

# EFFECTS OF COCENTRATE RICH OMEGA-3 SUPPLEMENTATION ON THE PROFILE OF CHOLESTEROL, LIPOPROTEIN, AND TRIGLYCERIDE OF BLOOD SERUM IN FILIAL ETAWAH GOAT

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## ABSTRACT

Effects of Concentrate rich Omega-3 supplementation on the profile of blood serum cholesterol, high density Lipoprotein (HDL) and Low Density Lipoprotein (LDL), and triglyceride in Filial Etawah goat was investigated. Totally 12 male filial Etawah goat averaging one year of old were used as an experimental animals, and divided into three groups. All groups received grass silage; However, P0 was supplemented by concentrate feed containing 3.9% Omega-3, P1 and P2 receiving concentrate rich Omega-3 about 5.1%, except P2 was added with mineral lick. After treated with different rations for 1 month, the blood were collected from each animal by using vacuum tube without coagulant. The blood were centrifuged with 2500 rpm for 30 min to collect blood serum for analysis blood biochemistry profile, include cholesterol, HDL, LDL, and triglyceride based on Chemistry Analyzer methods. Result research were obtained that blood serum biochemistry analysis in filial Etawah goat showed not significantly ( $p>0.05$ ) different of cholesterol, HDL, LDL, and triglyceride levels among treatments group, however, these values were in the normal range. In the research, blood serum cholesterol level about 32.05 to 41.18 mg/dl, HDL level about 18.75 to 46 mg/dL, LDL level ranged 12.00 to 12.75 mg/dL, and triglyceride level about 8.50 to 10.80 mg/dL. Conclusion of the research were indicate that supplementation of concentrate feed rich Omega-3 to filial Etawah goat received grass silage with or without mineral lick could maintain the levels of blood serum cholesterol, HDL, LDL, and triglyceride in the normal ranged, that it be supported the long life and healthier of filial Etawah goat.

**Key words: Omega-3, blood serum cholesterol, HDL, LDL, triglyceride, goat.**

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## INTRODUCTION

In general, goat livestock in weaning, growth, maturation and production requires sufficient quantity of nutrients and quality. Various efforts to improve performance, production and quality of progeny through the technology of food processing by manipulating the nutritional composition into high value, in terms of nutritional content, function and outcomes. High-quality feed if protein and energy content are high, easy to digest, balanced nutritional ratios. When the dry season, the nutritional conditions contained in the grass or forage are relatively decreased, especially the protein content, otherwise the crude fiber content increases, causing decreased digestibility value, resulting in decreased amount of absorbed nutrients, followed by decreasing performance of livestock production. Probiotics

containing non-pathogenic bacteria can be used for fermentation of green or fibrous materials, in order to increase their protein content and decrease crude fiber, and feed more easily digested. The addition of dietary supplements in the form of concentrates or minerals can improve the process of digestion and nutritional benefits, as well as feeds containing Omega-3 which serves as anti-hypertension, anti-inflammatory, antibacterial, and strengthen the body resilience system of goats. Omega-3 sources are obtained from fish oil or marine products, vegetable oils, or walnuts (Teama *et al.*, 2016). The filial Etawah goat is a crossbreeding goat between Jamnapari from India and native Indonesian goat. Commonly, the goat is used for milk producers in the female, while the male as a meat producer (Romziah *et al.*, 2009; Romziah *et al.*, 2011). The role of minerals added in the diet as a complement in the process of metabolism in the body of goats, as well as for the growth of bones, teeth, horns, feathers and reproductive functions.

Therefore, the research was observed the effects of supplementation of concentrate rich Omega-3 on the profile of cholesterol, High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL) and triglyceride levels in filial Etawah goat blood serum.

## METHOD

A total of twelve male filial Etawah goats about one year old with an average body weight of 21 kg were used as experimental animals, then divided into three treatment groups (P0, P1 and P2). Group P0 was fed grass silage and concentrate containing 3.9% Omega-3, P1 got grass silage and concentrate containing 5.1% Omega-3, while P2 received grass silage and concentrate containing 5.1% Omega -3, also given mineral licks. The research was designing on Completely Randomized Design (3 x 4 replicates). The feeding treatment was done for one month and at the end of the research was taken a blood collection of goats taken as much as 2.5 ml with vacuum tube without anti-coagulant, then centrifuged with 2500rpm for 30 minute to take blood serum for biochemical analysis to measure the levels of cholesterol, HDL, LDL and triglyceride by using Chemistry Analyzer method. The data obtained were analyzed by Analysis of Variance (ANOVA) method, followed by Duncan's Multiple Range Test, and it was proceed by SPSS version 13.00 soft ware.

## RESULT

Based on the proximate analysis, it were found that the dry matter content on the grass silage was 36.34%, in concentrate feed P0, P1 and P2 was 87.38 %, 87.36 % and 87.30 % respectively. Omega-6 content varies, in grass silage containing 0.34%, in concentrate feed P0 3.88 %, 5.45 % in P1 concentrate, and 5.09 % in P2 (Table 1).

Table 1. Mean of Dry Matter and Omega-3 Content in Grass Silage and Concentrate Feed

Parameter (%)	Grass Silage	Concentrate Feed		
		P0	P1	P2
Dry Matter Content	36.34	87.38	87.36	87.30
Omega-3 content	0.34	3.88	5.45	5.09

The highest dry matter consumption was in the P2 group ( $P < 0.05$ ), followed by P1 and P0 groups, each of 954. 53 g/h/d (P2), 954.52 g/h/d (P1), and 954.48 g/h/d (P0). The highest Omega-3 consumption ( $P < 0.05$ ) in the P1 group about 38.15 g/h/d, while P3 was 35.66 g/h/ d, and P0 was 27.18 g/h/d (Table 2).

Table 2. Mean of Dry Matter and Omega-3 consumption by Fialial Etawah Goat, Based on The Treatment Group

Parameter (g/h/d)	P0	P1	P2
Dry Matter Consumption	954.48 <sup>c</sup>	954.52 <sup>b</sup>	954.53 <sup>a</sup>
Consumption of Omega-3	27.18 <sup>c</sup>	38.15 <sup>a</sup>	35.66 <sup>b</sup>

<sup>a, b, and</sup> Superscript at the same row was significantly different (P<0.05)

The blood serum biochemical analysis of filial Etawah goat in this study showed that cholesterol, HDL, LDL, and triglyceride levels were not significantly different (P <0.05) among treatment groups (Table 3).

Table 3. Mean The level of Cholesterol, HDL, LDL and Triglyceride In Blood Serum of Filial Etawah Goat

Parameter (mg/dL)	P0	P1	P2
Cholesterol	32.05	41.18	38.86
High Density Lipoprotein (HDL)	18.75	29.00	46.00
Low Densty Lipoprotein (LDL)	12.00	12.75	12.40
Triglyceride	8.50	9.25	10.80

Mean of blood serum cholesterol level in P0 group was 32.05 mg / dl, P1 was 41.18 mg / dl, and P2 was 38.86 mg/dl. HDL levels in the P0, P1 and P2 groups were 18.75 mg/dl, 26.00 mg/dl and 46.00 mg/dl, respectively. Levels of LDL blood serum of filial Etawah goat in each treatment group were 12.00 mg/dL, 12.75 mg/dL and 12.40 mg/L. Levels of triglycerides in filial Etawah goat blood serum were 8.50 mg/dL, 9.25 mg/dL, and 10.80 mg/dL, respectively in groups P0, P1 and P2. The four types of parameters are all within the normal range.

## DISCUSSION

Omega-3 levels in the grass are too low, so that without supplementation of concentrated feeds it is certain that Omega-3 intake is only about 0.061 g/head/day, compared with the concentrate rich Omega-6, may increase Omega-6 intake to tens of thousands percent. It is known that the function of Omega-6 is to maintain the membrane structure of the cell, to improve the absorption of fat-soluble vitamins (A, D, E, K), thus potentially as anti-oxidants, decrease triglycerides in blood serum, regulate cholesterol metabolism, produce eicosachanoid, also regulates all processes within the cell, as well as the anti-inflammatory and immune processes (Shaikat *et al.*, 2013; Teama *et al.*, 2016). Cholesterol structures resemble wax and are normally present throughout the body, but the amounts are too high and bind to other components in the blood, causing clogging of the arteries. The cholesterol levels of goat blood serum PE in this study, all fall within the normal range, it was between 65-136 mg/d (Daramola *et al.*, 2005; Mohammed *et al.*, 2016), HDL levels achieved in blood serum

of filial Etawah goat in this study is much higher than the research done, against feeding Boer goats containing canola oil and palm oil (Adeyemi *et al.*, 2016). It is generally known that HDL is a lipoprotein, a combination of fat and protein circulating in the blood circulation that brings cholesterol from the body's tissue to the liver and into the bile. Therefore HDL is a good cholesterol component, so if high levels of HDL, individuals will avoid coronary heart disease (Jackson and Peter, 2002; Shaikat, *et al.*, 2013). In contrast LDL is also a lipoprotein that carries cholesterol from the liver to the tissues of the body, then it is known as bad or bad cholesterol. The results of this study indicate high levels of HDL serum adherence to high PE goats, otherwise low LDL levels. The results of the HDL study scores were much higher than those of Adeyemi *et al* (2016) using Canola and palm oil as the source of Omega-3 in concentrated feed given to Boer goats, which showed an HDL value of 1.66 mg/dL, whereas the LDL value he encountered was 0.89 mg/dL. Lower than the results of this study. Differences that occur can be caused by the type of source of Omega-3 that is used differently, in this study using corn oil. Similarly, triglyceride values in serum GO goat blood results of this study were also within the normal range (6-200 mg/dL). Some factors that can affect cholesterol, HDL, LDL and triglyceride levels in goat blood serum are among others: breed goats, age, sexual, nutrition, health status, disease, goat farm management, environment and bio security.

### CONCLUSION AND RECCOMENDED

The combination of feeding of grass silage with concentrates containing high amounts of Omega-3, either with or without mineral lick, that giving normal results on biochemical profile of filial Etawah goat blood serum to cholesterol, HDL, LDL and triglyceride levels. Based on the results of this study it is recommended that concentrated feeds rich in Omega-3 content combined with grass silage and mineral blocks can be applied to goat farms of PE and the like, and can be commercially produced.

### REFERENCE

- Adeyemi KD, Sabow AB, Aghwan ZA, Ebrahimi M, Samsudin AA, Alimon AR, Sazili AQ. 2016. Serum fatty acids, biochemical indices and antioxidant status in goats fed canola oil and palm oil blend. *J. Anim. Sci. Technol.* 58. doi:10.1186/s40781-016-0088-2
- Daramola J O, A A Adeloye, T A Fatoba and A O Soladoye, 2005. Haematological and biochemical parameters of West African Dwarf goats. <http://www.lrrd.cipav.org.co/lrrd17/8/cont1708.htm>
- Jackson PGG and Peter DC. 2002. *Clinical Examination of Farm Animals*. Appendix 3, Laboratory Reference Values: Biochemistry Copyright © 2002 by Blackwell Science Ltd
- Mohammed SA, Razzaque MA, Omar AE, Albert S, Al-Gallaf W. 2016. Biochemical and hematological profile of different breeds of goat maintained under intensive production system. *African J. Biotech.* 15 (24): 1253-1257.
- Plumb's Veterinary Drug Handbook, 5th ed. pp. 1241-49, Duncan and Prasse, Clinical Pathology, 4th ed. (Latimer, Mahaffey and Prasse) pp. 331-338  
The [Merck Veterinary Manual online edition](#)

- Romziah S, Retno SW, Anwar M. 2009. Blood Lipid Profile of Ettawa FILLIAL Ewes Fed Complete Feed Rich Omega-6. Proceeding of Second Collaboration Conference. Life Science: Synergy for Enhancement of Quality of Life. Unair-UPM. Surabaya, Indonesia.
- Romziah S, Retno SW, Anwar M. 2011. Milk peptide mapping of goat fed complete feed with high linoleic acid content. Universitate de Stiinc Agricole si Medicine Veterinaria Iasi, 55:546-550.
- Shaikat AH, Hassan MM, Khan SA, Islam MdN, Hoque MdA, Bari MdS, Hossain MdE, 2013. Haemato-biochemical profiles of indigenous goats (*Capra hircus*) at Chittagong, Bangladesh. Vet. World 6(10):789-793.
- Teama FEI, El-Tarabany AA. 2016. Physiological and biochemical response to Omega-3 plus as a dietary supplement to growing goats under hot summer conditions. R. Bras. Zootec. 45 (45):

