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EVALUATION OF A POLYCLONAL BLOCKING ELISA AND A COMPLEMENT FIXATION TEST DETECTING ANTIBODIES TO ACTINOBACILLUS PLEUROPNEUMONIAE SEROTYPE 2 IN PIG SERUM

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A polyclonal blocking ELISA and a complement fixation assay detecting antibodies to Actinobacillus pleuropneumoniae were compared in different samples. Low dose inoculated SPF pigs with minimal clinical symptoms were used to estimate the sensitivities of the assays in subclinically infected animals. The pig level sensitivity and specificity of the assays were determined by maximum likelihood estimation on test samples from six recently infected populations. The herd level sensitivity and specificity of the assays were calculated using test samples from 230 SPF herds. The sensitivities for subclinically infected pigs were 0.25 (ELISA) and 0.21(CF). The pig level sensitivities were 1.0 (ELISA) and 0.72 (CF). The pig level specificities were 0.86 (ELISA) and 1.00 (CF). The herd level sensitivities were 1.00 (ELISA) and 0.57 (CF). The herd level specificities 0.90 (ELISA) and 1.00 (CF).

INTRODUCTION

Actinobacillus pleuropneumoniae is the cause of porcine pleuropneumonia which is recognized worldwide as a disease of great economic importance to the pig production. A polyclonal blocking Enzyme Linked Immunosorbent Assay (ELISA) (Nielsen et al., 1991) detecting antibodies to Actinobacillus pleuropneumoniae serotype 2 (App2) was compared to a complement fixation assay (CF) (Casey, 1965; Nielsen, 1982) in different samples.

MATERIALS AND METHODS

A total of 24 low dose aerosol inoculated SPF pigs with minimal clinical symptoms of pleuropneumonia were used to calculate the sensitivities of the assays in subclinical infected pigs. The sensitivities and specificities of the assays for acutely infected pigs were determined by a maximum likelihood (ML) (Hui & Walter, 1980) estimation procedure. The estimation was based on test samples from six recently infected SPF herds used as six populations in the ML estimation. Test samples from 230 SPF-breeding and multiplying herds sampled through three consecutive months were analyzed using both assays and clinical, pathological and microbiological findings in the herds formed the basis for calculating herd-sensitivities and herd-specificities as previously described (Sørensen et al., 1992) for both assays.

RESULTS

The sensitivities of the ELISA and CF were 0.25 and 0.21, respectively for the subclinically infected pigs. The sensitivities of ELISA and CF were 1.0 and 0.72, respectively for acutely infected pigs. The specificities of ELISA and CF were 0.86 and 1.00, respectively for acutely infected pigs (See Enøe et al. for results from chronically infected pigs). Herd-sensitivities for ELISA and CF were 1.00 and 0.57, respectively. Herd-specificities for ELISA and CF were 0.90 and 1.00, respectively.

DISCUSSION

At the subclinical level both assays were shown to have a relatively low sensitivity. For health surveillance purposes the effect of low sensitivities on the negative predictive values should be kept in mind. On both pig and herd level the ELISA had a higher sensitivity than the CF. For herd health surveillance schemes like the Danish SPF programme this means a higher negative predictive value on the herd level when substituting the CF with the ELISA. This improvement is crucial for pig production programmes where trade with breeding animals is a major part of the programme. On the other hand, the specificity of the ELISA was lower than the specificity of the CF. This affects the positive predicitive value on the herd level negatively, when substituting the CF with the ELISA. However, the benefits of reducing the false negative rate of herds at risk of trading infected breeding animals have outweighed the costs of more false positive serological herd diagnosis in the health surveillance programme.

BIBLIOGRAPHY

Casey,H.L. 1965. Standardized diagnostic complement fixation method and adaption to micro test. Public health monograph no 74. US. Department of Health, Education and Welfare. Washington D.C.

Hui, S.L. & Walter, S.D. 1980. Estimating the Error Rates of Diagnostic Tests. Biometrics 36, 167-171.

Nielsen,R. 1982. Haemophilus pleuropneumoniae infection in pigs. Thesis. Danish Veterinary Laboratory, Copenhagen, Denmark.

Nielsen,R., Plambeck,T., Foged,N.T. 1991. Blocking enzyme-linked immunosorbent assay for detection of antibodies to Actinobacillus pleuropneumoniae Serotype 2. J.Clin.Microbiol.23, 794-797.

Sørensen,V., Barfod,K., Feld,N.C., 1992. Evaluation of a monoclonal blocking ELISA and IHA for antibodies to Mycoplasma hyopneumoniae in SPF-pig herds. Vet.Rec. 130, 488-490.

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