

THIS ARTICLE IS SPONSORED BY THE
MINNESOTA DAIRY HEALTH CONFERENCE.



UNIVERSITY OF MINNESOTA

College of Veterinary Medicine

VETERINARY CONTINUING EDUCATION



ST. PAUL, MINNESOTA
UNITED STATES OF MINNESOTA

Ongoing Study: Use of an On-Farm Culture System for the Strategic Treatment of Clinical and Subclinical Intramammary Infections.

S. Godden¹, R. Bey¹, K. Leslie², R. Dingwell³, P. Ruegg⁴,
L. Timms⁵, P. Rapnicki¹, J. Fetrow¹, S. Stewart¹, R. Farnsworth¹

¹ University of Minnesota, ² University of Guelph

³ University of Prince Edward Island

⁴ University of Wisconsin at Madison

⁵ University of Iowa

Introduction

Despite continued progress in mastitis control research, clinical and subclinical mastitis remains the most costly infectious disease, and the most frequent cause of antibacterial use, on commercial dairy farms. As such, mastitis researchers must continue to develop and validate new management tools that will help reduce the health and economic impact of this disease, while at the same time promoting the judicious and strategic use of antimicrobials on dairy farms. The major goal of this multi-site multi-herd controlled field study is to validate the efficacy, and to quantify the cost-benefit, of incorporating on-farm culture systems into both clinical and subclinical mastitis monitoring and treatment programs.

Objectives

The major goal of the following proposal is to complete a 3-year multi-site multi-herd controlled field study designed to validate the efficacy, and to quantify the cost-benefit, of incorporating on-farm culture systems into both clinical and subclinical mastitis monitoring and treatment programs. The specific objectives outlined in this proposal are:

1. Evaluate the use of an on-farm culture system for strategic treatment of clinical mastitis.
2. Evaluate the use of an on-farm culture system for strategic treatment of subclinical mastitis in fresh cows.
3. Describe antimicrobial susceptibility patterns for subclinical and clinical mastitis pathogens, and describe the relationship between susceptibility test results and odds for a bacteriological cure following intramammary antimicrobial therapy.
4. Validation of an on-farm culture system (Minnesota Easy Culture System II).
5. Validation of the California Mastitis Test (CMT) for detection of subclinical mastitis in fresh cows.

Study Design

This multi-state project will be completed in 2005 and 2006, and involve over 3000 cows from commercial dairy farms in Minnesota, Iowa, Wisconsin, Ontario (Canada), and Prince Edward Island (Canada). Data to address the five project objectives (listed above)

will be generated from two separate studies. The first study will evaluate the use of an on-farm culture system for strategic treatment of clinical mastitis. The second study will evaluate the use of an on-farm culture system for detection and strategic treatment of subclinical mastitis in fresh cows.

Study 1. Evaluate the use of an on-farm culture system for strategic treatment of clinical mastitis.

Clinical mastitis cases caused by gram negative infections frequently cure themselves and do not require intramammary (IMM) antibiotic therapy (note: there is still some question as to the validity of this observation). Conversely, IMM antibiotic therapy is recommended for gram-positive mastitis infections. An on-farm culture system would allow producers to differentiate gram-positive from gram-negative infections, allowing for strategic treatment decisions and a significant reduction in antibiotic use on farm.

In this study cows detected with grade 1 or 2 clinical mastitis are eligible for enrollment (grade 3 cases requiring systemic therapy would not be eligible to enroll). Cows would be sampled for later bacteriological culture at the time of detection of clinical mastitis, and then randomly assigned to one of two treatment groups:

Positive Control Group: Cows are immediately treated with intramammary (IMM) antibiotics.

Treatment Group: Milk is cultured on-farm overnight using the Minnesota Easy Culture System. Infections showing gram-positive growth would be treated with IMM antibiotics. Infections showing gram-negative growth or no growth would not receive IMM antibiotic treatment.

A study technician would visit the farm once per week to collect enrollment records, frozen milk samples collected at enrollment, plus 14 and 21 day follow-up milk samples for bacterial culture. Outcomes to be compared between the two treatment groups would include days out of tank, clinical cure rate, bacteriological cure rate, DHIA milk yield, DHIA SCC, clinical mastitis relapse risk, and culling risk in the current lactation.

Study 2. Evaluate the use of an on-farm culture system for strategic treatment of subclinical mastitis in fresh cows.

It is well documented that cows freshening with subclinical mastitis infections will have elevated SCC during the lactation and are at significantly higher risk for clinical mastitis flare-ups. Early detection and treatment of subclinical infections at calving might prevent these costly problems.

In this study all cows that freshen with visibly normal milk (no clinical mastitis) would be screened using a CMT (California Mastitis Test) between 0-24 hours after calving. All quarters would also be sampled for later bacteriological culture at the mastitis lab.

Nothing further would be done with cows with a negative CMT result in all 4 quarters. However, for cows with a positive CMT result in 1 or more quarters, the cow would be randomly assigned to one of 3 treatment groups:

Negative Control Group: No treatment given. Nothing further done with cow.
Positive Control Group: All CMT-positive quarters treated immediately with (IMM) antibiotic.

Treated Group: All CMT-positive quarters are cultured overnight using on-farm culture system. Quarters showing gram-positive growth would be treated with IMM antibiotics. Quarters showing gram-negative growth or no growth would not receive IMM antibiotic treatment.

A study technician would visit the farm once per week to collect enrollment records, frozen milk samples collected at enrollment, plus 7 and 14 DIM milk samples for ketone testing, plus 14 and 21 DIM milk samples for bacterial culture. Outcomes to be compared among all treatment groups would include days out of tank, bacteriological cure rate, DHIA milk production, DHIA SCC, clinical mastitis risk, and culling risk in the current lactation.

Potential Benefits from Study

If proven efficacious and cost-effective, the adoption of on-farm culture as a management tool could promote more judicious and strategic antimicrobial use to treat subclinical and clinical mastitis cases. As relates to the first objective, culture-based treatment decisions could result in a significant reduction in antimicrobials used for treating clinical mastitis cases, a reduction in the risk for antimicrobial residues in milk, and a reduction in risk for the potential development of antimicrobial resistance in mastitis pathogens, all while maintaining treatment efficacy and preserving the future production potential of the cow. As relates to the second objective, screening and culture-based treatment decisions could allow for producers to identify and treat existing subclinical infections shortly after calving, thus preventing future health problems and economic losses such as clinical mastitis flare-ups, elevated SCC, reduced milk yield, and premature death or culling.

Financial support for this study is provided by:

The Minnesota Agricultural Experiment Station
Fort Dodge Animal Health, Inc.
Department of Veterinary Population Medicine, University of Minnesota
Department of Veterinary Biological Sciences, University of Minnesota