The Effect of various vegetable oils in basal diets on the carcass and non-carcass characteristics of local duck

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Abstract. This study aims to examine the effect of various vegetable oil in the basal ration on carcass and non-carcass characteristics of local duck. It was conducted using a Completely Randomized Design (CRD) in a unidirectional pattern with 4 treatments and 6 replicates consisting of 6 ducks each. The treatments used include; P1: (96% basal ration + 4% palm oil); P2: (96% basal ration + 4% canola oil); P3: (96% basal ration + 4% coconut oil) and P4: (96% basal ration + 4% soybean oil). Furthermore, data were collected after the ducks were slaughtered at the age of 9 weeks, where 2 ducks were slaughtered at each test. The data obtained were analyzed using the Analysis of Variance (ANOVA) while the Duncan's Multiple Range Test (DMRT) was used when there are significant results. Moreover, the analysis results showed that the treatments had no significant effects (P>0.05) on the head percentage, as well as the shank, thigh, wing, breast, and back percentage. Based on the results, it was concluded that the addition of different types of vegetable oils in the basal ration failed to improve the carcass and non-carcass characteristics of local duck.

1. Introduction
Meat sources for waterfowl, especially ducks, in Indonesia have the potential to be developed and used as an alternative meat producer. The contribution of ducks in the supply of meat was relatively small at 2.29%, compared to native chickens which reached 20.33%. Besides, the existing source of duck meat comes from local male ducks as well as rejected female ducks. The acceptance of local duck meat by most people is still relatively low, although, ducks are utilized as a superior dishes in some areas [1]. Moreover, the nutritional content of duck meat in basal diet includes 14.95% protein, 15.72% fat, and 0.47% cholesterol (0.19 mg/g) [2].

Fat is added to poultry rations to increase productivity and potentially used as a supplement in feed ingredients [3] [4]. Also, fats and oils are often added to improve both the quality of rations as well as livestock products. Several types of oil that are often used for feed mixtures includes soybean and palm oil as well as animal fat [5] [6]. Meanwhile, vegetable oil has advantages over oil or fat of animal origin [7]. A variety of different oil sources are available from vegetable sources meanwhile, normal sources of oil in baked goods include sunflower oil as well as canola and soybean oil. Besides, oil has generally been used as an energy source in poultry diets. The advantage of incorporating oil in poultry diets include reduced food dust, increased intake and assimilation of lipoproteins, significant amount of basic unsaturated fat, and reduced heat for starch and protein [8] [9].

Although, most vegetable oils are notable source of linoleic acid, however, only few contain significant measures of α-linolenic acid. Among others, perilla oil has the most prominent α-linolenic...
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Acid (omega-3) content, with Low Density Lipoprotein (LDL) composition of 50% cholesterol and 25% protein, while the High Density Lipoprotein (HDL) consist of 20% cholesterol and 50% protein [10]. Vegetable oil act as an energy source, however, in excess amount, it is converted to body fats in form of fat deposits which increase heat conductivity in muscles and accelerates glycolysis thereby reducing the pH of the meat [11].

The productivity and growth of ducks are optimized by providing feed enriched with vegetable oil, rich in metabolized energy sources and fatty acids. Therefore, there is need to examine the effect of addition of different types of vegetable oils in basal diets on the carcass and non-carcass characteristics of local duck’s meat.

2. Material and method

2.1 Research materials
A total of 144 ducks were divided into 4 treatment groups, with 6 replicates consisting of 6 ducks each. The treatment include:
- P1: (96% basal ration + 4% palm oil);
- P2: (96% basal ration + 4% canola oil);
- P3: (96% basal ration + 4% coconut oil); and
- P4: (96% basal ration + 4% soybean oil).

The experiments were conducted for 9 weeks.

2.2 Research methods
The diets consisted of yellow corn, pollard, rice clean, soybean meal, premix, NaCl, limestone, as well as vegetable oils. Besides, the feed ingredients were arranged from the largest raw material to the smallest and then stirred until homogeneous. The diets contained crude protein 19-20% and energy 3200-3300 kcal/kg. Feedstuff’s composition (on dry matter basis) and nutrient content of the experimental diets are presented in Table 1.

2.3 Carcass and non-carcass collection
Data collection of carcass and non-carcass characteristics were carried out when the ducks were nine weeks old with as many as two duck per repetition. Slaughtering was performed in line with [12], which begin with a 12-hour mastery of emptying food in the digestive tract, thereafter, slaughtering was done by cutting the carotid artery, jugular vein, trachea, and esophagus. After cutting these four channels, the feathers were removed by dipping the ducks in hot water for 35-45 seconds. Meanwhile, the carcass is the body of duck obtained after slaughtering based on Islamic Shari’ah, which involves the removal of feathers and offal, without head, neck and legs. The breast section was taken for meat chemical analysis while the non-carcass weight was obtained by weighing the life weight which is reduced by the total weight of the head, neck, blood, hair, skin, legs as well as internal organs (viscera) [13].

2.4 Data analysis
This study was conducted using the one-way randomized design. The data were analyzed using analysis of variance (ANOVA) while differences between treatment means were further analyzed using Duncan’s New Multiple Range Test (DMRT) with significance level of P<0.05.
Table 1. Feedstuff’s composition (on dry matter basis) and nutrient content of experimental diets

| Ingredients                  | T1  | T2  | T3  | T4   |
|------------------------------|-----|-----|-----|------|
|                               | (Palm oil) | (Canola oil) | (Coconut oil) | (Soybean oil) |
| Yellow corn (%)              | 37  | 37  | 36.75 | 37.50 |
| Pollard (%)                  | 10.25 | 10.25 | 11.25 | 9.75  |
| Rich polish (%)              | 24.5 | 23.25 | 23.75 | 23.50 |
| Soy Bean Meal (%)            | 21.5 | 22.75 | 21.50 | 22.50 |
| Premix (%)                   | 2.35 | 2.35 | 2.35 | 2.35   |
| Limestone (%)                | 0.30 | 0.30 | 0.30 | 0.30   |
| NaCl (%)                     | 0.10 | 0.10 | 0.10 | 0.10   |
| Vegetables Oils              |     |     |     |       |
| Palm oil (%)                 | 4   | 0   | 0   | 0     |
| Canola oil (%)               | 0   | 4   | 0   | 0     |
| Coconut oil (%)              | 0   | 0   | 4   | 0     |
| Soybean oil (%)              | 0   | 0   | 0   | 4     |
| Total (%)                    | 100 | 100 | 100 | 100   |
| ME, kcal/kg                  | 3258.97 | 3262.89 | 3241.44 | 3266.61 |
| Crude protein, %             | 19.64 | 20.14 | 19.71 | 19.99 |
| Crude fiber, %               | 6.09 | 6.02 | 6.11 | 6.00  |
| Extract ether, %             | 5.64 | 5.56 | 5.61 | 5.56  |
| Ca, %                        | 0.97 | 0.98 | 0.98 | 0.98  |
| P av, %                      | 0.71 | 0.71 | 0.71 | 0.71  |

3. Result and Discussion

The results on the carcass and non-carcass characteristics consisting of percentage of head, shank, thighs, wings, breast, and back in 9 weeks old local male ducks with the addition of different vegetable oils in the ration are presented in Table 2.

Table 2. Carcass and Non-carcass characteristics of 9 weeks old local male ducks

| Variable                 | Treatment | P Value |
|--------------------------|-----------|---------|
|                          | P1        | P2      | P3      | P4      |
| Head percentage (%)      | 15.50±0.62 | 16.40±1.79 | 15.81±1.00 | 16.74±1.72 | 0.417 |
| Shank percentage (%)     | 2.80±0.21 | 3.00±0.40 | 2.78±0.25 | 2.94±0.43 | 0.585 |
| Thighs percentage (%)    | 27.06±1.53 | 28.26±0.58 | 28.59±1.81 | 28.19±1.29 | 0.275 |
| Wings percentage (%)     | 16.73±0.97 | 18.03±1.71 | 16.80±1.04 | 17.89±0.95 | 0.151 |
| Breast percentage (%)    | 27.28±2.62 | 24.58±2.07 | 25.91±2.53 | 26.69±2.95 | 0.319 |
| Back percentage (%)      | 28.95±1.87 | 28.97±0.56 | 28.54±1.75 | 28.23±1.38 | 0.795 |

P1 : 96% basal ration + 4% palm oil; P2: 96% basal ration + 4% canola oil; P3: 96% basal ration + 4% coconut oil and P4: 96% basal ration + 4% soybean oil

3.1 Carcass Characteristics

Carcass refers to remains of the poultry after removing the blood, feathers, head, shank and offal. The carcass characteristics data obtained in this study consist of the thighs, wings, breast and back percentage, meanwhile, the mean for this variable is presented in Table 2. Based on the analysis results, the treatments had no significant effects (P>0.05) on the thigh, wing, breast, and back percentage. Therefore, the addition of 4% different vegetable oils to the ration had no effect on the studied variables as the four treatments showed no significant differences.

In general, the components of poultry carcass is divided into five parts namely, chest (28%), back (25%), upper thighs (18%), lower thighs (16%), and wings (13%) [14]. These results were almost similar to [15] which reported that the addition of soybean and palm oil as a source of fat in feed had no significant effect on the percentage of duck left breast. Furthermore, the percentage of ducks' thighs and wings in this study was higher compared to [16] however, the percentage of breast and back was lower. The average percentage of thighs of male local ducks aged 10 weeks treated with 0; 0.05; 0.10; and
0.15\% of enzymes in the ration ranged between 52.93 to 54.78\% while the mean percentage of wings was between 14.62 to 15.18\%. In addition, the average percentage of the breast was 26.96-29.02\% while the average percentage of back was 29.92-31.24\%. The results obtained in this study were almost similar to [17] which noted that that the supplementation of soursop leaves powder (Annona muricata L.) on carcass components (breast, wing, thigh, back) of Male Tegal Duckin indicated no significant differences (P>0.05).

In contrast, the results were different from [18] which reported that the provision of katuk leaf flour on the ration, had no positive impact on the growth of the breasts, thighs, wings, and skin as well as the ratio of meat and bones of broiler chickens. This was supported by [19] which stated that the addition of betel leaf solution up to 2.5\%, 5\% and 7.5\% in local male duck feed have a significant effect (P<0.05) on the wing and thigh percentage, but showed no effect (P>0.05) on the back, breast as well as skin and thighbone percentage.

One of the factors that influence carcass composition is age. This was affirmed by [20] which noted that age had a significant effect on carcass tissue composition, which is an important consideration in slaughtered animals because age-related changes were observed in both edible and nonedible carcass components. The ducks used in this study had the same age (9 weeks) hence, the percentage of carcass characteristics is the same between treatments.

3.2 Non-carcass Characteristics
The Non-carcass characteristics data obtained in this study consist of the heads and shank percentage, meanwhile, the mean for this variable is presented in Table 2. Based on the results, the treatments had no significant effects (P>0.05) on the head and shank percentage. Therefore, the addition of 4\% different vegetable oils to the ration have no effect on the percentage of heads and shank as the four treatments showed insignificant differences.

These results were similar to [21] which noted that the the addition of citric acid acidifier in double step-down feed showed no significant effect (P>0.05) on non-carcass features in broiler chickens. Meanwhile, broiler chickens with small body weight generally have a greater percentage of wasted body part weight (such as legs, head and neck and viscera) compared to chickens with large body weight [22]. It was also reported that the use of fermented seaweed flour (Gracilaria verrucosa) in rations at 5\%, 7.5\% to 10\% and 5\% had no significant effect on live weight, carcass weight, carcass percentage, non-carcass weight, non-carcass percentage as well as carcass cut [23].

Based on the results, the percentage of non-carcass components between male and female broilers was the same. The weight loss variable is the amount of waste contained in the gizzard and intestines of broiler chickens. Non-carcass components such as legs (chicken feet) liver, gizzard and intestines (part of the intestines) have high economic value and are in great demand [24].

4. Conclusion
Based on the results, the addition of 4\% different types of vegetable oils in the basal ration failed to improve the carcass and non-carcass characteristics of local duck.

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