

# Seminal plasma proteins from fertile boars are associated with *in vivo* fertility

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The aim of this study was to determine if specific proteins in the seminal plasma of boars could be related to *in vivo* fertility. Nine boars with acceptable sperm motility and morphology for use in artificial insemination (AI), demonstrated major differences in total born and pregnancy rate when doses of 1.5 billion total sperm were used to breed  $50 \pm 5$  gilts over the study period. On four occasions, seminal plasma from semen used for AI was analyzed using proteomics techniques to determine if specific seminal plasma proteins were related to differences in *in vivo* fertility and conventional semen quality assessment parameters such as sperm concentration, sperm motility at collection and in stored extended semen to day 10 after collection. The seminal plasma proteins were separated using 7 cm gels, pH 3-10 in the first dimension, and all gels were cast and run simultaneously. Forty-two proteins were compared across the two lowest fertility boars and the two highest fertility boars using Imagemaster software (GE Healthcare). The gel pieces were analyzed using liquid chromatography-tandem mass spectrometry LC-MS/MS (LTQ, Applied Biosystems, Centre Genomique du Quebec, Universite Laval, Quebec). There were differences ( $P < 0.05$ ) among boars in four proteins, however none of these proteins were related to overall fertility. Two of the proteins were identified as different isoforms of Porcine Seminal Plasma Protein (PSP)-1, and both were highly positively correlated ( $P < 0.05$ ) to sperm motility at day 0 and day 3 of storage. However, total piglets born ( $r = -0.76$ ,  $P = 0.01$ ) and sperm motility at day 7 ( $r = -0.74$ ,  $P < 0.05$ ) were negatively correlated with a 20 kDa protein identified by mass spectrometry as AWN-1. Farrowing rate was positively correlated with a 25 kDa protein, which was identified as GSH-peroxidase, an antioxidant enzyme which may protect sperm membranes from oxidative damage.

**Implications:** The identification of fertility markers in seminal plasma of boars may lead to the development of a screening test, predictive of fertility for boars before incorporation into a breeding program.