Diagnosis of leptospirosis in swine

Carole A. Bolin, DVM, PhD

Leptospirosis is a worldwide zoonotic disease caused by infection with the spirochete bacterium *Leptospira interrogans. L. interrogans* is further divided on the basis of antigenic relatedness into serogroups and serovars. Approximately 200 different serovars of *L. interrogans* have been identified, and within a geographic region, certain serovars are prevalent and become adapted to a particular maintenance host. In the United States, the serovars of *L. interrogans* most commonly associated with leptospirosis in swine are *bratislava, pomona,* and *grippotyphosa.* Serovars *icterohaemorrhagiae, canicola,* and *hardjo* are also occasionally found in swine.

Clinical signs

The clinical signs of leptospirosis in swine vary with the infecting serovar. Disease associated with infection by serovar *bratislava* is characterized by a low serologic response, rapid transmission from pig to pig, mild clinical signs resulting from transplacental infection, and a prolonged renal carrier state. Infections with serovars *grippotyphosa* or *icterohaemorrhagiae* may cause severe disease and are associated with high titers of antibody and a short renal carrier state. Infection with serovar *pomona* causes clinical signs that are intermediate in severity and is characterized by high titers of antibody, variable clinical signs, and a renal carrier state. The major losses to the swine industry associated with leptospirosis are caused by abortions, stillbirths, weak pigs, and infertility.

Diagnosis

Diagnosing leptospirosis in swine is a challenge. The most commonly used diagnostic tests include serology, fluorescent-antibody tests (FATs), histopathology, and culture. Infection with serovars *pomona, grippotyphosa,* or *icterohaemorrhagiae* are usually readily diagnosed using serology and FATs because high titers of antibodies are produced in infected pigs and because the organisms are abundant in tissues. Diagnosing serovar *bratislava* infection is more challenging because the serologic response of infected pigs is relatively poor and because the organisms are rare in infected tissues.

Isolation of *L. interrogans* from tissues is the definitive method of diagnosis and allows one to identify the infecting serovar. Because culture of leptospires is difficult, time-consuming, and requires specialized culture medium and technical expertise, culture is usually only available at reference laboratories.

Serology, using the microscopic agglutination test (MAT), is the most commonly used test because it is inexpensive, widely available, and reasonably sensitive. However, vaccination and cross-reacting antibodies can interfere with interpretation of serologic results. Antibody titers may persist at a level of 100 or greater against several of the serovars in the vaccine for 45 to 60 days after vaccination. In contrast, titers due to infection with serovars other than *bratislava* tend to be 800 or greater and against a single serovar, or considerably higher against the infecting serovar than against other serovars. Pigs infected with serovar *bratislava* tend to have low antibody titers (i.e., 50 to 200) against *bratislava* or, if higher titers develop, they rapidly fall to low levels. This makes it difficult to distinguish *bratislava* titers resulting from infection from those resulting from vaccination or exposure to other serovars.

When pregnant swine are exposed to leptospires, there is often a significant delay between the time of infection and abortion. Therefore, antibody titers may peak prior to abortion and analysis of acute and convalescent serum samples may show steady or decreasing antibody titers rather than a pattern of seroconversion. Precolostral serum samples from piglets may contain leptospiral antibodies if transplacental infection has occurred. These antibodies are present in low titers (< 100) but are usually specific for the infecting serovar. Detection of fetal antibody titers can be very helpful in establishing a diagnosis of leptospirosis in swine.

FATs are available to identify leptospires in tissues or body fluids of pigs. The availability of this test is increasing, and the test can be used on fresh or frozen tissues. However, the FAT can be difficult to interpret and usually must be combined with a serologic test to determine the infecting serovar.

Histopathology with the use of silver stains is a useful technique to identify leptospires in swine tissues. This is the only routinely used diagnostic technique that can be applied to formalin-fixed tissues. However, histopathology is an insensitive technique to diagnose leptospirosis and the infecting serovar cannot be determined.

Numerous approaches have also been investigated to improve diagnosis of leptospirosis in swine. These approaches include enzyme immunoassays to detect antibodies against leptospires, improved procedures for culture, and genetic techniques includ-

Leptospirosis and Mycobacteriosis Research Unit, USDA, Agriculture Research Service, National Animal Disease Center, Ames, Iowa 50010

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ing nucleic acid probes and polymerase chain reaction (PCR)-based assays. These newer procedures are only available in a few laboratories.

Sample submission for leptospirosis

Thoughtful sample submission and test selection will maximize the chance that an accurate diagnosis of leptospirosis is made. If abortions or stillbirths are occurring, submit:

- lung, liver, and kidney from three to four fetuses for FAT and histopathology;
- placenta for FAT;
- sow serum for serology; and
- blood from three to four fetuses for serology.

If abortions or stillbirths are not observed, or if fetal tissue is unavailable, submit:

- serum from the affected pigs and from several other pigs in the unit for serology; and
- urine collected after intramuscular administration of furosemide (Lasix®) for FAT.

It is advisable to contact the laboratory before submitting samples to ensure that appropriate samples are collected and that they arrive at the diagnostic laboratory in suitable condition. In addition, in problem herds, it may be necessary to consult reference or regional diagnostic laboratories which have expertise in diagnosing this infection.

References

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Practice Tip

Preparing a winning proposal

You might want to ask yourself these questions before preparing a proposal to attract a client:

- What is the client's problem or need? Study the client's business situation and try to state for yourself the problem or need.
- What makes the problem worth solving? Frequently clients request proposals when some negative things have happened regarding profitability or productivity.
- What goals must be served by the action you're suggesting? Consider business, technical, social, and personal goals — especially those of the key decision-maker.
- Which goals have the highest priority? Start the proposal addressing these items.
- What can you offer that will achieve the desired goals? Be creative.
- What are the likely results from each of the recommendations to be made? Consider what they'll cost and how long they'll take. Be sure to show how what you're proposing will offer a competitive advantage to the client.
- Which recommendations should be highlighted? Look at the choices from your client's point of view. Resist the temptation to offer a solution that gives you the highest profit margin. Strive, instead, for a long-term relationship.

Source: *Persuasive Business Proposals*, by Tom Sant, AMACOM, cited in *Soundview Executive Book Summaries*, 5 Main St., Bristol, Vermont 05443.