Evaluating *Salmonella* Shedding in Backgrounded Calves Fed Broiler Litter

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Introduction

The ability of ruminants to utilize nutrients present in waste from other species provides an opportunity for efficient use of waste and a cost-effective source of cattle feed.[1] Processed broiler litter has been fed to beef cattle in the U.S. for several decades.[2] Recently, however, concerns have been raised about litter as a potential source of pathogens, including *Salmonella* species, that may be spread from poultry to cattle and ultimately to consumers.[3,4,5] This project was designed to determine whether feeding broiler litter increases the prevalence of *Salmonella* shedding in backgrounded beef calves.

Materials and Methods

Salmonella-positive litter was received freshly removed from a poultry house. The litter was stacked 7 feet high and covered with plastic to limit air exposure and control heating. When stacked in this manner, litter should reach the desired temperature 131°F (55°C) within 5 days and remain at that temperature for approximately 21 days. We also shallow-stacked litter (approximately 3 feet high), to avoid heating, therefore increasing the chance of *Salmonella* survival. During processing, the stacks were checked at 3 to 4-day intervals to monitor heating at various depths. Based on current industry recommendations, the stacks were allowed to heat for at least 21 days prior to feeding.

Sixty calves (average of 594 lb (270 kg) each) were placed in pens according to weight, with heaviest calves in one pen, lightest calves in another and three groups of intermediate-weight calves. Calves were started on a receiving ration for 14 days while learning to eat from an individual feeding gate system. Treatments were randomly assigned by pen, with all treatments represented in each pen. All pens have slatted floors with fenceline contact between pens. The calves were divided into 6 treatment groups based on diet: 1) no litter 2) no litter + Rumensin® 3) deep-stacked litter 4) deep-stacked litter + Rumensin® 5) shallow-stacked litter or 6) shallow-stacked litter + Rumensin®. Diets are of comparable nutritional value.

Prior to starting on the treatment ration, fecal samples were collected at 2 different times. Both samples were negative for all calves. Feces are collected from each calf and cultured biweekly throughout the trial. All feed ingredients are sampled and cultured weekly throughout the trial to rule them out as potential sources of *Salmonella* contamination. Calf weights also are being monitored on days 0, 14, 28, 56 and 84 to determine differences in gains between treatments for economic analysis.

At the end of the feeding period (84 days) the calves will be loaded onto a trailer, transported for 6 hours, unloaded overnight, reloaded and brought back to the research farm in an attempt to induce stress-related shedding of *Salmonella.* They will be re-sampled 24 hours after transport.

Cultures of all samples of litter, feed ingredients and feces were performed in the same manner. Ten grams (feces) or 25 grams (feed) was diluted with 90ml of Buffered Peptone Water and incubated at 98.6°F (37°C) for 20-28 hours. After incubation, a sub-sample (0.1ml) was transferred to 10ml of Rappaport's broth and incubated at 98.6°F for 20-24 hours. XLT4 agar plates were then streaked with 10µl of the growth from the Rappaport's broth and incubated for 20-24 hours at 98.6°F. Suspect *Salmonella* colonies were confirmed biochemically and serotyped.

Results

At 28 days into the feeding period, *Salmonella* has not been isolated from the feces of any of the calves. *Salmonella* has been isolated from 2 samples of the total mixed ration, both of which contained deep-stacked litter. Calves are gaining weight on all diets, with control diets appearing to give the most gain at 28 days into the study (controls = 4 lb/day (1.78 kg); deep-stacked litter = 2.6 lb/day (1.19 kg); shallow-stacked litter = 2.2 .b/day (1.01 kg).

References

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