOC for a purchase price of IDR 6286, -/tail is more than one that is equal to 1.65. It means that economic factors DOC production at a rate of 5,525 birds per period is relatively inefficient due to maintenance has not yet reached its optimum level. Thus to improve the production yield broiler breeders can be done by adding the DOC production factors. NPM ratio of the input feed at a purchase price per kilogram IDR 6.520, - is a smaller one that is equal to 0.39. It means that economic factors feed production at a rate of 518 750 kilograms per period is relatively inefficient because feeding has exceeded the optimum level of use has not yet reached its optimum level. Thus to improve the production yield broiler breeders can be done by increasing the FCR (Feed Conversion Ratio) which is how many kilograms of feed required to produce one kilogram of body weight. The ratio between the NPM of vitamin production factor at a purchase price per gram IDR 175, - is a bigger one is 86.6. It means that the economic factor vitamin production at a rate of 1,978 grams per period is relatively inefficient due to the use of vitamin less than optimum usage levels. Thus to improve the production yield broiler breeders can be done by increasing the use of vitamins.

3.4. *Income of broiler chicken farming*

Income is the difference between revenue and cost of farming.

Cost is used for maintenance of broiler yam in one period can be seen in Table 3.

Table 3: Average of broiler chicken business cost in Wonogiri Regency per period (n=60)

Cost Factor	Average amount	Unit	Unit cost (IDR)	Total cost (IDR)
DOC	5.525	tail	6.286,-	34.730.150,-
Feed	18.750,83	kilogram	6.520,-	122.255.433,-
Labor	69	HKP	50.000,-	3.453.333,-
Vaccine	741,83	ml	166,-	123.144,-
Drug	2.406,67	gram	325,-	782.166,-
Vitamin	1.978,33	gram	175,-	346.208,-
Heater	245,15	kilogram	6.000	1.470.900,-
Electricity	1	period	200.000,-	200.000,-
Total				163.361.234,-

Source: Primary Data Analysis, 2016

Revenue of Farming

Revenue of broiler chicken farming is the total amount of sales proceeds broiler chickens that have been harvested plus the sale of livestock manure. The average size of farm receipts broiler chickens in Wonogiri Regency can be seen in Table 4.

Table 4: Average of broiler chicken business revenue in Wonogiri Regency

Summary	Volume (kg)	Costunit (IDR)	Total revenue (IDR)
Revenue(chicken selling)	11.169,53	15.493	173.049.579,-
Feces selling	8.750,-	100,-	875.000,-
Total			173.924.579,-

Source: Primary Data Analysis, 2016

From the table above it can be seen that the acceptance of broiler chicken farming as much as 5,525 tail is IDR 173 924 579, -.

The average income of broiler breeders in Wonogiri Regency can be seen in Table 5.

Tabel 5: Average income of broiler chicken business in Wonogiri Regency per period (n=60)

Summary	Total (IDR)
Revenue	173.924.579,-
Cost	163.361.234,-
Income	10.563.345,-

Source: Primary Data Analysis, 2016

The average income of broiler chicken farming in Wonogiri Regency IDR 10,563,345, - per period. The average chicken farmer in Wonogiri maintain broiler chickens five year period. The level of income derived from the breeder broiler chicken farm provides an overview of the condition of production, where the higher the production will increase the income of farmers. Opinion breeder increases will have an impact on the welfare of farmers.

3.5. Farming Efficiency

One way to calculate the efficiency of farming is to calculate the R/C ratio. R/C ratio is the ratio between revenues and costs. If the R/C is more than one, then the maintenance of broiler chickens is already profitable, but when less than 1, the broiler chicken farming is not profitable. The results of the R/C farm in Wonogiri is

1.06 so it can be said that the broiler chicken farm in Wonogiri already profitable.

4. Conclusions and Recommendations

Based on the results and discussion of this study, it can take several conclusions, among others: (1). Production factors simultaneously significant effect on broiler production, individually significant factor is the DOC, feed, vitamins, heating and mortality; (2). Broiler chicken farm that do not achieve production efficiency. It can be seen from its marginal product value is not equal to its marginal production value, so that the factors of production needs to be increased or reduced its use. (3). Revenue broiler chicken farming in Wonogiri average is IDR 10,563,345, - per period. (4). Broiler chicken farming in Wonogiri Regency is efficient. It can be seen from the R/C ratio is 1.06.

The advice can be given in this study to increase business revenue broiler breeder chickens must increase production business by managing the factors of production. In order to achieve the level of economic efficiency and optimal profit, factors of production that needs to be added is DOC and vitamins. Production factors that need to be reduced is the feed.

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