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Logo Design

Ruth Cronje, and Jan Swanson;
based on the original design by Dr. Robert Dunlop

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Diagnostic tools for *Mycoplasma hyopneumoniae* surveillance

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Mycoplasma hyopneumoniae is one of the most important pathogens of swine worldwide. In the US, the USDA NAHMS swine study of 2006 listed *M hyopneumoniae* pneumonia as the second disease most frequently reported in grow-finishing sites (40% of sites), only after ileitis. The same NAHMS report showed that 62% of large sow farms (> 500 sows) and 81% of large nursery sites (> 5,000 pigs) reported vaccination for *M hyopneumoniae* in 2006.¹ Although the detrimental effects of *M hyopneumoniae* infection in a positive herd can be controlled through vaccination and/or medication, the costs of these interventions are significant. Therefore, the long term goal of the swine industry should be to achieve *M hyopneumoniae* negative status. Successful eradication of *M hyopneumoniae* from positive herds has been accomplished multiple times² and currently most genetic companies provide *M hyopneumoniae*-free gilts. However, *M hyopneumoniae* negative herds can get re-infected, either by introduction of positive pigs or by aerosol transmission.^{3,4} For that reason, *M hyopneumoniae* surveillance protocols are essential in negative herds.

Currently there are several diagnostic tests that can be used for *M hyopneumoniae* surveillance. In most negative breeding herds serum samples are tested for antibodies against *M hyopneumoniae* by ELISA. There are several ELISA tests available. ELISAs are in general good tests with high sensitivity and specificity.^{5,6} One of the limitations of these tests is that they do not detect acutely infected pigs. Therefore, recently infected pigs that have not yet developed an antibody response could test falsely negative. On the other hand, even though ELISAs are generally highly specific, negative herds that test large numbers of samples for surveillance will eventually encounter false positive results. For example, the IDEXX ELISA, which is the most commonly used *Mycoplasma* ELISA at the Minnesota Veterinary Diagnostic Laboratory, has a reported specificity of 98.6%.⁷ This means that for each 1,000 samples submitted from truly negative populations, 14 samples will test positive. Troubleshooting these false positives can include retesting the same sample with the same ELISA and/or retesting the same sample with a different ELISA. Other options are retesting all the samples available with the alternative ELISA, or resampling the affected pig and/or its penmates. If pigs are resampled, a nasal swab can also be obtained and tested by PCR. Nasal swab PCR might be a better method than serology to detect acute infections, although it can also yield false

negative results. Ultimately, if we want to achieve the highest confidence in the results, we would need to euthanize the positive pig, examine its lungs by histopathology and perform a PCR on a bronchial swab or a lung sample. This illustrates the wide range of options there are to troubleshoot these false positives, from retesting a serum sample to resampling and retesting a larger number of pigs or even euthanizing the positive pigs. Unfortunately, at this point there are no standard guidelines on how to troubleshoot false positives and this issue is approached on a case by case basis. The decision on exactly how to deal with a positive ELISA result in a set of samples from an assumed negative herd will depend on a number of factors, such as the amount of risk we are willing to accept, the amount of resources available for follow up testing and the individual value of the animals involved.

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