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(RESEARCH ARTICLE)

The effect of giving cassava peel flour (*Manihot utilissima*) in ration on the performance of Quail (Coturnix-*Coturnix japonica*)

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Abstract

This study aims to determine the effect of giving cassava peel flour at various levels of ration administration on ration consumption, body weight gain, and ration conversion in quail aged 1-6 weeks. With the treatment level T0 = without adding cassava peel flour, T1 = 3% cassava peel flour, T2 = 6% cassava peel flour, T3 = 9% cassava peel flour. Data were analyzed by means of variance with parameters of ration consumption, body weight gain, and ration conversion. The design used was a non-factorial complete randomized design (CRD) with 4 treatments and 5 replications consisting of 5 animals. The results of the analysis of variance showed that all treatments had no significant effect or were unable to balance the T0 treatment with 0% cassava peel flour as a control or comparison feed on ration consumption.

Keywords: Cassava peel flour; Performance; Quail; Ration

1 Introduction

Quail is one of the poultry commodities that is increasingly popular in society. This is proven by the large number of people who are interested in raising quails and the increasing consumption of products made from quails, both eggs and meat. In addition to quail eggs and meat, their feces can also be used as manure. Another advantage possessed by quails is that they are not too difficult to maintain, have a high resistance to disease.

The type of quail that is widely bred is the type of Coturnix-Coturnix japonica. Quail egg production can reach 250-300 eggs per year. Quail has the potential to be developed because in maintenance it does not require a large area and the capital required is relatively smaller. To increase the potential for quail production, good management, especially feed, is needed.

Quail maintenance can use a little capital, unlike other poultry. In addition to the rapid production of livestock, it is also not difficult to provide rations. Quails also have the characteristics and ability to produce meat and eggs relatively quickly, have high nutritional value, and are also affordable for low-income people.

One of the obstacles to increasing livestock production is the high price of feed, such as the cost of feed reaching 60-70% of production costs. For this reason, efforts are made to utilize other feed ingredients that are not competitive with humans, easy to obtain and not harmful to livestock. For the livestock sector, the availability of cassava is the main limiting factor so that not many factories use it. besides that the protein content is also much lower than corn even though the energy is relatively close.

Cassava (*Manihot utilisima*) is one of the main agricultural crops that has strategic value and has the potential to be developed. The advantages of cassava include being able to grow and develop on various types of soil even on infertile

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soil, being resistant to drought can be planted at any time and planting can be done more than once so that harvests can last throughout the year.

It is very important to develop the use of waste originating from agro-industry and non-conventional feed ingredients. One alternative feed ingredient that can be used as a feed ingredient for monogastric livestock is cassava. Cassava peel obtained from cassava plants is an industrial waste from the manufacture of tapioca flour and other products using cassava raw materials. In general, in the industrial process, cassava peel is disposed of as waste. The wider the cassava plant area, the higher the cassava peel waste will be.Based on the description above, the writer feels interested intested the effect of adding cassava peel flour (*Manihot utilisima*) on the performance of quail (*Coturnix-Coturnix japonica*).

2 Material and methods

This research was conducted at Jalan Sunggal no 25 J Medan Sunggal Medan City from August to September 2022. The materials used were 100 quails, CP 311 commercial feed, drinking water, vitamins, medicines, disinfectants and skin flour cassava, while the tools used are cages of 20 plots with a size of 30 x 30 x 25 cm, places for food and drink, lamps as lighting and heating devices, cleaning equipment for cages, stationery, calculators and, scales.

2.1 Research Methods

The research method used in this study was a non-factorial Completely Randomized Design (CRD) method with 4 treatments and 5 replications. The treatment given is as follows:

- T0 = Control (0% cassava peel flour)
- T1 = Rations with 3% cassava skin flour
- T2 = Rations with 6% cassava peel flour
- T3 = Ration with 9% cassava skin flour

2.2 Data Analysis Method

The data analysis model used in this study was a completely randomized design (CRD) with the following linear models:

$$Yij = \mu + Ti + \Sigma ij$$

Information:

Yij = Observation results of the i-th treatment and j-th repetition
u= Common mean value
Ti = Effect of the ith treatment
Σij = Experimental error due to the ith treatment and jth replication.

The research data were analyzed by analysis of variance and if there were significant differences, it would be followed by a different test according to the coefficient of variation in the results of the study [1]

2.3 Data Collection

Data collection for ration consumption was carried out every day by calculating the remaining rations and spilled but the calculation was done once a week, while for body weight gain it was done once a week (for 6 weeks).

2.4 Research Parameters

2.4.1 Feed Consumption

Observation of the amount of feed consumption is carried out by calculating the amount of feed given minus the remaining feed contained in the feed. Observations were made once every 1 week and then cumulative the amount of feed consumption in 6 weeks.

Feed Consumption= Amount of feed given - remaining feed (gram/head/day)

2.4.2 Daily Body Weight Gain (PBBH)

Observations of quail body weight gain were carried out once a week and observations of quail body weight gain were calculated based on the difference from the final body weight minus the initial body weight divided by the number of days of observation. Calculated by the formula:

$$\text{United Nations} = \frac{\text{B2} - \text{B1}}{Q}$$

Where

UN = Body weight gain (g/head/day)
B_2 = Body weight at the end of weighing (g)
B_1 = Initial body weight (g)
Q = Maintenance time (days)

2.4.3 Ration Conversion

Ration conversion is calculated by comparing the amount of ration consumed with body weight gain in the same unit of time. Ration conversion is useful for measuring feed quality. The lower the ration conversion rate, the better the quality of the feed.

$$\text{FCR} = \frac{KP}{B2 - B1}$$

KP = Feed consumption
B2 = Body weight at the end of weighing (g)
B1 = Initial body weight (g)

3 Result and discussion

3.1 Feed Consumption (g/head/day)

Feed consumption is calculated from the amount of feed given (grams) minus the remaining feed and scattered feed. The results of the statistical analysis showed that the cassava peel flour treatment had no significant effect on quail feed consumption from 7 days to 42 days of age. The average results of quail feed consumption at the age of 7 days to 42 days due to the treatment of cassava peel flour are presented in table 1.

Table 1 Average results of quail feed consumption (g/head/day) during the 0-6 week study

	Treatment			
Age	**T0**	**T1**	**T2**	**T3**
7 days	3,42^{mr}	3.92^{mr}	4.01^{mr}	3.75^{mr}
14 days	5,72^{mr}	4.78^{mr}	5,18^{mr}	5.07^{mr}
21 days	10.92^{mr}	10,10^{mr}	9,42^{mr}	10.00^{mr}
28 days	11.84^{mr}	11.75^{mr}	11.67^{mr}	10.37^{mr}
35 days	13.48^{mr}	16,24^{mr}	14,20^{mr}	16,66^{mr}
42 days	17,3^{mr}	17,68^{mr}	15.45^{mr}	16,74^{mr}
Total Feed Consumption	62,68	64,47	59,93	62.59
Average	10.45	10.75	9.99	10.43

Description: tn = Not significantly different

In table 1 it can be explained that the provision of cassava peel flour had no significant effect on quail feed consumption at 42 days of age. The highest average feed consumption was found in treatment T1 (3% cassava skin flour) which was 10.75 g, then T0 (0% cassava skin flour) which was 10.45 g, then T3 (9% cassava skin flour) which was 10 .43 g, and the lowest T2 (6% cassava peel flour) is 9.99 g.

The results of the analysis showed that the addition of cassava peel flour had no significant effect on weekly body weight gain. Body weight gain was calculated weekly based on the final body weight minus the initial body weight per unit of time in g/head/day. The absence of a significant effect on quail body weight gain between treatments was influenced by the nutritional content of the rations which were almost the same in each treatment even though the level of feed consumption was not significantly different in the treatments. There was no significant effect on quail body weight gain between treatments which was also influenced by the type of quail used in each treatment which was the same and the nutritional value contained in the rations for each treatment was almost the same.

The average results of consuming quail feed using cassava peel flour for 6 weeks (42 days) are also presented in diagrammatic form in Figure 1.

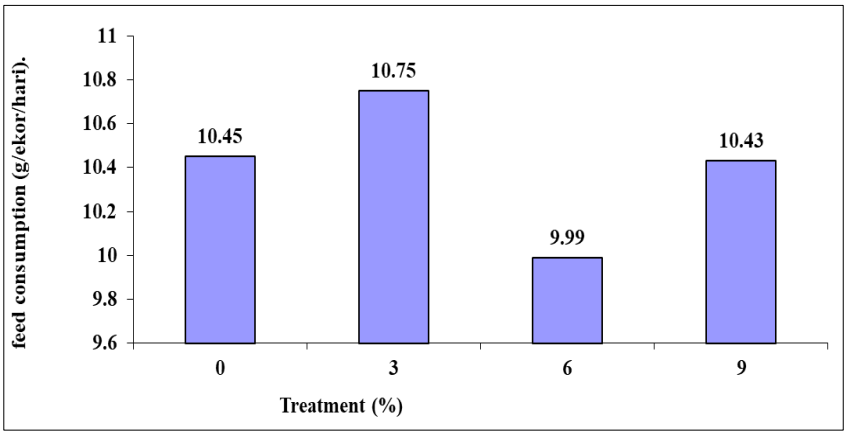

Figure 1 Bar chart of quail feed consumption (g/head/day) as a result of cassava peel application at 42 days of age

3.2 Body Weight Gain

Table 2 Results of average body weight gain (g/head/week) of quail during the 0-6 week study

Age	Treatment			
	T0	T1	T2	T3
7 days	2.35^{mr}	2.44^{mr}	2,20^{mr}	2,32^{mr}
14 days	1.37^{mr}	2,29^{mr}	1.24^{mr}	1.61^{mr}
21 days	2,18^{mr}	2,27^{mr}	2.80^{mr}	2.65^{mr}
28 days	4.37^{mr}	4.59^{mr}	3.67^{mr}	3.67^{mr}
35 days	4,17^{mr}	3.82^{mr}	4.08^{mr}	4.04^{mr}
42 days	3,12^{mr}	3,43^{mr}	3,10^{mr}	2.59^{mr}
Total Body Weight	17.56	18.84	17.09	16.88
Average	2.93	3,14	2.85	2.81

Description: tn = Not significantly different

Body weight gain is the increase in body weight for a certain time. The results of the statistical analysis showed that the treatment of cassava peel had no significant effect on the body weight of quails from 7 days to 42 days old. The average results of quail body weight gain at the age of 7 days and 42 days due to the cassava peel flour treatment are presented in table 2.

In table 2 it can be explained that the administration of cassava peel flour had no significant effect on quail body weight gain for 6 weeks (42 days). The results of the most prominent observations during the study were in the T1 treatment (3% cassava skin flour) with a feed consumption value of 10.75 g/head/day with the highest body weight gain of 3.14 g/head/day. Then in the T0 treatment (0% cassava peel flour) with a consumption value of 10.45 g/head/day with a body weight gain of 2.93 g/head/day. Furthermore, in the T3 treatment (9% cassava peel flour) with a feed consumption value of 10.43 g/head/day with a body weight gain of 2.81 g/head/day, and the lowest consumption was in the T2 treatment (6% cassava skin flour wood) with a figure of 9.99 g/head/day with a daily body weight gain of 2,

The results of statistical analysis showed that the provision of cassava peel flour had no significant effect on quail feed consumption. Body. A low consumption level will result in low consumption of feed nutrients, resulting in sub-optimal growth which causes a decrease in body weight.

The use of cassava peel flour affects the consumption of quail livestock, in treatment T1 it has a low composition number of cassava skin flour and its nutritional content is lower than treatment T0 as a control or comparison treatment with 0% cassava skin flour. In treatment T3 with a composition of 9% cassava peel flour had the lowest feed consumption rate and higher daily body weight gain than treatment T2 with 3% cassava peel flour. [3], adding environmental factors that affect feed consumption are uncomfortable temperatures, disease, and limited supplies of feed or drink, genetic factors in maintenance management, feed quality and cage density.

Results The average body weight gain due to the administration of cassava peel flour at the age of 6 weeks (42 days) is also presented in the form of a diagram which is presented in Figure 2.

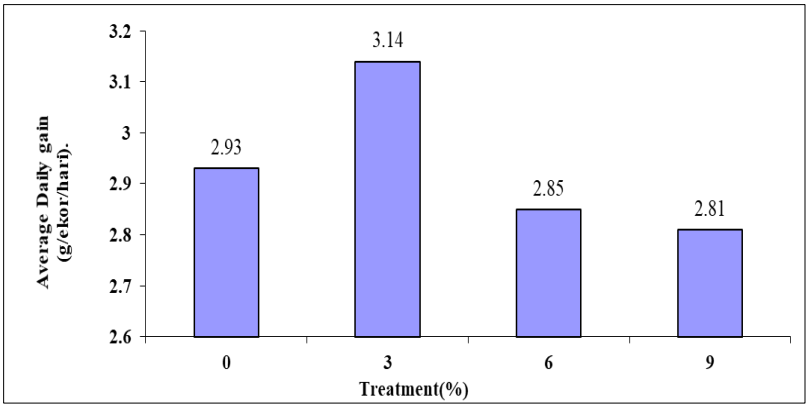

Figure 2 Bar chart of body weight gain (g/head/day) of quail due to treatment of cassava peel flour at 6 weeks of age

3.3 Feed Conversion

Calculation data of quail feed conversion on cassava peel application for 6 weeks. The results of the statistical analysis showed that the administration of cassava peel flour had a very significant effect on the conversion of quail feed at the age of 6 weeks (42 days). The results of the average conversion value of quail feed at 6 weeks due to the administration of cassava peel flour are presented in table 3.

In Table 3 it is presented that the application of cassava peel flour was not significantly different from the conversion of quail feed until the age of 6 weeks (42 days). Where the lowest feed conversion was found in treatment T2 (6% cassava skin flour) which was 3.59, then T1 (3% cassava skin flour) which was 3.61, and then T0 (9% cassava skin flour) which was 3, 92, and the highest was in the T3 treatment (9% cassava peel flour) which was 3.97.

To determine the effect of using cassava peel flour on the conversion of quail feed, a diversity analysis was carried out. The results of the analysis of diversity in table 9 show that the calculated F is greater than the F table of 0.01, which means that the T0, T1, T2, and T3 treatments in quail had no significant effect on quail ration conversion, or the average quail ration conversion obtained between treatments slightly different, namely T0 = 3.92, T1 = 3.61, T2 = 3.59, and T3 = 3.97. There was a very significant effect on quail ration conversion in the T0, T1, T2, and T3 treatments, influenced by age, nutritional content of the feed and the type of quail used during the same study.

This is in accordance with what was stated [4], that ration conversion is influenced by a number of factors such as: age of livestock, nation, nutritional content of rations, temperature conditions and poultry health [5], also states that ration

conversion rates are influenced by strains and environmental factors, namely all external influences including food factors, especially low nutritional value. this is supported by the opinion [6], that ration conversion depends on several factors including protein content, metabolic energy in the ration, body size, breed, age, availability of adequate amounts of nutrients, environmental temperature, and health.

Table 3 Average results of feed conversion for quail aged 6 weeks (42 days) as a result of giving cassava skin flour

Treatment	Feed Conversion Rate
T0	3.92tn
T1	3.61tn
T2	3.59tn
T3	3.97tn
Average	3.77

Note: tn = Not significantly different

Feed that contains high energy will result in improved efficiency in feed use compared to rations that contain low energy [2]. Quail are reared intensively up to 6 weeks of age, feed conversion ranges from 2.8-4.5 [7]. According to [8], a high feed conversion rate indicates less efficient use of feed, and conversely a number closer to 1 is more efficient.

The average yield of quail feed conversion with the addition of the use of cassava peel flour for 6 weeks is also presented in the diagram in Figure 3.

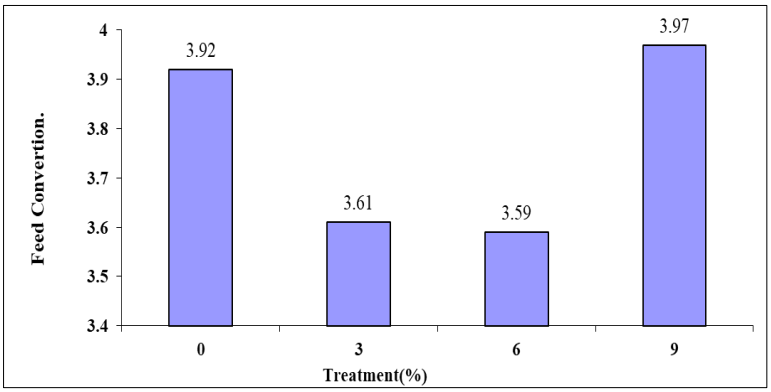

Figure 3 Bar chart of conversion of quail feed by giving cassava skin flour at 6 weeks (42 days) of age

4 Conclusion

The greater the use of cassava peel flour in the ration, the lower the quality of quail feed when compared to the T0 control feed treatment which did not use cassava peel flour. The use of cassava peel flour in the study in the T2 treatment (6% cassava skin flour) and T1 (3% cassava skin flour) had a lower feed conversion rate than the T0 treatment (0% cassava skin flour) as a comparison. in treatment T3 (9% cassava skin flour) had a higher feed conversion rate than treatment T0 (0% cassava skin flour), T1 (3% cassava skin flour), and T2 (6% cassava skin flour).

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

There is no conflict of interest.

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