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Short Communication

EFFECT OF BODY CONDITION SCORE ON OVARIAN REBOUND IN POSTPARTUM SAHIWAL COWS

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SUMMARY

The effect of body condition score (BCS) on ovarian rebound was studied inpostpartum Sahiwal cows. Advance pregnant Sahiwal cows (n=14) were selected and allocated into two Groups, Group I comprised of animals (n=7) with BCS ≥ 2.75 and that of Group II comprised of animals (n=7) with BCS < 2.75 at one week before parturition. Monitoring of BCS was carried out in all experimental animals at one week before due date of calving, on the day of calving and on 10, 20, 30, 40 and 50 days postpartum. Trans-rectal ultrasound scanning of ovaries was accomplished in animals of both groups on alternate days beginning from 21 to 51 days postpartum to record the development of dominant follicles (DF). Animals of Group-I (n=4) losing greater body weight (3.87±0.29 vs 2.83±0.08) did not show presence of DF than those (n=3), which showed presence of DF (2.83±0.08 vs 2.41±0.08). Gain in body weight started from day 20 postpartum in animals with DF of Group-I and they returned to their pre-partum BCS status by day 50 postpartum in contrast to the animals of Group-I without DF, which started gaining weight from day 30 postpartum but did not reach to their pre-partum BCS status by day 50 postpartum. None of the animals of Group-II showed presence of DF till 51 days postpartum. Based on present study, it may be concluded that development of dominant follicle is affected by status of pre-partum BCS and body weight during peri-parturient period in Sahiwal cows.

Keywords: BCS, Dominant follicle, Ovarian rebound, Sahiwal cows

The duration of postpartum period has an important influence on reproductive performance of dairy cows (Peter *et al*., 2009). Delay in onset of postpartum estrus results into economic losses due to increase in calving to conception interval, increase in calving interval leading to total production loss. Many reports have been published on the relationships among the resumption of postpartum ovarian cyclicity and nutritional endpoints, such as body condition score (BCS), body weight in high-producing dairy cows (Taylor *et al*., 2003). It is not practical to monitor energy balance in dairy cows in field conditions. However, since changes in BCS are positively correlated with energy balance, change in BCS may serve as an indirect indicator of energy balance (Ferguson, 1996). After parturition in dairy cows, the mobilization of fat from adipose tissue leads to loss in BCS (Alharthi *et al*., 2018); however, higher BCS with obesity indicates a greater risk for postpartum metabolic disorders (Roche *et al*., 2015). It has been reported that cows with high BCS at calving lose more body weight and body condition than cows with low BCS (Bernabucci *et al*., 2005). At calving, BCS is important in determining the length of anestrous period (De Rensis *et al*., 2008). In addition, low BCS at calving may result in delay in onset of first estrus and calving to conception interval (Mouffok *et al*., 2011). It is well accepted that the onset of normal ovarian cyclicity is one of the key events for dairy cows to maintain their maximum breeding potential following parturition. The objective of present study was to investigate the effect of BCS on ovarian rebound after calving in Sahiwal cows.

The present investigation was carried out on 14 advance pregnant Sahiwal cows of 5-8 years of age with 2-4 parity, which were maintained at Bull Mother Experimental Farm (B.M.E.F.), College of Veterinary Science and Animal Husbandry Anjora, Durg (C.G.). Present work was undertaken in these animals for a period extending from one week before due date of parturition to 51 days postpartum. Dry period of two months were provided to these animals, as it is a universal management practice with pregnant dairy animals. Animals were allocated into two groups, Group-I comprised of animals (n=7) with good BCS ≥ 2.75 and Group-II consisted of animals (n=7) with average BCS < 2.75 at one week before parturition.

BCS in the scale of 1-5 with 0.25 increments were recorded in advance pregnant animals at one week before due date of calving, on day of calving and on 10, 20, 30, 40 and 50 days postpartum as described by Ferguson *et al*. (1994). Postpartum ovarian activity was monitored using a Real-time B-mode ultrasound scanner (Prosound ALOKA Japan) equipped with a convertible 5.0-7.5 MHz linear array transducer designed for intra-rectal placement. Postpartum ovarian activity was monitored on alternate days beginning from day 21 postpartum till appearance of first postpartum dominant and/ or ovulatory follicle (≥ 10 mm in diameter) or up to 51 days postpartum. The mean and variances were calculated for each variable in animals and difference of significance in variables were determined with the help of independent 't' test between two groups. One-way ANOVA was applied and difference within group and between days was tested by Duncun's multiple range test using SPSS computer programme version 16.

The ultrasound scanning of ovaries in postpartum

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Sahiwal cows of two groups revealed ovarian activity with respect to follicular growth right from the first day of examination (day 21 postpartum). The ovaries were characterized by growth and regression of several small (up to 5 mm), medium follicle (>5 to <7 mm diameter) and large follicle (>7 to < 10 mm diameter) until the detection of first postpartum dominant follicle (≥ 10 mm) during the study period from days 21 to 51 postpartum (Fig. 1). Three animals of Group-I (3/7, 42.85%) showed presence of dominant follicle (≥10 mm) between days 31 and 51 postpartum, while remaining 4 animals of Group-I (57.14%) and all 7 animals of Group-II did not show presence of dominant follicle during the study period.

Body condition score (BCS; Mean±SE) in postpartum Sahiwal cows with and without dominant follicles (DF) in two groups of animals is presented in table 1. First postpartum DF was observed only in three animals and all 3 animals were from Group I with pre-calving mean BCS of 2.83±0.08. BCS in these animals was reduced by < 0.5 unit only in the scale of 1-5 from pre-calving to post-calving period until detection of dominant follicle.

Interestingly, the animals of Group-I without DF till 51 days postpartum had greater BCS at one week before calving and they lost greater body weight on the day of calving (3.87±0.29 vs 2.83±0.08) than those with DF (2.83±0.08 vs 2.41±0.08, Table 1). Furthermore, the animals with DF of Group-I started gaining body weight from day 20 postpartum and they returned to their pre-partum BCS status by day 50 postpartum. On the contrary, animals of Group-I without DF started gaining weight from day 30 postpartum but did not return to their pre-partum BCS status by day 50 postpartum. A reduction in

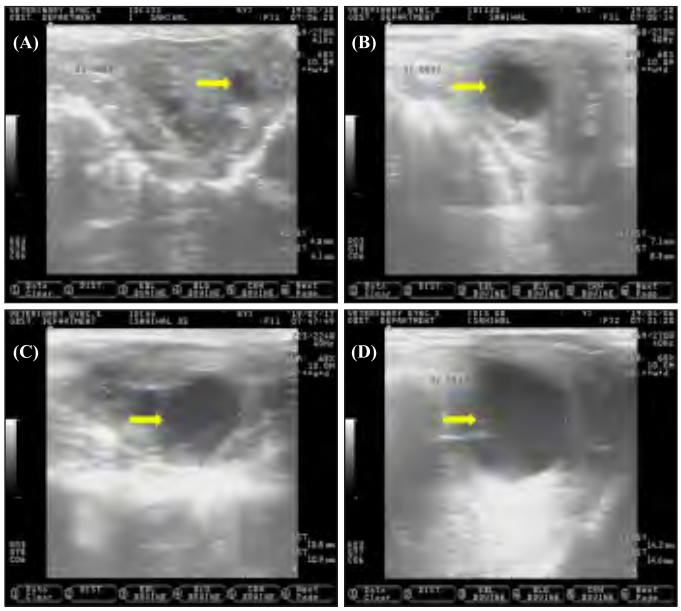

Fig. 1. Ultrasonographic images of follicle development in Sahiwal cows. Small follicle (A), Medium follicle (B), Large follicles (C and D). Yellow bold arrow indicate follicle demarcation

Table 1
Mean±SE of BCS in postpartum Sahiwal Cows with and without dominant follicles

Days Postpartum	Group - I		Group - II
	Animal with dominant follicle (n=3) (BCS> 2.75)	Animal without dominant follicle (n=3) (BCS> 2.75)	Animal without dominant follicle (n=7) (BCS<2.75)
-7	2.83±0.08^{b}	3.87±0.29^{b}	2.50±0.00^{bc}
0	2.41±0.08^{a}	2.75±0.14^{a}	2.28±0.06^{a}
10	2.41±0.08^{a}	2.68±0.11^{a}	2.35±0.07^{ab}
20	2.58±0.08^{ab}	2.68±0.11^{a}	2.46±0.03^{bc}
30	2.58±0.08^{ab}	2.81±0.06^{a}	2.46±0.03^{bc}
40	2.66±0.08^{ab}	2.87±0.12^{a}	2.53±0.06^{c}
50	2.83±0.08^{b}	2.87±0.12^{a}	2.60±0.05^{c}

Means bearing different letter superscripts differ significantly within a column

BCS in the range of 0.5-1.5 unit in the BCS scale of 1-5 from pre- to post-partum period till 51 days postpartum was associated with absence of development of dominant follicle in the animals of Group-I.

None of the animals of Group-II recorded presence of DF till 51 days postpartum. They had BCS < 2.75 at one week before parturition and their BCS was reduced by < 0.25 point on the day of calving. Although they started gaining weight by day 10 postpartum, earlier than animals of Group-I, they did not gain their BCS ≥ 2.75 till 50 days postpartum, which is considered as an ideal BCS prior to parturition.

Variations in body weight during postpartum period has an important role on reproductive performance; a more pronounced loss of body weight was observed in the cows that did not resume ovarian activity compared to the cows with ovarian activity resumption within seven weeks postpartum (Roche *et al.*, 2007). Dominguez (1995) reported that cows with poor body condition scores had fewer normal oocytes than cows with higher scores, leading to a smaller pool of normal follicles for the selection of those that continue developing into the final stages of maturation. These reports approximate with present findings where greater loss of BCS was recorded in those animals of Group-I, which had higher mean BCS (3.87±0.29) at one week before calving and did not show presence of DF than in animals that showed presence of DF till 51 days postpartum. Lower reproductive performance in cows has been associated with reduction of body weight by > 10% post-calving compared with cows that lost less than 10% (Heinonen *et al.*, 1988).

Consistent with the present findings, Shrestha *et al.*

(2005) showed that cows with a decrease in BCS of ≥ 1 unit at 3 and 7 weeks after calving had delayed development of dominant follicle. Tamadon *et al*. (2011) showed that cows losing more than 0.5 units BCS within 3 and 8 weeks postpartum had delayed development of dominant follicle compared to the cows that lost less BCS during the same period.

Findings of present study are well supported with the observation that reduction in BCS during the first and second months after calving is an important risk factor for the delay in first postpartum ovulation in lactating dairy cows (Shrestha *et al*., 2005). The risk of delayed first ovulation is increased by 16.5 days in cows that lose BCS ≥ 0.75 points compared to that of the cows with BCS loss < 0.75 points during 49 days after calving (Kafi and Mirzaei, 2010). Barletta *et al.* (2017) reported greater loss of BCS during the transition period being a key factor in prolonging the ovarian activity after calving. The delay in first ovulation as well as negative effects of NEB may underlie the negative association between BCS loss and fertility. In the present study, three animals with increase in BCS between second and third week of calving displayed presence of dominant follicle up to 51 days postpartum. Similar observation has been reported by Kadivar *et al*. (2014) who recorded that with the increase in BCS after second week of parturition, calving to first ovulation interval is decreased significantly. These authors further reported that this effect was not significant for increase in BCS between 4 and 6 weeks after parturition. The proportion of cyclic cows at 50 days postpartum was greatest for those that gained BCS, intermediate for those that maintained BCS and least for those that lost BCS after calving (Barletta *et al.,* 2017).

From the results of the present study, it may be concluded that development of dominant follicle is affected by status of pre-partum BCS and body weight during peri-parturient period in Sahiwal cows.

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REFERENCES

Alharthi, A., Zhou, Z., Lopreiato, V., Trevisi, E. and Loor, J.J. (2018). Body condition score prior to parturition is associated with plasma and adipose tissue biomarkers of lipid metabolism and inflammation in Holstein cows. *J. Anim. Sci. Biotech.* **9(1)**: 12.

Barletta, R.V., Maturana, F.M., Carvalho, P.D., Del-Valle, T.A., Netto, A.S., Renno, F.P., Mingoti, R.D., Gandra, J.R., Mourao, G.B., Fricke, P.M., Sartori, R., Madureira, E.H. and Wiltbank, M.C. (2017). Association of changes among body condition score during the transition period with NEFA and BHBA concentrations, milk production, fertility and health of Holstein cows. *Theriogenology.* **104**: 30-36.

Bernabucci, U., Ronchi, B., Lacetera, N. and Nardone, A. (2005). Influence of body condition score on relationships between metabolic status and oxidative stress in periparturient dairy cows. *J. Dairy Sci.* **88(6)**: 2017-2026.

De Rensis, F., Lopez-Gatius, F., Capelli, T., Molina, E., Techakumphu, M. and Scaramuzzi, R.J. (2008). Effect of season on luteal activity during the post partum period of dairy cows in temperate areas. *Anim.: an intern. J. Anim. Biosci.* **2(4)**: 554-559.

Dominguez, M.M. (1995). Effects of body condition, reproductive status and breed on follicular population and oocyte quality in cows. *Theriogenology*. **43(8)**: 1405-1418.

Ferguson, J.D. (1996). Diet, production and reproduction in dairy cows. *Anim. Feed Sci. Tech.* **59(1-3)**: 173-184.

Ferguson, J.D., Galligan, D.T. and Thomsen, N. (1994). Principal descriptors of body condition score in Holstein cows. *J. Dairy Sci.* **77(9)**: 2695-2703.

Heinonen, K., Ettala, E. and Alanko, M. (1988). Effect of postpartum live weight loss on reproductive functions in dairy cows. *Acta Vet. Scand*. **29**: 249-254.

Kadivar, A., Ahmadi, M.R. and Vatankhah, M. (2014). Associations of prepartum body condition score with occurrence of clinical endometritis and resumption of postpartum ovarian activity in dairy cattle. *Trop. Anim. Health Prod.* **46(1)**: 121-126.

Kafi, M. and Mirzaei, A. (2010). Effects of first postpartum progesterone rise, metabolites, milk yield, and body condition score on the subsequent ovarian activity and fertility in lactating Holstein dairy cows. *Trop. Anim. Health Prod.* **42(4)**: 761-767.

Mouffok, C., Madani, T., Smara, L., Baitiche, M., Allouche, L. and Belkasmi, F. (2011). Relationship between body condition score, body weight, some nutritional metabolites changes in blood and reproduction in Algerian Montbeliad cows. *Vet. World*. **4(10)**: 461-466.

Peter, A.T., Vos, P.L.A.M. and Ambrose, D.J. (2009). Postpartum anestrus in dairy cattle. *Theriogenology*. **71(9)**: 1333-1342.

Roche, J.R., Macdonald, K.A., Burke, C.R., Lee, J.M. and Berry, D.P. (2007). Associations among body condition score, body weight, and reproductive performance in seasonal-calving dairy cattle. *J. Dairy Sci.* **90(1)**: 376-391.

Roche, J.R., Meier, S., Heiser, A., Mitchell, M.D., Walker, C.G., Crookenden, M.A. and Kay, J.K. (2015). Effects of pre-calving body condition score and prepartum feeding level on production, reproduction, and health parameters in pasture-based transition dairy cows. *J. Dairy Sci.* **98(10)**: 7164-7182.

Shrestha, H.K., Nakao, T., Suzuki, T., Akita, M. and Higaki, T. (2005). Relationships between body condition score, body weight and some nutritional parameters in plasma and resumption of ovarian cyclicity postpartum during pre-service period in high-producing dairy cows in a subtropical region in Japan. *Theriogenology*. **64(4)**: 855-866.

Tamadon, A., Kafi, M., Saeb, M. and Ghavami, M. (2011). Association of milk yield and body condition score indices with the commencement of luteal activity after parturition in high producing dairy cows. *Iranian J. Vet. Res.* **12(3)**: 184-191.

Taylor, V.J., Beever, D.E., Bryant, M.J. and Wathes, D.C. (2003). Metabolic profiles and progesterone cycles in first lactation dairy cows. *Theriogenology*. **59(7)**: 1661-1677.