The Effect of Fresh and Hay Alfalfa (*Medicago sativa* L.) Supplementation on Carcass Quality of Hybrid Duck

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Abstract. This study aimed to determine the effect of alfalfa fresh or hay supplementation in the diets on the meat quality of hybrid duck. 75 hybrid ducks with 3 treatments and 5 replications were used in this study. Each replication consisted of 5 ducks. The diets were used in the trial consisted of P0 = Basal diets without alfalfa supplementation, P1 = Basal diets + 6% fresh alfalfa supplementation and P2 = Basal diets + 6% alfalfa hay supplementation. Either fresh or hay alfalfa was computed based on dry matter. Drinking water was given in ad libitum. Parameters observed were live weight, carcass weight, carcass percentage, and income. This study was designed with Completely Randomized Design. Data collected were analyzed (Anova) with Statistical Product for Service Solution version 22. Duncan's new Multiple Range Test was used in the analysis with significant results. Supplementation of 6% fresh and hay alfalfa did not increase live weight, carcass weight and carcass percentage of hybrid duck until the age of 35 days. However, supplementation of alfalfa (fresh or hay) can reduce the feed cost, thus giving impact to income. The highest income was earned from the duck with 6% alfalfa hay supplementation followed by 6% alfalfa fresh and control. It is recommended to sell the live weight of 35 days harvested duck instead of the carcass to raise the income.

1. Introduction

Hybrid duck is produced by crossbreeding a local duck with Pekin duck. Hybrid ducks have several advantages including a faster growth period and more resistance to disease. Hybrid duck is one of the ducks with a rapid growth period and short-term maintenance.

At this time, duck rearing by the farmer produces a vary of live weights due to varying feed. Poultry feed including duck feed is increasingly expensive, causing many farmers to provide inadequate feed supply for the duck. Therefore, the growth of ducks (live weights and carcass weights) does not meet the harvest age. The increasing price of commercial feed can be anticipated by the addition of forages with high nutritional content like alfalfa. Comparing to other poultry, ducks can consume and digest forage.

Alfalfa is one of the legumes that are widely used for ruminant and non-ruminant. Alfalfa contains 29% crude protein, calcium, chlorophyll, carotene, and vitamin K which is quite high. All parts of this plant contain components that are functional for the body, such as saponins, sterols, flavonoids, coumarin, alkaloids, vitamins, amino acids, sugars, proteins, minerals, and other nutritional components. Alfalfa contains high fiber and can function as an anti-cholesterol agent.
Based on the nutrient content of alfalfa, it is expected that the carcass will have high protein content. Alfalfa supplementation is expected to increase the palatability of feed because ducks like forage compared to other poultry, so it can increase feed intake and improve the quality of the carcass.

2. Material and Method
Seventy-five hybrid DOD (Day Old Duck) produced from Pekin crossed with Khaki Champbell were used in this study. Alfalfa hay and fresh, BR 1 for commercial diet (PT. Japfa Comfeed Production). The diet (Table 1) is prepared based on the needs of broiler ducks according to SNI (2006). Fifteen battery cages with lengths, widths, and heights of 125 x 125 x 50 cm in total were used. The study was conducted for 35 days. The ducks were randomly distributed in the 15 available cages. Feed was given twice a day, in the morning and evening. Drinking water was provided by ad libitum. Fresh Alfalfa was given with finely chopped, while hay alfalfa was dried and then milled so that the particles were smaller. Temperature and humidity were recorded every day.

One day old ducks were weighed individually with electronic scale to the nearest 0.1 gram and then they were weighed at 7, 14, 21 and 35 days old by using electronic crane scales to the nearest 1 gram. At 35 days of rearing, 15 hybrid ducks were selected and subjected to slaughter, defeathering, and evisceration. The carcass was collected after dissection. It contained the skeleton and some skeletal muscles.

The experiment was designed in Completely Randomized Design (CRD) with three treatments and five replications. Each replication consists of five ducks. The treatments given were, T0 = Basal diets without alfalfa supplementation; T1 = Basal diets + 6 % fresh alfalfa supplementation; T2 = Basal diets + 6 % alfalfa hay supplementation. All data obtained were analyzed by using the Statistical Product for Service Solution version 22 (SPSS Gmbh, Munich, Germany). Further, data with significant differences were tested with Duncan's New Multiple Range Test (DMRT).

| Diet          | Treatment | P0 (%) | P1 (%) | P2 (%) |
|--------------|-----------|--------|--------|--------|
| Commercial feed |           | 100    | 94     | 94     |
| Fresh Alfalfa  |           | 0      | 6      | 0      |
| Hay Alfalfa    |           | 0      | 0      | 6      |
|               |           | 100    | 100    | 100    |

3. Result and Discussion

3.1. Live weight
Based on Table 2. There was no significant difference in the live weight gain of hybrid ducks among 3 treatments. This was because the diets were isoenergy and isoprotein (Table 1), the energy of the diets between 2917 - 3007 kcal/kg while the protein between 19.91 - 20.66%. Live weight is affected by feed intake, energy and protein, and carcass weight. The same carcass weight will produce the same
body weights. Sudiyono and Purwatri [1] say that total feed intake will determine the live weight, increase feed intake so it will increase live weight and carcass weight. The average of live weight among treatments shown in Table 2 was between 1185.08 until 1288.75 grams. According to Solomon et al. [2], live weight of 35 days Pekin duck is between 1400 until 1500 grams. Sari et al. [3] say that the average live weight of 6 weeks Pekin duck is about 1750 grams. The live weight of 10 weeks local duck with basal diets was about 1223.75 grams but with supplementation turmeric flour until 2%, it raised between 1226.25 until 1327.50 grams [4]. Supplementation of *Pomacea canaliculata* Lamarck on 8 weeks hybrid duck until 20% gained the live weight of the hybrid ducks about 1099.06 until 1501.30 grams [5].

Table 2. The effect of supplementation alfalfa to carcass quality

| Level of Alfalfa (%) | Parameter | live weight (gram) | Carcass (gram) | Carcass percentage (%) |
|----------------------|-----------|--------------------|----------------|-----------------------|
| 0                    |           | 1267.50±136.04     | 709.50±26.66   | 54.84±5.02            |
| 6 (fresh)            |           | 1288.75±97.24      | 688.25±46.69   | 53.88±2.43            |
| 6 (hay)              |           | 1185.08±62.18      | 694.25±63.30   | 56.51±1.74            |

3.2. Carcass Weight

The Alfalfa supplementation (Table 2) indicated that there was no difference among treatments. This occurrence was linear with carcass weight, in which there was no significant difference, and so does the live weight. The live weight affects carcass weight in poultry. The carcass weight will increase when the live weight increase. Duck with the same live weight can be predicted that the carcass weight will be also similar. Subhan et al. [6] say that carcass weight is related to live weight. Higher live weights will produce higher carcass weights [7].

Supplementation of 6% alfalfa with fiber content in diets up to 6.84% was not able to increase carcass weight. According to Sutrisna [8], the 10% crude fiber content in the diets can increase the carcass weight. The difference in fiber content in diets is a factor affecting the carcass weight of hybrid duck. The fiber in diets will supply energy to livestock for keeping or production. Supplementation of 6% alfalfa in the diets provided insufficient fermentative energy. So the energy on diets and energy from fermentative digestion is only sufficient to duck keeping.

In this study, the carcass weight was gained from 694.25 to 709.05 grams. Hera et al. [9] state that the carcass weight of a 40-day duck is between 705 to 765 grams. The carcass weight of hybrid duck at the 8 weeks is 607.9 to 945.13 grams [5].

3.3. Carcass Percentage

Based on Table 2, it indicates that alfalfa fresh or hay supplementation has no significant difference in carcass percentage. It was because of the isoenergy and isoprotein diets, so the body weight and carcass weight were not significantly different, and so does the carcasses percentage. The carcass percentage obtained by dividing the carcass weight with the live weight.

Carcass percentage in this study ranged from 53.88 to 56.51%. Omoljola [10] says that carcass percentage of Rouen ducks is 68.9%, Pekin ducks 66.7% and in the Muscovy ducks 71.18%. Rukmiasih [11] says that carcass percentage of 10 weeks Cihateup duck is about 60.06%.

3.4. Feed Cost and Income

Feed cost can be used to measure the income generated from livestock business as feed usually take around 70% of the total cost. Feed cost and income can be predicted from the price of each component (feed, carcass, live weight) and FCR value.

Table 3. Price of treatment diets

| Diets | T0 | T1 | T2 |
|-------|----|----|----|
| BR1 (%) | 100 | 94 | 94 |
Results shown in Table 3. indicates that supplementation of fresh alfalfa and hay can reduce the cost of feed/kg. Supplementation with 6% alfalfa resulted in the highest income, either from live weight or carcass, followed by 6% fresh alfalfa and control. Selling live weight 35 days harvested duck is more recommended instead of a carcass form to boost the income.

4. Conclusion
Supplementation of 6% fresh alfalfa and hay did not increase live weight, carcass weight, and carcass percentage of hybrid duck until the age of 35 days. However, supplementation of alfalfa (fresh or hay) can reduce the feed cost that may give an impact on the income. The highest income was generated from the duck with 6% alfalfa hay supplementation followed by 6% alfalfa fresh and control. In conclusion, it is recommended to sell the live weight 35 days harvested duck instead of carcass form so that the income will be much greater.

Acknowledgment
The authors want to express an appreciation to Universitas Gadjah Mada that supported this project by Rekognisi Tugas Akhir (RTA) program

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