

ASSOCIATIONS BETWEEN CLINICAL MASTITIS AND PREGNANCY ON ONTARIO DAIRY FARMS

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Introduction

Efficient reproductive performance is an integral component of the production management system on all dairy farms. Reproductive efficiency in dairy cattle is perceived to be on the decline, partially due to the shift towards higher production per animal. However, there are several other factors that have been shown to affect reproductive performance. These include, but are not limited to, the interval to first ovulation, the presence of a corpus luteum, circulating hormones, follicular growth, estrus expression, ovarian disease, early embryonic development and sperm and oocyte health (6). However there is mounting evidence of an association between clinical mastitis and reproductive performance (1-5,7,8,10). It appears that the pathophysiologic events that follow clinical intramammary infection often involve the release of inflammatory mediators that can have negative effects on luteal function, levels of circulating progesterone and maintenance of early pregnancy (3). These effects are largely associated with the endotoxin release in clinical coliform mastitis. A mastitis event at or shortly after breeding may have a negative impact on the establishment and/or maintenance of pregnancy through either the hypothalamo-pituitary-ovarian axis, the uterine-ovarian axis or a nutritional effect on hormone levels (4,5).

In the early 1990's, studies of coliform mastitis in California revealed that cows with clinical mastitis had altered breeding intervals and reduced reproductive performance (2,7). More recent studies have added further evidence to the case for an association between intramammary infections and reduced reproductive performance (1,8,9,10). It has recently been shown that cows with subclinical or clinical mastitis before first service had increased days to first service, days open and services per conception as compared to controls. There is also evidence to suggest that subclinical mastitis may have as much of a detrimental reproductive effect as clinical mastitis (10). The strength and mechanism of a causal relationship has yet to be defined. The objective of this study, using a large population of dairy cows in Ontario, was to determine if cows that experience a clinical mastitis event within 30 days after breeding have a lower conception rate than cows not experiencing a clinical mastitis event.

Materials and Methods

Breeding and clinical mastitis treatment data collected from 57 Ontario dairy farms over a two year period were used. This included 4,555 breedings, of which 48% were first services, 25% were second services and 13% were third services. The overall conception rate for these breedings was 45%. Approximately 10% of the cows in these herds experienced a clinical mastitis event within 30 days following breeding. Each of these clinical mastitis events was of

sufficient severity to warrant treatment by the producer or herd veterinarian. Milk culture data from these clinical cases were not available.

The data were analyzed using a generalized linear model for a binomial distribution, using the logit link and an unstructured correlation structure. The outcome of interest was whether each breeding resulted in a pregnancy, or not, as determined by per-rectum examination of the cow by a veterinarian at least 35 days after breeding. The event of primary interest was a clinical mastitis event within 30 days after breeding. Herd and cow-within-herd were treated as random effects, while service number and DIM at breeding were included as fixed effect covariates.

Results and Discussion

While cows without a mastitis event within 30 days after breeding had a conception rate of 46%, those with a recorded mastitis event within 30 days of breeding had a conception rate of 38%. Conception rates for first, second and third-and-greater services are presented in Table 1. It is noteworthy that the greatest difference in conception rate occurred at first service, with 47% success for cows without a mastitis event versus 31% for cows with a mastitis event.

Table 1. Conception rate by service number for cows with and without a clinical mastitis event in the 30 days following insemination.

| Mastitis Case | Service Number | | | |
|---------------|-------------------|------------------|--------------------|--------------------|
| | 1 | 2 | 3+ | Overall |
| Yes | 31% (42/137) | 42% (25/60) | 41% (96/237) | 38% (163/434) |
| No | 47% (549/1172) | 45% (286/632) | 45% (1040/2317) | 46% (1875/4121) |

Results of the final analysis indicate that after controlling for day-in-milk at breeding, service number, herd and cow effects, cows without a clinical mastitis event within 30 days after breeding were 1.4 times as likely to be found pregnant at rectal pregnancy examination performed between 35 and 60 days after insemination.

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