WASHING/SANITIZING OF PIG TRAILERS TO REDUCE THE INCIDENCE OF *SALMONELLA.*

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BACKGROUND

During handling and transportation to market, poultry and red meat animals become stressed (8,14). This stress can cause shipping fever in cattle and increased excretion of fecal material by all species (8,14). While some healthy pigs can carry *Salmonella* in their intestinal tract without shedding (7), they may shed *Salmonella* under transportation stress (7,9,16,17,18). *Salmonella*-contaminated trailers, if not cleaned and santized between trips, have the potential to infect other farms (4), the abattoir environment (6), or other animals (4,10). Reports indicate that handling practices between farm and slaughter can affect the microbial flora on a carcass (2,10, 13). When a pig becomes contaminated with *Salmonella* during transportation and slaughter, the carcass and resulting meat may become the means for infection in humans (5,11,15).

There is no current U. S. requirement to wash and sanitize animal trailers between lots of animals. Research has indicated that washing and decontamination can reduce bacteria on poultry cages (3) and aircraft and ships used for animal transport (1).

OBJECTIVES

The primary objective of this study was to determine if washing and sanitizing the hauling trailers, could eliminate *Salmonella* from the trailers and thus help break the *Salmonella* chain. The secondary objective was to determine if the season of the year and distance traveled affected the incidence and level of *Salmonella* and *Escherichia coli* found in the trailers.

METHODS AND MATERIALS

Sampling of Trailers: Pigs from commercial growers were loaded into clean trailers for transport to the slaughter house. The trailers were part of the Hatfield Quality Meats Inc. fleet (Hatfield, Pennsylvania) and were identical in floor area. Each trailer contained three tiers and were divided by gates into 10 cells. Each cell can hold up to 20 pigs, thus each tailer can hold a maximum of 200 pigs. The trailer carried a single load (one trip) before samplingting. For this study, the hauling distances were grouped as either short distance (<500 miles) or long distance (>500 miles). The study was conducted throughout the course of whole year (all four seasons) in southeast Pennsylvania and the daily outdoor temperature was recorded.

After the pigs were unloaded, a technician cleared the area to be sampled by brushing the bedding material aside with their sterile-gloved hand. After regloving, the technician aseptically sampled a 100 cm^2 floor area using a sterile sponge dampened with 10 ml of buffer peptone water. Five to six individual cells (one sample per cell) were sampled from each trailer. The sponge was placed in a sterile Whirl Pack bag and stored refrigerated for tansport to the lab. The trailer was then cleaned and sanitized by the following procedure: a) rinse with reconditioned water (12) to remove dirt and bedding material; b) rinse with potable water; c) wash with alkaline detergent--Power Play (Equipment Trade Service Co., Norwood, PA); d) rinse with potable water; e) spray with quaternary ammonium sanitizer-Roccal®-D (The Upjohn Co., Kalamazoo, MI). The same floor areas (one sample/cell) were also sampled after washing/sanitizing.

Microbiological analysis: After the addition of 90 ml of 1% buffered peptone water to the bag, the sponges were mixed using a Stomacher laboratory mixer. The number of *E. coli* was determined using *E. coli* count Petrifilm™. The Petrifilms™ were incubated at 37 C for 24 h before hand counting.

The level of *Salmonella* in the diluted samples was quantitated. The following three tube Most Probable Number (MPN) procedure was used: a) pre-enrichment in 1 % buffered peptone water; b) selective enrichment in tetrathionate and selenite cystine broths; c) presumptive identification of characteristic colonies on brilliant green sulfa and double modified lysine agars; d) confirmation by biochemical and Poly 0/H agglutination tests. After the pre-enrichment and selective enrichment steps the samples were screened for *Salmonella* using the Tecra visual immunoassay. If positive, the MPN procedure was continued.

RESULTS and DISCUSSION

Before washing and sanitizing all trailers were positive for *Salmonella*, with some trailers having >110 MPN/cm^2 of floor area. As shown in Table 1 and 2, the level of *Salmonella* was reduced, in most cases, to undetectable levels (<1 MPN/cm^2) after washing and sanitizing. There were some instances (7 out of 188 samples) in which the washing/sanitizing did not reduce the *Salmonella* to the undetectable level, but there was generally a hundred-fold decrease. There was no statistical difference ($P>0.05$) between traveled distance and incidence of *Salmonella*. In addition season of the year had no effect on the prewashing incidence of *Salmonella*, e.g., trailers were positive for *Salmonella* regardless of season.

All trailers were positive for *E. coli* before washing and sanitizing, with some trailers having levels as high as 10^5 CFU/cm^2. As shown in Tables 1 and 2, there was an average two log reduction in *E. coli* counts after washing/sanitizing: this reduction is statistically significant ($P>0.05$). This limited reduction of *E. coli* compared to *Salmonella* can be explained by the differences in sensitivity of these two bacteria to the Roccal®-D sanitizer (Technical literature, Upjohn Co.) Season of the year had an influence on the levels of *E. coli* with summer trailers having a significantly higher values than winter trailers.

CONCLUSION

Washing/sanitizing pig hauling trailers after unloading animals significantly reduced the incidence of *Salmonella* and *E. coli*,

thereby limiting its spread and cross contamination of other animals, the farm, and the slaughter environment.

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TABLE 1. Effect of season on recovery of *Salmonella* as Most Probable Number/cm^2 and *E. coli* as log Colony Forming Units/cm^2 from the floors of the trailers, reported as the highest estimated.

	NUMBER OF		*SALMONELLA*		*E. coli*	
SEASON	TRAILERS TESTED	CELLS TESTED	BEFORE WASHING	AFTER WASHING	BEFORE WASHING	AFTER WASHING
SPRING	5	30	>110	2	4.44	3.40
SUMMER	10	56	110	1	5.65	3.67
FALL	7	42	>110	2	5.28	1.45
WINTER	10	60	21	1*	4.60	1.34

*Detectability = 1 MPN/cm^2.

TABLE 2. Effect of distance on recovery of *Salmonella* as Most Probable Number/cm^2 and *E.coli* as log Colony Forming Units/cm^2 from floor of trailers, reported as the highest estimated.

	NUMBER OF		*SALMONELLA*		*E. coli*	
DISTANCE TRAVELED	TRAILERS TESTED	CELLS TESTED	BEFORE WASHING	AFTER WASHING	BEFORE WASHING	AFTER WASHING
SHORT (<500 miles)	8	48	24	2	5.65	3.90
LONG (<500 miles)	24	140	>110	1*	5.73	3.45

*Detectability = 1 MPN/cm^2.