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Vaccines against mastitis in dairy animals

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Abstract

Mastitis is a highly detrimental disease in the dairy cattle industry, causing significant economic losses worldwide and adversely affecting animal welfare on farms. Numerous therapeutic and preventive strategies have been employed over the years to enhance the health, welfare, and productivity of dairy cows affected by mastitis. Vaccine development targeting common udder pathogens has seen progress, with both commercial vaccines and herd-specific autovaccines using inactivated whole bacterial cells being commonly used.

Introduction

Mastitis is a highly detrimental disease in the dairy cattle industry, causing significant economic losses worldwide and adversely affecting animal welfare on farms. The financial impact of mastitis is mainly attributed to decreased milk production, premature culling or removal of affected cows from herds, the production of unsalable or low-quality milk, and the costs associated with veterinary care and medicines. Cows suffering from mastitis experience overall poor health and diminished reproductive performance.

The pathogens most commonly isolated from infected udders can be categorized as follows:

1. Contagious pathogens
    - Staphylococcus aureus
    - Streptococcus agalactiae
    - Mycoplasma bovis
    - Corynebacterium bovis
2. Teat skin opportunistic pathogens
    - Coagulase-negative staphylococci

3. Environmental pathogens
    - Streptococcus spp., including Streptococcus uberis and Streptococcus dysgalactiae (prevalent)
    - Streptococcus equinus (formerly Streptococcus bovis, less prevalent)

4. Environmental coliforms:
    - Gram-negative bacteria, including Escherichia coli, Klebsiella spp., Enterobacter spp.
    - Arcanobacterium (formerly Actinomyces) pyogenes

5. Uncommon pathogens:
    - Various, including Nocardia spp., Pasteurella spp., Mycobacterium bovis, Bacillus cereus, Pseudomonas spp., Serratia marcescens, Citrobacter spp., anaerobic bacteria, fungi, and yeasts.

Numerous therapeutic and preventive strategies have been employed over the years to enhance the health, welfare, and productivity of dairy cows affected by mastitis. Vaccine development targeting common udder pathogens has seen progress, with both commercial vaccines and herd-specific autovaccines using inactivated whole bacterial cells being commonly used. These vaccines are further categorized as monovalent or polyvalent, depending on the number of targeted pathogens.

Immunization and immunotherapy have been active research areas for controlling and preventing mastitis. However, current vaccines are best used as supplementary measures alongside more effective control strategies.

Commonly targeted udder pathogens include S. aureus, S. agalactiae, and E. coli. Vaccines for S. aureus and S. agalactiae typically consist of whole organisms (cellular lysates, inactivated, and attenuated vaccines) or subunits (toxins, surface proteins, and polysaccharides). For E. coli, the J5 mutant core antigen is commonly employed.

Specific Pathogen Discussions:

1. Staphylococcus aureus: Current vaccines, which include autogenous bacterins and strains believed to offer cross-protection, aim to reduce clinical severity and increase cure rates. Their effectiveness in field conditions remains a challenge.
2. Streptococcus agalactiae: Vaccination against this pathogen has elicited systemic hyper immunity but not intramammary resistance, primarily due to the diversity of strains and variability in animal reactions.

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3. Mycoplasma bovis: Vaccine development for this pathogen is challenging due to short-lived resistance post-infection. Commercial vaccines and autogenous bacterins have shown limited efficacy.
4. Coliform mastitis (E. coli, Klebsiella species, Enterobacter aerogenes): Core lipopolysaccharide antigen vaccines have demonstrated effectiveness in reducing the incidence and severity of clinical coliform mastitis during the dry period and early lactation. However, these vaccines must be used cautiously due to potential adverse effects.
5. Streptococcus spp. (S. uberis, S. dysgalactiae): While experimental intramammary vaccinations have shown promise, commercially available vaccines for environmental streptococci are presently unavailable.
6. Pseudomonas aeruginosa: Disease control has been achieved through a combination of oral iodine administration and vaccination.

Conclusion

Mastitis continues to be a major economic concern in dairy farming. Vaccination, although a valuable tool, is not a standalone solution, particularly in herds with high mastitis rates. A combination of vaccination and comprehensive infection control measures, including stringent milking hygiene, treatment of clinical cases, segregation of infected cows, and culling, when necessary, is essential for reducing the incidence and duration of intramammary infections.

Reference

Ismail, Z.B. (2017). Mastitis vaccines in dairy cows: Recent developments and recommendations of application. *Veterinary world.*, 10(9): 1057.

VETERINARY MEDICINE – Otto M Radostits, Clive C Gay, Kenneth W Hinchcliff, Peter D Constable (10th EDITION)