

Substitution of *Atriplex amnicola* Leaves for *Trifolium alexandarinum* Hay Ration in Stall-Fed Teddy Goats

MUHAMMAD RIAZ, MUHAMMAD AJMAL KHAN†, MAHR-UN-NISA† AND SHEHBAZ AHMAD†

Departments of Livestock Management and †Animal Nutrition, University of Agriculture, Faisalabad–38040, Pakistan

ABSTRACT

The present study was conducted to examine the influence of partial replacement of conventional forages with saltbushes (*Atriplex amnicola*) leaves on Teddy goat performance. A basal feed comprising of 60% wheat straw and 40% Egyptian clover hay was substituted with a 50% fixed level of *A. amnicola* leaves hay. Data obtained for a 30 days of feeding trial showed a non-significant change in dry matter intake, organic matter intake, digestibility coefficients for crude protein, crude fiber and weight variation in response to substituted feed. However, there was more water intake, weight gain, and high digestibility of dry matter or organic matter in saltbush leave substituted feed group. It was noted that animals used more water when they are maintained on saltbush mixed rations. It was concluded that *A. amnicola* leaves could be used for the partial substitution of conventional forages to support livestock population maintained on saline affected lands.

Key Words: Saltbush; Egyptian clover; Digestibility; Weight gain

INTRODUCTION

Pakistan has a large number of livestock heads with meager feed resources. The animals are deficient both in energy and protein (Sarwar *et al.*, 2002). The promising alternative to full fill the gap of feed shortage is to grow more fodders but the country cannot afford to allocate more area for fodder production due to the direct competition with growing human population and high rate of urbanization. Moreover, soil hazards like salinity and water logging are further aggravating the situation. In addition to desertified rangelands, sixty four percent of canal commanded area of the country is salt affected and could not be used for conventional crops (Ahmad *et al.*, 1994).

Under present scenario, it is imperative to utilize the wastelands for salt tolerant trees and bushes to support livestock population. Goat has the capability to thrive on saline or bitter taste feeds. They could browse on pastures or forages that other ruminants would not normally consume. Goat can convert the saline biomass into high quality animal protein and thus support family income of a saline poor farmer. Teddy goat can be a better choice because of its compromising ability for stall-feeding system and less feed requirements. The present study was thus planned to examine the influence of partial replacement of conventional forages with saltbush leaves on Teddy goat performance.

MATERIALS AND METHODS

Sixteen male Teddy goats having same age and weight were randomly allotted to two different feeding regimes. Animals were kept in especially designed wooden cages as described by Horn *et al.* (1954), through

out the experimental period. All the ingredients of the rations used in experiment were made in hay form. *A. amnicola* leaves were used in hay form, which were separated from the soft stem and twigs of the saltbush. A basal feed for animals comprising of 60% wheat straw and 40% Berseem (*Trifolium alexandarinum*) was also prepared in hay form. *Atriplex amnicola* leaves were substituted with 50% of the basal feed (BF) to serve as experimental ration (ASF). The composition of rations used in experiment is given in Table I.

Table I. Composition of experimental diets

Items (%)	Diets	
	BF	ASF
Wheat straw	60	30
<i>Trifolium alexandarinum</i> hay	40	20
<i>Atriplex amnicola</i> leaves hay	0	50
Chemical composition		
Dry matter	87.28	88.65
Crude protein	11.04	11.93
Ether extract	3.50	5.25
Crude fiber	24.29	23.50
Nitrogen free extract	50.97	41.18
Ash	10.20	18.14

BS= Basal feed; ASF= Atriplex substituted feed

All animals were provided *ad-libitum* feeding and fresh drinking water round the clock during experimental period. Two weeks adjustment period was given to all animals. The four weeks were used as collection period; daily feed intake, water intake and weekly weights were recorded. A digestibility trial was conducted for two weeks at the end of feeding trial and digestibility coefficients were determined (Reaves & Henderson, 1969). Faeces were collected with the harnesses applied to the goats as described by Balch *et al.* (1951). The feed

offered, Orts and fecal samples were analyzed for, dry matter (DM), organic matter (OM) and crude protein (CP) contents according to AOAC (1990).

The data on various parameters of feeding trial and digestion trial were subjected to statistical analysis using completely randomized design technique. Tuckey's multiple range tests was used to compare means (Steel & Torrie, 1980).

RESULTS AND DISCUSSION

Intake. The average daily dry matter intake (DMI) in animals fed BF and ASF diets was 447±52 and 369±48 g per animal per day, respectively (Table II). The DMI, OM intake per day were remained non-significant in animals fed experimental diets ($P>0.05$). The results of the present study were consistent with the findings of Houreou (1991) and Swingle *et al.* (1994) who reported that goats liked the food of bitter taste and inclusion of saltbushes in mixed diets would minimize potential adverse effects of high salts or other anti-nutritional factors of halophytes on the performance of ruminants.

Water intake was significantly ($P<0.01$) higher in goats fed ASF diet compared to those fed BF diet (Table II). More (64%) water intake was observed in goats maintained on ASF diet compared to BF diet. There was 70% more water intake per $\text{kg}^{-0.75}$ body weight in ASF group as compared to BF group. It was observed that animals fed ASF diet used 80 and 85% more water per gm of DMI and OMI, respectively, compared to those fed BF diet. The increased water in take by the animals fed ASF diet may be because of higher ash and NaCl contents in ASF ration (Table I) due to the substitution of *A. amnicola* leaves for basal feed. Riaz *et al.* (1994) reported that water requirements increased with increased level of saltbush. Results of the present study are in line with Riaz *et al.* (1999), Gihad (1993), and Riaz and Ahmad (1999).

Digestibility. A significant ($P<0.01$) improvement in DM and OM digestibility was noted in animals fed ASF diet having *A. amnicola* leaves compared to those fed BF diet (Table III). Riaz *et al.* (1994) noted higher digestibility values in ration having saltbush compared to control. Swingle *et al.* (1994) reported that utilization of halophytes would depend upon the ability of animals to adapt new feed and to adjust feed intake to compensate for the lower dietary energy density. However, it was stated that energy and protein supplementation to sheep maintained on saltbushes resulted in better performance (Rehman *et al.*, 1988).

Weight gain. A decline in body weight of goat was observed maintained on basal diet. The over all weight loss was 0.4 kg in the whole experimental period; this loss was 0.3% of their initial body weight (Table III). The weight loss may be attributed to more lignified fibrous wheat straw contents in basal diet representing poor conventional ration. The over all gain in weight in ASF

Table II. Effect of Atriplex substituted feed on nutrient intake in Teddy goats

Parameters	BF	ASF
Dry matter intake (g day ⁻¹)	447 ± 52.0	369 ± 48.0
Dry matter intake (g/kg ^{-0.75})	64.18 ± 6.9	58.89 ± 6.1
Organic matter intake (g day ⁻¹)	40.00 ± 47.0	32.66 ± 43.0
Organic matter intake (g/ kg ^{-0.75})	57.30 ± 6.25	47.85 ± 5.6
Water intake (mL day ⁻¹)	776 ± 52.0 ^a	1274 ± 79.0 ^b
Water intake kg ^{-0.75} (mL day ⁻¹)	116.25 ± 4.1 ^a	193.40 ± 9.0 ^b
Water intake g ⁻¹ dry matter intake (mL day ⁻¹)	2.60 ± 0.35 ^a	4.66 ± 0.52.0 ^b
Water intake g ⁻¹ organic matter intake (mL day ⁻¹)	2.90 ± 0.40 ^a	5.29 ± 0.59.0 ^b

Means in same row with different superscript differ significantly at ($P<0.05$); BS= Basal feed; ASF= Atriplex substituted feed

Table III. Digestibility and daily live weight change in male Teddy goats fed experimental diets

Parameters	BF	ASF
Dry matter digestibility	57.42 ± 1.18 ^a	66.98 ± 0.89 ^b
Organic matter digestibility	56.42 ± 1.30 ^a	62.16 ± 0.42 ^b
Crude fiber digestibility	62.55 ± 3.80 ^a	63.48 ± 1.07 ^a
Crude protein digestibility	65.34 ± 0.63 ^a	65.52 ± 0.44 ^a
Daily body weight change	-10.00 ± 10.0 ^a	10.00 ± 30.0 ^b

Means in same row with different superscript differ significantly at ($P<0.05$); BS= Basal feed; ASF= Atriplex substituted feed

group was 0.09 kg per animal, which was 0.74% of their initial body weight. This gain in weight in ASF group may be due to its better digestibility. Khanum *et al.* (1987) concluded that feeding Kallar grass to Teddy goats decreased body weight due to lignifications of plants. Swingle *et al.* (1994) and Glenn *et al.* (1994) revealed that satisfactory weight gains could be obtained when halophytes are fed to livestock in mixed rations as a substitute for conventional roughages. The body weight gain in ASF group may be because of more water intake and its retention in the tissues of animal's body (Warren & Casson, 1992).

CONCLUSION

From the findings of present study it may be concluded that the inclusion of *A. amnicola* in goats ration could sustain body weight and maintain range livestock population especially during drought in saline affected areas.

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