BOTSTIBER INSTITUTE
FOR WILDLIFE FERTILITY CONTROL

SUMMARY

IMMUNOCONTRACEPTION OF WILD HORSES IN THE U.S.

Introduction

Wild horses have long been an icon of rugged independence and the American West. It is estimated that between 1825 and 1850, as many as two million wild horses may have roamed America's rangelands, and because these animals were useful for farming and ranching, they were not viewed as a significant problem.[1,2] By the 1890s, advances in farming technology coupled with a fading cattle market decreased the need for horses to the point that ranchers abandoned "literally millions of horses to roam freely on the range."[3] Once horses were no longer considered useful, their presence was perceived as a nuisance to ranchers and other private property owners, and as a result, wild horse populations decreased dramatically as "mustangers" captured and sold them to slaughter. By the early 1900s, most wild horses had disappeared from the Great Plains and those that remained were found primarily in the remote mountains, deserts, and badlands of the West. By the 1960s there were fewer than 18,000 wild horses left in the U.S.[4]

Public concerns over abuse and declines in wild horse populations intensified in the 1950s and 1960s, and due to the efforts of advocates like Velma Bronn Johnston (aka "Wild Horse Annie") and others, successful campaigns eventually led to the enactment of the Wild Free-Roaming Horses and Burros Act of 1971 (Public Law 92-195).[5] The Act protects wild horses and burros as "living symbols of the historic and pioneer spirit of the West," and since its passage, wild horse populations have increased, but the public continues to voice concerns over the way the animals are managed.[6]

Management

As amended, the Act directs the Bureau of Land Management (BLM) to manage wild horse herds by setting appropriate management levels (AMLs). AML is the number of horses and burros defined by the BLM as the number that can thrive in balance with other public-land resources and uses for each Herd Management Area (HMA). The aggregate AML that the BLM has established for 177 HMAs that comprise 31.6 million acres of public lands (of which 26.9 million are under BLM management) is 26,690.[7] Herds can grow at an average rate of 20% annually, and when herd populations exceed established AMLs, the BLM is authorized to conduct gathers to remove excess animals from HMAs.[8,9,10] When gathers occur, BLM transports the removed animals to long-term government holding pastures in the Midwest where they are cared for in perpetuity or, to a lesser extent, adopted by private individuals. From 1971 to 2019 the BLM removed and adopted out more than 240,000 animals.[11]

In recent years, the number of animals removed from the range and placed in long-term holding has far exceeded the number adopted and sold. According to the BLM's data reports for 2012 through 2018 over 37,000 animals were removed from the range while only 22,313 were adopted and sold.[12] The remaining animals have been placed in government holding facilities, and as of July 2019, there were 46,952 animals in either off-range corrals or pastures.[13] As a result, off-range wild horse management costs have increased dramatically. In FY 2018 alone, the cost of holding and caring for these animals exceeded $49.8 million - 61% of the $81.2 million in total annual expenditures for the entire wild horse and burro management program.[14] Meanwhile, despite annual removals, the BLM estimates that the on-range wild horse population has more than doubled since 2013, and as of March 2019, approximately 71,892 wild horses exist on public lands – 45,000 over the BLM's established aggregate AML.[15]

The costs associated with the off-the-range care of wild horses continue to increase because mortality rates in captivity are low. The average life span of wild horses and burros in captivity is approximately 30 years, and every year the agency continues to remove more animals from the range and place them in additional holding facilities. For these reasons, the BLM is working with other federal agencies, researchers and NGOs to develop long-term management strategies to reduce the number of removals by reducing population growth rates on-the-range.

Fertility Control

Since the 1970s, the BLM, federal and state agencies and NGOs have supported research to develop safe, practical and effective fertility control methods for managing wild horse populations. In 2013, the National Academy of Sciences (NAS) published a report commissioned by the BLM stating that two of the "most promising methods for application to free-ranging horses" are Porcine Zona Pellucida (PZP) immunocontraception vaccines, including, but not limited to, ZonaStat-H and PZP-22, and the GonaCon™ vaccine.[16]

The PZP immunocontraception vaccines have a long history of field testing and efficacy on wild horse populations. For best effectiveness, the PZP vaccine Zonastat-H requires an initial primer dose, an initial booster two weeks later, and then annual boosters in subsequent years. The vaccine can be administered either through hand injection or with a dart gun. The horses are typically gathered using either bait and water-trapping or helicopter-drive gathers. In some areas the vaccine is administered through remote, opportunistic darting.

Today, usually working with volunteers, the BLM uses ZonaStat-H to manage wild horse populations via remote opportunistic darting on several HMAs where the horses are habituated to humans and/or highly accessible.[17,18] However, most wild horses managed by the BLM live in rugged, remote areas where the animals are wary of humans, difficult to access and/or thinly dispersed, and annual darting is not possible. In these areas, a single-treatment, multiple-year contraceptive vaccine could be used to effectively reduce foaling rates which could reduce the population growth rate of wild horse herds. I the last five years, two peer-reviewed scientific publications have demonstrated that PZP-22 and GonaCon™ can produce 5 -7 years of infertility in free-roaming wild horses with one initial treatment and a single booster two to three years later. [19,20]

The PZP-22 vaccine consists of an initial priming injection of ZonaStat-H and three controlled-release pellets engineered to release PZP at 1, 3 and 12 months. A field trial from 2000 to 2004 at the Clan Alpine HMA in Nevada demonstrated that a single injection of PZP-22 reduced fertility in treated mares by 91% in year one, 73% in year two and 38% in year three.[21] To further evaluate the population-level effectiveness of PZP-22, in 2008, researchers began field studies conducted in two HMAs – the Sand Wash Basin HMA in Colorado and the Cedar Mountains HMA in Utah. In the fall of 2008, wild horse mares in Sand Wash Basin HMA and Cedar Mountains HMA were captured, treated with hand-injections of PZP-22 and released. In 2010, the previously treated Sand Wash Basin mares were boosted via

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remote, opportunistic darting with either PZP-22 or ZonaStat-H alone. In 2012, the previously treated Cedar Mountains mares were re-captured, boosted via hand-injection with either PZP-22 or ZonaStat-H and released. The efficacy of the initial PZP-22 treatments over two years was low relative to previous trials, but boosters, delivered by hand or by dart reduced foaling in treated mares by 65 -72% over three years with no clear and consistent difference in performance between the ZonaStat-H booster and the PZP-22 booster.[22]

GonaCon™ is a GnRH-based immunocontraceptive vaccine that has been shown to induce infertility for two or more years with a single administration in wild horses; however multiple years of infertility with a single administration has been limited to a fraction of treated individuals. [23,24,25] In 2009 a group of researchers began a field study to determine the efficacy and duration of infertility from both a single immunization and a subsequent re-immunization of GonaCon™ on a herd of free-roaming wild horses living in Theodore Roosevelt National Park in southwestern North Dakota.[26] In the fall of 2009, wild horse mares were captured, treated with GonaCon™, and released. Four years later, in the fall of 2013, the previously treated mares were captured, re-treated, and released. As expected, in the first two years of the study, a single immunization with GonaCon™ was minimally effective in reducing fertility in treated mares with 28-38% decrease in foaling between treated and untreated mares. These results were consistent with similar findings from a previous study on free-roaming mares in Nevada where it was reported that GonaCon™ reduced foaling on average 33% over a three-year period.[27] However, like the PZP-22 study, reimmunization of previously treated mares resulted in a significant reduction in fertility for three or more consecutive years.

At the time of this writing, PZP-22 and GonaCon™ can produce five to seven years of infertility in free-roaming wild horses with one initial treatment and a single booster two to three years later. As such, the use of these vaccines could result in a much greater reduction in wild horse population foaling rates if repeat immunizations of the PZP-22 vaccine and/or GonaCon™ vaccine were incorporated into long-term population modeling and management plans for areas where animals are difficult to access and/or thinly dispersed. The process would require agencies to capture, treat and release (CTR) a high proportion of the existing mare populations, repeat the process in two to three years in order to administer the initial boosters, and if needed, repeat the process to re-administer boosters five to seven years later. Initial inoculations with either vaccine may only provide modest reductions in population foaling rates, but when followed by subsequent reimmunizations could result in greater reductions in population growth rates over time.

Conclusions

At the time of this writing, PZP-22 and GonaCon™ can produce five to seven years of infertility in free-roaming wild horses with one initial treatment and a single booster two to three years later. If repeat immunizations of the PZP-22 vaccine and/or GonaCon™ vaccine were incorporated into long-term population modelling and management plans for areas where animals are difficult to access and/or thinly dispersed, the use of these vaccines could result in much greater reduction in wild horse population foaling rates. The process would require agencies to capture, treat and release (CTR) a high proportion of the existing mare populations, repeat the process in two to three years in order to administer the initial boosters, and if needed, repeat the process to re-administer boosters five to seven years later. Initial inoculations with either vaccine may only provide modest reductions in population foaling rates, but when followed by subsequent reimmunizations could result in greater reductions in population growth rates over time.

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