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## NEW CONCEPTS ON BOVINE MASTITIS CONTROL

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### ABSTRACT

Refining the recommended approach to mastitis control in dairy herds is a continual process. Recently developed concepts and practices are described.

### INTRODUCTION

Even though great technological advances have been made, mastitis continues a major economic issue for dairy producers<sup>6</sup>. Thus, researchers and dairy advisors continue to refine the National Mastitis Council (NMC) recommended mastitis control program<sup>12</sup>. The objective of this paper is to describe the most significant mastitis control concepts published recently for the prevention of new intramammary infection (IMI), the elimination of existing infections and the monitoring of udder health status.

### PREVENTION OF NEW INTRAMAMMARY INFECTIONS

Between regions of the world, major differences remain in the standard approaches used for pre-milking udder preparation. A summary of the literature and extension information in the area of milking management would suggest that a wide variety of methods can lead to the efficient and appropriate harvesting of milk. In some systems, pre-milking udder preparation is important for minimizing bacterial contamination, avoiding disinfectant residues and properly stimulating milk letdown. Assessment of the efficiency of the milking process remains as a substantial challenge. Use of the Lactocorder instrument has recently been described for objectively assessing milk flow relative to milking management methods and automatic machine take-off settings<sup>19</sup>. This method shows considerable promise as a practical tool to evaluate current milking management, and to demonstrate the impact of proposed changes.

Implementation of post-milking teat disinfection is almost unanimous throughout the North American dairy industry for the control of contagious pathogens<sup>10</sup>. It is recommended that all teats of all cows be dipped in an effective post-milking teat disinfectant after every milking. A bibliography of peer-reviewed publications that document the efficacy of teat disinfection products is published annually<sup>11</sup>. Nevertheless, there continues to be major regional differences throughout the world with respect to the importance of this milking management practice. It remains important that each dairy herd develop and document a milking management protocol that is efficient, and that achieves the udder health goals of the herd.

Over the past decade, there have been many noteworthy developments with respect to machine milking of dairy cows. Both small automated milking systems and large rotary parlour installations have become commonplace. Whatever the system, it must be well-designed and properly maintained. Consistent standards for the evaluation of milking equipment function have been documented<sup>13</sup>. Dynamic system testing is essential for an accurate assessment of equipment function. Standard evaluation procedures and forms are available, including video documentation of the evaluation process. There remains a great challenge for dairy producers to keep abreast of the developments in milking systems, while ensuring that their current equipment is functioning well and being used appropriately.

Over the past decade, there has been an overwhelming increase in awareness concerning the ergonomics, comfort and welfare of dairy cattle housing systems<sup>1</sup>. Furthermore, workers in this field have made effective use of time-lapse video recording to investigate the impact of facility design on cow behaviour. The use of this technology has assisted the development of free-stall and tie-stall designs that allow cows to express their natural behaviour. Unimpeded eating, drinking and resting should result in improved resistance to disease, and better udder health status. However, scientific documentation of these benefits from improved stall design in controlled studies is difficult to conduct, and is not abundant. There is a need for controlled research in this area, in particular on the relationships between cow comfort and udder health.

### **ELIMINATION OF EXISTING INFECTIONS**

The management of cases of clinical mastitis during lactation is a complex issue. The basic options for a clinical mastitis therapy protocol include treating all cows with antibiotics, treating no cows with antibiotics, or treating only certain cows with antibiotics. Different mastitis organisms require different treatment regimens and control strategies. Thus, timely and accurate milk bacteriological culture results would benefit producers and veterinarians. Many coliform cases could be managed conservatively, particularly in vaccinated cows. Cows with gram-positive infections could receive antibiotic therapy in a more pharmacological appropriate approach than is currently used. There remains a definite need for new, rapid ways to determine the bacterial cause of current cases of clinical mastitis. To this point, cow-side test systems, have not been extremely successful at improving our ability to classify clinical mastitis cases as to etiologic agent in time to affect the treatment protocol. Recently, an evaluation of Petrifilm™ for mastitis diagnosis and treatment protocol has been reported<sup>18</sup>. It was concluded that these products could be used to guide treatment decisions for clinical mastitis, but adequate training of farm personnel is essential. There is a recent trend for large farms in the United States to develop and implement a targeted therapy program based upon actual milk bacteriology using a selective media tri-plate or quad-plate, and a large volume of milk, cultured on-farm. These protocols use interpretive charts, decision flow diagrams and usually call for a 16 to 24 hour delay in antimicrobial therapy, until the causative organism is determined. The refinement of these, or other test systems hold great promise for benefits from rational antibiotic use in clinical mastitis therapy.

Udder health management during the dry period is an integral period for elimination of existing, and prevention of new IMI. There has recently been a great deal of interest in shorter dry period length, such as 35 – 40 days, and preliminary results of effects on metabolism and

milk production are very encouraging. As of yet, the effects of short dry period length on udder health have not been elucidated.

Intramammary administration of dry cow antibiotic therapy (DCT) has remained as a consistent recommendation for all quarters of all cows following abrupt cessation of milking. In North America, there is significant adoption of this process<sup>10</sup>. However, some regions of the world promote the use selective DCT, and others use very little DCT at all. When the control of contagious pathogens has been successful, the focus of DCT shifts from elimination to prevention. Two periods of increased susceptibility to new IMI have been identified during the dry period. These two periods occur in the early dry period immediately after drying-off, and at the end of the dry period just prior to calving. A landmark study has recently evaluated the association of milk production, and other important cow and quarter-level factors during late lactation, on new IMI during the dry period<sup>5</sup>. Cows that were producing higher levels of milk on the day before dry-off were significantly more likely to develop a new IMI during the dry period. In addition, teat-end scores, and the rate of teat closure, influenced new IMI. Quarters with a cracked teat-end were 1.7 times more likely to develop new IMI. At the end of six weeks, 23.4% of teats were still classified as open. Quarters that closed during the dry period were 1.8 times less likely to develop a new IMI. These recent field studies provide strong evidence for the importance of management strategies aimed at enhancing teat canal closure. The use of an external dry cow teat sealant applied at drying-off for reduction of the new infection rate over the dry period has been evaluated<sup>9</sup>.

Another important development to enhance teat canal closure and increase resistance to new IMI in the dry period is the use of an internal teat sealer. A large study to evaluate a bismuth subnitrate was performed under natural field conditions in New Zealand, utilizing over 500 cows. There was a ten-fold decrease in the rate of new IMI in quarters that received the teat sealer compared to non-treated control quarters<sup>20</sup>. In another large field study conducted in the United Kingdom on over 1000 cows on 16 farms, it was demonstrated that a bismuth subnitrate teat sealer had profound prophylactic effects. The rate of new IMI during the dry period, for all major pathogens combined, was significantly reduced compared to DCT administration<sup>8</sup>. Several other studies have recently reported excellent efficacy of OrbeSeal™ (TeatSeal™) internal teat sealer<sup>2,7,16</sup>. Few new technologies in the area of mastitis control in dairy cattle have resulted in such unanimously favourable results around the world. It is clear that administration of an internal teat sealer has great promise as a management tool to reduce new IMI during the dry period, and result in the reduction of SCC and clinical mastitis cases in the subsequent lactation. It is interesting that there are widely different labels, and approaches to the use of this product, in various regions of the world. In Europe, it is approved as an alternative to DCT in uninfected (low SCC) cows. In North America, OrbeSeal™ internal teat sealer is recommended for use as an adjunct to DCT. Over time, with the development of improved screening tests for existing IMI, it is expected that both of these approaches will be modified. It must be emphasized that proper aseptic technique cannot be compromised when administering internal teat sealers. In conclusion, it is clear that there will be worldwide adoption of this technology, and it will have significant benefit for mastitis control efforts.

Culling is a cornerstone for the control efforts for some. Recent studies have elucidated significant factors that affect the cure of *S. aureus* IMI with DCT<sup>3</sup>. Thus, there is an urgent

need for refinement of health management data collection and analysis methods to improve the sophistication of decision-making of treatment or culling decisions. Dairy herd management software should provide this important cow value information automatically. There is increased interest in the role of primiparous heifers with existing IMI, such as *S. aureus*, for the lactating herd. The importance of this situation, and the role of prepartum intramammary antibiotic therapy, has recently been reviewed<sup>14</sup>.

### **MONITORING OF UDDER HEALTH STATUS**

Establishing meaningful goals, and monitoring the progress towards attaining them over time, is a cornerstone of an effective udder health management program. Over the last decade, there have been tremendous developments in the tools and processes for monitoring udder health and milk quality in dairy herds. An excellent review of milk quality and mastitis tests has recently been published<sup>15</sup>. There have been considerable developments in the use of SCC data for monitoring udder health and milk quality<sup>17</sup>. Implementation of these methods should lead to widespread improvement in mastitis control. However, even with the advent and implementation of comprehensive computerized health management programs, it continues to be a challenge to collect, analyze and use clinical mastitis records. The development of an automated link where the milk bacteriological culture information is automatically recorded into individual and herd-level dairy herd computerized records holds great promise.

### **CONCLUSION**

There continues to be significant developments in mastitis control around the world. These changes vary from region to region in their applicability and impact. This paper has attempted to summarize some of the most noteworthy advances for modern udder health management programs.

### **RÉSUMÉ**

La mise à jour des recommandations et des approches de contrôle de la mammite dans les troupeaux de bovins laitiers est un processus continu. Les nouveaux concepts et approches pratiques sont présentés dans le texte suivant.

### **REFERENCES**

1. Anderson N. Dairy Cattle Behaviour: Cows Interacting with Their Workplace. *Am Assoc Bovine Prac*, 36:10-22. Sept. 2003.
2. Cook, N.B., A. Wilkinson, K. Gajewski, D. Weigel, R. Sharp and D. Pionek. 2004. The Prevention of New Intramammary Infections During the Dry Period When Using Internal Teat Sealant in Conjunction with a Dry Cow Antibiotic. *NMC Annual Meeting Proc.* 43:292-293.
3. Dingwell, R. T., K. E. Leslie, T. F. Duffield, Y. H. Schukken, L. DesCôteaux, G.P. Keefe, D. F. Kelton, K. D. Lissemore, W. Shewfelt, P. Dick, and R. Bagg. 2003. Efficacy of Intramammary Tilmicosin and Risk Factors for Cure of *Staphylococcus aureus* Infection in the Dry Period. *J. Dairy Sci.* 56:159-168.

4. Dingwell, R. T., Leslie, K.E., Kelton, D. F. "Management of the Dry Cow in Control of Peripartum Disease and Mastitis" *In: Veterinary Clinics of North America, Food Animal Practice*. W.B. Saunders Company. March 2003.
5. Dingwell, R. T., K. E. Leslie, Y. H. Schukken, J. M. Sargeant, L. L. Timms, T. F. Duffield, G. P. Keefe, D. F. Kelton, K. D. Lissemore, and J. Conklin. 2004. Association of cow and quarter-level factors at drying - Off with new intramammary infections during the dry period. *Preventive veterinary medicine* (In Press).
6. Fetrow, J., S. Stewart, S. Eickher, R. Farnsworth and R. Bey. 2000. Mastitis: An economic consideration. 39<sup>th</sup> NMC Annual Meeting Proceedings. Atlanta Georgia. Pg 3-47
7. Godden, S., P. Rapnicki, S. Stewart, J. Fetrow, A. Johnson, R. Bey, and R. Farnsworth. 2003. Effectiveness of an Internal Teat Seal in the Prevention of New Intramammary Infections During the Dry and Early-Lactation Periods in Dairy Cows when used with a Dry Cow Intramammary Antibiotic. *J. Dairy Sci.* 86:3899-3611.
8. Huxley, J. H., M. J. Green, L. E. Green, and A. J. Bradley. 2002. Evaluation of the Efficacy of an Internal Teat Sealer During the Dry Period. *J. Dairy Sci.* 85:551-561.
9. Lim, G.H. and Leslie, K.E. 2002. The Prophylactic Effect of a Dry Cow Teat Sealant and the Relationship to Adherence on the Teat-end. *World Buiatrics Congress, Hannover, Germany*. Pg. 145.
10. National Animal Health Monitoring System. Dairy 2002. Part III: Reference of Dairy Cattle Health and Health Management Practices in the United States.
11. National Mastitis Council 2004 Summary of Peer Reviewed publications on Efficacy of Pre-milking and Postmilking Teat Disinfectants published since 1980. URL: <http://www.nmconline.org/docs/Teatbibl.pdf>
12. National Mastitis Council Recommended Mastitis Control Program Website. 2000. URL: <http://www.nmconline.org/docs/NMC10steps.pdf>
13. National Mastitis Council. 1996. Procedures for evaluating vacuum levels and air flow in milking systems. The National Mastitis Council, Madison, WI.
14. Oliver, S. P., B. E. Gillespie, S. J. Headrick, M.J. Lewis, and H.H. Dowlen. 2004. Heifer Mastitis: Prevalence, Risk Factors and Control Strategies. *NMC Annual Meeting Proc.* 43:83.
15. Ruegg P. L, Reinemann, D. J: Milk Quality and Mastitis Tests. *The Bovine Practitioner*, 36.1:41-54, Feb 2002.
16. Sanford, C., G. Keefe, K. Leslie, I. Dohoo, H. Barkema, R. Dingwell and L. DesCôteaux. 2004. Efficacy of an Internal Teat Sealant (OrbeSeal™) for the Prevention of New Intramammary Infections During the Dry Period. *NMC Annual Meeting Proceedings.* 43: 306-307.
17. Schukken, Y.H., D.J. Wilson, F. Welcome, L. Garrison-Tikofsky, R.N. Gonzalez. 2003. Monitoring Udder Health and Milk Quality Using Somatic Cell Counts. *Vet. Res.* 34:579-596.
18. Silvo, B., D. Caraviello, A. Rodrigues and P. Ruegg. 2004. Use of Petrifilm™ for Mastitis Diagnosis and Treatment Protocols. *NMC Annual Meeting Proceedings.* 43:52-59.
19. Wallace, J.A., Y.H. Schukken, and F. Welcome. 2003. Measuring Stimulation's Effect With Milk Flow Curves. *NMC Annual Meeting Proceedings.* 42:86-97.

20. Woolford, M. W., J. H. Williamson, A. M. Day, and P. J. A. Copeman. 1998. The Prophylactic Effect of a Teat Sealer on Bovine Mastitis During the Dry Period and the Following Lactation. *N. Z. Vet. J.* 46:12-19.