Effect of semen type; inseminate volume, and sperm numbers on post-breeding inflammation in mares

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The duration and severity of post-breeding inflammation due to the presence of spermatozoa is a critical factor in the ability of the mare to become and remain pregnant. We hypothesized that uterine inflammation of mares inseminated with frozen semen (FS) would be less severe than mares bred with fresh cooled semen (CS), increasing the pregnancy rate. The objective of this study was to assess the inflammatory reaction clinically by cytology and biochemical components of uterine flushes of mares bred with CS or FS and determine effects on pregnancy rates.

Eighty-two mares were bred by artificial insemination (AI) with CS (n=44) or FS (n=38) on 104 cycles over a three month period. Mares inseminated with CS were bred within 24 hrs pre-ovulation with 500 to 1000 x 10^6 spermatozoa in volumes ranging between 50 and 100 mL deposited in the uterine body. Mares inseminated with FS were bred within one to four hrs post-ovulation with 50 to 100 x 10^6 spermatozoa in volumes ranging between 0.5 and 1 mL deposited at the tip of the uterine horn on the side of ovulation. Transrectal ultrasound examination and uterine lavage were performed on average 6.6 hrs post-breeding. Depth of fluid (cm) (UF) in the uterine body and degree of uterine edema post-insemination (0-5) (UE) were noted. The first 50 mL of recovered lavage fluid was evaluated for opacity (grade 0 = clear to 5 = mucopurulent) (FO), presence and number of PMNs (%), and protein level (mg/dL) (TP). Slides for cytological evaluation were prepared by cytocentrifugation (Cytospin4, ThermoShandon, Pittsburgh, PA) using disposal plastic chambers (Cytofunnel, ThermoShandon) and glass slides (Cytoslide, ThermoShandon). Total protein in lavage fluid was determined using the Dimension® clinical chemistry system. Statistical analysis was performed using a binary logistic regression model and chi square test to compare the effect of semen type on uterine inflammation parameters (mean ± SEM) and effect of inflammation on pregnancy rate at 15 days post-ovulation.

Pregnancy rate for mares inseminated with CS or FS were not statistically different (61.5% vs 63.3%). There was no significant difference between the two insemination methods with regard to UF post-AI (6.37 ± 0.57 vs 3.95 ± 0.49); FO (2.32 ± 0.16 vs 2.36 ± 0.19); UE post-AI (2.26 ± 0.15 vs 1.90 ± 0.13); PMNs (%) (1.26 ± 0.18 vs 1.27 ± 0.21); and TP (5.13 ± 1.49 vs 26.27 ± 9.8). Non-pregnant mares results were UF post-AI (6.01 ± 0.56 vs 5.95 ± 0.46); FO (2.76 ± 0.18 vs 2.15 ± 0.14); UE post-AI (2.55 ± 0.17 vs 2.27 ± 0.17); PMNs (%) (1.38 ± 0.20 vs 1.50 ± 0.23); and TP (9.85 ± 3.68 vs 7.33 ± 1.82). No significant differences were observed between pregnant and non-pregnant mares. These results provide preliminary information suggesting that PR is independent of UF collection, FO, UE, PMNs and TP content as long as flushing is performed in timely manner following breeding and ovulation.

Keywords: Endometritis, uterine cytology, mare, semen preservation, seminal plasma