The effects of bovine sperm-bound anti-sperm antibodies on capacitation
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Sperm-bound anti-sperm antibodies (ASAs) can prevent sperm capacitation resulting in decreased fertility in men. However, their effect on bovine sperm capacitation is not known. The objective of this study was to evaluate the effect of sperm-bound ASAs on bovine sperm capacitation. It was hypothesized that ASAs negatively affect the ability of bull spermatozoa to undergo capacitation in vitro. Four yearling angus bulls with satisfactory breeding potential were used. First, three ejaculates (ASA negative) were collected and cryopreserved. Then, ASAs were induced by serial immunizations with autologous spermatozoa. Three more ejaculates (ASA positive) were cryopreserved starting three weeks after the last immunization. The percentage of IgG- and IgA-bound spermatozoa was assessed at the time of semen collection using flow cytometry. On the day of the experiment, straws from each ejaculate were thawed and divided into two aliquots. Sperm capacitation was induced in one aliquot by incubation in SP-TALP with heparin (60 µg/mL) at 37 °C in 5 % CO2 in air for 45 min (HEP treatment). Another aliquot incubated without heparin served as the control treatment (CON). The percentage of capacitated live spermatozoa in each treatment group was determined via flow cytometry and the fluorescent stains merocyanine 540 and Yo-Pro1. The percentage of capacitated live spermatozoa was compared among ASA-negative CON, ASA-negative HEP, ASA-positive CON and ASA-positive HEP treatments using ANOVA for repeated measurements. Pearson’s correlation was analyzed between the percentage of IgG- or IgA-bound spermatozoa and the percentage of capacitated spermatozoa after exposure to heparin. While the mean percentage of capacitated spermatozoa was higher in the HEP than CON treatments among ASA-negative samples (P < 0.01), there was no significant difference between HEP and CON treatments in ASA-positive samples (Table). The percentage of capacitated spermatozoa was negatively correlated with the percentage of IgG- (P = 0.041, R2 = -0.402) and IgA-bound spermatozoa (P = 0.02, R2 = -0.429).

In conclusion, sperm-bound ASAs impaired the ability of frozen-thawed bovine spermatozoa to undergo capacitation in vitro. While their effect on fertility needs to be tested, the inability of sperm to undergo capacitation may be a mechanism by which ASAs may contribute to bovine subfertility.

Keywords: Anti-sperm antibodies, capacitation, bovine, spermatozoa