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Digestibility level of cacao waste fiber fraction fermented with indigenous microorganisms in sheep

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Abstract— *Ruminant sheep from forage and legumes, which has linited avabiility due to the shift inproductive land for grass and legumes, which have been widely used for housing and business. Research purposes; To see the digestibility level of the fiber fraction from cacao waste fermented with indigenic microorganisms in sheep*. *Research hypothesis: Increased digestibility of cacao waste fiber fraction fermented with indigenous microorganisms. Benefits of Research: The results of this study can reduce the waste problem cacao can be used as the building blocks for livestock rations ruminant by breeders.Material and Methods: This study used sheep as much as 16 tails whose age 6-12 months, the sheep will be sorted by weight, ration treatment consisted of four, namely; A = Concentrate (40%) + forage (60%), B = Concentrate (40%) + Grass (30%) + Lives fermentation (LF) (30%), C = Concentrate (40%) + Grass (30%) + rind cocoa Fermentation(RCF)(30%), D = Concentrate(40%) + Grass (30%) + (15%) LF+ RCF (15%). Variable research is weight gain, consumption of fiber fraction and the fiber fraction Digest.*

The results of the study are incressing weight of sheep ranged from 56.052 to 71.315 g / head / day with MD consumtion ranged from 289.78 to 359.00, from 129.02 to 160.22 NDF, ADF -115.42 84.29 grams / head / day and digestibility of MD ranged from 59.16 to 60.62%, 34.187 to 55.67 NDF, ADF 26.00 to 48.46. Conclusion: The waste cacao fruit can promote the growth of sheep are seen in terms of the fiber fraction. Suggestion; Giving the Waste cacao fruit in the diet in order to be improved.

Keywords— ***Grass, Leaves Cacao, Cacao Rind, Sheep.***

I. INTRODUCTION

Ruminant sheep from forage and legumes, which has linited avabiility due to the shift in productive land for grass and legumes, which have been widely used for housing and business. Efforts to resolve this problem do the utilization of agricultural waste or agricultural waste products of low nutritional value as animal feed, the use of alternative feed ingredient does not change the ability of livestock production.

Waste food crops and plantations have an important role and potential in the supply of green feed for ruminant livestock such as cattle, goats, sheep and buffalo, especially in the dry season. In addition ruminant rearing system is still largely dependent on forage, feed in the form of grasses and other forage feed with little or no additional feed.

To overcome the problem of shortage of forage, farmers are expected to utilize agricultural wastes which are abundantly available in the vicinity include fruit skin cacao, cacao plant leaves, shoots of cane, rice straw, hay soybean and peanut hay through a certain treatment. Cacao fruit consists of 73.73% rind, 2% of the placenta, and 24.20% seeds [1] in [2]. Cacao fruit skin is agro-industry waste produced cacao plant (Theobroma cacao L). The results of proximate analysis cacao rind contains dry matter (DM) 28%, coarse fibers (CF) 40.1%, Protein rough (CP) 8% and 50.8% TDN and Uses by ruminants 30-40% [3] in [4]. To improve the nutritional value of the fruit skin

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cacao with technologies such as physical treatment, chemical and biological, one of the technologies used are fermented. In the process of fermentation occurs solving complex compounds such as cellulose, hemicellulose, silica, by certain enzymes that reduce the content of crude fiber and improve the digestibility of the material. Research results [5] that fermented fruit peels that use Basil sp chocolate can lower crude fiber and increase the crude protein.

2.**Formulation of the problem**

Rations supplemented with waste cacao fermentation can be enhanced growth of sheep in terms of fractions of fiber?

3. **Research purposes**

To see the growth of sheep by waste cacao fermented in terms of the fiber fraction

4.**Research hypothesis**

Granting waste of cocoa can promote the growth of sheep in terms of fiber fractions

5. **Benefits of research**

The results of this study can reduce the waste problem cacao can be used as the building blocks for livestock rations ruminant by breeders.

Material : In this experiment the use of materials as follows: ration treatment consisted concentrat (bran Fine, coconut cake, waste manufacture of powdered soy, Ultra minerals, salts), LF and RCF which ration treatment advance in the analysis of proximate and power levels digestibility with analysis invitro, after it had given to cattle Sheep. In this experiment using local sheep aged 7-12 months as many as 16 individuals. Tools used include metabolic cage with a size of 50 x 130 cm with a bucket of equipment enclosures such as drinking, eating, tool container of urine and feces, scales O'haus capacity of 20 kg and other stationery.The based on previous research from [2]/

Methodology

This design is a follow-up research from [2] which on this experiment used randomized block design with four replications group as a group and 4 types of ration treatment. The ration treatment as follows :

A = Concentrate40% + forage (60%)
B = Concentrate 40% + Grass (30%) + LF (30%)
C = Concentrate 40% + Grass (30%) + RCF (30%)
D = Concentrate 40% + Grass (30%) + LF (15%) + RCF(15%)

II. MATERIALS AND METHODS

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Table 1. Composition Composer Concentrate

No	constituent ingredients	Amount (%)
1	Bran Fine	40
2	Coconut Cake	30
3	Waste Soybean Powder	27
4	Ulta Mineral	2
5	Salt	1
Total		100

(Fridarti, et, all. 2017)

Table 2. Nutrient content of constituents of ration (%)

No	containt	DM	CP	FC	CF	TDN	Matter Eskrat non N
1	Grass Field	11,45	12,45	4,94	32,05	59,75	40,31
2	Rind cacao Feermentation	14,55	5,35	1,19	21,96	86,31	57,97
3	Liveas Fermentation	28,09	6,09	0,98	20,34	53,13	57,26
4	Waste Soybean Powder	94,38	33,00	23,76	4,30	53,78	62,62
5	Coconut Cake	84,09	18,61	9,78	14,99	91,35	48,43
6	Bran Fine	84,08	11,05	6,35	16,51	90,72	51,99

(Fridarti, 2017)

Table 3. Chemical Ingredients Rations Treatment

No	Subtance	A	B	C	D
1	DM	40,61	41,54	45,60	43,67
2	CP	14,98	12,85	13,07	12,96
3	Fatt Crude	18,92	17,79	17,73	17,76
4	Crude Fiber	24,18	21,15	20,67	20,91
5	TDN	67,06	65,031	47,15	55,27
6	Matter Ekstrak non Nitrogen	45,08	50,38	50,16	50,27
	Fiber fraction				
7	NDF	44,526	46,01	45,54	45,77
8	ADF	29,09	33,24	32,71	32,97
9	cellulose	18,49	18,05	18,51	18,28
10	Hemicelulose	15,43	12,76	12,82	12,79
11	Lignin	9,03	13,71	12,79	13,25
12	Silica	1,56	1,46	1,39	1,43

(Fridarti, et.all. 2017)

To determine the effect of the treatment in early stages plus a statistical analysis of variance. If there is a real effect of different treatments to do LSD [6] in [2]

Iimplementation Research

Preparation and implementation of the experimental cage. Cages used is a metabolic cage as much 16 units with each unit filled with a single head of cattle sheep fitted with incandescent lamps as lighting equipment as

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well as a food and drink.

By the time the cattle enter into the cattle shed granted worm medicine as much as 2.5 ml. Before being given ration treatment, adaptation against the cage environment and food during10 day. After that, the cattle were given rations of treatment as the introductory period for 6 days, then do collecting on samples, urine and faeces for 6 days

Sun-dried feces, while urine is given a solution of 1 ml of concentrated HCl is then stored in the refrigerator. Once dried feces and urine samples taken for analysis 10%. After the period expires colencting, cattle were used to observe / measurement of weight gain. In this period the animals were weighed before attending future weight gain. At the time of cattle weight gain done weighed every 10 days for one month until the trial period ends.

Parameters measured

Namely cattle weight : 1). Increase Represents the difference between the final body weight with initial body weight., 2). Level consumption of food is Represents the difference between the amount of food consumed by the remaining daily groceries.

Digest 3). Daya substance or substances of food is calculated based on the sum Collection method., 4). Retensi Nitrogen: Reduce the consumption of nitrogen ration with nitrogen in the feces and urine.,5). Efficiency Rations: Represents the resulting weight gain each unit of ration dry matter consumed.,6). Protein Efficiency Ratio (PER) Namely Added body weight in consumption each unit of protein.

III. RESULTS AND DISCUSSION

1. The mean feed consumption of sheep during the study

Results averaging livestock feed intake (g /head / day) can be seen in Table 5. The results of the study the average feed consumption of sheep were given rations of treatment ranging from 289.789 to 339.003 g / head / day. Where the results of research feed consumption was lowest for the treatment granting cacao leaf fermentation can replace forage 50%, while consumption is highest seen on granting 100% forage. Results of analysis of variance showed that introducing fermented fruit skin cacao and cacao leaf fermentation can replace 50% forage provides highly significant effect on dry matter intake, protein rude, crude fiber ration (P <0.01).

Description: a, b, c = The mean with different superscripts in the same row variables showed highly significant effect (P <0.01).

SE = Standard Error, DM = Material Dry, A = untreated, B = 30% rind Cacao Fermentation, C = 30% Leaves Cacao Fermentation, D = 15% RCF + 15% LF

The results of this study showed that the diet consumed by livestock can increase the total bacterial cellulose in the rumen, as a result of their treatment leaves and rind of cacao fermented in advance, so that the complex compound is in the cacao leaf and fruit skin cacao has undergone an overhaul of complex compounds into simpler compounds. Therefore, the flow rate of feed in the rumen becomes faster as a result of livestock will feel hungry constantly, so the livestock will consume more feed. According to [7] in [2] feed consumption is influenced by several things: the type of animal, type of feed and feed palatability, the type and form of feed also influences the feed consumption. While the [8]in [2] states that the number of ration dry matter consumption basically depends on age, level of production, livestock body condition, weight cattle environmental conditions and the type and kind of foodstuffs.

The average of the results of research administration cacao leaves and rind of fermentation of fiber fraction ration consumption can be seen in tabel5 treatment. The average consumption of NDF ranged from 129.028 to 160.229 grams / day / head. The average consumption of ADF ration of treatment ranged from 84.297 to 115.428 g / day / head, the average consumption of cellulose ration of treatment ranged from 53.592 to 64.015 g / day / head, the average consumption of Hemi cellulose ranged from 39.633 to 44.800 g / day / head, Once analyzed statistics ANOVA test showed that administration of cacao leaves

Table 5. The mean consumption of food substances during the research (g / head / day)

Contain	Food sustnaces				SE
	A	B	C	D	
Dry Matter	289,789^{b}	310,349^{b}	316,105^{ab}	359,003^{a}	8.4093
NDF	129,028^{b}	142,813^{ab}	143,929^{ab}	160,229^{a}	3.9409
ADF	84,297^{b}	103,179^{a}	103,383^{a}	115,428^{a}	3.0964
Cellulose	53,592^{b}	56,053^{b}	58,526^{ab}	64,015^{a}	1.5339
Hemicellulose	44,730^{a}	39,633^{b}	40,546^{b}	44,800^{a}	0.9042
Lignin	26,167^{b}	42,57^{a}	40,448^{a}	46,403^{a}	1.4984
Silica	4,537^{ab}	4,553^{ab}	4,408^{b}	5,008^{a}	0.1090

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and rind of influence and highly significant (P <0.01) on the consumption of NDF, ADF, cellulose, hemicellulose, lignin and silica ration. This shows that the administration of leaves and rind of chocolate can increase the consumption of NDF, ADF, cellulose, hemicellulose, lignin and silica ration treatment. By the numbers shown that administration of a mixture of leaves and rind cacao fruit showed the highest results. This shows that the administration of leaves and rind of chocolate can increase the level of feed intake

2. The mean Weight Gain Sheep livestock, Efficiency Ration for Research

Results of research administration fermented fruit skin cacao and cacao leaves of fermentation on weight gain and feed efficiency can be seen in Table 6.

Table 6. The mean Weight Gain Sheep rations , Efficiency Ration for Research

substantion	Food Traitmant				SE
	A	B	C	D	
Weigth gain(g / head / day)	56,052[a]	60,789[ab]	65,263[bc]	71,315[c]	1.7720
Eficienci Ration	19,220	19,525	20,469	20,326	0.5167

Description: a, b, c = The mean with different superscripts in the same row variables showed highly significant effect (P <0.01).
SE = Standard Error, A = untreated, B = 30% Fermented RindCacao (RCF), C = 30% Leaves Fermentation(LF), D = 15% LF+ 15% RCF

The mean weight gain of sheep by fermenting fruit skin cacao and cacao leaf fermentation ranges between 56,052 – 71,315 grams per day, the lowest weight gain seen in treatment giving 100% forage and weight gain was seen in the treatment of the mixture 25% fermented fruit skin and cacao leaf fermentation 25%. Results of analysis of variance gain of sheep who receive treatment provision cacao fermented fruit skin and cacao leaf fermentation showed highly significant effect (P> 0.05). This shows that the administration of fermented fruit skin cacao, cacao leaf fermentation as well as mixed fruit skin cacao and cacao leaf fermentation gives showed a significant influence on weight gain of sheep. Like wise with weight gain in the percentage of body weight and kg / metabolic body weight. From the results of research show by administering a mixture of fermented cacao rind (25%) and cacao leaf fermentation (25%) showed the highest weight gain. This is due to that the skin of cacao fermentation and fermentation cacao leaf caused the consumption and digestibility of dry matter of the ration also increased, so that the skin of the fruit and cacao leaves are fermented undergone a revamp of the chemicals that can improve the digestibility of the ration. As stated [9] that the weight gain is influenced by feed intake, physical, chemical content and level of feed digestibility. Protein is required cattle to replace the damaged tissue, forming a new network in the process of development and growth as well as for the production of milk. Protein feed will be degraded by enzymes produced by rumen microbes and partly brought into abomasum.

3.**Rations efficiency**, Research Award fermented fruit skin cacao and cacao leaf fermentation of feed efficiency can be seen in Table 6. The results of the study the average efficiency of the ration ranges from 19.220 to 20.326, feed efficiency lows seen in treatment giving 100% forage and feed efficiency was seen on giving rind mixture of fermented cacao (25%) and cacao leaf fermentation (25%). Results anlisis giving rind variety of fermented cacao and cacao leaf fermentation showed no real influence on the efficiency ration (P <0.05). This shows that the administration of a mixture of green, cacao fermented fruit skin and cacao leaf fermentation of the best in this study was 50% forage supplemented with 25% fermented fruit skin cacao and 25% cacao leaf fermentation. This is due to the size of the ration efficiency depends on the number of ration dry matter intake, which could give weight gain. Opinions [10] in [2]. The efficiency of the food is produced body weight gain per unit rations consumed during a certain period. Added by [11] in [2], the efficiency of the use of food for meat and milk production is influenced by race, age, body weight and composition as well as the production level of the food nutrients.

4.**Food Digest Substance (%) ration treatment for Research**

Research the average digestibility of nutrients ration treatment can be seen in Table 7. The mean the results ration treatment provision cacao leaves and rind of fermentation showed dry matter digestibility of the ration ranges from 59.161 to 60.622%, digesty NDF range between 55.673 to 46.731%, ADF digesty between 48.468 to 32.711%, Cellulose from 51.549 to 41.039% and Hemicellulose digesty between 60.344 to 51.919%.

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Table 7. The digestibility of the ration food substances during Research treatment (%)

Substances	Treatment				SE
	A	B	C	D	
Dry Matter	59,161	57,822	60,562	60,622	6.2584
NDF	55,673	34,187	41,511	46,731	8.046
ADF	48,468	26,004	35,166	38,711	6.171
Cellulose	51,549	34,750	39,972	41,039	4.568
Hemicellulose	60,344	53,473	51,898	51,919	3.192

Description : SE = Standard Error, A = untreated, B = 30% Fermented Fruit Leather Cacao, C = 30% Leaves Cacao Fermentation, D = 15%LF + 15% RCF

Generate from this study when viewed from a statistical test that provision leaves and rind of cacao showed that the digestibility of nutrients showed different effects that are not significant (P> 0.05). It is alleged that the administration of leaves and rind of chocolate can replace the grass of the field by 30% and did not affect the digestibility of the ration of sheep.

Judging from the number of dry matter digestibility tends to rise while power Protein digestion rude, crude fiber, crude lipid and BETN tend to decline. It is thought to ration treatment has a balance of nutrients in the ration can improve the growth of sheep. Opinions [12] in [2] states that the higher levels of digestibility, the higher the rate of food. The content of nutrients that can meet the needs of rumen microbes will increase the activity of the rumen mirobial can run well.

The average of the results of research administration cacao leaves and rind of fermentation in the ration to the digestibility of the fiber fraction can be seen in Table 7. Mean digestibility of the fiber fraction in the form of NDF, ADF, cellulose, hemicellulose, respectively turur as follows: the average digestibility of NDF range between 34.187 - 55.673%, averaging ADF digestibility ranged from 26.004 to 48.468%, the digestibility of cellulose ranges from 34.750 to 51.549%. When viewed from a statistical analysis of variance test showed that introducing cacao leaves and rind of fermentation in the ration shows the effect of treatment were not significantly different (P> 0.05) the digestibility of NDF, ADF, cellulose, hemicellulose ration treatment. It is alleged that the administration of leaves and rind of chocolate showed no different effects with ration without treatment. When viewed in the numbers showed that administration of leaves and rind of chocolate can decrease the digestibility of the fiber fraction contained in the ration.

IV. CONCLUSION

Delivery of cacao leaves and rind of up to 50% replacement for forages can increase weight gain, feed intake and digestibility of the ration.

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