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Research Article

Feeding Behaviour of Awassi Sheep and Shami (Damascus) Goats

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Abstract: Seven male Awassi sheep and 7 male Shami (Damascus) goats, one year old and fed with a diet having 2503 Kcal ME and 155 g crude protein kg^{-1}, were housed individually for 49 days to determine the feeding behaviour. Each animal within each species was one replicate and kept individually within 100 x 120 x 120 cm wood pen in indoor conditions with natural daylight and 11-18 °C room temperature. Twice a week, starting right after daily feed refreshment at 12.00, behavioural observations were made at 12.00, 16.00, 20.00, 24.00, 04.00 and 08.00 with 5-minute intervals by monitoring the animals. The recorded activities were eating, ruminating, drinking, resting, standing, and playing. These activities of sheep and goats were 24.6 vs. 26.6 ($P > 0.05$), 17.6 vs. 16.6 ($P > 0.05$), 3.9 vs. 2.7 ($P < 0.01$), 20.3 vs. 23.9 ($P < 0.01$), 29.1 vs. 21.8 ($P < 0.01$) and 2.4 vs. 4.6 ($P < 0.01$) as a percentage, respectively. In conclusion, goats showed less drinking and standing but higher playing and resting behaviour than sheep without showing any significant difference between species with respect to eating and ruminating activity.

Key Words: Sheep, goats, feed intake, feeding behaviour

İvesi Koyunu ve Şam (Damaskus) Keçilerinin Yem Yeme Davranışları

Özet: Bu çalışma bireysel olarak barındırılan ve tek tip yem karması tüketen, 1 yaşlı, erkek İvesi koyunu ve Şam (Damaskus) keçilerinin yemleme davranışlarının belirlenmesi için yapılmıştır. Deneme hayvanları 2503 Kcal ME ve 155 g ham protein kg^{-1} içeren yoğun yemden sınırsız yemleme sistemi ile tüketmişlerdir. Hayvanlar 100 x 120 x 120 cm ağaç bölmelerde, doğal gün ışığında ve 11-18 °C çevre sıcaklığında bireysel olarak tutulmuştur ve her hayvan bir tekerrür oluşturmuştur. Haftada iki gün, günlük yem değişiminin yapıldığı saat 12.00'den itibaren başlanan davranış gözlemleri, saat 12.00, 16.00, 20.00, 24.00, 04.00 ve 08.00'de 5 dakikada bir tekrarlanarak hayvanların gözlenmesi şeklinde yapılmıştır. Bu gözlemlerde kayıt edilen davranış özellikleri yem yeme, geviş getirme, su içme, yürüme, ayakta durma, oyun, dinlenme ve diğerleridir. Bu davranışlar koyun ve keçi için, aynı sıra ile ve yüzde olarak 24,6 ve 26,6; 17,6 ve 16,6; 3,9 ve 2,7 ($P < 0,01$); 20,3 ve 23,9 ($P < 0,01$); 29,1 ve 21,8 ($P < 0,01$); 2,4 ve 4,6 ($P < 0,01$) bulunmuştur. Sonuç olarak, keçilerin koyunlara göre daha az su içme ve ayakta durma, daha fazla oyun ve dinlenme davranışı gösterdiği, yem yeme ve geviş getirme bakımından ise iki tür arasında önemli bir farklılığın olmadığı tespit edilmiştir.

Anahtar Sözcükler: Koyun, keçi, yem tüketimi, yem yeme davranışı

Introduction

Generally sheep and goats are kept extensively in developing countries depending on low productive native breeds. Mainly, goat farming is for milk-meat production while sheep farming is for meat-milk production.

With respect to growth performance characteristics such as daily gain, and feed conversion ratio, sheep are better than goats (1-5). These studies showed that sheep gain 214-346 g/d with 5.1-7.7 feed conversion ratio, which is higher than those of goats (91.3-131 g/d and 8.22-11.44, respectively), indicating there are sufficient data concerning the performance of small ruminants. Several studies on feeding behaviour of sheep and goats have shown that these species are different in eating habits (6-8). These differences could be easily seen naturally when foraging on pasture, where sheep can distinguish plants better since they have a narrow bite. However, they can not clearly see what they eat since they have a blind spot about 30 mm in front of their nose. Their decision on what to eat is, more likely, based on either touching the plants or feeds on the ground (9). On the other hand, goats utilise a considerably wider range of plant species than both sheep and cattle by using their front legs to lean on stem or branches of higher plants. Feeding behaviour of small ruminants might change depending upon environmental temperature, topography, availability or abundance of various plant species, genetic make-up of animals, prior experience or conditioning, prevailing nutritional and physiological state

of animal and stocking rate, period of occupation, and supplementation with nutrients when they are kept in stalls (10). For the concept of animal welfare, animals are free to show their natural feeding behaviour on pasture condition in response to their physiology and environment (11,12). On the other hand, sheep and goats are not free to display their natural feeding behaviour when they are housed in stalls. Animal nutritionists and ethologists have to know *"How do animals behave in housing conditions?"* to modify design of internal equipment in animal houses and feeding programs. However, there have been insufficient comparative studies on feeding behaviour of sheep and goats kept in stalls and consuming the same type of feed ad libitum.

Therefore, this study was carried out to determine the feeding behaviour of Awassi sheep and Shami (Damascus) goats, one-year-old males, housed individually and fed on the same type of feed.

Materials and Methods

Seven fat-tailed Awassi sheep and 7 Shami (Damascus) goats were housed for this study in the Research and Training Farm of Mustafa Kemal University in Antakya Province of Turkey. Antakya is located between 36° North latitude and 36° East longitude in the Eastern Mediterranean region. The experiment lasted 49 d, between 20 December 2002 and 7 February 2003. All experimental animals, chosen from one-year-old males, were subjected to consume the same experimental diet having 2503 Kcal ME and 155 g crude protein kg^{-1} ad libitum (Table 1). Each animal within each species was one replicate and kept individually within wood pen sized 100x120x120 cm indoor conditions with artificial lighting during night and 11-18 °C ambient temperatures. Individual pens contained two 15-l plastic buckets for feed and water supplies. Experimental diet was prepared based on the nutritional requirements of small ruminants recommended by NRC (13). Experimental diet and water were offered to animals ad libitum and their feed intakes were recorded daily. Individual experimental animals were weighed weekly. Feed intakes were also monitored at observation hours.

Behavioural observations were recorded twice a week (on Monday and Thursdays) for one-hour period at 12.00, 16.00, 20.00, 24.00, 04.00 and 08.00 hours with 5-min intervals after the refreshing of daily feed (at 12.00). The first seen activity was recorded as the determined activity. The recorded activities were eating (act of eating feed), ruminating, drinking, walking, standing, playing (act of playing with equipment and animals nested next to it), resting (sleeping or lying down) and others (defecation, urinating, etc.). The method of behavioural observation was based on the methods of "Time sampling" and "Point sampling" with some modifications (14,15).

Table 1. Composition of the diet given to experimental animals.

Ingredients	%
Barley (890 g DM, 2937 Kcal ME, 110 g CP and 49 g CF kg^{-1})	20
Corn (880 g DM, 3080 Kcal ME, 85 g CP and 29 g CF kg^{-1})	30
Wheat bran (910 g DM, 2548 Kcal ME, 130 g CP and 76 g CF kg^{-1})	17
Cotton seed meal (900 g DM, 2025 Kcal ME, 319 g CP and 130 g CF kg^{-1})	20
Alfalfa straw (850 g DM, 1530 Kcal ME, 150 g CP, 290 g CF kg^{-1})	10
Vitamin & mineral mixture (obtained from a commercial source)	1
Salt & limestone	2
Composition per kg diet	
ME (Kcal) (calculated)	2503
Dry matter (DM), g	892
Crude protein (CP), g	155
Crude fibre (CF), g	89

The main factor for comparing their feeding behaviour and relative data was species. Based on the count of activities for one-hour observation, nonparametric behavioural data were analysed using chi-square test. The presented proportional (%) activity was calculated dividing the count of each activity in each time period by the number of total observation in that time period. Data concerning growth and food intake were analysed using the one-way ANOVA procedure. Statistical analysis was performed with SPSS for Windows (16). Feed intake, growth and their relative data obtained in this study are presented as means per group with standard error of mean (SEM).

Results

Table 2 represents the behaviour of sheep and goat during a day for experimental period.

Sheep showed higher percentage of drinking and standing and lower percentage of resting, playing and other behaviours than those of goats ($P < 0.01$).

Eating activity is supported by time dependent feed intake data for both species (Figure 1).

Sheep and goats showed about the same ruminating behaviour to each other and distributed even for time intervals (Figure 2). In terms of drinking activity, higher drinking activity was determined in sheep in comparison to goats ($P < 0.01$).

Results of growth performance and daily feed intake of experimental animals are shown in Table 3.

Discussion

The experimental results showed that sheep and goats represented about the same percentage of eating and ruminating behaviour in contrast to Welch and Hooper (17). They reported that goats have more chewing activity for eating and less for ruminating than sheep. In current study, however, sheep consumed higher amount of feed than goats as expected. As known, sheep and goats are different in genotypic capacity, live weight, locomotor activity, eating habits, and consequently nutritional requirements. As expected, sheep eat higher amount of feed than goats since they are heavier. Supporting the present study, Abijaoude et al. (7) reported that goats generally have a lower feed intake rate because they have a more selective feeding behaviour.

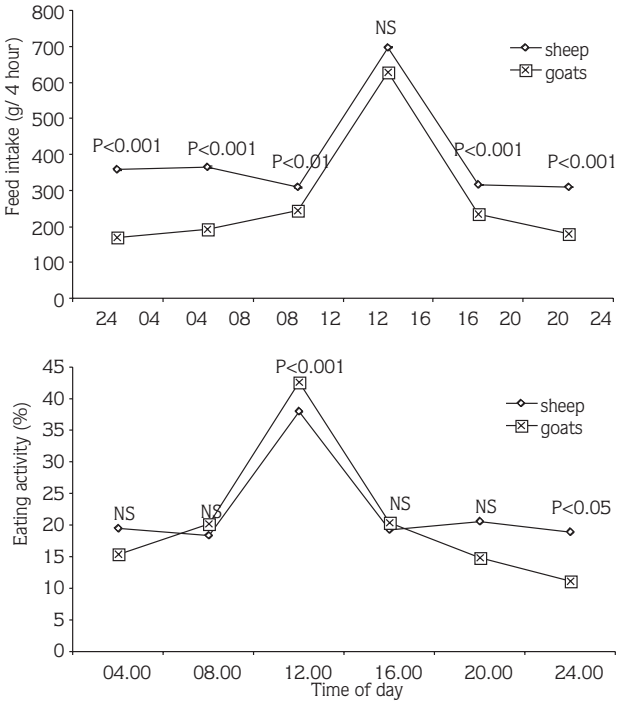

Figure 1. Feed intake and eating activity of sheep and goats during observation hours.

Table 2. Comparative behaviour of sheep and goats indoor feeding condition.

Daily activities (%)	Eating	Ruminating	Drinking	Standing	Playing	Resting	Others
Sheep	24.6	17.6	3.9	29.1	2.4	20.3	2.1
Goats	26.6	16.6	2.7	21.8	4.6	23.9	3.8
SEM	0.35	0.21	0.30	0.18	0.16	0.23	0.14
Significance	NS	NS	**	**	**	**	**

**, $P < 0.01$; NS, non significant

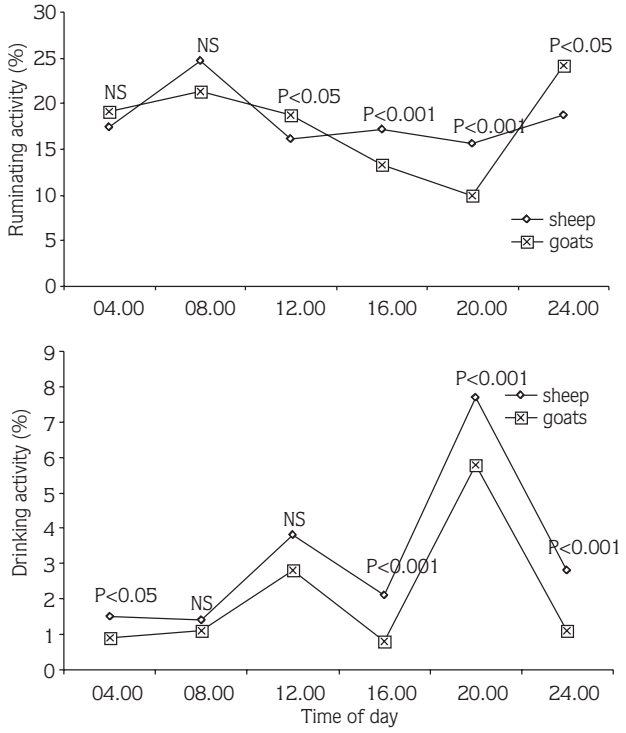

Figure 2. Ruminating and drinking activity of sheep and goats during observation hours.

Because of feed refreshing time, eating activity reached the highest level at 12.00 each day of the study. As explained by Welch and Hooper (17), penned animals preferred fresh feed and eating activity reached the maximum level when new feed was offered. From that point, automatic-feeding equipments can be used to increase feed consumption and daily gain.

The ruminating activity was at the highest level during the night and decreasing during the day for both species. Oshiro et al. (18) reported that the ruminating behaviour was influenced by room light, which is important in determining the rumination rhythm during 24 h. In general, small ruminants eat during the day and ruminate during the night (17). Keskin et al. (4) stated that artificial lighting did not change the rumination activity in goats.

Higher eating and lower drinking activities were observed in goats, as expected (Table 2), because, in ruminants, eating is a less potent stimulus than drinking, probably due to the great fluid reserve in the rumen and to the massive saliva during feeding, which can easily buffer osmotic challenges of ingested food (19). The dry matter intake of goats is also less than that of sheep (Table 3) ($P < 0.01$). This reflected the lower drinking activity in goats, expecting that there is always a linear relation between dry matter intake and water intake.

Both sheep and goats consumed feed intensively during the period of 08.00-20.00, showing diurnal variation is one of the factors affect feeding behaviour of small ruminants (20).

Table 3 supports why goats showed more resting and playing activity. They did not need to consume as much feed as sheep, because goats were different from sheep with respect to initial live weight and daily gain for the same age. It is assumed that penned goats show more resting and playing activity after a small meal in comparison to sheep.

In conclusion, goats showed less drinking and standing but higher playing and resting activities than sheep without showing difference in eating and ruminating activities. This difference might be due to the lower nutritional requirements of goats, originating from species characteristics. These lower nutritional requirements of goats might also make them feel more relaxed than sheep.

Table 3. Feed intake and growth performance of sheep and goats for 49 d.

Parameters per animal	Sheep (n = 7)	Goats (n = 7)	SEM
Initial live weight, kg	39.9[a]	25.3[b]	2.3
Daily feed intake, g	2046.2[a]	1534.8[b]	101.8
Daily gain, g	328.9[a]	214.6[b]	11.2
Final live weight, kg	56.6[a]	35.8[b]	3.1

[a,b]: $P < 0.01$

References

1. Görgülü, M., Kutlu, H.R., Demir, E., Öztürkcan, O., Forbes, J.M.: Nutritional consequences of free choice feeding among feed ingredients by Awassi lambs. Small Rumin. Res., 1996; 20: 23-29.
2. Fluharty, F.L., McClure, K.E., Solomon, M.B., Clevenger, D.D., Lowe, G.D.: Energy source and ionophone supplementation effects on lamb growth, carcass characteristics, visceral organ mass, diet digestibility and nitrogen metabolism. J. Anim. Sci., 1999; 77: 816-823.
3. Keskin, M., Şahin, A., Biçer, O.: Rasyondaki farklı protein miktarının Şam keçisi çebiçlerinde besi performansına etkisi. Mustafa Kemal Üniv. Zir. Fak. Derg., 2001; 6: 109-112.
4. Keskin, M., Biçer, O., Gül, S., Şahin, A.: Effects of artificial lighting on fattening and behaviour of goats. J. Anim. Vet. Adv., 2003; 2: 49-51.
5. Şahin, A., Keskin, M., Biçer, O.: Responses of lambs to the dietary inclusion of trigonella fenoum graceum l. J. Anim. Vet. Adv., 2003; 2: 74-75.
6. Ganskopp, D., Cruz, R., Fajemisin, B.: Relationships among variables indexing selective grazing behaviour of goats. Appl. Anim. Behav. Sci., 1997; 51: 75-85.
7. Abijaoude, J., Morand-Fehr, P., Tessier, J., Schmidely, Ph., Sauvant, D.: Diet effect on the daily feeding behaviour, frequency and characteristics of meals in dairy goats. Livest. Prod. Sci., 2000; 64: 29-37.
8. Das, N.: Factors influencing the inactive behaviours of stall-fed sheep under experimental conditions. Small Rumin. Res., 2001; 42: 39-47.
9. Forbes, J.M.: Voluntary Food Intake and Diet Selection in Farm Animals. CAB International, UK. 1995; 277-305.
10. Odo, B.I., Omeje, F.U., Okwor, J.N.: Forage species availability, food preference and grazing behaviour of goats in Southern Nigeria. Small Rumin. Res., 2001; 42: 163-168.
11. Sharma, K., Saini, A.L., Singh, N., Ogra, J.L.: Seasonal variations in grazing behaviour and forage nutrient utilisation by goats on semi-arid reconstituted silvi pasture. Small Rumin. Res., 1998; 27: 47-54.
12. Perevoltsky, A., Landau, S., Kababia, D., Ungar, E.D.: Diet selection in dietary goats grazing woody Mediterranean rangelands. Appl. Anim. Behav. Sci., 1998; 57: 117-131.
13. NRC: Nutrient Requirement of Sheep. Sixth Revised Edition, National Academy Press. NRC. Washington DC. 1985.
14. Savaş, T., Şamlı, H.E.: Yumurtacı tavuklarda agresyon ile bazı davranış özellikleri arası ilişkiler. VIV Poultry Yutav'99. Uluslararası Tavukçuluk Fuarı ve Konferansı, İstanbul. 3-6 /06/1999; 93-99.
15. Fraser, A.F., Broom, D.M.: Farm Animal Behaviour and Welfare. Third Edition. ELBS, London. 1990; 7-16.
16. Kinneer, P.R., Gray, C.D.: SPSS for Windows. Department of Psychology, University of Aberdeen, UK. 1994.
17. Welch, J.G., Hooper, A.P.: Ingestion of feed and water. In: D. C. Church, Ed. The Ruminant Animals, Digestive Physiology and Nutrition., 1988; 108-116.
18. Oshiro, S., Manun, O., Wadud, S., Onodera, R., Hirayama, T., Hirakawa, M., Higoshi, H.: Effects of fatty acids and acetone infusions on the ruminating behaviour of goats. Small Rumin. Res., 2000; 35: 117-122.
19. Rossi, R., Del Prete, E., Rokitzky, J., Scharrer, E.: Circadian drinking during ad libitum and restricted feeding in pygmy goats. Appl. Anim. Behav. Sci., 1999; 61: 253-261.
20. Grova, L., Bjelland, B.: Feeding Behaviour of Goats in the Valse Thornveld of The Eastern Cape. Combined Project in Livestock and Pasture Science, Univ. Fort Hare and Agricultural Univ. Norway. 1997.