

The Effects of Shearing on Behaviors and Physiological Responses in Javanese Fat-Tailed Sheep Fed By Tofu Byproduct

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ABSTRACT

Javanese Fat-tailed sheep is one of Indonesia local sheep which has a high adaptability, especially in the arid region. Sheep shearing is a common management by farmers in order to reduce heat stress and eradicate ectoparasites. This study evaluated the behavioral and physiological responses of fat tailed rams, treated by wool shearing and offered tofu by product as feed. This research used 12 rams (body weight 17.4 ± 1.1 kg) and was arranged in a 2 x 2 factorial design. The treatments of this study were feed type (with and without tofu by product) and wool shearing (shorn and unshorn). Rectal temperature (RT), pulse rate (PR), respiratory frequency (RF) and skin temperature (ST) and behavior were collected each week for three months. Data of physiological response were analyzed using analyses of variance. The results showed that there was no interaction effect between shorn and feed type on the physiological responses of rams. On the contrary, consumption of tofu by product significantly increased the RF ($P < 0.05$). Furthermore, wool shearing caused significantly higher ST ($P < 0.05$) of shorn rams than unshorn rams. Sheep behavior was not affected by the treatment. In general, the behaviors frequencies of *resting*, *locomotion* and *ingestion* were higher than the frequencies of other behaviors. It can be concluded that the physiological responses and behavior of javanese fat-tailed sheep were not changed either sheep was shorn or unshorn, indicating that shearing practices can be recommended in order to eradicate ectoparasites.

Key Words: Behavior, Physiological response, Fat-tailed sheep, Shorn, Tofu by product

INTRODUCTION

Javanese fat-tailed sheep is one of Indonesian local sheep that has a high potential as a meat resource. Mason (1978) concluded that this sheep has high genetic resources because of its ability to adapt to difficult environments and its high reproduction performance. Farmers mostly like to raise fat-tailed sheep because of its light body performance, the palatability of meat and plays a role as important thing for small farmer in Indonesia (Udo and Budisatria, 2011).

Feed and wool shearing are management factors that can influence the success of sheep raising. Tofu by product is a by product of tofu production and is well known used as feed for livestock. Rianto et al (2001) concluded that offering of tofu by product in wet or dry form did not affect dry matter intake of sheep compared with concentrate feed. Other studies that used tofu by product as ruminant feed were conducted by researchers such as Hernaman et al. (2005) and Pulungan et al. (1985). Nevertheless, the study that focused on behavior and physiological responses of sheep to the use of tofu by product is still rarely found.

Wool shearing is usually applied by farmers to minimize sheep ecto-parasites that cause health problem. In addition, farmers believed that shearing sheep would improve growth performance. Piccione et al. (2008) stated that the wool shearing would make sheep more adaptable to the environment than non-sheared sheep. Different feeding and wool shearing management might affect the behavior and physiological responses of sheep. Aleksiev (2009) concluded that shearing affected the physiological and behavior all responses of ewes. The

purpose of this study was to evaluate the effect of tofu by product supplementation in the ration and wool shearing on behavior and physiological responses of Javanese fat-tailed sheep.

MATERIALS AND METHODS

This research was conducted in the Laboratory of Small Ruminants, Department of Animal Production and Technology, Faculty of Animal Science, Bogor Agricultural University. This study used 12 heads of Javanese fat-tailed lambs with initial weight of 17.40 ± 1.10 kg. The animals were raised in individual cages for three months.

Feed Trials: The rations consisted of forage, concentrates and soybean by product. The by product was mixed with the concentrate. The concentrate consisted of rice bran and coconut oil cake powder (feed trial 1: without tofu by product). Feed trial 2 (with tofu by product) was the modification of concentrate with addition of 30% tofu by product. Both of feed trials were made with the same TDN value at 69.

Animals Management and data collection: Each animal was placed into an individual cage with a size of $120 \times 80 \times 100 \text{ cm}^3$. The adaptation period of sheep to feed trials was conducted for two weeks. Wool shearing to six sheep was conducted on each the beginning as first treatment factor. Different type of feeds (P1 and P2) also was conducted to the six sheep as second treatment factor. The grass was given every afternoon and evening, while the concentrate and tofu by product were given simultaneously at morning and evening feedings three hours before the grass. Measurement of physiological parameters and behavioral responses was conducted every week for three months that was at 05:30 to 06:00, 12:30 to 13:00, and 16:30 to 17:00. Physiological parameters consisted of rectal temperature (RT), pulse rate (PR), respiratory frequency (RF) and skin temperature (ST). The behavioral response was measured using focal sampling method (Morrison et al. 2006) that consisted of ingestive, eliminative, agonistic, care giving, vocalization, resting, and locomotive behavior.

Research design and data analyses: The study was designed using a completely randomized design with a 2×2 factorial arrangement. The first factor was feed type with 2 levels i.e., with and without tofu by product and the second factor was wool shearing with 2 levels i.e., shorn and unshorn. Sheep behavior data were analyzed descriptively by showing the frequency of each variable behavior. Physiological response data were analyzed by analysis of variance (ANOVA).

RESULTS AND DISCUSSION

Physiological Response of Javanese Fat-Tailed Sheep

The daily physiological responses of sheep were presented in Table 1. Wool shearing made the sheep comfortable that was also expected to affect normal physiological and behavioral responses. Sheep with short wool were more tolerant to hot weather (Williamson and Payne 1993).

Table 1 showed that offering tofu by product increased respiration frequency ($P < 0.05$) (34.92 ± 10.58 in the tofu by product fed sheep vs 23.76 ± 4.95 in control sheep). Feed supplemented with tofu by product had higher crude fiber (Table 1) than control feed (24.76% vs 21.48%) so that it could be the reason that retention time in rumen and heat metabolism increased (Wibowo 2008). Wool shearing significantly increased skin temperature ($P < 0.01$). Silanikove (2000) reported that wool can protect sheep from extreme hot and cold environment temperatures. Unshorn sheep were mostly protected from fluctuation of environment temperature due to the function of the wool as an insulator.

Table 1. Physiological response of Javanese fat-tailed sheep

Physiological response	Shearing	Feed (tofu byproduct)		Average
		Without	With	
Pulse rate(times/min)	Unshorn	86.97± 10.55	93.27± 3.82	90.12 ± 7.89
	Shorn	85.30 ± 5.36	96.03± 5.13	90.67 ± 7.52
	Average	86.14 ± 7.54	94.65 ± 4.32	
Respiratory frequency (times/min)	Unshorn	24.87 ± 7.20	41.92± 10.83	33.40 ± 12.45
	Shorn	22.65 ± 2.38	27.91 ± 3.91	25.28 ± 4.09
	Average	23.76 ± 4.95b	34.92 ± 10.58a	
Rectal temperature (°C)	Unshorn	38.78 ± 0.08	38.82 ± 0.20	38.80 ± 0.14
	Shorn	38.90 ± 0.26	38.64 ± 0.24	38.77 ± 0.27
	Average	38.84 ± 0.18	38.73 ± 0.22	
Skin temperature (°C)	Unshorn	28.48 ± 0.52	28.27 ± 0.39	28.38 ± 0.43B
	Shorn	29.07 ± 0.38	29.64 ± 0.39	29.35 ± 0.46A
	Average	28.78 ± 0.52	28.95 ± 0.82	

Behavior response of javanese fat-tailed sheep

In general, sheep showed normal behavior for each treatment. Frequency of each behavior can be seen in Table 2.

Table 2. The daily behavior of Javanese fat-tailed sheep

Behavior	Shearing	Feed (tofu byproduct)	
		Without	With
		(%)	
Ingestive	Unshorn	0.21	0.24
	Shorn	0.19	0.22
Agonistic	Unshorn	0.01	0.02
	Shorn	0.01	0.03
Care giving	Unshorn	0.14	0.11
	Shorn	0.16	0.14
Vocalization	Unshorn	0.01	0.05
	Shorn	0.07	0.06
Eliminative	Unshorn	0.01	0.00
	Shorn	0.00	0.00
Resting	Unshorn	0.32	0.34
	Shorn	0.33	0.31
Locomotive	Unshorn	0.30	0.23
	Shorn	0.24	0.24

Table 2 showed that behaviors of Javanese fat-tailed sheep in this study were mostly dominated by *resting*, *locomotive* and *ingestive behaviors*, respectively. Resting behavior indicated that the experimental sheep were not in a stress condition. Fraser and Broom (1990) mentioned that resting behavior has function for energy saving that will be used for activity.

CONCLUSION

Consumption of tofu by product significantly increased respiration rate, while shearing caused an increase in skin temperature. The behavior frequency of resting, locomotion and ingestion were higher than the frequency of other behaviors. In general, the physiological responses and behavior of javanese fat-tailed sheep were not changed either sheep was shorn or unshorn, indicating that shearing practices can be recommended in order to eradicate ectoparasites.

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