The effect of replacing maize with re-binding banana hump flour on the meat quality, footpad color, and feather or hybrid duck

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Abstract. The purpose of this study was to determine the deposition percentage of breast meat, leg colour, and feather weight of hybrid ducks. The research material was 100 hybrid ducks regardless of sex (age 21 days) Peking x Khaki Campbell. The method used was a field experiment using a completely randomized design (CRD) consisting of 5 treatments and four replications. Each replication of 5 hybrid ducks. The treatments used were T0: 20% corn, T1: 15% corn + 5% Banana Hump Flour re-binding, T2: 10% corn + 10% Banana Hump Flour re-binding, T3: 5% corn + 15% Banana Hump Flour re-binding, T4: 20% Banana Hump Flour re-binding. Data were analyzed statistically using Covarian analysis (ANCOVA). If the data results differ significantly between treatments, Duncan’s Multiple Range Test (DMRT) will proceed. The results showed that banana hump flour had no significant effect (P> 0.05) on the percentage of breast meat deposition and feather weight, but had a very significant effect (P <0.01) on the color of the legs. It can be concluded that the use of re-binding banana hump flour as a substitute for corn up to 20% in feed gives positive results on the percentage of meat and feathers of hybrid.

1. Introduction

The increasing number of population in Indonesia increases the consumption of animal protein that comes from poultry[10]. Ducks are poultry that can be used for meat and eggs [11]. [1] states that duck meat production had increased by 6.21% from 36.4 tonnes in 2017 to 38.7 tonnes in 2018. This increase in duck meat production shows that duck farming is one of the sectors that increase demand and development in society.

Feed-in duck farming contributes 60–70% of the total maintenance costs. One of the energy sources that is widely used in animal husbandry is corn, and this is because corn has ME 3370 Kcal/kg [2]. Currently, to meet the demand for corn, it still depends on imports because the availability of maize in Indonesia is limited, which causes the price of corn to fluctuate very much. Therefore, it is necessary to seek alternative feed ingredients that are good, easy to obtain, relatively inexpensive, and do not compete with humans without neglecting the nutritional value as a substitute for corn on duck farms.

One of the efforts that can be made to replace corn as an energy source is to use local feed ingredients, one of which is banana hump (Musa paradiciasa L.) [12]. Banana hump is the underside of a banana stem that is tuber-shaped and is located in the ground. Banana hump is a waste from banana plantations that are rarely used, but in general, plantation waste has a low nutrient content, so it needs processing first to be used as feed material. The advantage of using banana humps is that they
have like 76% starch, 20% water, and 4% other ingredients [8]. Banana hump flour is made from fresh banana humps that go through chopping, drying and grinding into flour. Banana hump flour has a crude fibre content of 26.72% [8]. [4] states that banana hump flour has a GE content of 2244.20 Kcal/kg. The presence of high crude fibre content requires technological engineering and nutritional reformulation so that the banana hump can be used as an alternative feed material for energy sources to replace corn.

Re-binding technology is an engineering technology that aims to enrich nutritional content by adding cellulase enzymes to reduce crude fibre and adding amino acids to increase protein levels. Banana hump flour Re-binding can be used as an alternative to ducks as an alternative energy source of feed for corn, which is thought to increase the deposition percentage of breast meat, leg colour, and feather weight of hybrid ducks. Based on the description above, it is necessary to research the effect of using banana hump flour re-binding as a substitute for corn in the feed on the deposition percentage of breast meat, leg colour, and weight of hybrid ducks after being given banana hump flour treatment re-binding.

2. Methods
The materials used in the study were 100 non-sexing hybrid ducks with cross-hybrid strains of Peking ducks (male) and Khaki Campbell ducks (females) 21 days old with an average body weight of 421.31±183.90 g with a diversity coefficient of about 44%. Hybrid ducks are obtained from smallholder farms in Blitar Regency for at of IDR. 10,000 per head. The treatment feed was in the form of banana flour from the type of Banana Kepok (Musa paradiciasa L.) obtained from Trenggalek, East Java. The number of cages used in this study was 20 flocks with five ducks in each flock. The duck cage is equipped with a place for feeding & drinking, hygrometer and other cage equipment. Feed and drinking water were given ad libitum.

The research method used in this study was a field experiment using a completely randomized design (CRD) consisting of 5 treatments and four replications. Each replication consisted of 5 hybrid broiler ducks. The treatments used were as follows:

- T0: Basal feed without banana hump flour re-binding substitution
- T1: Feed using substitution of corn with banana hump flour re-binding 5%
- T2: Feed using substitute corn with banana hump flour re-binding 10%
- T3: Feed using substitution of corn with banana hump flour with re-binding 15%
- T4: Feed using substitution of corn with banana hump flour with re-binding 20%

Deposition breast meat is part of breast meat that is taken without the bones then weighed [9]. The percentage of breast meat deposition was obtained by weighing the breast meat of hybrid ducks after slaughtering at the age of 56 days compared to their live weight (%). The nutritional content, especially protein, will affect the deposition of breast meat. The average percentage deposition of hybrid duck breast meat fed with banana hump treatment is re-binding presented in Table 3. The results showed that the percentage of breast meat from the highest sequentially during the study was P4 (8.57 ± 1.66%), P0 (8.44 ± 1.16), P3 (8.07 ± 1.04), P2 (8.06 ± 1.08), P1 (7.89 ± 0.94) use banana hump flour re-binding in the feed had no significant effect (P> 0.05) on the percentage of deposition of hybrid duck breasts. The results of this study were still lower than the results of [2]. The highest analysis results for the deposition of mojosari duck breast meat were in the P3 treatment (30.37+2.8%). In addition from [6] stated the local duck had more breast meat at range 26-29%. This is influenced by the nutritional content of the feed, especially the protein content. The high breast weight allows the ducks to produce a high percentage of the carcass.
3. Results and discussion

Table 1. Nutrient Analysis

| Feed Ingredients | CP (%)* | CF (%)** | Fat (%)* | GE (Kcal/g)** |
|------------------|---------|----------|----------|---------------|
| Rice Bran        | 12.85   | 1.83     | 9.66     | 4104          |
| Corn             | 9.01    | 1.73     | 3.87     | 3561          |
| Concentrate      | 38.39   | 3.91     | 2.32     | 3319.52       |
| Banana hump flour| 9.22    | 9.27     | 1.43     | 3695.38       |
| MBM              | 55.11   | 12.11    | 4.97     | 3901.54       |

Source: *Analysis Result from Feed Nutrition Laboratory, Faculty of Animal Science, Brawijaya University
**Analysis Result from Centre for Food and Nutrition Studies Laboratory, Gajah Mada University

Table 2. Composition and Nutrient Analysis

| Feed Ingredients | Composition (%) | Energy (Kcal/kg)* | Crude Protein (%)* | Crude Fiber (%)* | Crude Fat (%)* |
|------------------|-----------------|-------------------|--------------------|------------------|----------------|
|                  | T0 | T1 | T2 | T3 | T4 | 3838.5 | 3846.3 | 3854.01 | 3861.8 | 4047.5 | 17.19 | 17.43 | 17.67 | 17.91 | 18.60 | 2.23 | 2.62 | 3.01 | 3.4 | 3.88 |
| Rice Bran        | 60 | 60 | 60 | 60 | 60 |       |       |         |       |       |       |      |      |      |      |      |      |      |      |      |
| Concentrate      | 20 | 20 | 20 | 20 | 20 |       |       |         |       |       |       |      |      |      |      |      |      |      |      |      |
| Corn             | 20 | 15 | 10 | 5  | 0  |       |       |         |       |       |       |      |      |      |      |      |      |      |      |      |
| Banana hump flour| 0  | 4.5| 9  | 13.5| 18 |       |       |         |       |       |       |      |      |      |      |      |      |      |      |      |
| MBM              | 0  | 0.5| 1  | 1.5 | 2  |       |       |         |       |       |       |      |      |      |      |      |      |      |      |      |
| Total            | 100| 100| 100| 100| 100|       |       |         |       |       |       |      |      |      |      |      |      |      |      |      |

Table 3. The effect of replacement to breast meat, leg colour, and feather weight.

| Variables                | Treatments |
|--------------------------|------------|
|                          | T0 | T1 | T2 | T3 | T4 |
| Deposition of Breast Meat (%) | 8.44±1.16 | 7.89±0.94 | 8.06±1.08 | 8.07±1.04 | 8.57±1.66 |
| Leg Color                | 8.5±0.58cd | 7.0±0.82c | 7.5±1.73cd | 5±0.82b | 2.25±0.96a |
| Feather Weight (%)       | 8.32±0.97 | 9.72±1.04 | 9.38±0.57 | 9.26±1.02 | 8.54±1.15 |
The average value of the use of banana hump flour re-binding as a substitute for corn in feed to leg colour can be seen in Table 3. The average result of the treatment is P0 (8.5 ± 0.58), P1 (7.0 ± 0.82), P2 (7.5 ± 1.73), P3 (5 ± 0.82), P4 (2.25 ± 0.96). The variation analysis results showed that the use of banana hump flour re-binding in the feed as a substitute for corn had a significant effect (P <0.01) on the hybrid duck feet colour. This indicates that there is a significant difference in the colour of the legs, this is thought to be due to the carotene content in different feeds. [7] stated that the characteristics of the beak colour and leg colour were found to be colour variations, especially the yellow or orange colour of the duck's beak. The color pigment is carotene. The highest average yield was found in treatment P0 (8.5 ± 0.58) where there was no replacement of corn with a banana hump in the feed. Treatment P4 showed the lowest result, namely (2.25 ± 0.96). This is due to replacing corn as a source of carotene and xanthophyll with banana re-binding humps. [3] explains that the choice of corn is because corn is a source of pigments xanthophyll which causes yellow on the feet and skin.

Feather weight on banana hump flour treatment re-binding as a substitute for corn in feed can be seen in the Table. 3. The average treatment results were P1 (9.72 ± 1.04), P2 (9.38 ± 0.57), P3 (9.26 ± 1.02), P4 (8.54 ± 0.97). Statistical analysis results showed that the use of banana hump flour re-binding as a substitute for corn on feather weight had no significant effect (P> 0.05). The highest average hair weight was in treatment P1 (9.72 ± 1.04). The percentage of feather weight was obtained by weighing the ducks' feathers after plucking in a dry state divided by the live weight (%). According to research by [5] stated that the weight of duck feathers in the treatment showed the results of P1 (7.77%), P2 (6.67%), P3 (13.33%) and P4 (12.23%). This is influenced by the nutritional content, especially protein in the feed. Protein has an important function for poultry, one of which is for feather growth.

4. Conclusion
It can be concluded that the use of re-binding banana hump flour as a substitute for corn up to 20% in feed gives positive results on the percentage of breast meat deposition, as well as the weight of hybrid duck feathers.

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