

# Risk Factors and Impacts of Retained Placenta and Metritis in Dairy Cows

**J. Dubuc**<sup>1</sup>, *DMV, MSc, DVSc*; **T.F. Duffield**<sup>1</sup>, *DVM, DVSc*; **K.E. Leslie**<sup>1</sup>, *DVM, MSc*; **J.S. Walton**<sup>2</sup>, *PhD*; **S.J. LeBlanc**<sup>1</sup>, *DVM, DVSc*

<sup>1</sup>*Department of Population Medicine, University of Guelph, Guelph, ON, Canada N1G 2W1*

<sup>2</sup>*Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada N1G 2W1*

## Introduction

Retained placenta (RP) is a condition associated with aspects of immune function during the prepartum period. Retained placenta has been shown to be a risk factor for uterine diseases and for reduced reproductive performance. Metritis is a condition causing systemic signs of illness (fever, anorexia, decreased milk production) characterized by a foul-smelling, brown-red watery vaginal discharge, occurring within the first 20 days-in-milk (DIM). Metritis has been associated with risk factors thought to contribute to greater uterine bacterial contamination, such as dystocia and RP. Conflicting data are reported on the impacts of RP and metritis on milk production, reproduction, and culling. In particular, many studies have considered RP and metritis in isolation, and have used only short-term outcomes. The objective of this study was to investigate risk factors and impacts of RP and metritis in postpartum dairy cows.

## Materials and Methods

A total of 2,178 Holstein cows from six commercial herds were enrolled in an observational study. Blood samples were collected from cows weekly, from one week before calving until three weeks after, and were analyzed for non-esterified fatty acids (NEFA), beta-hydroxybutyric acid (BHBA), and haptoglobin (HAPTO). Samples were only considered for analysis when collected prior to the diagnosis of metritis. Periparturient diseases were diagnosed by farm managers using standardized disease definitions. Periparturient disease data were collected until 63 DIM. Diagnosis of metritis was based on a foul-smelling, brown-red watery vaginal discharge with systemic signs of illness, occurring within the first 20 DIM. Retained placenta was defined as retention of fetal membranes for greater than 12 hours. Milk production, reproduction, and culling data were collected until at least 300 DIM. Statistical analyses were conducted in SAS with models accounting for the effect of herd clustering.

## Results

The incidence of RP and metritis were 12% and 18%, respectively. Among cows with RP, 32% developed metritis. Risk factors for RP included increased NEFA in prepartum period ( $\geq 0.6$  mmol/L; OR=2.4;  $P<0.01$ ). Risk factors for metritis included increased NEFA in prepartum period ( $\geq 0.6$  mmol/L; OR=1.6;  $P=0.02$ ), dystocia (OR=2.1;  $P<0.01$ ), RP (OR=6.3;  $P<0.01$ ), and increased HAPTO in first week postpartum ( $\geq 0.8$  g/L; OR=2.2;  $P<0.01$ ). Retained placenta and metritis were associated with a reduction in milk production in multiparous cows of 1,657 lb (753 kg;  $P<0.01$ ) and 570 lb (259 kg;  $P=0.02$ ) per lactation (305 days), respectively. The effects of RP and metritis on milk production were additive. Milk production in primiparous cows was unaffected by RP or metritis. Retained placenta and metritis were individually associated with a decrease in first service pregnancy risk (No RP: 34.7%, RP: 29.2%,  $P=0.04$ ; No metritis: 35.4%, metritis: 27.2%,  $P=0.02$ ) in univariable statistical analyses. However, RP and metritis had no effect on subsequent reproductive performance (first service pregnancy risk and time to pregnancy), when accounting for endometritis, parity, and milk production level. Culling risk at 63 DIM was influenced by RP (No RP: 6.4%, RP: 9.5%,  $P=0.03$ ) in univariable analyses, but not by metritis (No metritis: 6.9%, metritis: 7.2,  $P=0.79$ ). However, RP and metritis had no effect on culling risk at 63 DIM and time to culling (up to 300 DIM), when accounting for milk production level.

## Significance

These data demonstrate that metabolic imbalances precede and increase the risk of metritis, beyond the expected risk factors of dystocia and RP. These data show additive detrimental impacts of RP and metritis on milk production. The effects of RP and metritis on reproduction and culling appear to depend on whether cows go on to have endometritis or become pregnant, respectively.