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## The comparison of goat rumen fermentation given the cocoa pulp-based complete feed and corn cob as fiber source

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**Abstract.** Cocoa pulp is one of the agricultural waste which its use is still less, cocoa pulp which owns a high glucose content can be utilized by cattle into energy, while corn cob is rich of rough fiber. This research aims to evaluate the condition of rumen fermentation in goats which has been given complete cocoa pulp-based feed with corn cob fiber sources. This research was conducted with completely randomized model programs, using goats to the age of 1 - 1.5 years as many as eight tails in place of the individual metabolic cages for 2 months. Treatment of complete feed is feed komplit P1 cocoa pulp with corn cob fiber resources while P2 is added to the concentrate on elephant grass, though the data using Test T. rumen fluid sampling is performed twice which are before cattle get fed 0 hours and 4 hours after get fed. From the results of research, found that the overall of the value of 6.97 pH 0 hours P1 and P2 6.92 hiccup on for 4 hours after the news feed P1 and P2 7.12 7.40. The overall value of NH<sub>3</sub> 0 hours P1 P2 30.20 mg to 24.55 mg and 65.77 mg 4 hours P1, P2 54.72 and for the average value of VFA 0 hours P1 P2 13.2 mm and 16.4 mm for 4 hours 17.3 mm P1, P2 19.8 mm. Conclusions Of analysis results in use of variance pulp-based complete feed use cocoa in comparison with the concentrates are added to the elephant grass showed the effect was not significant ( $P > 0.05$ ) pH values, NH<sub>3</sub> and VFA close relation to a source of protein feed used and easy or not The protein in degradation in the rumen.

### 1. Introduction

South Sulawesi is one of the areas with its agricultural potential variatias as the result, South Sulawesi areas become rich with the potential for agriculture and agro-industry waste for food utilization. In the era of farm modern, complete food has been developed to meet the nutritional needs of ruminant livestock. Agriculture and agro-industrial become alternative that can be used as the raw material of manufacture of complete food.

Cocoa Commodity in South Sulawesi is one of the superior commodities, with an area of 246. 223 and affected more than 143 237 tonnes of production [1]. Agriculture of cocoa and chocolate industry produce a lot of waste in the form of skin, pulp and pulp from waste kakao. the processing of cocoa



waste is needed because the cocoa crop is a crop that is generally utilized only part of the seed. Other fruit section is not used as the main ingredient [2]

Fibrous feed utilization as ruminant food requires supplementation of food energy and protein, because the quality is low. This is due to the low digestibility values as a result of the high content of fiber. Nutrient supplementation both energy and protein together for the purpose of optimization of microbial growth in order to air-fiber feed utilization can be optimized [3,4] states that the ideal conditions for the formation of microbial protein available if fermentable carbohydrate source simultaneously with a protein source, thus the balance of protein and energy content is a prerequisite for the preparation of concentrates for ruminants. The development of livestock feed formulation technology which is called complete.

From previous research Mide and Natsir [5] reported that the utilization of corn cob up to 45% in the complete ration should not adversely affect the productivity of goats. As for the utilization of cocoa pulp as food material have to do some researches. Natsir [6] reported that with the use of in vivo in testing of cocoa pulp by 10% with the source and straw positive response and can substitute use of molasses.

Ruminant digestion process is very complex and several factors influence each other, so that the mechanisms of digestion mainly occurs in the rumen need to know how to optimize the use of nutrients. Biochemical characteristics which include VFA composition, pH,  $\text{NH}_3$  and physical characteristics digestibility (long live food in the rumen, the change in rumen fluid, rumen volume) is a factor - a key factor for the manipulation of ruminant feed [7]. It is the reason behind Comparative research of Goat Rumen Fermentation with The Complete food of Cocoa Pulp-based using Fiber Sources of Corn Cob.

## **2. Materials and methods**

### *2.1. Design of experiments and treatment*

Eight male goats with range 1-1.5 years of age were randomly placed in individual cages metabolism (1 fish /plot enclosure). Under the scheme would completely randomized (CRD). The treatment lasts for 2 months held in March to May 2018. Complete food made with basic ingredients together with a source KAKOA pulp fibers from corn cobs. complete food which is made by way of corn cobs and other feed ingredients are finely minced still rough in advance using grinder. Then, each material food is weighed based on the formulation of each treatment and mixed thoroughly. Feed given twice daily at 08:00 and 16:00 pm in the same proportion. To feed controls after the administration concentrate on adding the feed of forage grass that has been milled. Drinking water provided ad libitum. rumen liquid taking was done in the last day of sample sampling.

### *2.2. Rumen liquid*

Rumen liquid samples taken by the system Stomach Tube [8] which uses Vacuum pump at the end of the study or the last day of the collection phase of each period. Rumen liquid samples which were taken were measured its pH with a pH meter, and then filtered with 4 layers of gauze (fabric filter) and a clear rumen liquid was added to the test tube and then stored in a thermos that has been filled ice cubes and stored in a freezer.

### *2.3. Parameters measured*

*2.3.1. Rumen fluid pH.* Measurement of rumen liquid pH was measured using pH meter. pH meter was first turned on and let it stable for 15 to 30 minutes. Make standardization with buffer liquid pH 7 standard. Rinse with distilled water and then dry with a tissue. Insert the electrode into tubes containing samples of rumen liquid, the pH value is set by looking at the numbers on the monitor screen.

**Table 1.** Each treatment composition Feed Ingredients

Materials	Treatment %	
	P1	P2
Cobs Corn	50	-
Bran	20	36
Pulp Cocoa	10	-
Coconut Cake	9	15
Molasses	-	20
Corn Flour	-	13
Flour Shrimp Heads	6	10
Fish Meal	-	-
Urea	1,5	2
Salts	1,5	2
Mineral Mix	1	2
Total	100	100

**Table 2.** Chemical Composition Each wafer Corn Cob Plus Treatment

Nutrition	contents (%)		
	P1	P2	Grass
Dry Materials	-	-	-
Organic materials	85,64	81,65	85,86
Protein rough	12,69	15,00	9,36
Rugged Fiber	2,76	4,48	4,40
BETN	40,89	46,81	35,01
NDF	53,64	69,15	33,14
ADF	37,96	17,25	35,57

#### 2.4. Levels of NH<sub>3</sub>

NH<sub>3</sub> levels are determined by techniques microdiffuse Conway [9]. A total of 1 ml of the supernatant centrifuge results are placed on one end of the cup groove Conway. 1 ml of saturated liquid Na<sub>2</sub>CO<sub>3</sub> was placed at one of end of the Conway cup with which was next to the supernatant. In a small cup in the middle filled with red berindikator boric acid methyl and bromine cresol green as much as 1 ml. Conway cup that has been smeared vaseline is sealed airtight Until a solution of Na<sub>2</sub>CO<sub>3</sub> solution is mixed with supranatan.

#### 2.5. Level of VFA

Determination of the VFA (volatile fatty acid levels) is done by steam distillation [9]. A total of 5 ml of the supernatant was put in a distillation tube, then add 1 ml H<sub>2</sub>SO<sub>4</sub> 15% and closed. The tube is connected with the cooling pumpkin and gourd containing 5 ml of 0.5 N NaOH distillation process by flowing water is evaporated to expire until distillate which accommodated up to + 300 ml volume. Then added 1-2 drops of indicator PP (Phenolphthalin) and titrated with 0.5 N HCl until the color changes from pink to colorless. FVA levels calculated with the following formula:

$$\text{Total VFA} = (V_b - V_s) \times N\text{-HCl} \times 1000/5 \text{ mM}$$

Description: B = volume of titrant blank  
 S = volume of titrant sample  
 N = normality of HCl solution.

Sutanto et al [10] explains that the ideal rumen pH to maintain normal metabolic processes rumen is 6.07.0. Crude fiber digestibility decreased at a low pH, particularly below pH 6.0. Soeharsono et al [11] stated that in young ruminants, usually protozoa yet. New protozoa in the rumen when the young ruminant contact with other animals ya ng contains protozoa. NH<sub>3</sub> concentration reflects the amount of dietary protein are widely dominant in the rumen and its value is greatly influenced by the ability of rumen microbes to degrade dietary protein [12].

Moantedkk [13], says that the ammonia concentration is determined by protein level of feed consumed, the degree degradabilitasnya, longer feed in the rumen and rumen pH.

### 3. Results and discussion

**Table 3.** Mean power values of dry matter and organic matter

Parameter	Treatment	
	P <sub>1</sub>	P <sub>2</sub>
Ph 0 Hour	6,97	6,92
Ph 4 Hour	7,12	7,40
NH <sub>3</sub> 0 Hour (mg/Ll)	30,20	24,55
NH <sub>3</sub> 4 Hour (mg/Ll)	65,77	54,72
VFA 0 Hour (mM)	13,2	16,4
VFA 4 Hour (mM)	17,3	19,8

Description: Different superscript on the same line indicate significantly different (P < 0.05).

Based on the results of variance showed the treatment had no significant effect ( $P > 0.05$ ) on pH value of rumen fluid treatment both P<sub>1</sub> and P<sub>2</sub> on the measurement of 0 hours and 4 hours after given feed rumen fluid pH value range indicates that microbes can live in optimum so that the process of digestion of feed in the rumen for the better. This is supported by the opinion [14] which states that the pH value is categorized into the optimum pH in the range of 6 - 7. That is one indicator of the degradation process the feed is good, because at the pH of the digestive enzyme-producing microbes coarse fibers can live optimally in the rumen. ruminal pH in the range which is very conducive to digestion of fiber [15]. The mean value of PH in this study IN 0 hours P<sub>1</sub> and P<sub>2</sub> of 6.92 and 6.97 for 4 hours of an increase in the value of 7.12 Ph namely P<sub>1</sub> and P<sub>2</sub> 7.40. It is a member illustrates that after feeding increased Baktri aktivitas and development in the rumen of goats. Asri [16] the high and low values in the rumen pH can affect the population of protozoa in the rumen.

Levels of NH<sub>3</sub> can be used to mengestimasi degradation of protein and its use by microbes. The production of ammonia is closely related to the amount of the use of feed containing protein in the ration. On this research in the get value rataan nh<sub>3</sub> after in you do variety shows with no real influence rataan 0 h P<sub>1</sub> and P<sub>2</sub> 30.20 24.55 and for 4 hours and 65.77 P<sub>1</sub> P<sub>2</sub> 54, 72. Satter and Slyter [17] ammonia production is affected by the grant of a feed that is tied to a protein source used and easily whether or not the protein didegradasi. If the feed is defisien protein or high protein content are escaped relegation, then the concentration of NH<sub>3</sub> rumen will be low (lower than 50 mg/l or 3.57 mM) and rumen organisms growth will slow McDonald et al [18] explains that the concentration of NH<sub>3</sub> high protein degradation process can point to feed faster than the process of the formation of microbial protein, so the resulting ammonia accumulates in the rumen.

Results of analysis of variance treatment had no significant effect ( $P > 0.05$ ) on goat rumen VFA concentration with the average Nilan VFA 0 hours P<sub>1</sub> P<sub>2</sub> 13.2 and 16.4 and 17.3 for 4 hours P<sub>1</sub> and P<sub>2</sub> 19.8. The value of the average concentration of VFA Yag generated in this study are in the normal range for microbial growth, high or low value of VFA in each treatment is also influenced by the type of feed given to livestock. This is in accordance with the opinion of Sutardi [19] who said that VFA concentration is strongly influenced by the type of feed, the high VFA showed an increase in protein and soluble carbohydrate in the diet.

The absence of any real effect on the characteristics of fermentation rumen (pH, NH<sub>3</sub> and VFA) might be due to the physical form of ration research that is relatively the same in this study, and not different amount of feed consumed, causing fermentation patterns in the rumen same for all treatments, so the total VFA is no different. Fermentation same pattern is also related to ruminal pH was not different. Ruminants most of the protein into the rumen of a remodeled by proteolytic enzyme produced by rumen microbes into ammonia (NH<sub>3</sub>). Specific differences of the two treatments is only in P1 treatment using cocoa pulp with P2 feed with additional control using bulrush.

#### 4. Conclusion

Rumen fermentation characteristic parameters (pH, NH<sub>3</sub> and Volatile Fatty Acids (VFA)) did not show any difference between the two diets were tested because it is in the ideal range for microbial digestion of fiber. So that the use of cocoa pulp 10% in ransum still be used and tolerated by the microbes in the rumen.

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