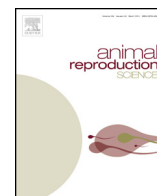




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Early post-partum hematological changes in Holstein dairy cows with retained placenta



Pierangelo Moretti^{a,b}, Monica Probo^b, Nicola Morandi^{b,d}, Erminio Trevisi^c, Annarita Ferrari^c, Andrea Minuti^c, Monica Venturini^b, Saverio Paltrinieri^{a,b,*}, Alessia Giordano^{a,b}

^a Department of Veterinary Science and Public Health, University of Milan, via Celoria 10, 20133 Milan, Italy

^b Central Laboratory, Veterinary Teaching Hospital, University of Milan, via dell'Università 6, 26900 Lodi, Italy

^c Institute of Zootechnics, Faculty of Agriculture, Università Cattolica del Sacro Cuore, via Emilia Parmense 84, 29122 Piacenza, Italy

^d Parco Tecnologico Padano, via Einstein, Loc. Cascina Codazza, 26900 Lodi, Italy

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ABSTRACT

Retained placenta (RP) occurs frequently in dairy cattle but little is known about the pathogenic or prognostic role of the hematological changes in this disease. This retrospective study was designed to investigate the hematological changes associated with RP in the immediate post-partum period and to assess whether these changes are associated with an acute phase reaction. Data concerning hematology, acute phase proteins, markers of inflammation and serum biochemistry performed on cows at 3 ± 1 days in milk (DIM) from two intensive farms were extracted from the database of the ProZoo project, a research project aimed to investigate the relationship between genomic traits and bovine health and production. After application of restrictive inclusion criteria, data from 45 cows, 22 with RP and 23 controls, were statistically compared. RBC count, d-ROMs concentration, and AST activity were significantly higher in the RP group than controls. Conversely, neutrophils, thiol groups, and serum zinc concentration were significantly lower in the RP group than controls. In conclusion, although retained placenta has to be considered as a syndrome with multifactorial causes, neutropenia may be a co-factor involved in its pathogenesis. Further studies are needed to clarify whether neutropenia acts as a contributor in the pathogenesis of RP or if it is a very early consequence of the syndrome, preceding any other inflammatory changes in blood.

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1. Introduction

Retention of fetal membranes or retained placenta (RP) occurs frequently in high-yielding dairy cows and has been

proven to cause negative effects on reproductive performances (Kelton et al., 1998). A worldwide survey by Kelton et al. (1998) estimates an incidence of between 1.3% and 39.2% with a median of 8.6%. These results agree with those obtained by a preliminary study on Italian herds (Bolla and Fantini, 2003).

Retained placenta is defined as fetal membranes not expelled after parturition. The time interval to classify a cow as affected by RP varies with different studies (Fourichon et al., 2000). Membranes can be retained for

* Corresponding author at: Department of Veterinary Science and Public Health, University of Milan, via Celoria 10, 20133 Milan, Italy. Tel.: +39 02 50318103; fax: +39 02 50318095.

E-mail address: saverio.paltrinieri@unimi.it (S. Paltrinieri).

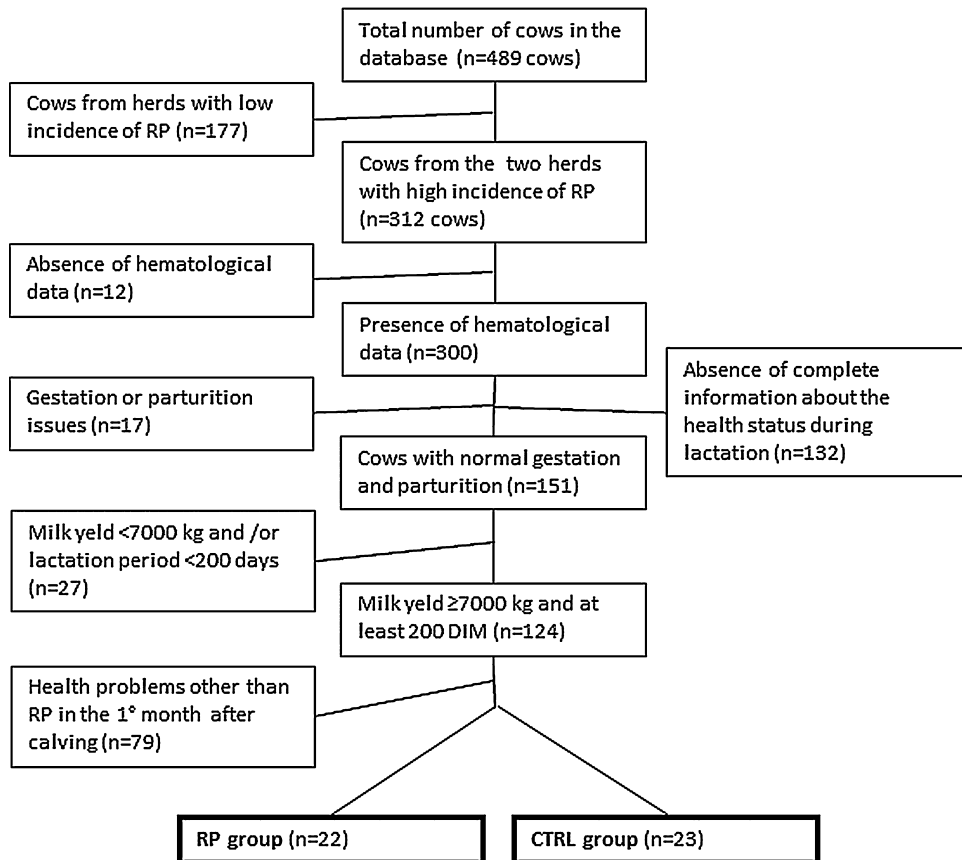


Fig. 1. Flowchart summarizing the results of the retrospective search in the database and the final composition of the study group.

7 days or more if a treatment is not administered (Paisley et al., 1986). This condition causes huge economic losses since it predisposes to a variety of reproductive and productive problems (Laven and Peters, 1996; Trevisi et al., 2008; Dubuc et al., 2010).

Although there are many studies concerning RP in cows, its pathogenesis is still not well understood (Schlafer et al., 2000; Boos et al., 2003). Pregnancy maintenance requires suppression of the immune response in order to avoid rejection of the fetal-placental unit and RP might result from a failure in switching off these immune-protective mechanisms.

In the last few years the understanding of the role of the innate immune system in the pathogenesis of reproductive diseases which occur in the transition period has been improved (Cai et al., 1994; Kimura et al., 2002; Hammon et al., 2006; Bertoni et al., 2008). The increasing number and activity of endometrial leucocytes appears to play an important role in placental detachment and neutrophil dysfunction may be involved in RP. It has been observed that leukocytes from cows with RP show, around the time of parturition, decreased chemotaxis (Gunnink, 1984a,b,c,d) and decreased phagocytic activity (Kimura et al., 2002). Moreover, leukocytes of cows with hyperketonemia, a condition frequently associated with RP, have a lower phagocytic activity, decreased cytokine production and chemotactic activity (Scalia et al., 2006).

Changes in clinical biochemistry associated with RP have also been described. Compared to healthy cows, cows with RP have higher serum concentration of non-esterified fatty acids (NEFA) and D-3-hydroxybutyrate (BHBA), lower serum concentration of vitamin E and calcium (Seifi et al., 2007). Inflammatory changes occurring after RP were described by Trevisi et al. (2008); cows with RP having lower concentrations of albumin (a negative acute phase protein) whilst the serum concentration of typical inflammatory markers (haptoglobin and ceruloplasmin) were similar to those of cows that normally expelled fetal membranes. Conversely, little is known about hematological changes occurring soon after parturition in affected cows. Therefore this retrospective study was designed to investigate the hematological changes associated with RP in the immediate post-partum period and to assess whether hematological changes are associated with an acute phase reaction, in order to provide additional insights on the pathogenesis of this condition.

2. Material and methods

2.1. Retrospective analysis of the database

This study started with a retrospective search of data recorded in the database of the ProZoo project, a research project aimed to investigate the relationship between

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