RESEARCH ABSTRACT

pork checkoff

ANIMAL SCIENCE

Title: Relationships between Seminal Plasma Proteins and Boar Fertility: Development of a Proactive Semen Fertility Test (Renewal – Year 2)
NPB #98-097

Investigator: W.L. Flowers

Institution: North Carolina State University
Raleigh, N.C.

Date Received: 12/29/1999

Abstract

Results from the first year of the proposal demonstrated that concentrations of 2 seminal plasma proteins were highly correlated with both in vivo and in vitro fertility of boars. These studies were performed on a small population (n=10) of boars. The objective of the second year of the study was to determine if the relationship between these 2 seminal plasma proteins and semen fertility existed for a much larger population of boars currently in use within commercial swine operations. Semen was collected weekly from boars in 2, 200-head, boar studs for 1 year. Concentrations of the 2 seminal plasma proteins (26 kDa, pI 6.2 and 55 kDa, pI 4.5) were determined for each collection. Farrowing rates and number of pigs born alive were recorded for sows inseminated with doses made from each ejaculate.

In general, there was a positive relationship between fertility and concentrations of the 2 seminal plasma proteins. Ejaculates with the highest levels of these proteins (> 10 relative units) exhibited the highest farrowing rates (86.7 $\pm$ 3.4 %) and greatest number of pigs born alive (11.2 $\pm$ 0.3) compared with those with lower levels (7.5 – 9.9 relative units, farrowing rate = 78.4 $\pm$ 3.1%, number of pigs born alive = 10.4 $\pm$ 0.3; 5.0 – 7.4 relative units, farrowing rate = 71.3 $\pm$ 3.9%, number of pigs born alive = 9.5 $\pm$ 0.3). These data demonstrate that quantification of these two proteins in seminal plasma holds promise for use in the development of a proactive semen fertility test.

Unfortunately, the range in farrowing rate and number of pigs born alive for ejaculates with the same concentration of these proteins was large - > 10 relative units – 80.0 to 94.0% and 10.2 to 12.2 pigs; 7.5 – 9.9 relative units – 70.2 to 86.0% and 8.8 to 11.2 pigs; 5.0 to 7.4 relative units – 65.4 to 80.3% and 7.8 to 10.7 pigs. This variation was primarily the result of individual differences among boars. In 380 of the 400 boars studied, as the level of these two proteins decreased, farrowing rate and litter size also decreased. However, for some boars whose ejaculates contained 10 relative units farrowing rates were consistently high (> 90%), while for others with similar concentrations farrowing rates were low (< 80%). Consequently, these data indicate that while concentrations of these 2 seminal plasma proteins can be used to provide a qualitative rank for the boar fertility, their usefulness in terms of predicting actual quantitative levels of fertility is limited.