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Popular Article

Advancements in Dairy Cattle Disease Prevention and Herd Health Management

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Abstract

The dairy industry has made progress in improving dairy health by focusing on disease prevention rather than treatment. Multiple factors influence dairy diseases, and epidemiology has helped identify and quantify these risk factors. This led to the development of health management, which integrates data-driven approaches to prevent diseases and enhance performance. Health management aims to promote animal health, productivity, welfare, and ensure safety, public health, and sustainability. Veterinarians play a crucial role in implementing effective health management by integrating nutrition, housing, and farm management. Furthermore, the definition of disease now includes subclinical conditions, driven by advanced technology and the understanding that any factor limiting performance can be considered a component of disease.

The Unit of Interest in Disease Prevention:

In disease prevention, there has been a shift from individual animals to herd-centric approaches. Traditional veterinary medicine focused on treating individual animals, while production medicine targets the underlying herd management system to address root causes and achieve herd health. This transition has significantly improved dairy cattle disease prevention.

Major Advances in Disease Prevention

- **Epidemiology**

Epidemiology provides insights into disease risk factors and biological interactions. It helps determine sample sizes, considers correlation and biases, and provides valuable information on disease prevalence and impact. Studies have focused on diseases like subclinical ketosis, endometritis, and intramammary infections in the dry period.



- **Udder health**

The somatic cell count SCC in milk indicates mammary gland inflammation, but doesn't specify immune cell types. Mastitis alters milk's immune cell composition. Healthy quarters contain mainly surveillance macrophages, while inflamed quarters have more granulocytes responsible for bacterial elimination. Milk has fewer lymphocytes regulating immune response. The new parameter, Differential Somatic Cell Count (DSCC), calculates granulocytes and lymphocytes as a percentage of SCC, indicating mastitis presence.

Preventing intramammary infections (IMI) and maintaining milk quality rely on proper pre-milking udder preparation. Practices like teat disinfection and optimizing milking techniques are crucial. Milking equipment design and function have improved, promoting cleanliness and milk flow. Selecting bedding material in free-stall housing, such as sand, prioritizes cow comfort and health, despite its impact on manure management.

Record systems and monitoring tools are vital for mastitis control. Clinical mastitis recording and automated analysis of individual cow SCC data enable informed decision-making and continuous evaluation. Advanced diagnostic techniques like DNA fingerprinting of mastitis pathogens offer insights into mastitis epidemiology, virulence factors, and infection sources. Innovative diagnostic methods, like milk checkers and Fossomatic meters, have emerged for rapid mastitis detection. These systems analyze milk or udder alterations and estimate biomarkers in body fluids. Tests such as PortaSCC® and the DeLaval cell counter offer accurate SCC estimation for mastitis detection.

Overall, advancements in understanding the immune cell composition, implementing effective milking practices, utilizing appropriate housing systems, and employing advanced diagnostic methods have significantly contributed to mastitis control and improved dairy cattle health.

- **Immunology**

Progress has been made in understanding immune function in dairy cows, aiding mammary and uterine health. Genetic markers allow selection for immune function and disease resistance. Genomic microarray technology investigates gene changes during the transition period and immune-related diseases.

Modified live virus vaccines have improved in safety, enabling effective disease prevention. Over the past 15 years, two genotypes of BVDV (types I and II) with distinct clinical behaviors have



been differentiated, leading to changes in vaccines to cover both types. Advanced diagnostic tools, like immunohistochemistry, have greatly enhanced the accurate and early identification of BVDV-infected animals.

- **Cow Comfort**

Significant progress has been made in understanding and addressing heat stress in dairy cows. Adverse effects have been quantified, leading to effective mitigation strategies. Lameness prevention is gaining momentum with research on housing, nutrition, and physiological factors. The detrimental effects of heat stress, social stress, lying time, and feed intake patterns on lameness, immune function, disease susceptibility, and overall performance are being thoroughly investigated.

- **Biosensor technology**

Biosensing technologies offer innovative solutions for rapid disease detection in farmed livestock. Nano-biosensors reduce costs associated with reagents, sample handling, analysis times, and transportation, ultimately promoting sustainable agriculture. Integrated with data infrastructure, biosensors enable real-time analysis of animal behavior and resource utilization. On-site biosensing facilitates cost-effective monitoring of various aspects of animal health and well-being.

- **Feedonomics**

Feedonomics is an interdisciplinary field merging feed science, animal nutrition, physiology, and metabolism. It utilizes high-throughput omics technologies like genomics, epigenomics, transcriptomics, proteomics, and metabolomics. By integrating these disciplines and molecular techniques, feedonomics aims to understand the intricate connections among animal genetics, diet, physiological processes, and overall health and performance.

- **Herd Health Management Programs**

Health management programs in dairy cattle aim to ensure well-being and minimize productivity losses. These programs involve collaboration between dairy producers and herd veterinarians based on performance goals and comparisons. Scheduled veterinary visits include reproductive exams, performance record review, and addressing management issues. The frequency of scheduled veterinarian visits is influenced by herd size. Smaller herds with fewer than 100 cows may have one or two cows calving per week, making a monthly visit sufficient, although additional unscheduled visits for sick cows might be required. Larger herds with daily calving events typically necessitate more frequent visits, and weekly scheduled visits are common for herds exceeding 200



cows. On very large dairy farms with over 2,000 cows, it is becoming more common to employ a full-time staff veterinarian responsible for day-to-day health and performance management.

Conclusion

In conclusion, the dairy industry has made significant progress in disease prevention through epidemiology, health management programs, and advancements in various fields. The focus has shifted to herd-centric approaches, integrating nutrition, housing, and management. Advances in immune function, diagnostics, cow comfort, biosensors, and feedomics have improved dairy health. Veterinarians play a crucial role in implementing these advancements. Overall, these efforts aim to enhance animal health, productivity, welfare, and ensure sustainability.

References

- Damm, M., Holm, C., Blaabjerg, M., Bro, M. N., & Schwarz, D. (2017). Differential somatic cell count—A novel method for routine mastitis screening in the frame of Dairy Herd Improvement testing programs. *Journal of dairy science*, 100(6), 4926-4940. LeBlanc, S. J., K. D. Lissemore, D. F. Kelton, T. F. Duffield, and K. E. Leslie. "Major advances in disease prevention in dairy cattle." *Journal of dairy science* 89, no. 4 (2006): 1267-1279.
- Neethirajan, S. (2017). Recent advances in wearable sensors for animal health management. *Sensing and Bio-Sensing Research*, 12, 15-29.
- Neethirajan, S., Tuteja, S. K., Huang, S. T., & Kelton, D. (2017). Recent advancement in biosensors technology for animal and livestock health management. *Biosensors and Bioelectronics*, 98, 398-407.
- Sun, H. Z., Plastow, G., & Guan, L. L. (2019). Invited review: Advances and challenges in application of feedomics to improve dairy cow production and health. *Journal of dairy science*, 102(7), 5853-5870.

