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Effect of restricted suckling on the onset of follicular dynamics and body condition score in Brahman cattle raised under tropical conditions

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ABSTRACT

With the aim of evaluating the effect of restricted suckling on the onset of follicular dynamics and body condition, multiparous *Bos indicus* cows were distributed in two groups. One group (RS = 36) was subjected to a scheme of restricted suckling starting at 21 days postpartum. Calves were allowed to suckle once per day for a period of two h whilst the control group (C = 18) remained with their dams at all times. At calving, body condition score, back fat thickness and body weight had similar values ($p > 0.05$) for both groups. By day 85 postpartum both groups had recorded losses in body weight. The cows in the continuous group formed a greater ($p < 0.05$) number of follicles of class size <6 mm in both periods before and after synchronization. The proportion of cows showing estrus and ovulation before 45 days, was not different ($p > 0.05$). The number of cows that exhibited estrus after 45 days, was greater ($p < 0.05$) in RS than C group, 72.2% and 55.5%, respectively. Same situation ($p < 0.05$) occurred in cows that ovulated, 88.8 and 66.7%, for groups RS and C, respectively. The subset in the intensive observations showed that the size of the bigger follicle was larger ($p < 0.05$) for RS cows than C cows from 36 h after CIDR withdrawal. At 57 h, the size of the biggest follicle recorded was not different between groups ($p > 0.05$). A regime of restricted suckling favors the earlier growth of follicles and the prompt restoration of ovarian activity.

1. Introduction

Bos indicus cattle raised under tropical conditions have prolonged calving intervals (Montiel and Ahuja, 2005) and this subpar performance is attributed to the long postpartum anestrous (Baruselli et al., 2004). This event likely influenced by the presence of a calf suckling at libitum coupled with the reduced nutritional status of the dam (Short et al., 1990a; Quintans et al., 2010). Although the precise mechanisms by which suckling alters the reproductive functions is not totally understood (McNeilly, 2006); it has been placed forward the concept that suckling has a prolonged inhibitory effect on the secretions of luteinizing hormone (LH) and this negative effect reduces the

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development of follicles capable of ovulating a viable ovum (Silveira et al., 1993). Also, it is known that the effect of suckling is less potent as the post-partum interval progresses (Garcia-Winder et al., 1986; Rund et al., 1989; Stahringer et al., 1994). The mechanism whereby ovarian activity post-partum is delayed can be attributed to the maternal-offspring bond. In effect, Williams et al. (1996) showed that suckling of cows by their own calves maintained the suppressed pattern of LH secretion, however, if an alien calf was suckling, the pulses of LH were approaching those of a forthcoming ovulation.

On the other hand, follicular dynamics do not appear to be a major contributing factor in delaying the onset of ovarian activity following parturition. Rubio et al. (Rubio et al., 2010) working with an Indian breed have shown that follicles grow as early as 20 days postpartum similarly to the information available for European breeds of beef cattle (for review see McNeilly, 2006). In effect there are several reports in Indian breeds that estrus and ovulation could occur as early as 40 days following calving (Molina et al., 2003; Galindo, 2013). When the body condition score is not very limiting, restricting suckling could be an adequate tool for advancing the onset of estrus and ovulation in beef cattle. A similar conclusion has been reached by others as if body condition is adequate (score of 3 or above in a scale 1–5) treatments such as estrous synchronization will be successful (Moraes et al., 2009). The objective of the present study is to compare the effect of restricted suckling prior to estrous synchronization with a previous systematic follow up on the onset of ovarian activity.

2. Material and methods

The present study was conducted in a Brahman herd at the Centre for Teaching, Research, and Extension in Tropical Animal Husbandry belonging to the Faculty of Veterinary Medicine of the National Autonomous University of Mexico, located in the State of Veracruz, Mexico at 20°4′ N and 97°3′ W. The study was conducted from March to September 2013. Average temperature and rainfall from March to June was 25 ± 4.2 °C and 328 mm, respectively. Average for July to October during the study was 25.3 ± 3.6 °C and 629.3 mm for temperature and rainfall respectively. The annual rainfall in that year was 1278.1 mm and temperature average 23.5 °C.

2.1. Animals

Fifty four multiparous *B. indicus* cows that calved in a 60 days period were selected and distributed in two groups. 1. Restricted Group (RS n = 36) was subjected to a scheme reducing suckling starting at 21 days postpartum. Calves were allowed to suckle once per day for a period of two h in the morning and kept in a corral with water and cut fresh grass. 2. Continuous or Control group (C n = 18) calves remained with their dams at all times. All animals stayed together in the same pasture in a rotational paddocks system based on *Cynodon nlemfuensis; Paspalum spp* and *Axonopus Spp* with mineral salts provided *ad libitum*.

Table 1
Body condition score (BCS), fat thickness (FAT) and body weight (BW) values of *Bos indicus* cows evaluated from calving to 85 days postpartum.

Variables	Restricted (n = 36)	Continuous (n = 18)
	Average ± SE	Average ± SE
BCS at calving	5.32 ± 0.118	5.21 ± 0.154
BCS 24	5.37 ± 0.102[a]	4.86 ± 0.115[a]
BCS 45	5.27 ± 0.119	4.97 ± 0.141
BCS 57	4.85 ± 0.080	4.92 ± 0.136
BCS 85	4.81 ± 0.084	4.63 ± 0.136
BCS Lost	**−0.51 ± 0.107**	**−0.59 ± 0.150**
FAT at calving cm	0.308 ± 0.014	0.305 ± 0.022
FAT 24	0.303 ± 0.012	0.379 ± 0.146
FAT 45	0.283 ± 0.013	0.294 ± 0.023
FAT 57	0.246 ± 0.014	0.279 ± 0.018
FAT 85	0.257 ± 0.013	0.221 ± 0.021
FAT Lost	**−0.048 ± 0.016**	**−0.046 ± 0.023**
BW at calving kg	572.51 ± 10.46[a,b]	594.97 ± 16.21[a,b]
BW 24	549.89 ± 10.55	572.89 ± 17.12
BW 45	529.02 ± 10.71	532.68 ± 15.77
BW 57	517.68 ± 9.06	522.15 ± 14.33
BW 85	528.22 ± 8.69[a,b]	513.42 ± 15.03[a,b]
BW Lost (kg)	**−44.29** ± 5.12[a]	**−81.05** ± 4.95[a]

[a] Different letters between columns indicate statistical differences at $p < 0.05$.
[b] Different letters within columns represent statistical differences at $p < 0.05$.

2.2. Ethical statement

The methods used during the present work were approved by the Animal Care Internal Committee (CICUA) of the Faculty of Veterinary Medicine and Zootechnics of the National Autonomous University of Mexico in accordance to The Code of Ethics of the World Medical Association (Declaration of Helsinki).

2.3. Body condition score (BCS) and fat thickness (FAT)

BCS and FAT evaluations were performed at calving, and at 24, 45, 57 and 85 days postpartum. Body condition (BCS) was registered in scale of 1–9 according to the procedure described by (Wagner et al., 1988).

The assessment of fat thickness (FAT) was carried out using an ultrasound device (Aloka SSD 500, Tokyo, Japan) with a convex transducer and 3.5 MHz frequency, to obtain the ultrasonographic images that were used to measure FAT. After animal immobilization, the examination site to measure FAT was the thurl area. This was located midway between the tuber coxae (hooks) and the tuber ischiae (pins), 2–3 cm above the greater trochanter of the femur (Schroder and Staufenbiel, 2006).

2.4. Onset of ovarian activity

Transrectal ultrasonography was performed to measure the diameter of all follicles present from 3 mm or larger diameter and the presence of a corpus luteum. Measurements were performed at days 25, 28, 31, 34, 37, 40, 41, 43, 45, 54, 57, 64, 68, and 85 postpartum days. A 7.5 MHz transductor was utilized for this recording. Follicles were classified in five size class: (I) <4 mm; (II) 7–11 mm; (III) 12–16 mm; (IV) 17–20 mm and (V) >21 mm.