EVALUATION OF SEROLOGICAL TESTS FOR DETERMINING THE PREVALENCE OF SWINE DYSENTERY

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Diagnosis and identification of herds affected with swine dysentery (SD) have centered on demonstrating directly or indirectly the presence of Treponema hyodysenteriae, the primary causal agent of the disease. Fluorescent antibody tests, and selective culture methods used to examine pig feces and colonic contents for the organism have been reported to lack sensitivity. Serological tests examined by other workers include an indirect fluorescent antibody test, a complement fixation test, a tube and a microtitration agglutination test (MAT) and an enzyme-linked immunosorbent assay (ELISA).

Recently, Joens et al. compared the ELISA to the MAT for detecting antibodies to T. hyodysenteriae in experimentally inoculated pigs. The ELISA was concluded to be a more sensitive test than the MAT as seroconversion was detected with the ELISA 2 weeks earlier and persisted 4-6 weeks longer.

A study was designed to compare the MAT and the ELISA by the serological sampling of pigs from known SD affected and nonaffected herds for antibodies against T. hyodysenteriae. The purpose was to be able to detect SD on a herd basis and thereby determine the prevalence of SD.

Herds were selected for serological sampling on the criteria of having had either a recent experience with SD on the premises (SD+) or determined to be free of the disease (SD-). Sera were collected from pigs chosen at random without replacement from 3 age groups; (a) weaned: pigs approximately 2-8 weeks post-weaning; (b) market: pigs 90-110 kg, approximately 6 months of age; and (c) adults: adult swine in the breeding herd. In most cases, all 3 age groups of pigs were available for sampling.

The SD status of a herd was determined as follows. SD+; (a) a clinical diagnosis of SD made on pigs in the herd; (b) T. hyodysenteriae isolated from pigs in the herd; (c) gross and/or microscopic lesions typical of SD demonstrated in tissues from pigs in the herd. SD-; (a) no history or diagnosis of SD, or isolation of T. hyodysenteriae from the herd; (b) no routine use of drugs that would suppress clinical signs of SD; (c) regular veterinary monitoring of the herd (type and frequency of visits, diagnostic and regulatory procedures); (d) closed herd or type, source, frequency and method of introduction of stock known; (3) no outbreaks of SD attributed to pigs traced back to the herd; (f) management practices, facility design, waste disposal, and pest control designed to minimize possible introduction of SD.

A total of 30 herds, 11 SD- and 19 SD+ herds were sampled. The estimate of a 5% detectable infection rate was used to determine the number of animals to sample in each herd. The hypogeometric distribution, which assumes sampling without replacement from a finite population, was used to generate a table listing the minimum numbers of pigs to sample at various levels of confidence and in various herd sizes. From this information, the number of pigs to sample was calculated to be approximately 40 at a confidence level of 85-90%. When possible, then, 40 animals from each age group were sampled.

The MAT was performed as described by Joens et al. with modifications reported by Egan and Harris.

The ELISA was conducted as described by Joens et al. A positive reaction in the MAT was considered to be agglutination at a serum dilution of 1:256 or greater. Sera which reacted at a level of 1.0 or greater optical density (OD) were considered positive in the ELISA.

A total of 1519 sera were collected from pigs in 11 SD- herds. A total of 1640 sera were collected from pigs in 19 SD+ herds. Data are summarized in Table 1. Of the 11 SD- herds, none of the pigs sampled had MAT antibody titers equal to or greater than 256. Of the 19 SD+ herds, 12 contained pigs with serum agglutinating titers greater than or equal to 256, and 7 did not.

By the ELISA test, 2 of the 11 SD- herds had sera from pigs which gave a higher O.D. reading than 1. Eighteen of the 19 SD+ herds had sera from pigs which tested at a higher O.D. reading than 1.

The ELISA was concluded to be of sufficient sensitivity to be used to detect herds infected with T. hyodysenteriae, and thereby provide a way to determine the prevalence of swine dysentery. The market pig was the best age group to test with the ELISA for detecting the greatest number of animals demonstrating serum antibodies to T. hyodysenteriae, without giving false positive results.

Selected References: Egan, I.T. and D.L. Harris. 1978. Page 11 in Proc. 59th Conf. Res. Workers Anim. Dis., Chicago, Ill. Harris, D.L. et al. Vet. Med. Small Anim. Clin. 67:61-64. Joens, L.A. et al. 1978. J. Clin. Microbiol. 8(3):293-298. Joens, L.A. et al. J. Clin. Microbiol. (manuscript accepted). Joens, L.A. et al. 1979. Vet. Rec. 105:463-465. Sample Surveys Department, Statistical Laboratory, Iowa State University Ames, IA USA. Taylor, D.J. and T.J.L. Alexander 1971. Br. Vet. J. 127:58-61.

Table 1. Comparison of MAT and ELISA in detecting antibodies to T. hyodysenteriae in sera from 3 age groups of swine in SD+ and SD- herds

Herd status	Age[a] group	No. of herds[b]	No. of sera	No. positive by MAT herds	No. positive by MAT pigs	No. positive by ELISA B204 antigen herds	B204 antigen pigs	B234 antigen herds	B234 antigen pigs	Total herds	Total pigs
SD-	A	11	976	0	0	1	2	1	1	2	3
	M	8	325	0	0	0	0	0	0	0	0
	W	7	218	0	0	0	0	0	0	0	0
SD+	A	15	659	6	9	10	77	12	53	12	107
	M	14	611	6	37	12	131	10	109	13	192
	W	8	370	3	3	1	1	1	1	1	2

a A = adult pigs, M = market weight pigs, W = weaned pigs; b Number of herds in which that particular age group was sampled.