

Body Condition Score and Locomotion Score Help to Predict Reproductive and Health Performances of Dairy Cattle Reared Under Intensive Management System in Sri Lanka

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Abstract

The reproductive performance and health parameters of dairy herds have a significant effect on the farm economy. Body condition score (BCS) and locomotion score (LMS) have been used as performance indicators to assess the performance of dairy animals. Objective of the current study was to evaluate the effect of BCS and LMS to predict the reproductive and health performance of dairy cattle in Sri Lanka. Body condition and lameness were scored using 1 to 5-point score system. Forty-three (n=43) pregnant cows and forty-six (n=46) early lactating cows were selected. Fertility was measured from farm records based on conception rate and length of postpartum anestrus of the selected herds. BCS level 2 to 4 showed the lowest post-partum length. Under the given conditions, BCS < 2 level recorded 70.75 ± 4.09 days of post-partum length, where BCS 2-4 level gave 34.4 ± 2.15 days of post-partum length. Low LMS was also associated with the lowest post-partum length compared to other groups (56.29 ± 5.29 in LMS <2, 47.16 ± 5 in LMS >2, 36 ± 1.15 in control). BCS and LMS had a significant effects on retain placenta condition. There was no significant effect of body condition on dystocia. Lameness condition had significant effects on dystocia and endometritis. Body condition had significant effect on the conception rate ($P < 0.0026$). In conclusion, BCS and LMS were found to have direct relationship with the reproductive performance and herd health parameters of dairy cattle, therefore the BCS and LMS can be effectively used to predict the reproductive performance in dairy cattle in the country.

Keywords: Body Condition, Locomotion Score, Postpartum, Anoestrus, Reproductive, Performance

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Introduction

The world population is estimated to reach 9 billion people in 2050 according to the latest demographic reports from the United Nations (2014), which will require a big increase in food production. Dairy and Beef production systems play a major role in world's food security, as well as rural economies by providing low cost protein diet to the growing human population and economic stability. Dairy farming is considered as one of the few agricultural activities that can provide enough income to maintain the economic viability of smallholder farms. In the mammalian ovary, the process of folliculogenesis begins during fetal life and proceeds until the end of reproductive capacity (Magamage *et al.* 2011), which is the major micro determinant of the reproductive success though it was not formally recognizes under existing farming macro-environment. In reproductive microenvironment, folliculogenesis, involving growth and development of ovarian follicles from primordial to preovulatory stages, is a complex phenomenon in which multidirectional regulation is the final determinant of dominant follicle, ovulation, and effective and positive estrus behavior leading to pregnancy in cows (Magamage *et al.*, 2011).

Body condition score and locomotion score are considered important functional characteristics which could be used to measure the production capability of dairy animals. BCS is defined as the most practical method to estimate the energy reserves of a cow. A locomotion score is a qualitative technique used to assess cow's ability to walk normally. It is measured visually and scored on a scale of 1 to 5 (Sprecher *et al.*, 1997). Extended postpartum anestrus is a major reproduction problem around the world. Approximately 20% of cows in estrus are not detected by the start of the breeding programs. Although many factors affect on postpartum anestrus, nutrition plays a crucial role.

The objectives of the current study were to investigate the effect of body condition score and locomotion condition on reproductive performance parameters; timing of estrus, length of post-partum anestrus, conception rate, dystocia, parturition difficulties and retained placenta.

Materials and Methods

All animal experiments were conducted under the approved guidelines of Sabaragamuwa University of Sri Lanka. Study was conducted at Ambewela Farm in Sri Lanka. Lactating cows

selected for the study had an average milk yield of 7000 L /lactation, milked three times a day. Eighty-nine (n=89) cows were selected for the whole experiment. Animals were graded and visually examined for various levels of LMS and BCS based on 1-5 lameness condition score system and 1-5 body condition score system. Twenty-three (n=23) near calving cows and twenty-six (n=26) cows after 45 days of calving were selected to evaluate BCS. Twenty (n=20) near calving cows and twenty (n=20) cows after 45 days of calving were selected for lameness score study. All the cows were selected with same parity and similar milk production conditions under the same nutritional plane. All animals were kept under similar conditions.

Lameness score

Cows were allowed to walk on leveled cemented flow around 10 meters and observed. Then scores were given for each cow according to the clinical description and assessment criteria for each lameness score within a 1- 5-point system as described by Sprecher *et al.* (1997).

Body condition score

All BCS were assigned by one individual using the visual technique developed by Edmonson *et al.* (1989).

Conception rate

Fifty (n=50) cows (45 days after calving) were synchronized using PGF2 α and GnRH protocol. Artificial insemination (AI) was performed for cows or heifers which showed heat signs after estrus synchronization. GnRH was injected again to the cows or heifers who didn't show the heat under first regime. AI was done after 12 hours after second GnRH injection. Conception was checked using per-rectal palpation method after 45 days of AI.

Dystocia and parturition difficulties

Visual observation was done at the calving of cows to detect Dystocia and any other parturition difficulties.

Retain placenta detection

Visual observation was done after the calving of cows. It was observed until 24 hours in every 6-12 hours after parturition.

Endometritis

Visual observation of the color of vaginal discharge and odor was done after the calving and rectal temperature was measured by digital thermometers.

Statistical analysis

Data were statistically analyzed by using SAS (version No.9.00-2000). One-way ANOVA, GLM was used to determine significant effect of BCS and LS on post-partum an-estrus ($P<0.05$). Means were compared by using Duncan's grouping method. Chi square was used to analyzed the effect of BCS and LS on dystocia, retain placenta, conception rate and endometritis.

Results and Discussion

Effect of BCS on length of postpartum anestrus

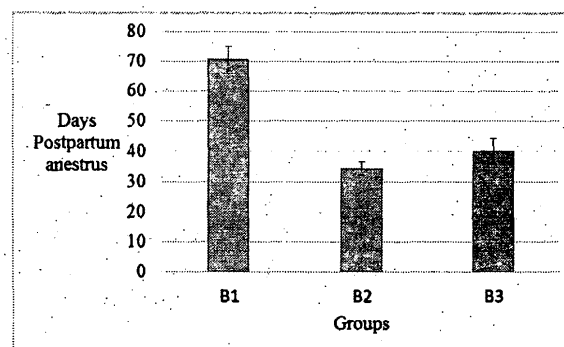


Figure 1: Effect of BCS on length of postpartum anestrus (B1 = <2, B2 = 2-4, B3 = >4)

There was a significant effect of the body condition score on the length of postpartum anestrus and on retain placenta condition. There was no effect on the BCS on the incidents of dystocia condition in the present tested group of animals ($P= 0.2547$). There was no significant effect of the body condition score on Endometritis condition according to the chi square ($P= 0.1749$). There was a significant effect of the body condition score on conception rate ($P= 0.0026$).

Effect of lameness condition score on length of postpartum anestrus

There was a significant effect of the lameness condition score on the length of postpartum anestrus, retain placenta condition, dystocia condition and on the incidence of endometritis condition. There was no significant effect of the lameness condition score on conception rate according to the chi square ($P= 0.5312$).

During the transition period (typically defined as the period from 3 weeks before and 3 weeks after calving) dairy cows are vulnerable to metabolic and infectious diseases, triggered by pre and post parturient stress. Early identification and detection of pre and post parturient abnormalities were useful in all-time (Gröhn *et al.*, 1989). It has been suggested that

the reproductive status of a cow is the single most important factor influencing culling decisions on farms, indicating that various forms of reproductive disorders likely contributes indirectly to the high rates of involuntary culling. These disease signs may go unnoticed during a routine health check. Thus practical methods for improved health monitoring would be useful. The BCS of a cow at parturition appears to have no relationship with conception or AI services per conception. However, current study showed significant effect of BCS on the length of postpartum anestrus and on retain placenta which are in agreement with many earlier work that was demonstrated the loss of BCS between parturition and AI may negatively influence conception.

In modern dairy industry, lameness is a critical welfare problem of cows and is a massive economic burden to the farm itself. Economic losses of lower milk yield, decrease animal's live mass and reproductive qualities, increase veterinary expenses and culling are result due to the lameness. Lameness reduced the proportion of cows that ovulated and the synergistic effect of high somatic cell counts (SCC) proportion. However, follicular growth and maximum follicular diameter were unaffected by high SCC, low BCS or lameness. Retain placenta is a sever health threat to the animal and it has been proven that retain placenta and BCS are correlated (Gröhn *et al.*, 1989). Current study was in agreement with previous work which has shown that the animals with lower level of BCS have the lowest threat of experiencing retain placenta condition. Further, it has shown, when the BCS is increased, probability of retain placenta condition also increased. Even the risk of experiencing such health has increased when

the body reservoirs increased. It has considered nutritional status of the animal is a major risk factor for retain placenta (Laven and Peters.1996).

In conclusion, BCS and LMS were found to have direct relationship with the reproductive performance and herd health parameters of dairy cattle, therefore the BCS and LMS can be effectively used to predict the reproductive performance in dairy cattle in the country.

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