

THE EFFECT OF UTILIZATION SWEET ORANGE (*CITRUS SINENSIS*) WASTE FLOUR ON THE DIGESTIBILITY OF CRUDE PROTEIN AND FAT IN THE MALE PADJADJARAN SHEEP

Adriani Lovita^{1*}, Tanuwirya Hidayat¹, Prajoga-Komar Sri Bandiati¹,
Abdullah Galih¹

¹Faculty of Animal Husbandry, Universitas Padjadjaran, Indonesia

Abstract

This research created to know the effect of utilization Sweet Orange flour (*Citrus sinensis*) on the digestibility of crude protein and fat in the male padjadjaran sheep and the level of utilization sweet range flour, which generates the highest digestibility of crude protein and fat. This research was conducted for 40 days in the breeding station and laboratory of animal feed and ruminant nutrition faculty of animal husbandry Universitas Padjadjaran. This research used Completely Randomized Design (CRD) with 4 treatments (T-1= 0 %, T-2 =4%, T-3=6% and T-4= 8%) and 5 replications. The result shows that the utilization of sweet orange waste flour does not give a significantly different ($P>0.05$) on crude protein and fat in the sheep ratio. Utilization of sweet orange waste flour up to 8% in the concentrate generates the relatively same result on the digestibility of crude protein and fat with the treatment control (T-1).

Keywords: *Citrus sinensis*, crude protein digestibility, crude fat digestibility, Padjadjaran sheep

INTRODUCTION

The excellent feed is a feed, which has a high digestibility value, so it can supply the main basic necessary, the growth, and the productivity of livestock. Digestibility is a part of nutrient, which cannot be secreted in feces. One experiment regarding digestibility is carried out by recording the consumed feed and the secreted feces in a day.

The digestibility of protein and fat depends on nutrient content in the feed. The high digestibility of fat and protein shows that protein and fat in the feed can be digested very well by livestock. The limitation of conventional feed, that has a high digestibility value, is an obstacle in providing feed material. That condition can encourage an effort to seek an alternative feed. Utilization of Sweet Orange waste (*Citrus sinensis*) is one of the effort to fulfill

a necessary and to improve the livestock digestibility especially padjadjaran sheep.

Sweet orange waste contains some beneficial compound including dry material 90.01%, ash 7.70%, crude protein 6.50%, crude fiber 3.40%, and Total Digestible Nutrient 79.00% [1]. Besides that, it contains an antioxidant including tannin 0.95%, flavonoid 0.46%, and saponin 0.84% [2]. Tannin plays a role in protecting feed protein, so it can not be degraded by the ruminal microbe. Flavonoid acts as an antioxidant, which can reduce free radical in the livestock body, so it will improve the metabolism and increase the digestibility. Saponin can give a positive impact on ruminant because it can synthesis microbial protein and reduce protein degradation in the rumen [3]. The presence of flavonoid and saponin in Sweet Orange sweet can increase fat and protein metabolism so that their digestibility will improve in the livestock digestive tract.

Currently, The research regarding the utilization of sweet orange waste has been carried out in decreasing the level of fat and cholesterol in Padjadjaran Sheep. However,

*Corresponding author:

Lovita_yoghurt@yahoo.co.id

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The research about the utilization of sweet orange waste in increasing the crude protein and crude fat digestibility is very necessary to be done, and it is hoped that sweet orange waste can be a material, which has a high benefit.

MATERIAL AND METHOD

Research Object : This research used 20 heads male padjajaran sheep with the average body weight 30.4 ± 4.50 kg. Padjajaran sheep were obtained from breeding station Faculty of Animal Husbandry Universitas Padjajaran. The cage, which was used in this research, was an individual cage in the breeding station at Laboratorium Biochemistry and Animal Breeding Faculty of Animal Husbandry Universitas Padjajaran.

Feed Ratio and Sheep Feeding : The feed ratio was used consisting of 40% concentrate and 60% the mixture of *Brachiaria brizantha* and *Pennisetum purpurerum*, which was obtained from around research cage in condition as feed. Concentrate consisted of refined rice bran. Corn Gluten Feed (CGF), peanut shells, molasses, pollard, palm oil, and sweet orange waste. The amount of concentrate sweet orange waste, which has been ground, was 300 gr/head/day. The level of utilization sweet orange waste was : 0%,4%,6%, and 8%. The amount of feed, which was given to sheep, is 2.825 kg/day/head, and it was given two times in the morning (8.30 pm) 1.40 kg and in the afternoon (3.15 pm) 1.425 kg.

Research Method : This research had been carried out by experimentas method using Completely Randomized Design (CRD) and consisting of 4 treatments :

1. T-1 = Grass + Concentrate Without Sweet Orange Waste (Control)
2. T-2 = Grass + Concentrate with 4% Sweet Orange Waste
3. T-3 = Grass + Concentrate with 6% Sweet Orange Waste
4. T-4 = Grass + Concentrate with 8% Sweet Orange Waste

Each treatment was repeated 5 times, so there were 20 experimental units. Data, which were obtained, were tested by using ANOVA test. Then, to know the difference among the treatment was done Duncan test.

Accumulation and Testing Sample

The accumulation of feces was done at 7.00 pm from cage 1 to cage 20 sequentially. All feces, which is there in each cage, were collected separately in a plastic bag. Then feces was sprayed with Boric Acid (H_3BO_3) 5% to bind protein, so it does not break down into NH_3 gas. The fresh feces, which had been collected, were weighed every day, and then it was entered to the oven. After dry, it was weighed again. Each feces was taken a sample as much as 10% to be analyzed in laboratorium [14].

Research Variable

The research variable consists of :

1. The crude protein digestibility (in vivo)

The value of protein digestibility was calculated by using this formula

The digestibility of crude protein [9].

$$\frac{CPC-FPC}{CPC} \times 100\%$$

Note :

CPC = Crude Protein Consumption (g)

FPC = The amount of Crude Protein in Feces (g)

2. The Digestibility of Crude Fat in Feed (in vivo)

The value of fat digestibility in feed was calculated by using this formula

The digestibility of crude fat [9]

$$\frac{CLC-FLC}{CLC} \times 100\%$$

Note :

CFC = Crude Fat Consumption (g)

FFC = The Amount of Crude Fat in Feces (g).

RESULT AND DISCUSSION

Result

Based on the result, the data regarding the average of crude protein and crude fat is shown in table 1 below.

Table 1 Effect of Sweet Orange on Crude Protein and Crude Fat

No	Treatment	T-1	T-2	T-3	T-4
1.	Crude Protein	58.34 ^a	57.03 ^a	55.92 ^a	54.86 ^a
2.	Crude Fat	49.31 ^a	52.05 ^a	50.89 ^a	49.52 ^a

Note : T-1 = Grass + Concentrate without Sweet Orange Waste (Control)

T-2 = Grass + Concentrate with 4% Sweet Orange Waste

T-3 = Grass + Concentrate with 6% Sweet Orange Waste

T-4 = Grass + Concentrate with 8% Sweet Orange Waste

Based on the ANOVA test, all treatments either on crude protein or crude fat are not significantly different ($P>0.05$). The average value of crude protein digestibility in T-2 and T-4 has experienced a significant decrease if those are compared with control (T-1). Barry [4] has stated that the usage of tannin under

2% will not increase the crude protein digestibility. Meanwhile, in crude fat digestibility, the value of T-2 tends to increase. Figure 1 is shown to clarify the data regarding crude protein and crude fat in each treatment.

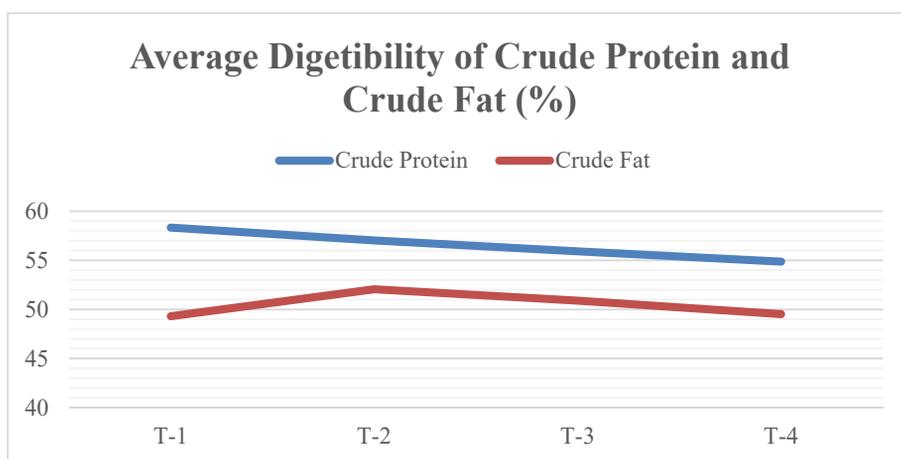


Figure 1. Illustration of The Effect Sweet Orange Waste in the Digestibility of Crude Protein and Crude Fat in each treatment

Discussion

The administration of Sweet Orange waste 4% makes the digestibility of crude protein tend to decrease as well as the administration in the level 6% and 8%. The tendency of decreasing digestibility of crude protein is due to tannin, which is found in the experimental ratio and can reduce palatability and digestibility [5]. Tannin can bind protein so that protein in the feed can resist to degradation by protease enzyme in the rumen [6]. Soebarinoto et al. [11] declares that tannin in the feed, which is high, can reduce protein because tannin can inhibit the

mechanism of protease enzyme. The result shows that the utilization of Sweet Orange waste on T-4 (8%) has the lowest level of the digestibility of crude protein, but the average of protein digestibility is not significant difference with control (T-1) and the other treatments. This condition proves that the utilization of sweet orange waste up to 8% has the same digestibility value with the control and can be used in feed sheep without disturbing the digestibility of crude protein. The utilization of DCP/ Dried Citrus Pulp on sheep above 15% will reduce the digestibility of crude protein. The other result according

to Bhattacharya [7] states that the administration DCP/Dried Citrus Pulp up to 20% will reduce the crude protein.

The tendency of increasing the digestibility of crude fat on T-2 (52.05%) is caused by the presence of flavonoid and saponin. This is supported by Hariana [8]; Zakaria et al. [12] that flavonoid can reduce free radical so that the nutrient absorption by intestine will be not disturbed and can increase the digestibility. Flavonoid increases the lipolysis activity by inhibiting phosphodiesterase enzyme (PDE) so that there is no decomposition of cyclic adenosine monophosphate (cAMP), which results in activating protein kinase A. Protein kinase A will activate sensitive hormones so that it happens lipolysis in adipose tissue. Kurniawan et al. [13] declares that the active compound such as saponin can increase bile secretion, which plays a role in absorbing fatty acid, monoglyceride, cholesterol and fat in the intestinal tract. Furthermore, there is a tendency of decreasing crude fat in T-3 (50.89%) and T-4 (49.52%). This is due to increased pectin in T-3 (0.06%) and T-4 (0.08%). The high content of pectin will decrease the digestibility of crude fat. Pectin, which is there in the Sweet Orange, affects the absorption of nutrient in the intestine by binding bile acid, so it can decrease fat absorption and control cholesterol, which will be released by the body in the form of feces [Almatsier [10]]. This result shows that utilization of Sweet Orange T-2 (4%) has the high digestibility of crude fat, but the average value of crude fat digestibility does not give a significant result on control (T-1) and the other treatments (T-3 and T-4). This condition proves that the utilization of Sweet Orange waste (*Citrus sinensis*) up to 8% has the same of digestibility with control and can be used in feed for Padjadjaran Sheep without disturbed fat digestibility.

CONCLUSION

The utilization of Sweet Orange waste flour (*Citrus sinensis*) up to 8% does not give a significant result on crude protein digestibility and crude fat digestibility and

give the relatively same result with the feed without the administration of Sweet Orange waste flour.

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