

## NATIONAL SEROPREVALENCE OF *TOXOPLASMA GONDII* AND SWINE PRODUCTION MANAGEMENT IN 1995 NAHMS SWINEHERDS.

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The prevalence of *Toxoplasma gondii* infection has decreased on swine farms in recent years.<sup>1</sup> The result of changing production strategies by swine producers, such as total confinement operations, have contributed to the decreasing trend of *T. gondii* seroprevalence in both sows and market pigs.<sup>2,3,4,5</sup> Although not a cause of major production losses on swine farms, *T. gondii* infection in swine is a public health concern because eating meat, including pork, is one way people become infected.

### Materials & Methods

Serum and farm data for this study were obtained from a random survey of swine herds in the top 16 hog producing states in the U.S. (GA, IL, IN, IA, KS, KY, MI, MN, MO, NE, NC, OH, PA, SD, TN, and WI) by USDA for the 1994-95 NAHMS program. Additional information regarding the sampling design is described elsewhere.<sup>6,7,8</sup>

Serum was tested for IgG antibodies to *T. gondii* using the modified agglutination test (MAT) which uses formalin-fixed tachyzoites as antigen.<sup>9,10</sup> Titers greater than or equal to 32 were considered positive.

Herd information and serologic data were used to study the relationships between *T. gondii* infection in sows and finishing pigs with farm management practices. Information selected for in-depth management strategy analysis was swine production facility type (confinement vs. partial or no confinement) and rodent control method. The likelihood of nonrandom occurrences between farm categories and *T. gondii* status was determined with Chi-square odds ratio (GraphPad InStat 3.0, San Diego, CA).

### Results

Samples from 285 swineherds were available for analysis. Of the 7979 swine sampled, the pig type of 7948 were recorded: 3236 were gestating females, 4712

were finisher pigs. Eight percent of the swine tested were positive for *T. gondii* antibodies. Fifteen percent of sows and 3% of finisher pigs were positive. Sows were 5 times more likely to be infected than finishers.

Using farms as the unit of analysis, 51% (144/285) had at least one positive animal in the herd. When sow herds and finisher herds were examined separately, 56% had at least one positive sow and 19% of finisher herds had at least one positive finisher on the premises.

For facility analysis, swine and swineherds were divided by facility type: total confinement or access to the outside during any phase of production. Sows and finishers in partial confinement were 2 times more likely to be infected than those in total confinement. The same was true when sow farms and finisher farms were used as the unit of analysis.

Farms using cats as the only method of rodent control were compared to farms only using bait and/or traps. Sows and finishers on farms that used cats were 7 and 4 times more likely to be infected. Eighty percent of sow farms that used cats were positive compared to only 7% of sow farms that used bait or traps. On finisher farms that used cats, 37% were positive, whereas, only 10% were positive on farms that used bait or traps.

## Discussion

Recent serologic surveys of swine in the United States for *T. gondii* antibodies show that there is a continuing decline in seroprevalence on swine farms. In 1983-84, the national seroprevalence of sows at slaughter was 42%.<sup>11</sup> Surveys in the 1990s showed that in sows from Iowa, 14.3%<sup>12</sup> and 22%<sup>4</sup> were positive. Twenty percent of sows from the 1990 NAHMS survey<sup>1</sup> and 36% of sow from Tennessee<sup>3</sup> were positive. Comparing the data from the 1990 NAHMS study to the 1995 NAHMS sows, sows in 1990 were 1.4 times more likely to be infected than sows in 1995. Finishers were not sampled in the 1990 NAHMS, so comparisons were not available. These high prevalences may reflect farm management practices used by many small farms of keeping sows outdoors part of the year rather in total confinement.<sup>2,3,12,13</sup> The national seroprevalence of *T. gondii* in finishers in 1983-84 was 23%.<sup>11</sup> Two recent studies found that infection in finishers had decreased and is considerably lower than sows. In North Carolina, finishing pigs sampled within one month of slaughter had a low seroprevalence of 0.6%<sup>5</sup> and in Tennessee, the seroprevalence was 3%<sup>1</sup>. This was also the seroprevalence of finishers tested in the 1995 NAHMS.

The presence of cats on farms is considered a risk factor for *T. gondii* infection because cats are the only definitive host and are capable of disseminating millions of oocysts into the environment. The percentage of infected animals was higher on 1995 NAHMS farms that had cats or used cats as rodent control compared to farms that used bait or traps. Farm management that denies access of birds, rodents, cats, and dogs reduces transmission of *T. gondii* to swine.<sup>2,3,4,5</sup>

These serological studies of swineherds are particularly important when investigating the implication of pork as a major source of *T. gondii* infection to people. The association of pork with *T. gondii* infection may deteriorate its image with consumers who are already concerned about other food-borne pathogens. The low seroprevalence in finishers, which are processed into commercial cuts of pork such as pork chops, indicates that these products are unlikely to be infected. Education of the producer regarding the transmission of *T. gondii* has led to changes in swine farm management, particularly the development of total confinement operations.

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