Prediction Of Fertility Of Young Sires Using In Vitro Tests

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One of the long-standing demands of the dairy and beef industries as well as the artificial insemination industry is to have simple, yet reliable laboratory tests to predict fertility of bulls in the field. Unfortunately, the present routine laboratory tests such as sperm motility, concentration, live and dead spermatozoa are not good indicators of fertility in the field. The overall objective of our investigation is to develop an in vitro test to predict fertility of bulls in the field. The specific objective of this study is to determine the sire effect on in vitro tests such as in vitro embryo production, sperm zona binding and sperm acrosome reaction. Eight unrelated young sires (S_1-S_8) were selected for this study. Frozen semen straws from three separate ejaculates per young sire collected at the beginning, middle and at the end of the test collection period was obtained from Westgen. Ejaculates from each sire were pooled before in vitro tests to minimize variability among ejaculates. On thawing, motile sperm were swim-up separated and subjected to; a) immunoflouroscent assay at 0 and 4 h of incubation, to assess acrosome status, b) in vitro fertilization assay, to assess cleavage rate and blastocyst production rate, and c) sperm-zona binding assay, to count number of sperms bound to zona pellucida. Oocytes obtained from slaughterhouse ovaries were randomly assigned to in vitro fertilization and sperm-zona binding assays. Acrosome reaction at 0 h is significantly different ($p<0.05$) among bulls and one of the eight bulls showed significantly lower ($p<0.05$) acrosome reaction (S_1-27.0±1.5, S_2-30.9±3.1, S_3-30.4±3.5, S_4-42.9±2.2, S_5-35.2±4.1, S_6-35.9±3.0, S_7-36.3±3.3, S_8-35.9±3.8). Cleavage rate is also significantly different ($p<0.01$) among bulls (S_1-69.2±4.4, S_2-55.0±5.0, S_3-56.7±7.8, S_4-55.8±3.5, S_5-48.3±4.9, S_6-55.8±6.8, S_7-70.0±3.4, S_8-64.2±4.9). Acrosome reaction at 4 h, number of sperm bound to zona pellucida and blastocyst development percentage were not significantly different ($p>0.05$) among bulls. Significant correlation was observed between acrosome reaction and zona binding assay. Studies are in progress to determine the correlation between the above in vitro tests and non-return rates of the experimental sires. Development of in vitro tests would a) provide fertility information to dairy and beef farmers who inseminate their own cows, and b) result in early identification of infertility in bulls.