Effects of porcine zona pellucida (pZP) vaccination with SpayVac® using three different adjuvants on ovarian activity in mares

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Introduction
Contraception can be provided to wild horses in a humane, economically feasible, and publicly acceptable manner. Currently, pZP immunocontraception has the greatest potential to control fertility because it is easy to administer, is safe, can provide multi-year efficacy, and has minimal side effects. SpayVac® (ImmunoVaccine Technologies, Inc. [IVT], Halifax, Canada) is the only single-dose pZP vaccine with proven multi-year contraceptive efficacy, which makes it practical and economical for broad-scale application in the field. Because the pZP antigen is a poor immunogen, vaccine effectiveness depends upon choice of adjuvant and formulation. The objective of this study was to compare the effect of vaccinating with pZP formulated as SpayVac® containing one of three adjuvants (proprietary IVT adjuvant, non-aqueous MFA [modified Freund’s adjuvant], and aqueous emulsion MFA) on ovarian activity in mares. Our hypothesis was that, irrespective of adjuvant, SpayVac® vaccination would not affect ovarian activity in mares.

Materials and methods
In March 2010, mares received one (2-ml) intramuscular injection in the neck of SpayVac® formulated with IVT adjuvant (n=7), non-aqueous MFA (n=7), aqueous emulsion MFA (n=7), or placebo controls (n=7). For 26 weeks, ovarian activity was determined by transrectal ultrasonography and palpation. Follicle size was recorded as diameter in mm. The percent of mares with ovarian activity (follicles $\geq 10$ mm with or without a corpus luteum) was analyzed by the non-parametric Wilcoxon rank sum test (GraphPad Prism®, GraphPad Software, La Jolla, CA). Significance was defined as $p<0.05$.

Results
Placebo controls and mares receiving SpayVac® with IVT adjuvant continued to cycle normally throughout the trial (FIG 1). However, by the end of the study, mares treated with SpayVac® containing non-aqueous MFA or aqueous emulsion MFA had significantly smaller ovaries and fewer follicles that could be distinguished ultrasonographically ($p<0.001$).

Conclusion
SpayVac® in MFA (either non-aqueous or aqueous emulsion) disrupts ovarian activity in mares 26 weeks after vaccination. It is not known if this effect is reversible. The mechanism is under investigation.

Keywords: Horse, immunocontraception, ovarian activity, pZP, SpayVac®