Jurnal Triton, Vol. 13 No. 1 (Juni, 2022) : 75-85
e ISSN : 2745-3650, p ISSN : 2085-3823
DOI: https://doi.org/10.47687/jt.v13i1.248

JURNAL TRITON

journal homepage : http://jurnal.polbangtanmanokwari.ac.id

# Physiological Response of Etawa Goats by Offering Complete Feed Containing Flour of Various Types of Banana Plant Weevil

**Purwanta[1], Bangkit Lutfiaji Syaefullah[2], Aswandi[3]***
[1,2,3]Animal Husbandry and Animal Welfare Extension Study Program Agricultural Polytechnic Development of Manokwari, Indonesia

ARTIKEL INFO

Article History
Received 13/04/2022
Received in revised 18/05/2022
Accepted 30/05/2022
Available online 30/06/2022

Keywords
Complete feed
Etawa goats
Physiological response

## ABSTRAK

Penelitian ini bertujuan untuk mengetahui respon fisiologis kambing etawa yang diberikan pakan lengkap yang mengandung tepung berbagai jenis bonggol pisang. Penelitian dilakukan dengan menggunakan Rancangan Acak Lengkap dengan perlakuan berupa 6 jenis pakan lengkap dengan formulasi yang berbeda, terdiri dari T0, T1, T2, T3, T4, dan T5 yang mengandung tepung bonggol pisang varietas yang berbeda dan perlakuan kontrol ( T0). Setiap perlakuan pada penelitian ini diulang sebanyak 5 kali, sehingga total terdapat 30 satuan percobaan. Media yang digunakan dalam penelitian ini berupa cairan rumen yang diambil dari 30 (tiga puluh) ekor kambing etawa yang diberi pakan lengkap mengandung tepung bonggol pisang selama 90 hari, kambing etawa yang digunakan sebanyak 30 ekor jantan. Cairan rumen dihisap menggunakan pompa vakum. Rerata bobot badan awal kambing etawa, 18,89 ± 1,87 kg (CV: 12,32%) umur 15-18 bulan. Ternak diberikan pakan lengkap yang mengandung tepung bonggol pisang selama 90 hari. Kandang berbentuk susut berukuran 24 mx 6 m sebanyak 2 unit kandang, dengan konstruksi berlantai panggung setinggi 140 cm dari permukaan tanah, di dalam kandang terdapat petak kandang percobaan berukuran 1 x 1 m dengan tinggi 130 cm untuk kambing Etawa. Variabel pH, Asam Asetat (mM), Propionat (mM), Asam Butirat (mM) dan Rasio C2/C3. Pakan komplit yang mengandung berbagai tepung bonggol pisang tidak berpengaruh nyata (P>0,05), sedangkan Asam Asetat, Asam Propionat berbeda nyata (P<0,01).



*Email Penulis Korespondensi : dzakiarifaswandi@gmail.com

*ABSTRACT*

*The objective of this research was to observe the Physiological response of Etawa goats which are given complete feed containing flour of various types of banana plant weevil. The study was carried out using a completely randomized design with treatment in the form of 6 complete types of feed with different formulations, consisting of T0, T1, T2, T3, T4, and T5 containing different varieties of banana weevil flour and control treatment (T0). Each treatment in this study was repeated 5 times, so that in total there were 30 experimental units. The media used in this study the form of rumen fluid taken from 30 (thirty) Etawa goats were given a complete feed containing banana weevil flour for 90 days, the Etawa goats used were 30 male. The rumen liquid is sucked using a vacuum pump. Etawa goat mean initial body weight, 18.89 ± 1.87 kg (CV: 12.32%) aged 15-18 months. Livestock are given complete feed containing banana weevil flour for 90 days. Loss-shaped cage measuring 24 mx 6 m as many as 2 units of cages, with a stage-floored construction as high as 140 cm from the ground, inside the cage there is an experimental cage plot measuring 1 x 1 m with a height of 130 cm for Etawa goats. Variables pH, Acetic Acid (mM), Propionic (mM), Butyric Acid (mM) and C2/C3 ratio. Complete feed containing various banana weevil flours had no significant effect on (P> 0.05), while Acid Acetic, Propionic Acid were significantly different (P<0.01).*

## INTRODUCTION

Feed is one of the most important factors in supporting the productivity of livestock production, in the management of feed livestock business occupies the highest cost of production, therefore the problem of feed adequacy is very important, both in terms of quality and quantity, so the search for new source feed ingredients in the form the by-products of agro-industry and by from crop crops and horticulture are very necessary. Banana plants are the easiest plants to grow and develop well, so many banana plants spread throughout the archipelago. Banana hump is the lower part of the banana plant stem which is below the surface, the chemical composition of dry ingredients of Ambon banana weevil flour, namely dry matter 89, 20%; protein 1.81%; crude fat 1.57%; Crude fiber 21.27; carbohydrates 86.72% and BETN 65.43%. Kapok banana hump flour, namely dry ingredients 91, 56%; protein 1.72%; crude fat 1.15%; Crude fiber 7.98%; carbohydrates 88.16% and BETN 88.86%. Batu banana weevil flour, namely 92.64% dry ingredients; protein 1.71%; 1.5% crude fat; Crude fiber 7.85%; carbohydrates 89.75% and BETN 81.90%. Milk banana hump flour, namely dry ingredients 88, 94%; protein 1.75%; crude fat 1.92%; Crude fiber 14.52%; carbohydrates 88.16% and BETN 73.4%. Plantain weevil flour, namely 80.70% dry ingredients; protein 1.44%; crude fat 1.23%; Crude fiber 16.67%; carbohydrates 81.38% and BETN 64.71% (Aswandi, 2012). Banana flour, contains carbohydrates of 66.2%, crude fiber 7-15.23%, and protein 5.88% (Department of Agriculture, 2005). Based on the nutritional potential of these raw materials, banana humps can be used as an energy source for ruminants, feed ingredients as an energy source are feed ingredients with a crude protein content of less than 20%, crude fiber less than 18% (NRC, 2001). Quantitatively, banana humps in Indonesia are very potential, Indonesian banana production is 5,755,673 tons/year, producing 20% weevil waste from total production or 1,151,014 tons/year (BPS RI, 2010). The weakness of raw material for banana humps is less palatable and the utilization of nutrients is low, it is not yet commonly used as ruminant feed ingredients, overcoming this need to be processed through practical and simple technology, increasing palatability approach through processing technology to form complete feed, through practical technological processes and simple, it is hoped that banana humps can be used as one of the feed ingredients that have high economic value in the future.

## METHODS

The research material uses humps from 5 (five) varieties of banana plants, namely: Ambon, Kepok, Stone, Milk and King. The banana weevil is processed to become flour, as a mixture of raw materials for making complete feeds.

The material studied in this second phase of the study was six types of complete feeds. Complete feeds which contain weevil flour from 5 varieties of banana plants. The media used in this study in the form of rumen fluid taken from 30 (thirty) Etawa goats were given a complete feed containing banana weevil flour for 90 days. The rumen liquid is sucked using a vacuum pump. The cage is 12 m x 6m, a cage plot measuring 1 x 1 m with a height of 130 cm.

The experimental Etawa goat cattle as many as 30 were put into a cage plot measuring 1 x 1 m with a height of 130 cm, the placement of experimental Etawa goats was done randomly. Etawa goats livestock was given treatment feed six types of complete feeds, according to the results of randomization treatment. Complete feeds were given to experimental Etawa goats for 90 days ad libitum, water was given once.

The rumen fluid is aspirated at 15 p.m, using a vacuum pump, then each rumen fluid is put into a 10 ml size bottle. After all, the collected samples are put into a 3.5-liter vacuum vaccine, given ice cubes. Complete feed material composition and chemical composition of experimental feed are as follows: Ingredients for the complete feed and nutritional composition of the experimental treatment:

T0 = King Grass Flour =70 %, + Banana Weevil Flour = 0% + Fine bran = 6,4 % + Coconut pulp = 4 % + Tofu Dregs = 11 % + Lamtoro Leaf =3 % + Brown sugar = 1 % + Fish flour =1 %+ Cassava flour = 3 %+ Sodium Sulfate =0,3 % + Mineral = 0,3 % + Sodium Propionate=0,3 %. Nutrient Composition = Dry Material = 89,20 %, Crude protein = 10,79 %, Crude Fat = 2,60 %, Crude Fiber = 28,71 %, Carbohydrate = 64,12, Energy =1.257 kcal/kg, Ca = 3,62 %, Phopor =0,21 %, BETN = 35,41 %, TDN 51,57% NDF = 67,23 % dan ADF 38,87 %.

T1 = King Grass Flour =70 %, + Ambon banana weevil flour = 40 % + Fine bran = 6,4 % + Coconut pulp = 4 % + Tofu Dregs = 11 % + Lamtoro Leaf =3 % + Brown sugar = 1 % + Fish flour =1 %+ Cassava flour = 3 %+ Sodium Sulfate =0,3 % + Mineral = 0,3 % + Sodium Propionate=0,3 %. Nutrient Composition = Dry Material = 88,22%, Crude protein = 10,36%, Crude

Fat = 2,74%, Crude Fiber = 26,54%, Carbohydrate = 70,10, Energy =1.731kcal/kg, Ca = 2,92%, Phopor =0,27%, BETN = 43,56%, TDN 51,57% NDF = 54,10 % dan ADF= 43,35%.

T2 = King Grass Flour =70 %, + Kepok banana weevil flour = 40% + Fine bran = 6,4 % + Coconut pulp = 4 % + Tofu Dregs = 11 % + Lamtoro Leaf =3 % + Brown sugar = 1 % + Fish flour =1 %+ Cassava flour = 3 %+ Sodium Sulfate =0,3 % + Mineral = 0,3 % + Sodium Propionate=0,3 %. Nutrient Composition = Dry Material = 88,76%, Crude protein = 10,17 %, Crude Fat =3,75 %, Crude Fiber = 24,36 %, Carbohydrate =72,21% , Energy =1836 kcal/kg, Ca =3,05 %, Phopor =0,28 %, BETN = 47,85 %, TDN 53,77% NDF =53,02 % dan ADF 45,12 %.

T3 = King Grass Flour =70 %, + Batu banana weevil flour = 40% + Fine bran = 6,4 % + Coconut pulp = 4 % + Tofu Dregs = 11 % + Lamtoro Leaf =3 % + Brown sugar = 1 % + Fish flour =1 %+ Cassava flour = 3 %+ Sodium Sulfate =0,3 % + Mineral = 0,3 % + Sodium Propionate=0,3 %. Nutrient Composition = Dry Material = 88,05%, Crude protein =10,13 %, Crude Fat =3,03 %, Crude Fiber =23,75 %, Carbohydrate =73,74 Energy =2,121 kcal/kg, Ca =2,82 %, Phopor =0,29 %, BETN =49,99 %, TDN=53,63 % NDF =52,67 % dan ADF=48,72 %.

T4 = King Grass Flour =70 %, + Milk banana weevil flour = 40% + Fine bran = 6,4 % + Coconut pulp = 4 % + Tofu Dregs = 11 % + Lamtoro Leaf =3 % + Brown sugar = 1 % + Fish flour =1 %+ Cassava flour = 3 %+ Sodium Sulfate =0,3 % + Mineral = 0,3 % + Sodium Propionate=0,3 %. Nutrient Composition = Dry Material =88,09 %, Crude protein =10,26 %, Crude Fat =4,44 %, Crude Fiber =25,33 %, Carbohydrate =70,30 , Energy =1,736 kcal/kg, Ca = 1,64 %, Phopor = 0,23 %, BETN = 44,97 %, TDN=54,39 % NDF =55,03 % dan ADF= 42,27 %.

T5 = King Grass Flour =70 %, + Banana weevil flour Plantain = 0% + Fine bran = 6,4 % + Coconut pulp = 4 % + Tofu Dregs = 11 % + Lamtoro Leaf =3 % + Brown sugar = 1 % + Fish flour =1 %+ Cassava flour = 3 %+ Sodium Sulfate =0,3 % + Mineral = 0,3 % + Sodium Propionate=0,3 %. Nutrient Composition: Dry Material = 87,57 %, Crude protein = 10,95 %, Crude Fat =3,43 %, Crude Fiber =25,94 %, Carbohydrate =71,25, Energy = 1,751 kcal/kg, Ca 1,95= %, Phopor = 0,22 %, BETN = 46,01%, TDN = 53,16 % NDF = 53,21% dan ADF = 43,02 %.

**Experimental design**

The study was carried out using a completely randomized design with treatment in the form of 6 complete types of feed with different formulations, consisting of T0, T1, T2, T3, T4, and T5 containing different varieties of banana weevil flour and control treatment (T0). Each treatment in this study was repeated 5 times, so that in total there were 30 experimental units.

**Procedure for collecting rumen fluid**

The Etawa goat whose rumen fluid is to be taken, is laid on a higher place, from the suction cup and the suction pump machine, so that gravity can help the smooth flow of the rumen fluid into the container, the equipment is prepared in such a way, 1 piece of hose is connected to the suction device at one end and the other end connected to the capillary in the holding cup, 1 piece of the tube again at the other end is connected to the second capillary in the container and the other end connected with an elastic rubber hose is inserted into the rumen through the mouth of the Etawa goats, one person is in charge of holding the Etawa goat leg the front and body of the Etawa goats so that it does not shift when the rumen fluid is taken, one person is in charge of inserting the tube into the Etawa goat's rumen.

The head of the Etawa goat is held and then positioned upward so that the mouth and throat are straight. The elastic hose is slowly rotated into the rumen, after the hose has entered the rumen, one person who is in charge of the vacuum operator presses the on/off button of the suction pump and the rumen fluid will then enter the container. The rumen fluid was sucked at 7.00 Wit, using a vacuum pump, then the pH of the rumen fluid was measured using a digital pH meter, then each 50 ml rumen fluid was put into a 100 ml bottle cover and added with duct tape until it is tight. After all the samples were collected, they were put into a 3.5-liter vaccine flask, given an ice cube. Samples analyzed in the laboratory were: pH, partial volatile fatty acid (VFA).

**Rumen Fluid Retrieval Technique**

Retrieving rumen fluid using the Prayitno method, (2021) carried out own modification. The rumen fluid is sucked at 15 p.m., using a vacuum pump, then each rumen fluid is inserted into a 100 ml size bottle, is tightly closed with a rubber cover and added with duct tape until it is tight. After all the collected samples are put into a 3.5-liter vacuum vaccine, ice cubes are given, samples analyzed in the laboratory were partial volatile fatty acid (VFA).

**Data analysis**

Data obtained from all the research variables in the second phase will be analyzed using variance analysis following the instructions of Steel and Terrie (1991), the F test will be conducted at a significance level of 5%, and 1% if differences are found followed by Duncan's multiple region tests.

## RESULTS AND DISCUSSION

**The pH of the rumen fluid**

The results of the analysis of variance showed that the treatment had a significant effect ($P<0.05$) on the pH of the rumen fluid. The Duncan test showed that the pH of the rumen fluid between T0 and T1 treatments was not significantly different ($P>0.05$) with an average pH of 6.29, due to the dry matter composition of Ambon banana weevil flour having a higher crude fiber content compared to flour. Other banana weevils, namely: 21.27%, so that it will affect the chemical composition of the complete dry matter of the feed, while T0 with T2, T3, T4, and T5 are significantly different ($P<0.05$). The resulting difference in pH is due to the composition of the dry matter, the crude fiber content of the components of the feed, and the composition of the forage sources (fiber) that compose the complete feed. T0 contains 70% of the source (fiber), on the other hand, the pH of the rumen fluid. on T2, T3, T4, and T5 were not significantly different (P>0.05) with the mean (5.67 ± 0.17). The pH findings of the rumen fluid provide clues that are seen from the average pH, T2, T3, T4, and T5 produce pH closer to the optimum pH range in the rumen than T0 and T1, because good pH conditions for microbial activity in the rumen require Acidic conditions, when viewed in terms of the degree of acidity in the rumen pH 5.67 shows a better degree of acidity, in connection with this it is also supported by Volatile fatty acid (VFA). The total resulting average treatment is: 84.17 mM

Hidanah et al., (2016) states that the normal state of rumen pH is maintained between 5- 6.5, namely to maintain microbial life that cannot withstand a pH of less than 5; Sairullah et al., (2016) stated that when livestock consumes feed containing a lot of fiber or structural carbohydrates, the pH tends towards 7.5, but if the feed contains more starch or soluble carbohydrates, the pH tends towards 5, Mutammi et al., (2019) also stated that the ideal fermentation process in the rumen requires a pH in the range between 5-7.5, whereas according to Adiwinarti et al., (2018) if the starch increases the pH will decrease from 4.5 to 5, low pH will inhibit the growth of cellulolytic bacteria, thus inhibiting the digestion of forage. Usman et al., (2013) stated that changes in feed can cause a shift in the cellulolytic and amylolytic microbial population in the rumen, the number of cellulolytic microbes decreases if there is starch fermentation in the rumen, ultimately affecting the pH conditions in the rumen.

Table 1. Average pH, Acetic Acid, Propionic, Butyric, Complete Feeds Containing Flour Various Types of Banana Plants

| Variabel | $T_0$ | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ |
|---|---|---|---|---|---|---|
| pH | 6,52±0,51$^{a}$ | 5,86±0,10$^{a}$ | 5,56±0,43$^{b}$ | 5,30±0,46$^{b}$ | 5,67±0,08$^{b}$ | 5,74±0,04$^{b}$ |
| Acid Acetic (mM) | 49,45±0,03$^{A}$ | 42,19±3,07$^{B}$ | 39,91±1,83$^{B}$ | 32,15±4,69$^{B}$ | 40,12±1,57$^{B}$ | 40,77±1,34$^{B}$ |
| Acid Propionic (mM) | 15,00±0,64$^{F}$ | 16,61±1,35$^{E}$ | 26,56±0,99$^{B}$ | 30,96±2,65$^{A}$ | 23,60±1,01$^{C}$ | 21,40±3,20$^{D}$ |
| Acid Butyric (mM) | 9,00±0,63$^{Cc}$ | 12,26±2,04$^{a}$ | 12,88 ±1,16$^{Ba}$ | 13,44±2,03$^{Aa}$ | 11,49±1,19$^{b}$ | 10,86±0,38$^{b}$ |
| $C_2/C_3$ | 3,3 | 2,45 | 1,48 | 1,04 | 1,63 | 1,86 |

*Note: different lowercase letters on the same row indicate significantly different (P <0.05); Different capital letters on the same line indicate very significant differences (P <0.01).*

**Volatile fatty acid (VFA) partial**

**Acetic acid**

The results of the analysis of variance showed that the treatment had a very significant effect (P<0.01) on the concentration of acetic acid, followed by Duncan's test which showed that the concentration of acetic acid between T0 treatments was significantly higher (P<0.01), which was 49.55 mM compared to respectively T1 (43.19 mM), T2 (40.91 mM), T3 (33.15

mM), T4 (40.12 mM) and T5 (41.77 mM). The concentration of acetic acid from fermentative digestion found in the study indicated that a complete feed containing banana hump flour could reduce the concentration of acetic acid, as Boufenart et al. (2016) reported that high concentrate feed resulted in an acetate concentration of 55.18 mM, Calahan et al. (2016) giving concentrate feed to cattle produced acetic acid between 53.5-54.5 mM; giving concentrate feed to Etawa goat and Etawa goat resulted in acetic acid concentration of 55.1 mM, Carberry et al., (2017) giving rice straw to cows resulted in a concentration of 70.4 mM acetic acid.

The finding of low acetic acid content in fermentative digestion of complete rations prepared from banana hump flour of various varieties proves that the use of banana hump flour in complete feeds can actually function as a source of easily digestible carbohydrates in complete feeds. The T0 treatment in this study contained higher king grass, which was 70%, than the T1, T2, T3, T4 and T5 treatments which only contained 30% king grass. In line with Comeau *et al*., (2017) stated that feed with high fiber content (forage) will produce higher acetic acid.

The proportion of flying fatty acids (VFA) in the digestion of ruminants is influenced by the type of feed, the composition of structural and non-structural carbohydrates and the size of the portion of forage that makes up the feed (Danman et al., 2015), Djamilla et al. (2016) stated that easily digestible carbohydrates will produce a small acetate-propionate ratio, whereas structural carbohydrates, such as hemicellulose will produce a larger acetate-propionate ratio. Based on the findings of acetic acid, it can be stated that regardless of the variety of banana weevil used, all of them can serve as a source of carbohydrates in complete feeds, because they have been shown to produce a lower ratio of acetate when compared to the control feed, as shown in the ratio of acetic acid to propionic acid in the study namely: T0, T1, T2, T3, T4 and T5 respectively: (3.30; 2.40; 1.40; 1.03; 1.63 and 1.95).

The concentration of acetic acid between T1 and T5 treatments together in the study was found to be significantly higher ($P<0.05$) with T3, which is 43.19 versus 39.39 mM, this difference indicates that the complete ration prepared with starch carbohydrate sources Ambon banana hump produced higher acetic acid content compared to the ration with carbohydrate sources from banana hump flour varieties of Kepok and Batu.

The finding of acetic acid concentration was confirmed by data on the chemical composition of Ambon banana hump flour which indeed has a higher crude fiber content than Raja and Batu varieties of banana hump flour. As already explained that acetic acid is the end product of fiber fermentation, feed ingredients with high fiber content but low in energy produce a high acetate-propionate ratio. Based on the findings of the concentration of acetic acid, if it is only seen from the acetate content produced from the fermentative digestion process, then as a source of carbohydrates, complete feed containing banana weevil flour of Ambon variety is better than Kepok and Batu varieties of banana weevil flour, and T4 with T1 and T5 respectively from high to low of 85.70 mM to 78.40 mM.

**Propionic acid**

The results of the analysis of variance showed that the treatment had a very significant effect (P <0.01) on the concentration of propionic acid. Based on the Duncan test, it showed that in the fermentative digestion, each complete feed treatment tested resulted in a very significant difference in propionic acid content (P<0.01). If sorted based on the concentration of propionic acid produced, then T0 produces the lowest propionic acid, then from the lowest to the highest are T1, T5, T4, T2, and T3 respectively 17.61 mM., 22.40 mM., 24.60 mM 27.56 mM, and 31.96 mM.

The lowest propionic acid production was obtained from the control ration, which was 15.00 mM, while the highest propionic acid production was obtained from the complete feed with carbohydrate sources of the banana weevil, Batu banana varieties, namely 31.96 mM, in line with the previous researcher. Elshazly et al. (2019) stated that propionate can be increased by providing more concentrate and digestible carbohydrates, suitable for use as feed to produce meat (fattening). Gerreia *et al.* (2020) that high concentrate feed can increase propionic acid 27.53 mM, higher than control; Adkin et al., (2013) that concentrate from grains produced higher propionic acid, namely: 31.7 mM; Hamchara et al. (2018) propionate 22.3 mM and based on the findings in this study it can be said that a complete ration prepared with a carbohydrate source of banana weevil in fermentative digestion can produce adequate propionic acid content for Etawa goat.

Variations in the content of propionic acid in the results of fermentative digestion between complete ration formulas in the study proved that banana hump flour from each variety had different advantages as a source of carbohydrates. Complete diets containing banana hump flour of the Batu variety have been shown to have the highest advantage in terms of easy-to-digest carbohydrate content (as evidenced by the highest digestive propionate content compared to other ration formulas). Iqbal et al. (2019) stated that soluble (non-structural) carbohydrates such as glucose, fructose and sucrose, and starch are the fastest to digest and metabolize and can be fully utilized, with the help of various species of bacteria in the rumen. Khattas et al., (2018) stated that propionate can be increased by providing more concentrated and digestible carbohydrates.

The findings of variations in the superiority of banana weevil flour as a source of carbohydrates in complete feed were confirmed by other findings with easily digestible carbohydrate sources (Khezri et al., 2017), so it can be concluded that a complete feed containing Batu banana hump flour is easily digested compared to banana weevil flour from other varieties.

**Butyric acid**

The results of the analysis of various treatments had a very significant effect (P<0.01) on the concentration of butyric acid, based on the Duncan test on butyric acid content between treatments of complete in vitro fermentative digestion results examined T3 (14.44 mM), T2 (12, 88 mM) was significantly higher (P<0.01) compared to T0 (9.00 mM), T1 (12.26 mM), respectively (13.66 mM with 10.63 mM).

Complete feed T3 (14.44 mM), with T4 (11.49 mM) and T5 (10.86 mM) in fermentative digestion in-vitro yielded butyric acid which was significantly different (P <0.05), whereas T3 and T2 and T1 is no different. Between T2 and T1, T4 and T5 were not significantly different (P>0.05). The mean of butyric acid content from fermentative digestion from complete ration T1 (12.26 mM) with T4 (11.49 mM) with T5 (10.86 mM), T0, T5 with T0 was not significantly different (P>0.05). The findings, if confirmed by several reports of previous researchers, gave concentrate to experimental Etawa goat animals, which was carried out by Liu *et al*., (2017) which produced butyric acid 12 mM; Lif *et al*. (2019) giving concentrate to cows resulted in butyric acid concentrations between 12.2 -14.1 mM.

Based on the findings of butyric acid, it can be concluded that the complete feed tried in the study deserves to be considered as a Etawa goat ratio. Several previous researchers, Manninelli, et al., (2018) reported that giving large amounts of concentrate feed to Etawa goat and Etawa goat resulted in 12.6 mM of butyric acid; Rajabi, et al., (2017) gave cassava chips to cows, resulting in a butyric acid concentration of 7.3 mM.

## CONCLUSION

Complete feed containing a mixture of 40% Batu banana hump flour can affect the volatile faty acid partial rumen fluid of Etawa goats, complete feeds containing Batu (T3) banana varieties of banana flour produce the best volatile fatty acid (VFA) partial.

## REFERENCES


Adiwinarti R., Kustantinah, I.G.S. Budisatria., Rusman & E. Indarto. (2018). Profile of rumen fermentation and blood urea nitrogen concentration of Kacang goat fed total mixed ratio vs. roughag. Earth Environ Sci. 119:1-5.

Adkin, A. M., L.K Warren., C.J. Mortensen & J. Kivipelto. (2013). Maternal supplementation of docosahexaenoic acid and its effect on fatty acid transfer to the foal. *Journal of Equine Veterinary Science*, 33(5), 336. https://doi.org/10.1016/j.jevs.2013.03.192.

Aswandi. (2012). Jurnal Triton Penyuluhan Pertanian. Hasil Penelitian Terapan Bidang Penyuluhan Sosial Ekonomi dan Teknik Pertanian. Vol. 3. Nomor. 1. Juni. ISSN. 2085 – 3823. Hal. 25-32.

Boufennart. S., L.Bouazza., A.Vega., M. Fondevila., Z.Aman & S. Lopez. (2016). In vitro assessment of nutritive value of date palm by-products as feed for ruminants. *Emirates Journal of Food and Agriculture* 28:695-703.

Badan Pusat Statistik Republik Indonesia. (2010). Produksi Buah-buahan menurut provinsi di Indonesia. Jakarta. Pusat.

Calhan, B., McMurdie, P., Rosen, M., Han, A. W., Johnson, A.J.A, & Susan, P. (2016). DADA2: high-resolution sample inference from Illumina amplicon data. *Nature Methods* 13(7):581-583.

Carberry. C.A., D.A. Kenny., S. Han., M. S. Cabe & S.M. Waters. (2017). Effect of phenotypic residual feed intake and dietary forage content on the rumen microbial community of beef cattle. *Applied and Environmental Microbiology* 78(14):4949-4958.

Comeau. A.M., G.M. Douglas & M.G.L. Langille. (2017). Microbiome helper: a custom and streamlined workflow for microbiome research. *mSystems* 2(1):e00127-16.

Donman S.E., D.P. Morgavi., & C.S. Sweeney. (2018). Review: the application of omics to rumen microbiota function. *Animal* 12:233-245

Djamila, D. & A. Rabah. (2016). Study of associative effects of date palm leaves mixed with Aristida pungens and Astragalus gombiformis on the aptitudes of ruminal microbiota in small ruminants. *African Journal of Biotechnology* 15(43):2424-2433.

Departemen Pertanian. (2018). Prospek Agribisnis Pisang. Badan Penelitian dan Pengembangan Pertanian. Departemen Pertanian. Jakarta.

Elshazly, A.G. & C.R.Youngs. (2019). Feasibility of utilizing advanced reproductive technologies for Etawa goat breeding in Egypt. Part 1: genetic and nutritional resources. *Egyptian Journal of Etawa goat & Goat Sciences* 14:39-52.

Garreca. R. J., I. Mateos., C. Saro., J.S. González., M.D. Carro & M.J. Ranilla. (2020). Replacing forage by crude olive cake in a dairy Etawa goat diet: effects on ruminal fermentation and microbial populations in Rusitec Fermenters. *Animals* 10(12):2235.

Hidanah S., D.S. Nazar., K. Supranianondo., R. Sidik & S. Mangkoedihardjo. (2016). Volatile fatty acids and ammonia levels in local Etawa goat‟s rumen fluid fed with fermented rice straw. Engineering Technol. 8:1324-1328.

Hamchara P., P. Chanjula., A. Cherdthong., & M. Wanapat. (2018). Digestibility ruminal fermentation, and nitrogen balance with various feeding levels of oil palm fronds treated with Lentinus sajor-caju in goats. *Asian-Australasian Journal of Animal Sciences* 31(10):1619-1626.

NRC. (2001). Nutrient Requirements of Dairy Cattle, seventh ed. National Academy Press, Washington, DC.

Prayitno. E. (2021). Ilmu Ternak. http//www. Ilmuternakkita.blogspot.com. diakses tanggal, 11-11-2021.

Steel, R.G.D & J.H. Torrie. (1991). Prinsip dan Prosedur Statistika. Edisi Kedua. PT. Gramedia Pustaka Utama Jakarta. (Diterjemahkan oleh B. Sumantri).

Sairullah P., S. Chuzaemi & H. Sudarti. (2016). Effect of flour and papaya leaf extract (*Caricapapaya L*) in feed to ammonia concentration, volatile fatty acid and microbial proteinsynthesis *in vitro*. J Ternak Tropika. 17:66-73.

Usman, Y. (2013). Pemberian pakan serat sisa tanaman pertanian (jerami kacang tanah, jerami jagung, pucuk tebu) terhadap evolusi pH, N-NH3 dan VFA di dalam rumen sapi. J Agripet. 13:53-58.

Iqbal N., M.T. Khan., H. Amanullah., I. Din., H. Khan., M. Shah & M. Mushtaq. (2019). Effect of feeding different levels of discarded date palm (Phoenix dactylifera) on digestibility, milk yield, and composition in Damani Etawa goat. *Tropical Animal Health and Production* 51:2181-2186

Khattas. M.S.A. & A.M.A. Tawab. (2018). In vitro evaluation of palm fronds as feedstuff on ruminal digestibility and gas production. *Acta Scientiarum. Animal Sciences* 40(1):e39586.

Khezri. A., O. Dayani & R. Tahmasbi. (2017). Effect of increasing levels of wasted date palm on digestion, rumen fermentation and microbial protein synthesis in Etawa goat. *Journal of Animal Physiology and Animal Nutrition* 101(1):53-60.

Li F, L.I.C.,Y. Chen., J. Liu., J.C. Zhang., B. Irving., C. Fitzsimmon., G. Plastow & L. Guan. (2019). Host genetics influence the rumen microbiota and heritable rumen microbial features associate with feed efficiency in cattle. *Microbiome* 7(1):92.

Liu. K. X. Q., L. Wang., J. Wang., W. Guo & M. Zhou. (2017). The impact of diet on the composition and relative abundance of rumen microbes in goat. *Asian-Australasian Journal of Animal Sciences* 30(4):531-537.

Manninelli. F., A. Cappucci., F.Pini., R.Pastorelli., F.De corosi., L.Giovannetti., M.Mele., S. Minieri., G.Conte., & M. Pauselli, M. (2018). Effect of different types of olive oil pomace dietary supplementation on the rumen microbial community profile in Comisana ewes. *Scientific Reports* 8(1):8455.

Mutammi. A.D., R. Adiwinarti & A. Purnomoadi. (2019). Konsentrasi VFA dan pH Cairan Rumen Kambing Kejobong yang Diberi Pakan dengan Imbangan Hijauan dan Konsentrat Berbeda. Fakultas Peternakan dan Pertanian, Universitas Diponegoro, Semarang Pros.Semnas.TPV-2019-p.353-358. *DOI: http://dx.doi.org/10.14334*

Rajabi, R., Tahmasbi, R., Dayani, O., & Khezri, A. (2017). Chemical composition of alfalfa silage with waste date and its feeding effect on ruminal fermentation characteristics and microbial protein synthesis in Etawa goat. *Journal of Animal Physiology and Animal Nutrition* 101(3):466-474.