CONTINUOUS UREA-MOLASSES SUPPLEMENTATION FOR SUMATRA THIN TAIL EWES GRAZING IN RUBBER PLANTATION: REPRODUCTIVE PERFORMANCES

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ABSTRAK

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Pengaruh suplementasi tetes-urea terhadap tampilan reproduksi induk domba diteliti pada domba lokal Sumatera. Digunakan induk domba sebanyak 116 ekor yang dibagi menjadi dua kelompok (58 ekor per kelompok) dan secara acak diberi perlakuan pakan, yaitu suplementasi tetes-urea dan digembalakan di areal perkebunan karet atau tanpa suplementasi dan hanya digembalakan di areal perkebunan karet. Tetes dicampur dengan urea (3%, kg/kg) dan diberikan *ad libitum* di dalam kandang. Penelitian berlangsung selama 21 bulan. Jumlah anak dilahirkan lebih banyak pada domba yang diberi suplemen dibandingkan kontrol (166 *vs* 114 ekor) yang diakibatkan oleh jumlah anak sekelahiran yang lebih tinggi (P<0,05) pada kelompok suplementasi (1,34 *vs* 1,24 ekor) dan selang beranak yang lebih pendek (216 *vs* 232 hari). Bobot lahir anak tidak berbeda antara kelompok suplementasi dan kontrol (1,79 *vs* 1,61 kg), tetapi bobot sapih lebih tinggi (P<0,05) pada kelompok suplementasi (8,90 *vs* 7,55 kg). Bobot induk setelah melahirkan juga lebih tinggi (P<0,05) pada kelompok suplementasi (22,7 *vs* 20,6 kg), tetapi angka kematian lebih tinggi pada kelompok kontrol (32 *vs* 25%). Dibandingkan pada induk kontrol, bobot anak disapih per induk per tahun lebih tinggi (P<0,05) pada domba yang mendapat urea-tetes (20,2 *vs* 15,1 kg), demikian juga produktivitas per kg bobot induk (0,88 *vs* 0,71 kg). Disimpulkan bahwa pemberian campuran tetes-urea kepada induk domba produktif dapat meningkatkan produktivitas induk yang terutama disebabkan oleh meningkatnya bobot anak disapih, lebih pendeknya selang beranak dan lebih rendahnya tingkat kematian anak.

Kata kunci : Tetes, urea, domba, keragaan reproduksi

ABSTRACT

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The reproductive responses of local Sumatra ewes on the continuous urea-molasses supplementation was studied in 116 ewes for 21 months. The animals were divided into two groups and randomly allocated to urea-molasses supplement and grazing in rubber plantation or grazing in rubber plantation only (control). Both groups were allowed to graze for 8 hours a day. The urea-molasses mixture contained 3% urea (kg/kg) and were fed to the supplemented ewes *ad libitum*. The number of lambs born from supplemented ewes were greater than control (166 vs 114 heads). This was associated with the higher (P<0.05) litter size and the shorter lambing interval of supplemented ewes compared to those of unsupplemented ewes (1.34 vs 1.24, and 216 vs 232 d, respectively). Birth weight were not different (P>0.10) between the treatments (1.79 vs 1.61 kg), but weaning weight of lambs born to the supplemented ewes were greater (P<0.05) than the unsupplemented ewes (8.90 vs 7.55 kg). The ewe's weight after parturition and the weight of lambs weaned per year were also greater (P<0.05) in the supplemented group compared to the control (22.7 vs 20.6 kg and 20.2 vs 15.1 kg, respectively). It was concluded that urea-molasses mixture was a good feed supplement for ewes grazing in rubber plantation. The urea-molasses supplementation clearly had positive effects on ewe and lamb productivity.

Key words : Urea, molasses, ewes, reproductive performances

INTRODUCTION

Continuous energy supplementation for ewes grazing in rubber plantation has increased the reproductive performances of the ewes and the weaning weight of lambs, but the increased biological performances was not associated with increased returns over the non-supplemented ewes (REESE *et al*., 1990). A relatively high prices of some by-product concentrates used in this study, such as fish meal and cassava meal, may have resulted in this uneconomical continuous supplementation scheme. Although strategic supplementation could reduce significantly the amount of feed supplements required to maintain the targeted production level (GINTING *et al*., 1992), it is necessary to keep looking for a more economic feed supplement through maximum utilisation of the locally available feedstuffs of a competitive price. Among the feedstuffs that can be utilised for energy supplementation, cane molasses is the most economical in certain region such as North Sumatra. Its high palatability and viscosity stimulates consumption by improving flavour and reducing dustiness when mixed with loose by-product in complete diets or supplements. Urea is generally added to correct any dietary crude protein deficiencies and to maximize rumen microbial population. The purpose of the present study was to examine the effect of daily urea-molasses supplementation on ewe reproductive performance and lamb growth.

MATERIALS AND METHODS

Animals and experimental procedures

Reproductively sound Sumatra thin-tail (STT) ewes were selected from the flock at the Sungai Putih Research Station and from neighbouring villages. A total of 116 ewes were separated into similar groups and the group randomly assigned to each of two treatments: control, with only grazing under rubber trees, or supplemented (grazing under rubber trees and supplemented with urea-molasses). Both groups of animals grazed together with a shepherd from 08:00 to 16:00. Upon returning from grazing, the animals were housed in pens with elevated floors. Molasses containing 3% urea (w/w) was available ad libitum in the pens of the supplemented treatment. The chemical composition of molasses was 78% dry matter, 8.0% ash, 3.4% crude protein, 0.03% phosphorus and 0.2% calcium. Metal of 200 litre drums were splitted lengthwise in half and served as feeders for the urea-molasses mixture. Iodinated salt blocks composed of 8.0% cement were available to animals of both treatments all the times. Internal parasites were controlled by orally drenching each ewe with Albendazole at three month intervals or after lambings.

Rams were exposed to the ewes daily during non-grazing hours, in a ratio of 1:25. After lambings, ewes with their lambs were kept indoors for two weeks, or until the lambs were considered strong enough to graze with the flock. During this time, they received harvested forages similar to that available in the grazing areas. The five forage species comprising over 95% of the forage consumed by the grazing ewes were *Paspalum conjugatum, Mikania micrantha, Pueraria javanica, Ottochloa nodosa,* and *Cyrtococcum oxyphyllum*. Grazed forage sampled by animals fitted with oesophageal cannula ranged from 15.0 to 20.0% crude protein and from 50 to 60% IVDM disappearance.

Statistical analyses

Ewes and lambs were weighed at parturition and lambs were weighed again at weaning (90 d). Group consumption of urea-molasses mixture was calculated monthly. Yearly ewe productivity was calculated per head and per kg of ewe from those ewes that lambed at least twice during the 21 months experiment. Data were analysed by analysis of variance according to the GLM procedure of SAS (SAS, 1985). Independent variables fitted to the model included supplement treatment, birth type and sex. Mean differences were analysed by student T test (STEEL and TORRIE, 1980).

RESULTS

Of the 116 ewes originally in the flock, 20 failed to lamb after 10 months and were culled from the flock. Of the 96 remaining ewes, there were 46 ewes in the control group and 50 ewes in the supplemented group. There were 92 lambings in the control and 124 lambings in the supplemented group, with an average litter size of 1.24 and 1.34, respectively (Table 1). Lambs from multiple births accounted for 47% in the supplemented group and 36% in the control. Lambs mortality was higher in the control than in the supplemented group ($P<0.05$).

Average urea-molasses consumption was 193 g per ewe per day, which corresponds to approximately 0.88% BW post partum of the supplemented ewes.

Table 1. Number of lambings, lambs by type of birth and mortality of lambs from Sumatra Thin-tail ewes grazing only or supplemented with urea-molasses

Treatment	Lambings	Lambs[1)]					Mortality[2)]		
		Ttl	Sgl	Tw	Tp	Qd	Mpl	Sgl	Overall
Control	92	114	73	32	9	-	37[a]	30[a]	32
+ Urea-molasses	124	166	88	62	12	4	29[b]	20[b]	25

[1)] Ttl= Total; Sgl= Singles; Tw= Twins; Tp= Triplets; Qd= Quadruplets
[2)] Mpl= Multiples
[a,b] Means in the same column with different superscripts differ (P<0.05)

Birth and weaning weight and gain of lamb to weaning are presented in Table 2. There were no significant effects of treatment on lamb birth weight, although lambs from the urea-molasses fed ewes were 11% heavier than lambs from the control. Urea-molasses supplemented ewes weaned heavier lambs (P<0.05). Type of birth and type of rearing affected (P<0.001) birth and weaning weights, respectively. Sex of lamb did not influence birth or weaning weights.

Ewe post-partum weights were positively correlated with the number of lambings during the experiment. Ewes that had lambed once were lighter than ewes that lambed twice, and ewes that lambed twice were lighter than ewes that lambed three times, in both control and supplemented group (Table 3). Ewes that lambed two and three times had larger (P<0.01) litter size, and weaned more kg of lamb, both on a per head basis and per weight of ewe (P<0.01), than ewes that lambed only once.

Lambing interval and ewe productivity were calculated from ewes that lambed two or more times (Table 4). Urea-molasses supplemented ewes had shorter lambing intervals (P<0.01), and higher weights of lambs weaned per lambing (P<0.05) and per year (P<0.01), both when expressed per head and per weight of ewe. On a yearly basis, urea-molasses supplemented ewes were 34% more productive per ewe, and 24% more productive per weight of ewe when compared to the controls.

Table 2. Birth and weaning weight of litters, and litter weight gain from ewes on grazing rubber trees alone or supplemented with urea-molasses

Item	Birth weight (kg)		Weaning weight (kg)		Litter birth weight (kg)		Litter weaning weight (kg)		Litter weight gain (kg)	
Treatment:										
Control	1.61		7.55		3.13		8.86		9.7	
		ns		*		ns		**		ns
+ Urea-molasses	1.79		8.90		3.39		11.95		9.9	
Birth Type:										
Single	2.19		9.42		2.19		9.68		8.5	
		***		***		***		**		**
Multiple	1.62		7.04		3.30		11.90		11.1	
Sex:										
Females	1.68		8.27		-		-		-	
		ns		ns						
Males	1.72		8.18		-		-		-	

ns = non significant;
* =P<0.05;
** = P<0.01;
*** = P<0.001

Table 3. Post-partum weights, litter size and weight of litter weaned from Sumatra Thin-tail ewes on grazing under rubber trees alone or receiving urea-molasses supplements

Parameter	Treatment	Number of lambings		
		1	2	3
Post-partum weight (kg)	Control	18.7	20.0	21.7
	+ Urea-molasses	17.9	21.8	23.2
		ns	*	*
Litter size	Control	1.13	1.29	1.27
	+ Urea-molasses	1.09	1.43	1.32
		ns	ns	ns
Litter weaned per lambing (kg)	Control	6.70	8.80	10.0
	+ Urea-molasses	6.40	11.0	11.6
		ns	**	*
Litter weaned per kg of ewe (kg)	Control	0.34	0.43	0.46
	+Molasses-urea	0.37	0.49	0.50
		ns	*	**

ns=non significant;
*=P<0.05;
**=P<0.01

Table 4. Productivity of Sumatra Thin-tail ewes grazing under rubber trees with and without urea-molasses supplementation

Treatment	Ewe weight (kg)	Lambing interval (d)	Lamb weight produced (kg) per:			
			Lambing per:		Year per:	
			ewe	kg of ewe	ewe	kg of ewe
Control	20.6	232	9.2	0.44	15.1	0.71
+ Urea-molasses	22.7	216	11.4	0.50	20.2	0.88
	*	**	*	*	**	**

* = P< 0.05;
** = P< 0.01

DISCUSSION

The consumption level of urea-molasses fed as supplement to ewes grazing in rubber plantations in this experiment (0.88% BW), was lower than the maximum level of supplement intake obtained (1.4% BW) when mixed concentrates were given to ewes in similar conditions (REESE *et al*., 1990). The 1.4% BW level elicited the highest increase in ewe productivity. In this experiment ewes had free access to molasses while in the barn (16 h/d), but the nature of molasses (high viscosity and high osmolarity) prevented rapid ingestion. The true molasses intake was actually less than the calculated by disappearance because there were losses; the urea-molasses stuck to everything including animals, pen walls and floors. The presence of molasses on the coat of animals made them look dirty and unthrifty, but did not seem to cause any discomfort or skin problems.

The large variation in calculated daily intake per head observed within the year is difficult to explain, but perhaps was related to the small changes in forage availability or quality, which dependent partly on rainfall. Very little can be done to encourage urea-molasses intake apart from assuring that there is always an ample supply of clean product, free from faeces and other foreign materials. Adequate feeder space per head was important, since animals crowded around the feeders when returning to barns after grazing. On the other hand, excessive molasses intake should be avoided to prevent alteration of rumen microflora that could negatively affect forage cellulose digestion. Response to the urea-molasses supplementation was most likely due to increasing the crude protein intake. The crude protein levels of forage consumed (15-20%) were much higher than ewe requirements (KEARL, 1982), so there was probably little benefit derived from the addition of urea.

Birth weights of lambs, although not statistically significant, were higher in the urea-molasses supplemented group. The birth weight of control (1.61 kg) or the supplemented group (1.79 kg) is comparable to 1.71 kg from the study of GATENBY *et al*. (1997a) when they supplemented ewes with concentrate for 2 weeks after lambing. A relatively lower value (1.45 kg) was reported by GATENBY *et al*. (1995). Other experiments (REESE *et al*., 1990 and GINTING *et al*., 1992) did not show significant increases in birth weight with supplements. However, slightly larger lambs at birth associated with ewes in better condition, was reflected in higher ewe body weight post-partum. This could have reduced lamb mortality in all these experiments.

Higher weaning weights of lambs from ewes receiving urea-molasses was perhaps due to increased milk production as was observed in another supplementation experiment (SANCHEZ *et al*., 1989). A similar result was reported by ROMJALI *et al*. (1995) when they supplemented ewes with concentrate during late pregnancy and entire lactation or by GATENBY *et al*. (1997b) from ewes supplemented for 2 weeks after parturition. Lambs from the urea-molasses supplemented group had also access to the supplement and their growth was probably in part improved by this. Liquid urea-molasses supplementation increased lamb daily gains when compared with grazing only.

An important effect of supplementation with molasses was on the weight of ewes. Ewe post-partum weight was positively related with number of lambings during the experiment in both treatment groups (Table 3). Heavier ewes also had larger litters at more frequent intervals, and weaned more lamb per head and per ewe weight. Young ewes benefit from urea-molasses while still growing during their first parity. Body condition, although not measured was visually better in the urea-molasses fed ewes.

Lambing intervals was shortened by approximately one cycle in ewes supplemented with urea-molasses (216 d) compared to control (232 d). A relatively shorter (201 d) was reported by INIGUEZ *et al*. (1990) in ewes continuously supplemented with concentrates. This fact, together with larger lamb litters weaned in the supplemented group, produced significantly higher year-round ewe performance, 34% above controls. Productivity was also higher per weight of ewe, both per lambing and per year, indicating a higher efficiency of the production system as a whole. The level of annual ewe productivity obtained in control group(0.71 kg) and supplemented group (0.88 kg) of lamb per kg of ewe per year in this experiment, were lower than those calculated from REESE *et al*. (1990) which were 0.92, 0.83, 1.01 and 1.13 for concentrate supplement levels of 0, 0.6, 1.0 and 1.4% of body weight. The main reason for this discrepancy in experimental results using the same breed in similar conditions, was the selection of animals. REESE's data were calculated from ewes after 6 to 7 parities, so they were proven dams. In the present study, of the 96 ewes at the commencement of the study and lambed at least once, only 59 remained, 21 months later, at the end of the study. Ewes that were removed from the study due to culling or death included 22 from the control ewes and 15 from the supplemented ewes. After this heavy culling of less productive ewes, 10 ewes from the urea-molasses treatment (or 16% of the starting number) had levels of productivity comparable to ewes supplemented at 1.0% or 1.4% BW (REESE *et al*., 1990). In the control group, 10% of the ewes were as productive as the mean from REESE's (1990) control treatment of grazing alone.

CONCLUSION

Urea-molasses supplementation of ewes grazing in rubber plantation clearly had positive effects on ewe and lamb productivity. Larger litters and high milk production, reflected in heavy litter weights at weaning combined with a short lambing interval are the main factors determining overall ewe productivity. These should be the main criteria for selection. Larger litter size unmatched by high milk production does not have much positive value, and could even be deleterious to ewe performance and survival. The urea-molasses supplement should be encouraged for use as an economical supplement to improve ewe and lamb productivity.

REFERENCES

GATENBY, R.M., M. DOLOKSARIBU, G.E. BRADFORD, E. ROMJALI, A. BATUBARA, and I. MIRZA. 1995. Reproductive performance of Sumatra and hair sheep crossbred ewes. SR-CRSP Annual Report 1994-1995. Sungai Putih, North Sumatra. p. 20-25.

GATENBY, R.M., G.E. BRADFORD, M. DOLOKSARIBU, E. ROMJALI, A.D. PITONO, and H. SAKUL. 1997a. Comparison of Sumatra sheep and three hair sheep crossbreds. I. Growth, mortality and wool cover of F_1 lambs. *Small Rum. Res*. 25:1-7.

GATENBY, R.M., M. DOLOKSARIBU G.E. BRADFORD, E. ROMJALI, A. BATUBARA, and I. MIRZA. 1997b. Comparison of Sumatra sheep and three hair sheep crossbreds. II. Reproductive performance of F_1 lambs. *Small Rum. Res*. 25:161-167.

GINTING, S.P., E. ROMJALI, M.D. SANCHEZ, and K.R. POND. 1992. Identification of an economic form of supplementation of ewes in rubber plantation. Small Ruminant-CRSP Working Paper No. 10.

INIGUEZ, L., M. SANCHEZ, and S. GINTING. 1990. Productivity of Sumatra sheep in a system integrated with rubber plantation. *Small Rum. Res*. 5:303-317.

KEARL, L.C. 1982. *Nutrient Requirements of Ruminants in Developing Countries*. International Feedstuffs Institute, Utah State University, Logan Utah, USA. 381p.

REESE, A.A., S.W. HANDAYANI, S.P. GINTING, W. SINULINGGA, G.R. REESE, and W.L. JOHNSON. 1990. Effects of energy supplementation on lamb production of Javanese thin-tail ewes. *J. Anim. Sci*. 68:1827-1840.

ROMJALI, E., M. DOLOKSARIBU, SIMON ELIESER, SUBANDRIYO, and R.M. GATENBY. 1995. The weaning weight of local Sumatra and crossbred lambs in North Sumatra. SR-CRSP Annual Report 1994-1995. Sungai Putih, North Sumatra. p. 26-30.

SANCHEZ, M., S. PURBA, and K. POND. 1989. Rubber seed as supplement for lactating ewes. SR-CRSP Annual Research Report 1988-1989. Sungai Putih, North Sumatra. p. 13-17.

SAS. 1986. *User's Guide : Statistics*. Cary NC, USA. 956 p.

STEEL, R.G.D. and J.H. TORRIE. 1980. *Principles and Procedures of Statistics*. McGraw-Hill Book Co. Inc, New York.