The effect of alfalfa (*Medicago sativa* L.) supplementation on hybrid duck performance

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Abstract. This research was aimed to determine the effect of alfalfa supplementation in the diets on hybrid duck performance. Ninety male hybrid ducks were distributed into 3 treatments and 5 replications. Each replicate consists of 6 ducks. Three types of diet were used in the study namely T0 = Basal diet 0% alfalfa supplementation, T1 = Basal diet + 3% alfalfa supplementation and T2 = Basal diet + 6% alfalfa supplementation. The alfalfa supplementation was calculated based on dry matter and given to duck in fresh condition. Water was given ad libitum. Parameters observed were feed intake, body weight gain and feed conversion ratio. Data were analyzed using analysis of variance, followed with Duncan's New Multiple Range Test. Results showed that 3% alfalfa supplementation significantly affected (P<0.05) to feed intake and body weight gain in weeks 2 and 3 but not 6% supplementation. The conclusion from this study is that 3% alfalfa supplementation able to increase feed intake and body weight gain of hybrid ducks.

1. Introduction

Hybrid ducks belongs to poultry with have high feed consumption, and the Feed Conversion Ratio (FCR) produced usually also high. This duck is the result of crossbreed between two superior ducks which inherited the combination of superior characteristics from both parents. As the result, the hybrid ducks have faster growth and shorter rearing periods compared to the local one.

Alfalfa is a perennial legume that has been developed in various countries for animal feed. Alfalfa contains functional compounds for metabolism, such as saponins, sterols, flavonoids, coumarins, alkaloids, vitamins, amino acids, sugars, proteins, minerals, and others nutritional component. In addition, it also contains fiber (dietary fiber) in sufficient quantities and able to function as anti-cholesterol. One of the most dominant components is saponin (2-3%) which is found in alfalfa leaves [1]. The protein content around 29%, dry matter (DM) 19%, ash (BO) 88%, extract ether (EE) 10%, crude fiber 31% and crude protein (CP) 20% according to Suwignyo et al. [2]. Moreover, alfalfa has physiological functions in digestive tract due to it has high fiber and crude protein. In this regards, crude fiber able to stimulate peristalsis in digestive tract. However, poultry has limitation in consuming crude fiber, for example broiler chickens can consume fiber up to 5% while ducks can reach up to 10%.

Since, the main factor in poultry production is feed cost which can reach up to 70% of total production cost, therefore a study to look for alternative feed ingredients which not affect to the duck...
performance become challenging. Alfalfa might be able to address the previous issue since duck has high tolerance to fiber. This current study would like to observe the tolerance level of hybrid ducks to the ratio of given alfalfa in diet.

2. Material and methods
In total 90 hybrids (crossed between Peking duck and Khaki Chambell) were reared in this experiment. Commercial feed (PT. Japfa Comfeed®) as basal feed were given, while alfalfa was served in fresh. Hybrid ducks were housed in battery cages for 7 weeks. The dimensions of each indoor cage pens were 125 x 125 x 50 cm. Alfalfa was chopped the given to ducks according to the diet proportions. Feed and water were available ad libitum, offered twice a day in the morning and evening time. The diets as treatment were (Table 1) based on the nutritional requirement of duck according to SNI standard [3].

The feed was recorded daily to determine feed intake (gram/head) and to calculate FCR. Growth performance (body weight gain) was determined from day 7 to 35, by measuring body weight (gram) in weekly period. The experiment was designed as Complete Randomized Design with 3 treatments and 5 replications, each treatment consists of 6 ducks. All data obtained were analyzed by Statistical Product for Service Solution version 22 (SPSS GmbH, Munich, Germany). Data with significant differences were tested with Duncan's New Multiple Range Test (DMRT) [4].

Table 1. Diet of ducks with alfalfa supplementation

| Diet          | Treatment | T0 (%) | T1 (%) | T2 (%) |
|---------------|-----------|--------|--------|--------|
| Commercial feed | 100      | 97     | 94     |
| Alfalfa       | 0         | 3      | 6      |
| Total         | 100       | 100    | 100    |

| Nutrient content | T0 (%) | T1 (%) | T2 (%) |
|------------------|--------|--------|--------|
| EM (kcal/kg)     | 3.000  | 2.958  | 2.917  |
| Crude protein (%)| 20.02  | 20.02  | 20.02  |
| Crude fiber (%)  | 5.40   | 5.84   | 6.29   |
| Extract ether (%)| 3.80   | 3.99   | 4.17   |
| Ca (%)           | 1.00   | 1.02   | 1.04   |
| P available (%)  | 0.27   | 0.26   | 0.26   |
| Lysin (%)        | 1.07   | 1.04   | 1.01   |
| Methionine (%)   | 0.49   | 0.48   | 0.46   |

3. Results and discussion

3.1. Feed intake (FI)
Results of analysis showed that feed intake increased significantly in weeks 2 and 3 (Table 2), because body growth and production of ducks began to increase rapidly. Supplementation with 3% alfalfa in weeks 2 and 3 increased feed intake compared to the control diet, but not in supplementation with 6% alfalfa. This might be due to the palatability and nutrient content in the diet. According to the the Anggorodi [5] the amount of feed intake was influenced by palatability and digestibility. Moreover, Hernandez et al [6] said that nutrient content and feed composition of diet can affect to feed intake.

Ducks have higher tolerance in consuming fiber compared to the other poultry. Diet which supplemented by alfalfa suggested to increase feed palatability and feed consumption. However, supplementation to 6% alfalfa was decreasing feed intake. The higher proportion of alfalfa in the diet means more crude fiber content in the diet (Table 1). The more amount of crude fiber affected to the reduction of diet consumption. According to Cherry [7] the decrease of diet consumption was due to higher fiber content means bulky, meanwhile the amount of consumed diet is limited.
Table 2. The effect of supplementation alfalfa on ration to feed intake

| Level of Alfalfa (%) | Weeks | Gram/head |
|----------------------|-------|-----------|
|                      | 1     | 2         | 3          | 4          |
| 0                    | 291.23±22.10 | 563.61±76.73 | 740.10±39.60 | 922.10±66.34 |
| 3                    | 306.87±28.03 | 667.73±09.09 | 779.63±20.51 | 956.86±32.46 |
| 6                    | 274.37±33.76 | 572.46±61.84 | 698.23±43.73 | 947.53±22.93 |

a,b numbers with different superscripts on the same line show significantly different

3.2. Body weight gain

According to Table 3, its shown that supplementation of 3% alfalfa improve weight in weeks 2 and 3. Supplementation with 6% alfalfa did not increase on body weight gain of duck; this might be influenced by physiological digestive processes. Zumiarti et al. [8] stated that feed intake can be determined by nutrients consumed of livestock.

Table 3. The effect of supplementation alfalfa on ration to body weight gain

| Level of Alfalfa (%) | Weeks | Gram |
|----------------------|-------|------|
|                      | 1     | 2    | 3    | 4    |
| 0                    | 195.87±13.69 | 255.70±23.71 | 251.30±15.81 | 275.83±34.68 |
| 3                    | 201.53±20.66 | 296.83±25.09 | 263.00±37.71 | 303.00±24.47 |
| 6                    | 184.50±29.60 | 218.99±24.23 | 259.17±31.02 | 283.99±41.43 |

a,b numbers with different superscripts on the same line show significantly different

The higher alfalfa supplementation can affect the rate of digesta in the gastrointestinal tract, therefore decrease the rate of nutrients absorption lead to the low body weight gain. It is explained by Golian and Maurice [9] that feed in the digestive tract would be retain faster if the feed intake contains high crude fiber and it also increases the amount of water consumed by the duck.

3.3. Feed conversion ratio

Feed conversion ratio was not different between treatments (Table 4). This was due to the nutrient content of the treatments also were contain similar of energy and protein. The only different was the the fiber content. According to Purba and Prasetyo [10] the difference of crude fiber content in the diet will not affect to protein content and FCR. Pesti [11] stated that increasing protein content in feed can preserve ideal ratio of essential amino acid levels to improving feed efficiency. Based on the results of this study the protein content of diet (basal and treatment) were considered to have sufficient essential amino acids to obtain the efficiency of hybrid ducks feed.

Table 4. The effect of supplementation alfalfa on ration to feed conversion ratio

| Level of Alfalfa (%) | Weeks |
|----------------------|-------|
|                      | 1     | 2    | 3    | 4    |
| 0                    | 1.48±0.03 | 2.21±0.25 | 2.95±0.13 | 3.37±0.42 |
| 3                    | 1.53±1.65 | 2.26±0.21 | 3.01±0.41 | 3.16±0.19 |
| 6                    | 1.50±0.15 | 2.22±0.23 | 3.21±0.29 | 3.39±0.47 |

As comparison, Purba and Prasetyo [10] reported the FCR average of EPMp ducks fed with 6 and 9% crude fiber in diet on 12 weeks were 4.95 and 4.94. Ketaren and Prasetyo [12] shows that the FCR of MA ducks (crossing of Mojosari and Albio ducks) within eight weeks was 3.43, meanwhile Christian et al. [13] found that average FCR among 2.90 until 2.99.
4. Conclusion
As the conclusion, supplementation with 3% alfalfa in the diet increased feed consumption and body weight gain in 2nd and 3rd weeks but not on feed conversion ratio of hybrid ducks in this study.

References
[1] Parman S, Harnina S, Biologi L, Tumbuhan F, Biologi J and Undip F 2008 P Media Inf. Biol. Strukt. dan Fungsi Sellula 16 1–12
[2] Hermanto H, Bambang Suwignyo B S and Nafiatul N 2017 Bul. Peternak. 41 54
[3] SNI 2006 Pakan meri (starter duck). ndonesia
[4] Steel R G D and Torrie J H 1993 Prinsip dan prosedur statistika (Jakarta: PT Gramedia Pustaka Utama)
[5] Anggorodi R 1995 Nutrisi aneka ternak unggas (Jakarta: PT Gramedia Pustaka Utama)
[6] Hernandez F, Madrid J, Garcia V, Orenco J and Megias M D 2004 Poul. Sci. 83 169–74
[7] Cherry J A 1982 Poul. Sci. 61 345–50
[8] Zurmiati, Wizia M H A dan M E M 2017 J. Peternakan Indonesia. 19 85–92
[9] Maurice A G and D V. 1992 Poul. Sci. 71 51375–1363
[10] Purba M and Lh P 2014 J. Ilmu Ternak dan Veteriner. 19 220–30
[11] Pesti G M 2009 J. Appl. Poult. Res. 18 477–86
[12] Ketaren P P and Prasetyo L H 2000 Produktivitas itik silang MA di Ciawi dan Cirebon Prosiding Seminar Nasional Peternakan dan Veteriner. Pusat Penelitian Peternakan, Badan Penelitian dan Pengembangan Pertanian, Departemen Pertanian
[13] Christian, Irfan H. Djunaidi M H N 2001 J. Ternak Trop. 17 34–41