CASE REPORT

Leptospira pomona: A case report in growing swine and breeding stock

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Summary— *Despite a routine vaccination program,* Leptospira pomona *infection was identified in a 1200-sow herd that is a supplier of breeding stock. Serologic monitoring indicated rooms in the unit that were affected and a slaughter and medication program was instituted to eliminate the organism from the herd.*

Leptospira pomona is an infectious agent that affects growing and finishing pigs. The financial impact of leptospirosis is generally believed to be confined to the breeding herd: it is a reproductive disease of mature animals that results in abortion. Infection does occur, however, in all ages of swine.

Leptospira pomona is well adapted to the pig. Infection spreads when mucosal membrane surfaces come into contact with contaminated urine, whereupon the pathogen disseminates rapidly through a population of animals. The organism appears to gain both infectivity and virulence as it passes through a swine population. Few, if any, clinical signs may be noted in growing swine. However, postmortem evaluation may reveal renal lesions of leptospirosis, and afflicted animals are often condemned at slaughter, ostensibly because they are uremic.[1]

Case history

Leptospira pomona infection was identified in a 1200-sow herd that is a supplier of breeding stock. This farrow-to-finish herd is operated with all-in/all-out handling of pigs by room from weaning to 20 weeks of age. At 20 weeks of age, animals are sorted and either selected as breeding stock or held for sale to slaughter. At selection, animals are moved to holding pens. Care is taken not to commingle pens of pigs in the holding area, but contact with urine may cross-contaminate some animals. Animals produced by this farm that are retained as breeding gilts are commingled with purchased breeding boars and gilts after the latter have been through a 30-day isolation and quarantine period (Fig 1).

Biosecurity on the farm is rigorous. Workers and service personnel are required to shower and to wear clothing provided by the farm. No visitors are allowed on the farm. Anyone entering the facility must have been free from previous contact with swine for at least 96 hours. Access to the facility is through a secure gate located 0.25 miles from the facility.

Samples for PRV qualification and brucellosis validation are taken on a monthly basis. A veterinarian inspects the herd monthly and 30–40 animals are examined at slaughter monthly as well. Gilts and boars that enter the herd are vaccinated twice with five-serovar Leptospira plus erysipelas bacterin, breeding boars are revaccinated twice yearly, and sows are revaccinated prior to each breeding.

Approximately 200 purchased breeding boars and gilts arrived in early September 1992 from the same farm where the producer had purchased all breeding stock in the past. These animals were held for 5 weeks in isolated quarantine and, after negative brucellosis and PRV testing, boars and the larger gilts were moved directly to the breeding barn and the smaller gilts were moved to finisher 9, where they were commingled with gilts produced on the farm that had been retained for the breeding herd. This holding room also contained gilts that had been selected as candidates for sale as breeding animals. Because of space limitations, two pens (totalling approximately 20 head) of gilts were left in the quarantine barn and not moved into the farm.

From samples taken during a routine serologic screening for PRV in late October, we found that 23 of 25 gilts in the finisher 9 holding room had a titer > 1:1600 to *Leptospira pomona*. Nineteen of 25 had a titer > 1:12,800. These gilts had all been produced on the farm and were to be shipped to a state that requires individual animals to be negative to PRV prior to entry. Pre-shipment PRV testing was the initial reason for testing these gilts — not because we suspected leptospirosis. In fact, testing for leptospirosis was performed because of an error in completing the laboratory request form! No clinical signs of renal illness were observed in these animals or, for that matter, in any animals examined on-farm throughout this infection.

Abilene Animal Hospital, PA, 320 NE 14th Street, Abilene, Kansas 67410.

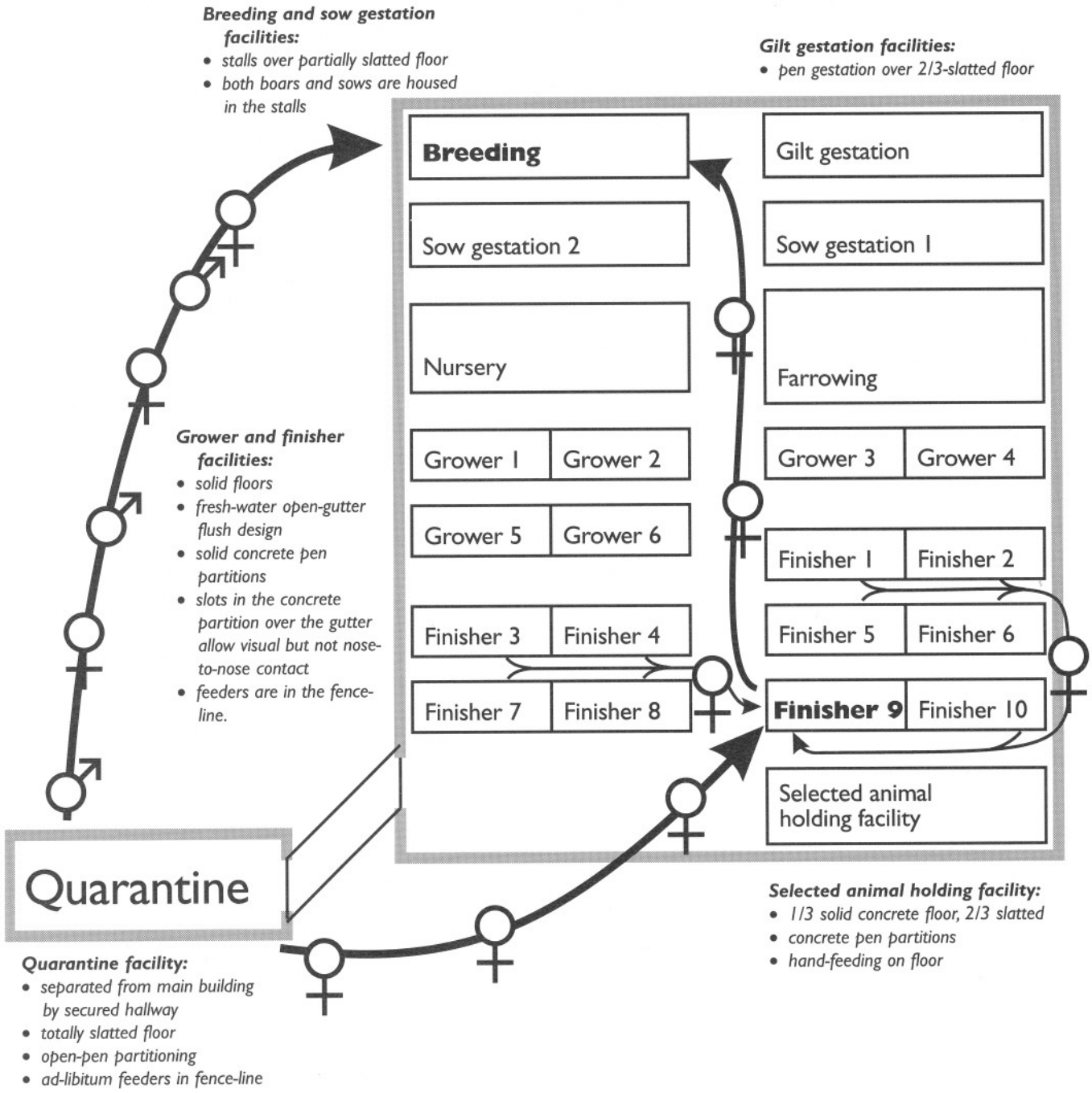

Fig 1.— Movement of purchased and retained production as breeding stock.

To rule out sampling error, we repeated the serologic screening for Leptospira in these 25 animals the first week of November, 1 week after the initial test. We broadened the scope of this screening to include a number of animals in the growing barns and breeding areas that had not been in contact with the specific holding room. Those results showed that over 30% of animals in five of the 10 finishing rooms and in the selected-animal holding area had undergone seroconversion to *Leptospira pomona* with titers > 1:1600 and with most > 1:12,800. All animals in the grower rooms were negative. To confirm the diagnosis, we split the samples and sent them to three separate diagnostic laboratories (Kansas State University, Iowa State University, and the University of Minnesota). Results were in close agreement with differences of only one dilution in nearly all cases. Additionally, the group of gilts remaining isolated in the quarantine facility from the group purchased in September were found to be positive to *L. pomona* with titers >1:1600.

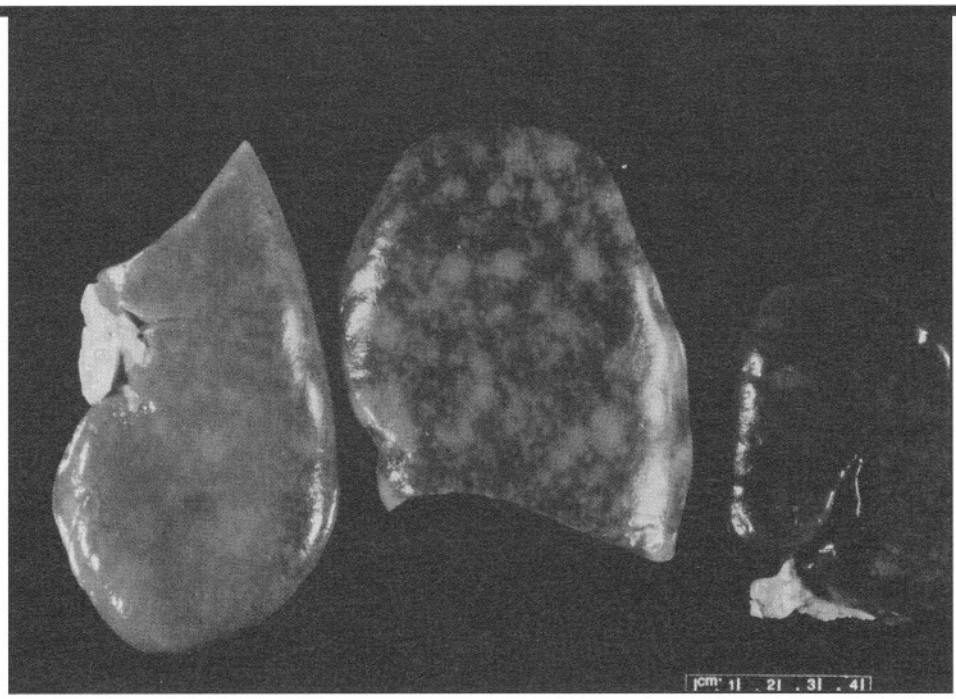

Fig 2.— *Leptospira pomona* induced renal lesions as noted on slaughter evaluation, November 1992

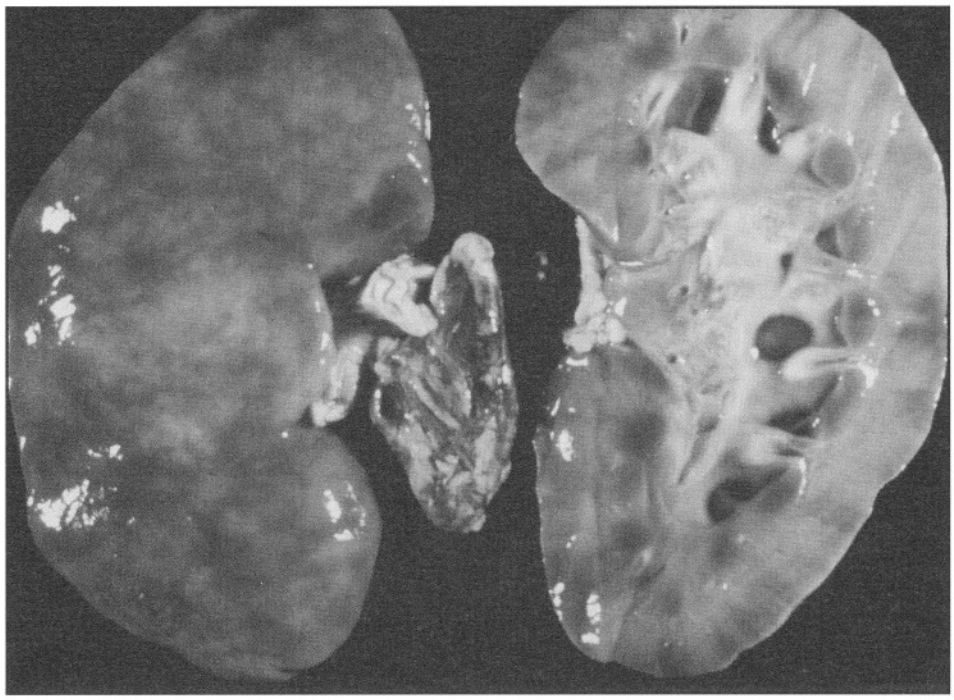

Fig 3.— Renal lesions due to leptospirosis. ISU Diagnostic Laboratory file photo

Three of 40 animals were condemned for uremia based on the routine slaughter examination during the first week in November. The inspecting veterinarian, who was not aware of the serologic evidence for leptospirosis, diagnosed the cause as leptospirosis. Both fixed and fresh renal tissue were retrieved from the slaughter evaluation. Samples were submitted to Iowa State University for bacterial isolation, fluorescent antibody analysis, and histopathologic evaluation. They found grossly enlarged kidneys with raised granulomatous lesions on the surface (Figs 2 and 3). Special staining techniques demonstrated leptospira in the renal tubules. *Leptospira pomona* was isolated in large numbers from renal tissue. Subsequent slaughter evaluations conducted at other slaughter plants also resulted in a small number of carcasses being condemned (3

of 700), while in 12 of 120 carcasses from a separate group of boars, the kidneys, but not the entire carcass, were condemned.

On-farm postmortems were conducted on most of the grower-finisher animals that died through the month of November and early December, but no renal lesions could be demonstrated. No clinical signs consistent with leptospirosis were ever noted during the routine inspections of the herd. Growth rate, appearance, and herd death loss remained at pre-infection levels. No abortion storm occurred and reproductive performance parameters remained unchanged.

Control measures

On November 11, we began a weekly room-by-room serologic screening of animals in the six growing rooms, the 10 finishing rooms, and the selected-animal holding areas. As soon as leptospirosis was diagnosed, disinfectant baths were placed in hallways to prevent personnel from tracking urine into rooms. Efforts were further increased to ensure that no pigs were moved between rooms. The producer discontinued the practice of grouping animals after selection at 20 weeks of age, and left animals in their respective rooms after they were selected for breeding. Interestingly, if one animal in a room was detected as positive, it was the general case that nearly all animals (>80%) sampled in the room were positive. This suggested that the infection spread rapidly within infected rooms, despite the fact that there was no clinical illness. All animals in a positive room were slaughtered.

Animals from the infected rooms remained there until space became available in the quarantine and selected-animal holding areas. These two areas could be easily isolated and served as holding points where animals could await slaughter. By mid-November, all positive animals had been removed to those holding barns and were sealed off from the rest of the farm. By sampling animals in each room on a weekly basis, we were able to monitor new infections as they developed and plan appropriate slaughter and cleanup procedures.

All growing and finishing animals were placed on 400 g of chlortetracycline (CTC) per ton of feed, an approved and labelled claim. Additionally, farm personnel vaccinated all negative pigs in growing and finishing rooms with a five-serovar *Leptospira* bacterin, and repeated this procedure 3 weeks later. All animals added to the grower from nurseries were vaccinated when they were moved from the nursery and again 3 weeks later.

Breeding herd

Serologic results in early November demonstrated that the infection had spread through the breeding herd. These animals must have been exposed prior to the initial diagnosis because gilts had been added to it from finisher 9 and boars from quarantine before the seropositive gilts were discovered. We reviewed all previous serologic samplings for *Leptospira* (that we had conducted as standard diagnostic practice for abortions and reproductive failure). All were negative to *L. pomona* with one exception, a single sow with a titer of 1:1600 detected in early 1991.

The majority of breeding boars (68 of 73) were seropositive when we conducted the initial serological examination in early November. Approximately half of the sow herd rapidly seroconverted. In the gilt barn, which had received the most animals from finisher 9, more than 30% of sampled animals had titers of >1:800. Interestingly, no reproductive failure or abortion accompanied this seroconversion. Stillbirth rates were actually lower than the same period a year earlier. We expected the spread through breeding boars because eight dedicated pens were used for breeding, ensuring that all boars were exposed.

The breeding herd was placed on 400 g per ton of CTC in the feed for a 6-week period. Additionally, farm personnel revaccinated all animals, even though they had previously immunized them against leptospirosis. In order to eliminate renal shedding of the organism,[2] personnel injected the entire breeding herd with two doses of penicillin and dihydrostreptomycin at 10 mg per lb of dihydrostreptomycin on consecutive days.

A follow-up monitoring of the few sows that aborted during this time and of the sows that returned to estrus indicated that many of these animals were still negative to *Leptospira pomona*. We repeated the samples from the day of abortion to 3 weeks post-abortion without noting an associated *Leptospira pomona* antibody titer. In fact, most were negative or had a titer <1:100. These pregnancy losses were within the expected rate of 1.75% for this herd.

Discussion

We believe that *Leptospira* entered this herd via purchased animals that were moved in from the quarantine area. We suspect the disease was horizontally transmitted because a few gilts that remained in the quarantine facility had positive antibody titers and because seropositive sows were found in the source herd, reported to us by the source herd veterinarian. We investigated the water supply and holding tanks as possible vectors. Water samples were tested in laboratory animals at Iowa State University with negative results.

The methods we used to control and prevent the spread of infection seemed to succeed. Within 5 weeks of the initial diagnosis, all seropositive grower and finisher animals had been removed from the operation. All areas were cleaned and disinfected. All growing and finishing rooms were tested and found to be negative, and ongoing serology, which we con-

duct on a monthly basis, has shown no spread of infection anywhere in the production system. Careful monitoring at monthly slaughter evaluations has not detected renal lesions. We detected no decrease in growth performance that could be associated with this infection based on weight-for-age evaluations performed as part of the selection process.

The breeding herd still contains animals that are seropositive. We will attempt to serologically evaluate the persistence of infection over time. If the renal carrier state was eliminated through naturally developing immune mechanisms or as a result of the CTC and streptomycin therapy, we have the possibility of regaining a seronegative herd. With attrition, many positive animals will no longer be in the herd. The half-life for *L. pomona* antibody is approximately 20 days.[3] Recovered animals that are not persistently infected can be expected to spontaneously revert to a negative antibody-titer status over time. Carriers that continue to shed *Leptospira* in the urine do not return to serologically negative status.[3] If indeed the organism has been eliminated, we anticipate that serology will indicate that the breeding herd is once again negative to *Leptospira pomona* by serologic evaluation within 14 months.

Because this operation sold breeding stock, control and prevention did not stop with the herd itself. The customers and their veterinarians cooperated in the management of this problem. All customers were notified. Any animals purchased from the farm in the months immediately prior to the outbreak were tested. If they were found to be positive, the customer herds were placed on medication. Animals in the herd were vaccinated and those still in quarantine were removed from the farm. Because none of the customer herds noted documented cases of reproductive failure due to leptospirosis, we believe that these efforts succeeded. Additionally, spread of the organism from purchased animals to customer herds was only documented in two instances and that spread was minor: it involved a very small number of animals and was not accompanied by further spread or evidence of infection based on serologic monitoring.

We were also concerned about the zoonotic potential of the disease. All farm personnel and veterinarians voluntarily cooperated in a serologic testing program with guidance from the Department of Infectious Diseases, Kansas University Medical School. We detected no evidence of human infection with *L. pomona.*

The large number of animals infected with this atypical manifestation of leptospirosis indicates the need to reevaluate industry standards of leptospirosis control. Because it is a disease that can affect the grow-finish phase (by resulting in condemnations), it certainly warrants additional scrutiny of grower/finisher herds and of the renal lesions found at slaughter. Although there were no reproductive repercussions in any of these herds, this case probably justifies recommending that inbound breeding stock be screened for leptospiral antibody. Given the limits and benefits of leptospiral bacterins, we should probably also recommend that incoming breeding stock be isolated, acclimatized, and serologically monitored before it enters the herds. Vaccines do not prevent infection or the establishment of the carrier state, but they can limit reproductive losses.

Finally, the success and control of the infection on this farm is yet more support for the use of all-in/all-out animal movement in United States operations. Without this system, it wouldn't have been possible to rapidly eliminate the problem from breeding stock candidates.

References

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