NEWSLETTER

Fall – 2020

IOWA STATE UNIVERSITY
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Veterinary Diagnostic Laboratory

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Backyard Poultry & Avian Influenza

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Avian influenza (AI) is a highly contagious respiratory viral disease that affects both domestic and wild birds. AI viruses are classified into two types: 1) lowly pathogenic avian influenza (LPAI) which typically causes little to no clinical signs in poultry and 2) highly pathogenic avian influenza (HPAI) which typically causes high mortality. Waterfowl and shorebirds, such as ducks and geese, are natural hosts for the AI virus, and these birds can shed the virus, often without showing any signs of illness or death. Spring and fall are the peak seasons for bird migration, and many of these birds can be in your towns and neighborhoods, carrying the virus.

Backyard poultry are susceptible to AI infection and are at high risk. Many backyard flocks are kept outdoors, are free-range, have multiple ages, species and sources of birds, and have less strict standards for biosecurity compared to commercial flocks. This invariably results in mixing with other birds within the flock and contact with other wild waterfowl creates favorable conditions for disease spread within and between flocks. Many studies show that the backyard flocks with more types of poultry and flocks with lower sanitary conditions have higher incidences of AI.

If a flock has sudden (less than 24-48 hours), high death rates (close to or over 50%) or many birds with respiratory signs, suspect AI infection and proceed with testing. There is not an approved vaccine in the United States nor is there a treatment for AI. Good management and biosecurity practices are the only way to protect against AI infection in backyard poultry.

To learn more, your clients can contact the Iowa Poultry Association at no additional cost. An AI test is available through the ISU VDL. The test looks for antibodies (indicating previous exposure) against AI using a dozen eggs as the sample type. Commercial poultry in Iowa are routinely tested for AI along with several other pathogens to ensure healthy birds and safe meat and eggs.

www.iowapoultry.com

Thank you for keeping the Iowa poultry industry safe and free from diseases. Do your part by regularly testing your clients' birds!

Questions?
515-294-1950 — isuvdl@iastate.edu

Panchan Sitthicharoenchai
Pathology

Dr. Panchan Sitthicharoenchai, known to those around her as "Pan", is originally from the busy city of Bangkok, Thailand. She received her DVM degree in 2012 and Master of Science degree in 2014 from Chulalongkorn University in Thailand. She moved to Ames in 2014 to pursue a combined PhD and anatomic pathology residency at Iowa State. After spending time in Ames, she fell in love with the Midwest lifestyle and accepted a position at the ISU VDL as a diagnostic pathologist in 2019. She is a pathology nerd and enjoys solving cases, assisting in diagnostic investigation, and loves a good discussion about disease pathogenesis.

Although she grew up half-way across the world, Pan is not foreign to the United States culture as she spent part of her childhood in Georgia and South Carolina. Her hobbies include photography and traveling. One of her goals is to visit all 48 mainland states. She also enjoys swimming and hiking on a routine basis. Additionally, it should come as no surprise from her rich Thai heritage that she spends much of her spare time cooking Thai food. She is always open for Thai recipe requests and recommendations.

STAFF HIGHLIGHT

Best Practices for Culture of Septicemic Bacteria from Diseased Swine for use in Autogenous Bacterins

Drs. Stevenson, Arruda, and Schwartz
Diagnostic Pathologists

The most common septicemic bacterial agents in swine cultured for use in autogenous bacterins include *Streptococcus suis*, *Glaesserella (Haemophilus) parasuis*, *Actinobacillus suis*, and *Mycoplasma hyorhinis*. Swine populations and individual pigs can harbor multiple virulent and avirulent strains of each of these bacteria, but one virulent strain usually predominates in outbreaks of disease. The efficacy of an autogenous bacterin depends, in part, on inclusion of the virulent strain of bacteria responsible for outbreaks of disease using best practices to ensure that the correct (virulent) strain is cultured from diseased pigs.

Etiology, Epidemiology, and Disease

S. suis is an opportunistic pathogen and ubiquitous commensal of the upper respiratory tract, palatine tonsil, and female reproductive tract, and it is also considered normal intestinal flora in swine. 35 polysaccharide capsular serotypes are described, and strains vary greatly in virulence within and between serotypes. Numerous virulence factors are described, but are inadequate to predict virulence of strains. When host innate, maternal and/or acquired immunity is diminished, *S. suis* can cause purulent or fibrinopurulent pneumonia as part of the porcine respiratory disease complex (PRDC), or it can invade by transiting tonsillar crypt epithelium or respiratory mucosal epithelium to produce septicemia, or at least bacteremia of sufficient duration to allow localization and fibrinopurulent inflammation most commonly in joints, leptomeninges, heart valves and/or serosal membranes. Certain virulent strains produce pneumonia, while different virulent strains invade and produce systemic disease.

G. parasuis is a commensal of the upper respiratory mucosae of swine. It is a fastidious organism that requires nicotinamide adenine dinucleotide (NAD) for growth. Most strains can be classified into 1 of 15 capsular serotypes (1-15), now routinely accomplished by PCR for serotype-specific capsular gene loci. Strains vary greatly in virulence within and between serotypes. Like *S. suis*, *G. parasuis* produces opportunistic disease of two types when host innate, maternal and/or acquired immunity is diminished. Certain virulent strains establish in the lung and produce fibrinopurulent bronchopneumonia as a part PRDC. Other virulent strains invade by transiting the respiratory mucosa to produce fibrinopurulent polyserositis and polyarthritis (Glässer's disease), and less commonly leptomeningitis.

A. suis is a ubiquitous opportunistic pathogen that is a commensal of the upper respiratory mucosa and tonsillar crypts of swine. There are differences between strains based on surface antigens and virulence, but routine methods of categorization based on serotype or virulence factors are not available. Certain virulent strains are opportunists in the PRDC where they produce localized or diffuse fibrinonecrotic pleuropneumonia that is grossly indistinguishable from *A. pleuropneumoniae*. Other virulent strains can invade and produce acute fatal septicemia or, following bacteremia, can localize and produce fibrinopurulent arthritis, polyserositis, valvular endocarditis, leptomeningitis and/or osteomyelitis/spondylitis.

M. hyorhinis is a sporadic opportunistic pathogen that is a ubiquitous commensal of the ciliated respiratory epithelium in the upper respiratory tract and conducting airways of swine. Genetic and antigenic variation in strains is known, but routine methods of categorization are not available. Certain virulent strains invade and cause fibrinopurulent polyserositis and/or polyarthritis in nursery-age pigs. Although a role for *M. hyorhinis* has been suggested by some, there is not compelling published evidence to support a role in PRDC.

Sampling

1. **Select the right pigs to sample:**
   - Animals exhibiting acute typical clinical disease, preferably untreated with antibiotics.
   - Avoid euthanasia methods that result in fracture of the calvarium (e.g. captive bolt/blunt force trauma).

2. **Collect, preserve and transport the right samples. Samples should be collected to minimize fecal or other contamination, sealed in leak-proof plastic bags, chilled and shipped on ice to arrive at the testing laboratory the next day.**
   - When swabs are used:
     - Standard sheathed bacterial culture swabs are adequate for *S. suis*, *A. suis* and *M. hyorhinis*.
     - Due to the fastidious nature of *G. parasuis*, recovery is enhanced by transporting swabs in Aimes transport media.
   - When pneumonia is the primary concern:
     - Fresh and fixed lung tissue is the appropriate sample.
   - When systemic disease is a concern, then samples should be from organs affected based on clinical signs and/or gross lesions:
     - **Brain** samples are obligatory when nervous disease is observed.
       - Aseptically collected meningeal swabs are preferred. This is best accomplished by removing the head by disarticulating the atlanto-occipital joint. The foramen magnum should be gently flamed using a propane plumber's torch, then a swab inserted to swab over and beneath the cerebellum.
       - The surface of the brain can also be swabbed during removal; however, it is more difficult to avoid contamination.
       - Removing and sending the brain for culture is not recommended, due to the near certainty of contamination. However, fixed and unfixed brain should be included in the submission for histopathology and to rule out other causes of neurologic disease.
     - **Cerebrospinal fluid (CSF)** can also be of value if collected aseptically with a syringe and needle prior to removal of the head. Submitting CSF in a snap cap for culture and EDTA for cytology can provide added diagnostic information when tissues are not submitted.
     - **Joint swabs** should also be collected aseptically. This can be accomplished by first removing the skin over the joint, then the exterior of the joint and the knife should be flamed prior to opening the joint and swabbing.
     - **Polyserositis**; care should be taken to swab uncontaminated serosal surfaces exhibiting fibrinopurulent serositis. Alternatively, fibrin can be collected and shipped in Aimes transport media. Sampling abdominal serosa or pericardium is preferred over visceral pleura since avirulent strains of any of these agents can leach from the lung into fibrinopurulent exudate on the visceral pleura, when the pleuritis was caused by a different virulent agent.
     - **Organ/tissue**: when spleen, vegetative heart valves or other systemic tissues are sampled, overt contamination should be avoided, and they should be bagged separately for shipment. This prevents cross-contamination during shipment.

Interpretation

1. Isolates used in an autogenous bacterin should be cultured from a site with lesions typical of the disease that the bacterin is intended to prevent.
   - For pneumonia, the isolate should be from a pneumonic lung with gross and microscopic lesions typical of the specific isolate.
   - For septicemia or localized systemic sites, the isolate should come from spleen or tissues with typical lesions i.e. joints, serosal membranes, and/or vegetative lesions on heart valves.
2. **In cases with nervous disease, lesions of fibrinopurulent meningitis should always be confirmed** when *S. suis*, *H. parasuis* or *A. suis* is isolated for use in an autogenous bacterin. This is because transit of the blood brain barrier by these organisms occurs more frequently than meningitis. And culture of these organisms (especially *S. suis*) from meningeal swabs is frequent in the absence of meningitis.
3. **For cases of septicemia or systemic disease, isolates from the lung are NOT appropriate.** This is because these isolates have not demonstrated ability to invade and cause systemic disease.
4. High numbers in pure or nearly pure culture increase confidence that the isolate is the cause of disease and that collection methodology minimized contamination.
5. When possible, isolates used in autogenous bacterins should be characterized by serotyping or sequencing for future distinguishability. The addition of too many isolates in a single bacterin will reduce antigenic mass and thus efficacy for all included isolates.

ANNOUNCEMENTS:

Upcoming University Holidays:

Thanksgiving	Thursday, November 26th Friday, November 27th
Christmas	Thursday, December 24th Friday, December 25th

HATS will be closed on Thanksgiving Day, but will be receiving drop-offs until 4pm on Friday, November 27th for PRRSV and PEDV/PDCoV/TGEV testing.

HATS will be receiving drop-offs until 3pm on Christmas Eve for PRRSV and PEDV/PDCoV/TGEV testing and CLOSED on Christmas day.