Research Update: *Streptococcus suis*

S.F. Amass, L.K. Clark, R. Struve, P. San Miguel, C. C. Wu, K. Knox, and M.A. Hill
Departments of Veterinary Clinical Sciences, Biology, and Veterinary
Pathobiology; and Swine Practitioner, Manning, Iowa

Streptococcus (S.) suis can cause brain, joint, lung, and heart infections in pigs. Thus, treatment and mortality costs are greatly increased in herds where streptococcosis is a problem. Streptococcosis cannot be prevented by segregated nor medicated early weaning protocols (Clark et al., 1994).

Most healthy pigs are carriers of *S. suis*. Thirty-five serotypes of *S. suis,* and subtypes within these serotypes, have been identified (Mogollon et al., 1990). We concluded from our previous studies (Amass et al., 1995) that the sow sheds multiple serotypes of *S. suis* in bodily secretions and excretions. The pig can become colonized with *S. suis* shortly after birth when these sources are contacted. Colonized piglets carry *S. suis* into the nursery, where it may be transmitted among other pigs and cause clinical disease as maternal immunity declines.

This research had the following objectives:

1. To determine if cesarean section would produce *S. suis*-free pigs.
2. To determine if pigs were contaminated with *S. suis* during birth.
3. To determine if the subtypes of *S. suis* carried by the sow were those found in the pig using DNA fingerprinting.

Part 1. Use of cesarean section to derive pigs free of *S. suis* (Amass et al., 1996a)

Methods: Oral and blood swab samples from 50 cesarean derived pigs, and oral swab samples from their dams were collected. Pig samples were collected in a sterile bubble at the time of delivery before pigs contacted the sow or the environment. All samples were culturally examined for *S. suis*. *Streptococcus suis* isolates were serotyped.

Results: *Streptococcus suis* was not isolated from either oral or blood samples from any pig. *Streptococcus suis* was confirmed in samples from 8 of 10 sows.

Discussion: We concluded from these results that the oral region and blood of cesarean-derived pigs of *S. suis* infected dams are free of those serotypes of *S. suis* isolated from these dams. Consequently, we hypothesize that cesarean-derived pigs are likely free of *S. suis* infection.

Part II. Contamination of pigs with *S. suis* during birth (Amass et al., 1996b)

Methods: To determine if pigs were contaminated with *S. suis* of sow origin during birth, multiple samples were collected from 43 piglets of 8 dams. Oral and vaginal swab samples were collected from each sow prior to farrowing. Pigs were removed from the vagina with sterile obstetrical

sleeves into which they were immediately placed. Swab samples of the oral region and surface of each piglet were collected. Umbilical blood from each piglet was collected into tubes of culture media. Room air was sampled to estimate the concentration of airborne *S. suis*. All collected samples were culturally examined for *S. suis*. *Streptococcus suis* isolates were serotyped.

Results: *Streptococcus suis* was isolated from the oral swab samples of 8/8 sows and from the vaginal swab samples of 3/8 sows. *Streptococcus suis* was isolated from the oral swab samples of 9/43 piglets, the surface swab samples of 13/43 piglets, and the blood samples of 2/43 piglets. In 3 of 8 dams, *S. suis* isolated from samples collected from the dam was of the same serotype as the *S. suis* isolated from oral or surface swab samples of that dam's pig. *Streptococcus suis* was not isolated from air samples.

Discussion: These results indicated that the source of *S. suis* was the sow, and that *S. suis* was transferred to the surface and oral cavity of the pig during birth when the pig contacted or swallowed *S. suis* from sow vaginal secretions.

Part III. Use of DNA fingerprinting to demonstrate sow to pig transmission of subtypes of *S. suis* (Amass et al., 1997)

Methods: Isolates of *S. suis* serotype 5, collected from 3 sows and 9 of their pigs at birth, were analyzed by DNA fingerprinting to demonstrate that the *S. suis* which colonizes the sow is of the same subtype as the *S. suis* transmitted to her pigs during birth.

Results: The cleavage pattern of DNA from *S. suis* serotype 5 isolated from vaginal swabs of all 3 sows matched the cleavage pattern of DNA from *S. suis* serotype 5 isolated from oral or surface swabs from their respective pigs, but did not match the negative control. Two subtypes, defined as different cleavage patterns within a serotype, of *S. suis* serotype 5 were demonstrated in this herd.

Discussion: This study provides definitive evidence that the pig becomes contaminated with *S. suis* of the same subtype as carried by the sow during birth when it contacts and/or swallows *S. suis* from sow vaginal secretions.

Applications

- Cesarean section can be used to derive *S. suis* free pigs for research, but this method is impractical for commercial rearing of *S. suis* free pigs.
- Removal of pigs from the sow at birth followed by surface disinfection is not a non-surgical alternative to produce *S. suis* free pigs.

References

Amass, S.F., L.K. Clark, K. Knox, et al. 1996b. *Swine Health and Prod*. 4(6):269-272.

Amass, S.F., L.K. Clark, and C.C. Wu. 1995. *Swine Health and Prod*. 3(5):189-193.

Amass, S.F., P. SanMiguel, and L.K. Clark. 1997. *J. Clin. Microbiol.* 53(6):1595-1959.

Amass, S.F., R. Struve, L.K. Clark, et al. 1996a. *Swine Health and Prod*. 4(4):196-198.

Clark, L.K., M.A. Hill, T.S. Kniffen, et al. 1994. *Swine Health and Prod*. 2(3):5-11.

Mogollon, J.D., C. Pijoan, M.P. Murtaugh, et al. 1990. *J. Clin. Microbiol.* 28:2462-2466.