The Sero-prevalence of Salmonella spp. in Finishing Swine in Iowa

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Summary: This study represents the first attempt to classify Iowa production sites for Salmonella spp. sero-prevalence. The data suggest that the Iowa herds are similar in their distribution with respect to sero-prevalence of salmonella as Danish herds. Ignoring herd size, 91.2 % of surveyed herds were negative or level 1, 8.2 % were level 2 herds, and 1.6 % level 3. These results are similar to previous Danish studies (Alban et al., 2002, Mousing et al., 1997). The current data suggests that larger herds tend to have a higher sero-prevalence than smaller units; however, formal analysis has yet to be conducted to determine the direct association between herd size and salmonella sero-prevalence. Studies by Carstensen et al. (1998) suggested that herd size was statistically associated, albeit weakly, with Salmonella sero-prevalence, but the authors concluded the relationship was probably not biologically significant.

Introduction: The study objective was to estimate the Salmonella serologic prevalence of production sites in Iowa.

Methods and materials: The study population was 1150 Iowa producers who submitted at least one lot (lot sizes – 20-180 head) per month - March to February 2002. Four diaphragm samples were collected from each lot as part of an Aujeszky’s Disease surveillance program. A total of 1131 farms met the criteria. Sample analysis: Meat juice samples were tested by the IDEXX Swine Salmonella test kit®. The cut-off positive value was designated by the manufacturer. Statistical analysis: For the individual animal the prevalence and 95 % CI were calculated using Proc SurveyMeans (SAS 8.1®). For lots and farms the sampling probability was unknown, therefore Proc Means (SAS 8.1®) was used. Farms were classified based on their estimated annual production and sero-prevalence. Farms with < 5000 annual production were classified: negative, level 1 (0 % - < 25 % sero-positive), level 2 (25 – 50 %) and level 3 (> 50 %). Farms with > 5000 annual production were classified: negative - 10 % - < 10 % sero-positive), level 2 (10 – 33 %) and level 3 (> 33 %).

Results: From a total of 28,465 samples collected, 26,325 were used in this analysis. The remaining samples were from herds that did not produce sufficient numbers within the sampling time period. Of those selected, 24,403 samples tested negative, 1915 positive and seven samples could not be tested. These 26,325 samples were collected from 6521 harvest lots. In 1229 lots at least one animal tested positive with 1915/5200 positive. Their average lot prevalence was 38.8 %. At least one positive animal was submitted from 506 farms. Farms with < 500 head annual production were classified: negative- 232/319; Level 1 - 57/319; Level 2 - 25/319; and Level 3 - 5/319. Farms with between 500 - 5000 head were classified: negative - 371/784; Level 1 - 340/784; Level 2 - 61/784; and Level 3 - 12/784. Farms with > 5000 head the classifications were: negative - 7/28; Level 1 - 14/28; and Level 2 - 7/28. Figure 1 gives the percentages of levels within herd sizes. Figure 2 provides information about the estimated sero-prevalence ignoring herd size. Figure 3 gives the frequency distribution histograms for each herd size.
Discussion: This study represents the first attempt to classify Iowa production sites for *Salmonella* spp. sero-prevalence. The data suggest that the Iowa herds are similar in their distribution with respect to sero-prevalence of salmonella as Danish herds. Ignoring herd size, 89 % of herds were negative or level 1, 95 % were level 2 herds and 1.5 % were level 3. This is very similar to the results reported by Mousing et al., (1997): 93 % of Danish herds where negative or level 1, 3.9 % where level 2 and 2.3 % where level 3. The data however do suggest that larger herds may tend to have a higher sero-prevalence (Figures 1 and 3). This interpretation however is limited by the fact that few herds are large in this dataset - only 28, but again this follows a similar pattern observed in Danish studies in 1997 (Mousing et al., 1997). Studies by Carstensen et al. (1998) suggested that herd size was statistically associated with *Salmonella* sero-prevalence in Danish herds but the authors concluded the relationship was probably not biologically significant. This analysis has yet to be conducted on Iowa herds to determine if these herds differ from Danish herds with respect to the ecology of salmonella.

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References:


Figure 1: The cumulative percentage of levels of *Salmonella* sero-prevalence in Iowa herds

![Figure 1: The cumulative percentage of levels of *Salmonella* sero-prevalence in Iowa herds](image1)

Figure 2: Frequency distribution of sero-prevalence of 6652 lots in Iowa

![Figure 2: Frequency distribution of sero-prevalence of 6652 lots in Iowa](image2)

Figure 3: Frequency distribution of sero-prevalence by annual herd slaughter size (left annual harvest < 500; middle annual harvest, 500 to 5000; right, annual harvest > 5000)

![Figure 3: Frequency distribution of sero-prevalence by annual herd slaughter size](image3)