Diagnostic approaches to reproductive failure in pigs

Larry Rueff, DVM

In the following article, I will review my clinical approach to reproductive problems in the pig. The usual complaints concerning reproductive problems fall into one of two categories:

- Acute reproductive problems, usually described by the client as a storm of problems associated with abortions, stillborn pigs, premature litters, and/or sows off feed.
- Chronic reproductive failure, usually exhibited by low farrowing rates, low live births, and/or a high number of animals failing to conceive.

The practitioner must be aware that these two problems are quite different and will usually have different diagnoses and solutions.

The problem with diagnosing reproductive disease is that swine producers usually want to blame chronic reproductive failure on an infectious disease. In my 20 years of practice experience, this has rarely been the case.

When investigating a reproductive problem, the most important question a practitioner can ask the farmer is whether the animals have recently exhibited high levels of one or more of the following clinical signs:

- Sows or boars off feed
- Sows or boars running high fevers
- Abortions
- Abnormal returns to heat
- Weak and premature pigs
- High incidence of mummies and/or stillborns

If the answer to each of these is "no," then the likelihood that infectious disease is a factor in the reproductive failure is very low. At that point, infectious disease should move to the background and other causes of reproductive failure to the foreground.

Even though I will discuss disease diagnosis first, I cannot stress enough that unless the above clinical signs are observed, chances of recovering a significant infectious agent are extremely remote.

Infectious disease diagnosis

Acute reproductive failure

I will first focus on the most common diseases that result in reproductive storms, which are pseudorabies virus (PRV, Aujeszky's disease), porcine reproductive and respiratory syndrome (PRRS), influenza, parvovirus, and leptospirosis. Diagnosing these diseases is relatively straightforward; however, when they have been ruled out, the situation becomes more frustrating.

Start with a good history. Consider the answers to the "clinical sign" questions mentioned earlier. After examining the herd for these clinical signs, other diagnostic procedures can start with submission of aborted fetuses and placentas (if available) for standard laboratory procedures, including virus isolation, bacterial culture, and histopathology.

Serum samples from acutely ill animals (sick no longer than 24–48 hours) should be collected from a minimum of 5 and preferably 10 animals. This serum should be banked, and the same animals should be re-bled in 14 days. All of the above diagnostic tests should be utilized to enhance diagnostic success.

Often, these diagnostic tests will yield no specific agent(s). This suggests that noninfectious causes of reproductive failure should be considered. However, an infectious agent may be identified through isolation of the organism, pathologic changes in the tissues, and/or increasing titers in the paired serum samples. All test results should be evaluated and integrated to help determine the precise diagnosis. For example, the organism may not be isolated despite diagnostic tissue lesions. If none of these tests confirm infectious disease, the practitioner is assured that these common diseases are not playing a role in the reproductive failure.

In my experience, when farms are exhibiting acute clinical signs as outlined above, a diagnosis will be reached 99% of the time. An infectious agent will usually not be identified when individual sows abort, and producers should be discouraged from pursuing extensive diagnostic work-ups in these cases. The "normal" abortion rate in swineherds is 0.5%-1%. These "normal" abortions are usually due to noninfectious causes. They may represent the termination of genetic errors during development. The bottom line is that a low rate of sporadic abortions is normal and should not cause alarm. Diagnostic testing will usually identify no specific agent. Attempting to find a cause for sporadic abortion in an individual sow is almost always a fruitless diagnostic experience. It is costly to the producer and is usually a waste of time.

Chronic reproductive failure

Some of the same diagnostic procedures may be conducted in the herd with chronic reproductive failure when the incidence warrants it. Tests may confirm that the herd is fairly stable and there is no unusual disease activity. Paired serum samples on animals that are not actively sick will probably show no real change in titer activity. This does not mean there will be no titers. Influenza, parvovirus, PRRS, and leptospirosis are present on pig farms. Sows have normal baseline titers or change individually due to subclinical infections.

When considering noninfectious causes of reproductive failure, a number of broad areas must be examined that may be difficult to pinpoint because reproduction is just suboptimal, rather than the total disaster seen with acute clinical abortion storms. It is also more difficult to evaluate and prove the causes of reproductive problems associated with people management.

Swine Veterinary Services, Greensburg, Indiana, 47240

This Diagnostic note has not been refereed. It continues a series describing how swine practitioners approach various disease syndromes.

This article is available online at http://www.aasp.org/shap.html.

Rueff L. Diagnostic approaches to reproductive failure in pigs. *Swine Health Prod.* 2000;8(6):285–287.

Table 1: Causes of reproductive failure in swine

Infectious diseases

Boar:
- Viral
- Bacterial

Sow or gilt:
- Viral
- Bacterial

Noninfectious

Boar:
- Age
- Body temperature
- Usage

Sow or gilt:
- Parity
- Genetics
- Lactation length
- Body condition

Feed:
- Lactation feed intake
- Gestation feed intake
- Nutrient density
- Micronutrients
- Mycotoxins

Management:
- Employee quality
- Employee training

Environment:
- Housing
- Movement
- Seasonal infertility
- Ambient temperature

There are some special challenges in getting to the root of chronic reproductive failure associated with these situations. The accompanying chart illustrates the general areas that must be thoroughly evaluated if one expects to rule-in or rule-out causes of chronic reproductive failure.

Chronic reproductive failure differs from farm to farm, but most often is defined by poor farrowing rate or poor born alive data. Normal farrowing rates in the United States are 75% to 85%. This is a wide range, but infectious disease will rarely cause that kind of range. Suboptimal farrowing rates of 60% to 75% are often found with chronic reproductive problems. Born alives of 10.2–10.6 per litter are normal. When herds fall below these parameters, they are performing at suboptimal levels.

Common causes of suboptimal reproductive performance

Boar factors

In the past, it was more difficult to assess individual boars. However, artificial insemination has made this an easier factor to evaluate. If AI is involved you must consider the following:

- collection techniques;
- extension and semen evaluation techniques;
- transport and storage techniques; and
- insemination techniques.

The good news is that factors affecting semen quality can be observed much more readily in the confines of a boar stud than when boars were hand-mated or were running in groups.

Female factors

Age at first mating still plays a large role in poor reproductive performance. Animals bred too young have not had a chance to ovulate at their maximum rate, and this can result in low born alive data. They may also have poor performance in later parities, and often never catch up.

Lactation length does affect subsequent born alive litter rates. As early weaning has become the standard, I see many herds with born alives below 10 pigs. People have accepted low born alives and farrowing rates that are a direct result of early weaning. This may not be a good long-term decision. Sows weaned below 14 days set the stage for poor reproductive performance in swineherds.

Feed factors

When evaluating feed in a herd, the two essential considerations are nutrient quality of the feed, and the volume of feed or feed intake for the farm. It has been my experience that most feed-related problems have to do with total feed intake in gestation and lactation rather than quality of the diet. This does not mean that one should not look at nutrient content as well as the mixing and delivery systems on the farm. However, I have often observed herds not providing enough total feed intake.

Total intake is determined not only by challenge feeding in the farrowing house, but by the proper amount of feed delivered during gestation as well. This is under human control, not the pigs'! Body scoring is a must on all farms. I have dealt with many farms that had a total feed intake of less than 2,000 lbs (908kg) per sow per year, which is too low in our midwestern environments. My target is 2,200 to 2,350 lbs (998-1067kg) per sow per year. This number varies somewhat with herd genetics, and also changes when gilts are introduced into the breeding herd.

Mycotoxins can cause abortions and may cause sows to be off feed. Feed samples should be checked for specific mycotoxins common to the area. Ideally, the laboratory should report concentrations of specific mycotoxins.

Management factors

Management of the breeding herd is important. One must look at the quality of animal care and organization by employees. This is often very difficult to judge, since when employees are being observed they may be on their best behavior. It is important to meet with employees and make sure they understand the proper techniques in mating animals, and that they understand the physiology and normal biology of the pig. It is always amazing to me how commonly the people in charge of reproduction don't know what normal behavior is. Time spent explaining and educating is very important to employee performance.

Environmental factors

The animals' living conditions must be evaluated. Housing temperatures must be examined, particularly during the wintertime. Breeding and gestation environments should not be much below 65°F. This may be a problem, particularly for individually crated animals that can't lie together to maintain some body heat. In the summer, it is important to keep temperatures as comfortable as possible with cooling systems and increased air movement. However, in my opinion, the impact of increased ambient temperature on reproductive performance is overrated. It does affect feed intake, which will have some impact on reproduction. However, seasonal infertility occurs during mild summers as well as during extremely hot ones.

Pregnant swine should not be moved

during the period of embryo attachment, and therefore should arrive at their final gestation area by day 5 postbreeding, and not moved again until at least day 50. It is preferable not to move the sows in gestation at all until they go to the farrowing house.

Seasonal infertility

Seasonal infertility deserves some special discussion. Although production becomes abnormal, the problem that the pig has to deal with is normal. It is obvious that the pig is not uniformly fertile year round as we would all like to believe. In the northern latitudes, you can expect to see these clinical signs of seasonal infertility at the following times:

- Delayed puberty in gilts: gilts reach puberty approximately 30 days later if they are born between December 1 and March 15. This results in gilt pools going dead starting approximately the middle of June and continuing through the middle of September.
- Failure to exhibit estrus postweaning: a higher percentage of weaned sows fail to come into heat after weaning, from approximately July 1 through September 15.
- Longer wean-to-first service interval: the animals that do come into heat from July 1 to September 15 have a longer wean to service interval by 1–3 days.
- Increased number of normal recycles at 21 days: starting 3 weeks after July 1, a higher percentage of animals fail to conceive at normal 21-day heat checks. This continues until about October 1.
- Increased number of abnormal recycles: a higher percentage of abnormal recycles occurs between days 25–40, from July 15 to October 1.
- Increased abortion rate: increased abortions that occur from approximately September 1 to November 15 are referred to as fall abortions.
- Increased "fail to farrow" sows: a higher number of "failed to farrow" sows appear from approximately November to January.
- Decreased born alive: the animals bred July to mid-September, that farrow from November to mid-January, will have piglets born alive rates that are reduced by as much as 0.5 pig.

These clinical signs of seasonal infertility will be seen on almost all farms, although the percentage expressed varies. Seasonal infertility occurs every year in the swine industry and is a difficult thing to deal with. I have noticed that the variation between farms can be greater or lesser from year to year, but the overall impact on the industry is almost always the same.

Case Study

This past summer, a producer called concerning a week of breeding that resulted in extremely poor conception at 21 days. The primary complaint was that 20 of 65 animals (approximately 30%) recycled at 21 days. Another 10 animals (approximately 15%) were found open on the day of the ultrasound one week later. When real time ultrasound (RTU) was performed. A visit was made to the unit on August 19, 1999. This is a 1200-sow unit that breeds approximately 65 animals per week. Their normal farrowing rate is 82%. An RTU is routinely performed between days 25 and 32 postbreeding. The farm does 18-day to 23-day visual recycle checks with a boar in the aisle to assist. The normal number of animals found open at 21 days is usually 7%. The number of animals found open 7 days later with the RTU is usually an additional 5%-7%. A 5% fallout post RTU is fairly normal.

The case herd was well managed. Approximately 2 years ago, the herd had been through a PRRS outbreak that resulted in a significant number of abortions and animals off feed. The herd owners were concerned that PRRS was starting up in the herd.

We inquired about other clinical signs. No animals had been off feed, there were no abortions, and all other females appeared normal. There was a slightly higher percent of gilts bred in the group of females that recycled at 21 days, but all parities were affected. The body condition looked good on the farm.

Ten animals that had recycled and/or had a negative RTU were serologically tested. Since there were no aborted tissues or placenta available, no other diagnostic samples were sent in. The owner was advised to continue to observe the herd. If any abortions took place, they were instructed to refrigerate and submit them to my office. Two weeks later, the same animals were rebled. These samples were sent in for PRV, PRRSV, and influenza titers. The farm vaccinates for parvovirus and leptospirosis, so serology was not done for those two diseases. In the next 2 weeks, no other animals were seen off feed or exhibiting any other clinical signs.

The animals were negative for pseudorabies. There were no titer changes in the paired samples for PRRSV, but titers ranged from 0.30 to 1.90 on the ELISA test. There was no change in titer of influenza H1N1, but some animals had titers as high as 80. All paired tests were negative for influenza H3N3. It appeared that there was no active infectious disease circulating in the herd. The owner was advised that this appeared to be seasonal infertility and to continue to monitor the herd.

By December, no other disease symptoms had been seen in the herd. For 2 weeks after the problem week, conception rates were normal, then there were 3 more problem weeks. The herd has since returned to normal 21-day RTU results. This appears to be a classic case of seasonal infertility. We had to reach this conclusion indirectly, but were able to rule out a problem with infectious disease in the herd.