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EFFECTS OF FEEDING AND MANAGEMENT SYSTEMS ON BODY WEIGHT AND REPRODUCTIVE PERFORMANCE OF BALOCHI EWES

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ABSTRACT

This study was conducted to assess the performance of Balochi ewes under three management systems i.e. T_1-Extensive (grazing only), T_2-Semi-extensive (grazing plus daily feed supplementation for nine months @ 0.625 kg/ewe/day) and T_3-Intensive (experimental ration only @ 1.5625 kg/ewe/day). Animals under T_1 lost as high as 7.9 kg body weight during winter. T_2 flock maintained their body weights and T_3 achieved significantly higher body weight (i.e. 15.1 kg). Highest conception and lambing percentages (93.8%) were attained under T_3 group, followed by T_2 (87.5%) and T_1 (75%). These results strongly recommend appropriate feed supplementation to small ruminants on Balochistan ranges for sustainable pastoral livelihood.

Key words: Ewes, grazing systems, weight gains, breeding performance, Balochistan.

INTRODUCTION

Although Balochistan is geographically the largest province of Pakistan, but its cultivated area is comparatively limited due to several ecological reasons. Eventually, small ruminants have historically emerged as a preferred subsistence oriented livelihood choice. Traditionally, bulk of sheep and goats diet comprised of forage plant species. During the past, the animal population in this province has quickly multiplied. Consequently, many fold more grazing pressure on local rangelands has been causing decline in forage availability from this natural resource. Range resources have visibly become depleted. Eventually, the animals are under-nourished, more prone to diseases and their productivity is quite low under poor conventional management systems (Wahid, 1990).

Under traditional management practices, small ruminants are not supplemented on rangelands for improving their nutritional status (Wahid, 1990). Conclusively, under the prevailing low feeding regimen, the genetic potential of local sheep is under-exploited and breed improvement programmes offer little success. For sustaining the local pastoral livelihood, it is now strategic to give serious and scientific consideration to extensive range-livestock production. For this reason, El-Hag *et al.* (2006) offered supplementary feeding to desert ewes at mating time which increased lambing and gave heavier lambs with greater monetary return to farmers. Bianchi *et al.* (2001) advised a preferential diet for ewes around mating period in order to improve the reproductive performance of flocks, because protein deficiency in diet may lead to reduced forage intake and consequently reduced performance (Taylor *et al.*, 2002). It was further concluded that lack of feed supplement affected body condition score, wool characteristics and lambing percentage of ewes (Taylor *et al.*, 2002). This study was conducted to determine the effect of feeding and management systems on body weight and reproductive performance of Balochi ewes.

MATERIALS AND METHODS

This study was conducted at the Range-Livestock Research Station (RLRS) of Arid Zone Research Centre (AZRC), Zarchi, district Kalat, Balochistan, Pakistan. This area is located at 29°07'N, 66°24'E and at an altitude of 1850 m (ICARDA, 1989) where average annual precipitation is 200 mm. Wahid (1990) described Zarchi vegetation as desert shrub type dominated by *Artemisia maritima* and *Haloxylon griffithii*. Chemical composition of major range plant species reported by Wahid (1990) was used as nutritional guideline. A flock of 48, two to five years old Balochi sheep, was maintained at RLRS for this study. Flock was randomly divided into three groups of 16 animals each. Each group was randomly allotted one of the following treatments for nine months:

Extensive management system (T_1): Animals depended on grazing only for eight hours daily during the study period i.e. fall, winter and spring (October – June).

Semi-intensive management system (T_2): In addition to daily grazing for 8 hours, animals were fed an experimental ration @ 0.625 kg/ewe/day in the afternoon.

Intensive management system (T_3): Sheep were fed the experimental ration @ 1.5625 kg/ewe/day and were not allowed any grazing.

Cost per kg of experimental ration ranged between Rs.6.50 to 8.00, depending upon fluctuation in market prices of ingredients. Ingredients and chemical composition of the experimental ration are given in Table 1.

Table 1: Ingredients and chemical composition of the experimental ration

Ingredients	Composition (%)
Lucerne hay	50
Cottonseed cake	25
Wheat straw	10
Wheat bran	15
Crude protein	12
Total digestible nutrients	55

Ewes were weighed on 1st and 16th of every month from October to June. All animals were vaccinated against enterotoxaemia, sheep pox, Foot and Mouth disease, Caprine Contagious Pleuro-pneumonia and anthrax. They were also drenched with Systamex, Zanil or Nilzan (Levamisol hydrochloride), depending upon availability in the market and were also dipped in Neguvon solution as per prevailing schedule before and during the study.

Following parameters were recorded: initial (mature) body weight of ewes, fortnightly body weight, conception rate, lambing percentage, lamb birth weight, lamb weaning weight and lamb mortality. Data on body weight were analyzed by analysis of variance using completely randomized design (Steel and Torrie, 1984) and means were compared by the LSD test using MSTATC computer package. Whereas conception rate and lambing percentage data were analyzed by Chi-square analysis (Little and Hills, 1978).

RESULTS AND DISCUSSION

Fortnightly body weights of ewes are given in Table 2. During the first two weeks of study, body weights of ewes under three treatments did not differ significantly. Ewes under T_1 (i.e. extensive management) and T_2 (i.e. semi-extensive management) showed similar but significantly lower ($P<0.05$) body weights than T_3 (i.e. intensive management) during next one month period. However, during rest of the winter and spring period, ewes under three treatments differed significantly ($P<0.05$) in their body weights. The values were the highest for T_3 and lowest for T_1. But during the last two months of study, again the ewes in T_1 and T_2 had similar but significantly lower ($P<0.05$) body weights than T_3 ewes. It may be concluded that increased protein supplementation under T_3 has positive impact on ewes performance as mentioned by Taylor *et al*. (2002).

Loss of weights in sheep during winter is a common observation on Balochistan ranges because vegetation gets dormant with a sharp decline in its nutritive value (Wahid, 1990) and animals get limited grazing time due to snow and severe cold. This climatic inhospitality forces the local population to migrate

Table 2: Effect of feeding and management systems on body weights (kg) of Balochi ewes

Treatment	W1^F	W2^F	W3^F	W4^W	W5^W	W6^W	W7^W	W8^W	W9^W
T_1	32.8^a	32.4^a	29.8^b	29.8^b	29.1^c	28.4^c	28.6^c	28.4^c	26.8^c
T_2	34.2^a	33.3^a	32.2^b	32.5^b	32.7^b	33.8^b	33.9^b	34.2^b	32.0^b
T_3	33.2^a	35.2^a	35.6^a	38.0^a	38.5^a	39.3^a	41.6^a	42.7^a	43.3^a
SEM	± 0.64	± 0.66	± 0.77	± 0.80	± 0.87	± 0.99	± 1.05	± 1.17	± 1.25
Treatment	**W10^S**	**W11^S**	**W12^S**	**W13^S**	**W14^S**	**W15^s**	**W16^s**	**W17^s**	**W18^s**
T_1	25.7^c	24.9^c	29.6^c	27.9^c	31.7^b	34.4^b	32.4^b	33.9^b	35.2^b
T_2	31.6^b	30.3^b	34.6^b	32.7^b	34.6^b	36.4^b	32.8^b	34.3^b	34.7^b
T_3	43.7^a	39.2^a	48.3^a	43.5^a	40.7^a	42.5^a	36.8^a	38.6^a	39.2^a
SEM	± 1.39	± 1.36	± 1.41	± 1.22	± 0.98	± 0.90	± 07.0	± 0.70	± 0.68

Trt : Treatment
W1 – W18 : Fortnightly body weights of ewes (i.e. 16th October – 16th June)
T_1 : Extensive management, range grazing alone, no ration feeding
T_2 : Semi-intensive management, range grazing + ration feeding @ 0.625kg/ewe/day
T_3 : Intensive management, ration feeding along @ 1.5625 kg/ewe/day
abc : Values in the same column with different superscripts differ significantly ($P<0.05$).
F (superscript) : Fall
W (superscript) : Winter
S (superscript) : Spring
s (superscript) : Summer

down to plains. Although from precipitation and forage availability point of view the study year was above average one, even then it was only possible for animals to maintain live weights with some additional supplemental feed. The ewes under T_1 lost weight upto 7.9 kg during winter (Table 2). As soon as forage availability improved during spring, the animals were not only able to make up the losses but gained 2.4 kg over the initial weight (W_1). Whereas ewes under T_2 managed to almost maintain live weight, which reflected the impact of better management and nutrition. The ewes under T_3 had higher body weights throughout winter and at one stage they gained 15.1 kg (W_{12}) over the initial weight (W_1), but later on this group started losing body weight, indicating any unknown stress on the animals.

Data on birth and weaning weights and mortality in ewes of three groups are given in Table 3. Birth and weaning weights under T_3 were significantly higher than both T_1 and T_2. There was no mortality under the T_2 and T_3.

Table 3: Birth, weaning weights and mortality of lambs

Treat-ment	Birth weight (kg)	Weaning weight (kg)	Mortality (%)
T_1	3.00 ± 0.22^b	15.56 ± 0.66^b	16.7^a
T_2	3.10 ± 0.20^b	16.80 ± 0.80^b	0.0^b
T_3	3.84 ± 0.20^a	19.22 ± 0.79^a	0.0^b

Values in the same column with different superscripts are different ($P<0.05$)

Mating of experimental females with breeding males took place in October and November, however, breeding rams remained with flock throughout the study period. Ewes not repeating oestrous cycles were monitored closely for pregnancy symptoms till visible confirmation of pregnancy.

The average lambing percentages in T_1, T_2 and T_3 were 75.0, 87.5 and 93.8 respectively. Highest lambing percentage was attained under T_3 (i.e. intensive management), followed by T_2 (semi-extensive management) and T_1 (extensive management). These results show that higher body weights resulted in higher conception rates but the differences among treatments were statistically non-significant. Lambing took place in March. There were no abortions as well as twins and triblets, leading to 100% lambing rate. These results are partially in line with the findings of Bianchi *et al.* (2001) and El-Hag *et al.* (2006). Similar findings were reported by Rafique *et al.* (1991) in Pakistan. Thomson and Bahaddy (1988) reported that fertility was related ($r = 0.87$) to live weight at mating in Awassi ewes in semi-arid North-West Syria.

Conclusively, appropriate supplementation on Balochistan ranges is critical and would change the overall socio-economic scenario of local pastoralists. However, it would ask for cheaper and local resource based balanced feed supplements to be formulated by the researchers. It would further demand to build up the capacity of local pastoralists by involving local extension services to purchase and feed these supplemental rations to their animals particularly during winter. Since this study did not focus on economic analysis of feed supplementation of Balochi ewes during winter, further studies would be required to assess its net economic returns for local small ruminants producers.

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