

The Use of Ramie By-Product (*Boehmeria nivea*) Materials as Complete Feed on the Growth and Hematology of Weaning Ettawa Cross Breed Goat

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ABSTRACT: This study aims to determine the effect of complete feed using ramie with or without ensilage and vegetable or animal sources of protein towards the growth and blood hematology of weaning Ettawa cross breed goat. The study used a 2X2 factorial design and 6 (six) replicates. The complete feed treatment using ramie by-product without ensilage showed that almost all parameters of growth was higher than the ensilaged one ($P < 0.05$) except height. Complete feed treatment using ramie by-product with an additional source of animal protein indicates the final weight and daily weight gain (PBBH) was higher ($P < 0.01$). The interaction of both treatments was proved the final weight, daily weight gain, and chest circumference. The complete feed treatment using ramie without and with ensilage, the addition of a source of protein and the interaction of both treatments had no effect on the blood hematology. The study could be concluded the weaning Ettawa cross breed goat that received complete feed using ramie waste without ensilage showed higher growth while the addition of animal protein sources are higher.

Keywords: Blood hematology, Ensilage, Growth, Protein Source, Ramie.

INTRODUCTION

Ramie (*Boehmeria nivea* L Goud) is a shrub that produces fibers in the bark. Its fiber production is approximately 3 to 5% of forage production and the rest is forage by product. Ramie leaves can be used as a substitute for forage legume since its crude protein content was 22% (Saroso, 2000). It was reported that it has shortage of amino acids methionine, mineral phosphor (P) and cuprum (Cu) (Duarte *et al.*, 1997). Methionine is an essential amino acid, while mineral P plays a role in energy metabolism and Cu is a micro mineral in the transport of oxygen. The straw from decortication residue which has crude fiber (CF) as high as 37.81% can be used as a source of fiber (energy) for ruminant. Production and nutritional feed quality of ramie by product was maximized as complete feed constituent and being formulated with vegetable or animal sources of protein, a source of energy, vitamins and mineral. Complete feeds with different protein sources experiencing ensilage that those without ensilage. Ensilage in complete feed is the simplest method of improving its quality for long-term storage (Wongnen *et al.*, 2009), and increase the digestibility of dry matter (DM), organic matter (BO), crude fiber (CF) as well as non-structural carbohydrate (Vasupen *et al.*, 2005; 2006) due to the growth of lactic acid bacteria. Complete feed was given to after weaning Ettawa cross breed goat in order to identify its influence as animal feed by measuring growth and blood hematology.

MATERIAL AND METHODS

Complete feed consists of ramie by-product (stalks and leaves), dried cassava, cassava, rice bran, pollard, crushed soybeans, soybean meal, fish meal, molasses, urea, salt, calcium, and mineral mix. Ration composition and nutrient are presented in Table 1. Twenty after weaning Ettawa cross breed goats (age 3 to 4 months) and 24 units of individual housing are equipped with eat and drink container. The chemicals and analysis was equipment BK, BO, CP, NDF, and ADF. Weighing capacity of 200 g and 20 kg. The method used was experimental in vivo, the basic design of completely randomized design (CRD) 2X2 factorial and 6 (six) replicates (Steel and Torrie,

1993) The first factor is a complete feed without ensilage (CF0) or with ensilage (CF1), while the second factor is a source of vegetable protein (N) or animal (H). The four kinds of treatment are: 1) CF0N is complete feed without ensilage and source of vegetable protein, 2) CF0H is complete feed without ensilage and sources of animal protein, 3) CF1N is complete feed with ensilage and source of vegetable protein, 4) CF1H is complete feed with ensilage and diverse sources of animal protein. Difference analysis was following the procedure of general linear models (GLM) in the SAS program version 6.12 (SAS, 1996) and a further test of Honestly Significant Different (Gill, 1978). Growth parameters variables measured were as follows: final body weight, daily weight gain (PBBH), height, body length, chest circumference, and the circumference of the pelvis (Hardjosubroto and Astuti, 1993) and hematological blood (glucose, erythrocytes, leukocytes, hemoglobin, and PCV).

Table 1. Complete feed formulation and nutrient composition

Ingredient	Proportion (%)			
	CF0N	CF1N	CF0H	CF1H
Ramie leaves	13.5	13.5	13.5	13.5
Ramie stalk	16.5	16.5	16.5	16.5
Dried cassava	10	10	10	10
Cassava	10	10	10	10
Rice bran	9.4	9.4	14.95	14.95
Pollard	9	9	9	9
Soybean meal	10.5	10.5	-	-
Crushed soybeans	8.8	8.8	-	-
Fish meal	-	-	13.75	13.75
Molases	10	10	10	10
Urea	0.3	0.3	0.3	0.3
Salt	0.5	0.5	0.5	0.5
Calcium	0.5	0.5	0.5	0.5
Mineral+Vitamin	1	1	1	1
Total	100	100	100	100
Chemical composition*				
Ash (% BK)	10.42	9.50	13.53	11.25
Extract ether (% BK)	1.93	2.51	3.31	3.42
Crude fiber (% BK)	19.59	13.46	19.91	15.65
BETN (% BK)	48.18	52.99	41.12	49.62
Crude protein (% BK) ¹	19.88	21.54	22.13	20.07
TDN (% BK) ¹	70.01	70.01	65.74	65.74

*) Calculation based on table (Hartadi *et al.*, 2005) and analysis result of Animal Feed Laboratory,
¹) Nutrition need of after weaning Ettawa cross breed goat is PK 12.70% and TDN 64.81% (Ranjhan, 1981).

Sequences of Work

1. Prepare 24 after weaning Ettawa cross breed goat and weighing and worm medication and vitamins. Goats are placed in individual cages.

2. Raising begins with a stage adaptation for 14 days and feeding as much as 3.5% of its weight at 06.30 pm and 15.00 pm and drinking water and labium. Raising is carried out for four months.
3. Complete feed using ramie by-product with ensilage (Table 1) then conduct the ensilage process an-aerobically for 21 days at room temperature. Complete feeds using ramie by-product without ensilage was prepared every day with the composition as in Table 1 with the leaves and stems of ramie was in the form of air-dried.
4. Individual weighing was conducted every two weeks (after the preliminary stage) and measured the size of the body to determine the weight and daily weight gain before feeding in the morning. Blood sampling was conducted for hematology test.

RESULTS AND DISCUSSION

The treatment using a complete feed of ramie by-product with and without ensilage and source of vegetable and animal protein on the growth of after weaning Ettawa cross breed goat is presented in Table 2.

Feed using ramie without by-product and with ensilage and vegetable and animal protein sources

Parameter	Protein source	CF0	CF1	Interaction
Final body weight (kg BB 0.75)	N	9.51±0.68 ^{ac}	8.66±0.20 ^{bc}	s
	H	10.19±0.23 ^{ad}	8.72±0.33 ^{bd}	
Daily weight gain (g/kg BB0.75)	N	77.97±11.89 ^{ac}	42.37±3.22 ^{bc}	s
	H	108.66±22.06 ^{ad}	51.02±4.86 ^{bd}	
Height (cm)	N	62.80±1.60	63.00±3.29	ns
	H	62.80±2.93	61.00±1.90	
Body length (cm)	N	55.78±1.37 ^a	51.40±3.20 ^b	ns
	H	56.00±1.09 ^a	51.83±1.72 ^b	
Chest circumference (cm)	N	61.00±1.55 ^a	60.20±2.31 ^b	s
	H	63.00±1.67 ^a	58.20±2.99 ^b	
Pelvis Circumference (cm)	N	62.00±1.67 ^a	58.60±3.98 ^b	ns
	H	66.40±2.15 ^a	59.00±4.43 ^b	

Description: ^{ab}: different superscript in the same row/column showed significant differences (P<0.05).

^{cd}: different superscript in the same row/column showed highly significant differences (P<0.01).

CF0: complete feed ramie by-product without ensilage; CF1: complete feed using ramie by-product with ensilage N: source of vegetable protein; H: source of animal protein.

Final Weight and Daily Weight Gain (PBBH)

After weaning Ettawa cross breed goat who get complete feed using ramie by-product without ensilage showed final body weight of 9.76±0.55 kg BW0.75 (20.87±0.45 kg; CF0N) and 9.93±1.73 kg BW0.75 (21.50±2.08 kg; CF0H) higher than the complete feed with ensilage of 9.93±1.73 kg BW0.75 (18.30±2.08 kg; CF1N) and 8.76±0.59 kg BW0.75 (18.07±0.49 kg; CF1H) (P<0.05). Final weight of after weaning Ettawa cross breed goat achieved as a result of weight gain daily (PBBH) with a positive average value 77.97 g/kg BB0.75/day (CF0N) dan 108.66 g/kg BW0.75/day (CF0H). 42.37 g/kg BB0.75/day (147.71 g/day) (CF1N) and 51.02 g/kg BW0.75/day (189.23 g/day) (CF1H) (P<0.05). Weight gain was consistent with the consumption of BK, OM and NDF and were higher in animals that received complete feed without ensilage (P<0.01) (Susanti and Suhartati, 2015). It shows the total consumption intake to supports livestock growth and productivity. Final body weight in this study was higher than the study results of Musnandar

et al. (2011). The goat who received rations of grass substitution with fermented palm bunches of 0%, 50% and 100% produced the final weight of 16.68 kg; 18.07 kg and 18.5 kg). Achievement of the final weight of the treatment showed that complete feed can provide energy and protein for the after weaning Ettawa cross breed goat and indicated real interaction of both treatments. Growth period is the period that require nutrient intake of energy and protein sources in sufficient amounts as provided in the rations, larger than the recommended requirements of Ranjahn *et al.* (1981) for after weaning Ettawa cross breed goat.

Height, Body Length, Chest Circumference, and Pelvis Circumference

After weaning Ettawa cross breed goat who received complete feed using ramie by-product without and with ensilage showed no significant difference of body length of 62.80±1.60 cm on CF0N; 62.80±2.93 cm on CF0H; 63.00±3.29 cm in CF1N, and 61.00±1.90 cm on CF1H. The average size of goat body length who received complete feed using ramie by-product without ensilage was 55.78±1.37 cm (CF0N) and 56.00±1.10 cm (CF0H), longer than those who got complete feed with ensilage of 51.40±3.20 cm (CF1N) and 51.83±1.72 cm (CF1H) (P<0.01). After weaning Ettawa cross breed goats' body length (less than one year) was 49.4±7.8 cm (Kurnianto *et al.*, 2013). Body weight is a reflection of livestock (Cam *et al.*, 2010). The size of chest circumference of after weaning Ettawa cross breed goat who got complete feed using ramie by-product without ensilage was 61.00±1.55cm (CF0N) and 63.00±1.67 cm (CF0H), greater than those who received complete feed with ensilage of 60.20±2.31 cm (CF1N) and 58.20±2.99 cm (CF1H) (P<0.01). The development of chest circumference size was according to goat consumption that received complete feed of ramie by-product of BK, BO and NDF that were respectively higher than complete feed without ensilage. Treatment of different protein sources showed the same response in body length and chest circumference. The effect of complete feed using ramie by product without ensilage on the size of the pelvis circumference was 62.00±1.67 cm (CF0N) and 66.40±2.15 cm (CF0H), higher than those who received complete feed silage of 58.60±3.98 cm (CF1N) and 59.00±4.43 cm (CF1H) (P<0.01).

Blood Hematology

The distribution of complete feed using ramie by-product with and without ensilage and the use of vegetable and animal protein source at weaning goat against hematological blood condition is presented in Table 3.

Table 3. Condition blood hematology of after weaning Ettawa cross breed goat who received complete feed of ramie by-product with and without ensilage and different protein sources

Parameter	Protein source	CF0	CF1	Interaction
Glucose	N	46.67±8.07	46.17±4.83	ns
	H	46.83±10.68	45.67±7.92	
Erythrocytes (X106/uL)	N	2.39±0.34	2.07±0.51	ns
	H	2.15±0.34	1.94±0.39	
Leukocytes (X103/uL)	N	19.82±5.39	19.48±3.28	ns
	H	21.15±3.65	17.02±3.34	
Hemoglobyn (g/dL)	N	9.77±0.64	9.15±1.29	ns
	H	9.38±0.95	8.80±1.34	
PCV (%)	N	26.00±5.19	23.63±6.11	ns
	H	23.37±4.55	21.90±6.10	

Description: CF0: complete feed using ramie by-product without ensilage; CF1: complete feed using ramie by-product with ensilage N: complete feed using ramie by-product with vegetable protein sources; H: complete feed using ramie by product with the source of animal protein.

Complete feeds using ramie by-product with and without ensilage had no effect on blood hematology of blood glucose; erythrocytes; leukocytes; hemoglobin and PCV. Barbari goat that got the complete feed block consisted of grass hay: concentrate of 60:40 (T1). While mustard cake in concentrate amounted to 15% (T2) and 30% (T3) that was replaced with leucaena leaves flour showed the blood glucose concentration of 53.59±0.85 mg/dl; 53.67±1.05 mg/dl and 53.80±0.95 mg/dl ($P>0.05$) (Samanta *et al.*, 2003). Kramer (2000) reported the condition of normal blood hematology of goats was: erythrocytes 6 to 19 X10⁶/uL; leukocyte 4 to 13X10³/uL; hemoglobin 8 to 12 g/dL; and PCV 22 to 38%. The number of erythrocytes of weaning Ettawa cross breed goats who received complete feed using ramie by-product with both treatments was lower than Kramer guidance (2000). It was suspected that weaning Ettawa cross breed goats showed symptoms of anemia. Leukocyte counted higher than the Kramers' recommendation (2000). They were showing infection. Nutrition in complete feed using ramie by-product with vegetable or animal protein source is also had no real effect on blood hematology. Interaction of the two treatments on after weaning Ettawa cross breed goats hematological blood is not significantly different.

CONCLUSION

The weaning Ettawa cross breed goats that received complete feed using ramie by-product with ensilage shows lower growth, while complete feed using ramie by-product with source of vegetable protein has low nutrition than animal protein source.

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