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EFFECT OF FRESH NONI LEAVES TO REDUCE CHOLESTEROL CONTENT IN ETAWA CROSSBREED GOATS

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Abstract: Excessive consumption of goat meat can increase the risk of blockage of blood vessels which causes heart disease and stroke, this is due to the high cholesterol content. This study aims to determine the effect of applying fresh noni leaves in reducing cholesterol, LDL (Low Density Lipoprotein), HDL (High Densiy Lippoprotein) and TG (Tryglicerida) in goat blood. The research was conducted in an experimental cage in Tatura Village, South Palu District, Palu City and Central Sulawesi Health Laboratory, from August to September 2019. Using two groups i.e., 6 were given fresh noni leaves and 6 were given king grass + corn leaves. The variables to be observed were cholesteroltotal, LDL, HDL and TG content in goat blood, which were analyzed using the CHOD-PAP photometric method. The use of fresh noni leaves to goats during the study (4 weeks) significantly reduced the total cholesterol (TKL), LDL and HDL content compared to those which had been given king grass + corn leaves ($P < 0.01$), while the TG content showed no significant difference ($P>0.05$). Giving fresh noni leaves to etawa crossbreed goats can be used to reduce total cholesterol, LDL and HDL and increase TG.

Keywords:*Cholesterol, Fresh Noni Leaves, Etawa Crossbreed Goats.*

I. INTRODUCTION

Excessive consumption of goat meat can increase the risk of blockage of blood vessels which causes heart disease and stroke, this is due to the high cholesterol content[1].In 100 grams of goat meat, it contains 9.2 g of total fat and 70 mg of cholesterol[2]. One of the ways which is thought to reduce the cholesterol content of goat meat is by giving noni leaves. Noni (Morinda citrifolia) along with being known as a medicinal plant in humans, noni can also be given to livestock[3]. Noni leaves have a high level of palatability for livestock[4], but not many studies have examined the benefits of noni (Morinda citrifolia) for ruminants, especially goats. The use of noni leaves as a feed additive for livestock has been carried out, which the active compound content in noni leaf extract is useful as an herbal feed additive alternative to antibiotics.

Goat livestock has a complex digestive system and is different from other livestock, but giving noni leaves to goats is expected to reduce the cholesterol content in goat meat. Research on the benefits of noni leaves on reducing cholesterol content in goats has never been done. Researchers are interested in conducting research on the impact of noni leaves on reducing cholesterol content in meat and eliminating odors in goats. Therefore, the research will be conducted to examine "Benefits of Noni *(Merinda citrifolia)* Leaves on Cholesterol Content in Etawa Crossbreed Goat Meat".

This study aims to analyze the effect of consumption of freshnoni leaves on the total cholesterol, LDL, HDL and TG content of the etawa crossbreed goats. Understanding the effect of consumption of fresh noni leaveson the total cholesterol, LGL, HDL and TG content in etawa crossbreed goats.

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II. Method

The field research was carried out in theexperimental cage on Basuki Rachmat street, Palu City and laboratory tests were carried out at the Central Sulawesi Health Laboratory. The research was conducted for 2 (two) months (August - September 2019). 12 goats (1.5-2 years old) were placed in individualcages, measuring 1 x 0.5m. Six were given king grass + corn leaves and six were given fresh noni leaves ad libitum. Fresh noni leaves are obtained in the vicinity of the Universitas Tadulako Lecturer housing, Tondo Village. The leaves are taken every morning and given fresh as needed. The results of the proximate analysis of noni leaves and Raja grass + Corn leaves can be seen in Table 1.

Table 1. The results of the proximate analysis of noni leaves and king grass + corn leaves *)

Contents (%)	Noni Leaves	King Grass + Corn Leaves
Water Content	33,6	40,24
Crude Fat	2,03	2,88
Crude Protein	14,36	3,9
Crude Fiber	19,50	30
Ash Content	6,45	15,65

Source:Animal Products Technology Laboratory, Faculty of Animal Husbandry and Fisheries, Tadulako University, 2019.

Cholesterol test is carried out before and after giving fresh nonileaves to goats. A total of 25 cc / head / blood treatment was taken every week to determine changes in cholesterol, LDL, HDL and TG content using the CHOD-PAP photometric method. Collected data were analyzed using independent t-test with SPSS.

III. Results and Discussion

Blood Cholesterol

Hyperlipidemia is an abnormality in the cholesterol content in the blood which consists of an increase in total cholesterol, low density lipoprotein (LDL), triglycerides (TG), and a decrease in high density lipoprotein (HDL) in the blood[5]. Essentially, the power to reduce blood cholesterol content is more or less effected by the amount of the active substance in each type of plant[6]. The content in various parts of the plant also varies in the fruit, leaves, skin and even the roots.

The effect of treatment on the total cholesterol content in goat blood can be seen in Figure 1. The mean TKL content at PO and P1 (Figure 1) during the study were 75.00 mg / dl and 49.65 mg / dl, respectively. The results of the analysis of variance using the t test showed that the treatment of P0 and P1 had a very significant effect on reducing the cholesterol content in the blood ($P < 0.01$). The reduction in cholesterol at P0 was apparently caused by high crude fiber, namely 30%, while the reduction in cholesterol in P1 was not only crude fiber content (19%) but also because of the saponin content of 16.44%. Saponins used in low levels can reduce cholesterol and triglycerides[7].

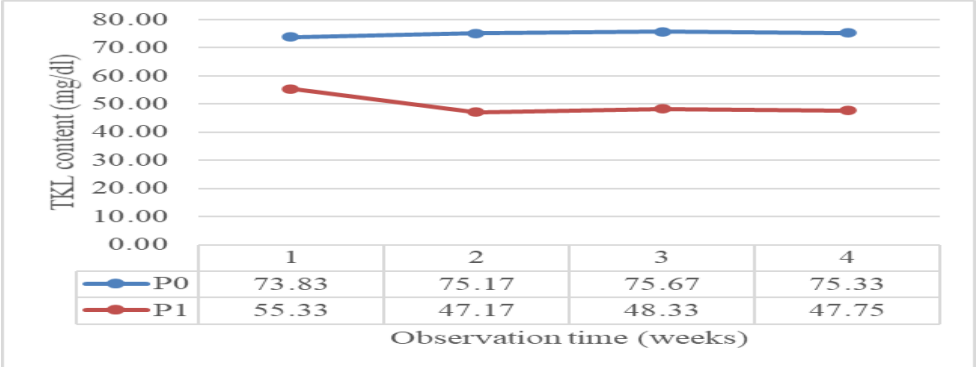

Figure 1. Graph of TKL content (mg / dl) in blood at treatment P0 and P1 for 4 weeks.

Saponins are heterogeneous groups that occur naturally in various plants[8]. Saponins reduce the absorption of certain nutrients, namely cholesterol and glucose in the intestine through intraluminal physicochemical intervention and have a hypocholesterolemic effect[7], [9]. Research conducted by Vinarova et al.[10], states that saponins can reduce cholesterol drastically, from 78% to 45%, by changing the cholesterol contained in feed into cholesterol deposits that cannot pass through the intestinal mucus layer. Furthermore, to prove whether the lost cholesterol is deposited, an in vitro study was conducted. The results prove that 45% of cholesterol is found in a mixture of food material, 55% is found in sediments which have larger aggregates which make them not able to penetrate the intestinal wall and are excreted with feces and can directly affect serum cholesterol.

The cholesterol value in the P1 treatment group was lower than the cholesterol value in the P0. The addition of noni fruit flour in the ration can reduce the cholesterol content of chicken meat[11]. Wardiny [12]has found that giving 9% noni leaf flour in the ration can reduce egg cholesterol by 37.86% from the control ration and 65.23% when compared to commercial eggs.

Low Density Lipoprotein (LDL)

LDL is referred to as bad cholesterol because LDL plays a role in carrying cholesterol to cells and body tissues, so that if the amount of cholesterol is excessive it can accumulate and settle on the walls of blood vessels and harden into plaque[13]. Plaque is formed from elements of fat, cholesterol, calcium, cell waste products and materials that perform in the blood clotting process[14]. The average LDL content (Figure 2) at P0 and P1 were 19.43 mg / dl and 6.83 mg / dl, respectively, during treatment. The LDL content in the blood in treatment P1 decreased until week four, as well as in treatment P0. The results of the analysis of variance showed that there was a very significant difference in the treatment of P0 and P1 in goats in reducing LDL content (P <0.01 = 0.000 <0.001).

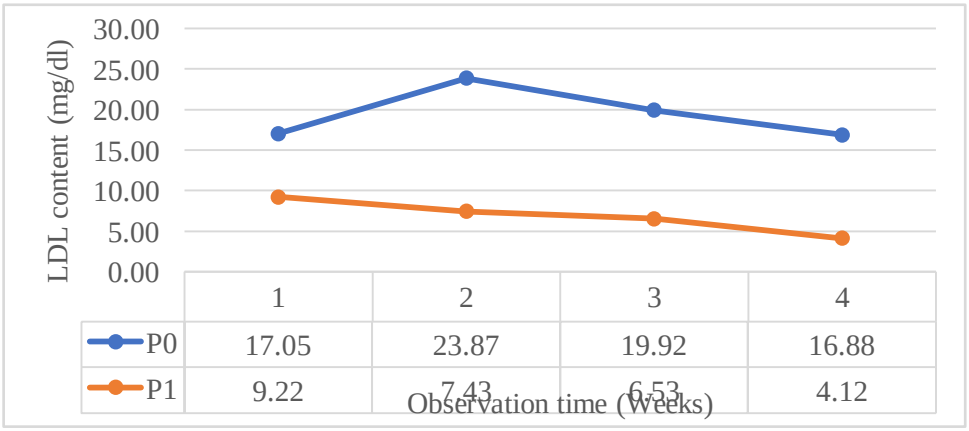

Figure 2.Graph of LDL content (mg / dl) in blood in the treatment of giving fresh megkudu leaves and giving king grass for 4 weeks

Graph 2 shows that the LDL content at four weeks of giving fresh noni leaves has decreased. The results of this study indicate that the relationship between LDL and total cholesterol is unidirectional in the sense that if total cholesterol falls, LDL will also decrease. This is in accordance with the results of the study

by Vinarova et al.,[10], where feeding containing high cholesterol content without the addition of saponins in mice caused the total cholesterol concentration to increase significantly. This increase was mainly due to the increase in the LDL cholesterol content, however, the addition of saponins in the rats' feed was able to reduce the LDL cholesterol content and total cholesterol.

High Density Lipoprotein (HDL) Content

HDL is considered the good cholesterol because it performs in carrying excess cholesterol in the tissues back to the liver for re-circulation or excretion from the body[15]. HDL prevents the buildup of cholesterol in the tissues, especially blood vessels[16]. HDL is a lipoprotein that plays an important role in the distribution of cholesterol which has the function of transporting cholesterol back to the liver for metabolic processes[17]. The mean HDL content at P0 and P1 (Figure 3) during treatment were 34.27mg / dl and 27.41mg / dl, respectively. In the P0 treatment there was an increase in the HDL content in the blood and then fluctuated, likewise in the P1 treatment there was a fluctuation in the HDL content for four weeks.The results of the analysis of variance showed that the HDL content at P0 was significantly different from the HDL content in P1 ($P < 0.01 = 0.000 < 0.01$).

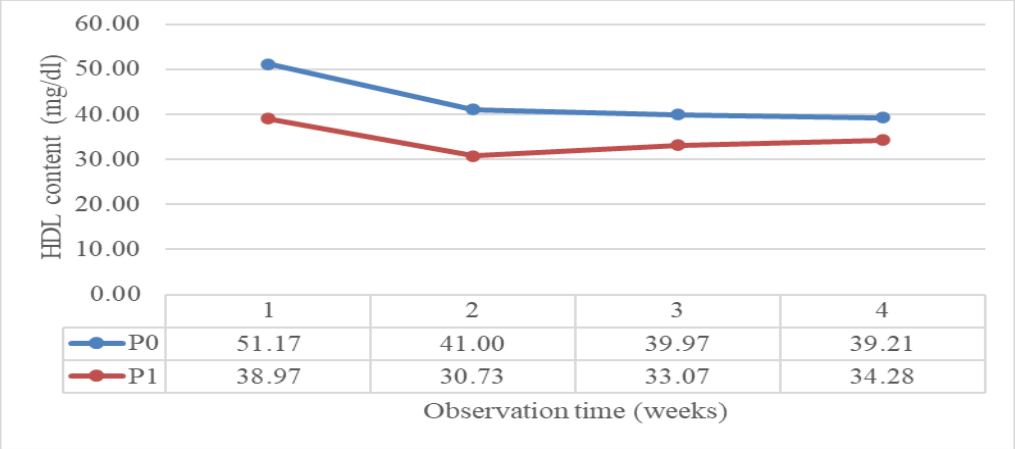

Figure 3. The content of HDL (mg / dl) in the blood in the administration of fresh noni leaves and king grass mixed with corn forage for 4 weeks.

HDL content in blood at both P0 and P1 showed an increase in the first week and decreased at week 2 and then tended to be stagnant at weeks three and four. The results obtained are in accordance with the results of research by Ni Kadek and Ni Made[18] where male Wistar rats were given high-fat feed for 6 weeks. Based on the results of measurements of rat blood lipids, it is known that the test animals that were given fat-rich feed for 6 weeks experienced an increase (total cholesterol, LDL and triglyceride content) and decreased (HDL) when compared to normal controls. The results of the measurement of rat blood lipids after being given the saponin fraction of katuk leaves which have the ability as an antidyslipidemia, namely being able to reduce the total cholesterol, triglycerides, LDL content and increase the HDL content.

Triglyceride (TG) Content

Triglycerides are fatty acids and are the most sufficient type of fat in the blood. High levels of triglycerides in the blood (hypertriglyceridaemia) are also associated with coronary heart disease. High triglycerides are often accompanied by a state of low HDL content. The content of triglycerides in the blood is largely influenced by dietary carbohydrate content and obesity [19].

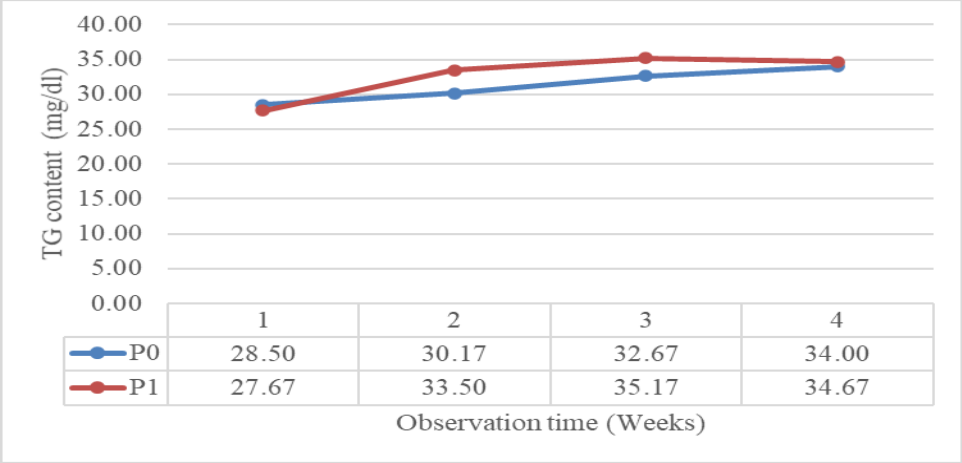

Figure 4.The content of TG (mg / dl) in the blood in the treatment of giving fresh noni leaves and feeding king grass mixed with corn forage.

The average TG content at P0 and P1, respectively, was 11.33 mg / dl and 13.50 mg / dl, increasing from the first week to the fourth week. The mean TG obtained during the study at P0 and P1 were 25.07 mg / dl and 26.20 mg / dl. The results of the analysis of variance showed that the P0 and P1 treatments showed no significant differences (P> 0.05 = 0.151> 0.05).The decrease in TKL and LDL has an impact on increasing TG, despite the fact that the increase in TG takes a period of time which tends to be slow. Herpandi et al.[20], stated that the decrease in triglyceride content in rats receiving Total Seaweed rations followed the pattern of total and LDL cholesterol. This occurs because the absorption of the three compounds is in one unit, namely in the form of micelles and chylomicrons. When the LDL content is high, essentially the triglycerides are high. Furthermore, it was stated that the decrease in triglyceride content in mice that received the Total Seaweed ration followed the pattern of total and LDL cholesterol. Triglyceride values at both P0 and P1 are still in the normal range

IV. Conclusions

The use of fresh noni leaves to goats during the study (4 weeks) significantly reduced the total cholesterol (TKL), LDL and HDL content compared to those which had been given king grass + corn leaves ($P < 0.01$), while the TG content showed no significant difference ($P>0.05$). Giving fresh noni leaves to etawa crossbread goats can be used to reduce total cholesterol, LDL and HDL and increase TG.

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