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Effect of body condition score on reproductive performance of Chokla ewes

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ABSTRACT

Body condition scoring (BCS) is a simple, non-invasive, time saving and beneficial technique to rank ewes according to their body reserve by sight and touch. The aim of the present study was to evaluate the impact of different BCS on reproductive performance of Chokla ewes in semi-arid region of India. Adult Chokla ewes (150) were used to study the effect of body condition score (BCS) on lambing rate and birth weight of lamb. Ewes were classified as per their BCS on 1 to 5 scale of half unit increment with 1 being an extremely thin and a 5 being fatty ewe. The ewes of 2.5, 3.0 and 3.5 BCS were marked as group1 (G1), group 2 (G2) and group 3 (G3), respectively. The heart girth (HG), pin shoulder length (PSL) and body weight of ewes were recorded at the time of mating. The gestation length, lambing rate and birth weight of lamb were also recorded during experiment. The HG, PSL and body weight of G1 ewes were significantly lower as compared to G2 and G3 groups ewes. The highest lambing rate was obtained in ewes of G2 group followed by ewes of G3 and G1 groups. The birth weight of lambs born from ewes of G1 group was significantly ($P<0.05$) lower as compared to ewes of G2 and G3 groups. The results indicated that the BCS of 3 or 3.5 at the time of mating resulted higher lambing rate and as well as more birth weight of lambs per lambing. Hence, attempt should be made to maintain majority of the ewes in the BCS of 3 to 3.5 during mating to get optimum productivity.

Key words: Body condition score, Heart girth, Lambing, Mating, Sheep

In the arid and semi-arid region, scarcity of feed, water and adverse climatic conditions lead to lower body condition score (BCS) of ewes, which is the main limiting factor in sheep production system. Ewes must have adequate amount of body fat as an indicator of energy store to maintain their health, reproductive function and productive capacity (Atti *et al.* 2001). The ewes with low body fat reserves have fewer large ovarian follicles due to which less number of follicles reach to the final stage of development and ovulation with greater possibility of reproductive failure and reduction in the production level (Michels *et al*. 2000). It is therefore essential to have a simple and reliable indicator at hand, which allow to assess nutrition level of ewes particularly in production systems where the availability of feed is not constant and to decide when and how to supplement the flock (Atti *et al.* 2001). The BCS method is one of these indicators, which is a simple, noninvasive, time saving and effective technique to rank ewes according to their body reserve by sight and touch. The literature on effect of BCS on reproductive and productive efficiency of ewes in Indian context is not available to the best of our knowledge. Therefore, the aim of the present study was to evaluate the impact of different BCS on reproductive performance of Chokla ewes in semi-arid region of India.

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MATERIALS AND METHODS

The experiment was carried out at the Central Sheep and Wool Research Institute farm, which is located in the semi-arid region of the country at longitude 75°–28^{1}E and the latitude of 26°–26^{1}N and at altitude of 320 m above mean sea level. The mean relative humidity ranges from 20 to 85%. The maximum and minimum ambient temperature ranges from 6 to 46°C. The annual rainfall in this area ranges from 400–700 mm with an erratic distribution throughout the year

The present study was conducted on 150 mature Chokla ewes (3 to 6 years). The Chokla breed of sheep is light to medium size with square and compact body, small head having reddish brown or dark tan colour extending up to middle to the neck with white body colour. The coats are dense and relatively fine covering entire body including the belly and the greater part of legs. Fairly developed quarters, with small udder and teats are found in the ewes (Arora *et al.* 1975). The average body weight of Chokla ewes and ram was approximately 29.1 and 41.6 kg, respectively. The ewes were mated during the monsoon season (mid August) and

ewes began to lamb in the mid January. All the animals were allowed to graze 8 to 10 h/day on natural pasture interspersed with seasonal grasses, shrubs and bushes. In addition to grazing, the ewes were provided a concentrate mixture of 250 g/ day. After grazing, the ewes were housed in an enclosure having asbestos sheet roof and open from sides.

The body weights and different allometric measurements i. e. heart girth (HG) and pin shoulder length (PSL) were recorded just before/after mating. Body size measurements were taken with flexible measuring tape. The HG was measured by passing the tape around the chest exactly behind the point of elbow. The PSL was measured from the point of shoulder to the pin-bone of the same side. The body condition score were assigned after visual and tactile appraisal by experienced observer according to method reported by Russel *et al.* (1969). The sheep score ranges between 1 and 5 with lower scoring ewes (1.0 BCS) being very thin and highest scoring ewes (5.0 BCS) very fatty. BCS was performed using palm and fingers to feel the muscling and fat cover over and around the vertebra in the loin region. During scoring the ewes were kept standing and relax position. The fingers and thumb were used in determining the sharpness of spine and transverse process behind the last rib and in front of hipbone (loin area). Ewes were classified as per their BCS. The ewes of 2.5, 3.0 and 3.5 BCS were marked as group1 (G1), group 2 (G2) and Group 3 (G3), respectively.

The significance between different mean values of HG, PSL, body weight of ewes and birth weight of lambs were analyzed using student's t- test (Snedecor and Cochran 1980). The lambing rate in ewes was analyzed using chi-square test.

RESULTS AND DISCUSSIONS

The data on body weight, PSL, HG of Chokla ewes having different BCS is presented in Table 1. The BCS had significant effect on PSL, HG and body weight of ewes. The PSL, HG and body weight differs significantly (P<0.05) amongst all groups of ewes. The findings of the present study revealed that the ewes having lower BCS had low body weight, HG and PSL as compared to ewes having more BCS. A positive correlation of BCS with HG and other allometric measurements of ewes have also been reported (Atti *et al.* 2001, Nsoso *et al.* 2003).

Table 1. Effect of BCS on body weight and allometric measurement of Chokla ewes

Body condition score (BCS)	No. of ewes utilized for study	Pin shoulder length (PSL) cm	Heart girth (HG) cm	Body weight (kg)
2.5	28	56.8±0.53^{c}	66.7±0.62^{c}	23.9±0.52^{c}
3.0	93	58.0±0.29^{b}	67.9±0.33^{b}	25.3±0.28^{b}
3.5	29	59.5±0.52^{a}	70.5±0.61^{a}	27.9±0.51^{a}
Total	150	58.1±0.26	68.4±0.31	25.7±0.21

Values with different superscript in same column differ significantly (P<0.05).

Table 2. Effect of BCS on reproductive performance of Chokla ewes

Body condition score (BCS)	No. of ewes utilized study	No. of ewes available at lambing	No. of lambed (Lambing %)	Gestation length (days)	Av. birth (kg of lambs)
2.5	28	27	20 (74.0%)^{b}	152.8± 0.41^{a}	2.69± 0.08^{c}
3.0	93	90	76 (84.4%)^{a}	151.6± 0.21^{b}	2.94± 0.05^{b}
3.5	29	29	24 (82.8%)^{a}	151.3± 0.37^{b}	3.42± 0.06^{a}
Total	150	146	120 (82.1%)	151.9± 0.19	3.02± 0.06

Values with different superscript in same column differ significantly (P<0.05).

The mean values of lambing rate, gestation length and birth weight of lambs are presented in Table 2. The lambing rate of ewes in G2 and G3 groups was significantly (P<0.05) higher than ewes of G1 group. The gestation length was significantly (P<0.05) higher in the G1 group ewes as compared to ewes having 3.0 and 3.5 BCS. The birth weight of lambs born from the G1 group ewes was significantly (P<0.05) lower as compared to ewes of G2 and G3 group, which also differed (P<0.05) amongst all the group of ewes.

Although, in the present study the weight of 3.5 BCS ewes was significantly (P<0.05) higher than 3.0 BCS ewes but the lambing rate of 3.5 BCS ewes was at lower side as compared to ewes of 3.0 BCS. In agreements to our findings Gunn *et al.* (1969) reported that the fertility in ewes decreases when BCS of ewes exceeds more than optimum BCS (3.0). However, Ducker and Boyd (1977) argued that ewe weight as such is not good indicator of ovulation rate in Grey face ewes. In spite of larger ewes being (25%) heavier than smaller ewes but because of good BCS the smaller ewes were having higher ovulation rate and fertility than larger and heavier ewes in poor BCS.

Finding of this study revealed that the ewes with 2.5 BCS had significantly (P<0.05) lower lambing rate than the ewes with 3.0 and 3.5 BCS. Rhind *et al.* (1989) suggested that an early negative energy balance (lower BCS) during folliculogenesis could leads towards defective follicular development and low plasma progesterone concentration and results in low fertility. Short term flushing may be useful to improve reproductive performance in ewes of all the body condition (Pearse *et al.* 1994). Rhind *et al.* (1984) reported that the excessive fat accumulation in the body has deleterious effects on the estrus activity, the conception rate of ewes and also the embryo survival (West *et al.* 1991), which, leads to low conception, and lambing rate. The results reported by

Molina *et al.* (1994) are in agreement with our findings, they reported that appropriate body condition at mating was important for fertility and ewes with higher BCS had significantly higher lambing rate than those with lower BCS. Our results indicated that the ewes with 3.0 or 3.5 BCS at the time of mating delivered lamb having significantly ($P<0.05$) higher birth weight than the lambs born from the ewes of lower BCS at the time of mating. In accordance with our findings Torre *et al*. (1991) reported that the ewes with good BCS during mating, produces lambs with more birth weight as compared to low BCS ewes.

Our results might be able to provide a reasonable indicator of status of ewes at different production phases, which allow to assess ewe's nutrition level and to decide when, and how to supplement the flocks. It is desirable to have ewes in 3 or 3.5 BCS at the time of mating to get higher lambing rate and as well as more birth weight of lambs per lambing.

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REFERENCES

Arora C L, Acharya R M, Bhadashiya B S and Dass N C. 1975. Characterization of Chokla breed in Rajasthan and future prospects of its improvement. *Indian Journal of Animal Sciences* **45**: 345–50.

Atti N, Theriz M and Abdennebi L. 2001. Relationship between body condition at mating and reproductive performance in the fat tailed Barbarine breed. *Animal Research* **50**: 135–44.

Ducker M J and Boyd J S. 1977. The effect of body size and body condition on the ovulation rate of ewes. *Animal Production* **24**: 377–85.

Gunn R G, Doney J M and Russel A J F. 1969. Fertility in Scottish black face ewes as influenced by nutrition and body condition at mating. *Journal of Agricultural Science* (*Cambridge*) **73**: 289–94.

Michels H, Decuypere E and Onagbesan O. 2000. Litter size, ovulation rate and prenatal survival in relation to ewes body weight: genetic review. *Small Ruminant Research* **38**: 199–209.

Molina A, Gallego L,Torres A and Vergara H. 1994. Effect of mating season and level of body reserves of fertility and prolificacy of Manchega ewes. *Small Ruminant Research* **14**: 209–17.

Nsoso S J, Aganga A A, Moganetsi B P and Tshwenyane S O. 2003. Body weight, body condition score and heart girth in indigenous Tswana goat duting the dry and wet season in south Botswana. *Livestock Research for Rural Development* **4**: 1–8.

Pearse B H G, Mc Meniman N P and Gardner I A. 1994. Influence of body condition on ovulatory responses to lupin (*Lupinus ongustifolius*) supplimentation of sheep. *Small Ruminant Research* **13**: 27–32.

Rhind S M, Gunn R G, Doney J M and Leslie I D. 1984. A note on the reproductive performance of grey face ewes in moderately fat and very fat condition at mating. *Animal Production* **38**: 305–07.

Rhind S M, Mc Millon S, Mckelvey W A C, Rodriguez-Herrijon F F and Mc Neilly A S. 1989. Effect of body condition of ewes on the secretion of LH and FSH and the pituitary response to gonadotrophin-releasing hormone. *Journal of Endocrinology* **120**: 497–502.

Russel A J F, Doney J M and Gunn R G. 1969. Subjective assessment of body fat in live sheep. *Journal of Agricultural Science* (*Cambridge*) **72**: 451–54.

Snedecor G W and Cochran W G. 1980. *Statistical Methods*. 7th edn. Iowa State University Press, Ames, Iowa, USA.

Torre C, Casals R, Caja G, Paramio M T and Ferret A. 1991. Effect of body condition score and flushing on the reproductive performance of Ripollesa breed ewes mated in spring. *Proceedings of FAO/CIHEAM Meeting on Body Condition of Sheep and Goat, Purroy*. (Ed.) Zoragoza A. Spain, March 14–16, 1990, Options Mediterraneennes **13**: 85–90.

West K S, Meyer H H and Nawaz M. 1991. Effect of differential ewe condition at mating and early post mating nutrition on embryo survival. *Journal of Animal Science* **69**: 3931–38.