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The reproductive performance of beef cows of different ages with calves weaned at three or seven months

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Abstract

The aim of this study was to evaluate the reproductive performance of beef cows in different age groups, with the calves weaned at three (early weaning) or seven months (conventional weaning). The study was based on data gleaned from 1,868 cows from 3 to 11 years old (British breeds and cross-breeds) on a farm located in Cristal, a South Brazilian town. During the experiment, the animals were raised only on natural pasture. The mating season ranged from mid-November to mid-February (11/19 to 02/19). After pregnancy diagnosis, information was analyzed according to the age of the cow (A3 to A11) and to the weaning procedure, early (EW) or conventional (CW). A chi-square test was performed to evaluate the reproductive performance of the cows in each age group (PRA3, PRA4, PRA5,..., PRA11), as well as the reproductive performance of cows submitted to early weaning (PREW) and conventional weaning (PRCW). Pregnancy rates were higher for EW only, for cows 3 and 4 years old (A3 and A4, 84.3% and 95.0%, respectively; $P < 0.01$). There was no statistical difference in the PREW and PRCW of cows mating between 5 and 11 years old. Cows that were 6 years of age reached the highest pregnancy rate (97.4%). The PRT (pregnancy rates that did not consider the age) was 88.7% and 82.0% for the EW and CW, respectively ($P < 0.01$). Therefore, the age of weaning had a strong influence on the reproductive performance evaluated by pregnancy rate, especially on animals between 3 and 4 years old.

Keywords: weaning age, pregnancy rate, bovine.

Introduction

The increasing costs of raising cattle and the economic importance of high reproduction rates have been boosting the development and use of more efficient management practices. Early weaning increases pregnancy rates and decreases the birth to conception interval, therefore increasing meat production (Almeida *et al*., 2002). Many studies have been performed to obtain higher conception rates in lactating cows (Short and Bellows, 1971; Simeone and Lobato, 1996; Fagundes *et al*., 2003).

According to Ferreira (1992), the main reason for low pregnancy rates in beef cows is the long post-partum anestrous period due to lactation and to nutritional deficiency of the animals. Therefore, early weaning would be a good strategy to remove the negative effects of lactation and to obtain higher pregnancy rates (Gottschall *et al*., 2005). However, to reach good results, this technique should consider some other important points besides the time of weaning, such as the cow's age. Therefore, depending on the age of the cow, early weaning may have better or worse effect on the animal reproductive performance (Vaz and Restle, 2000).

The objective of this study was to evaluate the combined effect of both weaning procedures (early or conventional) and the cow's age on the reproductive performance of beef cows.

Materials and Methods

This study was performed on a private farm located in the State of Rio Grande do Sul, the southernmost of Brazil (30°60'S; 52°03'W), between 1999-2002. Data were collected from 1,868 cows between 3 and 11 years old (British breeds and cross-breeds). Among them, 463 cows were submitted to early weaning (EW) 3 months after parturition, and 1,405 were submitted to conventional weaning (CW) at 7 months. The age at first breeding was 2 years old. The pregnant animals remained in the herd during the whole period unlike the open cows, which were culled each year.

The option between the weaning systems was based on the cow's body condition score (BCS). The EW group was composed of cows with a BCS lower than 2.5 (in a scale from 1 to 5) at the beginning of breeding season. The cattle were maintained on native grass with a stocking rate of 320 to 450 kg/ha, adjusted according to the forage availability (evaluated by visual height and pasture density). The mating season ranged from mid-November to mid-February (11/19 to 2/19) during the whole experiment.

The pregnancy rates were obtained by rectal palpation 60 days post-breeding, always by the same veterinarian. Pregnancy rates were classified according to weaning system (EW or CW) and the age of the cow (from 3, A3, to 11 years old, A11.

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Chi-square tests were performed to compare pregnancy rates according to the cow's age (PRA3, PRA4, PRA5,...), the weaning group (PREW and PRCW), and considering the weaning group and the cow's age simultaneously (PREWA3, PRCWA3, PREAA4, PRCWA4,...).

Results

Table 1 shows the reproductive performance of the beef cows according to the different ages and weaning practices. Not considering the weaning procedure, the cow's age influenced the pregnancy rate, with the greater rates observed for 6 year-old cows ($P < 0.05$; Fig. 1). Not considering the cow's age, the pregnancy rate (PR) was about 7% higher for EW than CW ($P < 0.01$), indicating that early weaning could improve reproductive performance. Considering both cow's age and weaning procedure (Fig. 2), EW increased PR in the first two age groups (A3 and A4; $P < 0.01$) by about 18 and 16%, respectively. For 5 year old cows, no effect was detected of early weaning on PR.

Table 1. Pregnancy rates (%) of beef cows with calves weaned at three (early weaning, EW) or seven months (conventional weaning, CW) according to the age at mating.

	EW (3 months)		CW (7 months)		PRG (%)*
Age (years)	n	%	n	%	
A3	280	84.30[a]	325	66.50[b]	74.7[D]
A4	60	95.00[a]	399	79.20[b]	81.3[C]
A5	29	100.00[a]	232	94.00[a]	94.6[A, B]
A6	17	100.00[a]	175	97.10[a]	97.4[A]
A7	11	90.90[a]	51	90.20[a]	90.3[B, C]
A8	24	91.70[a]	80	88.80[a]	89.4[B, C]
A9	25	96.00[a]	53	84.90[a]	88.5[B, C, D]
A10	10	100.00[a]	62	79.00[a]	81.9[C, D]
A11	7	85.70[a]	28	75.00[a]	77.1[C, D]
PRT**	463	88.78[a]	1405	82.00[b]	

[a, b]Different small letters mean statistical differences ($P < 0.01$) between data in the same line.
[A, B]Different capital letters mean statistical differences ($P < 0.01$) between column data.
* PRG - pregnancy rate considering the age.
**PRT total pregnancy rate.

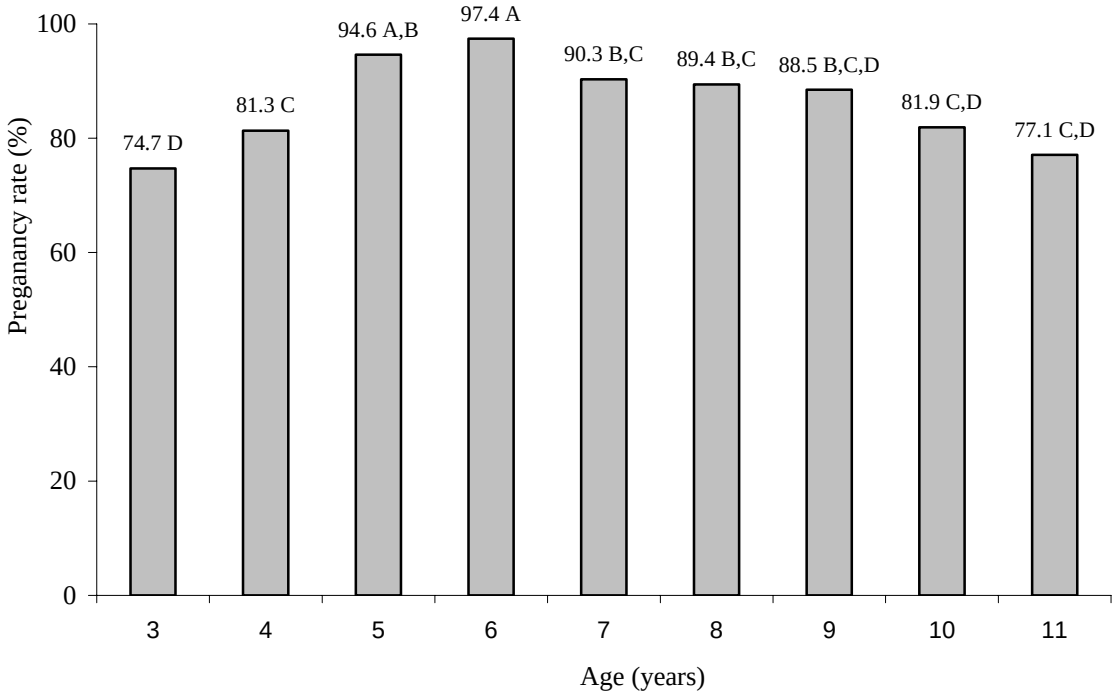

Figure 1. Pregnancy rates according to the cow's age group, without considering the type of weaning. Different capital letters in each column mean statistical differences ($P < 0.01$).

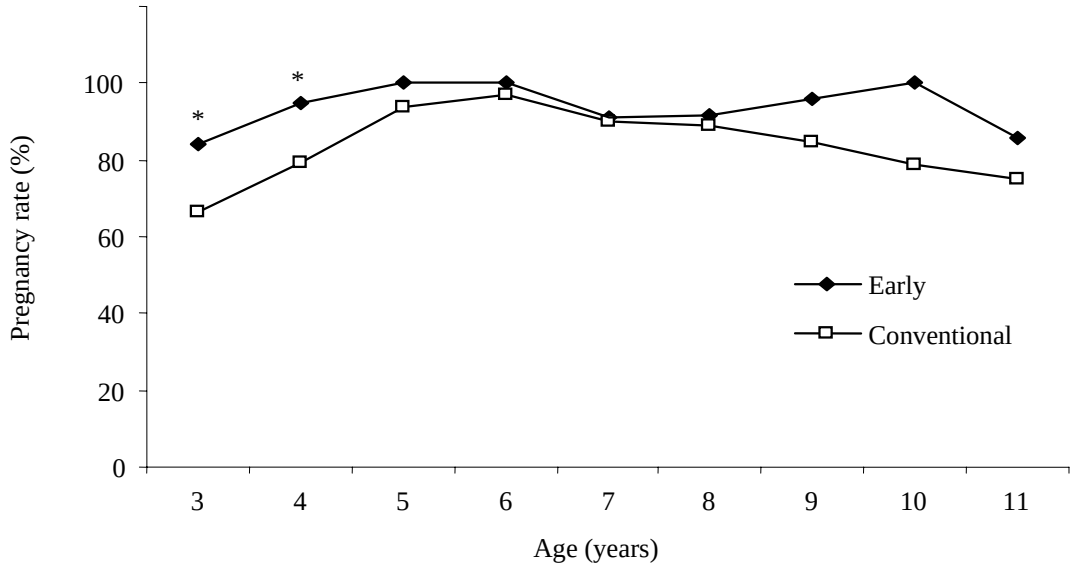

Figure 2. Pregnancy rate of cows submitted to early (3 months) or conventional (7 months) weaning according to age group and time of weaning. The symbol '*' indicates significant difference at 0.01 level for the same age group.

Discussion

In this paper, early weaning influenced the pregnancy rate only for cows in the beginning of reproductive life (A3 and A4; $P < 0.01$). The group with lower PR was the A3 (75%). Moletta and Perotto (1996) also verified that the effect of the EW had more influence on young animals. These authors found a PR of 96% and 40% for EW (70 days post-partum) and CW (210 days), respectively, with a stronger effect in primiparous cows (82% for EW, and 4% for CW). These results show that younger cows suffer a great damage during the post-partum period, mainly when the animal is still in lactation. According to Milagres *et al.* (1979) and Patterson *et al.* (1992), nutritional requirements differ between animals according to the age and the reproductive function. Costa *et al.* (1981) and Funston and Deutscher (2004) state that younger and primiparous cows usually have lower PR because they must produce milk in addition to keeping their own growth; therefore, the nutrients are used mainly for those functions instead of for reproduction.

If we take notice of the cows at maturity (around 6 years old), it is possible to observe that mature cows used to have higher pregnancy rates than young and old cows. The difference between A6 and A3 cows on the PR, for example, was 23% higher for the A6 cows, regardless of the type of weaning. Vaz and Restle (2000) obtained similar results, with cows between 5 to 7 years old presenting better reproductive performance. The PR was 42% for 3 to 4 years old cows, 62% for 5 to 7 years old, and 52% for cows greater than 8 years old. Similarly, Moletta and Perotto (1997) reported 36% higher PR in mature cows compared to young cows. However, Catto and Afonso (2001) obtained similar PR for primiparous and multiparous cows (82% and 81%, respectively).

Pregnancy rates are not constant at different ages (see Fig. 2). The EW increased PR more intensely in younger cows (A3 and A4, $P < 0.01$). Restle *et al.* (2001), in a study analyzing the performance of Charolais and Nellore cows and weaning the animals at 3 and 7 months after calving, reported similar results, where the effect of EW on the reproductive performance was clearly more evident in the young cows (3 and 4 years old; 51%).

The total pregnancy rate (PRT), not considering the age of the animals, was about 7% higher for EW than for CW ($P < 0.01$). Similar results were obtained by several authors (Lobato and Barcellos, 1992; Moojen *et al*., 1994; Lobato *et al.*, 2000). Lobato *et al.* (2000), for example, compared cows weaned at 70 and 176 days post-partum and observed PR of 100% and 90%, respectively. However, Almeida and Lobato (2004) verified that the age at the weaning did not influence the PR (77.3 and 72%, for the EW and CW, respectively). Williams (1990) and Buskirk *et al.* (1995) claimed that lactation is one of the most important things that affects the reproductive efficiency because the reduction in gonadotropin secretion causes a hypothalamic-hypophyseal block. The simple presence of the calf, even without the suckling, can result in this kind of block (Short *et al*., 1990). According to National Research Council (1996), the net energy requirement for maintenance of a cow during 90 to 180 days of lactation is 57% higher than that of a cow in a dry period.

In conclusion, cows exposed to early weaning had better reproductive performance than cows submitted to conventional weaning procedures, not considering the cows age. The early weaning had a greater influence on the PR for young cows, especially those between 3 and 4 years old. Mature cows (6 years old) had better reproductive performance than young and old cows, regardless of type of weaning. The data obtained in this study confirmed the literature information. Furthermore, the data suggests that younger cows need more attention in management because they usually have the lowest pregnancy rates.

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