



Birth-Related Seasonality and Forecasts in a Buffalo Raising Company in Camaguey, Cuba

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INTRODUCTION

The reproductive performance of buffalo species is characterized by increases in fertility associated with shorter days (short-day seasonal polyestrous), with a higher intensity in areas far from the equator line. Though in zones near the equator, the females have an almost year-round menstrual cycle, which is dependent on proper nutrition to keep reproductive efficiency (Pirondi *et al.*, 2019).

The significance of buffaloes in tropical areas is linked to the need to study the reproduction of this species under the environmental conditions of Camaguey, and its perspectives. Accordingly, this paper aims to define the seasonal behavior patterns and birth forecasts for the 2008-2018 period.

DEVELOPMENT

The data recorded between 2008 and 2018 from nine buffalo dairies at the Maraguan Basic Facility, Jimaguayu, in the province of Camaguey, were included in the research. Birth seasonal decomposition was performed through a multiplicative model, whereas various seasonal models were evaluated using the Time Series Model. The selection criteria were based on the R square, root mean square error (RMSE), and the mean absolute percentage error (MAPE). Every analysis was performed with IBM SPSS 24, for Windows.

Citations (APA)

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The highest values of the seasonal factors were observed in the July-December period, but especially in August (the highest percentage), due to the favorable environmental conditions associated with the existence of greater grass availability. Using a different method, Mitat (2022), at Los Naranjos genetic project, found that 65.7% of calvings took place between July and October, when García Quiñones *et al.* (2017) recommended the largest concentration of parturitions, thus improving the reproductive indicators.

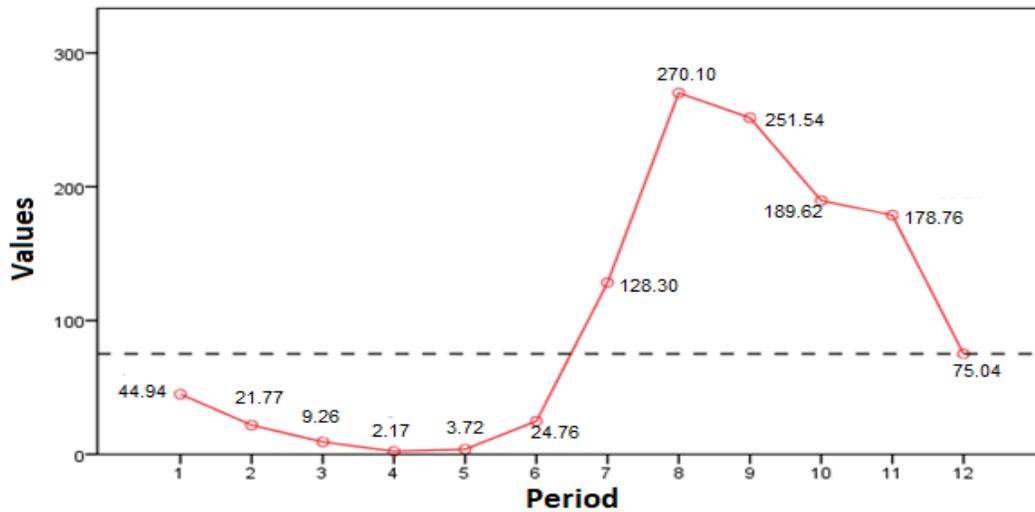


Figure 1. Monthly birth-related seasonal factors (%) in 2008-2018.

The best calving fit was found with a simple seasonal model ($R^2=0.744$; $RMSE=16.712$; $MAPE=53.468$), according to Ljung-Box (8.85, $P=0.919$), which permits forecasting a stable performance in the next stage (Figure 2).

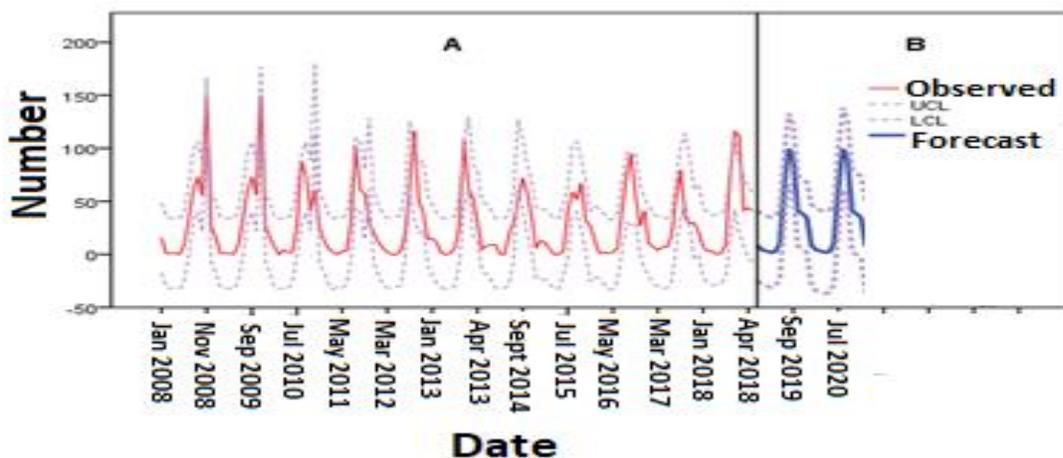


Figure 2. Birth sequence observed in the 2008-2018 period (A), and the fit forecast model until 2023 (B)

D'Occhio *et al.* (2020) noted that external factors are to be managed due to their negative impact on reproduction, whose approaches include strategic nutritional supplementation, the utilization of assisted reproduction techniques, and the implementation of handling strategies that enhance buffalo well-being. For instance, Abulaiti *et al.* (2022) demonstrated that the inclusion of the modified Ocsynch protocol helped improve estrus features, ovulation, and pregnancy of crossbred multiparous animals, and it was suggested for the high and low breeding seasons for promising results.

CONCLUSIONS

The absence of a clear tendency in the evaluated models evidenced the need for technical and organizational steps to increase births. The methodology used may also be applied in other buffalo-raising companies in Cuba, as part of the strategies required to raise production in the coming stage, based on the concentration of calvings in the months with the highest grass availability.

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AUTHOR CONTRIBUTION STATEMENT

Research conception and design: LFC, JABV; data analysis and interpretation: JABV, LFC, HJFB; redaction of the manuscript: LFC, JABV, HJFB.

CONFLICT OF INTEREST STATEMENT

The authors state there are no conflicts of interest whatsoever.