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THE INFLUENCE OF FARM AND LAIRAGE ENVIRONMENTS ON *SALMONELLA* CONTAMINATION IN MARKET HOG LYMPH NODES

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I. INTRODUCTION

Salmonella is present in swine production environments, processing environments, tissues, organs, and feces [1,2,3,4,5,6,7]. Cutting an infected lymph node during fabrication may lead to carcass contamination, and cross-contamination of clean surfaces of the processing line [1,8,9]. The literature suggests that lairage likely contributes to *Salmonella* contamination [10,11,12] and understanding the impact of lairage duration on *Salmonella* occurrence in mesenteric lymph nodes (MLNs) and superficial inguinal lymph nodes (SILNs) is a key data gap addressed by this study.

II. MATERIALS AND METHODS

Market hogs from four separate flows of pigs were sampled in this study, and pigs from each flow are designated as a “group”. For each group, the finishing barn was in a separate state within the United States. Immediately following depopulation for transport to processing, five pens were sampled using pre-moistened skim milk EnviroBooties using one pair per pen. EnviroBooties were placed over boot covers, and the pen area was sampled by walking in a “Z” pattern. For each group, hogs were held in 3 lairage pens. The 3 lairage pens containing study hogs and 9 lairage pens containing non-study hogs were sampled immediately following depopulation using EnviroBooties as described above. For each flow, approximately 100 MLNs and 100 SILNs were obtained. MLNs and SILNs were classified by lairage duration (< 3 hours, between 3 and 6 hours, > 6 hours). Each individual EnviroBootie was combined with 100 ml of Buffered Peptone Water (BPW) to prepare a bootie-BPW-suspension. Then, 30 ml of bootie-BPW-suspension was combined with 30 mL of BAXMP media containing 30 μl of BAX Quant solution, mixed, and incubated at 42°C for 24 hours to produce a BAX bootie enrichment. MLNs and SILNs were weighed after removing connective, adipose, and muscle tissues. Then, each lymph node (LN) was surface sterilized in boiling water for 3 seconds, placed into a filter barrier bag, and smashed with a rubber mallet. The LNs weighing less than 3 grams were combined with 20 ml of BAXMP media, while all other LNs were combined with 80 mL of BAXMP media. The LN-BAXMP mixture was homogenized and incubated at 42°C for 24 hours. Prevalence was determined using enrichments as substrates for the BAX System Real-Time PCR Assay for *Salmonella* according to the manufacturer’s instructions. Data were analyzed using the GLIMMIX procedure of SAS, and statistical significance was determined using a threshold of $p < 0.05$, to determine the impact of lairage time on market hog lymph node contamination.

III. RESULTS AND DISCUSSION

Salmonella was detected in 83.3% (35/42) of finishing pens, with individual group prevalence ranging from 50% to 100%. Overall, *Salmonella* prevalence in lairage was 92.1% (81/88), which suggests that market hogs are routinely exposed to *Salmonella* during lairage. *Salmonella* prevalence in MLNs was 59.4% (234/394). *Salmonella* prevalence in MLNs from hogs with lairage durations ≥ 3 hours was significantly higher than for durations less than 3 hours (Table 1). While *Salmonella* prevalence in SILNs from hogs with lairage durations shorter than 3 hours (10.0%) was significantly higher than for lairage durations of 3 to 6 hours (2.0%), the overall SILN prevalence could be considered low at 3.5 % (14/400) (Table 1).

Table 1: Prevalence of *Salmonella* in mesenteric and superficial inguinal lymph nodes collected from market hogs at commercial processing facilities in the United States.

Lairage Duration	Mesenteric Lymph Node Prevalence % ± Standard Error of Mean% (N)	Superficial Inguinal Lymph Node Prevalence % ± Standard Error of Mean% (N)
Less than 3 hours	25.0% ± 5.25% (17/68)[a]	10% ± 3.59% (7/70)[a]
3-6 hours	65.5% ± 3.44% (125/191)[b]	2.0% ± 0.99% (4/200)[b]
More than 6 hours	69.7% ± 4.00% (92/132)[b]	2.3% ± 1.32% (3/130)[ab]

[ab] Indicates that values within a column differ significantly (P<0.05). The effect of lairage duration was significant for mesenteric (P<0.0001) and superficial inguinal (P=0.0130) lymph nodes.

IV. CONCLUSION

Lairage holding pens are frequently contaminated with *Salmonella* and are a plausible contamination source. Longer lairage durations may be associated with increased MLN contamination. While MLNs typically do not enter the food chain, these data suggest that lairage could impact *Salmonella* prevalence in lymphatic tissues, especially tonsils. Future research should determine if *Salmonella* prevalence in specific lymphatic tissues is related to lairage duration.

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