

EFFECT OF ENVIRONMENTAL FACTORS ON BODY CONDITION SCORE OF TAGGAR GOATS UNDER DRY LAND FARMING IN WESTERN SUDAN

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ABSTRACT: Effects of type of supplementation, season of kidding and litter size on body condition score (BCS) at kidding and at weaning time were evaluated in Taggar goats in extensive management under dry land farm. The supplemented groups (2 and 3) had ($P<0.05$) higher body condition at kidding compared with the control group. Body condition at time of weaning was sharply decreased, but the decline was greatest in control groups. The rainy season kidders showed higher ($P<0.05$) BCS at kidding and at weaning time compared with dry season kidders. Twin kidders had a tendency ($P>0.05$) for higher BCS at kidding compared with single and triplet kidders. At weaning time triplets kidder had slightly lower ($P<0.05$) body condition compared to single and twin kidders.

Key words: Tropical, supplementation feeds, productivity, Dalanj, Taggar, Sudan.

INTRODUCTION

In many parts of the tropics, animal productivity is constrained by regular feed shortages occasioned by dry seasons and droughts. During such periods animals are mainly dependent on poor quality grasses and crop by-products with little or no supplementation, leading to low animal performance.

Body condition score (BCS), measured on a scale of 0–5 (Russel et al., 1969), was reported to be a result of fat accumulation and mobilization. It is generally acknowledged that live weight and body condition are intimately connected to the productivity of domestic ruminants (Robinson, 1990). Cycles of production frequently involve animals storing surplus energy in the form of body fat in times of dietary sufficiency. These reserves are then catabolized when dietary energy intake is inadequate to match the demands of production. Furthermore, there is a good reason to believe that feedback occurs among dietary energy intake, body energy stores and reproductive rate (Lamond, 1970) such as frequency of breeding and litter size reflect the nutritional status of the dam.

Taggar goat breeds of southern Kordofan State, Sudan, frequently inhabit harsh environments where there are marked seasonal constraints in the availability of feed nutrients and water. Observations on the productivity of the Taggar goat have linked live weight and body condition score of the doe to kidding interval and litter size (Ibrahim, 2009). A quantitative assessment of the effects of environmental factors that influence the changes in live weight and body condition of goats in harsh environments is important aiming to improve their productivity. The objective of this research was to study the effects of environmental factors (type of supplementation, season of birth and litter size) on body condition score at kidding and weaning time of Taggar goats under dry farm condition.

MATERIALS AND METHODS

Study area

The area of study (Dalanj) lies within the medium rain (500 mm) woodland savannah (longitudes 12.02° N, Latitudes 29.39° E). The total area extends over 9300 km² with a population of 250,000 people. The soil types varied from sandy (goz) in north to heavy clays (vertisoil) and the lighter clay (gardoud) in the south. The mean monthly temperature ranged from 31.3 C° in April to 25.8 C° in July. Annual rainfall ranging between 500-800 mm, with peak rain in August (SKDP, 2000).

Experimental animals and housing

Forty- seven pregnant Taggar does with three bucks were acquired by direct purchase from the Dalanj livestock local market. The age of experimental animals varied between 1-4 years. Does and bucks were treated with the necessary medication against endo-and ecto-parasites (AGVET, USA 1.0 ml/50 kg body weight subcutaneously, Ivomec super drench). Vaccination against goat pox, Anthrax and Hemorrhagic Septicemia were carried out. The does were ear tagged, weighed and divided into Groups 1, 2 and 3, consisting of 16, 16 and 15 does respectively. The initial live body weight averaging 19.16±6.53kg, 19.14±4.17kg and 19.17±4.05kg for Groups 1, 2 and 3 respectively. Each group was kept in separate enclosures constructed from iron bars and wire, and equipped with trough feeders and watering. Animals were individually tethered at proper distance from each other and offered supplement type in separate troughs. All does were daily turned out to graze on pasture from 8.00 a.m (before midday) to 6.00 pm (after midday). On their returned from pasture, does in Groups 2 and 3 were offered 350g/day/head of supplement A and B (Table 1), respectively.

Assessment of body condition score

Assessment of body condition score was conducted at weekly intervals for 12 weeks after kidding. Body condition score was assessed using the 5 point scale described by Aumont et al. (1994) and Thompson and Meyer (2002). According to this scale, emaciated goats were given score 1, thin goats score 2, average goats score 3, fat goats score 4 and obese goats score 5. The animals were visually assessed by palpation of the lumbar vertebrae area between the back of the ribs and front of the pelvic bones.

Table 1 - Ingredients and chemical composition of types of supplement

Components (%)	Supplement A					Supplement B	
Sorghum grains	15					15	
Groundnut Cake	45					-	
Rosella seeds	-					50	
Wheat bran	19					19	
Groundnut Hulls	20					15	
Common Salt	0.75					0.75	
Proximate analysis (DM basis)							
Supplement types	DM%	CP%	CF%	E.E%	NFE%	Ash%	ME(MJ/Kg DM) ¹
Supplement A	93.2	20.4	10.3	4.5	58	6.8	12.20
Supplement B	93.9	16.7	17.4	6.6	47.5	11.8	11.57

¹ Metabolizable energy was calculated from Ellis (1981); Me (MJ/kg DM) = 0.12 CP + 0.01 EE + 0.005 CF + 0.014 NFE.

Statistical analysis

Resulting data were analyzed for variance (analysis of variance) according to complete randomized design using Statistical Package for the Social Sciences, software package (SPSS version 10, 1996). Duncan's Multiple Range Tests (DMRT) was used to separate multiple means where appropriate.

RESULTS

The data in (Table 2) revealed that the type of supplement had significant effect on the BCS at kidding and weaning. The BCS of does in the control group at kidding and weaning were significantly lower than that of the supplemented groups.

The BCS at kidding and at weaning in the two seasons of birth, indicated that rainy season kidders maintained (P<0.01) higher score compared to cool dry season kidders (Table 3).

Table 2 - Effect of type of supplement on the body condition score

Animal Group	N	BCS at kidding	BCS at weaning
Group 1	15	2.89±0.11 ^b	2.60±0.11 ^b
Group 2	16	3.53±0.13 ^a	3.13±0.13 ^a
Group 3	15	3.63±0.11 ^a	3.40±0.11 ^a

^{ab}Values in the same column with different letters are different at P<0.01 according to Duncan's Multiple Mean Separation.

Table 3 - Effect of season of birth on the body condition score			
Season of birth	N	BCS at kidding	BCS at weaning
Rainy season	28	3.53±0.10 ^a	3.13±0.10 ^a
Cool dry season	18	3.06±0.09 ^b	2.83±0.09 ^b

^{ab}Values in the same column with different letters differ according to Duncan's multiple range mean separation (P<0.01).

On the other hand, there was no effect of litter size on BCS at kidding (Table 4). However, this effect was apparent (P<0.01) at weaning, showing that the highest BCS was maintained by the twin kidders (3.13±0.12) followed by single kidders (3.02±0.08) and the triplet kidders (2.92±0.14) (Table 4).

Table 4 - Effect of type of litter size on the body condition score			
Litter size	N	BCS at kidding	BCS at weaning
Single	32	3.27±0.08	3.02±0.08 ^a
Twin	12	3.42±0.12	3.13±0.12 ^a
Triplet	2	3.00±0.38	2.00±0.36 ^b

^{ab} Values in the same column with different letters differ (P<0.01) according to Duncan's Multiple Range Separation.

DISCUSSION

Body condition score is a subjective measure of nutrient reserve. The condition presented in this study in supplemented groups was very high. These results were supported by others (Cisse et al. 1994., Okello et al., 1996 and Acero-Camelo et al., 2008) who reported that the level of feeding was found to be an important determinant of goat condition, also in agreement with Santucci (1984) and Branca (1987). The pregnant does recovered their body slightly, this may be related to the increased energy needs in gravid does due to fetal growth which could lead to less lipid deposition or an increase in lipo-mobilisation from supplemented concentration offered to goats. Improved body condition scores in the present study indicates that animals responded to a higher intake of ration feeding during late pregnancy, results similar of that recorded by Morand-Fehr and Sauvant (1978).

The condition score obtained in rainy and cool dry season reflected the effect of seasonal changes in nutritive grazing value, a similar result were reported by Fredricks (1993) and Nsoso et al. (2003) who reported that season affected body condition score with lower scores in the dry season than in the wet season.

Body condition before weaning declined with throughout the entire lactation period, whereas the change in condition in supplemented goats was less pronounced compared with un-supplemented goats, perhaps due to the fact that as does go through an entire lactation, body condition score changes as fat reserves are used for milk production. These results were in agreement with by Susmel and Cuzzit (1988) and Gubartalla et al. (2002).

The change in condition at weaning period for does born in rainy and cool dry seasons was not affected by season of birth. However, all does in both seasons lost condition and could be due to nutritional changes reflecting rangeland condition. Similar results were reported by Cisse et al. (1994) and Nsoso et al. (2003) who reported that goats lost condition with progressive deterioration of pasture in the dry season.

The effect of litter size on body condition score was apparent since does with triplets and twins lost more score compared with does giving birth to single kids. This was likely due to the fact that heavier does tended to produce more milk, results consistent with Awemu et al. (1999) and Ciappesoni et al. (2004).

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