

Effect of seminal plasma proteins on boar fertility using low sperm doses

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Semen assessment techniques for predicting relative male fertility, rather than simply infertility, are still needed. Several seminal plasma (SP) proteins have been shown to play an important role during fertilization and implantation. Specific seminal plasma proteins have been identified in the stallion (Brandon et al., 1999) and the bull (Killian et al., 1993) as potential markers of fertility, suggesting that specific SP proteins may be related to differences in fertility. As part of an ongoing study of ejaculate quality and boar fertility, the impact of total protein concentrations and PSP-I in seminal plasma on fertility outcomes was examined. The first sperm rich fraction of ejaculates collected from nine boars twice weekly over 6 to 7 month periods was evaluated for motility, morphology and concentration, diluted to 1.5 billion morphologically normal sperm in 50 mL BTS extender, and used to breed at least 55 gilts per boar. At four times (replicates) during this period, specific SP aliquots of the first sperm-rich fraction and the sperm-free fraction were obtained. These different fractions were evaluated using the BCA protein assay in order to quantify total protein concentration, and by immunoblotting techniques to visualize and quantify PSP-I protein. The boars differed consistently for pregnancy rate (73 % to 98 %; $P < 0.001$) and farrowing rate (71 % to 98 %; $P < 0.001$). Total born was affected by both boar (8.8 to 12.0; $P < 0.001$) and replicate (9.5 to 11.1; $P = 0.038$), with no boar x replicate interaction. Our initial results indicate that although total protein concentration in raw SP was different among boars (19.13 to 37.97 mg/mL; $P = 0.029$), total SP protein in diluted semen did not differ among boars or replicates, and showed no meaningful correlations with boar fertility. With respect to PSP-I, there were no differences among boars within fraction, suggesting that PSP-I abundance is not a useful indicator of proven fertility.

Implications:

It appears that total protein and the relative abundance of PSP-I protein are not reliable predictors of semen quality and boar fertility in this model. However, other specific seminal plasma proteins are being further investigated.