discharge ($p<0.05$) or 60 days later ($p<0.03$). The presence of peritonitis and/or a perforated abomasum at surgery was significantly associated with failure to discharge the cow from the hospital ($p<0.02$). The time elapsed since the cow had been toggled to our initial evaluation was longer in cows surviving 60 days post-operatively ($p=0.05$). Cows treated with continuous intravenous fluids were more likely to die ($p=0.001$), whereas treatment with penicillin or oxytetracycline was associated with discharge from the hospital ($p<0.05$).

Only 40% of cows that had been toggled and then had a right ventral paramedian abomasopexy or right flank pyloropexy survived 60 days post-operatively. Cows with evidence of a systemic disturbance (tachycardia and dehydration) requiring intravenous fluids are less likely to survive. Ultrasound and belly tap was not routinely performed in our patients, but they may help determine the prognosis for surgical correction.

Risk Factors for Intramammary Infection at First Calving in Ontario Dairy Heifers

L. Bassel, *MSc*[1]; **D. Kelton,** *DVM, PhD*[1]; **A. Godkin,** *DVM, DVSc*[2]; **K. Leslie,** *DVM, MSc*[1]; **K. Lissemore,** *DVM, DVSc*[1]

[1]*University of Guelph, Guelph, Ontario, Canada*

[2]*Ontario Ministry of Agriculture, Food and Rural Affairs, Ontario, Canada*

Introduction

It has been established that a significant number of heifers are infected prior to, and at calving, with both minor and major mastitis pathogens. Ontario is no exception, and has a significant proportion of heifers calving with quarters infected with mastitis pathogens including *Staphylococcus aureus*, coliform bacteria, environmental streptococci and coagulase-negative staphylococci. Because of the negative impact such infections may have on future milk production and udder health, it is important to identify risk factors for these intramammary infections (IMI) so that attempts can be made to control them. It is particularly important to investigate risk factors for *S. aureus* IMI, since infected heifers must experience a mode of transmission other than spread at milking time.

Materials and Methods

From July 1997 to December 1998, a group of 60 dairy producers participated in the Sentinel Herd Project. Composite milk samples were collected from all heifers calving during the study period, within three days post-calving. These samples were cultured using standard bacteriological methods. Based on the results of the milk cultures, heifers were classified as infected with *S. aureus* or not, and infected with environmental pathogens (environmental streptococci or coliform bacteria) or not. Additionally, cow level data such as breed and age at calving were obtained from the Ontario Dairy Herd Improvement Corporation. Farm-specific management practices were determined by administering a survey to herd owners/managers. Two separate backwards elimination, multivariable logistic regression analyses were performed to identify whether there were cow or herd-level factors associated with the risk of calving with an IMI caused by *S. aureus* or environmental pathogens.

Results and Conclusions

The results of this study indicate that increased age at calving is a significant risk factor for both *S. aureus* IMI and environmental pathogen IMI. The risk of *S. aureus* IMI at calving is also affected by the amount of time heifers spend housed with adult cows, and the number of *S. aureus*-positive cows in the herd during the period prior to calving. It is likely that the *S. aureus*-infected udders of adult cows represent the most impor-

tant source of *S. aureus* for heifers. It is also apparent that contact with adult animals increases the risk of heifers calving with an IMI due to *S. aureus*. Application of teat dip to the udder of heifers prior to calving was associated with a decreased risk of calving with an infection caused by environmental pathogens. The significance of this observation is not clear. It is possible that application of teat dip prior to calving was a surrogate measure of a farmer's attention to detail. An individual willing to spend time dipping teats may also maintain a cleaner calving environment.

In this retrospective study, there was no good measure of environmental cleanliness and animal density, factors known to contribute to environmental pathogen IMI in lactating cows. Therefore, it was not possible to assess the contribution of these factors to the risk of heifers calving with IMI due to environmental organisms. Further investigation may be warranted to determine whether prepartum teat dipping of heifers is an effective way of minimizing IMI due to environmental pathogens.

Use of a Cow-side Antibiotic Susceptibility Test to Predict Gram Staining Characteristics of Clinical Mastitis Pathogens of Dairy Cattle

J. Wenz, *DVM, MS;* **R. Elia,** *DVM;* **S. Lawson,** *BS;* **F. Garry** *DVM, MS*
Integrated Livestock Management, Dept. of Clinical Science, Colorado State University, Ft. Collins, CO 80253

Introduction

Gram-staining characteristics of mastitis pathogens are an important consideration when developing mastitis treatment protocols. Rapid identification of clinical episodes due to gram-negative pathogens could reduce the use of intramammary mastitis (IMM) treatments with poor efficacy, while ensuring treatment of environmental streptococci infections. The objective of this study was to determine if the MASTiK® cow-side antibiotic susceptibility test could be used to predict whether a clinical mastitis episode was caused by a gram-negative pathogen, based on the susceptibility pattern obtained from the test, with the assumption that gram-negative clinical mastitis would not be treated with intramammary antibiotics.

Materials and Methods

Two milk samples were collected from the affected quarter of cows with clinical mastitis. One sample was submitted to a diagnostic laboratory for bacterial culture and the other was tested with the MASTiK® test. Briefly, 1ml of the sample was added to a 3ml reagent vial (sterile milk and pH indicator) and incubated at 36°C (96.8°F) for 3 hours. From the preincubated sample, 50 µl were added to each of 32 wells in the test plate and incubated at 36°C (96.8° F) for 4-8 hr or until the positive control well turned positive (up to 24 hrs). MASTiK® determines susceptibility to erythromycin, oxacillin, ampicillin, penicillin, cephalothin, pirlimycin, oxytetracycline and sulfadimethoxine at varying concentrations. Wells were scored based on color change: purple indicated no bacterial growth (sensitive to the antibiotic at the given concentration), yellow indicated bacterial growth (resistant to the antibiotic at the given concentration) or intermediate. Samples were grouped based on bacteriologic culture results from the diagnostic lab as: gram-negative (GN), gram-positive (GP), mixed growth being a gram-negative and environmental streptococci (MX) or no growth (NG). Total number of resistant (yellow) wells was tallied for each sample. The sensitivity and specificity of the test for properly identifying a GN infection (GN and NG) was determined using various percent-resistant wells cutoffs. Samples with a high percentage of resistant wells were more likely to be GN, as 5 of 8 antibiotics tested have a poor GN spectrum.