

Diagnostic approach to enteric diseases of swine

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Although it is less glamorous and less talked about than respiratory disease, enteric disease occurs in pigs of all ages and is extremely challenging to diagnose and treat. As with any disease, an accurate diagnosis is the key to solving a clinical problem. Treatment and control programs for enteric disease are relatively pathogen specific. To establish an effective control program, it is generally preferable to identify the primary cause, but this often isn't possible. In this article I will summarize our approach to obtaining a diagnosis for the different pathogens at the different stages of pig growth.

Neonatal enteric disease

Clinical diarrhea in the preweaned piglet is more straightforward to identify, treat, and prevent than postweaning and grow-finish diarrhea.¹ Diagnosis is relatively easy but may take multiple submissions to be certain. If a pig has diarrhea during the first week of its life, weaning weight will be reduced and days to market extended. If diarrhea affects the weaning weight or causes death loss in the litter, it is easy to justify the cost of a thorough diagnostic evaluation. If the diarrhea only affects 5% of the litters, responds quickly to antibiotics, and disappears from the farm completely after 1–2 weeks, the diagnosis is not as critical because the clinical losses in such cases are minimal.

We have many tools available to help with the diagnosis, and sacrificing neonatal pigs at this stage is relatively inexpensive. Because farrowings occur weekly on most United States swine operations, it is easier to get the necessary specimens because the syndrome will probably repeat itself every week. Pigs that have had diarrhea for less than 12–24 hours and have not been treated with antibiotics are the best to

submit for necropsy.

The diagnostic tests are fairly basic. Culture and sensitivity, electron microscopy, antigen detection kits, fluorescent-antibody tests, mucosal smears, and histopathology are all invaluable tools. Histopathology is essential to confirm the pathological lesion of the pathogens isolated. Fresh samples and thorough flushing of the intestinal lumen with buffered formalin is required for good histological assessment. We sample from three different areas of the jejunum and ileum. If all of the isolation and identification tests are negative, having a histological assessment along with a history is often enough to start treatment and a preventive protocol. Often the most valuable tool available is the clinical history and the clinical experience of the veterinarian. Knowing the age of onset, response to therapy, and even the pig's appearance helps the practitioner to rule out different possibilities.

Chronic problems with such pathogens as *Clostridium*, *Coccidia*, and transmissible gastroenteritis virus (TGEV) can be frustrating and can make us question our diagnosis. Resubmission of fresh samples may be necessary—be sure that this subsequent sample selection and work-up is as thorough as the initial submission. If the first round of diagnostics come out with weak results and the control is not effective, it is easy to justify the resubmission of pigs. In our experience, clients are willing to spend the money needed to get an accurate diagnosis. Getting to the bottom of the problem is essential for a successful control program and client satisfaction.

The majority of diagnoses can be made with a bacterial culture and sensitivity, tests for rotavirus and TGEV, and histopathology. In most cases, we will do a culture and

sensitivity in our clinic laboratory and send out formalin-fixed tissues for pathologic evaluation. Anaerobic culture is required to isolate *Clostridium*. The client always appreciates a quick and accurate diagnosis. For the more challenging cases, second opinions from another diagnostic laboratory are sometimes useful.

Postweaning enteric disease

The diagnostic evaluation of postweaning diarrhea is very similar to evaluation for neonatal diarrhea. Diagnostic work-ups of acute enteric disease are kept simple if the postmortem exam is strongly suggestive. Lesions of acute *Escherichia coli* and *Salmonella* are usually evident grossly, and a simple culture will identify the pathogen. As the enteric condition becomes more chronic and nonspecific, a more complete work-up is needed. When sacrificing pigs, be sure to request a thorough work-up including culture, histopathology, PCR, and electron microscopy. Taking shortcuts could result in missing the cause of the enteric problem.

Pigs that are acutely affected and untreated are always the best sample. Culture and sensitivity, intestinal smears, electron microscopy, and histopathology are all part of a routine work-up. In contrast to the neonates, postweaned pigs may also have involvement of the large intestine. It is necessary to perform a good postmortem and to identify organisms in the large intestine for a complete work-up of enteric disease in postweaned pigs.

Pathogens affecting nursery and finisher pigs often overlap.¹ Diarrhea at these stages of production can be more nonspecific and chronic. This makes an accurate diagnosis more difficult, and can be frustrating for both the veterinarian and the producer.

The diagnostic evaluation must also rule out noninfectious causes of diarrhea. Plant protein hypersensitivities can occur if the pigs are not transitioned carefully through the different feeding strategies after weaning. This lesion may appear in the small intestine

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as villi tip blunting. It is important to rule out rotavirus in this situation. Multiple submissions are required and a thorough search for rotavirus and other pathogens that blunt the villi must be ruled out.

As the pigs get older, the significance of the diarrhea is harder to evaluate. If pigs are gaunt and dehydrated, and the herd has a mortality rate of 0.25%–0.5%, diagnostics are easy to justify because the cause is easier to identify. If the pigs have diarrhea with little or no clinical evidence of performance loss, an accurate diagnosis can be more elusive, making the sacrificing of pigs less justifiable. However, if the client is concerned enough to call and ask for help, s/he is probably concerned enough to permit diagnostics as well as sacrificing pigs.

We are often reluctant to sacrifice enough pigs and pigs that still look good. We often err by sacrificing pigs after the initial insult is over. Again, histopathology may be the most important test and sampling from three different areas of the small intestine with at least two from the large colon is needed. Rectal swabs and PCR testing permits a larger number of samples without sacrificing the pigs; however, processing multiple samples will be expensive. The cost must be communicated to the client.

Finisher enteritis

Diagnosis of acute enteritis in a finishing barn is relatively straightforward when death loss is high and sick pigs justify sacrificing live pigs for postmortem examination.¹ Lesions are usually grossly evident and if not grossly evident, can usually be found histologically. Ileitis (porcine proliferative enteropathy [PPE]) may be present in the acute form as a hemorrhagic and necrotic distal small intestine. It may also present in a more chronic form, as intestinal thickening or a necrotic mucosal cast often described as “garden hose gut.”

Large colon involvement opens up the potential for a variety of other diseases. Stevenson² has described the procedure to determine the cause of diarrhea in a population of grower/finisher pigs. Chronic diarrhea is harder to identify if the willingness to sacrifice good pigs is decreased. Chronic pigs that are debilitated may have recovered from the initial lesion and attempts at diagnosis can be obscured.

Finisher diarrhea may not be accompanied by significant clinical loss. Unfortunately, in

such instances we often depend on clinical signs and response to therapy for diagnosis. Diarrhea in finisher pigs is often called ileitis, and responds well to antibiotics that are effective against *Lawsonia intracellularis*. However, often diarrhea in finisher pigs does not respond to antibiotics, and the practitioner needs to decide whether the bacteria is not sensitive to the antibiotic or whether we are truly dealing with a different etiology. In instances like these, rectal swabs can be helpful, at least to get an idea of what pathogens are present and help to direct therapy and prevention.

As with enteric disease in younger pigs, obtaining a diagnosis is much easier when you submit the right pig at the right time.

Case report

Neonatal diarrhea is often costly and frustrating because it tends to repeat itself every week. On one farm, we were consulted when preweaned pigs suddenly began to have diarrhea at 3 days of age. The farm had no previous history of diarrhea and had not changed any management or preventive protocols. Clinical examination showed no affect on the sows. Approximately 90% of the pigs in the affected litters had diarrhea, with approximately 50% of litters affected overall. There was no apparent difference between the gilt and sow litters. The affected pigs had watery diarrhea and the pigs were dehydrated, chilled, and had pasty fecal stains on their hair coats. We implemented an injection of ceftiofur at processing as a preventive strategy. Incidence of diarrhea was reduced, but not eliminated. The pigs responded marginally to injectable gentamicin.

We visited the farm and collected four acutely affected pigs that, aside from an injection of ampicillin with iron during processing on day 1 of age, were untreated. Postmortem examination revealed moderately hyperemic intestines with yellow watery fluid filling the small and large colons. The stomachs were full of milk but the lacteals were only marginally filled. Tissues were submitted to the diagnostic laboratory for culture and sensitivity, TGEV and rotavirus identification, and histopathology. *Escherichia coli* was isolated. Tests for TGEV and rotavirus were negative. There was histologic evidence of villi blunting, which would suggest a rotavirus infection.

Despite treating pigs on day 1 with

ceftiofur, we were still seeing 1- to 5-day-old pigs with diarrhea. The diarrhea was affecting approximately 25% of the litters, and was severe enough to set the pigs back 2–3 days. The mortality rate remained low. We submitted another four pigs for further laboratory evaluation. Based on previous clinical experience, we felt that *Clostridium perfringens* type A was a strong possibility. At this time the culture was positive for *Clostridium perfringens* type A and histologic lesions had villi blunting, providing evidence for a *Clostridium perfringens* type A toxin effect. *Clostridium perfringens* type A is a relatively difficult diagnosis and often relies on clinical experience and histopathology. Our assessment is that antibiotic use at processing will sometimes kill the *Clostridium*, but not before the toxin has been able to cause the villi damage. Once the damage occurs, the pigs recover slowly or, if damage to the villi is severe enough, may not recover at all.

Persistence, patience, and practice are all important to successfully diagnose swine enteric disease. The practice part is subjective, but conclusions and recommendations must be made in the field. If we are wrong, our control protocol will fail and we must resubmit tissues for a more definitive diagnosis.

Implications

- In many cases of enteric disease, a diagnosis is easily obtained. Acute conditions are easiest to identify. A good necropsy exam, culture, and histopathology are needed.
- Endemic conditions require multiple submissions and more sophisticated diagnostic techniques. Practitioners may be forced to rely on clinical impressions.
- Persistence and patience are critical to the ongoing diagnostic search for elusive pathogens.
- Sometimes the syndrome responds or disappears regardless of or in the absence of treatment.

References

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