

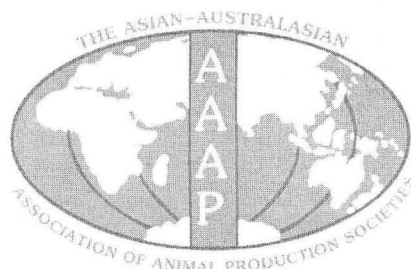


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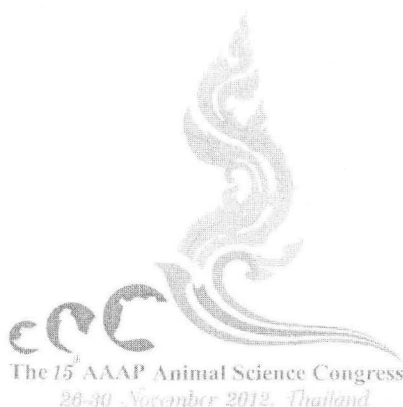
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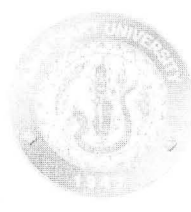
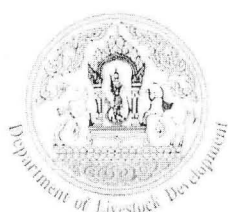
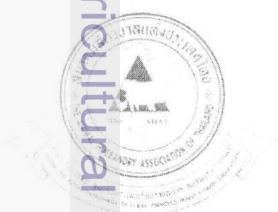
Improving Smallholder and Industrial Livestock Production for Enhancing Food Security, Environment and Human Welfare

Proceedings Full Papers

Editors: S. Koonawootrittriron, T. Suwanasopee, T. Jaichansukkit,
D. Jattawa, K. Boonyanuwat and P. Skunmun



The 15th AAAP Animal Science Congress





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Asian-Australasian Association of Animal Production Societies

Scope of AAAP: AAAP is established to devote for the efficient animal production in the Asian-Australasian region through national, regional, international cooperation and academic conferences.

Brief History of AAAP: AAAP was founded in 1980 with 8 charter members representing 8 countries-those are Australia, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines and Thailand. Then, the society representing Taiwan joined AAAP in 1982 followed by Bangladesh in 1987, Papua New Guinea in 1990, India and Vietnam in 1992, Mongolia, Nepal and Pakistan in 1994, Iran in 2002, Sri Lanka and China in 2006, thereafter currently 19 members.

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Digestibility Comparison of Ramie (*Boehmeria nivea*) Leaves Hay and Silage in Jawarandu Goat Ration

Despal, Mubarak and M. Ridla

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Ramie leave is a leafy protein by product of ramie plantation that can be used as feed source for ruminant. Due to its seasonal availability following of its 40 days harvesting period for the fiber production, the leave should be conserved to be able to use it in daily ruminant ration. Our previous works have optimized drying and ensiling techniques of the leave. This study was aimed to compare digestibility of ration contained ramie leaves hay and silage on Jawarandu goat. The experiment was done using female Jawarandu goats weighted 27 ± 4.68 kg. The experiment was conducted from September to December 2010 at the field laboratory of Dairy Nutrition, Faculty of Animal Science, Bogor Agricultural University. Randomized block design was used in this experiment. Three types of iso-caloric and iso-nitrogenous rations (R1 = Control ration consisted of 50% grass + 50% concentrate; R2 consisted of 50% grass + 50% concentrate + 10% ramie leaf silage, and R3 consisted of 50% grass + 40% concentrate + 10% hay ramie leaf) were used as treatment. Each treatment was repeated thrice. Ration and nutrients offered, ration and nutrients left over, total fecal and its compositions were measured for consumptions and digestibilities calculations. The data obtained were analyzed using analysis of variance (ANOVA) and continued with Duncan's multiple range tests. The results showed that the digestibility of Ether Extract (DEE) in R1 (78.01%) was lower than R2 (86.47%) and R3 (86.61%); The digestibility of nitrogen free extract (DNFE) in R1 (72.73%) was higher than R2 (62.80%) and R3 (63.86%), but there were no significant different effect of the treatments on digestibilities of dry matter (DMD), material organic (DMO), crude protein (DCP), and crude fiber (DCF) of the rations. Substitution of 10% concentrate by ramie either in hay or silage forms did not affect digestibility of ration and nutrition except nitrogen free extract digestibility which was slightly lower for the ration contained ramie leaves.

Key Words: Ramie leaves, Silage, Hay, Digestibility, Goat

INTRODUCTION

Seasonal availability of forage in Indonesia needs a precise planning to be able to provide sustainable high quality forage for ruminants. Conserving seasonal available leafy protein plantation by product such as ramie leave is one alternative of forage planning. Ramie leave is by product of ramie plantation which produces fiber for textile industry. Each hectare of ramie plantation produced 100 ton of forage with 38% to 62% of leaves to stem proportions (Angelini *et al.*, 2000). The forage yield was three times higher if the ramie was planted in tropical climate.

According to our previous experiment, the leaves contained 16.35% crude protein and 13.61% crude fiber and susceptible for dairy ruminant such as Jawarandu goat. Inclusion of ramie leaves hay and silage

Our previous work have also compare several drying technique on ramie leaves' hay making. Our experiment has also worked on addition of several water soluble carbohydrate sources to improve ramie leaves silage quality. Comparison of ramie hay and silage utilization in dairy ration was also tested in vitro. The results showed that both hay and silage of ramie leaves improved nutrient and digestibilities of the ration (Despal et al., 2011).

The study was aimed to compare in vivo digestibility of ration contained ramie leaves hay and silage in vivo using dual purpose Jawarandu Goat.

MATERIALS AND METHODS

The experiment has been conducted from September to December 2010 in field laboratory of Faculty of Animal Science, Bogor Agricultural University. Female Jawarandu goats with initial weight 27 ± 4.68 kg were placed in individual metabolic cage. Rations were offered 3% BW twice daily, while waters were given ad libitum.

The experimental rations were consisted of 50% nature grass and 50% concentrate (R0), 50% grass + 40% concentrate + 10% ramie leaves in form hay (R1) or silage (R2). Concentrate of R0 treatment consisted of 15% cassava extract meal, 7.07% corn meal, 15.73% coconut oil meal, 10.49% soybean oil meal, 1.24% DCP and 0.47 CaCO₃. While concentrate of R1 and R2 treatments consisted of 15% cassava extract meal, 5.05% corn meal, 11.23% coconut oil meal, 7.49% soybean oil meal, 0.88% DCP and 0.36 CaCO₃. All rations were formulated iso nitrogenous (15% CP) and iso caloric (65% TDN).

Hay was made by drying ramie leaves in open sun drier for 21 h light intensity. To be able to mix the hay with concentrate, the leaves were then ground to pass 0.5 mm screen. Ramie leaves silage were made by ensiling two centimeter chopped ramie leaves in 200 liter plastic container anaerobically. Part of cassava extract meal (20% W/W ramie leaves fresh substance), ingredient of R2 concentrate, were added prior ensiling to improve the silage quality. Ensiling process were let 5 weeks at room temperature. The silages were given fresh.

The animal were adapted to experimental condition for 1 week, then 2 weeks of preliminary phase followed by 1 week collecting phase. The amount of feeding offered, left over, feces and their nutrients (DM, ash, CP, fat, CF) contents during collecting phase were measured and analyzed to calculate ration and its nutrients consumption and digestibility. The digestibility trial followed total collection method (Menke and Close, 1986).

Randomly block design was used in this experiment. Three types of rations were tested as treatments and three animals per treatment were used as block. The blocks were decided based on animal body weight. Data were analyzed using ANOVA and the significant different between treatment were subjected to Duncan multiple range test.

RESULTS AND DISCUSSIONS

Ration composition and consumption

Proximate composition of ration and the amount of ration consumed by animal were given in table 1. Proximate composition of the experimental ration did not show a large different between the treatment. Lower DM content of R2 ration might cause by degradation of some DM during ensiling of ramie leaves.

Utilization of 10% ramie leaves in form of hay or silage did not influence DM, CP, fat, CF or NFE consumption significantly. Average daily DM and nutrient consumed by animal in this experiment were equal to that recommended by NRC (2006) and higher than that was found by Suparto (2011) which found average daily DM consumption for only 434 – 560 g. Treatment R1 tend to produce higher ration consumption than R2. It might cause by higher bulk density of R1 ration compare to R2 (Toharmat, 2006). Although the animals were offered DM ration about 3% BW, however, the animal only consumed DM ration for about 2.7% BW (for R0 and R1) and 2.6% BW (for R2). Parts of the ration offered were left over in the feeding bucket. These might be non edible part of nature grass or part of concentrate that cannot be ingested by the animal.

Table 1. Proximate composition of experimental rations

Parameters	R0	R1	R2
Ration (%)			
DM	55.09	54.67	48.87
Ash	8.34	9.14	8.47
CP	12.95	12.50	12.57
Fat	5.83	5.53	6.31
CE	19.84	20.21	20.57
NFE	53.04	52.63	52.10
Consumption (g/d)			
DM	681.92 ± 62.21	784.19 ± 215.80	637.89 ± 33.87
ON	625.95 ± 57.21	713.09 ± 196.25	580.06 ± 30.65
CP	93.23 ± 8.06	102.08 ± 27.41	91.53 ± 1.57
Fat	38.45 ± 3.57	45.68 ± 12.34	51.34 ± 1.50
CE	128.22 ± 13.18	153.92 ± 42.06	129.95 ± 10.17
NFE	366.05 ± 32.40	411.40 ± 114.51	307.25 ± 19.38

Ration digestibility

Digestibilities of experimental ration were shown in table 2. The amounts of nutrient digested were not significantly different between the treatments. However, coefficients of ration digestibility were different among the treatments. Treatment R0 had higher digestibility coefficient in compare to R1 and R2 except for fat and CF digestibility coefficient.

Table 2. Digestibility of ration

Parameters	Treatments		
	R0	R1	R2
Digested (g/head/day)			
DMI	445.73±31.46	477.88±143.69	392.54±16.65
OMI	439.61±33.76	471.40±138.19	380.51±15.65
CEI	67.54±1.31	64.64±18.51	59.63±3.53
FCEI	30.04±3.41	39.74±11.80	44.42±2.34
CEI	75.73±3.76	103.49±30.19	83.61±5.13
NFE	266.32±25.94	263.52±81.04	192.85±7.76
TDN	477.16±38.02	521.08±152.93	436.02±15.98
Digestibility (%)			
DMI	65.42±1.35 ^a	60.68±1.41 ^b	61.57±1.42 ^b
OMI	70.28±1.03 ^a	65.91±1.08 ^b	65.63±1.33 ^b
CEI	72.66±4.88 ^a	63.13±2.63 ^b	65.12±2.75 ^b
FCEI	78.01±1.57 ^b	86.61±2.15 ^a	86.47±2.27 ^a
CEI	59.22±3.15 ^b	67.02±2.83 ^a	64.47±4.19 ^{ab}
NFE	72.73±0.53 ^a	63.86±1.75 ^b	62.80±1.53 ^b
TDN*	70.83±0.83 ^a	67.44±1.16 ^b	67.71±1.53 ^b

Note: Different superscripts at the same row showed a significant different at $p < 0.05$.

There was no different between hay and silage addition of ramie leaves on digestibility of ration. Coefficient digestibility of ration used in this experiment ($> 60.68\%$) were higher than that was found by Anitasari (2008) which were only 50.7-59.7% but lower than that was found by Hutabarat *et al.* (2009) on in vitro digestibility trial. Calculated total amount of nutrient digested (TDN) by the animal ($>67\%$) were higher than TDN formulated concentrate (65%).

It can be concluded that inclusion of 10% ramie leaves in form of hay or silage did not influence ration consumption but slightly reduced digestibility. However, there is no digestibility different between hay or silage form of ramie leaves inclusions. The experimental rations have higher coefficient digestibility therefore produced higher total digestibility nutrient than that was expected.

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