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Scientific Paper

Comparison between the performance of Nelore females and crossbred females in relation to age at the first calving and birth weight of the progenies in the transition region of Cerrado-Amazon

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Abstract

Observations of 406 registers of bovine females were assessed with the aim of comparing the performance of Nelore females with crossbred females Caracu x Nelore in relation to birth weight (PN) of the product and age at first calving (IPP). The registers were from the farms Boa Esperança and Paulista, located in the city of Sinop, Mato Grosso. For the birth weight, the model employed the fixed effects of the genetic group, sex of the product, farm, birth period, interactions between genetic group with sex, with farm and with birth period, besides the co-variable of age at calving, and age at first calving. The model employed included the effects of the genetic group of the matrix, farm and period of calving. The average IPP was equal to 31.52 ± 1.14 and, except for the effect of birth period, all other effects studied in the model were not significant (p>0.05). Regardless of the matrix genetic group, cows that gave birth during rainy seasons presented higher precocity for the first calving. Males coming from crossbred females were heavier in relation to females coming from Nelore females or crossbred that gave birth to females.

Keywords: crossing, beef cattle, productivity, zootechny.

Comparación de rendimiento de hembras Nellore y hembras cruzadas para la edad al primer parto en el peso al nacer de las crías en la zona de transición Cerrado-Amazonia

Resumen

Observaciones de 406 registros de hembras bovinas fueron evaluadas con el fin de comparar el rendimiento de hembras Nellore con hembras mestizas Caracu x Nellore enrelación al peso al nacer (PN) del producto y la edad al primer parto (IPP). Los registros son provenientes de la Granja Buena Esperanza y Paulista, situada en el municipio de Sinop, Mato Grosso. Para peso al nacer el modelo emplea los efectos fijos de grupo genético, sexo del producto, granja, época del parto, las interacciones entre grupo genético con el sexo, con la granja y época del parto, además de la covariavel edad de la vaca al parto. Para la edad al primer parto el modelo empleado incluido los efectos del grupo genético de la matriz, de la granja y época del primer parto. El Promedio para IPP fue igual a 31,52 ± 1,14 y excepto por el efecto del época del parto, todos los otros efectos estudiados en el modelo no fueron significativas (p> 0,05). Independientemente del grupo genético de la matriz, vacas que paren en la temporada de lluvias mostraron mayor precocidad para el primer parto. Machos de las hembras cruzadas fueron más pesados en comparación con las hembras provenientes de hembras Nellore o mestizas que hayan parido hembras.

Palabras clave: cruzamiento, ganado de corte, productividad, zootecnia.

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Comparação entre o desempenho de fêmeas Nelore e fêmeas cruzadas para idade ao primeiro parto o peso ao nascimento da progênie na região de transição cerrado-amazônia

Resumo

Observações de 406 registros de gado do sexo feminino foram avaliadas, a fim de comparar o desempenho de fêmeas mestiças com fêmeas Nelore Nelore x Caracu enrelación peso ao nascer (PN) do produto e idade ao primeiro parto (IPP). Os registros são da Fazenda Boa Esperança e Paulista, localizado no município de Sinop, Mato Grosso. Para peso ao nascer modelo usa os efeitos fixos de grupo genético, produto do sexo, fazenda, momento da entrega, as interações entre sexo grupo genético, com exploração agrícola e momento da entrega, para além da idade da vaca covariavel entrega. Para a idade ao primeiro parto, o modelo utilizado incluiu os efeitos de grupo genético da matriz, fazenda e idade ao primeiro parto. A média para IPP era igual a 31,52 ± 1,14 e, excepto para o efeito do tempo de entrega, todos os outros efeitos estudados no modelo não foi significativa (p> 0,05). Independentemente do grupo genético da matriz, vacas que pariram na estação das chuvas apresentou maior precocidade para a primeira entrega. Fêmeas cruzadas machos foram mais pesados em comparação com fêmeas de fêmeas Nelore ou fêmeas mestiças que pariram.

Palavras chave: reprodutores, bovinos de corte, produtividade, criação de animais.

Introduction

In the search for higher competitiveness in the meat production systems in the tropics, the crossing of zebu breeds has been largely used, for they present excellent adaptation to tropical conditions, with breeds of European origin, specialized for the meat production. However, there are still some questions to be answered regarding the crossbred animal performance in the tropical environment, mainly over the reproductive performance.

The crossing is considered as a genetic improvement tool that aims to enhance the efficiency of production characteristics, optimizing the additive genetic merit of different races (exploring the existent genetic variance between them), and complementing these same differences, causing the heterosis effect, which is maximum in the first generation of the crossing and more pronounced the more genetically divergent are the races involved in the crossing. One of the key considerations in the use of crossing is the evaluation of the greater growth consequences, and relating its impact to the matrix flock (JOHNSTON et al., 1996).

Among the factors that most influence the productivity of beef cattle flocks, we can highlight the reproductive efficiency, whose main components are the age at first calving and birth weight. The age at first calving is an indicative of sexual precocity and, thus, of considerable economical importance, since it marks the beginning of the productive life of a matrix. The birth weight of the animals is related with the birth ease. Heavier products increase the possibility of dystocic deliveries, and one of the effects of crossing is the weight increase of the animals.

We aimed to compare the performance in relation to weight at birth and age at first calving of products originated from Nelore females and with crossbred females of Caracu x Nelore.

Material and Methods

Data from 406 registers of females were assessed in order to compare the performance of Nelore females with crossbred females in relation to weight at birth (PN) and the age at first calving (IPP). The registers are from Boa Esperança and Paulista farms, located in the city of Sinop-MT. The animals remained in a diet of pasture, composed by grass of the genus Brachiaria (*Brachiaria brizantha* cv. Marandú) and Panicum (*Panicum maximum* cv. Mombaça), under a continuous stocking system and fixed stocking rate. The management of entry and exit of animals in the paddocks was according to the height control of this genus of grass, respecting its support capacity. In order to complement the diet of pasture, we gave the animals, during the rainy periods, mineral protein supplement, and in the dry season, mineral energetic/protein supplement, provided according to the demand of animal consumption.

After the birth, the newborn animals were weighed with a precision scale of three digits, where we immediately established the cares to the newborns, with cutting and cleaning of the umbilical cord and due identification of the animals, conducted through the control of numbered ear tags.

For the weight of the progeny at birth, the model employed is described as Yijklm = μ + Gi + Sj + Fk + El + Gsij + Gfik + Geik + b1 (ijklm-Yijklm) + b^2(ijklm - Yijklm)$^{-2}$ + εijklm, where Yijklm is the weight at birth of animal, belonging to the genetic group of the mother i (i = Nelore and crossbred); of sex j, on farm k (k = 2) at birth period 1 (1 = drought and rainfall); b1 and b2 are regression coefficients of the linear and quadratic of the cow age to the average birth (ijklm) in relation to the PN, and εijklm is the random error assuming iid~(0; σ2).

As for the age at first calving, the model employed is described as Yijkl = μ + Gi + Ej + Fk + GEij + GFik + EFJK + GEFijk + ϵijkl, where Yijkl is the IPP of the matrix 1, belonging to the genetic group I (I = Nelore females and crossbred); on farm j, at birth season k (k = 2, drought and rainfall); with the term ϵijklm characterizing the random error assuming ~ (0; σ2). For all hypothesis tests, we adopted the significance level of 0.05.

Results and Discussion

The average for weight at birth was equal to 38.51 ± 2.79 and the variance coefficient was of 4.88%. The IPP average was equal to 31.52 ± 1.14, and the variance coefficient was of 2.46%, with determination coefficient of 56.51%. Except for the main effects and the interaction of genetic group, sex and birth period, all other studied effects in both models were not significant.

The averages and standard deviation per birth period are exhibited in Table 1. We can see that on rainy periods there was a reduction of IPP in approximately 7%, with lower dispersion of the IPP between matrixes; this small percentage must be due to mineral/energetic/protein supplementation in the dry season, and mineral protein supplementation in the rainy period, improving the utilization of dry matter from the fodder in the period with less water precipitation.

PEROTTO et al., (2001) also verified the effect of the season of the year over the IPP in Nelore calves. Such results is due to the fact that the calves born in winter have better growth rates, because they are nursed in spring and summer, whereas the ones born in summer and autumn are nursed in autumn, winter and early spring.

Thereby, calves born from July to September are indirectly benefited by the greater milk production of the mothers and, directly, by the ingestion of better quality forage when, during the spring, they start to graze, and according to BOLIGON et al. (2008), the selection based on the characteristics of age at first calving and days for the birth can improve the reproductive performance of the females; however, the response to the individual selection must be small. On the other hand, the calves born in the summer and early autumn are nursed when the quality of the tropical pastures start to decline and the winter pastures are not yet available. Besides, these animals start to ingest forage through the grazing in seasons that coincide with the shortage of pasture.

However, taking into account the improvement of productive aspects of Nelore matrixes, in study developed by BOLIGON et al. (2008), the genetic correlation estimates between the weight characteristics and the IPP were low to moderate, and favorable to the selection. Similar observations about negative genetic correlations between weight measured in different ages and the IPP were also described by MERCADANTE et al. (2000) and TALHARI et al. (2003), for Nelore and Canchim breeds, respectively. These results characterize the synergism action between genes favorable to weight characteristics connected to the age expression at first calving, that is, females with higher growth potential after-weaning tend to be more premature at first birth.

According to SILVA et al., (2003), the heritability value of pregnancy probability indicates that this characteristic can be used in programs of bull selection, aiming to increase the premature reproduction of its breeds. The use of crossbred females, in relation to the performance of Nelore matrixes, did not improve the sexual precocity in the herds. That is due to the fact that, generally, the matrixes were premature, and the females presented

Table 1. Averages, standard deviation (DP) and number of observations per birth period.

Birth period	Average IPP	DP
Drought	32.06 (n=308) a	0.88
Rainfall	30.02 (n=208) b	0.21

Averages followed by the same lower case letter in the column do not differ between them by the F test at 5 % significance.

Table 2. Averages, standard deviation and number of observations per classes of genetic group and sex of the animal.

	Weight at Birth	
Genetic Group	**Female**	**Male**
Crossbred	37.37 ± 2.45 (n = 89) Aa	42.13 ± 1.55 (n = 69) Ab
Nelore	36.45 ± 1.65 (n = 135) Ba	39.66 ± 1.81(n = 113) Bb

Averages followed by the same capital letter in the line and lower case letter in the column did not differ between them by the F test at 5% significance.

their first conception around 22 months of age, corroborating with TALARICO et al. (2004).

According to PEREIRA et al. (2002), the use of characteristics with heritability inferior to 0.14 in improvement programs would cause little response to the selection, and would also require the reproducers to have a big number of breeds assessed in order to the DEPs to present sufficient reliability. However, in order to obtain improvements in the productive rates, it is essential to assess the reproductive characteristics, even if it is of low heritability, aiming to select young matrixes, because this selection enables a faster return of investments, prolonging the reproductive life and the number of progenies per cow.

In Table 2 are shown the averages and standard deviation for weight at birth of males and females, progenies of the maternal genetic groups of crossbreds and Nelores. Males from crossbred females presented, in average, 13% more weight at birth in comparison to crossbred females, and were 6% heavier at birth when compared to males from Nelore mothers. Nelore males weighed 8% more at birth than Nelore females.

BOWDEN (1980) concluded that no differences were observed in efficiency among the breeds or between crossings when the food provided to the cows met the requirements for the reproduction and milk production, and connected to this factor we can highlight that the nutritional factor of the matrix can cause a significant effect in relation to the calf weight at birth, which can explain the result found in the present study, where the male and female animals, progenies of the crossbred matrixes, obtained greater weight when compared to animals born of Nelore females.

Another factor cited by BOWDEN (1980), is that when the reproduction is compromised or the genetic potential of the calf for growth is limited by the lack of food, the potential differences in efficiency between types of cattle can manifest.

SILVA et al. (2008) also verified a higher weight at birth of crossbred animals, when compared to Nelore animals. TORAL et al. (2004), studying the Nelore breed, also found a significant effect ($P<0.05$) of the animal sex over the weight at birth.

Conclusions

The use of crossbred females increases the weight at birth in calves, presenting higher weights in male calves. Regardless of the genetic group of the matrix, the cows that gave birth at rainy season presented greater precocity for the first calving.

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