

EFFECT OF *Leptospira* sp. INFECTION ON REPRODUCTIVE EFFICIENCY OF A CROSSBREED CATTLE HERD IN THE SOUTH OF BAHIA STATE, BRAZIL*

EFEITO DA INFECÇÃO POR *Leptospira* sp. NA EFICIÊNCIA REPRODUTIVA DE UM REBANHO BOVINO MESTIÇO NO SUL DA BAHIA

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ABSTRACT. Lopes L.B., Oliveira Junior A.C., Melo C.B. de, McManus C. & Leite R.C. **Effect of *Leptospira* sp. infection on reproductive efficiency of a crossbreed cattle herd in the South of Bahia State, Brazil.** [Efeito da infecção por *Leptospira* sp. na eficiência reprodutiva de um rebanho bovino mestiço no Sul da Bahia]. *Revista Brasileira de Medicina Veterinária*, 32(1):51-54, 2010. Universidade de Brasília, Campus Universitário Darcy Ribeiro, Asa Norte, ICC Sul, Caixa Postal 4508, Brasília, DF 70910-970, Brasil. E-mail: cristianomelo@unb.br

Brazilian animal production is under the world spotlight due to the increase in production and exportation of cattle and beef. Despite positive results in animal production in recent years, reproductive performance in some herds continues to be below optimum due to various factors, including infectious diseases that affect reproduction. Reproductive performance in a crossbred zebu herd was evaluated through number of inseminations per pregnancy associated with serology for *Leptospira* sp. No association was found between serological profile and reproductive performance of the tested animals.

KEY WORDS. Disease, beef cattle, production, reproduction, abortion.

RESUMO. A pecuária brasileira vem ganhando destaque mundial devido ao incremento na produção e nas exportações de carne bovina. Apesar dos resultados positivos do setor pecuário nos últimos anos, o desempenho reprodutivo de alguns rebanhos permanece abaixo do esperado devido a vários fatores, dentre eles, as doenças infecciosas que comprometem a reprodução dos bovinos. O desempenho reprodutivo de um rebanho mestiço-zebu foi avaliado através do número de serviços por prenhes associada à sorologia para *Leptospira* sp. De acordo com

os resultados obtidos, não foi encontrada associação entre o perfil sorológico e o desempenho reprodutivo dos animais testados.

PALAVRAS-CHAVE. Doença, gado de corte, produção, reprodução, aborto.

INTRODUCTION

Brazil is presently one of the world's largest producers and exporters of beef and cattle, producing more in volume terms than United States and Australia. Despite the results achieved in breeding

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and genetic improvement using biotechnologies, reproductive indices need to improve reproductive performance of a great part of the national herd. In beef herds, financial profit is directly linked to reproductive efficiency. The mean number of inseminations per conception should be between 1.3 and 1.6 doses, which represent a mean percentage of 60 to 70% conceptions for the first service. The ideal service period for beef cattle is approximately 85 days (Velloso, 1999). Reproductive efficiency may be influenced by various factors including infectious diseases (Corrêa et al. 2000, Royal et al. 2000). Bovine leptospirosis, which is a bacterial disease linked to reproduction, is frequently associated with a decrease in reproductive performance (Mineiro et al. 2007). Leptospirosis species usually cause abortion in the final third of gestation, heat repetition and consequently an increase in calving intervals (Ellis 1984, Elder et al. 1985, Prescott et al. 1988, Dhaliwal et al. 1996). Where animals are infected by serovar *hardjo*, abortions may occur in any phase of gestation as well as an increase in embryo loss and consequently the number of doses of sêmen used per pregnancy. This can reach three to six doses per conception (Faine 1982, Ellis 1984, Ellis et al. 1985). As well as infertility, infection by diverse serovars may increase the number of lambs born weak, debilitated and lighter than the average (Ellis et al. 1986, Dhaliwal et al. 1996). Kennedy & Miller (1993) attributed the birth of these light calves to the occurrence of placentitis caused by infection by *Leptospira*. According to Rodrigues (2003), in Brazil as well as in other countries, the serovar *hardjo* is that most linked to embryo loss.

According to some authors, *Leptospira* seems not to have a direct effect on fertilization, in this way increasing the calving to conception interval and consequently the increase in number of services per pregnancy is generally due to early embryo death and return to service (Genovez & Pituco 2003). Despite various authors having shown the association between infection by *Leptospira* with infertility and embryo mortality (Hanson 1980), interference in the function of the corpus luteum and decrease in fertilization (Dhaliwal et al. 1996), Bielanski & Surujbali (1996) did not find a negative effect of the presence of *Leptospira* during the *in vitro* fertilization process and subsequent development of embryos produced *in vitro*. The objective of this study was to evaluate the influence of bovine leptospirosis on pregnancy rates in a cattle herd in the Southern Bahia, Brazil.

MATERIAL AND METHODS

The farm studied was close to the Municipality of Medeiros Neto in the State of Bahia, Brazil, a traditional cattle producing region in Brazil. The herd 1,841 dams of 272 were Tabapuã and 1,569 crossbreeds of the breed composition called Red Norte. Of these dams, 1,071 (58%) were multiparous, 425 (23%) primiparous and 345 (19%) nuliparous. All females were reared at pasture and artificial insemination with commercial semen from a single station was used. Heat was observed by the inseminators twice a day, at six in the morning and five in the afternoon. The females that were detected in heat were taken to the stable and inseminated 12 hours after heat detection.

Blood was collected randomly in the first three days of January 2004 in 18% of the crossbred herd, 320 females in reproduction. The sample size was calculated in accordance with Sampaio (1998). Vacuum tubes were used for collection and serum samples were conserved at -20°C until laboratory diagnosis was carried out in the Department of Preventive Veterinary Medicine of the Veterinary School of the Federal University of Minas Gerais. Microscopic agglutination with live antigens was used for serology for *Leptospira*. The study was carried out in accordance with Cole et al. (1973), modified by Hermann (2002). This test is described by Lilembaum (1995) as the most used by researchers for leptospirosis diagnosis in cattle. Samples were considered positive when they showed 50% agglutination of *Leptospiras* per microscopic field with titulation equal to or above 100. Amples were tested for the serovarieties: pomona, wolfii, bratislava, hedomadis, sejroc and hardjo (hardjo sample norma, hardjo samplebovis and hardjo sample OMS).

Reproductive performance in the 2003/2004 calving season was compared with the serologies found. The 320 females sampled were classified in two groups: 217 animals with one service per gestation and 103 animals with more than one service per gestation or negative diagnosis of gestation. The chi squared test (χ^2) at 5% significance was used for the association study between groups (Sampaio 1998). After the first analysis, the associations were carried out with heifers separately.

RESULTS AND DISCUSSION

In contradiction with other authors, data in this study indicated that infection by *Leptospira* did not negatively influence the fertilization process or embryo development in the animals studied (Table 1).

Table 1. Association between *Leptospira* serology of females and reproduction performance.

Groups	N° of semen doses /pregnancy	
	1 dose/semen	>1 dose or various
Positive (>100)	169 (69.26%) ^{aA}	75 (30.74%) ^{aB}
Negative (<100)	48 (63.16%) ^{aA}	28 (36.84%) ^{aB}

Lower case letters in the same column or upper case in the same row did not differ significantly using the Chi squared test ($P > 0.05$).

According to Ellis (1994), titles above 100 for the serovariety *hardjo* indicate previous exposure or active infection. Vasconcelos et al. (1997) affirmed that titles of 100 to 200 are indicative of contact with antigens of *Leptospira* sp., but don't indicate a recent infection while values equal to or above 400 are suggestive of an active infection.

The seroagglutinant titles found here varied between 100 and 3.200 suggesting an acute infection and circulation of *Leptospira* sp. in the herd. Two hundred and forty four animals were positive for the bacteria, with some having three positive reactions. This reveals the presence of more than one serovariety in the herd and many may be cross reactions between tested serovarieties, as shown in Table 2. Several studies show a wide variation in serological profile with different serovars in cattle herds (Ellis et al. 1982, Ellis 1984, Elder et al. 1985). When the influence of the serology for *Leptospira* sp. was evaluated in the heifers, the same result was found (Table 3), suggesting that the agent did not significantly affect fertilization and embryo development, when previous exposed or infected by the agent.

Table 2. Number of animals soropositive for leptospirosis detected by the microscopic agglutination in the studied herd (2003-2004).

Sorovar Pomona (+)	Wolffi	Bratislava	Hebdomadis	Sejroe	Hardjo OMS	Hardjo ovis	Hardjo norma
Reactions	0	129	105	107	61	100	128
Total		244 (76.2%)					

Table 3. Association between serology for *Leptospira* in heifers and reproductive performance.

Groups	N° of semen doses /pregnancy	
	1 dose/semen	>1 dose or various
Positive	53(70.67%) ^{aA}	22(29.33%) ^{aB}
Negative	17(68%) ^{aA}	8(32.00%) ^{aB}

Lower case letters in the same column or upper case in the same row did not differ significantly using the Chi squared test ($P > 0.05$).

One possible explanation for these results, according to Ellis et al. (1981), is that animals with localized infection by the serovar *hardjo* do not necessarily show high antibody titles, these animals

being more prone to infertility but considered negative in serological tests. *Leptospira* has the ability to install itself in renal structures, thereby becoming inaccessible to antibodies, an may be eliminated in the urine for up to two years or more, and the infected animal the main source of infection for susceptible animals (Gerritsen et al. 1994). According to Thiermann (1982), the serovar *hardjo* may persist for 97 to 142 days in the uterus of sexually mature females. Junqueira et al. (2006) showed differences between results in heifers compared with other dams. Nevertheless, the losses occurred during foetal development, which differs from the results here. The authors evaluated the number of doses per calf born. The mean was 2,3 doses, showing low efficiency in the use of artificial insemination which did not occur in this study, independent of the animal category (heifer or cow) studied.

CONCLUSION

According to the results found here, preoccupation with *Leptospira* should be concentrated in the second third of gestation, from the third month after conception. This is *Leptospira* seems not to negatively affect fertilization or initial embryo development in the conditions used here. Nevertheless the multifactor aspect of infectious illnesses and the association between causative agents of reproductive disturbances seem to be determinants in the variation of results in the literature.

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