Incidence risk of clinical mastitis in eight commercial dairy herds in central New York

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Introduction

The frequency and etiological profile of clinical mastitis (CM) may differ considerably between dairy herds from different countries and even between herds within a given country (Olde Riekerink et al, 2008). Therefore, descriptive results of epidemiological studies characterizing CM can provide information that can be used as a basis for development of targeted strategies of control and prevention. Although several studies have reported the association between pathogen and CM, few have prospectively monitored the frequency and etiology of CM on farms for an extended time. The objective of this study is to describe pathogen distribution and incidence risk of CM in 8 large New York dairy herds during 1 year.

Materials and Methods

Eight commercial dairy farms milking between 1100 and 1900 cows were monitored for CM occurrence during a period of 12 months between May 2016 and May 2017. All herds were located in Central New York and were enrolled in the daily milk sample pick-up and 24-hour result program of Quality Milk Production Services at Cornell University, in Ithaca, NY. Cases of CM were identified at the quarter-level through fore-stripping by trained farm personnel and it was defined as a quarter with abnormal milk. Milk samples were collected on-farm from every cow with visible signs of CM. The cow's ID and affected quarter were recorded in on-farm software and the collected milk sample was stored in the farm refrigerator ($\cong 4°C$) until the laboratory courier picked them up within 24 hours. Refrigerated milk samples were submitted for aerobic culture following National Mastitis Council guidelines (NMC, 1999). Samples with monoculture growth were also evaluated with matrix-assisted laser desorption/ionization time of flight technology (MALDI-TOF) for species identification. A case was considered new if there was at least 14 d between a previously diagnosed case and current case in the same quarter or a different pathogen was identified. The incidence risk at cow level and at the quarter level within herds was calculated monthly and yearly as the number of CM cases divided by the number of cows at risk and by the number of quarters at risk. Cow level data was collected and stored in Dairy Comp 305 (Ag Valley Software), laboratory results were stored in Excel (Microsoft Corp; Redmond, WA), and descriptive statistical analysis was performed with SAS v. 9.4 (SAS Institute Inc., Cary, NC, USA).

Results

A total of 7,513 clinical cases were recorded over the period of evaluation; of which 30% were negative, 30.9% gram-positive, 25.4% gram-negative, 5.1% mixed culture (2 morphologically different organisms isolated in the same sample), 6.6% other non-bacterial microorganisms (e.g., yeast and *Prototheca* spp), and 1.7% contaminated. *Escherichia coli* was the most prevalent pathogen (17.9%), followed by *Streptococcus uberis* (9.9%), *Streptococcus dysgalactiae* (8.7%), *Klebsiella* spp (6.7%), and *Staphylococcus aureus* (3.1%). The cow-level overall mean incidence risk of clinical mastitis over the study period was 4.8%, while the median was 5.1% (ranging from 1.2 to 7.5%). The overall monthly mean and median incidence risk were 5.17 and 5.12 (ranging from 1.3 to 8.4%), respectively. At the quarter level, the overall mean and median estimated incidence risk over the study period were 1.2% and 1.3%, ranging from 0.3 to 1.9%.

Significance

The variation observed in CM incidence observed between farms is affected by several factors including mastitis control and prevention programs, housing, and management conditions. Negative culture results, followed by environmental pathogens (gram-positive and gram-negative) were the most frequent culture results in these CM cases. This data serves as a baseline for the next stage in this study, which is to evaluate the effects of bedding practices and look for the association between these practices and CM risk.