STUDY OF REPRODUCTIVE POTENTIAL OF BALUCHI SHEEP ON RANGES IN BALUCHISTAN

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Summary

A reproductive potential trial using randomized complete block design with 3x3x2 factorial, was conducted on 84 Baluchi yearling ewes. Ewes grazed on rangeland dominated by Artemisia maritima and Holoxylon grifthii with or without flushing and supplementation of barley grain (BG) and cotton-seed-cake (CSC) during premating, late pregnancy and lactation of 90 days. Analysis of variance revealed that conception rate which ranged 64.28 to 85.71, was significantly greater ($p < .05$) in ewes flushed with CSC followed by ewes under BG or control feeding regimes. During the gestation period, liveweight of ewes changed from 31.24 to 21.2 kg. A loss of 32% of initial body weight was observed at lambing. Losses in live weight of ewes, regardless the supplementation, were uniform and non-significantly different. Live weight of ewes at lambing and weaning were also similar. Birth weight of lambs was significantly different at $p < .05$. Lambs born to larger ewes seemed to be heavier than lighter ones. Lambs suckling to ewes with losses in body weight during lactation gained more weight which was significantly different at $p < .05$. In the paper, factors affecting the conception rate, changes in liveweight of ewes during gestation and lactation and subsequently growth of lambs are discussed.
(Key Words: Baluchi Sheep, Reproduction Potential, Ranges, Pakistan)

Introduction

In arid or semi-arid regions, major source of nutrition for livestock, particularly sheep and goats, is grazing on so called range lands. As rainfall in these areas, occurs usually in winter leading to regeneration of vegetation in spring. Major part of the year is dry and small ruminants on these ranges, are confronted with malnutrition during various physiological phases of reproduction, especially late gestation and lactation. To meet their energy requirements, animals are forced to mobilize their reserve body tissues, leading to loss in body weight. Thus ultimately poor ovulation, low conception and lambing rate, inadequate milk production and slow growth rate of lambs are observed (MAFF, 1975; Denny, 1983; Donald and Russel, 1970; Coop et al, 1972; Cumming, 1977).

Baluchi breed which shares 40% of total sheep stock of Baluchistan (Siddiqui, 1982) is confronted with these problems. Due to low productivity of ranges, breed is facing the problem of malnutrition which has reduced its reproductive potential through low ovulation rate, increased abortions and poor lambing percentage. Before formulating a strategy for the improvement of its production level, it was imperative to study the reproductive potential. For this purpose, study was conducted under her own home-tract conditions.

Materials and Methods

Study was conducted during 1987-88, at Range-livestock Station, Zarchi, located 25 km, west of Kalat. The area is representative of dry but cold arid environment characterized by temperature of $-12^{\circ}C$ to $35^{\circ}C$ loamy soils and 50-150 mm rainfall/annum. Vegetation is shrub which is dominated by Artemisia maritima and *Holoxylon grifthii*. Based on ecological conditions, production system is transhumance in nature.

On August, 16th 1987, 84 yearling Baluchi

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ewes of uniform size were divided into 3 groups. Group 1 served as control (only grazing) whereas ewes of group 2 and 3 were flushed with barley grain (BG) or cotton-seed-cake (CSC) for a period of 60 days at a rate of 300 and 150 g/head/day. After one month of start of flushing, 3 active rams intacted with harness and crayon colors, were introduced, one in each group of ewes under control or flushed with BG or CSC. Rams remained with ewes for a period of 60 days. For the identification of repeater ewes, carayon colors were changed on monthly basis. After 100 days of completion of mating, in each group only pregnant ewes were retained and divided into further 3 groups which were assigned to supplemental feeding of BG or CSC or control, during advanced gestation and lactation. During advanced gestation and lactation, energy requirements of the ewes were determined on the basis of number of days of pregnancy, expected milk yield and liveweight as per MAFF, 1975. As rainfall was very poor (51 mm during 1988) productivity of range land was low. Due to poor physical conditions, ewes of all groups regardless the supplementation assigned, were given 50% of metabolizable energy of maintenance through a basal ration of lucern hay at a rate of 535 and 750 g/head/day during gestation and lactation. Ewes of experimental groups were given an additional allowance of 25% of maintenance requirements of energy during gestation and lactation through BG and CSC at a rate of 150, 240, 200 and 300 g/head/day. During the whole study period comprising flushing (pre-breading), breeding, gestation and lactation, ewes grazed under conventional grazing practices. Lambs had free access for suckling to their respective dams. Ewes as well as lambs were weighed at the start of flushing, mating, lambing and weaning. Data collected on changes in liveweight of ewes and lambs was subjected to randomized complete block design with 3x3x2 factorial.

Results and Discussion

Liveweight of ewes during pre-mating, at mating and at the start of supplementation during advanced gestation is given in table 1.

As shown in the table 1, 64.28, 75.0 and 85.71% of ewes exposed to rams, under control or experimental groups of BG and CSC had conceived. Abortion rate during late pregnancy was 16.67, 14.28 and 8.30 % in ewes of control and those flushed with BG and CSC, leading to lambing percentage of 47.61, 60.72 and 77.41. Changes in liveweight of ewes from lambing to weaning at 90 days of lactation and subsequent growth of lambs are given in table 2.

Analysis of variance revealed non-significant differences ($p < .05$) in most of the production traits of this breed with or without flushing and supplementation. Although, ewes regardless the kind of flushing and supplementation, had con-

TABLE 1. EFFECT OF FLUSHING ON REPRODUCTIVE PERFORMANCE OF EWES

Attributes	Treatments		
	Control	Barley grain	Cotton Seed-Cake
Ewes LW at the start of flushing (LWO-1, kg)	32.86^{a}	26.67^{bc}	31.56^{ab}
Ewe LW at breeding (LWB-2, kg)	31.36^{a}	28.50^{bc}	30.43^{ab}
Ewe LW at the end of flushing (LWF-3, kg)	29.43^{a}	26.78^{bc}	28.33^{ab}
Ewe LW at 100 days of gestation (LWSD-4, kg)	26.20^{a}	23.70^{b}	23.44^{bc}
Conception rate (%)	64.28	75.0	85.71
Abortion rate (%)	16.67	14.28	8.30
Lambing percentage (%)	47.61	60.72	77.41
Lambs survival rate (%)	56.73	74.62	82.67

^{a,b,c}Means in the same row with different superscript letters differ ($p < .05$).

TABLE 2. PERFORMANCE OF EWES AND LAMBS DURING LACTATION

Parameters Feeding regime	LW of ewe at lambing (LWEL-5,kg)	LW of ewe at weaning (LWEW-6,kg)	LW gain of ewes (g/day)	Birth weight of lambs (kg)	LW of lambs at weaning (kg)	LW gain of lambs (g/day)
1. Control	23.17^{a}	25.67^{a}	30.0^{b}	1.83^{bc}	9.80^{a}	90.06^{a}
2. Without flush but supple with BG	20.26^{bc}	24.27^{b}	40.0^{a}	2.70^{a}	9.24^{b}	72.02^{bc}
3. Without flush but supple with CSC	21.29^{ab}	24.04^{bc}	30.0^{b}	2.22^{ab}	9.38^{b}	80.0^{b}
4. Flushed with BG but no supple	22.13^{b}	27.58^{a}	60.0^{a}	2.53^{a}	12.38^{a}	110.0^{a}
5. Flushed and supple with BG	21.78^{bc}	24.28^{b}	30.0^{b}	2.40^{a}	10.63^{b}	91.44^{b}
6. Flushed with BG but supple with CSC	26.08^{a}	23.83^{bc}	-25.0^{c}	2.48^{a}	8.0^{c}	61.3^{c}
7. Flushed with CSC but no supple	23.25^{ab}	27.15^{a}	43.3^{a}	2.79^{a}	10.29^{ab}	83.37^{b}
8. Flushed with CSC but supple with BG	24.94^{a}	27.39^{a}	27.25^{b}	2.60^{a}	10.09^{ab}	83.25^{b}
9. Flushed and supple with CSC	22.65^{bc}	25.0^{ab}	26.83^{bc}	2.21^{b}	10.61^{a}	93.33^{a}

^{a,b,c}Means in the same column with different superscript letters differ ($p < .05$).

sistently lost body weight during breeding and gestation but losses were similar. Similarly non-significant differences were observed in liveweight of ewes of all groups at lambing and weaning of 90 days. However, a significant variation ($p < .05$) was observed in liveweight gain of ewes during early lactation of 90 days, under supplemental feeds of BG or CSC. Most of the ewes flushed with BG but supplemented with CSC had lost body weight at a rate of 25 g/head/day. Duncan's multiple range-test revealed that ewes flushed with BG but grazed on rangeland only, gained the highest body weight followed by those under BG supplemental feed.

Birth weight of lambs was significantly different ($p < .05$) with highest in those born to ewes flushed with BG. Lambs born to ewes maintained on ranges along with supplementation of CSC or without any supplemental feed were equally heavier. Highly significant variation ($p < .05$) was recorded in weaning weight and liveweight gain, (g/day) of lambs. Lambs suckling to ewes under grazing conditions were the heaviest than those under supplemental feeding of BG or CSC. Live weight gain of lambs was also highest in lambs nourished by ewes under flushing regime of BG or those under rangelands. Weight gain was the poorest in lambs suckling to ewes supplemented with CSC during lactation. Interaction between flushing during pre-mating and supplementation during late pregnancy and lactation was non-significantly different at $p < .05$ and did not affect the growth of lambs significantly.

This is a common observation that every third year is dry. Due to poor rainfall, the year 1987-88 was dry. Therefore rangeland production was low. Continuous grazing had led to further deterioration of the rangelands (MART/AZRI, 1988). Maximum conception at first estrus was due to optimum weight, ewes had maintained during late summer which coincided to breeding season. Due to rainfall during the previous year, ranges were adequately productive and had helped the animals in maintaining the body weight which is essential for optimum ovulation and conception rate (Hight and Jury, 1973). Higher conception rate in ewes flushed with BG and CSC was due to flushing concentrates and their nutritional nature which had stimulated the ovarian activity controlled by hormones which are proteins in nature. The highest conception rate in ewes flushed with CSC was due to its proteinous quality. During late summer to early autumn, which is the breeding season, available vegetation is mainly composed of lignocellulosic contents, deficient in energy and nitrogen. Flushing with BG and CSC had met the deficiency of energy and nitrogen, yielding to higher conception rate than in ewes main-

tained on ranges. These observations on conception rate in ewes whether flushed or without any flushing, are in line to those reported by Rattary et al. (1980), Moore (1982) and Thompson et al. (1985).

As shown in table 1, during the whole gestation period, ewes regardless the kind and quantity of flushing and supplementation, had been consistently losing body weight. This loss in body weight varied from 5-8 kg and constituted almost 30% of initial weight. Losses in body weight of ewes were greater during late gestation than in early but similar in all groups. These losses in body weight of ewes were due to a number of biological and environmental factors. Pasture quality and quantity had been continuously deteriorating from late summer to early spring and could not supply expected level of metabolizable energy required by ewes during late pregnancy as assessed through poor physical condition of ewes. Since the gain in mass of the foetus in the last 8, 4 and 2 weeks of gestation is equivalent to 85, 50 and 25% of its birth weight, therefore it is logical to expect a relationship between plane of nutrition in late pregnancy and lambs birth weight (Robinson, 1982). Decline in supply of energy during late gestation, had proportionately adverse effects on live weight of ewes with or without flushing and supplementation, as shown in figure 1. To overcome these losses in body weight, ewes had to mobilize body reserve tissues with an efficiency of 0.84 as anticipated by MAFF (1975) and ARC (1980). These huge losses in body weight of ewes also suggested that rangelands of southern Baluchistan dominated by *Artemisia* spp. are unable to support the animals in maintaining their live weight during physiological stages. The observations on rangeland productivity and subsequent performance of ewes are in conformity of results recorded by Griego (1977) during his work on sheep and goats grazed on Artemisia compestris and Artemisia rerbaalba.

Dry but cold winter characterized by -12°C to 4°C temperature further complicated the situation. As reported by Young (1983), metabolic activities during severe winter are increased. Energy generated during metabolism is liberated to the atmosphere for the maintenance of an equilibrium between external and internal body temperature. The energy meant for productive functions, was lost thus leading to mobilization of body reserve and losses in body weight. As a result emaciated ewes became susceptible to infections and infestations. Interaction of malnutrition with infestation also aggravated the situation leading to 7-10% abortion in ewes (Reid, 1968; Rafiq et al., 1989). These changes in liveweight of ewes during late gestation till lambing, coincide to those reported by Robinson et al. (1982) and Mavrogenis et al. (1980).

Changes in liveweight of ewes during lactation with or without supplementation were also related with level of feeding. Rangelands could not contribute their due share in the supply of metabolizable energy during early spring because of low dry matter production per hectare. Most of

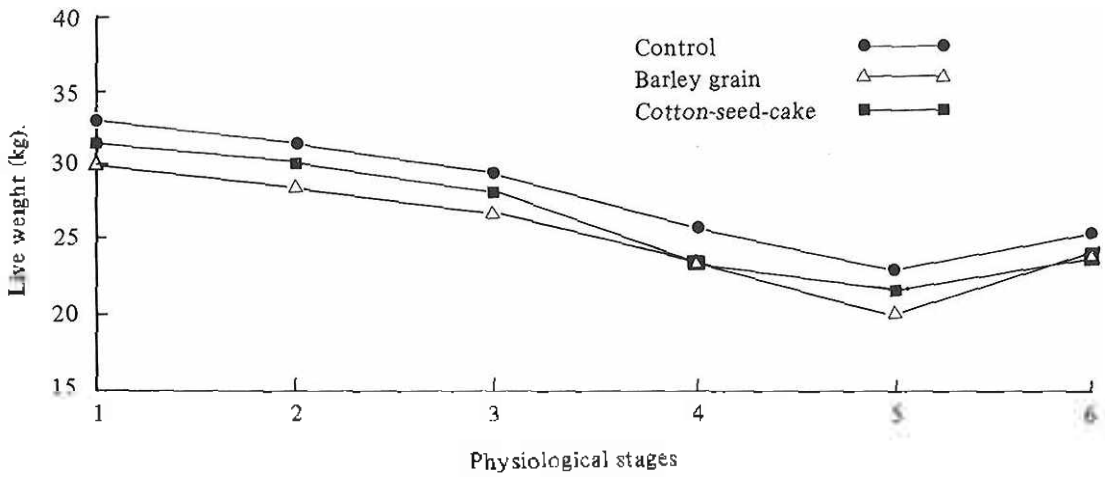

Figure 1. Changes in live weight of ewes at various physiological stages.

the ewes during early lactation, had gained liveweight except those flushed with BG but supplemented with CSC, who lost body weight at a rate 25-40 g/day. This variability in weight gain of ewes was due to the availability of protein and energy during early lactation. In spring there is usually a steady increase in herbage allowance as a result of vegatative growth which gave a rise in intake by ewes during first few weeks of lactation. In most cases, it appeared that shrubs in early lactation contained sufficient proteins to supply the total protein requirements of lactating ewes even when intake of herbage was restricted. In addition to this qualitative aspect of vegetative, supplementation with BG or CSC has also contributed in weight gain of ewes, during early lactation. These responses in liveweight of supplemented ewes coincide to the observations recorded by Penning and Treacher (1981). However, losses in live weight of some of the ewes were related with milk yield. This type of situation as anticipated by Gibb and Treacher (1980), is not un common and suggest that protein requirements of ewes are being met adequately for milk production (Orr et al., 1981).

Variations in birth weight, weaning weight and weight gain of lambs was due to level of feeding and milk yield during late gestation and lactation. Chronic malnutrition during gestation as speculated by Mellor and Murrary (1982a) influenced the birth weight by a gradual slowing down of prenatal growth of lambs under rangeland conditions. Prolonged malnutrition of the ewes during gestation had also led to the inability of lambs to regain normal growth rate even when the feed intake was increased during late pregnancy. Greater liveweight gain and weaning weight of lambs suckling to ewes flushed with BG but without any supplementation, was due to level of milk production of respective dams. Lambs suckling to ewes with losses in body weight, gained more weight than others. These changes in liveweight of lambs are close to the observations recorded by Gibb and Treacher (1980) and Orr et al. (1981). The overall performance of lambs of Baluchi bread, is comparable with those recorded by Robinson et al. (1982), Amin and Suliman (1979), Economides (1980) and Mavrogenis et al. (1980).

Highly significant differences ($p > .05$) in lambs survival rate, were due to poor birth weight, milk yield of respective dams and severe winter. Mortality in lambs was the highest during first 4 weeks of age and greater in female than males.

Keeping these observations on reproductive and productive traits of economical importance, it can be confidentially said that Baluchi breed is potentiable one. Huge losses in liveweight, also suggest the ecological constraints leading to transhument movements as production system in the region. Subjected to improved environmental conditions, particularly nutrition during dry but cold winter which coincides to breeding, late gestation and lactation, its reproductive potential can be brought up at par to a number of sheep breeds in the region. Although improvement in rangeland production is equally important but this is time consuming process. Measures of immediate nature, e.g. flushing and supplementation with low cost ingredients or compound ration, should constitute part of husbandry practices without any alteration in the eco-system. Such measures will not only reduce the grazing pressure on rangelands but also improve the productive and reproductive potential of this valuable species of livestock.

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