Variable Efficacy of a Vaccine and Direct-Fed Microbial for Controlling *Escherichia coli* O157:H7 in Feces and on Hides of Feedlot Cattle

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**Abstract**

To evaluate the efficacy of a type-III secreted proteins vaccine and a *Lactobacillus-acidophilus*-based direct-fed microbial (DFM) for controlling *Escherichia coli* O157:H7, cattle (n=864) were allocated to the following groups: DFM, finishing diets containing 10^9 colony-forming units (CFU)/animal/day L. acidophilus and *Propionibacterium freudenreichenii*; VAC, finishing diets and 2 mL intramuscular injection of vaccine at allocation and 28 days later; or CON, finishing diets only. Cattle within replicates were stratified by initial levels of *E. coli* O157:H7 and randomized to experimental groups, with 30 pens allocated on June 15, 2011 (AS1), 18 pens allocated on June 28, 2011 (AS2), and 18 cattle per pen. Rectal fecal samples and perineal swabs were collected at 28-day intervals until shipment to slaughter (103-145 days on trial). Numbers of cattle with enumerable *E. coli* O157:H7 (≥1.6 CFU/g feces) were reduced in AS1 and AS2 by VAC (p=0.008), although interventions had no impact on numbers of *E. coli* O157:H7 shed. For AS1, VAC reduced prevalence of *E. coli* O157:H7 in feces (p=0.03) and perineal swabs (p=0.04) in the feeding period but not at shipment to slaughter. For AS2, prevalence of *E. coli* O157:H7 was not reduced in either feces or perineal swabs by VAC at any time. For AS1, DFM reduced prevalence of *E. coli* O157:H7 in perineal swabs (p=0.01) during the feeding period. For AS2, DFM increased *E. coli* O157:H7 detection in feces (p=0.03) and perineal swabs (p=0.01) at shipment to slaughter. Seventy-five percent of AS1 *E. coli* O157:H7 isolates had only stx1, while 87% of AS2 isolates had stx1 and stx2 genes. Of the two interventions, VAC shows the most potential for pre-harvest control of *E. coli* O157:H7, but due to variable efficacy of both DFM and VAC, additional product development is necessary to ensure more consistent pre-harvest control of *E. coli* O157:H7.