National Mastitis Council Newsletter

UDDER TOPICS

2015
Volume 38, No. 3

In This Issue

Future Meetings

NMC Regional Meeting
July 28-29, 2015
Syracuse, New York

NMC 55th Annual Meeting
January 31-February 2, 2016
Glendale, Arizona

NMC Regional Meeting Set for Syracuse, New York

Syracuse, New York will host the 2015 NMC Regional Meeting, July 28-29 at the Holiday Inn Syracuse/Liverpool in Syracuse, New York.

"The 2015 regional meeting is an event for anyone with an interest in milk quality," says Frank Welcome, the 2015 regional meeting program chair and senior extension veterinarian with Cornell University's Quality Milk Production Services. "The Empire State is not only a hub for education, technology and research, it's also home to an expansive dairy industry, making it a perfect location for our regional meeting."

The conference kicks off with **short courses** on **July 28**. Two of the short courses will be taught in Spanish. An evening reception is also planned for the first day. The second day (**July 29**) will feature the **general session** program.

A **post-conference tour** featuring four area dairy farms and a reception at a winery will be held Thursday, **July 30**.

A program and registration booklet has been mailed to all NMC members and is posted on the NMC website. A brief outline of the topics is shown below.

NMC Regional Meeting Program

Tuesday, July 28 – Short Courses & Reception

- Course 1: Mastitis Therapy and Residue Avoidance *[taught in Spanish]*
- Course 2: Troubleshooting Bacterial Milk Quality Problems: An Organized Approach
- Course 3: Milk Quality Evaluation and Monitoring Using PCDART
- Course 4: Emerging Mastitis Pathogens; Klebsiella, Prototheca, Mycoplasma and "Other Streps"
- Course 5: Milking Robots: They're Proven and Here to Stay; There Are Many More On The Way. A Presentation of Robotic Milking Facts. *[on-farm course]*
- Course 6: Using On-Farm Culture to Guide Strategic Treatment Decisions for Clinical Mastitis
- Course 7: Parlor Efficiency – A Practical Approach To Linking The System, Cows and People
- Course 8: Systematic Treatment of Clinical Mastitis to Decrease Drug Use and the Risk of Residues, and Sell More Milk
- Course 9: Parlor Routines and Procedures, Dairy Stockmanship *[taught in Spanish]*
- Reception

Wednesday, July 29 – General Session Program

- Pathogen Based Treatment Protocols
- Coagulase-negative Staphylococci: An Intriguing Group of Bacteria
- Lactococcus and Other Organisms We Are Calling "Other Streptococci"
- Lunch
- Managing Your Milking Center to Reach the Next Level
- Milk Quality: The Cooperative Approach [presentation and panel discussion]

Thursday, July 30 – Post-conference Farm Tour

Experts Discuss Teat – Liner Interactions

Three generations of milking researchers met at the University of Wisconsin earlier this year for 10 days of discussions, debate, and experimentation on teat-liner interactions. One important goal for the group was to clarify and simplify advice on how to optimize three of the key physical influences of any milking unit on cows' milking characteristics and teat condition. Those three key influences are milking vacuum, pulsator settings and liner compression.

Results of a series of recent studies at the University of Wisconsin indicate that the relative effect of each of these factors (over their typical range of commercial settings), on raising or lowering average milk flow-rate, is approximately: 20% for milking vacuum; 20% for liner compression, and 10% for pulsator settings (estimated from figure 1 in the paper by Penry et al. 2015 National Mastitis Council Annual Meeting Proceedings, pg 144-145, for example).

Milk harvesting invariably involves a compromise between three competing goals: milking gently; milking quickly; milking completely. If the predominant goal for an individual farmer is for gentle milking, there will inevitably be a reduction in the milking speed (demonstrated as a reduction in peak and average flow rates) even though the goal of completeness of milking can still be achieved. If milking speed is the predominant goal, gentleness of milking will suffer and it is likely there will be an increase in teat-end hyperkeratosis.

Success in achieving the goal of gentle milking can be confirmed by a number of visual observations. Teat Club International (Mein et al, 2001 National Mastitis Council Annual Meeting Proceedings, pg 347-351) described a series of machine-induced teat changes and these should be used to assess gentleness of milking. Short-term machine-induced changes such as discolouration (a measure of teat barrel oedema and congestion), ringing at the base of the teat (a measure of teat barrel congestion and high mouthpiece vacuum) and teat-end congestion (a measure of inadequate liner compression) are good indicators of milking that is not gentle on teat tissues. Teat-end hyperkeratosis is a longer term effect and, while it can be used to assess gentleness of milking over a period of time, it is of relatively little value when making short-term adjustments to try and achieve gentle milking. These observation methods have been refined to provide more specific information about liner performance in the paper "The Smart Position on Teat Condition" (Doug Reinemann, Proceedings of the 2012 New Zealand Milk Quality Conference).

"Milk harvesting invariably involves a compromise between three competing goals: milking gently; milking quickly; milking completely."

How can manufacturers and advisers apply this new information?

The development of liner maps – tables which describe how a particular liner performs under a range of claw vacuum and pulsation settings (see Penry et al. 2015 National Mastitis Council Annual Meeting Proceedings, pg 144-145) – offer a huge step forward in understanding how particular liners behave. Measuring average milk flow rates and assessing teat congestion (by calculating the estimated change in effective diameter of the teat canal), allows milking systems to be adjusted to suit the particular liner and an individual farmer's goal of milking gently or quickly.

The University of Wisconsin team is developing a technical paper describing how to develop liner maps on commercial dairies. The basic steps are:

- Use of herd parlour management data to derive average (i.e., milk yield divided by total milking time) and peak milk flow-rates for a range of vacuum and pulsation settings.
- Estimating overpressure so that the 'true milk:rest' ratio can be determined for any given liner
- Conducting systematic milking-time observations of cow behaviour and assess post-milking teat condition)

Article submitted by Ian Ohnstad, The Dairy Group, Doug Reinemann, University of Wisconsin; Graeme Mein, Werribee, Australia; John Penry University of Wisconsin (PhD student & DVM); Morten Dam Rasmussen, Aarhus University; John Upton,University of Wisconsin (post doc)

SCC Regulatory Limit in the US Remains at 750,000

Voting delegates at the National Conference on Interstate Milk Shipments (NCIMS), held April 24-29, 2015 in Portland, Oregon, rejected a proposal to reduce the somatic cell count limit in the United States from 750,000 cells/ml to 400,000 cells/ml. The proposal, submitted by the International Dairy Foods Association, failed by a vote of 18-32.

Efforts to lower the SCC regulatory limit in the US to 400,000 cells/ml go back to 1997, when Dr. K. Larry Smith, Ohio State University, submitted the first proposal to NCIMS recommending a change from 750,000 to 400,000 cells/ml. NMC submitted proposals in 1999, 2001, 2003, 2005, and 2011 recommending a 400,000 SCC limit. A few other organizations submitted similar proposals over the years, however NCIMS has kept the limit at 750,000 cells/ml. NMC continues to support a SCC regulatory limit of 400,000 cells/ml.

Although the regulatory limit in the US will remain at 750,000 cells/ml, milk products that are exported to the European Union must meet the EU SCC requirement of 400,000 cells/ml. Since milk and dairy products for export can't be easily segregated, essentially all farms in the US still need to meet a 400,000 standard.

NCIMS meets every other year to consider proposed changes in the Pasteurized Milk Ordinance (PMO) and allied documents that establish the conditions under which Grade A milk is produced, inspected, hauled, and processed in the US. For more information, go to: www.ncims.org.

What Are These New Bacteria Showing Up on Mastitis Diagnostic Reports?

Many veterinary and milk quality laboratories are using a new instrument for identifying bacterial organisms. The new technology, MALDI-ToF MS (Matrix Assisted Laser Desorption/Ionization - Time of Flight Mass Spectrometry), uses laser excitation of biomolecules such as proteins, and mass spectrometry to create a unique spectrum pattern of an unknown micro-organism. Results are compared with thousands of spectra in a reference database, from which a bacterial identification is provided. The procedure is rapid, frugal in its use of chemicals required for testing, and accurate, providing species identification for a majority of samples tested. MALDI biotyping is revolutionizing the field of microbiology.

Diagnostic laboRATOries now have bacterial identification information that is far more specific than has been traditionally reported for organisms isolated from milk. In the past, a number of expensive tests and additional days were needed to distinguish between members of bacterial groups such as the Coagulase-negative staphylococci (CoNS) species. With MALDI, this group is identified not as CoNS or as environmental *Staphylococcus* species, but usually to species level, such as *Staphylococcus chromogenes* or *Staphylococcus simulans*. For bacteria that were previously reported as environmental streptococci, MALDI biotyping expands the range of identification to include, among others, *Aerococcus* species including *Aerococcus viridians*, *Enterococcus* species including *Enterococcus casseliflavus* and *Enterococcus faecalis,* and *Lactococcus species*, including *Lactococcus garvieae* and *Lactococcus lactis*.

While these new bacterial identifications may be confusing at the moment, it's likely, going forward, that this greater level of specification will lead to a greater understanding of the influence of bacteria on intramammary infections and on milk quality.

Submitted by Carol Hulland, Miami, Florida

Effects of Freezing Bedding Samples on Bacterial Counts

Troubleshooting the sources of bacteria that may be causing mastitis outbreaks in a herd often involves sampling and identifying the primary sources of the etiological agents in the cows' environment. For cows in confinement housing, bedding is often the primary source of environmental mastitis pathogens. For logistical reasons, bedding samples are often frozen during transport and prior to bacteriological examination. However, little data is available on the validity of freezing bedding samples relative to the effects on bacterial counts of common mastitis pathogen groups. An Ohio State University study compared bacteriological counts in common bedding materials analyzed either fresh or after being frozen up to 21 days.

Bedding samples were collected from two commercial dairies on Ohio during October 2013, November 2013, May 2014 and June 2014. Bedding types sampled were recycled manure solids, sand, and sawdust. Bedding samples were collected prior to use as bedding and from stalls after use. Each sample was thoroughly mixed and divided into four subsamples for analysis as fresh or after freezing at -20C for either 7, 14 or 21 days.

Freezing of samples had different effects on bacterial counts according to bedding type and pathogen group. Total Gram-negative bacterial counts in recycled manure and sand were reduced in frozen samples compared with fresh bedding. However, Gram-negative bacterial counts did not differ within recycled manure and sand bedding samples frozen for 7, 14 and 21 days. Similarly, coliform counts in recycled manure and sand bedding were reduced by freezing, but were similar among samples frozen for 7, 14 and 21 days. Gram-negative bacterial and coliform counts in sawdust were not affected by freezing. Klebsiella and streptococcal counts were similar in fresh and frozen samples for all three bedding types.

Documentation of procedures and consistency of methods for storing bedding samples appears to be necessary when comparing bacteriological results. Freezing decreased the Gram-negative and coliform counts in recycled manure and sand bedding. However bacterial counts did not change over 21 days once these two bedding types were frozen. Surprisingly, bacterial counts in sawdust samples did not follow a similar trend and were unaffected by storage conditions. Standard operating procedures for storage of bedding samples should be practices and documented in reports by both clinicians and researchers evaluating bedding as a potential source of environmental pathogens.

Source: International Dairy Federation Animal Health Newsletter, No. 8, October 2014. pg. 9 (E. Homerosky, S. Reed, and J. Hogan)

Good Communication Key to Udder Health Programs

During his presentation at the 2014 NMC Regional Meeting, Theo Lam reviewed results of a short questionnaire on udder health programs around the world. Lam said one of the obvious messages from the reports is that the importance of communication in the success of udder health programs cannot be overestimated. According to Lam, almost all of the survey respondents said that seeing communication as a core activity is considered one of the most important lessons learned.

Communication starts with clear, simple and consistent messages, with messages that are harmonized between all parties involved, so that whoever sends them, the message the farmer receives is always the same.

"The importance of communication in the success of udder health programs cannot be overestimated."

Consistency is key, said Lam. Key messages have to be delivered primarily by local advisers, people who contact farmers in their routine interactions, and should be underpinned by other information sources.

Source: Udder Health Programs of the World (Lam and De Vliegher). 2014 NMC Regional Meeting Proceedings, pp. 117-125.

Bovine Mastitis – The Significance of Levels of Exposure to Pathogens

Dr. Frank Dodd, who was recognized by NMC as one of twenty 'legends in mastitis research', presented a superb review on the significance of levels of exposure to pathogens at a little-known seminar in Sweden in 1987 to mark the retirement of Professor Olaf Claesson. Dodd's review was re-published in the Bulletin of the International Dairy Federation (381/2003) as a tribute soon after his death.

Dodd listed the following examples to support the conclusion that frequency of new infections increases with increasing level of exposure to mastitis pathogens.

- Milking-time hygiene techniques lower bacterial exposure and also reduce the rate of new infection.
- Reducing levels of infection in herds results in lower subsequent rates of infection.
- Rates of new infection in uninfected quarters of cows with no infected quarters are lower than in the uninfected quarters of cows with one or more infected quarters.
- Infection rates are increased when teat lesions colonised by mastitis pathogens are common.
- Data from artificial challenge experiments indicate that new infection rates are much greater than those normally occurring in herds that are subjected to natural levels of exposure to pathogens.

Dodd also pointed out that not all of these observations demonstrate a direct (causal) relationship between new infection and level of exposure but that, overall, they provide strong support for the likelihood of a causal relationship. According to another of NMC's 'legends of mastitis research', Dr. K. Larry Smith, Ohio State University, the same logic applies to environmental streptococci. Smith (1997) concluded that "the level of exposure is the major risk for environmental streptococcal mastitis in today's dairy herds and we need to continually learn ways to keep cows clean, dry, cool and comfortable."

While correlation does not imply causation, it is clear that pathogen concentration in or near the environment of the teat orifice has a dominant influence on rate of new mastitis infection.

References

Dodd, F.H. 1987. Bovine mastitis - the significance of levels of exposure to pathogens. Re-published in International Dairy Federation Bulletin 381/2003 [included in the IDF Mastitis Newsletter No. 25, pp 3-6].

Smith, K.L. 1997. Risk factors for environmental streptococcal intramammary infections. In Proceedings of Symposium held at Ontario Veterinary College, Canada, June 1997, on "Udder Health Management for Environmental Streptococci", pp 42-50.

Article submitted by Graeme Mein, Werribee, Australia.

Editor's note: The IDF Mastitis Newsletter No. 25 with Dr. Dodd's paper can be found on the International Dairy Federation website www.fil-idf.org. Search under publications, newsletters.

Klebsiella Control Includes Alleyway and Pen Hygiene

Recommendations to lower the incidence of Klebsiella mastitis include the use of sand bedding, and inorganic material, over other organic material beddings such as wood shavings and sawdust.

Alleyways and holding pens have also been identified as high risk areas for Klebsiella exposure. Manure will splash onto the legs and teat skin as cows walk through, so it is important to reduce this exposure by keeping alleyways clean and dry. Unclean animals carry manure and associated pathogens such as Klebsiella back to the stalls to contaminate bedding. The key to controlling Klebsiella is to reduce its prevalence in the total environment. Choosing bedding such as sand is one control factor, however maintaining clean and dry housing and alleyways is also key to reducing prevalence of Klebsiella in the environment and risk of exposure.

Source: 2015 NMC Annual Meeting Proceedings, pg 37-49 (P. Moroni et al)

Resource For Milkers

What You Should Know About Mycoplasma Mastitis

Mycoplasma species are bacterial pathogens that can cause mastitis. An increase in the prevalence of mycoplasma mastitis has been observed over the past decade which appears to be related to increasing herd size and the associated importation of cattle into herds as they expand. For this reason, mycoplasma mastitis appears to be an emerging mastitis problem.

Mycoplasma species are classified as contagious mastitis pathogens. It is believed the spread of mycoplasma mastitis occurs primarily during the milking process, however evidence suggests that mycoplasma organisms can also be transmitted between animals outside the milking parlor. This transmission may occur via nose to nasal discharge and nose to nose contact.

Signs of mycoplasma mastitis include: an increase in the number of severe mastitis cases that are unresponsive to treatment; cows may have clinical mastitis in more than one quarter at the same time; and decreased milk production.

One of the challenges with identifying mycoplasma is that it won't show up on a routine mastitis bacteria culture. Special tests are required to detect mycoplasma.

There is no effective treatment of mycoplasma mastitis. If kept in the herd, infected cows should be segregated and milked last or separately from uninfected cows. Control measures include strict milking time hygiene. If animals are purchased, all replacements should be tested for mycoplasma before commingling with the herd. Bulk tank milk samples may be cultured periodically to monitor for presence of *Mycoplasma* species in a herd.

A printer-friendly version of this NMC article is available in both English and Spanish on the NMC website: http://bit.ly/1SlvLxE

The Beginnings of Milking Machine Testing

Throughout the first 50 years following the birth of the modern milking machine in 1892, the most common method of measuring milking machine characteristics was by 'rule of thumb'. The method of 'testing' was to insert a thumb into a teatcup and deduce 'performance' by the perceived level of discomfort on the tester's thumb. Real testing started in the early 1950's due to the pioneering efforts of two inventive and practical New Zealand scientists, Walter G. Whittlestone and Doug S.M. Phillips. The development of the first commercial air-flow meter (Phillips, 1951 and 1953), the first commercial vacuum recorder (Phillips, 1952) and the first guideline tables for pump capacity, air consumption by components and reserve air-flow tables (Phillips, 1952), laid the foundations for basic machine testing as we know it today.

As an interesting reminder that some things never change, the first of these papers by Phillips (1951) includes a brief section outlining 'the major causes of unstable flow of milk in the milkline and resultant irregular vacuum at the cups'!

During the next 10 - 15 years, the test equipment and basic testing principles developed in New Zealand were quickly adopted or adapted for use in North America (initially via the pioneering activities of Dan Noorlander in California - see Noorlander, 1962), Europe (initially via Alfa-Laval AB, I believe) and many other dairying countries (Hall and Nordegren, 1968). And the rest, as they say, is history….

References

Hall HS. and S-A Nordegren. 1968. Mechanical Testing of Milking Machine Installations. In Proceedings, Symposium on Machine Milking 1968. pp 161-188. Published by The National Institute for Research in Dairying, Shinfield, Reading, England.

Noorlander DO. 1962. Milking Machines and Mastitis. Published by D. Noorlander with support of Dairy Equipment Co, Madison, WI, USA.

Phillips DSM. 1951. Testing and servicing as factors in milking machine performance. In Proceedings of the Ruakura Farmers' Conference Week. NZ Dept. of Agriculture, Wellington.

Phillips DSM. 1952. Recent developments in providing an efficient testing and servicing organisation for milking machines. In Proceedings as above.

Phillips DSM. 1953. A robust air-flow meter for field use. J. Scientific Instruments. 30:382-383

Article submitted by Graeme Mein, Werribee Australia

NMC to Team Up with University of Minnesota for Dairy Conference in China, October 26-28, 2015

This year's University of Minnesota China Dairy Conference, set for October 26-28, 2015 in Hohhot, Inner Mongolia, China, will be jointly organized with the National Mastitis Council.

Conference topics will focus primarily on managing udder health and milk quality and safety. Other topics will include lameness and transition cow management. In addition, a half-day short course on dairy farm economics will be offered.

The target audience is local dairy advisors and dairy professionals in China with an interest in mastitis and milk quality. Oral presentations and handout materials will be translated into Chinese. Additional information: www.cvm.umn.edu/events/dairy-conference-china

Name This Mastitis Pathogen

What mastitis pathogen has the following characteristics? The answer is on page 6.

- Commonly inhabit soil and plants.
- Exposure to teats occurs primarily between milkings when teats contact environmental sources.
- May cause chronic infections lasting several lactations.
- Infection rates are higher during the dry period than lactation.
- Infections respond poorly to antibiotic therapy.
- Some strains are resistant to germicides containing chlorhexidine gluconate.
- The most effective means of reducing the rate of intramammary infections is by keeping cows clean and dry to decrease teat end exposure to environmental pathogens.
- Appearance on blood agar: colonies are 2 to 3 mm in diameter, yellow to grey, and often resemble staphylococci. Approximately 20% of isolates from bovine intramammary infections are hemolytic. Red pigment may develop if cultures are incubated at room temperature.

NMC Scholars Program Deadline is July 31

Graduate students with an area of interest in udder health and quality milk production are invited to apply for the NMC Scholars Program.

The goal of the scholars program is to encourage graduate student participation in NMC programs and activities, and support the development of future milk quality researchers and specialists. Successful applicants will receive travel funding to attend the NMC 55th Annual Meeting, January 31-February 2, 2016 in Glendale, Arizona.

Program details are available on the NMC website, www.nmconline.org. The submission deadline is July 31, 2015.

Association Between Occurrence and Severity of Mastitis on Pregnancies per Artificial Insemination at First Service

A recent prospective study determined associations between occurrence and severity of clinical and subclinical mastitis during a defined breeding risk period (3 days before to 32 days after artificial insemination) on pregnancies per artificial insemination at first service.

Dairy cows (n = 3,144) from four Wisconsin herds were categorized based on the occurrence of one or more clinical mastitis or subclinical mastitis events during and before the breeding risk period: (1) healthy, (2) mastitis before breeding risk period, (3) subclinical mastitis during breeding risk period, (4) chronic subclinical mastitis, (5) clinical mastitis during the breeding risk period, or (6) chronic clinical mastitis.

Clinical mastitis cases were categorized based on etiology (gram-negative, gram-positive, and no growth) and severity (mild, moderate, or severe).

Compared with healthy cows, the odds of pregnancy were 0.56, 0.67, and 0.75 for cows experiencing chronic clinical mastitis, clinical mastitis, or subclinical mastitis during the breeding risk period, respectively. The occurrence of chronic subclinical mastitis was not associated with reduced probability of pregnancies per artificial insemination at first service.

continued below

National Mastitis Council
421 S. Nine Mound Rd.
Verona, WI 53593 USA

continued from above

Compared with healthy cows, the odds of pregnancy were 0.71 and 0.54 for cows experiencing mild or moderate-severe cases of clinical mastitis during the breeding risk period, respectively. The odds of pregnancy for cows experiencing clinical mastitis caused by gram-negative or gram-positive bacteria during the breeding risk period were 0.47 and 0.59, respectively.

The occurrence of clinical mastitis that resulted in no growth of bacteria in cultured milk samples was not associated with reductions in pregnancies per artificial insemination at first service.

Regardless of etiology, microbiologically positive cases of clinical mastitis with moderate or severe symptoms were associated with substantial reductions in pregnancies per artificial insemination at first service. Etiology, severity, and timing of clinical mastitis were associated with decreases in the probability of pregnancy at first artificial insemination. Severity of the case was more important than etiology; however, regardless of severity, microbiologically negative cases were not associated with reduced probability of pregnancy.

Source: Journal of Dairy Science, Vol. 98 pg 3791-3805 (June 2015)

Answer to **"Name This Pathogen"** on page 5: *Serratia* species.

Source: NMC Laboratory Handbook on Bovine Mastitis pg. 99

Udder Topics is published as a service to National Mastitis Council members. Send comments or contributions to: Anne Saeman, NMC, 421 S. Nine Mound Rd., Verona, WI 53593, USA. Phone: (608) 848-4615; Fax: (608) 848-4671; email: nmc@nmconline.org; website: www.nmconline.org. Mention of specific equipment, products or suppliers does not imply endorsement by NMC.