

Effects of dietary fiber and distillers grains on fecal shedding of enterohemorrhagic *Escherichia coli* in feedlot steers

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Introduction

The objective of this study was to determine whether the presence of distillers grain (DGS) in the diet or the level of neutral detergent fiber (NDF) affects shedding of enterohemorrhagic *Escherichia coli* (EHEC) in feedlot steers.

Materials and Methods

The study was a 2 x 2 plus 1 factorial design within a randomized block design with 2 levels of dietary DGS, 2 levels of dietary fiber, and a corn control diet. A total of 100 pens of 800 steers were fed during the summer. Within each of 4 blocks, 25 feedlot pens (n=8 steers/pen) were randomly assigned in balanced fashion to the following diets: (1) 20% DGS as % of diet dry matter (DM); (2) 40% DGS diet; (3) corn fiber isolate added to match 20% diet; (4) corn fiber isolate to match 40% diet; and (5) control corn diet. Fecal samples were collected individually from steers at d 0, 35, 70, and 105, which were included in the analysis as sampling period. EHEC-7 testing was performed by the NeoSEEK™ STEC Detection and Identification test (Neogen® Corp., Lansing, MI). To measure the effects of DGS and dietary fiber level on fecal shedding of EHEC-7, multilevel multivariable logistic regression in a generalized linear mixed model was utilized. Random effects of clustering by pen within block, block, and the repeated measure of animal ID were included in the model. Each EHEC serogroup of interest was modeled separately. In the interpretation of results, P-values ≤0.05 were considered significant.

Results

For EHEC O45, O103, O121, O145, and O157 the greatest proportion of positive fecal samples were collected in

sampling period 1 (day 0) (p<0.0001). Uniquely, EHEC O111 was more likely to be found in sampling periods 3 or 4 than 1 or 2 (p<0.0001). EHEC O45 and EHEC 103 were significantly associated, and also associated with interaction effects of sampling period by DGS, sampling period by fiber, and DGS by fiber. Increased fiber significantly increased the odds of finding O45 and O103 in sampling periods 3 and 4. The inclusion of DGS at increased fiber levels significantly increased the odds for detecting O45 and O103. EHEC O145 and EHEC O157 were significantly associated, and the interaction effect of sampling period by DGS significantly affected the presence of O145 and O157. During sampling period 3, the presence of DGS increased the odds for finding O145 and O157. EHEC O111 was affected differently than all other EHEC serogroups. The interaction effects of fiber by sampling period and fiber by DGS significantly affected the presence of O111. Increased fiber level in sampling periods 2 and 3 significantly decreased the odds to find O111, while in sampling period 4 increased fiber had no effect on O111. Inclusion of DGS decreased the odds of detecting O111 at moderate fiber levels.

Significance

These results indicate that the effects of sampling period, dietary fiber, and DGS are not the same for every serogroup, but certain serogroups are associated, possibly because they are affected by the same risk factors.