

2017 Reciprocal Meat Conference – Meat and Poultry Safety

Meat and Muscle Biology™



Antimicrobial Resistance Patterns of Enterococcus Isolated from Feedlot Cattle after Feeding Direct-Fed Microbials in Diets with and Without Tylosin

A. English*, A. Echeverry, J. Sarturi, T. Opheim, K. Nightingale, M. Miller, and M. Brashears

Animal and Food Science, Texas Tech University, Lubbock, TX, USA

Keywords: antimicrobial resistance, direct-fed microbials, enterococcus
Meat and Muscle Biology 1(3):136

doi:10.221751/rmc2017.129

Objectives

The purpose of this study was to determine the antimicrobial resistance patterns of *Enterococcus* isolated from feedlot cattle supplemented with either a direct-fed microbials (DFM; *L. salivarius*, L28) or tylosin as part of their finishing diet.

Materials and Methods

L. salivarius L28 was used in this study, a newly isolated DFM. Three treatments based on conventional high concentrate diets were fed to finishing cattle for harvest: base (no DFM, tylosin or monensin), MonPro (DFM at a feeding rate of 10^7 cfu/head/d, with monensin, but no tylosin), and a control (tylosin and monensin). A total of 36 composite fecal samples, from 3 animals per pen, were collected after 56 d of feeding. Samples were weighed, enriched and plated onto KF Streptococcus Agar supplemented with 1% TTC solution. Three typical isolates from each plate were randomly selected and streaked onto 5% sheep blood agar for antimicrobial resistance analysis using Sensititre susceptibility MIC plates, following the National Antimicrobial Resistance Monitoring System (NARMS) protocol. The data was analyzed using a Chi-Squared test to compare resistance patterns across treatment group with a significant value of $p < 0.05$.

Results

Enterococcus was isolated from 100% ($n = 36$) of fecal samples collected. After 56 d of feeding, 100% ($n = 36$) of the control group isolates were resistant to at least 1 antibiotic, and 66% ($n = 24$) were multi-drug resistant (MDR) to 3 or more antibiotics. Isolates from the base treatment group on d 56 exhibited 97% ($n = 35$) resistance to 1 drug and 28% ($n = 10$) were MDR. Ninety-four percent ($n = 34$) of isolates in the MonPro group showed resistance on d 56, and 47% ($n = 17$) of isolates were MDR. The percent of isolates with MDR differed significantly between treatments ($p = 0.004$). Specific antibiotics of concern are listed in Table 1.

Conclusion

While the enterococci isolated in this study, in all 3 treatments, had resistance to at least 1 antibiotic, there were differences in the MDR. The most MDR was observed in the control groups. MDR in the isolates collected from cattle fed the base diet was similar to the isolates from cattle fed the MonPro diet. A total of 10 and 17 of the isolates were MDR, respectively. The supplementation of L28 instead of the tylosin resulted in fewer MDR enterococci. These results indicate that supplementation with a DFM, such as L28, may be effective in mitigating the presence of multi-drug resistance in feedlot cattle.

Table 1. Percentage of resistance for specific antibiotics across treatment.

Treatment	n	Daptomycin	Lincomycin	Erythromycin	Tylosin Tartrate	Tetracycline
Control	36	25%	100%	28%	75%	67%
Base	36	17%	94%	11%	44%	33%
MonPro	36	14%	94%	17%	44%	47%