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Effects of Gedi Leaves (*Abelmoschus manihot* (L.) Medik) as a Herbal Plant Rich in Mucilages on Blood Lipid Profiles and Carcass Quality of Broiler Chickens as Functional Food

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Abstract

The objective of this research was to evaluate the effects of gedi leaves (*Abelmoschus manihot* (L.) Medik) on blood lipid profiles and carcass quality of broilers. A hundred chickens were allocated to four diet treatments, with 5 replications. The diets were basal diet (R0), 5% GLM (R1), 10% GLM (R2), and 15% GLM (R3). Treatments had no significant effect on total blood cholesterol, triglyceride, LDL-cholesterol and HDL-cholesterol, significantly effect on reducing carcass weight and abdominal fat, but recorded no significantly effect on carcass percentage. It can be concluded that adding gedi leaves to broiler diets might provide benefit for functional food.

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Keywords: Gedi Leaves, Blood Lipid, Carcass, Broilers, Functional Food

INTRODUCTION

There are a lot of reports indicating the positive effects of herbs like antibacterial and antioxidant, and some of medical effects of herbs are related to their secondary metabolites such as phenols. Recent study have been testing the inclusion of herbal extracts as replacers to antibiotic growth promoters. It was present a mechanism of action based on the alteration of the intestinal microbiata, the increased of enzyme secretion, the improvement of the immune response, the morpho-histological maintenance of the gastrointestinal tract, the digestion stimulant and the antioxidant activity [1,2], and then promotion of production performance and improving the quality of animal origin food [3,4].

Gedi plant in North Sulawesi of Indonesia have been reported is species of *Abelmoschus manihot* (L.) Medik, and that gedi leaves contained 20.18 % protein, 17.53 % crude fiber, 1.06 % crude fat and have many compounds, also contain amount of total phenolic (0.082 % w/w) and positive contain steroid [5]. This plant also have gum mucilage of polysaccharides [6,7] that have many therapeutic effects like antibacterial, anti-inflammatory, anti-microbial, anti-coagulant and anti-oxidant properties [8, 9, 10, 11, 12] and sufficient mineral Ca (3.29%) and amino acid lysine (425

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mg/g) [5], that may offer beneficial effects as poultry feedstuff to a special production trait such as cholesterol-less meat.

The pharmacological action of active gedi plant substances in human is well known, but in animal nutrition the number of precise experiments is relative low. Therefore, the present study was designed to examine the effect of graded levels of gedi leaves powder supplements on the blood lipid profiles and carcass quality of broiler chickens.

MATERIAL AND METHODS

A total of 100 unsexed day-old chicks (Cobb CP 707) were weighed and randomly allocated to four diet treatment groups,each with 4 replications of 5 birds. The dietary treatments were basal diet and gedi leaves meal (GLM), namely, basal diet (R0 = control), 95% basal diet + 5% GLM (R1), 90% basal diet + 10% GLM (R2), and 85% basal diet + 15% GLM (R3) (Table 1). Animals were fed commercial complete based diet and the diets were administrated during 35 days. Feed and water were provided *ad libitum* throughout experiment. All diets were fed to birds as mash. Mortality was recorded daily throughout the experimental period. At 6, 16 and 26 days of age, each bird received one dose of commercially new castle disease virus (NDV) vaccine.

Table 1. Chemical analysis of the diets (*as fed*)

Composition	Basal Diet* (R0)	5% GLM (R1)	10% GLM (R2)	15% GLM (R3)
Calculated Analysis:				
Dry Matter (%)	93.38	92.80	92.21	91.61
Crude Protein (%)	22.34	22.23	22.12	22.02
Crude Fiber (%)	4.66	5.30	5.94	6.59
Fat (%)	3.15	3.05	2.40	2.84
Nitrogen-Free Extract (%)	57.26	55.96	54.65	53.35
Ca (%)	1.28	1.38	1.48	1.58
P (%)	0.71	0.69	0.68	0.66
Methionine (mg/g)	17.0	17.0	16.0	16.9
Lysine (mg/g)	47.0	65.9	84.8	103.7
GE (kal/g)	3685	3671	3658	3645
Fiber Component:				
NDF (%)	68.67	66.28	63.88	61.49
ADF (%)	21.02	20.89	20.76	20.63
Hemicellulose (%)	47.65	45.38	43.12	40.85
Cellulose (%)	6.13	6.39	6.66	6.92
Lignin (%)	14.78	14.34	13.89	13.45
Silica (%)	0.09	0.14	0.20	0.50

Notes: [a] Basal diet is a commercial ration with this composition: corn, rice bran, fish meal, soybean cake, coconut cake, meat and bone meal, oat, peanut cake, canola, leaf meal, vitamin, calcium, phosphate, and trace mineral; GLM = gedi leaves meal

At the end of the experiment, blood sample from one randomly selected birds per pen was collected by wing-vein puncture using sterilized 27 gauge needles and 3 ml syringes into test tubes treated with heparin for measurement of concentrations of blood total cholesterol, LDL, HDL and triglyceride. Sera were harvested from clotted blood by sentrifugation at 2000 g for 15 min. Serum samples were kept in 24 ^{0}C until measuring cholesterol. Cholesterol was measured by enzymatic colorimetric test, CHOD-PAP method. At 36 days of age, one representative bird from each pen was conventionaly sacrified by cervical dislocation technique, as described in the Report of the AVMA Panel on Euthanasia [13] and its carcass parameters (ready to cook) including carcass percentage and abdominal fat were determined.

The value obtained were expressed as mean ± SD. The data were subjected to analyze for a completely randomized design (CRD) that was employed in one-way analysis of variance, and significant differences compared by

Duncan's multiple range tests. All of statement of differences were performed at significance levels of 1% and 5% [14]. Software package Genstat 12.2 was used for statistical calculation.

RESULT AND DISCUSSION

Impact of dietary treatments on blood lipid profiles is presented in Table 2. Result show that broiler chicks feed on diets containing GLM recorded no significant effect for total cholesterol, LDL-cholesterol, HDL-cholesterol and triglyceride. This was similar to the finding of Toghyani et al. [3] that serum triglyceride and total cholesterol concentrations were not significantly affected by supplementation of *N. nativa*. Ashan [15] reported that there was no effect on blood biochemical parameters of broiler chickens fed herbal oil.

Table 2. Effect of gedi leaves on blood profiles of broiler chickens

Blood parameters	R0	R1	R2	R3	*p value*
Cholesterol (mg/dl)	122.6 ± 10.88[a]	110.4 ± 14.08[a]	106.0 ± 9.13[a]	110.4 ± 2.97[a]	p>0.05
Triglyceride (mg/dl)	52.4 ± 2.07[a]	41.0 ± 2.12[a]	31.4 ± 1.95[a]	36.4 ± 2.70[a]	p>0.05
LDL (mg/dl)	55.4 ± 3.05[a]	56.4 ± 3.36[a]	52.2 ± 3.49[a]	59.4 ± 2.19[a]	p>0.05
HDL (mg/dl)	57.8 ± 1.30[a]	52.0 ± 1.41[a]	52.0 ± 0.71[a]	47.4 ± 0.55[a]	p>0.05

[abcd] means with the same letters on the same row are in not significantly difference (P>0.05)

Normal cholesterol level in broiler ranged from 125 to 200 mg/dl, indicating that total cholesterol levels of broiler for all treatments in this study were below the normal standard and tend to decrease up to treat 15% gedi leaves. Those low total cholesterol might be due to high crude fiber levels in diets and secondary metabolites in gedi. McDonald *et al.* [16] stated that high crude fiber in ration of animals might increase digest velocity in the intestine causing decrease of nutrient absorption and fat metabolic formation. On the other hand, the soluble fiber in mucilage prevents the intestinal absorption of cholesterol produced by the bile for the digestion of feed. Result of this study indicated that sterol might be useful to inhibit cholesterol absorption and decreased serum cholesterol level by competition of intestinal absorption. Fitosterol inhibit digestion and cholesterol transportation, reduce LDL level and total cholesterol serum. This condition caused low cholesterol absorption in body metabolism.

Table 3. Carcass quality of broiler chickens fed gedi leaves

Parameters	R0	R1	R2	R3	*p value*
Carcass weight (g)	1383.2±12.91[d]	1008.4±12.72[c]	812.4±14.05[b]	691.6±14.64[a]	p<0.01
Carcass (%)	71.51±0.70[a]	68.82±5.08[a]	68.85±6.70[a]	68.30±6.37[a]	p>0.05
Abdominal fat *	1.618±0.32[c]	0.682±0.16[b]	0.302±0.05[a]	0.270±0.09[a]	p<0.01
Mortality	0	0	0	0	

[abcd] means with the same letters on the same row are in not significantly difference (P>0.05)

*) Mandey, *et al*. (2014)

Figure 1. The comparison of carcass yield R0 (control) and 15% GLM (R3)

Phytogenic compounds have a number of active ingredients and pharmacologically active substances that are beneficial for maintaining health and improving performance of poultry. Carcass yield significantly reduced, however, there were no significant different of carcass percentage between treatments (Figure 1). Result of this study indicated that carcass yield enhanced the performance of broiler for functional food.

Data obtained for carcass and abdominal fat as a percentage of live body weight at slaughter were presented in Table 3. Carcass yield decreased significantly ($P<0.01$) with supplementation of GLM in the diets (Figure 1), however, treatments had no significant ($P>0.05$) effects on the carcass percentage. Carcass yield was markedly affected by dietary treatments. This was similar to the finding of Ayoola, et al. [17] that inclusion of thyme leaf in the broiler diet did not have significant effect on dressed carcass percentage. Moreover, highly significantly reduced ($P<0.01$) was observed between the treatments with regard to the abdominal percentage. Gedi supplementation in broiler diets has been reported was significantly ($P<0.01$) decreased feed intake [18]. This negative effect of gedi leaves in feed intake was caused by a lot of mucilage in gedi that caused high viscoucity. Nutrition factors affect broiler body composition significantly, and crude protein and energy level influence mainly the deposition of abdominal fat. When the chicks took low energy feed, fat deposition of carcass decreased.

CONCLUSION

It can be concluded that dietary inclusion gedi leaves can have beneficial effects on blood lipid profiles and carcass quality. Consequently, it can be suggested that gedi leaves can be used particularly in diets of chick birds where digestion problems at growing lead to scouring, and the reducing of abdominal fat should be taken into account for carcass quality as a functional food and deserves further study.

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