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# Vaccinating with SRP *E. coli* does not affect feeder cattle performance, health, or carcass characteristics

## Abstract

Siderophore-receptor and porin-based (SRP) *Escherichia coli* vaccine technology functions by starving the *E. coli* organism via competitive exclusion for proteins that scavenge iron, an essential nutrient for *E. coli* viability. Vaccination with SRP *E. coli* technology decreased the prevalence of *E. coli* O157:H7 in artificially inoculated cattle and in cattle naturally shedding the organism. Examination of the effects that SRP *E. coli* vaccines exert on performance parameters has yet to be attempted in a commercial setting. The use of SRP *E. coli* vaccine technology effectively decreases the prevalence of *E. coli* O157:H7 in feeder cattle and may improve beef safety; however, the vaccine's effects on the economics of cattle feeding are unknown. Therefore, the objective of our study was to assess the effects of vaccinating cattle three times with an SRP *E. coli* vaccine versus a placebo on performance, health, and carcass characteristics of cattle fed in commercial feedlots.

## Keywords

Cattlemen's Day, 2012; Kansas Agricultural Experiment Station contribution; no. 12-231-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 1065; Beef Cattle Research, 2012 is known as Cattlemen's Day, 2012; Beef; *E. coli*; Feeder cattle; Performance; Health; Carcass characteristics

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# Vaccinating with SRP *E. coli* Does Not Affect Feeder Cattle Performance, Health, or Carcass Characteristics

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## Introduction

Siderophore-receptor and porin-based (SRP) *Escherichia coli* vaccine technology functions by starving the *E. coli* organism via competitive exclusion for proteins that scavenge iron, an essential nutrient for *E. coli* viability. Vaccination with SRP *E. coli* technology decreased the prevalence of *E. coli* O157:H7 in artificially inoculated cattle and in cattle naturally shedding the organism. Examination of the effects that SRP *E. coli* vaccines exert on performance parameters has yet to be attempted in a commercial setting.

The use of SRP *E. coli* vaccine technology effectively decreases the prevalence of *E. coli* O157:H7 in feeder cattle and may improve beef safety; however, the vaccine's effects on the economics of cattle feeding are unknown. Therefore, the objective of our study was to assess the effects of vaccinating cattle three times with an SRP *E. coli* vaccine verses a placebo on performance, health, and carcass characteristics of cattle fed in commercial feedlots.

## Experimental Procedures

Sixty pens of feeder cattle (4,869 head; initial body weight =  $728 \pm 12.7$  lb) housed in 4 commercial feedlots in Kansas and Nebraska were administered 1 of 2 treatments: (1) subcutaneous injection with 2 mL of SRP *E. coli* O157:H7 vaccine (Pfizer Animal Health, New York, NY) on day 0, between 21 and 29 days on feed, and between 42 and 57 days on feed (VAC), or (2) subcutaneous injection with a placebo containing physiological saline emulsified with a commercial adjuvant on the same days as the VAC cattle (CON). Cattle were individually weighed on day 0. Pen weights were recorded on the day of slaughter. Daily feed delivery to individual pens was recorded. Animal health was observed by trained feedlot personnel daily. Pen-closeout data were provided by each feedlot, and carcass characteristics were recorded by trained personnel at a commercial abattoir.

## Results and Discussion

No negative effects on performance or health were observed when feeder cattle were vaccinated with three doses of SRP *E. coli* vaccine compared with CON. Average daily gain was not different between treatments (3.09 versus 3.11 lb for CON and VAC, respectively;  $P = 0.73$ ; Table 1). Likewise, CON and VAC did not differ in percentages of Prime and Choice carcasses (46.1 versus 45.3%, respectively;  $P = 0.61$ ) or percentages of yield grade 1 and 2 carcasses (68.6 versus 69.1% for CON and VAC, respectively;  $P = 0.76$ ). Based on these observations, SRP *E. coli* vaccine may be used to reduce the prevalence of *E. coli* O157:H7 without negative effects on animal performance;

however, we must note that CON cattle were subjected to the same number of pen removals for revaccination as VAC. Examination of the effects of no vaccination and no pen removals versus multiple pen removals for vaccination is warranted.

## Implications

Vaccinating feedlot cattle with SRP *E. coli* vaccine may reduce the prevalence of *E. coli* O157:H7 in packing plants, but additional research is needed to determine the effects of the additional handling requirements on growth and carcass performance.

**Table 1. Effects of vaccinating feedlot cattle 3 times in the feedyard with SRP *E. coli* on performance, mortality, and carcass traits**

Item	CON	VAC	SEM	<i>P</i> -value
Initial weight, lb	729	728	12.78	0.72
Slaughter weight, lb	1,184	1,190	11.51	0.16
Average daily gain, lb	3.09	3.11	0.056	0.73
Dry matter intake, lb	19.9	20.5	0.31	0.13
Feed:gain	6.47	6.56	0.11	0.54
Death loss, %	3.2	3.2	0.70	0.98
Dressing percentage	65.1	65.0	0.22	0.57
Prime/Choice, %	46.1	45.3	2.03	0.61
Yield grades 1 and 2, %	68.6	69.1	1.96	0.76