Parturition intervals and distributions of parturitions by months of buffalo in Southern and South-eastern Brazil

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ABSTRACT - Reproductive rate is an important component of economic success in livestock production. Parturition interval (IEP) is a direct measure of the productivity of the animal. Long IEP reduce the number of calves produced per year. The objective this study was to determine the distribution of parturitions across month and to evaluate factors affecting IEP. The data included 7,588 parturitions of Murrah, Mediterranean and Carabobo buffalo from 10 herds in Southern and South-eastern Brazil. The analysis of distribution of parturitions evaluated the effects of month, year and their interaction on birth date of calves by using a Chi-Square test in SAS PROC FREQ (SAS Institute, Cary, NC, USA). Parturition intervals (n = 2,630) were evaluated using analysis of variance in SAS PROC GLM. The model for IEP included the fixed effects of season (December to May = 1, June to November = 2), year, season x year, sex of the preceding parturition, age of weaning of the previous calf, and herd. All sources of variation were significant (P<0.0001) except sex of the preceding parturition (P <0.85). The mean IEP was 446.7 ± 10.4 days, for seasons 1 and 2 IEP were 419.8 ± 11.3 and 473.6 ± 40.7 days, respectively, a difference of 54 days. As weaning age increased there was a lengthening of IEP. Buffalo in Brazil showed seasonal parturition with calving concentrated from January to April, although the frequency by month differed across years (P<0.0001). These months also had the lowest calving interval.

Key words: Calving interval, Reproduction, Season.

INTRODUCTION - Reproductive rate is an important component of economic success in livestock production. These traits are important to herd evaluation because reduced age at first calving improves herd productivity and also reduce generation interval, consequently improving rate of genetic gain. Equally important to reducing age at first calf is reducing the parturition interval. With reduced partarition interval, the dam produces more progeny during her lifetime with better economic return to the owner. Perotto et al. (2006) reported the importance of longevity of cows in the herd which permits a low replacement

rate and high lifetime productivity. However, females with high longevity and reduced replacement may increase generation interval and consequently decrease genetic gain of the herd. The economicly optimum length of parturition interval is one year. In buffalo, some authors evaluating reproductive efficiency have reported the world average to be close to 14.5 month (Sampaio Neto et al., 2001). Souza et al. (1995) evaluated parturition intervals in Mediterranean buffalo and reported an average of 426.8 ± 132.9 days with a minimum value of 371.5 days. Schulz et al. (2004) reported a leastsquares mean calving interval of 449 days (14.8 months) with coefficient of variation of 16.5% and found seasonality for buffalo in southern Brazil with a concentration of parturitions occurring from February to May (75.3%). Malhado et al. (2004) evaluated calving intervals of beef buffalo in Brazil and reported an average of 433.3 days, with a coefficient of variation of 22.2%; year and month had highly significant effects on calving interval. The shortest calving interval was recorded in March (382.1 ± 10.1 days) and the longest calving interval was recorded in December (576.1 ± 18.2 days). The objective of this study was to determine the distribution of parturitions across month and to evaluate factors affecting calving interval of buffalo.

MATERIAL AND METHODS - The data included 7,588 parturitions of Murrah, Mediterranean and Carabao buffalo from 10 herds in Brazil, raised in pasture from 1988 to 2002. Animals were natural mated in the field and the health practices included vaccinations, and ecto- and endoparasite controls. Distribution of parturitions was evaluated by analyzing the effects of month, year and their interaction on birth date of calves by using a Chi-Square test in SAS PROC FREQ (SAS Institute, Cary, NC, USA). The ANOVA model for interval between parturition (IEP, n= 2,630) included the fixed effects of season (December to May = 1, June to November = 2), year (15), season x year, sex of the preceding parturition (2), age of weaning of the previous calf (210), and herd (9).

RESULTS AND CONCLUSIONS - Parturition interval was affected by season, year, season x year interaction, age of weaning of the previous calf, and herd ($P < 0.0001$). The effect of sex of the preceding parturition was not significant ($P < 0.85$) in agreement with Schulz et al. (2004). The least squares mean of calving interval was 446.7 ± 10.4 days. This value was similar to those reported by Sampaio Neto et al. (2001) and Schulz et al. (2004) but higher than that of Souza et al. (1995). For season 1 the IEP average was 419.8 ± 11.3, ranged from 368.6 ± 10.2 in 2002 to 453.5 ± 13.1 in 2001. For season 2, the IEP average was 473.6 ± 40.1, and ranged from 362.8 ± 21.2 in 1994 to 575.4 ± 95.7 in 1992. The range in season 1 was 84.9 days, much smaller than the 212.5 days of season 2. The difference between average of season 1 and 2 was 54 days. The season x least squares means are presented in Figure 1.

A seasonal distribution of parturitions was evident. Eighty five percent of parturitions (n= 6,448) occurred from December to May, with highest concentration from February to April, (4,663 parturitions, 61.5%; Figure 2). These results are in agreement with values reported by Schulz et al. (2004). Sampaio Neto et al. (2001) reported research from Belém of Pará, Brazil and found the highest concentration of calving in the second half of the year. They attributed this to management of the herd rather than climatic factors as this region is near the equator and thus light variation is small. The same authors evaluated buffalo raised in Ceará state, Brazil and found an effect of season ($P < 0.001$), with calving concentrated in the period from January to June. Zicarelli (1994) report with buffalo can be

considered a species with a preferentially seasonal activity. That is, even though a buffalo may be fertile during the whole year, its sexual activity increases when the day-light hours decrease. However, the reproductive efficiency remains at high standard levels even when daylight hours begin to increase (January in the northern hemisphere; July in the southern hemisphere) and are still shorter than day-dark hours. In fact, considering that the buffalo originate from a tropical area north of the equator where food availability coincides with decreasing daylight hours, the animals calving during the summer (wet season) have a natural selection advantage. Buffalo in Brazil showed seasonal parturition with calving concentrated from January to April, although the frequency by month differed across years. A shorter calving interval was also observed from December to May.

Figure 1. Distribution of calving interval by season (December to May = 1, June to Novmber = 2) by year for buffalo in Brazil.

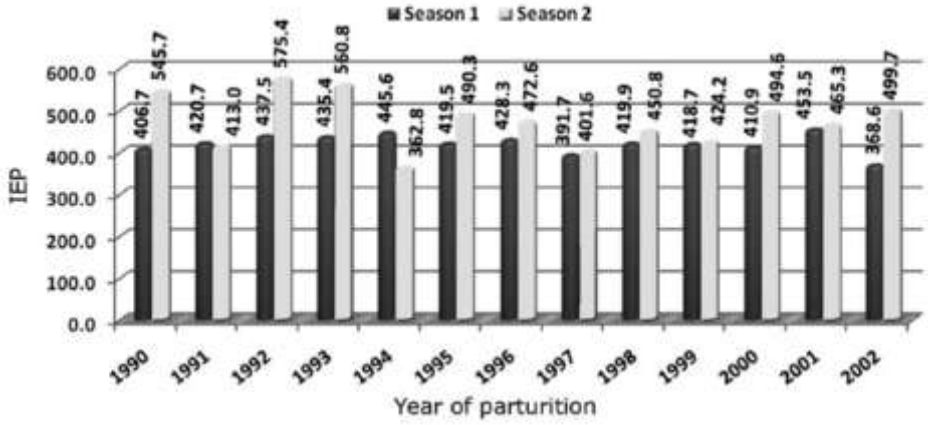
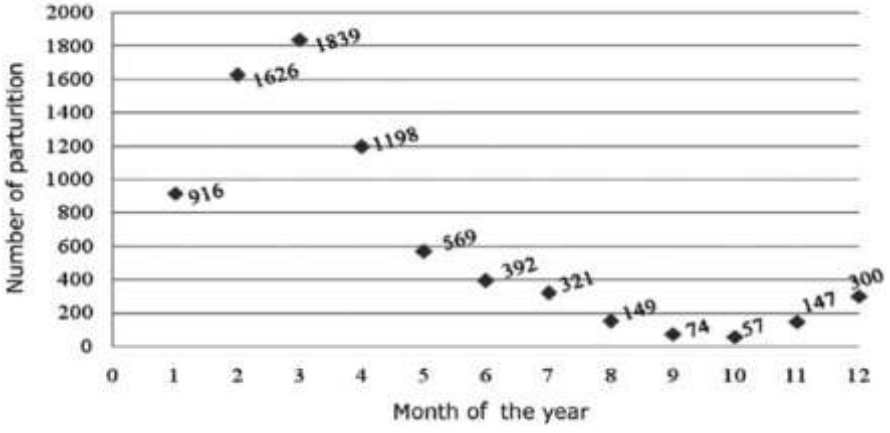


Figure 2. Distribution of calving by month of year for buffalo in Brazil.



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