

# Transport and Holding at the Abattoir: A Critical Control Point for *Salmonella* in Market Swine?

J. D. McKean<sup>1</sup>, H. S. Hurd<sup>2</sup>, M. H. Rostagno<sup>3</sup>, R. W. Griffith<sup>4</sup>, I. V. Wesley<sup>2</sup>

1: Department of Veterinary Diagnostic and Production Animal Medicine, Iowa State University, Ames, Iowa, USA, 50011, phone: 515-294-8790; Fax 515-294-8793; Email: [x2mckean@iastate.edu](mailto:x2mckean@iastate.edu).

2: National Animal Disease Center:ARS;USDA, Ames, Iowa, 50010. 3: Federal University of Lavras, Department of Veterinary Medicine, Caixa Postal 37, CEP 37200-000, Lavras, MG, Brazil.

4: College of Veterinary Medicine, Iowa State University, Ames, Iowa 50011.

**Abstract:** The study objective was to compare on-farm and abattoir collected fecal and tissue samples to estimate transport and holding effects on *Salmonella* contamination of market swine. One-half of study pigs from each commercial finishing herd (6) were necropsied on-farm and the other half at a commercial abattoir. The farm *Salmonella* prevalence was estimated at 5.3% based on culture of fecal samples, ileocecal lymph nodes, and cecal contents. The abattoir *Salmonella* prevalence estimate was 39.9% based on the same sample types. This study demonstrates that transport and holding at the abattoir is a critical control point for *Salmonella* contamination.

**Keywords:** Abattoir, fecal sample, ileocecal lymph node, *Salmonella*

**Introduction:** Studies have reported the *Salmonella enterica* isolation rates in market swine are three to 10 times higher after transport and slaughter compared to on-farm rates (Hurd et al., 2001a). Carcass contamination post slaughter has been reported as related to intestinal *S. enterica* infections. A recent study demonstrated that *Salmonella* can infect market aged swine within two hours of exposure to a contaminated environment (Hurd et al., 2001b). The objective of this study was to compare the on-farm *S. enterica* prevalence with that after transport and holding utilizing identical sampling procedures.

**Materials and Methods:** Six herds scheduled for depopulation in the Accelerated Pseudorabies Eradication Program (APEP) were utilized in this study. Three days before depopulation, study animals (100/site) were individually identified and a 1 g antemortem fecal sample was collected. On depopulation day, study pigs were randomly divided into on-farm necropsy (50) and abattoir necropsy (50) groups.

The abattoir group was transported with other swine from the site in cleaned and disinfected commercial vehicles. At the abattoir, they were held in pens for an average of 2.5 hours. After exsanguination the carcasses were diverted for

necropsy. The following were aseptically collected from each carcass: ileocecal lymph nodes, ~ 10 g of cecal contents, superficial inguinal lymph nodes and a 1 g fecal (same procedure as antemortem). The following day identical samples were collected on-farm after humane euthanasia. All samples were cultured for the presence of *S. enterica* as previously described (Hurd et al., 2001a). Cultures were submitted for serotyping at the National Veterinary Services Laboratory, Ames, Iowa.

**Results:** *Salmonella* isolation rates for all herds, by sample type, collected at the farm and abattoir are presented in Figure 1. This comparison demonstrated isolation rates from abattoir samples were seven times higher (5.3 vs. 39.9%) than identical on-farm samples ( $P < 0.05$ ). Isolation rates were significantly higher ( $P < 0.05$ ) for all collected.

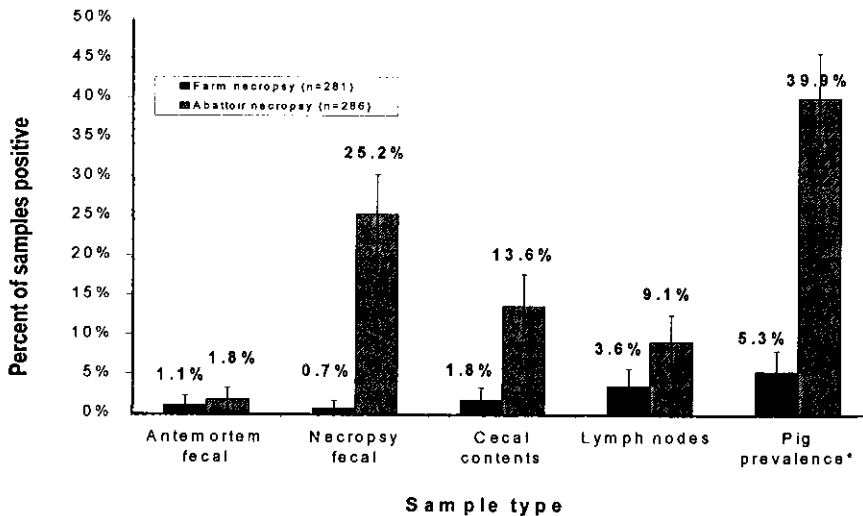
Based on antemortem fecal samples, mean *S. enterica* prevalence for the six herds was estimated as 1.47%, with no difference between treatment groups. For each herd, the *S. enterica* prevalence was higher at the abattoir than on-farm; and, except for Herd 1, prevalence was significantly higher ( $P < 0.05$ ). The cecal contents and fecals collected at the abattoir yielded positive isolations more frequently than on-farm. Cecal content isolations for Herds 3 and 4 and fecals for Herds 2, 3, and 4 were significantly different ( $P < 0.05$ ). Only Herd 3 demonstrated a significant difference in lymph node isolation rates ( $P < 0.05$ ). All serotypes found on-farm ( $n=9$ ) presented at the abattoir. At the abattoir an additional 8 serotypes were recovered. Pigs from herds raised outside were more likely ( $P < 0.001$ ) to be *S. enterica* positive at the abattoir, 53.2 vs. 27.2%, but on-farm rates were not different ( $P = 0.9$ ) for outside (4.8%) and confined (5.4%) swine.

**Discussion:** Study results demonstrated that commercial transport and lairage practices increased the isolation of *S. enterica* from farm to abattoir. These results are consistent with studies where antemortem fecal samples were compared with tissues collected at the abattoir (Hurd et al., 2001a). The current study design minimized variations caused by collection differences by evaluating the same samples in each location. The only differences were method of euthanasia and time interval between exsanguinations and sample collection. A regression analysis of abattoir-collected samples demonstrated no impact on *S. enterica* isolation rates based on time elapsed before necropsy. Comparison of on-farm and abattoir recovered serotypes showed that pigs contracted new serotypes at the abattoir. These observations suggest that holding pens are a critical control point for *S. enterica* contamination of market swine.

**Acknowledgements:** Supported by a grant from the National Pork Producers Council on behalf of the National Pork Board.

**References**

- Hurd, H. S., McKean, J. D., Wesley, I. V., and Karriker, 2001 a. The effect of lairage and transport on *Salmonella* isolation from market pigs. J. Food Prot., 64: 939-944.
- Hurd, H. S., Gailey, J. K., and Rostagno, M. A., 2001 b. Rapid infection in market swine following exposure to a *Salmonella* contaminated environment. Am. J. Vet. Res., 8: 62.



\*Pig prevalence is determined by *S. enterica* isolation from any of the samples collected at necropsy (1 g fecal, cecal contents, or superficial and inguinal lymph nodes).

Figure 1. Comparison of *Salmonella enterica* isolation rates from market swine (6 herds) necropsied on-farm of origin or the abattoir after 2.5 hours holding in pens.