Carcass Production and Component of Lamb Provided Metanogenic Inhibitor Feed

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ABSTRACT: The aim of this research is to investigate effects using different level of medium chain fatty acids (MCFA) as methanogenic inhibitor substrate to evaluate production of carcass. Three different proportion of medium chain fatty acids, namely R0: 0% MCFA, R1: 1% MCFA, R2: 1.5% MCFA in 100% dry matter. Each treatment consisted of four sheep. The sheep were kept for three months before slaughtered. The data were analyzed using a variance analysis (completely randomized design), followed by Duncan's new Multiple Range Test (DMRT) for the significant means. The variables measured were production of carcass consisted of body weight, carcass weight, dressing percentage, back fat thickness, lean, carcass fat and bone. The result indicated that R0, R1 and R2 treatment were not different significantly ($p>0.05$) on back fat thickness, lean, carcass fat and bone, meanwhile to body weight, carcass weight, dressing percentage was significantly ($p<0.05$). The conclusion of research was medium chain fatty acids 1 - 1.5% as metanogenic inhibitor feeds can increase the production of carcass with an increase in body weight, carcass percentage and not degrade the quality of carcass

Keywords: carcass production, lamb, methanogenic inhibitor feed,

INTRODUCTION

Methanogenic inhibitor feed is the feed if consumed can prevent the formation of methane in the rumen. Methane gas is one of the fermentation products of feed by rumen microbes. Many nutritionists of ruminant trying to reduce methane production, because they felt responsible for the contribution of livestock to atmospheric pollution by methane as one of the pollutants that have always been related with the destruction of ozone and global warming (Moss *et al.*, 2000)

It is true by Steinfeld *et al.* (2006), the livestock sector accounts for the largest methane emissions of up to 35%. The statement discriminating of livestock should be studied in a wise and balanced, in view the consumption of livestock products of Indonesian society is still very low, growth is still very slow breeding, while farm product much needed public. However, in the midst issue of global warming, some researchers have conducted research for reducing methane in ruminants. One of the studies have been done inform that the role of medium chain fatty acids (MCFA) able to reduce methane in the rumen fermentation in vitro. According Sondakh *et al.* (2012) that the content of 1% MCFA able to reduce methane in the feed of 14.33% and if MCFA was increased to 1.5%, methane content decreased again to 25.30% in the in vitro fermentation. In the midst of efforts to reduce methane, in fact, there is a correlation between the decrease methane and increase propionate acid. Sondakh *et al.* (2012) stated that the addition of MCFA to 1.5% was not only reducing of methane but also able to increase the proportion of propionate acid. The Increased propionate in rumen fluid is desirable for fattening purposes. Availability of propionic acid in the rumen resulted in the formation of glucose through gluconeogenesis. The more of glucose will be converted into glycogen in the body and to be stored in the liver and

muscles. Glycogen will be changed into lactic acid (anaerobic) or pyruvic acid (aerobic) and will produce adenosine triphosphate (ATP) and used as a source of energy for contraction, to pump Ca^{2+} in relaxation time, and set the rate of balancing of Na and K (Stryer , 1998). The availability of energy as ATP is an indicator in determining the meat quality.

The increase in propionic acid when the methane reduced by MCFA is interesting to study to ruminant for knowing the carcass production.

MATERIAL AND METHOD

Animal. Twelve male sheep approximately 1 year old with an initial liveweight of 16-17 kg were kept in individual cages shaped stage in three months and, were randomly divided into three groups ration treatment. Each group consisted of four sheep.

Feed. Feed used were consisted of forage and concentrate in the ratio 60:40. Forages used were Elephant grass (*Pennisetum purpureum*), while the concentrate used were coconut cake, soybean cake and rice bran with different compositions for each treatment. The experiment consisted of three ration treatments, namely, (I) Ration treatment was containing MCFA 0%, (II) Ration treatment was containing MCFA 1.0% and (III) ration treatment was containing MCFA 1.5%. According to the results of previous studies feeding trial II and III able to reduce methane gas to 14.33% and 25.30% (Sondakh *et al.,* 2012). For a clearer treatment of the experiment can be seen in Table 1.

Table 1. The composition of the nutrient content of the feed experiment, fat content and MCFA in coconut cake from each treatment

Variable	MCFA (%)		
	0	1.0	1.5
Feed materials (%)			
Elephant grass	60.00	60.00	60.00
Consentrate	40.00	26.00	19.00
Coconut cake	0.00	14.00	21.00
The composition of nutrient			
Crude Protein	17.08	17.28	17.01
Crude Fat	5.93	5.07	5.27
Crude Fiber	23.27	23.29	23.41
Extract Non Nitrogen	42.34	42.35	43.28
Ash	10.46	9.84	9.96
MCFA	0	1.0	1.5

Animals that have been weighed in the initial body weight, kept in individual cages and given food every day. Feeding is done at 08.00 and 15.00 and provided ad libitum. Before feeding, first feed weighed and then the next day weighed food remains being awarded and taken during the study. This study was conducted over 12 weeks.

After the animals reared for 12 weeks, the animals are slaughtered. Before slaughtering, the animals were body weight to obtain the life weight. Cutting is performed with multiple stages include stunning, the slaughtering, the separation of the head and legs, barking, the release of abdominal compounds, cleaning of carcasses and carcass division into 4 parts.

The variables measured were carcass production includes slaughter weight, carcass weight, dressing percentage, back fat thickness, percentage of carcass components (lean, carcass fat and bone). The dressing percentage is calculated carcass weight divided slaughter weight multiplied by 100%. Back fat thickness measurements were done on the back fat over the rib eye area between the ribs 12 and 13 using the ruler (millimeters) (Anonymous, 2010). Measurements carcass components,included lean, carcass fat and bone were weighing each carcass components then divided by carcass weight multiplied by 100%.

Data analysis

The data obtained were statistically analyzed using Analysis of Variance (ANOVA) with a completely randomized design in the direction pattern of each treatment with 4 replications. Differences between treatments were tested by using test Duncan Multiple Range Test (DMRT) (Steel and Torrie, 1980).

THE RESULT AND DISCUSSION

The research result of carcass production which consist of body weight, carcass weight, dressing percentage, the percentage of lean, carcass fat and bone are presented in Table 2.

Table 2. The average of sheep carcass production getting feed containing different MCFA

Variables	MCFA (%) in 100% dry matter		
	0	1.0	1.5
Body weight (kg)	24.01^{a} + 0.87	25.15^{b}+ 0.85	26.04^{b}+ 0.61
Carcass weight (kg)	9.5^{a}+ 0.71	10.92^{b} + 1.09	11.7^{b}+ 0.57
Dressing percentage (%)	40.16^{a} + 1.85	43.50^{b}+ 1.45	44.96^{b}+ 0.92
Back fat thickness (mm)^{ns}	2.82 + 0.09	2.87 + 0.09	2.9 + 0.08
Lean percentage (%)^{ns}	65.16 + 0.12	65.13 + 0.15	65.12 + 0.10
Fat percentage (%)^{ns}	15.67 + 0.23	15.72 + 0.29	15.75 + 0.19
Bone percentage (%)^{ns}	17.23+ 0.24	17.45+ 0.17	17.53+0.26

^{ns} non significantly
^{a,b} Different superscript at the same row indicate differ significantly ($P<0.05$).

The results showed that the content of MCFA ration significant effect ($P <0.05$) to slaughter weight. The Slaughter weight ranged from 24.01 kg - 26.04 kg. Based on data slaughter weight in Table 2 shows that treatment of MCFA 1.0 to 1.5% the slaughter weight is higher compared to the treatment without MCFA, meanwhile treatment 1.0% and 1.5% showed non significantly. The using MCFA 1.0 to 1.5% in the feed is able to raise sheep slaughter weight from 1.14 to 2.03 kg or an increase of 4.75 to 8.45%. The tendency is different the variable of slaughter weight due to the treatment of feed containing MCFA. The high slaughter weight in feed containing MCFA 1.5% was related to body weight daily weight gain. According Sondakh (2013) (unpublished) that the provision MCFA 1.5% MCFA can raise daily weight gain sheep. The Increase daily gain will determine the increase in slaughter weight animal.

Dressing percentage is an indicator of carcass quality. It is the first indicator of carcass quality after slaughter. The results showed that there were differences in the dressing percentage. Containing of MCFA 1.5% in feed is higher weight carcass if compared with no MCFA feed. Based on Table 2, feed containing MCFA of 1 - 1.5% give effect to the slaughter weight. This causes the

is difference of carcass weight. According to Purbowati *et al.* (2005), the percentage of carcasses was affected by body weight and feed. Similarly stated by Soeparno (2005) that some of the factors that influence the production of an animal carcass is the growth rate, body weight and nutrition. This is also reinforced by Nusi *et al.* (2011) and Perdana (2008) that increasing live weight will yield high carcass weight, so that the carcass produced will also increase. Wood *et al.* (2008) suggests also that the body weight have a real impact on carcass weight and other components.

Back fat thickness (subcutaneous) plays an important role in the indicators of carcass productivity because it can give an accurate estimation result to estimate the percentage of lean and carcass fat (Priyanto *et al*., 1993). Based on this research, back fat thickness at the feed given MCFA of 0 - 1.5% have not shown different results. Soeparno (2005) stated that an indicator of carcass productivity such as back fat thickness, percentage of lean and fat percentage can be affected by breed, nutrition, and sex of animal (Soeparno, 2005).

Important components of the carcass consisted of meat and muscle, carcass fat and bone. Carcass components is an indicator of the carcass quality. The results showed that the lean percentage for each treatment 0, 1 and 1.5% MCFA are 65.16, 65.13, and 65.12%. Feed containing MCFA 0 – 1.5% not cause differences in the percentage of lean. Lean percentage can be increased if the feed given high-energy, as is commonly done on dry-lot fattening that may increase the rate of formation of muscle tissue. The percentage of lean was influenced by back fat thickness. Lean percentage will decrease with increasing thickness of back fat (Priyanto *et al.*, 1993).

The results showed that the percentage of fat for all treatment with MCFA 0, 1, and 1.5% are 15.67, 15.72 and 15.75%. MCFA content of the feed has not been able to increase the percentage of carcass fat. Carcass fat content has relationship with back fat thickness, so that the indicators of carcass quality can be determined from a thickness of back fat (Priyanto *et al*., 1993). Not different fat percentage is likely due weight back fat thickness remains relatively the same for each treatment. In the sense that livestock research for all treatments have not experienced a significant accumulation of fat. This is because the highest slaughter weight at the treatment of feed containing 1.5% MCFA reached 26.04 kg. According to Herman (2004) that a live weight of 33-40 kg (average 38.29 kg) of sheep are no showing growth. Butterfield (1988) states that after the cow reaches maturity, the growth of muscle (meat) will be relatively slow, fat will grow rapidly and bone are relatively constant (hardly grow). When cattle are no longer experiencing the growth of fat deposition will be increased.

The results showed that the percentage of bone for treatment MCFA 0, 1, and 1.5% are 15.67, 15.88 and 15.82 percent. Table 2 shows the data of the carcass components composition consisting of lean meat (lean), fat and bone suggests that the meat contain more followed by bone and fat. Carcass components of research results are consistent with results of previous researchers (Herman, 2004; Purbowati *et al.*, 2005).

CONCLUSION

Medium chain fatty acids 1 - 1.5% as metanogenic inhibitor feeds can increase the production of carcass with an increase in body weight, carcass percentage and not degrade the quality of carcass.

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