

IMMUNOCONTRACEPTION OF FERAL HORSES

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ABSTRACT

Feral mares inhabiting Assateague Island National Seashore, which have been previously immunized with porcine zonae pellucidae in 1988 and 1989 will be given booster inoculations of PZP in March of 1990. These ten mares represent the longest standing experiment with PZP immunization and will be studied for normalcy of ovarian function in May and June of 1990. Urine samples will be collected and analyzed for estrone conjugates and progesterone metabolites, both of which provides indirect examination of blood estrogens and progesterone, and compared with untreated mares. The results will provide insight into the long-term effects of this antifertility vaccine upon ovarian function in mares.

INTRODUCTION

Liu et al. (1989) demonstrated that porcine zonae pellucidae (PZP) elicited antibodies which blocked fertilization and inhibited fertility in the domestic captive mare. In 1988 a project was initiated to test the remote delivery of this contraceptive vaccine with feral horses. Twenty-nine mares inhabiting Assateague Island National Seashore (AINS) were remotely inoculated with one, two or three doses of PZP, by means of barbless darts fired from a tranquilizer gun, between February 29 and April 30, 1988. Eighteen mares received three inoculations, eight received two inoculations and three received a single inoculation. Sixty percent of these mares were pregnant at the time of inoculation and all delivered healthy foals within two to three months following administration of the PZP. The following year, none of the 18 mares receiving three inoculations had foals and only one of the eight mares receiving two shots had foals. Based on control populations and previous foaling records for the treated mares, the results represented a 93 % reduction in foal production. Social behavior and organization were unaffected by the vaccine.

In February of 1989, 14 of the mares treated with PZP in 1988 and which did not produce foals were given a single booster inoculation of PZP. Thirteen of these mares remain infertile. Twelve mares receiving PZP inoculations in 1988 were left

untreated in 1989, and five of the 12 are currently pregnant, documenting the reversibility of the vaccine. These results indicate (1) the PZP vaccine is highly effective in blocking fertility in feral mares, (2) the PZP vaccine can be delivered remotely, without the need to capture or immobilize mares, (3) the PZP vaccine is safe to deliver to pregnant animals and will not disrupt pregnancies in progress or cause damage to foals exposed as fetuses and (4), PZP inoculation will not alter sexual behavior or social organization.

Despite the success achieved to date in feral horses with the PZP vaccine, there remain several unanswered questions regarding the most effective manner in which to administer the vaccine and its long-term effects upon reproductive function in horses. The major concern at present is the long-term effects of chronic PZP administration upon ovarian function. Although the vaccine has been tested in four species of primates, no studies have lasted longer than 18 months. There is concern, based on limited data derived from rabbits and dogs, that long-term administration might interfere with normal ovarian endocrine function because of interference with ovarian cells by the PZP.

The treated mares on Assateague Island represent the longest standing study to date, however, the National Park Service does not plan to begin inoculating animals until 1991 (largely because the population was decreased significantly in September of 1989, by equine encephalitis) and this would cause a break in the continuous treatment of the experimental mares on the island. It is very important that the mares treated in 1988 and 1989 are treated again

in 1990, or three years of work will have to be repeated to reach this stage of chronic treatment. This proposal seeks to inoculate a minimum of ten mares with PZP for the third consecutive year and to monitor ovarian activity in May and June by means of urinary steroid metabolites.

EXPERIMENTAL DESIGN

Ten Assateague Island mares treated with PZP in 1988 and 1989 will be inoculated with a single booster dose in March of 1990. Inoculation will be carried out by means of barbless darts and a Pax-Arms tranquilizer gun. During May and June of 1990, a student will be employed to collect urine samples from the ten treated and a minimum of five control mares, as described by Kirkpatrick et al. (J. Wildl. Manage. 52, 1988). Urine samples will be returned to my Billings laboratory and analyzed for ovarian steroid metabolites by enzyme immunoassay. Specifically, estrone conjugates (E1C) and non-specific progesterone metabolites (iPdG) will be measured: the former provides an indirect index of plasma estrogens and the latter an index of plasma progesterone. Figure 1 indicates the normal ovarian steroid profiles for the mare, measured by EIA. The methods and validation of these assays for use in mares is currently in press (Kirkpatrick, J.F., S.E. Shideler and B.L. Lasley, Urinary steroid evaluations to monitor ovarian function in exotic ungulates: VII. Urinary progesterone metabolites in the Equidae assessed by immunoassay, Zoo Biology). Endocrine profiles from treated animals will be compared with untreated animals and examined for the presence or absence of normal pre- and post-ovulatory E1C peaks