Risk factors involved in retained placenta of dairy cows from family agriculture herds

Fatores de risco envolvidos na retenção de placenta de vacas leiteiras em rebanhos da agricultura familiar

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ABSTRACT

Objective: The aim of this paper was to assess the risk factors in the occurrence of retained placenta in cows from family agriculture herds in four cities in southwest Paraná. Methods: A total of 607 calving’s in 25 herds were studied, considering as a diagnosis if the placenta was retained 12 hours after calving. A semi-structured questionnaire was applied to the producer in order to evaluate the risk factors involved concerning the cow, its pre-partum supplementation, its parturition, its calf, its clinical sanitary conditions and its seropositivity for reproductive diseases. Results: A total of 89 retained placenta cases were studied during a year, being the average prevalence of 16.8%. Among those cows, 50.6% had received mineral salt pre-partum, 18% had received mineral salt for lactating cows and 31.5% had not receive any supplementation. Among the calving’s observed in the cows involved, 21.3% were premature, 19.1% had dystocia and 4.5% twin births. 55.9% of the calves were male, 20.43% were large, 53.76% medium and 22.5% small in size. Among the affected cows, 44.9% presented hyperthermia, 41.6% decreased appetite, 27.0% concomitant disorders, 47.19% were seronegative for brucellosis, leptospirosis and neosporosis, 32.58% were seropositive for leptospirosis, 10.11% were seropositive for neosporosis and 4.49% were seropositive for both diseases. Conclusions: It can be concluded that under the study conditions, there were no decisive factors for the occurrence of retained placenta, reaffirming the multifactorial nature of this disease.

Keywords: Bovine; Multifactorial; Reproductive diseases; Mineral Supplementation; Body condition score.

RESUMO

Objetivo: O objetivo deste trabalho foi avaliar os fatores de risco na ocorrência de retenção de placenta em vacas de rebanhos da agricultura familiar em quatro cidades no sudoeste do Paraná. Metodologia: Um total de 607 partos em 25 rebanhos foram estudados, considerando como diagnóstico, a retenção de placenta 12 horas após o parto. Um questionário semiestruturado foi
aplicado ao produtor para avaliar os fatores de risco envolvidos em relação à vaca, sua suplementação pré-parto, sua parturição, seu bezerro, suas condições clínicas sanitárias e sua positividade para doenças reprodutivas. Resultados: Um total de 89 casos de placenta retida foram estudado durante um ano, sendo a prevalência média de 16,8%. Entre essas vacas, 50,6% receberam sal mineral antes do parto, 18% receberam sal mineral para vacas em lactação e 31,5% não receberam suplementação. Entre os partos observados nas vacas estudadas, 21,3% eram prematuros, 19,1% tinham distocia e 4,5% eram nascidos de gêmeos. 55,9% dos bezerros eram do sexo macho, 53,76% médios e 22,5% pequenos. Dentre as vacas afetadas, 44,9% apresentavam hipertermia, 41,6% têm um ano, sendo a prevalência média de 16,8%. Entre essas vacas, 50,6% receberam sal mineral antes do parto, 18% receberam sal mineral para vacas em lactação e 31,5% não receberam suplementação. Entre os partos observados nas vacas estudadas, 21,3% eram prematuros, 19,1% tinham distocia e 4,5% eram nascidos de gêmeos. 55,9% dos bezerros eram do sexo masculino, 20,43% eram grandes, 53,76% médios e 22,5% pequenos. Dentre as vacas afetadas, 44,9% apresentavam hipertermia, 41,6% apetite diminuído, 27,0% desordens concomitantes, 47,19% soronegativas para brucelose, leptospirose e neosporose, 32,58% soropositivas para brucelose, 10,11% soropositivas para neosporose e 4,49% soropositivas para ambas as doenças. Conclusão: Pode-se concluir que, nas condições do estudo, não houve fatores decisivos para a ocorrência de retenção de placenta, reafirmando a natureza multifatorial desta doença.

Palavras-chave: Doenças reprodutivas; Fêmea bovina; Multifatorial; Suplementação Mineral; Escore de condição corporal.

1. INTRODUCTION

Dairy production is one of the most important economic activities in southwest Paraná, at full expansion and with low productive and reproductive rates (TELLES et al., 2008). The majority of diseases in dairy cows occur in the immediate postpartum period (JAGUSZEKI et al., 2018; NOBRE et al., 2018), with emphasis on metabolic disorders and other afflictions, such as hypocalcemia, metritis, mastitis, ketosis, displaced abomasum and retained placenta (NOBRE et al., 2018).

Retained placenta is a disease resulting from the permanence of parts or all of the fetal membranes in the uterine lumen (NASCIMENTO; SANTOS, 2011). It is one of the most frequent complications affecting especially dairy cows rather than other species (JONES et al., 2000; NOBRE, 2012) due to the cotyledonary placenta, firmly adhered by the juxtaposition of the chorionic villi to the maternal caruncles, which, under normal conditions, should be expelled spontaneously between three and eight, at most 12 hours after delivery (JONES et al., 2000; NOBRE, 2012; TONIOLLO; SILVA, 2010; CHRISTENSEN et al., 2009; NASCIMENTO; SANTOS, 2011).

The mechanism for the occurrence of retained placenta has a multifactorial character, involving physiological, pathological, environmental, nutritional and animal-related factors, especially the flaws in maternal-fetal separation (JONES et al., 2000; NOBRE, 2012; NASCIMENTO; SANTOS, 2011). By detecting the predisposing factors, it is possible to identify the presence of associated diseases, which together, lead to losses in the dairy activity. Among these diseases, there are those that cause abortion in the final third-period of gestation, such as brucellosis and leptospirosis, which are zoonoses, and those affecting the middle third-period of gestation, such as neosporosis (CHRISTENSEN et al., 2009; NOBRE, 2010).
The understanding and identification of the risk factors involved in the occurrence of retained placenta in the southwest region of Paraná State will allow the establishment of effective control measures, causing its reduction. It should also improve reproductive rates, and consequently increase the profitability of the dairy activity (JONES et al., 2000; NOBRE, 2010; NASCIMENTO; SANTOS, 2011).

In this sense, the aim of this study is to assess the risk factors in the occurrence of retained placenta in cows from family agriculture herds in four cities in the southwest Paraná.

2. MATERIALS AND METHODS

The study was carried out in 25 dairy herds in family agriculture properties under semi-intensive management, located in the cities of Nova Prata do Iguaçu, Nova Esperança do Sudoeste, Realeza and Salto do Lontra, in the southwestern region of Paraná State. The southwestern mesoregion of Paraná is characterized by a humid subtropical climate and an average temperature of 19°C. The cities are located in latitude (25°37'57" to 25°54'26" S) and longitude (53°15'45"to 53°31'57" W), with altitude ranging from 438 to 538 meters.

In this study, 607 calvings were observed, considering as a diagnosis of placenta retention if the fetal membranes remained in the uterus 12 hours after calving.

The risk factors involved in the occurrence of retained placenta were assessed through the application of a semi-structured questionnaire containing data from the animal and the property, answered by the dairy producer in all cases of the occurrence of the disease.

The risk factors evaluated for placenta retention were in relation to the cow (milk production, body condition score - ECC, pre-partum dietary supplementation and previous occurrence), the parturition (duration of gestation, eutocic or distocic delivery, and birth conditions), the calf (number, gender and size) and the clinical health conditions of the affected animals (rectal temperature, appetite, concomitant diseases and seropositivity for brucellosis, leptospirosis and neosporosis).

The ECC of the animals studied was grouped, considering lean cows those presenting ECC 1.0 to 2.5, cows in proper body conditions those with ECC 3.0 to 3.5, and fat, those cows with ECC 4.0 to 5.0 (EDMONSON et al., 1989).

The size evaluation of the calves was based on the classification by Nutron (2012). For the Holstein, Brown Swiss and Zebu breeds, calves were considered large, medium and small if presenting above 43 kg, 32-43 kg and less than 32 kg, respectively. Jersey calves were considered large if greater than 30 kg, medium those between 25-30 kg, and small those with less than 25 kg.

Concerning the seropositivity for brucellosis, leptospirosis and neosporosis, the cows affected by placenta retention were submitted to blood collection by tail vein puncture, with prior antisepsis,
using disposable needles and siliconized vacuum tubes without anticoagulant. Blood was collected from 15 to 45 days after calving, thus avoiding the occurrence of false-negative results arising from the immune deficiency observed in the transition period. After collection, the blood was centrifuged (200rpm), and the serum stored in three aliquots, previously identified and frozen.

The serological examination for brucellosis was performed by the screening technique of buffered, acidified plate antigen (BAPA), (BRASIL, 2006), at an accredited private veterinary lab. The screening for leptospirosis was performed at the Department of Veterinary Preventive Medicine and Animal Husbandry at UNESP, Jaboticabal-SP Campus, through microscopic sero-agglutination technique (MSAT). The serology for Neosporacaninum was developed at IMUNODOT (Desenvolvimento, Indústria e Comércio de Imunógenos e Produção de Diagnósticos Veterinários Ltda.) in Jaboticabal-SP, through indirect immunofluorescence technique (IFA), where positive animals were diagnosed with titers equal to or greater than 1:200.

The collected data were tabulated and submitted to descriptive statistical analysis in order to identify the main risk factors involved in the occurrence of retained placenta. The average values were tested by the statistical program IBM SPSS 20.0® by means of descriptive analysis of frequency.

3. RESULTS

From the 607 animals calving during the study period, from 25 family agriculture properties, 89 cows presented retained placenta, with an average prevalence of 14.66% (89/607) of retained placenta in the animals studied, observing the variation among the studied agriculture properties (16.8 ± 10.63).

Among the studied cows, 50.6% (45/89) received commercial mineral salt exclusively during pre-partum, 31.5% (28/89) received no supplementation and 18% (16/89) received commercial mineral salt for lactating cows.

Under the conditions of this study, 59.6% (53/89) of the cows affected by the retained placenta presented adequate body condition, 20.2% (18/89) were lean and 20.2% (18/89) were fat, thus decreasing the likelihood of ECC interference in the studied prevalence. Of the calvings studied, 19.1% (17/89) were dystocic and 80.9% (72/89) were normal. The occurrence of fever was observed in 44.9% (40/89) of the cows with retained placenta included in this study.

From the 89 cows with retained placenta, 94.38% (84/89) were examined for reproductive diseases, whereas the remaining 5.62% (5/89) were led to death. A total of 50.0% (42/84) of the cows presented negative results for brucellosis, leptospirosis and neosporosis, 34.52% (29/84) were positive for leptospirosis, 10.71% (9/84) positive for neosporosis, and 4.76% (4/84) positive for both
leptospirosis and neosporosis. In this study, 15.5% (13/89) of the cows were diagnosed with neosporosis, with 4.8% (4/89) of them also positive for leptospirosis.

4. DISCUSSION

Animals with higher milk production seem to be more susceptible to retained placenta when compared to animals of low production (CORASSIN et al., 2011). The susceptibility previously described has also been observed in this study, since 78.7% (70/89) of the cows affected by retained placenta were of medium or high production for the region (16 and over 25 liters/day, respectively), and only 21.3% (19/89) were of low production (up to 15 liters/day). Likewise, Borges (2012) reported that retained placenta affects animals with different classes of milk production, being prevalent in high and medium production cows (82%), similar to the data found in this study.

ECC influences significantly in the occurrence of retention of placenta in bovine milk, to suggest that pre-delivery ECC should be between 3.5 and 4, aiming to reduce the incidence of this disease (CARVALHO et al., 2019). Nobre et al., (2012) verified an increased incidence of retained placenta in animals with ECC 2.0 and 2.5, relating the occurrence of the disease with the weakness of the immune system, and the consequent increased susceptibility to the disease. Overweight animals have a higher likelihood of metabolic disorders (NOBRE et al., 2012). Similarly, cows with ECC equal to or greater than 4.0 are generally more susceptible to retained placenta and other disorders (CORASSIN et al., 2009).

An anionic diet with selenium helps reduce the occurrence of retained placenta (GREGHI et al., 2014). Sufficient quantities of pre-partum mineral (5 mg/day selenium), preferably associated with vitamin E, help improve the immune response mediated by lymphocytes B and T and mainly neutrophils, responsible for phagocytosis and for degrading the placentomes in order to promote the placenta release (NOBRE, 2010). Although the composition of mineral and vitamin supplementation can relate to retained placenta, individual consumption data were not observed in this study.

Jovanovic et al. (2013) reported that selenium deficiency relates to the occurrence of retained placenta, because it is an important antioxidant mineral in the removal of free peroxides, which decrease the cell elasticity and permeability. However, in none of the studied properties had the cows with retained placenta received specific selenium supplementation. Associated with that, it can be observed that 31.46% (28/89) of the cows received no kind of mineral supplementation, which possibly favored the occurrence of retained placenta by immunosuppression due to mineral deficiency (LAVEN; PETERS, 1996).

From the 89 affected cows, 6.7% (6/89) presented retained placenta in previous births. Borges (2012) and Joosten et al. (1991) emphasized that animals that have had retained placenta in one birth
have 50% more chances of presenting placental retention in their following birth, with such chance increasing six-fold after two consecutive deliveries with retained placenta (JOOSTEN et al. 1987). Thus, retained placenta can reoccur in the same individual or their descendants (CAMARGOS et al., 2013).

The shortening of the gestation period (pregnancy with less than 270 days) observed in 21.3% (19/89) of the cows with retained placenta relates to the immaturity of the placentomes, since the maturation process is essential to the release of the placenta (JOOSTEN et al., 1991; NASCIMENTO; SANTOS, 2011; NOBRE et al., 2012). Similar data were reported by Borges (2012), where 22% of the cows had shorter gestation. Failure in the separation of placenta is associated with the occurrence of abortions (CAMARGO et al., 2013), which was observed in 7.9% (7/89) of the animals studied. From 285 days of gestation, animals tend to have a higher incidence of retained placenta (BORGES, 2012), which could be observed in 78.7% (70/89) of the animals in this study, for animals presenting a normal gestation period (270 to 300 days).

Dystocic labors, resolved through the traction of the calves, favor the increase in the incidence of retained placenta, where the manipulation of the calves in assisted deliveries increase chorionic villi local edemas, maintaining strong placental adhesion (NOBRE et al., 2012). Similarly, assisted deliveries cause pain and stress, with the release of cortisol, endorphins and catecholamines resulting in decreased uterine contractility, and in some cases even the exhaustion of the animal, with weakening of miometriais contractions, making the expulsion of the placenta difficult (SANTOS, 2010). However, Borges (2012) found no association between the type of labor and the occurrence of retained placenta.

The occurrence of 4.5% (4/89) of twin births in this study has possibly contributed to the average prevalence of 16.8% (89/607) of retained placenta in the studied herds. Nobre (2010) showed that from 48 cows that calved twins, 52.1% (25/48) of them had retained placenta, showing the influence of this factor in the occurrence of this disease. In twin births, the retained placenta can be a consequence of the decrease in the gestation period (CAMARGOS et al., 2013; NOBRE et al., 2012) or more animal stress and increased local edema due to possible dystocia, damaging the maternal-fetal separation (NOBRE, 2010; MARTINS et al., 2013).

From the studied calvings, 57.3% (51/89) were male, which tend to have greater weight than female, predisposing greater occurrence of dystocia (JOOSTEN et al., 1987; REZENDE et al., 2013), extended gestation and dystocic labors (BORGES, 2012) predisposing the occurrence of retained placenta. Gaafar et al. (2010), in a similar study, reported that the fetal testicular hormone can partially contribute to the occurrence of retained placenta. However, the gender of the calf is considered
controversial as to the effect on the incidence of placental retention (JOOSTEN et al., 1991; NOBRE et al., 2012).

Gaafar et al. (2010) reported that the incidence of retained placenta significantly increases with the weight of the born calves, possibly due to a greater pressure of the fetus on the placenta, resulting in a stronger fixation of the cotyledon on the caruncle. In this study, it was observed that from the born calves, 20.43% (19/93) were considered large in size, which possibly contributed to the prevalence of retained placenta in the herds studied (16.8%; 89/607), because the other 53.76% (50/93) were considered medium and 22.5% (20/93) were considered small-sized calves.

A higher incidence of retained placenta is also associated to the occurrence of miscarriage, stillbirth and calves born dead, which altogether in this study represented 15.8% (14/89) of retained placenta, lower than 20.95% (53/253) of the cases arising from miscarriages and stillbirths described by Nobre (2010). Here, 84.3% (75/89) of the calves were born alive, 7.9% (7/89) were aborted, 4.5% (4/89) were stillbirths and 3.4% (3/89) were born dead.

Up to 24 hours of post-partum, the cows with retained placenta may not present any other clinical signs (BORGES, 2012), but from this point on, there is an increase in rectal temperature that can persist for up to 10 days (DRILICH et al., 2006; BURFEIND et al., 2014). The occurrence of fever can be associated with concomitant diseases and/or can signal a progression of inflammatory process with an evolution to endometritis (TRAJANO, 2013). Santos (2010) mention that 50-80% of the cows with retained placenta not treated with antibiotics present at least one day of fever in the first two weeks after calving.

Another change observed in the animals with retained placenta is the decrease of up to 60% in appetite, indicating systemic impairment of the animal (BORGES, 2012). Laven e Peters (1996) reported that 55 to 65% of the cows with retained placenta present a reduction in appetite. Similar data were found in this study, where 41.6% (37/89) of the cows with retained placenta showed appetite reduction. Laven e Peters (1996) consider retained placenta after 24 hours of delivery, thereby increasing the time for the appearance of systemic signs, whose observation of fever and loss of appetite is fundamental to establish therapeutic measures (SANTOS, 2010).

Since retained placenta is a multifactorial syndrome, concomitant diseases relate to their occurrence, or predispose to complications in other organs due to the production of endotoxins (BORGES, 2012). Borges (2012) reported that 50% of the animals affected by placenta retention presented clinical signs of other diseases, being 26% metritis, 22% displaced abomasum, 14% mastitis, 14% hypocalcemia, 10% ketosis and 14% laminitis. Except for the occurrence of laminitis, in this study the cows that had retained placenta, also presented the following diseases: 33.3% (8/89) mastitis, 16.7% (4/89) displaced abomasum, 16.6% (4/89) other diseases (parasitic sadness,
pneumonia and bloat), 12.5% (3/89) udder edema, 12.5% (3/89) uterine infection, 4.2% (1/89) hypocalcemia and 4.2% (1/89) ketosis, corroborating with the findings of Borges (2012).

Diseases with reproductive importance, such as brucellosis, leptospirosis and neosporosis, may predispose to the increased incidence of retained placenta, as well as causing major economic losses. Furthermore, some of them, such as leptospirosis and brucellosis, since they are considered zoonoses, and are defined as a public health issue when detected (CHRISTENSEN et al., 2009). In this sense, the importance of detecting these diseases in dairy herds is emphasized, since half of the examined animals had been positive for neosporosis and/or leptospirosis.

All of the 89 cows studied in this paper were negative for brucellosis. This result possibly relates to the mandatory controlling measures, through vaccination and periodical inspections with the elimination of positive animals (BRAZIL, 2006). Although the brucellosis control program is running since 2006, Viana et al. (2009) reported 3.5% of occurrence of this disease in their study.

Leptospirosis, diagnosed in 41.67% (35/84) of the cows with retained placenta in this study, is considered one of the major diseases causing abortion and retained placenta (MAGAJEVSKI et al., 2007). Magajevski et al. (2007) reported a 45.7% prevalence of leptospirosis in a similar study.

It is possible that the high occurrence of leptospirosis found in this study, higher than any of the other diseases, can be considered a relevant factor to the average prevalence of retained placenta found in the herds studied (16.8%). Additionally, the fact that all animals studied were fed in troughs should be considered, since it can promote the proliferation of rodents, a risk factor for leptospirosis.

Langoni et al. (2013) in a study in the southwestern region of Paraná reported the prevalence of 24% neosporosis, with no noted association with retained placenta, suggesting that the occurrence of neosporosis is not the main factor involved with retained placenta, although it could promote it.

Under the conditions of this study, involving the calving of 607 dairy herd cows from family agriculture, in the southwestern region of Paraná, it can be concluded that a determining factor has not been identified for the occurrence of retained placenta, reaffirming the multifactorial nature of such disease.

Conflict of interest statement: The authors have no competing interests.

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