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HAEMATOLOGY AND BLOOD FAT PROFILE OF MUSCOVY DUCK FED WITH DIFFERENT PROTEIN LEVELS SOURCED FROM GOLDEN SNAILS

(Profil Hematologi dan Lemak Darah Entog yang Diberi Pakan dengan Kadar Protein Berbeda Bersumber dari Keong Mas)

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Abstract

This research was conducted to see that effect of using golden snail as alternatif fed for Muscovy ducks on different ration level to hematologi profil and blood fat. 64 Muscovy ducks of 8 weeks of age were use in this study use a randomized block design with four treatments and four replications, whereas each replicate consisted of four male Muscovy ducks. The composition of the ration used consisted of corn, rice bran, pollard, coconut meal and golden snail meal. There were four treatments included P0 (control feed), P1 (control feed + 10% golden snail meal), P2 (control feed+20% golden snail meal), P3 (control feed + 30% golden snail meal). The parameters observed were hematological profile including hemoglobin content, erythrocyte count, leukocyte count, and blood hematocrit content and than blood metabolites including cholesterol, triglycerides, HDL and LDL. The study used a completely randomized design with four treatments and three replicates. The data were subjected to analysis of variance (ANOVA). Based on the results obtained there was no significant difference in erythrocyte levels each treatment, but the hemoglobin level in muscovy duck given 30% golden snail showed significant differences in all treatments. Results of blood metabolites, showed no significant difference in triglyceride levels in all treatments, but the cholesterol content in the ration given 30% golden snail meal (P3) was lower and significantly different from other treatments. In general, giving 30% golden snail meal in the ration shows better results based on the hematological profile

Keywords: Muscovy duck; golden snails meal; feed; hematology profile

Abstrak

Penelitian ini dilakukan untuk melihat pengaruh penggunaan keong mas sebagai pakan alternatif bebek Entog terhadap perbedaan kadar ransum terhadap profil hematologi dan lemak darah. 64 ekor itik entok umur 8 minggu yang digunakan dalam penelitian ini menggunakan rancangan acak kelompok dengan empat perlakuan dan empat ulangan, dimana masing-masing ulangan terdiri dari empat ekor itik jantan. Komposisi ransum yang digunakan terdiri dari jagung, dedak, pollard, bungkil kelapa dan bungkil keong mas. Terdapat empat perlakuan yaitu P0 (pakan kontrol), P1 (pakan kontrol + 10% tepung keong mas), P2 (pakan kontrol + 20% tepung keong mas), P3 (pakan kontrol + 30% tepung keong mas). Parameter yang diamati adalah profil hematologi meliputi kadar hemoglobin, jumlah eritrosit, jumlah leukosit, dan kadar hematokrit darah serta metabolit darah yang meliputi kolesterol, trigliserida, HDL dan LDL. Penelitian menggunakan rancangan acak lengkap dengan empat perlakuan dan tiga ulangan. Data yang diperoleh dianalisis menggunakan sidik ragam (ANOVA). Berdasarkan hasil yang diperoleh tidak terdapat perbedaan kadar eritrosit yang bermakna pada setiap perlakuan, namun kadar hemoglobin pada itik entok yang diberikan keong mas 30% menunjukkan perbedaan yang bermakna pada semua perlakuan. Hasil metabolit darah, tidak menunjukkan perbedaan kadar trigliserida yang bermakna pada semua perlakuan, namun kadar kolesterol pada perbandingan yang diberikan tepung keong mas (P3) 30% lebih rendah dan berbeda

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nyata dengan perlakuan lainnya. Secara umum pemberian tepung keong mas 30% dalam ransum menunjukkan hasil yang lebih baik berdasarkan profil hematologi.

Kata kunci: Bebek entog; tepung keong mas; pakan; profil hematologi

INTRODUCTION

Meat product from poultry is a general food commodity that consumed by the community in effort to fulfill daily nutrition. Beside chicken and duck, Muscovy duck is one of the poultry that is in great demand because it has a distinctive and delicious meat taste. Among the three poultrys comodities, ducks and Muscovy ducks are considered to have higher fat and cholesterol content, but biologically, Muscovy duck contains lower fat and protein than the other local ducks but the cholesterol is the highest (Ismoyowati *et al.*, 2012).

Each poultrys has a different ability to synthesize cholesterol depending on the quality and quantity of feed given.As we known, consumption of meat with high fat and cholesterol content can cause health problems especially in old age such as obesity and atherosclerosis. The nutritional feed ingredient was manly factor influenced nutritional meat content as fat, cholesterol, and fatty acid of meat beside age, genetic, and habit of Muscovy duck. Older ducks generally have higher fat content (Triyantini *et al.,* 1997; Damayanti, 2006; Woloszyn *et al.*, 2006; Baeza, 2006).

Therefore, the information of fatty acids, cholesterol and fatty acid profile content is required. The content of fat, cholesterol and fatty acid profile can be controlled via the feed source of oil content in the animal feed (Wood et al; 2003; Schiavone *et al.*, 2007), differences in eating habits, feed ingredients with high source of omega 3 microalga (Wood et al; 2003), and the influence of protein (El-Deek *et al.,* 1997). Furthermore, genetics also affects the nutrient content of the Muscovy duck meat Woloszyn *et al.*, 2006; Baeza, 2006).

According to Setioko (1997), reared duck at backyard had various nutritional content of the crop, the feed material mainly rice, snails, insects, leaves, and also other unknown materials. The study of use golden snails as a feed protein source for poultry have been carried out. The use of 15% golden snail meal in broiler chicken shows a better feed conversion ratio than control Jawa *et al.*, 2020). The use of 5% golden snail meal with 10% cassava leaf meal in duck diet had the greatest effects on the performance and egg physical quality without affecting their chemical quality (Sumiati et al., 2020). The high protein content of the golden snail is indicated to impact the physical and chemical composition of the carcass and meat.

This study was conducted to determine the effect of giving golden snail meal rations at a certain level on the hematology, fat and cholesterol profile. These results are expected to be a reference in the use of golden snails as feed for Muscovy duck to produce better meat quality.

RESEARCH METHODS

Animal and Dietary Treatments

The experiment used 64 male Muscovy ducks of 8 weeks of age. The experiment was conducted in a randomized block design with four treatments and four replications, whereas each replicate consisted of four male Muscovy ducks. The Muscovy ducks were allocated randomly in a floor pen of cages. The diet and dringking water were provided ad libitum. The feeding is done twice in the morning (06.30 a.m) and evening (5 p.m) with same amount.

The diet ingredients used were corn, rice bran, pollard, coconut meal, golden snail meal (Table 1) and nutrient content in diet presented in Table 2.

Variables and Sampling

The variables measured were hematological profile. Hematological

parameters measured included hemoglobin content, erythrocyte count, leukocyte count, and blood hematocrit content. Blood sampling was carried out at the end of the study (week 7). Blood samples were taken in the morning before gave the diet. The blood sample was taken through the pectoralis vein as much as 6 ccs and put in an anticoagulant tube. Hemoglobin did calculation was done by using the Sahli method. Meanwhile, the hematocrit was determined by measuring the volume of erythrocytes using a microcapillary hematocrit reader. The number of erythrocytes is calculated using a hemocytometer. The blood is first diluted with Hayem's solution 200 times and then read using a counting chamber with the aid of a 10x40 magnification microscope. The blood was diluted using a briliant cresyl blue (BCB) 0.03% and then counted with a counting chamber under a microscope with a magnification of 10x40 times to count blood leukocytes. The formula used to count erythrocytes and leucocytes is presented below :

The number of erytrocytes = a x 10^4

a = the number of cells counted in the hemocytometer

The number of leukocytes = b x 50

b = the number of cell counted in the hemocytometer

Blood metabolites measured include cholesterol, triglycerides, HDL dan LDL. Blood cholesterol was measured using the CHOD-PAP (cholesterol-oxidase p-aminophenazone) enzymatic colorimetric method. In contrast, blood triglyceride levels were measured by the GPO-PAP (glycerol phosphate oxidase-p-aminophenozone) method. HDL profiles were measured using enzymatic colorimetric methods, and LDL levels were measured using the formula LDL = total cholesterol-HDL-1/5 triglycerides. (Friedewald *et al.*, 1972).

Statistical Analysis

The study used a completely randomized design with four treatments and three replicates. There were four treatments included P0 (control feed), P1 (control feed + 10% *Pomacea canaliculata* meal), P2 (control feed+20% *Pomacea canaliculata* meal), P3 (control feed + 30% *Pomacea canaliculata* meal). The data were subjected to analysis of variance (ANOVA).

RESULT AND DISCUSSION

Results

Effect of Level Golden Snail Meal on Haematology Profile

The data of hematology profile presented in Table 3.

Effect of Level Golden Snail Meal on Fat and Cholesterol Profile

The fat and cholesterol profile on this study showed on table 4.

Discussion

Effect of Level Golden Snail Meal on Haematology Profile

Based on the results of the blood analysis, it was seen that there was no significant difference in the erythrocyte levels in each treatment, but the leukocyte hemoglobin and total hematocrit levels had significant differences between treatments. This shows that nutritionally the four treatment rations are not so different even though the protein content of each treatment is different. Erythrocytes are one of the blood elements that transport hemoglobin in the blood circulation, hemoglobin contains proteins that act as binders and transporters of oxygen to be carried throughout the body, then used in metabolic processes.

Regarding hemoglobin levels, treatment P3 where the ration contained 30% gold snail flour showed significantly different ($p<0.05$) results compared to treatments P0, P1 and P2, which means that the administration of 30% gold snail flour in the ration increased the hemoglobin level of the snail blood. Haemoglobin contains protein that acts as a binder and transporter of oxygen to be carried throughout the

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body, then used in metabolic processes. As is known, the P3 ration contains 30% golden snail flour and has the highest crude protein content of 22.81% (see table 3) compared to other treatments.

The results of analysis, leukocyte levels showed a significant difference ($p<0.05$) between Muscovy duck that was given additional golden snail meal rations and the control (P0). Giving golden snail meal increased the protein ration (as shown in table 2) and was able to increase leukocyte levels. Leukocytes are cells that play a role in the body's defense system that is very responsive to infectious agents. Leukocytes function to protect the body against various diseases by way of phagocytes and produce antibodies (Junguera, 1997). High levels of leukocytes indicate the ability of livestock to respond to infection better.

The rate of increase and decrease in the number of leukocytes in the circulation reflects the responsiveness of white blood cells in preventing the presence of disease and inflammatory agents (Nordenson, 2002). Factors that affect the number of leukocytes and their differential include environmental conditions, age and nutritional content of feed. Among these factors, nutritional factors have a very important role, for example, protein (Addass et al., 2012). Protein plays an important role in the process of leukocyte formation because protein is one of the components of blood (Etim et al., 2014).

The hematocrit value in this study there was a significant difference ($p<0.05$) in treatment P1 (table 2) against other treatments. If it is seen from the erythrocyte levels that are not significantly different, the hematocrit levels should also not be significantly different because normally, the number of erythrocytes is positively correlated with the hematocrit value. The amount of hematocrit value is influenced by the breed and type of livestock, age and production phase, sex of livestock, disease, and local climate. The rise and fall of the hematocrit value depend on the volume of blood cells compared to the total blood volume (Swenson,1977). The hematocrit value is usually considered to be as useful as the total erythrocyte count (Frandson, 1992). Hematocrit value is closely related to blood viscosity where an increase in hematocrit value will increase blood viscosity (Wilson, 1981). Disproportionate changes in the volume of erythrocytes and blood plasma in circulating blood will change the PCV value (Swenson, 1984).

An increase in the number of erythrocytes at a low ambient temperature will increase the hematocrit value if the blood volume remains constant, on the contrary if at a high ambient temperature it will decrease the hematocrit value as a result of the reduced number of erythrocytes (Swenson,1977). This means that the hematocrit value changes in line with changes in erythrocytes. Based on these results, it appears that the hematocrit value with the number of erythrocytes has a relationship. The greater the number of erythrocytes, the greater the hematocrit value in the blood. Decrease in hematocrit value can be caused by damage to erythrocytes, decreased production of erythrocytes or can also be influenced by the number and size of erythrocytes (Dawson and Whittow, 2000). The hematocrit value is highly dependent on the number of erythrocytes, because erythrocytes are the largest cell mass in the blood (Virden et al., 2007).

Effect of Level Golden Snail Meal on Fat and Cholesterol Profile

Base on the data we can see that the P3 (30% snail meal) have quality of fat cholesterol better than other. The cholesterol contain were significant different than other treatment. The value of the cholesterol is 62 mg/dl and other treatment between 97 mg/dl until 104,5 mg/dl. The nutritional feed ingredient was manly factor influenced nutritional meat content as fat, cholesterol, and fatty acid of meat beside age, genetic, and habit of Muscovy duck. Older ducks generally

have higher fat content (Triyantini *et al.*, 1997; Damayanti, 2006; Woloszyn *et al.*, 2006; Baeza, 2006).

The results of the analysis of LDL cholesterol levels showed that the P3 and P1 treatments were better than control (P0/without treatment) and treatment P2(using 10% snail meal), otherwise, HDL cholesterol levels were lower at P3 compared to other treatments, which ranged from 44.4 mg/dl – 51.8 mg/dl. The low HDL in treatment P3 was probably due to the higher body weight of the muscovy duck compared to other treatments (Kingham, 2009), because the protein content of the feed in the ration was the highest.

CONCLUSION AND SUGGESTION

Conclusion

Giving 30% snails meal on the ration of muscovy duck increases the protein value of the ration, blood hemoglobin and lowers blood cholesterol levels.

Suggestion

The use of fresh golden snails is not recommended because it can cause poisoning.

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Table 1. Composition of Ingredients Diet

Feed Ingredients	Treatments			
	P0	P1	P2	P3
Corn	35	35	35	35
Rice Bran	30	15	15	15
Pollard	20	20	15	10
Coconut Meal	15	15	15	15
Golden Snail Meal	0	10	20	30
Total	100	100	100	100

Table 2. Nutrient composition of Treatments Diet

Nutrient Content	Treatments			
	P0	P1	P2	P3
Energy Metabolism (Kcal/kg)	3121.90	2946.90	2872.40	2847.40
Crude Protein (%)	13.78	17.48	19.41	22.81
Ether Extract (%)	5.51	5.09	5.15	5.01
Crude Fiber (%)	7.57	5.92	5.7	5.15
Calcium (%)	0.06	0.5	0.65	0.79
Phosporus (%)	0.65	0.44	0.46	0.38

Table 3. Blood analysis of Muscovy duck *(Cairina moschata)* given different levels of golden snail meal

Treatment	Haemoglobin (g/dl)	Eritrosit M/UI	Leukosit k/UI	Hematokrin %
P0	24,10[a]	2,67[a]	13,00[b]	33,45[a]
P1	22,00[a]	2,77[a]	18,40[a]	36,15[b]
P2	23,85[a]	2,74[a]	19,05[a]	33,60[a]
P3	29,25[b]	2,64[a]	18,50[a]	33,55[a]

Table 4. Fat and Cholesterol Analysis of Muscovy duck Given Different Levels of Golden Snail Meal

Treatment	Trigliserida mg/dl	Kolesterol mg/dl	Chol LDL mg/dl	Chol HDL Direct mg/dl
P0	140,50[a]	98,50[a]	23,50[a]	47,30[a]
P1	214,00[b]	97,00[a]	9,50[b]	44,40[a]
P2	117,50[a]	104,50[a]	29,00[a]	51,80[a]
P3	129,00[a]	62,00[b]	9,50[b]	26,65[b]