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Reproductive Behavior of Jersey Cattle Breed

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ABSTRACT

The reproductive features of Jersey cattle breed were determined, and the non-genetic factors that affected the features, service period (days), calving interval (days), gestation length (days), and gestation service per insemination performed, were assessed. Records of 150 calvings between 204 and 2013 at *Los Pinos* UEB, *Triangulo Tres* Cattle Raising Company, in Camagüey, Cuba, were used. The cows were inseminated with semen from the same breed. SPSS, version 11.5, was used to calculate the basic statgraph, analyze variable normality (Kolmogorov-Smirnov test), the Levene´s test, and multiple linear analyses of variance for each dependent variable. The non-genetic factors that affected the service period and calving interval were the calving number, season, and year. The values achieved for the service period features and calving interval were 259.2 ± 13.2, and 539.8 ± 13.2 days, respectively. The duration of gestation (280.6 ± 1.6 days), and gestation service (2.2 ± 0.2 services performed) were not affected by any of the non-genetic effects studied.

Key Words: *Jersey breed, reproductive behavior*

INTRODUCTION

Moreno (2005) and González (2011) noted that the Jersey cattle breed can easily adapt to different climatic and geographic conditions. Moreover, it can tolerate high temperatures and humidity contents, without significantly affecting yields. The animals are naturally active, and their agility and size allow them to move long distances while grazing. This breed can mature before other breeds, and are the most efficient breeding animals with longer breeding lifespan.

McDowell (2009) noted that Jersey has remarkable advantages over other dairy breeds, in terms of reproduction, according to research done in other countries; it matures quickly. A dairy heifer may be served at a younger age and smaller size. As a result, it will be milked earlier, with the ensuing earlier income for producers. Jerseys are also known for their calving ease. These features increase confidence in this breed, and reduce labor force and veterinary costs. The reproductive advantages of Jerseys are still more remarkable in areas where extended periods of stress and high temperatures occur.

The aims of this research are to determine the reproductive features of the Jersey breed; and assess the non-genetic factors that affected these features at Los Pinos UEB, from the *Triangulo Tres* Cattle Raising Company, in Camaguey, Cuba.

MATERIALS AND METHODS

Location

Records from Los Pinos UEB, from the *Triangulo Tres* Cattle Raising Company, in Camagüey were used to evaluate 150 calvings that took place between 2014 and 2013, in a Jersey female herd, between 38 and 126 months of age, inseminated with Jersey bull semen.

Herd Working System

Natural breeding is applied with restricted suckling (30-40 min) after each manual milking, twice; weaning is 270 days after calving.

The animals graze the year round on varied pasture, including Camagüeyan (*Bothriocha pertusa*), Texan (*Paspalum notatum*), Pangola grass (*Digitaria decumbems*), Guinea (*Panicum maximum*), and some areas with sugar cane (*Saccharum officinarum*) and *king grass* (*Pennisetum* sp) forages for the feeding troughs.

Data collection and processing

The data were collected from individual reproduction control cards. The reproductive features, as service period (PS) in days; calving interval (IPP) in days; length of gestation (DG) in days; and gestation service (S/G) days in inseminations performed, were included. To estimate the reproductive features and the effect of the non-genetic factors affecting them, SPSS (2006), version 11.5 was used to calculate the basic statgraph, analyze variable normality (Kolmogorov-Smirnov test), the Levene´s test, and multiple linear analysis of variance of each dependent variable.

The variation causes used in the mathematic model were offspring sex (2); calving number (7); calving season (2) in the dry season (November to April), and the rainy season (May to October); and the calving year (10), to study the reproductive features.

To study the different non-genetic variation causes that affected the features studied, the following mathematical model was used,

$Y_{ijklm} = \mu + S_i + N_j + E_k + A_l + e_{ijklm}$

Where:

Y_{ijklm}: dependent variable for PS, IPP, DG and S/G, corresponding to the I th individual of ijkm subclass.

M: general mean.

S_i: fixed effect of the I th offspring sex (2).

N_j: fixed effect of j th calving number (7).

E_k: fixed effect of k th calving season (2).

A_l: fixed effect of l th calving year (10).

e_{ijklm}: residual effect, or experimental error.

RESULTS AND DISCUSSION

Table 1 shows the observations, according to the effects considered in the mathematical model, with a rather stable distribution.

Service period *(PS) and calving interval (IPP)*

The result achieved for the service period and the calving interval (Table 2) with 2.59 ± 13.8 and 539.8 ± 13.2 days, respectively, are higher that the ones reported for the species in 50-80 days, and may reach 120 days, according to Veras (1999) and Brito (2010), who reported from 85 to 110 days for the service period. Furthermore, the calving interval of 539 ± 13.2 days does not correspond to reports by Veras (1999), Calveras and Morales (2000), and Brito (2010), who noted 365 - 400 days. These authors claim that in both reproductive features the main causes affecting them are the working conditions, feeding, estrus detection and neglect during calving and after, with negative repercussions on milk production and reproduction.

The results achieved for the service period and the calving interval in Jerseys, at *Los Pinos* UEB, from the *Triangulo Tres* Cattle Raising Company, are mainly affected by the heifer breeding system, weaned at 270 days of age. The poor feeding conditions do not meet the nutritional requirements for milking and dry dairy cows, as well as estrus detection by specialized personnel, and the lack of teaser bulls, which corroborate the previous findings.

In different papers Lamb, Linch, Gieger, and Minton (1997) refer to the effect of the inhibiting impact of suckling, double milking sessions, and lengthening of lactation time on ovarian functions. They referred to post-calving anestrus increase due to the lack of teaser bulls. Álvarez (2002) noted the need to keep a rate of 30 to 50 cows per teaser bulls in artificial insemination systems, arguing that post-calving anestrus increase owed to the lack of teaser bulls.

Calving number effect

The number of calving for the service period and calving interval (Table 3), is higher for the first, second and third calving, in comparison to the fourth, fifth, sixth and seventh calvings, which differ significantly ($P < 0.01$). These results corroborate the findings of Pérez and Gómez (2005), when they indicated that from the first to the fourth calvings, the cows have longer service periods and calving intervals in comparison with the ensuing calvings. It may be caused by incomplete anatomo-physiological development; as well as by physiological and endocrine adjustments, puerperium variations, and body development into adulthood, for about 4-5 years.

Several papers written in tropical areas and Europe have reported a decrease in the reproductive features, whereas the number of calvings increases, either in Zebu, or Europeans, according to Boligon, Rorato and Ferreria, (2005); Carolino, Pereira, Carolino, Machado, and Gama, (2006); Pérez and Gómez,(2009).

Calving season effect

The rainy season showed the best behavior for either feature (Table 4).These results were corroborated by several authors, who observed a greater calving interval under different environmental conditions in Holstein X Cebú, and Holstein X dairy breeds, for the dry season, mainly due to a decrease in pasture availability and faulty feeding, effecting on body development and estruss occurrence (McManus, Sau, and Falcao, 2002; Santana, Guerra, Falcón, Rodríguez and Gonzáles, 2004).

Most specialists have claimed that the behavior of the calving season for the service period and calving interval is the result of climatic variations, estrus handling practices, and dairy and beef cattle feeding in tropical and subtropical environments (Valle, Lobo, Duarte, and Wilcox, 2003; Ceró, 2007; Sánchez, Lámela, López and Benítez, 2008).

Calving year effect

The service period and calving interval for the calving year (Table 5) were higher from 2004 to 2009, in comparison to 2010 and 2013, as there were differences in feeding, reproductive handling and animal health (Álvarez, 2002).

Other authors reported that not all the years have the same behavior, in terms of climate conditions and specialized personnel in the dairies, feed availability and animal handling (Ribas, Gutiérrez, Mora, Évora and González, 2004; Falcón, Guerra, Veliz, Santana, Rodríguez and Ortiz, 2005).

Length of gestation

The general mean (Table 2) and its standard error for gestation duration was 280.6 ± 1.6 days, coinciding with the results of research by Brito (2010) in bovines of 270 to 310 days of age. Also similar, are the results for different crossings of Holstein X Zebu in Cuba (Evora, Guerra, De Bien, and Prada, 2002; López, Lámela and Sánchez, 2007 and Hernández, 2010).

Bartolomé (2009) achieved values between 279 and 285 days for dairy cows, like Jersey, Ayrshire, Guernsey and Holstein, coinciding with the results obtained in the breed studied.

None of the non-genetic factors analyzed affected that feature, coinciding with research on dairy and beef producing cattle under grazing conditions in the country (Ribas *et al.*, 2004; Ceró, Rodríguez, González and Guerra, 2005; Hernández, Vinay, Villegas, Ruiz, Cornejo and Lasso, 2010).

Services per gestation

The results from the gestation services were 2.2 ± 0.2 inseminations performed, which is considered very bad for bovines, according to Brito (2010). These results are higher than for other dairy breeds, like Cuban Taino, Cuban Mambi and Cuban Siboney, with 1.5-2.2 in the Cuban conditions. (Rojas, Wilkins, Bave and Pena, 2000; Planas and Ramos, 2001; Hernández, Ponce de León, De Bien, R., Mora, and Guzmán, 2007).

The number of gestation services was not affected by any of the non-genetic factors studied. It was corroborated with other results in the country with crossbreds for higher milk and beef productions, according to Santana *et al.* (2004); Hernández *et al.* (2010).

Castro (2009) noted that when the number of services required is below 1.5, the herd is considered to have excellent fertility, with optimum values reached at 1.25 services per pregnancy.

The insemination rate is used to assess herd fertility, depending not only on the herd fertility conditions, but also on errors in the organization of artificial insemination. This rate relates inseminations performed to cows with the number of pregnant animals at a given time. Accordingly, the insemination rate shows the necessary number of inseminations to achieve gestation. In Cuba, 1.5 to 1.7 inseminations per pregnant cow is considered good (AACJ, 2008).

CONCLUSIONS

Reproductive features like service period, calving interval and gestation service were deficient under production conditions.

The service period and calving interval were significantly affected ($P < 0.01$) concerning the calving number, calving season and year, but not for offspring sex.

Gestation length behaved according to reports in the literature, and it was not affected by the non-genetic effects studied.

RECOMMENDATIONS

It is important to improve dairy unit maintenance, handling and feeding conditions, by increasing forage areas with sugar cane and king grass, along with stocks of legume protein.

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Table 1. Distribution of observations by effects included in the mathematical model used

Identification		**Observations**
Total		**150**
Offspring sex	Male	90
	Female	60
Calving number	1	26
	2	30
	3	28
	4	24
	5	18
	6	12
	7	12
Calving season	Dry	68
	Rainy	82
Calving year		
2004		11
2005		10
2006		11
2007		12
2008		15
2009		18
2010		15
2011		21
2012		17
2013		20

Table 2. Means and standard error. Variance analysis

Sources of variation	PS	IPP	DG	S/G
Offspring sex	NS	NS	NS	NS
Calving number	xx	xx	NS	NS
Calving season	xx	xx	NS	NS
Calving years	xx	xx	NS	NS
X± ES(days)	259.2 ± 13.3	539.8 ± 13.2	280.6 ± 1.6	2.2 ± 0.2(ir)
R^2 (%)	7.2	6.9	5.4	5.3

** (P < 0.01)
ir: inseminations performed

Table 3. Behavior of PS and IPP for the calving number

Calving number	PS (days)	IPP (days)
	X ± ES	X ± ES
1	288.5 ± 14.1 a	569.1 ± 13.9 a
2	280.2 ± 13.9 a	560.8 ± 14.2 a
3	281.8 ± 13.5 a	562.4 ± 14.5 a
4	256.1 ± 15.1 b	536.7 ± 15.7 b
5	247.7 ± 14.5 b	538.3 ± 14.8 b
6	240.1 ± 13.1 b	520.7 ± 12.2 b
7	242.2 ± 13.9 b	522.8 ± 12.4 b

Means with different letters in the same column differ significantly ($P < 0.01$). Tukey test

Table 4. Behavior of PS and IPP for the calving season

Calving season	PS (days)	IPP (days)
	X ± ES	X ± ES
Dry	275.6 ± 14.2	556.2 ± 13.9
Rainy	242.9 ± 12.1	523.5 ± 12.9
Significance level	($P < 0.01$).	($P < 0.01$).

Means with different letters in the same column differ significantly ($P < 0.01$). Tukey test

Table 5. Behavior of PS and IPP for the calving year

Calving year	PS (days)	IPP (days)
	X ± ES	X ± ES
2004	238.3 ± 14.1 a	518.9 ± 15.3 a
2005	234.1 ± 15.1 a	514.7 ± 14.9 a
2006	239.6 ± 12.3 a	519.2 ± 13.1 a
2007	231.9 ± 13.1 a	512.5 ± 14.1 a
2008	236.4 ± 12.6 a	517.1 ± 15.2 a
2009	246.5 ±13.1 a	527.1 ± 13.8 a
2010	288.3 ± 12.6 b	568.9 ± 13.3 b
2011	280.1 ± 12.9 b	560.7 ± 14.9 b
2012	282.8 ± 13.3 b	563.4 ± 15.1 b
2013	289.6 ± 13.9 b	570.2 ± 15.3 b

Means with different letters in the same column differ significantly ($P < 0.01$). Tukey test