



***Myths and Facts: Native Porcine Zona Pellucida (PZP)
Immunocontraception in Wild Horse Herds***

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While we continue to counter the abysmal state of the larger politics that surrounds wild horses, and the challenges we face to protect their free-ranging lifestyle on our federal lands, we want to clarify some unsubstantiated criticism leveled at devoted scientists and advocates, who work hard on the front lines to find *viable and humane* alternatives to the current government capture and removal management policies. This does *not* imply an endorsement for opinions that attribute range degradation to an overpopulation of wild horses and burros. While livestock graze on 160 million acres of BLM-managed lands, wild horses and burros are relegated to only 26.9 million acres, where they are outnumbered by millions of privately owned livestock. Consigned to just 11% of our public lands, wild horses are outnumbered by livestock by an average ratio of 50:1.

Further, we work diligently for the ideal of wild horses and burros to be left undisturbed in their natural habitats. However, we have come to accept that we need solutions that would actually be considered within the current economic and political paradigm defined by the mandated "multiple-use" management of our public lands. Whether we like it or not, that is the law. Therefore, we urge Congress to redirect funds used for costly and devastating captures, removals and warehousing toward minimally intrusive solutions to manage wild horses and burros on the range.

In response to opinions misrepresented as facts about ***Native Porcine Zona Pellucida (PZP) Immunocontraception in Wild Horse Herds*** on social media, we first need to frame the following *Myth and Facts* document with a point of view.

Fact: America's wild horses and burros no longer have the ability to roam freely throughout our vast western rangelands. The Bureau of Land Management (BLM) manages 245 million acres of America's public lands for uses, which include recreation, livestock grazing, hunting, mining, and oil and gas extraction. Since the passage of the Wild Free-Roaming Horses and Burros Act in 1971, the BLM manages wild horses and burros on our public lands as part of a "multiple-use" management policy. Multiple-use management of its public lands was mandated by an amendment to the original 1971 law through the Federal Land Policy and Management Act (FLPMA) (1976). Wildlife are managed by hunting permits, livestock are managed through grazing permits, and wild horses are managed through capture, holding, and adoption.

Wild horses and burros existing within Herd Management Areas (HMAs) that have been fenced for livestock, are unable to migrate freely, as they once did in response to climatic changes, water resources, and forage availability.

Fact: Reality about self-regulating herds - In the natural world, wildlife populations are regulated by climate, resources and predation. Mountain lions and wolves are large enough to prey on wild horses and burros, but, primarily due to their threat to livestock, there are not a sufficient number of predators to regulate wild horses and large mammal populations.

In a balanced natural habitat, large grazing ungulates, like wild horses and burros, will naturally self-regulate, but usually only after the range is almost completely destroyed. The mechanisms for self-regulation in large ungulates is not the same as it is in rodents. So, unless we are prepared to accept range destruction and starvation, self-regulation in wild horse herds is not an option, as indicated by public uproar when a herd's condition declines due to lack of resources in their area.

Fact: Impact on genetics and social structure - Today, most of the wild horse populations on our western rangelands have already been genetically and socially disrupted by decades of roundups and removals as well as relocation of horses (due to preference for color,

size and conformation to cater to a dwindling adoption market).

Over 50 credible organizations, and dozens of reputable scientists and individuals, work tirelessly to identify and implement the most minimally invasive, safe and humane solutions, policies, and management methods available, to keep our wild horses and burros protected in viable free-roaming herds. We work nationally to protect an equitable share of resources for wild horses and burros on our public lands and maintain vigilant support for the protection of predators to restore an ecological balance on America's wilderness areas and rangelands.

Faced with the invasive management choices of permanent sterilization, roundups and warehousing of wild horses, the only compromise worth exploring, was one that offered the horses the most natural lifestyle, proven to have zero to minimal impact on natural behaviors, natural selection, health and well-being.

Without a doubt, the only method of wildlife fertility control with minimal impact is the native PZP vaccine. This proven technology, which has been used safely in various wildlife populations around the world for *over 30 years, provides an alternative to the current capture, removal and warehousing of horses and burros in government holding facilities.*

Fact: Economics - Unfortunately, free-ranging wild horses and burros do not create a profit for any industry. Outnumbered on public lands by privately owned livestock 50 to 1, they compete with the economic interests that benefit other stakeholders, who have a legal right to public land resources, whether we like it or not.

After 30 years of a costly, mismanaged program focused on removing horses from the range, the BLM is finally listening to recommendations issued from the 2013 National Academy of Sciences (NAS) report, to pursue slowing down reproduction and achieving desired Appropriate Management Level (AML), over time, reducing and, in some cases, eliminating the need for removals, saving millions of tax dollars annually. Currently, 48,000 wild horses and burros are warehoused in holding ranches and corral facilities costing taxpayers about \$67 million a year in 2014.

In Summary:

Pressure from public land ranchers to significantly reduce or remove wild horses on public lands, continues to fuel ongoing roundups. *Ironically*, pressure from advocates *against* utilizing a non-hormonal fertility control vaccine to slow down reproduction in wild horse herds, also fuels ongoing roundups.

Meanwhile, in the middle, we have a significantly large majority of credible organizations, scientists and individuals that have been working on the front lines for decades to end the capture and the warehousing of wild horses, through the exploration of scientifically viable and proven solutions that can be implemented on the range today.

The BLM needs to respond to all stakeholders. One has to wonder whether those advocates on the extreme end of the debate are even aware that the BLM's current discussion at the national level is to get to an Appropriate Management Level (AML) of 26,684 horses and burros before they commit to on-the-range management. The methods to do this include:

- continued roundup, capture and mass removal of horses from the range;
- experimental forms of hormonal fertility control (that contain Gonadotropin Releasing Hormone (GnRH) blockers, which impact natural behavior;
- permanent sterilization (castration of stallions and spaying of mares).

All of these methods permanently destroy natural selection, genetic diversity and negatively impact natural behaviors.

Given the decades of data that support native PZP as an effective, safe and humane tool to slow down reproduction so that wild horses and burros can be managed on their ranges and avert costly traumatic roundups, stockpiling and fracturing of the herds, it is irresponsible to maintain an oppositional stance without providing alternative solutions that would endure the political, economic and environmental realities, which continue to ignite the historic battle over the distribution of our public land resources.

While droughts impact wildlife, ranchers and communities around the country, reasonable compromises to allow wild horses and burros to remain on the range continue to be challenged, but it is a priority we must pursue to ensure their survival. Today the protection and conservation of our natural resources is paramount to restoring balance on America's vast rangelands, so that true preservation, within a genuinely wild environment, might one day be possible.

Myths and Facts

Myth: Porcine zona pellucida (PZP) is a pesticide.

Fact: Native PZP is a non-hormonal vaccine that has been proven safe to administer to pregnant and lactating mares, does not have any debilitating health side-effects, and does not enter the food chain. It is derived from pig ovaries obtained from a slaughterhouse in Iowa, as a by-product of hogs already destined for slaughter. Therefore, no fewer hogs will be killed if the PZP vaccine were no longer made. Major competitors for pig ovaries include Chinese restaurants, and pharmaceutical companies that use ovarian endocrine components for research and production of products.

PZP is not a pesticide. The Food and Drug Administration (FDA), which classified native PZP as a contraceptive vaccine, worked out a Memorandum of Understanding (MOU) with the Environmental Protection Agency (EPA) to become the regulatory agency for wildlife contraceptives. EPA agreed, but the EPA has no classification for wildlife contraceptives. So, they simply labeled it a "pesticide." However, that does not make it a pesticide. It was a *contraceptive vaccine* at the FDA, and it still is [under several Investigational New Animal Drug documents (INADs)]. We can call a horse a "zebra" 97 times, but that won't make that horse a zebra.

Consider this. The same vaccine is used in more than 85 species of zoo animals around the world, many of them critically endangered. This particular use is still under the authority of the FDA, and they classify it as an immunocontraceptive vaccine, largely because they have an office for such things, but mostly because it is a contraceptive vaccine, meaning that it renders temporary infertility. It is the same vaccine, the same dose, with the same adjuvants. However, more to the point, *why would the Association of Zoos and Aquariums (AZA) and the American Association of Zoo Veterinarians endorse the use of a*

"dangerous pesticide" in so many valuable animals? They would not. They have no trouble endorsing the use of a well-studied immunocontraceptive vaccine. In 2012, when The EPA representative was asked at the *Wildlife Fertility Control Conference* in Jackson Hole, Wyoming about changing the classification, he responded that it was impossible, because EPA doesn't have an office for wildlife contraceptives. If the FDA had transferred authority to the American Dairy Association, instead of the EPA, it would probably be classified as a dairy product! This unfortunate mislabeling needs to be interpreted based on facts. These are the facts.

Myth: Native PZP is a sterilant.

Fact: By definition, contraception is reversible; sterilization is not. Because permanent infertility, or very sporadic reversal, will occur within 5-7 years of consecutive vaccine treatment, native PZP is only used in the context of approved management plans on Herd Management Areas (HMAs), Wild Horse Territories (WHTs), sanctuaries, and tribal, state and federal lands. PZP is a tool to slow down, delay, or manage reproduction in the hope that it will provide a viable alternative to capture, removal, and holding, all which destroy herd structure and genetic viability—permanently. Each horse removed from a herd reduces the gene pool of that particular population, permanently.

From a population management perspective, where the current alternative to native PZP use is removal, once a free-roaming mare has made a genetic contribution to the herd, there is no reason for her to continue to foal every year for the rest of her life. If the management plan calls for more than one foal per mare, that can also be achieved and will still contribute to population control but may not completely eliminate the need for periodic removals in some areas or for periods of time, depending on other environmental factors and policies.

It should also be noted that not all mares respond physiologically to the vaccine, due to differences in immunological health and condition, just as humans do not all respond to a particular vaccine in the same way, e.g., flu vaccines. So the fear that native PZP can eradicate all wild horses is not possible *even if the BLM darted every single mare*. There would still be a percentage of mares that will continue to foal. Other forms of population reduction methodologies can cause permanent sterilization and detrimental health effects, and one should

be concerned with their use. Native PZP has been used for 28 years in wild horses, both on the range and in sanctuaries, where all concerns and outcomes have been carefully documented.

Myth: PZP is a chemical contraceptive and poses a significant risk to the mares inoculated and to foals born to inoculated mares.

Fact: PZP is not a "chemical" contraceptive. It is a vaccine-based contraceptive, and the two are worlds apart (Kirkpatrick et al. 2011). The vaccine is close to 95% effective (Kirkpatrick and Turner 2008). Those mares inoculated improved in body condition and health (Turner and Kirkpatrick 2002). The vaccine's use increased longevity of treated horses (So how dangerous can it be?) (Kirkpatrick and Turner 2007). The vaccine, long ago, was demonstrated to be safe in pregnant animals, and for the offspring born to them (Kirkpatrick and Turner 2002). In fact, foal mortality decreases with the use of PZP. One could cite a dozen other papers that show its safety in pregnant animals and their offspring, in every animal from white-tailed deer to African elephants.

Myth: PZP causes ovarian damage and other pathologies?

Fact: Native PZP does *not* cause ovarian damage. Ovarian damage is the result of treatment with SpayVac®, not native PZP. It is important to note the difference. A recent paper by Bechert et al. (2013) describes the ovarian damage associated with the SpayVac® form of the vaccine. Killian et al. (2008) report uterine pathologies (edema) caused in mares by using the SpayVac® form of the vaccine. However, neither study used pure native PZP. There is a significant difference. There are three forms of PZP—pelleted "PZP-22," SpayVac®, and liquid native PZP (ZonaStat-H). All three are significantly different with regard to efficacy, physiological mechanism, and safety. **Native PZP is highly effective and without associated pathologies.**

Myth: PZP is being used to pave the way for human contraception vaccine.

Fact: The idea that PZP is being used in horses to pave the way for a

human contraceptive vaccine is a myth. PZP was originally looked at as a candidate for a human contraceptive vaccine (a first) way back in the 1970s and '80s. However, it failed on three counts:

1. Contraceptive vaccines are never 99.9% effective. PZP is, at best, 95% effective, and no one would use a contraceptive that is 95% effective. Consider flu vaccine efficacy. Would anyone use a contraceptive with the same low efficacy as the flu vaccine?
2. Second, the time it takes for reversal to fertility is so variable that all the pharmaceutical company attorneys could envision was litigation from users.
3. No one has ever come up with a successful synthetic or recombinant form of the vaccine, and the labor-intense bench chemistry necessary to make native PZP automatically renders it useless for the human market. Only those who have actually witnessed the intense and exacting process for production of native PZP can entirely understand this.

Myth: A population of 150 wild horses is the lowest population needed to maintain a viable and genetically healthy herd.

Fact: The actual numbers required for genetic health, within specific herds, are still in question. Healthy herds can be maintained where smaller numbers of horses exist, but this is because they display a higher genetic diversity. Herds with a low genetic diversity require larger numbers, as do those living in harsh environments where, for example, winter-kill has been an issue in the past. In these herds, it is important to maintain a "buffer" population in case of cataclysmic die-off.

There is simply no empirical evidence to support the need for 150 reproducing adult horses for a minimal genetically viable population. That number has been gleaned from a misinterpretation of notable Texas A&M University equine geneticist Dr. E. Gus Cothran's work. If it did have some factual basis, the Pryor Mountain Wild Horse Range herd, as well as a number of other wild horse populations, would have disappeared many years ago.

Myth: The 2013 National Academy of Sciences (NAS) Report did not recommend fertility control in federal wild horse herds.

Fact: The 2013 NAS report did call into question some of BLM's management practices and also recommended that the use of wild horse contraception be greatly *increased*. Only 0.3% of the BLM's wild horse budget was used for fertility control in 2014.

The NAS committee had to work within the boundaries of the law [the Wild Free-Roaming Horses and Burros Act (1971, as amended)], and the multiple-use mandate, required by the Federal Land Policy and Management Act (1976) (FLPMA) for BLM public lands. These are the laws. Many of us do not agree with all the provisions within them, but FLPMA is currently the Organic Act for the BLM (and the law), and we live by laws, not personal preferences. If federal laws are flawed, they have to be changed through the legislative process of Congress, with concurrence by the President. The vagueness and lack of clear definitions in current wild horse and public land law—both statutory law and regulatory law—make wild horse protection and management difficult. Numerous judges, in deciding cases, have stated that they have “little to work with,” even when he or she covertly agrees with wild horse advocates.

There were major differences between the expertise of members of the 2013 NAS Committee, charged with addressing the management of a wildlife species (wild horses) and scientists who focus on domesticated horses—ranging from “conformation” to racing, to every other issue one can envision.

None of the individuals on the NAS Committee were involved in domesticated horse research or management. There is no evidence, however, that NAS Committee members were unfit to address the horse as a wildlife species in either the makeup of the committee or the recommendations they made. Any reference to imply this would be a biased, unsupported opinion. However, the organizers of this NAS project refused to take up the native (vs. nonnative) status of horses in North America, despite a written request from a renowned paleomammalogist from the American Museum of Natural History.

Wild Horse Management: The Example of Assateague Island National Seashore (ASIS)

Assateague Island National Seashore is managed by the National Park Service (NPS) and is not to be confused with Chincoteague Island, which is outside this National Seashore, with an entirely different population of horses. Chincoteague ponies are managed by the Chincoteague Volunteer Fire Company. Since the establishment of ASIS, in the 1960s, the NPS has classified the horses there as "wildlife," and aside from native PZP contraception, the agency manages them as wildlife. ASIS horses have been left entirely to themselves, aside from population management. There has never been any governmental research there, although independent academic institutions and scientific nonprofits have conducted extensive research on this herd.

The 28-year history of the management of the Assateague (ASIS) horses with PZP has been vetted in peer-reviewed, reputable scientific journals. Although an occasional scientific paper can be slipped through the peer-review system, 14 published primary research projects on ASIS, involving many different scientists, and quite a number of different institutions, have resulted in an entire body of research over these 28 years.

Now let's examine all of this through the eyes of the ASIS horses themselves.

Since the establishment of an immunocontraceptive management plan on ASIS:

- Horses have not been removed or handled;
- Mortality rates have declined significantly, particularly among foals;
- Body condition (Henneke) scores have improved;
- Longevity has increased dramatically, and mares now live a minimum of three times longer than they did during the pre-contraceptive years, in better body condition.

The ASIS management plan has generated the most sophisticated and accurate wild horse modeling methods available and has pioneered the most up-to-date and accurate genetic studies ever conducted with wild horses (also published in peer-reviewed journals).

This particular horse population has been living on that island for close to 400 years. They live on sand, marsh, mud and water and have adapted well. ASIS horses are probably monitored more closely than any other wild horse population anywhere, and lameness is almost non-existent. Had there been detrimental issues, these horses would not have thrived over 400 years. No reports of these concerns have been documented by the NPS biological technician, who has literally lived with these horses, 12 months a year for over 20 years, and who knows wild horses better than 99.9% of the American public.

Myth: Inoculations introduce pathogens. Can administering the native PZP vaccine cause their hooves to fall apart, if laminitis is triggered?

Fact: After 28 years of using this vaccine in wild horses, there is no data, whatsoever, to support this myth. Horse populations that have been managed with the native PZP vaccine, both in the wild and in sanctuaries, are living into their early thirties with no laminitic or founder episodes documented as a result of the vaccine.

Myth: Mares will stay in perpetual estrus (heat) if they don't get pregnant. Won't prolonged estrus cycling make stallions "edgy" and aggressive, creating continuous "unrest?" In the chaos, won't foals be harmed or even killed?

Fact: At the heart of this issue is the subjective nature of casual observation. Science is based on data, not informal surveillance. Systematically collected data, reviewed by other scientists, accepted as legitimate, treated appropriately statistically, and published in a recognized journal is the only acceptable means for arriving at generalizable, accurate behavioral information. A good start for understanding the rudiments of behavioral research in social animals can be found in Craig (1986).

In 1983, it was shown (Kirkpatrick and Turner 1983; 1986 a,b) that some wild horses (those with very old origins) do not have the same ovulatory patterns as domestic horses, and that wild horses have well-defined breeding seasons (usually from about late March until July, but this will vary somewhat from herd to herd, with herds that have more recent origins having broader ovulatory seasons). Wild mares in herds of older origins do not extend their breeding season if they do not

become pregnant. Keiper and Houpt (1984) also showed this for Assateague horses. This DOES happen, however, in deer (McShea et al. 1997) but not typically with wild horses, although it may happen in horse herds of more recent origins, in small numbers. In 28 years of data collection on Assateague Island, only a single documented incident of a stallion killing another stallion, because of fighting, has been observed. This occurred in the middle of breeding season (late May).

Much of the debate about extended breeding seasons is derived from misinterpretation of data. In those herds where an occasional later birth occurs among treated mares, this is the result of:

- her failure to get pregnant during the "regular" breeding season, because she was contracepted and her antibody titers were high;
- falling antibody titers later in the season;
- a later pregnancy as she reverses. However, PZP did not extend her ovulatory season.

The inference of the question is that by treating wild horse mares with PZP, they will continue to cycle throughout the year, and that this will cause stallion "unrest," aggression, and potential injury.

Another implication from opponents has been that late foals will die over the winter. However, improved foal survival refutes this. The stallion aggression factor is not the major complaint. By contrast, in older herds, documented evidence shows that mares will NOT continue to cycle if they do not conceive, at least beyond the normal 3-4 month breeding season.

If critics were correct, and PZP did cause "unrest" and continuous cycling, which, in turn, led to worked-up stallions and foals dying as a result of this behavioral turmoil, then any area using PZP would have greater foal mortality. However, after 15 years of management-level treatment on ASIS, foal mortality has decreased. That is a data-driven fact.

Granted... wild horse behaviors are subtle, and individual horses will show a wide range of variability in behavioral patterns. It takes a great deal of observational experience to pick them up. We do know that hierarchies and band stability are not affected by PZP application. We also know that aggressiveness and aberrational behaviors are not caused by native PZP use. Perhaps, however, there may be a subtle

change in daily routine. However, the larger question is, even if subtle alterations in behavior may occur, this is still far better than the alternative of wild horses being rounded up, bands broken apart, and all of the other negatives that go with traditional management. These issues need to be put into the perspective of risk-benefit by PZP opponents.

There may be some minor time-budget changes. In any case, they are not significant in the world of wild horse behavior.

Myth: Pharmaceutical companies are involved with the ASIS and other native PZP projects.

Fact: No pharmaceutical company has had any involvement with the ASIS project or with any other native PZP horse projects around the world. **PZP is not a commercial product** and will not ever become one. Given the limitations explained above, there is no effort by any individual or agency to make PZP a commercial product. PZP not only does not make money for its producers, but it actually costs more to produce and distribute than the nonprofits involved glean monetarily.

Myth: Managing wild horse herds with the use of native PZP is similar to Nazi eugenics.

Fact: This is not just a display of paranoia and ignorance but is meant to demean the good intentions of many people, who genuinely care about the well-being of wild horses. We must assume that the implication is that genetics are manipulated through the use of native PZP, but nothing could be farther from the truth. The use of contraception to slow down reproduction is simply to counter irreversible, permanent impacts to herd genetics caused by capture and removals. **PZP must be used within the context of a herd area management plan or other herd plan that ensures every mare will have an equal opportunity to make a genetic contribution to the population.** The advantages to that are expressed in genetic studies conducted and mentioned above (Eggert et al. 2010). This myth is couched not just in illiteracy, but, worse, is degrading and insensitive to those individual scientists and others advocating native PZP use as a humane alternative to traumatic and costly roundups and warehousing of wild horses, slaughter, permanent sterilization and the separation of harem bands that have been established through natural selection.

Myth: Predation is a viable management solution.

Fact: To be fair, many of us wish that predation were a viable possibility, but it is not. Many prey animal populations are managed by natural predation, but due to hundreds of years of livestock grazing, fences have been erected and predators reduced by systematic decimation. Even the single-referenced population [Montgomery Pass Wild Horse Territory (WHT)] that once was controlled by mountain lions (because California allows no mountain lion hunting) is no longer controlled by these predators, primarily because of land-use changes and the removal of fences that now allow these wild horses to move where lions are not a problem with foal predation, i.e., into developed areas. Turner and Morrison (2001) published a paper on foal predation in this WHT, adding that additional research was needed. More recent data about this herd will soon be published (2015). It is doubtful that mountain lion populations outside of California will be allowed to increase (and neither will wolf populations). These key predators will not present a long-term solution, not because they could not control wild horse populations, naturally, but **because the political conditions for increasing predator populations simply do not and probably never will exist.** Introducing large predators near human and livestock populations pose the risk of serious opposition. The same is true for the removal of livestock from public lands. Equity in public land grazing, in a true multiple-use system, would allow larger wild horse populations. The laws are vague about Appropriate Management Levels (AMLs) for wild horses, making removal a quick solution for the BLM to a complex range management issue.

The fact is that our free-ranging wild horses are fenced, captive inside their Herd Management Areas (HMAs) or Wild Horse Territories (WHTs), and even restricted within their own HMAs by internal fencing. They essentially live in large human-created "pastures," and Darwinian natural selection is not possible under these artificial, restricted conditions. This situation is not likely to change in our lifetimes. However, with the assistance of an understanding and informed Congress, perhaps an entirely new management scheme for federal wild horses can eventually be achieved.

Myth: Native PZP is patented.

Fact: The process to produce PZP is neither patentable, nor is its use in wildlife patentable. Legal steps were taken by the scientists

involved, back in the 1990s, to make sure that native PZP would never become a commercial product. Thus, **no organization, entity or person can own or co-own a patent on this vaccine.**

Myth: The Motive of Financial Gain

Fact: No organization or individual is gaining financially from native PZP. **Native PZP is provided at 60% of the cost of production** (\$24/dose), and somewhere between \$10,000 and \$20,000 worth of PZP is given away (donated) annually by the producers, in cases where users cannot afford to purchase it. The income from PZP represents, annually, about 24%, at most, of the annual budget of the institution that produces it. Put another way, wildlife contraception, in any form, is akin to running an animal shelter without tax support. Thus, the “profit motive” referenced to by skeptics is pure myth.

Myth: Wild horse HMAs will become zoos with genetically modified organisms (GMOs).

Fact: Unfortunately, this is already the case since livestock ranching has cross-fenced public lands and predator levels are too low for natural population management. Because of livestock grazing interests on public lands, it is unlikely any movement to restore and adequate amount of predators needed to manage horse populations will be implemented in the foreseeable future. Native PZP so far, is currently the most promising option for minimally invasive management to keep wild horses on the range and without the permanent effects on genetic diversity, well-being etc. inflicted on wild horse herds by sterilization, roundups, removals which have been and will continue to be the alternative option no matter how many protests we have.

Myth: Wild horse protectionists’ “sanctuaries” are sad, pathetic parodies of real wild horses.

Fact: Of course, it is sad that there is even a need for wild horse sanctuaries, or that any living creature needs “rescue” and sanctuary. However, there is always the option to do nothing at all. Anyone who has actual experience providing care for horses, specifically if they want to include mare and stallion co-habitation, will understand the following options for population management in sanctuaries:

Option 1: No management.

Mares, geldings, and stallions would be housed together, allowing nature to run its course. Results of this could include natural behaviors of horses in normal herd groups, as well as the addition of foals from at least 55% of the mares (based on a model using data from wild herds and assuming that 55% of mares foal each year) (Kirkpatrick 1986; Garrott et al. 1991; Keiper and Houpt 1984). This option, of course, is contraindicated by limited space, and perhaps the acquisition of resources to feed an ever-increasing population.

Option 2: Adoption.

All or most foals born would be available for adoption. Results of this could include a new administrative structure to deal with this, control of the fate of placed horses (follow-up, etc.), and the issue of only the younger animals being "adoptable" (very common in horse adoption programs). A secondary result of being able to place only younger animals is the increased fertility achieved by the dam when a foal is removed from her. In effect, this can potentially speed up population growth (Kirkpatrick and Turner 1991a). The failure of the federal Adopt-A-Horse Program suggested this was not a viable option.

Option 3: Gelding and Vasectomy.

All males would be permanently sterilized through gelding or vasectomy. All horses could be housed together. The results of this option would be that all population growth would be stopped, permanently interfering with natural hormone-driven movement, behaviors and genetic diversity. Stallion sexual and herding behavior is dependent upon testosterone, and gelding removes that steroid (McDonnell 2011).

Option 4: Permanent sterilization of mares.

This may include spaying (ovariectomy), sterilization_vaccines and IUDs for mares. In addition to data showing that various foreign objects placed inside a mare's uterus, to stop fertilization, creates various medical problems, these methods are also more invasive and permanently affect genetic diversity and natural selection. If a mare is pregnant, she must have her foal aborted before an intrauterine device (IUD) can be inserted, and if the IUD is too small, it will often be expelled.

Option 5: Separation.

All mares would be separated from stallions. The results of this would be no population growth, no natural herd behaviors, and potential management obstacles (Stallions in pens or pastures together can lead to increased fighting, but needing to keep each stallion separate is difficult on limited land with limited resources.). This alternative differs little from gelding in terms of the loss of natural behaviors and maintaining naturally selected herds and genetic diversity.

Option 6: Contraception.

All mares of breeding age will be treated with a contraceptive. If the contraceptive did not interfere with normal behaviors, the results of this would be normal herd social organization and behaviors, and a slowing or cessation of population growth.

Those dedicated to finding the most minimally invasive options that can be applied on the range as an alternative to the current paradigm of capture, removals and slaughter, agree that the most promising tool currently available is the *native PZP vaccine*, which has been a proven, effective and humane method to make this possible for over 20 years.

Because it is non-hormonal, it **does not**:

- affect the endocrine system or natural behaviors;
- create negative health side effects;
- enter the food chain harming other wildlife.

In order to allow horses in sanctuaries to live as natural a lifestyle as possible, wild horse bands at ten sanctuaries are managed with native PZP, a non-hormonal immunocontraception. This allows the natural hormone-driven movement and behaviors that are necessary for the horse's well-being, physically and emotionally, while prohibiting conception. Not all mares respond to the vaccine (non-responders) and a small percentage of mares that had been responding to the vaccine, and taken off the program, have become fertile again. In this way, the vaccine becomes a tool to slow population, without permanently destroying natural selection or genetic diversity.

Data presented at *The Wild Horse Symposium: Humane Management of Wild Horses through Immunocontraception* in Jackson Hole, Wyoming, showed that the birth control program at Return to Freedom

has an efficacy rate of about 85-91%, while efficacy rates in the wild can be as high as 96%.

Summary: Benefits of Managing Wild Horse Populations on the Range with Immunocontractive Fertility Control

The bottom-line benefits of fertility control on the range are: **No removals, no disruptions of social groups (harem bands), better health, less adult and foal mortality, far greater longevity, sound and intact social structures, sound genetics, and overall better lives.** That's what fertility control has brought to free-roaming wild horses and to those horses that live in sanctuaries and on Native American lands that are being managed by fertility control. This is precisely why fertility control in the form of native PZP should be promoted, not denigrated.

While there is much to criticize about the current BLM wild horse management paradigm, one of the more notable problems is the lack of use of a safe, effective, cost-efficient, and humane means of fertility control. So few federal wild horse mares are being contracepted with native PZP that, with some exception—such as within the McCullough Peaks Herd Management Area, the Pryor Mountain Wild Horse Range, and the Little Book Cliffs Wild Horse Range—application is negligible. According to financial data supplied by the BLM to the Wild Horse and Burro Advisory Board, the agency spent 67 percent of its total annual \$77 million wild horse budget, in 2014, rounding up, removing and stockpiling horses from federal lands. **BLM spent a mere 0.3 percent on population growth suppression for 450 mares.** Three of five wild horses now live in government holding pens and pasturages, costing taxpayers an estimated \$120,000 per day. Worse, each removal merely speeds up the reproductive success of horses remaining in the field through compensatory reproduction.

It is a matter of agency robotics on the part of the BLM to do what it has carried out, historically, that is, roundups, holding, and (minimal) adoption. It is possible for larger wild horse areas to utilize native PZP, in the field, with bait-trapping, vaccination, and release, creating far less trauma for the animals involved and considerably less expense.

Those who oppose its use have been misled, are misinformed, and do not have experience managing harem bands of horses or they do so by separating stallions or allowing excessive breeding. Wild horse populations managed with native PZP would not be living an additional

10+ years, with quality of life, if there were negative impacts on their health and well-being.

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