Preliminary Investigation of the Association between Feeding Starch-based Ethanol Co-Products and *Salmonella* Species Shedding in Commercial Feedlots

J.B. Osterstock[1], *DVM, PhD;* **J.E. Kahl**[2]*;* **S.D. Lawhon**[3], *DVM, PhD*
[1]*Texas AgriLife Research, Amarillo, TX 79106*
[2]*Texas A&M University, College Station, TX 77843*
[3]*Department of Veterinary Pathobiology, Texas A&M University, College Station, TX 77843*

Introduction

Fecal shedding of *Salmonella* spp in feedlot cattle is an important component of pre-harvest food safety. Prevalence of salmonella in feedlot cattle varies and may be influenced by factors affecting hindgut and environmental ecology. Feedlots in the Texas Panhandle have begun to incorporate wet corn distiller's grains (WDGS) in their rations due to the increase in starch-based ethanol production in the region. Previous research has identified an association between feeding distiller's grains and shedding of *E. coli* O157:H7. These findings indicate that changes in starch, fiber, and fat composition of rations containing WDGS may impact hindgut ecology favoring the colonization and shedding of specific microorganisms. The objective of this study was to estimate the association between feeding WDGS and fecal shedding of *Salmonella* spp in feedlot cattle.

Materials and Methods

Six feedlots in the Texas Panhandle were selected for sampling based on the presence of WDGS in the ration at the time of collection (n=3 with WDGS; n=3 without WDGS). Within each feedlot, six pens were randomly selected for sampling and feces was collected from 10 fresh fecal pats. Samples were placed on ice and shipped to the College of Veterinary Medicine at Texas A&M University. One gram of feces was inoculated into separate tubes of buffered peptone water and tetrathionate broth and swabbed onto XLT4 and MacConkey's agar plates. One milliliter of the buffered peptone water was transferred to Rappaport-Vassiliadis (RV) broth and the buffered peptone water was held overnight at 39.2°F (4°C) for subsequent determination of the Most Probable Number of organisms present in positive samples; the tetrathionate and RV broths were incubated 24 hr at 98.6°F (37°C). After incubation, the tetrathionate and RV broths were swabbed onto XLT4 and MacConkey agar plates which were incubated an additional 24 hr at 98.6°F. Characteristic colonies from either of the four plates were subjected to biochemical testing to confirm the isolate as *Salmonella* spp. Determination of serotypes of salmonella and antimicrobial resistance profiles for recovered isolates is ongoing and not reported here. Descriptive statistics were generated for the proportion of samples from which salmonella was isolated, adjusted for correlation within feedlots. The odds of isolating salmonella associated with feeding WDGS were estimated using mixed-effects logistic regression with feedlot and pen modeled as random effects and inclusion of WDGS modeled as a fixed effect.

Results

Fecal samples were collected from the pen surface of six pens in each of six feedlots. Three feedlots fed 0% WDGS, two feedlots fed 15% WDGS, and one feedlot fed 24% WDGS on a dry matter basis. All feedlots used steam-flaked corn based rations. Salmonella was recovered from 32.7% of all fecal pats sampled. Prevalence of salmonella in fecal pats varied from 0% to 90% among pens and 0% to 85% among feedlots. Feedlots with WDGS in the ration had a salmonella prevalence of 15% (S.D. 0.36) and feedlots not using WDGS had a prevalence of 51% (S.D. 0.50). The odds of culturing salmonella from fecal pats in feedlots not feeding WDGS were not significantly different (OR 24.5; $P = 0.21$) relative to feedlots with WDGS in the ration. Feedlot and pen accounted for 55.4% and 22.0% of the variability in the model, respectively.

Significance

The results of this preliminary investigation indicate that feeding WDGS does not have a significant effect on salmonella shedding in feedlot cattle. In light of previous reports regarding shedding of *E. coli* O157:H7 associated with feeding ethanol co-products, these findings suggest that alterations in hindgut ecology attributed to feeding WDGS do not significantly impact *Salmonella* spp. However, if WDGS is associated with increased shedding of *E. coli* O157:H7, the numeric decrease in prevalence among cattle fed WDGS observed here may support previous reports of antagonistic patterns of salmonella and *E. coli* shedding.