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The use of waste cacao *(Theobroma cacao L)* fermentation as a substitute for forage to cattle sheep performance

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Abstract: The purpose of the study is to see the performance of sheep by the leaves and rind cacao fruit fermented in terms of nutrition. Research Hypothesis: Increased development of sheep by the leaves and cacao rind fruit fermented in terms of the nutrition. Benefits of Research: The results of this study can reduce the waste problem cacao can be used as the building blocks for livestock rations ruminasia 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 + forage (40: 60), B = Concentrate 40% + Grass 30% + cacao leaves fermentation (CLF) 30%, C = Concentrate 40% + Grass 30% + skin cacao fruit fermentation(CFF) 30%, D = Concentrate 40% + Grass 30% + CLF 15% + CFF 15%. Variable research is weight gain, consumption of Dry Matter (DM), crude protein, crude fiber, feed efficientio, nitrogen retention .The results of the study are increasing weight of sheep ranged from 56.052 to 71.315 g / head / day with Dry matter consumption ranged from 289.78 to 359.00, from 45.85 to 55.36 g crude Protein(CP), 43.75 - 57.78 g crude fiber(CF), and feed efficientio ranged 19,220 - 20,469%, nitrogen retention 3,304 - 4,165, ratio efficientio protein 1,215 - 1,284The conclusion: The leaves and rind cacao fermented fruit can replace 50% forage and increase the performance of sheep were significantly (P <0.01).
Keywords: Grass, Leaves cacao, Rind cacao fruit, Fermented, performance sheep

INTRODUCTION

Cacao plant waste in the supply of animal feed potentially ruminants 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 can be replaced with alternative feed. cacao fruit consists of 73.73% rind, 2% of the placenta, and 24.20% seeds Haryati and Hardjosuwito [1]. 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% IPPTP [2]. In wet cacao fruit skin moisture content from 84.24 to 86.03%; rough fat 0.74 to 1.23%; 0.90 to 1.07% crude protein; Sugar reduction from 0.80 to 0.97%; tannin from 0.08 to 0.82%; caffeine from 0.04 to 0.12%; coarse fibers from 0.52 to 4.68; ash from 0.55 to 1.57% Anonimous [3]. In addition, the chocolate industry only uses 30% of cocoa fruit, which generates a large volume of husks and shells that can be useful to obtain value-added products [22-24]. Regarding usual disposal of cocoa pod husk, it has been used as cattle feed, however theobromine content restricts the portion that can be consumed so their use has been limited [25].

Improving the quality of chocolate can waste being done with technology such as the treatment of physical, chemical and biological, one of the technologies used are fermented. In the process of fermentation occur 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. Fridarti research results [4] that fermented fruit peels that use Basil sp chocolate can lower crude fiber and increase the crude protein. Muzir study [5] that the fruit skin cacao fermented with yeast tape shows the physical shape and texture well, written by fridarti [6] that fermented cacao rind with Micro Organism Local (MOL) rind of chocolate can increase crude protein and lower crude fiber.

Cacao sewage treatment research by various methods well ammoniation, fermentation with the fungi aspergillus and bacillus mikroba, treatment research on goats, cows have a lot to do but research fermented cacao leaves and rind of a specific use microorganisms indigenus yet. So the research attempted cacao waste

fermentation using microorganism's indigenus to feed the sheep, which indigenus microorganisms are microorganisms that exist in living things that do not interfere with her life. Several studies have isolation of microbial indigenus one by isolation and identification of bacteria of lactic acid and probiotic bacteria are generally investigated derived from fruits, animals and trash. Khairati [7] have managed to characterize molecular Lactic Acid Bacteria from the cacao-producing Bacteriocin green. Novianty research results [8] also characterize molecular amylolytic lactic acid bacteria as probiotic potential of cacao. Formulation of the problem: Is cacao waste fermentation can increase peforman sheep? Research purposes: To get an increase peforman sheep fed with fermented cacao waste. Research hypothesis: Based feed waste fermentation cacao can increase peformen sheep. 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.

MATERIALS AND METHODS

In this experiment the use of materials as follows: ration treatment consisted concentrate (bran Fine, coconut cake, powder waste soybean, Ultra minerals, salt), leather cacao fermentation and cacao leaf fermentation which ration treatment advance in the analysis of proximate and power levels digestibility with in-vitro analysis, 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.

Methodology

This experiment using a randomized block design (RBD) with four replications as a group and 4 types of ration treatment. The ration treatment as follows:

A = Concentrate + forage (40: 60)
B = Concentrate 40% + Grass 30% + skin cacao rind fruit fermented (CFF) 30%
C = Concentrate 40% + Grass 30% + cacao leaves fermented (CLF) 30%
D = Concentrate 40% + Grass 30% + skin cacao rind fruit fermented (CFF) 15% + cacao leaves fermented (CLF) 15%

Concentrate composition used can be seen in Table 1, the nutrient content of the material making up the ration can be seen in Table 2. The nutrient content of the ration treatment can be seen in Table 3

Table 1. Composition Composer Concentrate

No	constituent ingredients	amount (%)
1	bran fine	40
2	coconut cake	30
3	weste soybean powder	27
4	ultra mineral	2
5	salt	1
Total		100

Table 2. The nutrient content of the constituents of ration (%)

No	material	Dry Matter	Crude Protein	Crude Lipid	Crude Fiber	TDN	MEnN
1	grass Courses	11,45	12,45	4,94	32,05	59,75	40,31
2	Skin cacao fermentation	14,55	5,35	1,19	21,96	86,31	57,97
3	Cocoa leaf fermentation	28,09	6,09	0,98	20,34	53,13	57,26
4	soybeans powder waste	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	Fine bran	84,08	11,05	6,35	16,51	90,72	51,99

Description : TDN = Total Digestible Nutrition, MEnN = Material Ectrax non Nitrogen

Table 3. Chemical Ingredients Rations Treatment

No	substance	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	Fat fiber	6,92	5.79	5.73	5.76
4	Crude fiber	24.18	21.15	20.67	20.91
5	TDN	67.06	65.03	47.15	55.27
6	Matter Ekstrac no Nitrogen	45.08	50.38	50.16	50.27
	Fiber fraction				
7	NDF	44.52	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	Hemicellulose	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

To determine the effect of treatment in early stages of the statistical analysis of variance. If there is a real effect of different treatments to do *Least Significance Different (*LSD) Steel and Torrie [9].

Implementation Research

Research was conducted in metabolic cages sebanyak 16 units with each unit filled with a single head of the sheep fitted with incandescent lamps as lighting equipment as well as a food and drink. Award-worming 25 ml when livestock get into the cage. Before being treated rations, livestock beradabtasi advance for 15 days. After that, the cattle were given rations of treatment as the introductory period for 15 days, then do colecting to ration treatment sample taken ration, urine and faeces for 6 days. After the period expires colecting, livestock directly observable / measurement of weight gain. In this period the animals were weighed before attending future weight gain. Sample feed, feces dried in the sun for 6 days, while urine is given a solution of 1 ml of concentrated HCl is then stored in the refrigerator. Once dried feces and urine respectively 10% of samples taken for analysis.

The variables measured

1. Animal body weight, food consumption rate, the digestibility of the food substance or substances.
2. Retenci nitrogen, feed efficiency, Protein Efficiency Ratio (PER)

RESULTS AND DISCUSSION

Consumption

The average feed consumption of sheep during the study. Results averaging livestock feed intake (g / body / day) can be seen in Table 4.

Table 4. The average of consumption of food substances for research

substantion	Food traitmant				SE
	A	B	C	D	
Dry Matter (g/head/days)	$289,789^{b}$	$310,349^{b}$	$316,105^{ab}$	$359,003^{a}$	8.409
Dry matter (weight %)	3,90	3,79	3,88	4,22	0.175
DM (kg/weight^{0,75})	44,473	54,539	65,78	75,52	1.542
Crude Proteinr (g)	$45,85^{c}$	$48,91^{bc}$	$51,56^{ab}$	$55,36^{a}$	1.628
Crude Fiberr (g)	$43,75^{b}$	$50,73^{ab}$	$50,20^{ab}$	$57,78^{a}$	2.403
extract matters non nitrogen (g)	$173,72^{b}$	$179,38^{b}$	$181,97^{ab}$	$201,91^{a}$	6.604

Description: a, b, c = Mean with different superscripts in the same row variables showed highly significant effect (P <0.01).
SE = Standard Error, DM = Dry Materials, A = untreated, B = 30% Fermented Fruit rind cacao, C = 30% Leaves cacao Fermentation, D = FFC15% + 15% LCF

The results of the study the average feed consumption of sheep were given rations of treatment ranging from 289.789 to 339.003 g / body / day. Results of analysis of variance showed that introducing fermented rind fruit skin cacao and cacao leaves fermentation can replace 50% forage provides highly significant effect on dry matter intake, protei rude, crude fiber ration (P <0.01). While the research results Pazla [10]. Award cacao rind in ammoniation on the sheep were added to the mineral phosphorus, sulfur and saccahromyces sp showed the average dry matter intake ranged from 436.64 to 555.51 grams / body / day, while the material consumption organic ranged from 317.22 to 404.3 grams / body / day. It is suspected the existence of high fiber content in the fruit skin cacao. This is consistent with the statement of Zain [11] that the fiber (NDF, ADF and lignin) will decrease the level of consumption. According to Van Soest [12] 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. Sutardi [13] states that dry matter intake is influenced by several factors such as the quality or composition of the food in the ration. Then Blaxter [14] states that the ration dry matter intake was influenced by the palatability, the amount of feed available, the quality or composition of the chemical feed. While the NRC [15] 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 ration dry matter intake will be influenced also by the palatability, the amount of feed available, the quality and chemical composition of the feed itself. While the NRC [15] 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. Tillman *et al.;* [16] stated that Crude Fiber is a factor of chemical components which is the biggest influence on digestibility, high semaikn generally the lower crude fiber digestibility and rate of degradation of food in the rumen. Devies [17] stated that his consumption of food substances is influenced by the quality and composition of the food in the ration.

Mean Weight Gain Sheep livestock, Efficiency ratio and Protein Efficiency Ratio for Research

Results of research administration fermented fruit rind skin cacao and cacao leaves of fermentation on weight gain and feed efficiency can be seen in Table 5.

Table 5. The average of Weight Gain, Sheep, Efficiency ration and REP for Research

substantion	Food traitmant				SE
	A	B	C	D	
Weight (g/head/days)	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
Ratio Eficienci Protein (REP)	1,215	1,239	1,253	1,285	0.0290
Retenci Nitrogen	3,55	3,304	3,779	4,165	0.9217

Description: a, b, c = Mean with different superscripts in the same row variables showed highly significant effect (P <0.01).
SE = Standard Error, DM = Dry Materials, A = untreated, B = 30% Fermented Fruit rind cacao (FFC), C = 30% Leaves cacao Fermentation (LCF) , D = Fermented Fruit rind cacao(FFC)15% + 15% Leaves cacao Fermentation(LCF)

The mean weight gain of sheep by fermenting fruit rind skin cacao and cacao leaves fermentation ranged between 59.052 -71.315 grams / day / body, the result of analysis of variance gain of sheep who receive treatment provision cacao fermented fruit rind skin and cacao leaves indicates the effect of different fermentation highly significant (P <0.01). This shows that the administration of fermented fruit skin rind cacao, cacao leaves fermentation as well as mixed fruit skin cacao and cacao leaves fermentation gives showed a significant influence on weight gain of sheep. While the research results Pazla [10] Award cacao rind ammoniation plus mineral phosphorus, sulfur and saccahromyces sp get the average body weight ranged between 75-130 grams. This is consistent opinion of Davies [17] says that the level of food consumption is influenced by the animal, body weight, the age of cattle, production rate, obesity livestock, protein, calorie feed, blood and rumen metabolism, physiological condition and value of feed digestibility. Opinion Tillman *et al.;* [16] 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. In the rumen, protein fermented into ammonia (NH_3), which is used to build cells. In addition Suyuti [18] states that the eating habits of the animals affected by hunger, the time available, the physical form of food and frequency of feeding.

Research Award fermented fruit skin rind cacao and cacao leaves fermentation of feed efficiency can be seen in Table 5. The results of the study the average efficiency of the ration ranges from 19.220 to 20.466. Results anlisis giving rind variety of fermented cacao and cacao leaves fermentation showed no real influence on the efficiency ratio (P> 0.05). While the research results Pazla [10] Award ammoniation cacao rind which suplay mineral phosphorus, sulphur and saccahromyces sp showed the average feed efficiency ranging from 17% - 22.65% This is due to the size of the ration efficiency depends on the number of ration dry matter intake capable giving weight gain. Added by Sutardi [13] states that the amount of feed efficiency will depend on the amount of ration dry matter intake, which could give weight gain. Opinions Moteiro [19] the efficiency of the food is produced body weight gain per unit rations consumed during a certain period. Added by Ranjhan and Pathak [20], 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.

Nitrogen retention is a description of the amount of nitrogen that can be stored in the body of livestock. Nitrogen retention results during the research can be seen in table 18. Statistical test results shown that the average nitrogen retention that shows no real influence. This illustrates that the increase in nitrogen metabolism in the body of livestock affecting the nitrogen anabolism. Opinions Sutardi [21] states that the uses of protein for ruminants are also dependent on the biological value protein. This value will be used by the body of livestock. Added by Sutardi [13] 50-67% nitrogen absorbed derived from microbial protein. The share of microbes relatively large if the protein content of the feed is low, contrary to the provision of rations of high protein content, protein value will be determined largely by the nature of the protein, the quantity and quality of protein feed

CONCLUSION:

The leaves and fruit skin cacao use fermentation microorganisms can replace forage indigenus 50% and improve the performance of sheep were significantly (P <0.01). Despite the low consumption, weight gain and feed efficiency which can be lower than ammoniation brown rind that has been added minerals phosphorus, sulfur and Saccharomyces sp.

Suggestion:

It should further study the addition of other ingredients such as minerals added to the fermentation process to increase the activity microorganism's indigenus cacao rind of making it more effective and optimum.

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