Association of Pathogen Load in Pigs with Retail Pork Contamination.


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Abstract

Salmonella and Campylobacter are estimated to cause 3.9 million illnesses annually in the United States, and most of these illnesses are food-related. Pigs can be sub-clinically infected with these pathogens and fecal contamination of meat during processing is a food safety risk. Quantitative measures of foodborne safety risk are rarely reported and are a critical data gap for development of quantitative risk assessments. The goal of this study was to determine the association between the concentration of Salmonella and Campylobacter in porcine feces and hide with concentrations in meat. Samples were collected 5 times from 100 individually identified pigs during the peri-harvest period. Feces were collected on the farm and in lairage. A hide swab was collected before scalding and the entire carcass was swabbed immediately before chilling. For each individually identified carcass a meat sample was collected. Salmonella and Campylobacter were cultured and quantified at each stage using the Most Probable Number Method (MPN). At the time of submission, 20 pigs have been sampled. Salmonella was cultured from one farm and one lairage sample. The proportion (%) of samples that were Campylobacter positive was 95, 100, 100, 100, and 37 for farm, lairage, hide, carcass and rib samples respectively. The mean Campylobacter concentration for each sample type was: farm, 227,785 cfu/g; lairage, 1,946,294 cfu/g; hide, 476 cfu/100 cm²; carcass, 470 cfu/half carcass; and ribs, 820 cfu/lb.

Introduction

Salmonella and Campylobacter are estimated to cause 3.9 million illnesses annually in the United States, and most of these illnesses are food-related (Mead et al.). Pigs can be sub-clinically infected with these pathogens and fecal contamination of meat during processing is a food safety risk. Qualitative measures of contamination have been used in the past to assess food borne safety risk, but this can be problematic because it does not consider the quantity of bacteria contaminating the product, which is important for the risk of human infection as it relates to infectious dose. Quantitative measures of contamination could be utilized to evaluate interventions and to collect data for public health risk assessments. Quantitative measures of foodborne safety risk are rarely reported in the literature, most likely as a consequence of the substantial labor and media requirements of traditional culture based methods for determining pathogen concentration. The goal of this study was to determine the association between the concentration of Salmonella and Campylobacter in porcine feces and hide with concentrations in meat.

Material and methods

Samples will be collected 5 times from 100 individually identified pigs during the peri-harvest period. Feces were collected on the farm and in lairage. A hide swab was collected before scalding and the entire carcass was swabbed immediately before chilling. For each individually identified carcass a meat sample was collected. Salmonella and Campylobacter were cultured and quantified at each stage. Samples that were cultured for Salmonella were placed in Tetthionate Broth (TTB) with iodine added only for 48 h at 37°C. The samples were then transferred to Rapport-
Valsides (RV) Broth and incubated at 42°C for 24h and then spread-plated onto Xylose Lactose Tergitol 4 (XLT4) plates. Plates were then read yes/no for the presence of a Salmonella suspect colony. Four 10-fold dilutions were made and the 3 tube MPN method was used to quantify the samples. Calculations were performed using the excel spreadsheet from the FDA’s Bacteriological Analytical Manual. The farm and lairage samples were enumerated using the direct dilution method for Campylobacter. The fecal samples were mixed with buffered peptone water (BPW) and plated onto Campy-Cefex plates. After incubation under microaerophilic conditions at 42°C for 48h the suspect campylobacter colonies were counted. The hide, carcass and meat samples were incubated in Bolton Broth for 48h under microaerophilic conditions at 42°C and were then spread plated onto Campy-Cefex the plates were read and the MPN was calculated as described previously. Descriptive statistics will be performed on the results (prevalence and mean concentration). Determination of association between concentrations will be preformed using the Spearman’s Rank Coefficient. The risk of a meat sample being positive will be calculated using odds ratios.

Results

At the time of submission, 20 pigs have been sampled. Salmonella was cultured from one farm and one lairage sample. The proportion (%) of samples that were Campylobacter positive was 95, 100, 100, 100, and 37 for farm, lairage, hide, carcass and rib samples respectively. The mean Campylobacter concentration for each sample type was: farm, 227,785 cfu/g; lairage, 1,946,294cfu/g; hide, 476 cfu/100cm²; carcass, 470 cfu/half carcass; and ribs, 820 cfu/lb. Further results will be given at presentation.

Discussion

Based on the preliminary results at every stage peri-harvest the pigs have had Campylobacter recovered.

Conclusions

References