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

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**Abstract.** The aim of this study was to determine the effect of fresh and hay alfalfa supplementation in diets on hybrid duck performance. In total 75 hybrid ducks with three treatments and five replications were used in this study. Each replication consisted of five ducks. The feeds were used in the trial consisted of P0 = Basal diets, P1 = Basal diets + 6 % fresh alfalfa supplementation (based on dry matter) and P2 = Basal diets + 6 % alfalfa hay supplementation (based on the dry matter). Water was given *ad libitum*. Parameters observed were feed intake, body weight gain and feed conversion ratio. This study was arranged with Completely Randomized Design. Data was analyzed with ANOVA (α=5%) using the SPSS version 22 continued with Duncan's new Multiple Range Test if significant results were found. The results showed that basal diets and fresh alfalfa supplementation significantly affected (P<0.05) to feed intake, body weight gain and feed conversion ratio. Supplementation of 6 % alfalfa fresh resulted the highest body weight gain, followed by control (basal diet) and alfalfa hay. The conclusion from this study was supplementation of 6% alfalfa fresh give a better performance (body weight gain and consumption) than alfalfa hay supplementation, but not for FCR.

1. **Introduction**

Feed in the poultry production system is the biggest costs in a production period. However, feed is the main component needed by the animals. Feed with good composition and according to the physiological status of the animal will have a positive impact on animal production. Feed innovation needs to be created for the concerning of feed costs reduction and production for poultry.

The feed innovations must certainly consider the nutrient content, so that, it will able to be digested and according to the needs of the animal. The innovation can be created by supplementing legumes like alfalfa (*Medicago sativa* L.). Alfalfa has a crude protein content of up to 20% and complete amino acid content that is very good for livestock.

The general character of poultry is low fiber tolerance, but ducks are one of the poultry with high fiber tolerance (could reach 10% fiber compared to chickens that only 5%). Alfalfa supplementation can be offered, either fresh or hay. This study also conducted to find out whether the different forms of alfalfa will impact the hybrid duck production. Utilization of hybrid ducks due to their character i.e. better fiber tolerance, faster growth and a short maintenance period.

2. **Material and methods**

Seventy-five hybrids DOD (Day Old Duck) resulted from Pekin crossed with Khaki Champbell, were used in this study. Feed offered were alfalfa hay, fresh and commercial feed (PT. Japfa Comfeed
Production. The diet (Table 1) was prepared based on the needs of broiler ducks according to SNI [1]. Fifteen battery cages with lengths, widths, and heights of 125 x 125 x 50 cm in total were used. Camry digital scale was daily used to weigh the feed; while hanging digital scales was weekly used to weigh live duck. Thermo hygrometer was used to determine the temperature and humidity of the cage. The research was conducted with preparation, maintenance, and data collection. The study was conducted for 7 weeks. The ducks were randomly distributed in the 15 available cages. Feed was offered twice a day, in the morning and afternoon. Drinking water was given 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 daily recorded.

Retrieval of data for production and other parameters were collected by weighed an initial (DOC) to duck final weight (35 days). Duck body weight was weekly weighed. Recording of feed consumption was daily done by the weighing of feed given and leftover feed.

The experiment was arranged in Completely Randomized Design (CRD) with three treatments and five replications. Each replication consisted of five ducks. The treatment given were, P0 = Basal diets without alfalfa supplementation; P1 = Basal diets + supplementation of 6 % fresh alfalfa; P2 = Basal diets + 6 % alfalfa hay supplementation. All data obtained were analyzed by Statistical Product for Service Solution version 22 (SPSS Gmbh, Munich, Germany). Data with significant differences were continued to test with Duncan’s New Multiple Range Test (DMRT) [2].

Table 1. Diet of ducks with alfalfa supplementation

| Diet                  | Treatment   |
|-----------------------|-------------|
|                       | P0 (%) | P1 (%) | P2 (%) |
| Commercial feed       | 100     | 94     | 94     |
| Fresh Alfalfa         | 0       | 6      | 0      |
| Hay Alfalfa           | 0       | 0      | 6      |
| **Nutrient content**  |          |        |        |
| EM (kcal/kg)          | 3000    | 3007   | 2917   |
| Crude protein (%)     | 20.02   | 20.66  | 19.91  |
| Crude fiber (%)       | 5.40    | 6.84   | 6.81   |
| Extract ether (%)     | 3.80    | 3.86   | 3.70   |
| Ca (%)                | 1.00    | 1.09   | 1.04   |
| P available (%)       | 0.27    | 0.26   | 0.26   |
| Lysine (%)            | 1.07    | 1.34   | 1.26   |
| Methionine (%)        | 0.49    | 0.50   | 0.47   |

3. Results and discussion

3.1. Feed Intake (FI)

Results of the study (Table 2) showed that supplementation of 6% fresh alfalfa and control increased feed consumption in 2nd, 3rd, and 4th weeks compared to hay alfalfa supplementation. The increased of feed consumption in the duck with fresh alfalfa compared to hay might be due to the palatability factor. Daud et al. [3] said that ducks are poultry that prefers forage feed instead of dry feed like hay. Anggorodi [4] said that increasing the palatability is usually followed by increasing consumption of diet.

CP of hay alfalfa was 18.2% and CF 28.9%, while CP for fresh alfalfa was 20.6% and CF 26.7%. The high CP content can cause decreasing feed consumption due to bulky of crude fiber. According to Sauvant [5] the high fiber content in alfalfa will affect to digestion rate and affect the utilization of energy metabolism. This is supported by the opinion of Castellini [6] and Rahmat et al. [7] that poultry
is very sensitive to feed quality because poultry grows quickly and relatively little use fibrous feed such as hay.

Table 2. The effect of supplementation alfalfa on diets to feed intake

| Level of Alfalfa (%) | Weeks 1 | Weeks 2 | Weeks 3 | Weeks 4 |
|----------------------|---------|---------|---------|---------|
| 0                    | 282.73±19.82 | 557.03±25.17\(^a\) | 741.43±12.42\(^a\) | 903.42±93.85\(^a\) |
| 6 (fresh)            | 282.73±19.82 | 557.03±25.17\(^a\) | 741.43±12.42\(^a\) | 903.42±93.85\(^a\) |
| 6 (hay)              | 262.40±14.81 | 264.06±50.35\(^b\) | 467.23±58.51\(^b\) | 735.09±73.12\(^b\) |

\(^{a,b}\) numbers with different superscripts in the same column show significantly different

3.2. Body Weight Gain (BW)

The result of study (Table 3), showed that weight gain significantly increased in 2\(^{nd}\) and 3\(^{rd}\) weeks. Supplementation of 6\% fresh alfalfa and control affect to increasing hybrid duck body weight but not in hybrid duck with 6\% hay alfalfa supplementation. The increasing body weight of hybrid duck with 6\% fresh alfalfa supplementation was closely related to increasing feed intake. This opinion supported by Daud et al. [3] [8] stated that the increasing feed consumption means increasing amount of feed consumed that usually affect an increasing body weight gain of hybrid ducks.

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

| Level of Alfalfa (%) | Weeks 1 | Weeks 2 | Weeks 3 | Weeks 4 |
|----------------------|---------|---------|---------|---------|
| 0                    | 187.90±17.03 | 246.87±20.46\(^a\) | 242.47±17.13\(^a\) | 272.50±26.47 |
| 6 (fresh)            | 180.27±30.13 | 257.00±30.90\(^a\) | 219.49±23.98\(^ab\) | 284.00±43.96 |
| 6 (hay)              | 192.81±54.27 | 162.80±31.15\(^b\) | 191.40±37.98\(^b\) | 282.80±44.97 |

\(^{a,b}\) numbers with different superscripts in the same column show significantly different

The low body weight gain of hybrid ducks with supplementation 6\% alfalfa was allegedly due to the high fiber content in hay alfalfa. The high fiber in the diets will require a considerable amount of time in the digestive rate to be absorbed by ducks. Absorption of low nutrient content from feed caused decreasing body weight gain of duck. These results were agreed with previous researcher, the high content of crude fiber in the diets resulted low nutrient digestion in broiler ducks [9].

3.3. Feed Conversion Ratio (FCR)

Results of analysis variance (Table 4) showed that FCR significantly increased at 2\(^{nd}\), 3\(^{rd}\), and 4\(^{th}\) weeks. This was also influenced by increasing body weight gain. According Zumiarti et al. [10] stated that the speed of growth is an important factor affecting feed conversion, where low gain weight will be resulting high feed conversion.

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

| Level of Alfalfa (%) | Weeks 1 | Weeks 2 | Weeks 3 | Weeks 4 |
|----------------------|---------|---------|---------|---------|
| 0                    | 1.51±0.12 | 2.26±0.12\(^a\) | 3.07±0.24\(^a\) | 3.33±0.39\(^a\) |
| 6 (fresh)            | 1.50±0.16 | 2.23±0.26\(^a\) | 3.19±0.31\(^a\) | 3.41±0.57\(^a\) |
| 6 (hay)              | 1.48±0.58 | 1.63±0.24\(^b\) | 2.48±0.37\(^b\) | 2.63±0.37\(^b\) |

\(^{a,b}\) numbers with different superscripts in the same column show significantly different

Feed conversion ratio was obtained by dividing feed intakes with the gain weight of the duck. Feed conversion can be used as an illustration of production efficiency. This is supported by AAK [11] stated that feed conversion rates indicate a level of efficiency in the use of diets. The smaller feed conversion rate, the more efficient this applies, and the vice versa. Feed conversion rate for 6\% fresh alfalfa supplementation (P1) and control (P0) treatment was higher than 6\% hay alfalfa supplementation (P2). It indicated that the quality of the diet (P2) was better to be converted into weight gain (muscle) compared with P1 and P0.
High consumption value of feed due to fresh alfalfa consumed more and more. This was related to the amount of fiber consumed; only some of fiber consumed can be digested in the caeca of the poultry. According to Anggorodi [4] only 20% of crude fiber can be digested in the caeca, so that the crude fiber fraction that cannot be digested will immediately get out of the digestive tract. As a result, the chance of absorption of feed decreases and the tract digestives becomes empty, so the ducks will consume more diets. This resulted in high feed conversion values.

4. Conclusion
Supplementation 6% fresh alfalfa in the diet did not increase feed consumption and body weight gain, but increased feed conversion. Feed conversion ratio of duck with 6% alfalfa hay supplementation better (lower) than 6% fresh alfalfa supplementation and control.

References
[1] SNI 2006 Pakan meri (Starter Duck) (Indonesia: Badan Standardisasi Nasional)
[2] Steel R G D and Torrie J H 1993 Prinsip dan prosedur statistika (Jakarta: PT Gramedia Pustaka Utama)
[3] Daud M and Yaman M A Z 2015 Pros. Semin. Nas. Teknol. Peternak. dan Vet. 479–86
[4] Anggorodi R 1995 Nutrisi aneka ternak unggas (Jakarta: PT Gramedia Pustaka Utama)
[5] Sauvant D, Perez J M and Tran G 2002 Bull. Vet. Bimest. Vet. Prat. Fr. 86 329
[6] Castellini C, Perella F, Mugnai C and dal Bosco A 2002 Welfare, productivity and qualitative traits of egg in laying hens reared under different rearing systems Photochem. Photobiol.
[7] Rahmat N, Rudy S and Khaira N 2015 P J. Ilm. Peternak. Terpadu 3 12–9
[8] Sutrisna R 2011 J. Penelit. Pertan. Terap. 11 112–8
[9] Kang P, Hou Y Q, Toms D, Yan N D, Ding B Y and Gong J 2013 Asian-Australasian J. Anim. Sci. 26 253–9
[10] Zurmiati, Wizna M H A dan M E M 2017 J. Peternak. Indones. 19 85–92
[11] Kanisius A A 2003 Beternak Ayam Pedaging (Jakarta)