

Antibiotic Susceptibility Patterns for Environmental Streptococci Isolated from Bovine Mastitis in Central California Dairies

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Environmental streptococci are frequently isolated from bovine mastitis in dairy cows with only limited information available on the antimicrobial susceptibility of these organisms. A total of 362 environmental streptococci isolated from cases of bovine mastitis from the central San Joaquin Valley of California over a 3-yr period were used in the study. Overall, 39.9% of the strains tested were *Streptococcus uberis*, 42.2% were *Streptococcus dysgalactiae*, and 11.1% were *Enterococcus* spp. The antimicrobial susceptibility for these organisms was determined for the following antimicrobial agents: penicillin, ampicillin, cephalothin, ceftiofur, penicillin + novobiocin, erythromycin, pirlimycin, tetracycline, and sulfadimethoxine. Results demonstrate substantial differences in the susceptibility patterns for the various organisms collectively referred to as the environmental streptococci. The MIC₉₀ for penicillin was 0.06 µg/ml for 152 strains of *S. dysgalactiae* compared with 0.25 µg/ml for 133 strains of *S. uberis*. However, the *Enterococcus* spp. were the most resistant organisms tested. These data also indicate that the use of interpretive criteria based on human data may provide misleading results. In conclusion, these data confirm that the environmental streptococci are a diverse group of organisms comprised of several different genera and species and that identification of environmental streptococci to the species level is needed to appropriately modify control methods. Moreover, the use of the agar disk diffusion (Kirby-Bauer) susceptibility test for agents with human-based interpretive criteria is contraindicated, and these tests should only be performed with agents with mastitis specific interpretive criteria.

Key Words: bovine mastitis • antimicrobial susceptibility • streptococci • enterococci

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Isolation of Streptococci from milk samples of normal, acute and subclinical mastitis cows and determination of their antibiotic susceptibility patterns.

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Streptococci are frequently isolated from bovine mastitis in dairy cows with only limited information available on the antimicrobial susceptibility of these organisms. A total of 42 Streptococci isolated from 148 milk samples of normal, sub acute and acute bovine mastitis cases. Overall, 35% of the strains tested were *Streptococcus dysgalactiae*, *Streptococcus agalactiae* 26%, *Streptococcus uberis* 18 and 4% were *Enterococcus* sp. Differences between the number of isolations in acute and sub acute groups were statistically significant, ($p < 0.5$). The antimicrobial susceptibility for these organisms was determined for the following antimicrobial agents: cephalexine, penicillin, clindamycin, cloxaciline, gentamicin, streptomycin, amoxicillin, tetracycline, kanamycin, oxytetracycline, ampicillin, chloramphenicol and erythromycin. *S. agalactiae*, *S. dysgalactiae*, *S. uberis* and *Enterococci* demonstrated high level of resistance against streptomycin, penicillin and cloxaciline. Low level of sensitivity to other tested antimicrobials was demonstrated

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Antimicrobial susceptibility of Streptococcus species isolated from clinical mastitis in dairy cows.

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The antimicrobial susceptibility was determined for 50 *Streptococcus uberis*, 42 *S. dysgalactiae* subsp. *dysgalactiae* and eight *S. agalactiae* strains isolated from cow mastitis. Only 27% of the strains were susceptible to all antimicrobial compounds tested. Resistance to tetracycline was most frequent (particularly for *S. dysgalactiae* strains), then macrolide and/or lincomycin resistance. High level resistance to streptomycin and kanamycin was detected. All *S. dysgalactiae* and *S. agalactiae* strains were susceptible to beta-lactams but 44% of the *S. uberis* strains showed an elevated penicillin G MIC. All strains were susceptible to chloramphenicol and rifampicin.

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Antimicrobial susceptibility of udder pathogens isolated from dairy herds in the west littoral region of Uruguay.

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A total of 522 strains belonging to streptococci, enterococci and staphylococci isolated from sub-clinical and clinical cases of bovine mastitis from the west littoral region of Uruguay were analysed for their susceptibility to several antimicrobial agents. The susceptibility patterns were studied by agar disk diffusion methods (ADDM) and broth micro-dilution to determine the minimum inhibitory concentration (MIC). The concentration that inhibits 90% (MIC90) of the analysed strains reported in micrograms per millilitre, for *Staphylococcus aureus* were > 8, 8, < or = 0.5, < or = 4, < or = 1, < or = 0.5, > 64, < or = 0.25, 0.5, < or = 1 and < or = 1 to penicillin, ampicillin, oxacillin, cephalotin, gentamicin, erythromycin, oxitetracycline, enrofloxacin, trimethoprim/sulfamethoxazole, neomycin, and clindamycin, respectively. Coagulase-negative staphylococci (CNS) had different values for penicillin (4) and ampicillin (2), while the other antimicrobial agents had the same MIC90 values as reported for *S. aureus*. The MIC90 values for streptococci were 0.12, 0.25, < or = 4, 16, < or = 0.25, 0.5, 0.25 for penicillin, ampicillin, cephalotin, gentamicin, erythromycin, oxytetracycline and trimethoprim-sulfamethoxazole, whereas MIC90 for enterococci were 4, 4, 4, < or = 0.5, 2, > 8 for penicillin, ampicillin, gentamicin, erythromycin, oxytetracycline and trimethoprim-sulfamethoxazole, respectively. Of 336 strains of *S. aureus*, 160 (47.6%) were resistant to penicillin. For 41 CNS strains, 10 (27%) presented penicillin-resistance. All the streptococcal strains were susceptible to penicillin, while 3 (7%) of the 43 enterococcal strains were resistant. Non significant statistical differences were found between the results obtained by ADDM and broth micro-dilution for classifying bacterial isolates as susceptible or resistant according to the National Committee of Clinical Laboratory Standards

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Trends in antibacterial susceptibility of mastitis pathogens during a seven-year period.

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Milk samples collected from dairy cattle suspected of having mastitis were submitted to the Microbiology Laboratory of the Animal Health Diagnostic Laboratory, Michigan State University, for bacteriologic culture. A total of 2778 isolates, from the years 1994 to 2000, were isolated, identified, and subjected to in vitro antimicrobial susceptibility testing using the disk diffusion method, in accordance with National Committee on Clinical Laboratory Standards (NCCLS) standards. Isolates included in this study were *Streptococcus uberis*, *Streptococcus dysgalactiae*, *Streptococcus agalactiae*, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Serratia marcescens*, and *Pseudomonas aeruginosa*. The proportion of bacterial isolates determined to be susceptible did not change during the 7-yr period for the majority of bacterial-antibacterial interactions tested. However, analysis for linear trend in proportions determined that there were increases in the proportion of *S. aureus* isolates that were susceptible to ampicillin, penicillin, and erythromycin. For *Strep. uberis*, increases in the proportion of susceptible isolates occurred for oxacillin, sulfa-trimethoprim, gentamicin, and pirlimycin, and a decrease in the proportion of susceptible isolates occurred with penicillin. For *Strep. dysgalactiae*, increases in the proportion of susceptible isolates occurred with erythromycin, gentamicin, sulfa-trimethoprim, and tetracycline. For *Strep. agalactiae*, increases in the proportion of susceptible isolates occurred with sulfa-trimethoprim. Among *E. coli* isolates, there was an increase in the proportion that were susceptible to ampicillin and cephalothin. Among *K pneumoniae* isolates, there was an increase in the proportion that were susceptible to ceftiofur. Overall, there was no indication of increased resistance of mastitis isolates to antibacterials that are commonly used in dairy cattle

Evaluation of .5% and 1% Iodophor Teat Dips on Commercial Dairies

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ABSTRACT

Two postmilking teat dips containing .5 and 1% iodine were evaluated for approximately 8 mo under conditions of natural exposure to mastitis pathogens on four commercial dairy farms. In the two herds using .5% iodophor, incidence of intramammary infection with *Staphylococcus aureus* and *Streptococcus agalactiae* was reduced 68.3 and 46.2%, respectively. When numbers of new infections with both pathogens were combined, efficacy for the .5% iodophor was 62.3%. In the two herds using 1% iodophor, incidence of intramammary infection with *Staph. aureus* and *Strep. agalactiae* was reduced 52.4 and 70.7%, respectively. When numbers of new infections with both pathogens were combined, efficacy for the 1% iodophor was 64.3%. Efficacy of teat dips was variable against coagulase-negative staphylococci and *Corynebacterium bovis*.

Field trial of a staphylococcal mastitis vaccine in dairy herds: clinical, subclinical and microbiological assessments

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KEYWORDS

Staphylococcus aureus • mastitis • dairy cows • vaccine

ABSTRACT

Objective To assess the efficacy of a new staphylococcal mastitis vaccine under commercial dairying conditions.

Design A field trial involving 1819 cows and heifers conducted on seven dairy herds in Victoria. The trial was done 'blind'; approximately half the animals were vaccinated and the remainder were untreated controls.

Procedure The vaccine was given twice during the last 10 weeks of pregnancy. Effects of vaccination were assessed, during the ensuing lactation, on the basis of clinical and sub-clinical mastitis and microbiological investigations of the milk.

Results A total of 273 cases of clinical mastitis were recorded. *Staphylococcus aureus* was isolated from 112 of these, 45 cases in vaccinates and 67 cases in controls; the difference was not statistically significant. One herd was notable in having a high

incidence of clinical staphylococcal mastitis. This herd accounted for 15.8% of the animals in the field trial but 54.5% of cases of clinical staphylococcal mastitis. For this herd, vaccinated animals had significantly lower incidence of clinical staphylococcal mastitis and prevalence of subclinical mastitis, relative to controls. An unexpected feature of the trial as a whole was the low incidence of clinical mastitis from which *S aureus* was isolated in pure culture (26.3% of cases) and the high incidence of clinical *Streptococcus uberis* mastitis (22.7% of cases).

Conclusions The trial showed that the vaccine was efficacious in reducing the incidence of clinical mastitis and prevalence of subclinical mastitis in a herd that had a serious staphylococcal mastitis problem.

Effect of Re-17 Mutant *Salmonella typhimurium* Bacterin Toxoid on Clinical Coliform Mastitis

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The objective of this study was to test the hypothesis that the incidence and severity of clinical coliform mastitis could be decreased by Re-17 mutant *Salmonella typhimurium* bacterin toxoid. Holstein-Friesian cows from two Arizona dairies were selected for this study based on July through November projected calving dates; peak lactation occurred during the period of highest rainfall and peak environmental stress. The cows were randomly assigned to either a vaccinate or a control group, and 1292 cows were paired by herd, parity, calving date, and milk yield. The 646 vaccinates were injected twice during the third trimester of pregnancy with an Re-17 mutant *S. typhimurium* bacterin toxoid, and the 646 controls were not vaccinated. Vaccinated cows had significantly fewer clinical cases of coliform mastitis with positive coliform cultures and had lower culling rate from coliform mastitis than control cows during the first 5 mo of lactation. During the same period, the mortality rate from clinical coliform mastitis was 75% less in the vaccinated clinical coliform mastitic group than in the control group. Incidence of mastitis increased with advancing parity. The Re-17 mutant *Salmonella typhimurium* bacterin toxoid provided cross-protection against coliform mastitis; incidence and severity of clinical coliform mastitis were significantly lowered during the first 5 mo of lactation.

Key Words: core antigen • coliform • cross-protection • ma

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Feeding and Management

Control of Udder Infection by Management

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ABSTRACT

Evidence from field surveys indicates we are making very little progress in the control of udder disease apart from reducing the level of infection due to *Streptococcus agalactiae*. The conventional view is that the prevalence of the disease is due to poor husbandry and that most farmers could overcome the difficulty by applying what is currently accepted as good management. An objective consideration of the published literature gives almost no support to this optimistic viewpoint and reveals that we do not have a practical farm control for infections other than those caused by *S. agalactiae*.

In this paper the factors that determine the level of infection in a herd and the way a control might be achieved are discussed. On the basis of our present knowledge, it appears that of the various possible fields of research the study of management, and particularly hygiene, is most likely to produce a control within the next few years. However, for success, the hygiene systems will have to be much more effective than those currently in use.

BASES PARA LA APLICACIÓN DE AUTOBACTERINAS STREPTOCOCCUS AGALACTIAE

VACUNACIÓN CON CEPA 1a INACTIVADA ETAPA DE SECADO

EVALUACIÓN POR LA PRUEBA DE PROTECCION EN RATÓN EVALUACIÓN DE LA PRODUCCIÓN DE ANTICUERPOS ESPECÍFICOS

Resultados

Vía intracisternal

Vía intramuscular

Ambos grupos experimentales desarrollaron incremento significativo de IgG, 1 y 2., de IgM en suero y en leche, aumento significativo de IgM y de IgA con producción de Ac específicos contra la cepa de Streptococcus 1a

Yokomizo Y and Norcross N.L. Bovine antibodies against Streptococcus agalactiae, type 1a, produced by preparturient intramammary and systemic vaccination. Am J Vet Res 39: 511-516, 1978