General Description
Like ZonaStat-H, the native PZP (Porcine Zona Pellucida) vaccine, PZP-22 works by causing the target female to produce antibodies that attach to the envelope surrounding the ovulated egg, block sperm attachment, and prevent fertilization. PZP-22 adds to the ZonaStat-H vaccine three small timed-release pellets containing PZP and a federally-approved adjuvant that stimulates the immune system. The pellets are designed to release PZP and adjuvant at 1, 3, and 12 months, mimicking a series of PZP booster shots. For hand-injection or jabstick, or remotely by a specially designed dart. For hand-injection, the pellets can be pre-inserted into needles for easier handling and delivery in the field.

History
Native PZP was shown in the 1990’s to be an effective contraceptive and a useful management tool on island populations of wild horses and white-tailed deer. However, researchers and managers alike recognized that a single-shot, multi-year version of PZP would expand its usefulness for managing populations of free-ranging wildlife.

Pursuit of timed-release preparations to simulate PZP boosters began in 1992. After some false starts, researchers settled on packaging PZP and adjuvant into polymer pellets that produced both the desired timed-release effects and offered easier handling and delivery. The PZP-emulsion/pellets combination was named PZP-22 by the Bureau of Land Management (BLM) because research on captive mares showed that antibody titers remained at contraceptive levels for approximately 22 months after treatment. Field trials of PZP-22 on wild horses at Clan Alpine Herd Management Area (HMA), Nevada, and on white-tailed deer at Fripp Island, South Carolina, proved highly encouraging.

Efficacy
The initial field trial of PZP-22 in wild horses at Clan Alpine HMA showed fertility reductions of 90% in Year One and 75% in Year Two, and a full return to fertility in Year Four. PZP-22 efficacy, very similar to that seen in wild horses at Clan Alpine, has been reported in two field trials in white-tailed deer, at Fripp Island and at Hastings-on-Hudson, New York.

Follow-up field trials at Cedar Mountain, Utah, and elsewhere yielded more variable fertility reduction, highlighting the importance of appropriate timing of delivery and of vaccine release from the polymer pellets. New batches of pellets that restore the originally-designed release patterns await testing. In both wild horses and deer, administering a single PZP booster 2-3 years after initial treatment reduces fertility by 66-90% for three or more additional years. Boosters of native PZP and PZP-22 yield similar results, so that a PZP-22 primer followed by a native PZP booster 2-3 years later offers at least 5-6 years of effective contraception over a 7-year period.

Prospects for Management Use
Because it is reversible, PZP-22 protects the demographic and genetic health of treated populations. As with any fertility control agent, PZP-22 will work best as a management tool when a high proportion of females is treated. Generally, a multi-year effort will be needed to reach and maintain the levels of contraception needed.

In the second round of gathers among the Cedar Mountain wild horses, 70% of mares in the herd were treated with initial PZP-22 treatments or
boosters of native PZP or PZP-22. The next year, population foaling rates declined to 34% of control levels, and annual population growth dropped by 74%.\textsuperscript{xii} Weaker population effects have been observed at Cedar Mountain and elsewhere when a smaller proportion of mares was treated. On Fripp Island, a 40% reduction of white-tailed deer densities was observed over a five-year period following hand-injection of about 90% of females present with PZP-22 and other single treatment PZP preparations.\textsuperscript{xiii} Population data emerging from Hastings-on-Hudson suggest that reduction of white-tailed deer populations using PZP-22 will not be limited to island environments.\textsuperscript{x}

References


