

HUSBANDRY STANDARDS FOR KEEPING WILD EQUIDS IN CAPTIVITY, 2001

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INTRODUCTION

Within the genus, *Equus*, three species of zebras (*E. grevyi*, *E. zebra* and *E. burchelli*), one species of African wild ass (*E. africanus*), three species of Asian wild asses (*E. hemionus*, *E. onager* and *E. kiang*) and one species of Asian wild horse (*Equus caballus przewalskii*) remain. Among the eight species considered, some differences in social structure and space requirements are present, but in general the husbandry standards for keeping each of these species in captivity are similar.

The husbandry standards described in this document cover the following species.

Latin Name	Common Name
<i>Equus burchelli</i>	Plains zebra
<i>Equus grevyi</i>	Grevy's zebra
<i>Equus zebra</i>	Mountain zebra
<i>Equus asinus</i>	African wild ass
<i>Equus hemionus</i>	Dziggetai
<i>Equus onager</i>	Khur, Kulan, Persian onager
<i>Equus kiang</i>	Kiang
<i>Equus caballus przewalskii</i>	Asian wild horse (Przewalski's horse)

PLAINS ZEBRA: Plains zebras are medium-sized equids averaging ~550-600 lb with broad stripes. The pattern and coloration of the plains zebras vary throughout the range. Several subspecies of plains zebras are recognized and can be distinguished by the differing size and coat patterns of each subspecies.

Plains zebras are found in a variety of habitats, including grassland, savannah and lightly wooded areas and are widely distributed throughout Africa. They live in large herds that can sometimes number in the thousands and they associate in stable, long-lasting family groups comprised of a single stallion and multiple mares and foals (typically 1 stallion and 1-6 mares and foals). Bachelor herds also occur.

This zebra species is stable in the wild at this time. Threats to the plains zebras include loss of habitat to humans, competition with domestic livestock and over-hunting.

GREVY'S ZEBRA: Grevy's zebras are the largest of the three zebra species averaging ~850-1000 lbs. This species can be distinguished from the other two species of zebras by its large size, its uniform narrow stripes and its large rounded ears.

Grevy's zebras are endangered and the range of Grevy's zebras has been greatly reduced in recent years, with a decline of more than 70% of the wild population in recent years. Fewer than 5000 individuals remain in the wild and the decline is still continuing. This species is now only found in a few areas of Ethiopia and northern Kenya. Threats to this species include loss of habitat to and competition for resources with domestic livestock, drought and hunting.

Grevy's zebras inhabit arid and semi-arid grasslands and scrublands where they predominantly graze, but are also known to consume browse when forced to do so in drought conditions. Grevy's zebra stallions typically protect large territories and mate with mares who wander into the territory for food or water. The only stable social bond in Grevy's zebras is that which is present between a mare and her foal (up to 2 yrs of age). Sometimes a mare and her foal will associate with other mares and foals, but the relationships are never long-lasting. Bachelor herds also occur.

MOUNTAIN ZEBRA: Mountain zebras are the smallest of the three zebra species averaging an adult weight of 650 lbs. The stripe patterns of this zebra species are not as wide as the plains zebras, nor as narrow as the Grevy's zebras. The dewlap running along the throat also distinguishes the mountain zebras from the other two species of zebras.

Two subspecies, the Hartmann's mountain zebra (*E. z. zebra*) and the Cape mountain zebra (*E. z. hartmannae*), occur in the mountainous areas of southern and southwestern Africa and occupy a variety of habitats. This species is found living in stable, long-lasting family herds comprised a single stallion and multiple mares and foals (typically 1 stallion and 1-6 mares and foals). Bachelor herds also occur.

The Hartmann's mountain zebra is considered Vulnerable and the Cape mountain zebra is considered Endangered. Threats to this species include loss of habitat and competition with domestic livestock for food and water.

AFRICAN WILD ASS: The African wild ass is likely the world's most critically endangered equid. Recent field surveys have revealed dismal results and it is believed that fewer than 400 individuals survive. Those surviving individuals occur in scattered and isolated populations in Eritrea, Djibouti, Somalia and Ethiopia and continued to be threatened by loss of habitat, hybridization with domestic donkeys and hunting.

Much less is known about this rare species. The gray African wild ass has a light underbelly, a black dorsal stripe a black-tipped mane and very long ears. The Somali wild asses also possess unique leg stripes.

ASIAN WILD ASS, DZIGGETAI, KULAN, ONAGER, KHUR: *Equus hemionus* (Dziggetais) and *Equus onager* (Persian onagers, Kulans and Khurs) range throughout Asia. The Dziggetais are found in Mongolia and China, the Persian onagers in Iran and Israel, the kulans in Turkmenistan and Kazakhstan and the khurs in India. These wild equids vary little in size, but there are color and physical differences that can be used to identify the species and subspecies from one another.

These wild asses inhabit steppe and desert grassland regions throughout their Asian range. Threats to this species include increasingly intensive land use by man and competition with domestic livestock for valuable resources. The populations of all of these subspecies continue to decline. In particular, the wild population of Persian onager (*E. h. onager*) has been reduced to fewer than 400 individuals in Iran and Israel.

KIANG: Three subspecies of kiang, the Eastern kiang (*E. k. holdereri*), the Western kiang (*E. k. kiang*), and the Southern kiang (*E. k. polyodon*), occur in China, Nepal and India. The kiang is the largest of the wild asses with a maximum estimated body weight of ~700 lbs. The hair coat of these chestnut-colored equids changes from a wooly dark brown coat in the winter to a thinner red-brown coat in the summer and the underbelly and underside of the neck are white.

Kiangs inhabit various types of habitat where food is available, including open grassy plains, alpine regions, desert steppes and mountainous areas. Typically kiangs are observed alone or in small herds, but are sometimes observed in large herds of several hundred individuals.

ASIAN WILD HORSE (PRZEWALSKI'S HORSE): the Asian wild horse is an endangered species and is extinct in the wild. The last Asian wild horse was observed in the wild in Mongolia in the late 1960's. The causes of extinction were loss of habitat and resources to domestic livestock and over-hunting. This species has been successful in European and North American captive collections and captive-born horses have been reintroduced back into Mongolia.

This unique heavily built equid averages 550-650 lb, is light yellow-brown in color and possesses a stiff black mane. It is believed that, prior to extinction in the wild, stable family herds comprised a single Asian wild horse stallion and multiple mares and foals (typically 1 stallion and several to many mares and foals) inhabited the semi-desert environment in northern China and southern Mongolia.

1. ABIOTIC ENVIRONMENTAL VARIABLES

1.1 Temperature

- 1.1.1 In general, wild equids are tolerant of an extremely wide range of temperatures and weather conditions and generally only need protection from temperature/weather extremes.
- 1.1.2 Healthy equids can withstand temperatures in excess of 100 degrees F as long as adequate water and sufficient shade are provided. Dominant herd members may monopolize the premium shaded areas and exclude subordinate individuals so sufficient shade opportunities must be provided to accommodate every member of the herd.
- 1.1.3 Most wild equid species may be kept outdoors year round in southern parts of North America and only require shelter from wind or excessive precipitation.
- 1.1.4 In the northern parts of North America, protective shelters and/or barns should be available during the winter months to provide protection from rain, snow, sleet and wind chill as needed. African species may be less cold-hardy and may need more shelter and supplemental heat than other wild equids.
- 1.1.5 Special consideration and additional protection should be given during inclement weather to individuals not yet acclimated to winter conditions, aged individuals, foals under a year of age and sick individuals. For these individuals, the tolerance for weather and temperature extremes may be reduced and protection from the elements (shade, shelter, bedding, supplemental heat) may be needed more frequently for these individuals than for other members of the herd.
- 1.1.6 When temperatures fall below freezing for more than 4 days, shelter and/or barns with supplemental heat should be available. The more cold-hardy species may not need supplemental heat.
- 1.1.7 Bedding should be provided within winter holding shelters and/or barns to provide comfort and adequate insulation during periods of inclement weather.
- 1.1.8 Temperatures below 15 degrees F may result in frostbite on ears or feet.

1.2 Ventilation and Humidity

- 1.2.1 Adequate ventilation in indoor enclosures is essential for the respiratory health of wild equids. In most equid barns adequate ventilation can be provided with doors, windows, exhaust fans and louvered vents. Barn ventilation systems should:
 - 1.2.1.1 Provide fresh air to meet respiration needs of animals
 - 1.2.1.2 Minimize odors and improve air quality
 - 1.2.1.3 Control moisture condensation
 - 1.2.1.4 Control or moderate temperature extremes
- 1.2.2 Barn ventilation requirement in cold weather is 4-6 complete air changes per hour.

- 1.2.3 A barn with forced air heat should be capable of maintaining a temperature of 45 – 60 degrees F.
- 1.2.4 Barn ventilation requirement in warm weather is 16-32 complete air changes per hour.

1.3 Illumination

- 1.3.1 Equids are typically exhibited and managed in outdoor enclosures year round, weather permitting, under conditions of natural light.
- 1.3.2 When held indoors, skylights, fluorescent or incandescent lights provide adequate lighting for the duration of their confinement.
- 1.3.3 Data has shown that some equids managed in NA are seasonally polyestrous and rely on photoperiodic changes (longer days) to begin cycling again after a period of seasonal anestrus. However, most species of wild equids seem to do well under conditions of natural light and have no specific artificial lighting requirements for successful management and reproduction in captivity in North America.

1.4 Space Wild equids occupy a large spaces and widely varied habitats in the wild. The native habitat occupied by each species of wild equid is in direct relation to their adaptations and their social and dietary needs. Though space in most zoos and conservation centers is limited, captive equid enclosures/exhibits should be as large as possible and should try to mirror these natural habitats and meet the social needs of the species whenever possible.

1.4.1 Outdoor enclosures/exhibits

- 1.4.1.1 In general, because of the large size, aggressive nature and social needs of wild equids, breeding herds require a larger exhibit space than most other ungulate species in captivity. To encourage compatibility and ensure the safety of subordinate herd members, the maximum space available should be provided for equid species.
- 1.4.1.2 As a minimum guideline, outdoor enclosures for wild equids should provide at minimum:
 - 1.4.1.2.1 For non-breeding herds (mares and offspring, no stallion present), 1000 sq ft per individual
 - 1.4.1.2.2 For breeding herds (stallion, mares & offspring present), 2000 sq ft per individual
 - 1.4.1.2.3 For bachelor herds, 2000 sq ft per individual
- 1.4.1.3 Hartmann's mountain zebras are the least gregarious of all zebra species and must be given more space than other equids due to aggression.
- 1.4.1.4 It may be necessary to separate the stallion from the herd when breeding is not desirable or when a pregnant mare is preparing to foal. A separate outdoor off-exhibit holding/exercise enclosure (minimum 500-1000 sq ft) should be available for the stallion during the period of time that he is separated from the herd. If possible, it is best to isolate (no visual, auditory, olfactory contact)

the stallion from the herd to avoid the incidence of stereotypic behavior (pacing, etc.).

- 1.4.1.5 Outdoor enclosures should not have blind corners where individuals could be trapped by aggressive herdmates.
- 1.4.1.6 Outdoor enclosures are improved when planted with grass, bushes, ornamental grasses and trees. The addition of plant material provides the equids with shade, visual barriers, a varied enclosure and a more natural habitat. All plant material must be protected from the equids with the use of fencing (chainlink, heavy mesh, wooden corrals, electric fence all work well) to prevent plant damage and consumption. Extreme care should be utilized when selecting plants and toxic plants should not be used.
- 1.4.1.7 Natural (planted areas, tree groves, deadfalls, brush piles, etc) or manmade (shelters, hay feeders, structures, etc.) visual barriers should be provided to allow subordinate herd members to escape or rest.
- 1.4.1.8 It may be necessary to shift the animals out of the exhibit for cleaning, enclosure maintenance or other purposes. Adequate off-exhibit holding where animals can be safely held while the exhibit is cleaned or repaired should be provided.
- 1.4.2 Indoor and/or holding enclosures
 - 1.4.2.1 As a minimum guideline, indoor and/or holding enclosures for wild equids should provide:
 - 1.4.2.1.1 300-500 sq ft per individual if stalled separately
 - 1.4.2.1.2 400-600 sq ft per individual if stalled as a herd
 - 1.4.2.1.3 When confined to a small space even for a short period of time such as exhibit cleaning, stallions should be separated from the rest of the herd to avoid aggression.
 - 1.4.2.2 Indoor and/or holding enclosures where individual animals can be temporarily isolated from herdmates should be available.
 - 1.4.2.3 Due to the aggressive nature of some species of wild equids, it may be necessary to shift the animals out of the indoor and/or holding enclosures for cleaning. Adequate shift space/stalls should be provided for this purpose.
 - 1.4.2.4 Equids housed in a herd situation and given in/out access of the barn benefit from multiple stall/barn doors that can provide stress-free ingress and egress into and out of the barn.
- 1.4.3 No specific furnishings are needed for equids within the indoor or outdoor enclosures to accommodate locomotory or foraging behaviors, however exhibit furniture (browse, deadfalls, stumps, scratching posts, etc.) is appreciated and provides enrichment for equids. If possible, furniture should be moved or changed on a regular basis to alter pathways and elicit interest.
- 1.4.4 Visual barriers to allow subordinate herd members to escape or rest should be provided.
- 1.4.5 Appropriate substrates for indoor and outdoor enclosures

- 1.4.5.1 A relatively flat or slightly rolling outdoor terrain is preferred by most equids, though slopes are utilized as well if available within the enclosure.
- 1.4.5.2 A natural substrate of dirt and/or grass is preferred for outdoor enclosures. Many types of small gravel (1" minus) or crushed rock can be used successfully as a substrate and will aide in hoof wear. Caution should be exercised if the natural substrate of the enclosure is sand. Feeding off the ground in a sandy area should be avoided to prevent accidental ingestion and sand impaction. If softer substrates are utilized (dirt, grass, etc), sufficient hoof wear may not occur naturally and supplemental hoof trimming/care may be required to control excessive hoof growth.
- 1.4.5.3 Equids enjoy rolling/dusting themselves, so a rolling area of dirt, mulch or similar material is appreciated.
- 1.4.5.4 The most common surface within an indoor and/or holding enclosure is concrete with a broom-swept finish to prevent slipping and to control excessive hoof growth.
- 1.4.5.5 Bedding such as straw, dust-free sawdust and wood shavings can be used within indoor enclosures to provide comfort and insulation, absorb urine and prevent slipping.
- 1.4.6 No regular or seasonal changes or variations in the environment are required, though environmental enrichment (browse, deadfalls, mulch piles, toys, etc.) are appreciated and provide positive stimulation and prevent boredom for equids.
- 1.4.7 Sanitation – Both indoor and outdoor enclosures and facilities should be cleaned and disinfected on a regular basis to prevent excessive accumulation of feces and food waste and reduce disease hazards, insects, pests and odors.
 - 1.4.7.1 Bedding, feces and leftover hay/feed should be removed from the indoor/holding enclosures daily. Facilities with cement floors should be thoroughly cleaned daily and hosed/disinfected on a regular basis. When possible vertical surfaces should also be cleaned and disinfected.
 - 1.4.7.2 Feces and leftover hay/feed should be raked and removed from the outdoor enclosure daily.
 - 1.4.7.3 Supplies of food and bedding within facilities/barns must be stored in a sanitary manner that protects the supplies from spoilage, contamination and vermin infestation.
 - 1.4.7.4 Premises where animal facilities and enclosures are located must be kept clean, in good repair and free of clutter to reduce or eliminate breeding and living areas for rodents, pests and vermin and, in turn, protect the health and well-being of the animals
 - 1.4.7.5 An effective pest control program for the control of insects, rodents and vermin must be established and maintained so as to promote the health and well-being of the animals and reduce contamination by pests in animal enclosures.

- 1.4.8 Identify number of air changes/hour required – see Section 1.2
- 1.4.9 Security regulations for keeping captive equids differ from state to state and facilities must comply with regional requirements.
 - 1.4.9.1 For most equid species an eight foot barrier is recommended. If dry moat is utilized the depth of the moat and any additional fence should reach eight feet. Barriers should be constructed of block or wood walls, rock or rock like structures, or sturdy wire mesh fence, chain link fencing (preferably 9-gauge), and be free of projections and hazards.
 - 1.4.9.2 Solid visual barriers (6-8' high) are best utilized for corrals and/or holding areas.
- 1.4.10 Equid Transport
 - 1.4.10.1 Stock trailers are the preferred transport container for equids. Equids can also be transported within crates, but because of their size and aggressive nature, the use of a crate is typically not recommended.
 - 1.4.10.2 When transporting equids in trailer or crate, the containment area should provide the individual enough room to stand and lie down comfortably in a normal position. The trailer or crate should be strong enough to contain the equids securely. The interior of the trailer or crate must be smooth with no gaps large enough to trap a leg or hoof and no sharp points, edges or protrusions that could injure the individual. For more specific requirements and regulations regarding transport crate size and design for equids, IATA (International Air Transport Association), USDA (United States Department of Agriculture), or APHIS (Animal and Plant Health Inspection Service) guidelines should be consulted.
 - 1.4.10.3 Food and water should be provided to the individuals during transport. Because equids are likely to be excitable and/or aggressive, it is recommended that the water be affixed and the food be positioned in the trailer stall or crate prior to loading. A small door or window should be available into the trailer stall or crate through which the handler can safely provide additional food and water during transport.
 - 1.4.10.4 Trailer stall or crate floors should be lined with rubber matting and bedded with hay, straw or shavings for cushion, warmth, urine absorption and to provide traction during transport.
 - 1.4.10.5 It is usually not possible to remove waste during equid shipments using a stock trailer or crate. For short transports, removal of waste is not necessary and an adequate amount of bedding material should be used to absorb urine during transport. For longer crate shipments, a crate with a removable leak-proof collection tray can be used and feces and urine that falls through a slatted or mesh crate floor can be removed during transport as needed.

- 1.4.10.6 Stock trailers and crates should be thoroughly cleaned and sanitized before use to reduce the risk of disease and parasite infection.
- 1.4.10.7 Transport of equids in either hot or cold temperature extremes is not recommended without supplemental cooling or heating of the trailer or crate.
 - 1.4.10.7.1 General temperatures permitted by airlines for live animals are 45 – 85 degrees F.
 - 1.4.10.7.2 If equids must be transported in temperatures below 40 degrees F, precautions should be taken (ample bedding, etc.) and supplemental heat should be considered.
 - 1.4.10.7.3 If equids must be transported in temperatures above 90 degrees F, precautions should be taken, adequate ventilation should be provided and/or supplemental cooling measures should be considered.
- 1.4.10.8 Equids travel most calmly in a darkened trailer with little stimulus from their surroundings.
- 1.4.10.9 When possible, a period of acclimation should be offered to allow the individual(s) a chance to get familiar with the trailer or crate prior to transport.
- 1.4.10.10 Individuals should, in general, be separated during transport. With careful consideration and assessment, exceptions can be made (mare & offspring, bonded mares, docile individuals, etc.) and equids can be transported in pairs or as a herd as long as adequate space is provided. Stallions should always be transported in separate spaces from other individuals.
- 1.4.10.11 The handler, hauler or vet should be able to easily and adequately visualize the individual during transport.
- 1.4.10.12 Upon arrival at the final destination, each individual should be released into a small holding pen with few visual or auditory stimulants until the individual can acclimate to its new surroundings. After a long transport an individual may be calm/quiet/shaky/wary of its new surroundings or may be highly excitable and aggressive. Caution should be exercised to protect the individual and other herd members. Introductions to new herd members or to a large enclosure should not be made until the individual is acclimated to its surroundings and its post-transport behavior has returned to normal.

1.5 Water Equids are not aquatic species and do not need water features in their enclosures/exhibits.

2. BIOTIC VARIABLES

2.1 Food and Water

- 2.1.1 All wild equids are dependent on water and should have clean, potable water available to them at all times.
 - 2.1.1.1 Water tubs, automatic waterers and exhibit pools are all suitable for providing a source of fresh water to equids in captivity.
 - 2.1.1.2 Tubs or waterers should be secured to prevent tipping/emptying. Water tubs or automatic waterers should be properly positioned and easily accessible to equids of all ages. Tubs and waterers should be cleaned and sanitized regularly to ensure the availability of clean drinking water at all times.
 - 2.1.1.3 If an exhibit pool is available as a water source, it should be regularly cleaned and there should not be a build-up of algae to ensure the availability of clean drinking water at all times.
 - 2.1.1.4 Multiple water sources may be necessary to ensure that all herd members have access to water at all times.
- 2.1.2 In nature, equids are primarily grazers and are easily maintained in captivity on a modified domestic horse diet.
 - 2.1.2.1 A combined diet of good quality dried hays and commercial herbivore concentrate pellets provided at a suggested rate of 1.5-3% body weight per day will more than likely provide adequate nutrition for most equid species.
 - 2.1.2.2 Equids spend a majority of their day foraging for food in the wild. When possible in captivity, the daily ration should be offered at several feedings throughout the day to mimic the natural feeding habits of equids, to avoid boredom and to reduce the risk of stereotypical behaviors such as pacing, cribbing, coprophagia, etc.
 - 2.1.2.3 Scheduled feedings are often used to facilitate training and shifting of individuals, locking the herd into a holding area or other management needs.
 - 2.1.2.4 If a balanced diet is provided through the combination of dried hay/commercial pellet daily ration, no mineral supplementation will likely be required. However, commercial salt and/or mineral blocks can be used with equids if necessary.
 - 2.1.2.5 No variations in the above diet are required, but additional foods (fresh fruit and vegetables, browse, etc.) are appreciated on a random schedule and provide stimulation and enrichment to the dietary routine. Care should be taken to ensure that food enrichment items are not offered in such quantities as to decrease consumption of the carefully balanced base diet. To avoid obesity, the caloric content of enrichment foods should be factored into the overall diet.
 - 2.1.2.6 All dietary components should be wholesome and free of foreign matter, vermin, mold and chemical contamination. Uneaten items should be removed from the enclosure on a daily basis to prevent the possibility of food-borne illness.
 - 2.1.2.7 Feeding hay and pelleted feed directly off the ground should be avoided if at all possible to minimize parasitic infection and

accidental sand or gravel ingestion/impaction. Hay can be offered in above-ground hay mangers or bags. Hay mangers should not be above shoulder level as dust inhalation may result in respiratory problems. Both buckets/food pans on the ground and elevated food buckets are acceptable for offering the daily pelleted ration. Food buckets/pans should be made of a durable material that can be easily cleaned and sanitized.

2.1.2.8 When animals are fed together in herds, multiple feeding sites must be offered within the enclosure to prevent dominant individuals from monopolizing the feed and to reduce aggression at feeding time.

2.1.2.9 When possible, all changes to the diet should occur gradually to allow a period of transition and to reduce the risk of digestive upset. When transferring an equid to a new institution, a supply of the currently fed diet should be shipped as well to ease any transition to a new hay or pellet.

2.2 Social Considerations

All equids are gregarious. Two distinct social systems are observed in the family Equidae.

The common zebra, mountain zebra, Przewalski's wild horse and the Asian wild asses live in stable family herds that consist of a single stallion and one or more mares and offspring. Adult membership of family herds is relatively stable and breeding herds may stay together for extended periods of time. Bachelor herds also occur.

The social system of the African wild asses and Grevy's zebra is quite different than other species of wild equids. In both species there are no permanent bonds between individuals, except that bond between a mare and her foal. There are no stable associations between adult individuals. At any one time, individuals of either gender may be found alone or in a variety of different social associations, such as bachelor herds, mare herds, mare/foal herds and mixed gender herds. In general, adult stallions are territorial and solitary.

2.2.1 In captivity, the recommended social group compositions for equids are: 1) mare/foal herds of several mares and their offspring, 2) breeding herds of one stallion and multiple mares and their offspring and 3) bachelor herds of two or more stallions.

2.2.1.1 Breeding herds are generally composed of one adult stallion and multiple mares and their foals. The dominant stallion will not tolerate additional adult stallions or juvenile stallions over a year of age within the herd. It is generally not advisable to have additional adult stallions or juvenile stallions over a year of age in close proximity to the breeding herd.

- 2.2.1.2 There is typically no need to isolate parturient mares from the mare herd. In general experienced mares successfully give birth and raise young within the herd. Dominant mares may occasionally interfere with new mothers and mare/foal bonding. First time mothers and/or mares with poor foal-rearing history may be temporarily isolated from the herd (preferably prior to parturition) in a confined area to encourage mare/foal bonding following parturition.
- 2.2.1.3 Depending on the temperament of the herd stallion, it may be necessary to separate the stallion from the mare prior to parturition to prevent harassment of the laboring mare and to ensure the safety and well being of the newborn foal. See Section 1.4.1.3.
- 2.2.1.4 Individual stallions exhibit variable behavior within the herd making it a challenge to give general recommendations. Some stallions are extremely tolerant and may be managed with the herd at all times, including during parturition. Other stallions are more aggressive to mares and may be untrustworthy around foals. Some stallions are so aggressive that they can only be introduced to mares for breeding purposes. Infanticide has been documented in several cases with Przewalski's horse and precautions should be taken when introducing a new stallion to pregnant mares.
- 2.2.1.5 The timing of forced "emigration" of juveniles will be somewhat variable depending on the temperament of the stallion and the size of the enclosure. Dominant stallions may not tolerate young stallions born into the herd as they reach maturity. To preserve herd structure and prevent injury, it is often necessary to separate the young stallions from the herd (this is a natural dispersal process in equids) before 12 months of age. Young mares can typically remain in the herd until 12- 24 months of age. As with all herd animals, separation and/or removal of an individual from the herd can produce a high level of excitability and stress for both the individual and the herd. When removal of an individual from the herd is necessary, a gradual separation process over the course of several days to weeks is recommended. This gradual transition will allow the individual to become acclimated to being separated from the herd. If facilities allow, once a permanent separation from the herd has occurred, the individual should be moved to a remote area out of visual contact of the herd to reduce the stress of the separated individual.
- 2.2.1.6 Seasonal separation of equid sexes is not a natural phenomenon but is often utilized as a management tool in northern climates to control foaling season.
- 2.2.1.7 Multi-generational associations, usually mares and daughters, occur in captive herds but these are not necessary for successful management in captivity.

- 2.2.1.8 Bachelor herds of wild equids composed of multiple sub-adult and/or adult stallions occur in the wild and, given sufficient space, have been successful in captivity.
 - 2.2.1.8.1 Significant distance (no visual, olfactory or auditory contact) should separate bachelor herds from mare herds to ensure compatibility and reduce aggression within the bachelor herds.
 - 2.2.1.8.2 In wild and captive bachelor herds, dominance struggles occur and fighting, sparring and vying for dominance are common. These interactions are important in developing social skills that will be needed during their adult life. These altercations occasionally lead to injuries.
 - 2.2.1.8.3 Bachelor herd formation is most successful when utilizing subadult and/or similarly aged individuals to establish the herd and reduce initial potential aggression.
 - 2.2.1.8.4 If an introduction must be made to an existing bachelor herd, younger individuals should be used as possible, to cause the least amount of disruption to the established dominance hierarchy.
 - 2.2.1.8.5 Hormonal compounds have been successfully used to reduce aggression when initiating equid bachelor herds.
- 2.2.2 Appropriate herds sizes:
 - 2.2.2.1 For small enclosures, a trio (1 stallion and 2 mares) with space for offspring is ideal.
 - 2.2.2.2 For larger enclosures, it is possible to manage equids in large herds consisting of one stallion and multiple mares with offspring. Depending on space available, one stallion can cover 10-15 mares or more.
 - 2.2.2.3 See Section 1.4 for recommendations on indoor/outdoor space needed for single individuals, mare/foal herds, breeding herds and bachelor herds.
- 2.2.3 The social requirements of equids do not require the influence of adjacent groups or related species to promote normal behavior.
- 2.2.4 Multi-species exhibits are possible with some equid species. Extreme caution should be used when mixing wild equids with other species and in general this social group composition is not advised for most wild equid species.
 - 2.2.4.1 It is possible to manage selected equid species in mixed species exhibits, though this is generally not advisable. Plains zebras have been commonly exhibited with other ungulates (African antelope, giraffes, etc) and birds.
 - 2.2.4.2 In general, mares are more compatible than stallions within mixed species situations.

2.2.4.3 It is important not only to carefully assess mixed species situations and select compatible species, but also to provide adequate space for animals to voluntarily separate themselves when desired/necessary.

2.2.4.4 Equids can be extremely aggressive and/or fatal to antelope newborns and precautions should be taken to separate the species at calving time to prevent injury or death of calves

2.2.5 Introductions

2.2.5.1 Before the introduction process begins, a new individual should first be comfortable in the surroundings and reliable in the normal daily cleaning and feeding routine.

2.2.5.2 If possible, individuals that are new to a facility should be introduced to outdoor enclosures alone to allow acclimation prior to introduction to the herd. The individuals should be allowed to freely enter new enclosures at their own pace and should be allowed to wander freely to and from the enclosures. Sufficient time should be allowed for the new individual to adjust to and explore the new enclosure before proceeding with the introduction process.

2.2.5.3 It is, in general, advisable to perform equid introductions in a large space to provide enough room for running, chasing, etc. Typically, for most institutions, the only area large enough for an introduction to take place is the outdoor enclosure/exhibit.

2.2.5.4 When introducing a new individual into an established herd, a preliminary introduction period with visual, olfactory and limited tactile contact should be allowed. This will allow the new individual and the members of the established herd to safely acclimate and become acquainted without full contact. The animal care staff should observe and assess this limited contact introduction period frequently. The behavior of the new individual and of the herd can be evaluated to determine when it is safe to proceed to the next step in the introduction process.

2.2.5.2 In some cases, it may be less stressful to introduce the new individual to one individual of the herd at a time if this is possible in the existing facilities. Introducing the new individual to the most subordinate member of the herd first may allow for an alliance to be established. Once the alliance is formed, the two mares can then be introduced together into the remaining herd members.

2.2.5.3 Introductions of new mares to the breeding herd may occur with or without the stallion present, depending on the temperament of the stallion. It is, in general, advisable to separate the stallion and allow the new mare to become established within the mare herd first. When the mare herd is cohesive, the stallion can then be reintroduced.

- 2.2.5.4 A new stallion should be introduced to the entire breeding herd, rather than to single mares, to distract potential individual aggression by the stallion.
 - 2.2.5.5 Visual barriers should be available during introductions if not commonly present within the exhibit. The availability of dispersed food items, browse and/or enrichment items within the exhibit may help distract aggressive individuals upon initial introduction, although these items should not block common paths or escape routes.
 - 2.2.5.6 Introductions should be conducted in a space that is adequate for individuals to run, interact and get away from one another as necessary. Gates and doors can be opened to give access to off-exhibit barns or holding areas (as long as there are no blind corners or doorways in these areas where an individual could be cornered/trapped). Adequate staff should be available to operate doors/gates as necessary to separate individuals if the introduction is not successful.
- 2.2.6 Due to the large size and the excitable, sometimes aggressive, nature of wild equids, it is in general not advisable for caretakers or visitors to have direct interaction with equid species.
- 2.2.6.1 Some equids species are tolerant of human interaction and have become habituated to their daily routine and to having their caretakers in close proximity. Successful husbandry is enhanced when a stable, trusting, respectful relationship occurs between wild equids and their keepers.
 - 2.2.6.1.1 A positive keeper/animal relationship allows keepers to be in close proximity of the equid for visual inspection and limited tactile contact through a protective barrier.
 - 2.2.6.1.2 A positive keeper/animal relationship enhances the daily routine, as the animals are cooperative in shifting and other normal daily activities.
 - 2.2.6.1.3 A positive keeper/animal relationship is the basis of behavioral management programs. Target training can occur to allow routine and non-routine husbandry and veterinary tasks.
 - 2.2.6.1.4 A positive keeper/animal relationship may allow hand feeding treats through a protective barrier that can be useful when oral medications need to be administered.
 - 2.2.6.2 It is necessary for equids to be tolerant of the presence of caretakers and cooperative within the daily routine. Conversely, caretakers must be respectful of the strength and power of wild equids and use extreme caution when working in the enclosure with or in the vicinity of wild equids. It should be noted that equids can be aggressive and dangerous. In particular, stallions of all species and protective new mothers have the tendency to be excessively aggressive. Caretakers working in the enclosure with

equids should be aware of their animals and surroundings at all times. It is advisable to have an escape route or a self-defense plan in mind if unexpectedly put in a dangerous situation. Wild ass stallions have a tendency to become extremely aggressive and protective to caretakers after a mare has foaled.

2.2.6.3 Visitors should not have the opportunity to have direct access with wild equids (share space, make physical contact, etc) or to introduce foreign or hazardous objects into the enclosure.

3. HEALTH AND NUTRITION

3.1 Diet

3.1.1 The extensive literature and known requirements for domestic horses are broadly directly applicable to wild equid species. Diets should be reviewed annually with an experienced animal nutritionist and diet components should be tested regularly.

3.1.2 In the wild, equids are primarily grazers and are easily maintained on modified domestic horse diet in captivity.

3.1.2.1 A combined diet of good quality dried hays (10-12 % crude protein) provided on an *ad lib* basis and of commercial herbivore concentrate pellets (formulated to meet the general nutritional requirements of domestic non-ruminants – Crude Protein 14-17% as fed) provided at a suggested rate of 1.5-3% body weight per day will more than likely provide adequate nutrition for most equid species.

3.1.2.2 A proper proportion of pellets:hay should be offered. If given the opportunity, equids may prefer one food type to another and an unbalanced diet may result. For further information, refer to the AZA Nutritional Advisory Group Technical Papers Handbook, Fact Sheet Number 6 – Hay and Pellet Ratios: Considerations in feeding ungulates.

3.1.2.3 If a balanced diet is provided through the combination dried hay/commercial pellet daily ration, no mineral supplementation will likely be required. However, commercial salt and/or mineral blocks can be used with equids if necessary.

3.1.2.4 No variations in the above diet are required, but additional foods (fresh fruit and vegetables, browse, grasses, etc.) are appreciated on an intermittent basis and provide stimulation and enrichment to the dietary routine. Care should be taken to ensure that food enrichment items are not offered in such quantities as to decrease consumption of the balanced base diet. To avoid obesity, the caloric content of enrichment foods should be factored into the overall daily ration.

3.1.2.5 All dietary components should be wholesome and free of foreign matter, vermin, mold and chemical contamination. Uneaten items

should be removed from the enclosure on a daily basis to prevent the possibility of food-borne illness.

3.1.2.6 Feeding hay and pelleted feed directly off the ground should be avoided if at all possible to minimize parasitic infection and accidental sand or gravel ingestion/impaction. Hay can be offered in above-ground hay mangers or bags. Both buckets/food pans on the ground and elevated food buckets are acceptable for offering the daily pelleted ration. Food buckets/pans should be made of a durable material that can be easily cleaned and sanitized.

3.1.2.7 When animals are fed together in herds, multiple feeding sites must be offered within the enclosure to prevent dominant individuals from monopolizing the feed and to reduce aggression at feeding time.

3.1.3 Diet variations

3.1.3.1 Pregnant and lactating mares may need additional energy depending on body condition.

3.1.3.2 Foals and juveniles should be fed a gradually increasing diet through the growth phase.

3.1.3.3 Seasonal temperature changes may increase or decrease appetite. Consumption should be monitored closely and daily rations altered as necessary to meet these seasonal changes.

3.1.3.4 Overfeeding and obesity can be a problem with captive wild equids. Obesity can lead to reduction in reproduction and in health problems and should be avoided.

3.1.4 When possible, the daily ration should be offered at several feedings throughout the day to mimic natural feeding habits of equids, to avoid boredom and to reduce the occurrence of stereotypic behaviors.

3.2 Medical Management In general, the medical and husbandry practices for domestic horses are applicable to wild equid species.

3.2.1 Quarantine and hospitalization

3.2.1.1 Though removing an equid from the herd should be avoided if at all possible, it may at times be necessary to hospitalize individuals away from the herd for health care or quarantine purposes. If at all possible to reduce disruption of the herd dynamics, medical treatments should occur while the individual is either in the herd or, if separation is critical, is isolated only temporarily from the herd.

3.2.1.2 State regulations generally require equids to be tested prior to transport between institutions. Testing prior to and/or subsequent to transfer of equids between institutions is suggested in order to prevent the transmission of infectious disease. Although standard laboratory tests for equine diseases have not been validated for wild equids, it is reasonable to assume that they are valid.

3.2.1.3 It is suggested that newly acquired equids be isolated for a quarantine period prior to introduction to the established

collection. Typically the quarantine period for a newly acquired equid is 30 days, though this period may be longer if health concerns arise. Though quarantine procedures vary from institution to institution, additional testing is typically performed during this quarantine period to assure that the newly acquired individual is healthy prior to introduction to the collection.

- 3.2.1.4 Equids are gregarious and may be excitable when isolated for hospitalization or quarantine. It might be necessary to pull another individual from the herd to provide company and comfort during the hospitalization or quarantine period.
- 3.2.2 Preventative care - Members of these taxa are known and/or assumed to be susceptible to all domestic equid diseases common to your region.
 - 3.2.2.1 Annual routine physicals while under anesthesia are suggested. This annual physical could include blood collection for CBC, chemistry panel and serum banking. Annual vaccinations can be given at this time. In addition an overall physical could take place including, dental exam and floating, hoof exam and trimming, rectal sonography for pregnancy detection, etc.
 - 3.2.2.2 Annual vaccinations may provide protection from disease. Those vaccinations recommended for all wild equids on an annual basis are tetanus, encephalomyelitis and equine herpesvirus type-1 (rhinopneumonitis). Other available equine vaccines which may be used in endemic areas or in cases of exposure are rabies, strangles, Potomac Fever, botulism and West Nile virus. Vaccinations can be delivered via blow dart, via IM injection under anesthesia for the annual physical or opportunistically when anesthetized for an unrelated reason or via IM injection given by the vet or keeper and voluntarily accepted by the equid through operant conditioning.
 - 3.2.2.3 Equids are susceptible to ecto- and endoparasites and these infections can be debilitating and may cause death. Commercially available anthelmintics are generally effective and safe for use with wild equids. Regular fecal parasite ova checks (quarterly or bi-annually) should be performed to monitor parasite load and to treat infections as needed.
 - 3.2.2.4 Proper hoof wear can be a concern and a health issue for wild equids in captivity. Routine anesthesia for hoof care and trimming is sometimes necessary.
- 3.2.3 An effective pest control program for the control of insects, rodents and vermin must be established and maintained so as to promote the health and well-being of the animals and reduce contamination by pests in animal enclosures.
- 3.2.4 Hereditary diseases and abnormalities, such as cleft palate, may occur in wild equids. In general, individuals with hereditary defects are removed from the gene pool.

- 3.2.5 It is recommended that a gross necropsy be performed post-mortem, with a detailed assessment of major systems and organs. Post-mortem assessment often uncovers the underlying cause of death or reveals parasitic infections or nutritional deficiencies that would only be found with such an examination. Testes and ovaries can be collected from equid species immediately post-mortem and gametes can be successfully recovered for research or long-term cryopreservation and/or in vitro fertilization.
- 3.2.6 Capture and Restraint
- 3.2.6.1 For most adult equids, capture and restraint is accomplished through the use of chemical immobilization.
- 3.2.6.2 Various chemical compounds are widely used to chemically restrain wild equids. Choice of drugs used will be dependent on availability of the chemicals and preference of the veterinarian. Morphine derivatives, alpha 2 inhibitors and various tranquilizers used alone or in combination may be utilized. These chemical compounds are typically delivered via dart from a blow pipe or dart gun.
- 3.2.6.3 Chemical immobilization of equids can be not only unpredictable, but also dangerous for the animal and for the handlers. This method of capture and restraint should only be attempted with trained veterinary assistance.
- 3.2.6.3.1 In preparing for chemical immobilization of equids, it is best to keep the individual with its herdmates for as long as possible and keep the herd as calm as possible prior to the procedure.
- 3.2.6.3.2 If possible, the individual needing attention should be separated from the herd prior to introduction of anesthetic drugs. Equids often display erratic behaviors when under the effect of the anesthetic drugs, and may be perceived as a threat by other herd members. Care should be taken to protect drugged individuals when chemical immobilization must take place with other herd members present.
- 3.2.6.3.3 Once the individual is recumbent, it is advisable to use lariats to control the legs so that veterinarians and caretakers can safely work around the recumbent individual with less risk of being kicked. If the individual must be moved to another location during the anesthesia, care must be taken to adequately restrain the head and legs so the handlers and vets are at less risk of being kicked or bitten.
- 3.2.6.3.4 The duration of the immobilization should be kept to a minimum to reduce physiological stress caused by the chemical compounds.

- 3.2.6.3.5 Reversal/recovery of the immobilized equid should take place in a controlled space to allow the individual sufficient recovery time in a safe environment, prior to introduction and interaction with the rest of the herd.
- 3.2.6.4 Manual capture and restraint of adult equids is generally not recommended. With several handlers, newborn equids up to a few days of age can be captured and manually restrained for a neonatal exam.
- 3.2.6.5 Operant conditioning techniques can be applied and utilized to accomplish some husbandry procedures with equids.
- 3.2.7 Neonatal management
 - 3.2.7.1 A general health examination should be performed on foals at about 24 hours of age. First time mothers or mothers with poor maternal care histories should be given additional time to bond with her foal and the neonatal exam should not be performed until at least 48 hr of age, if at all.
 - 3.2.7.2 Permanent identification should be done at the neonatal examination. Ear tags, ear notches, tattoos and transponders are all acceptable methods of permanent identification for equids. The stripe patterns on all of the species of zebra and on the African wild asses are unique for each individual. A photograph of the stripe patterns of an individual can also serve as a method of identification for these species.
 - 3.2.7.3 Equid foals are typically up and following their mothers very shortly after birth and are typically observed nursing frequently. To ensure that the foal is receiving sufficient nutrition from the mother, a blood sample should be taken at the neonatal exam to test for glucose levels as well as passive transfer of immunoglobins.
 - 3.2.7.4 Vitamin injections are also given at the neonatal exam.
 - 3.2.7.5 A full physical examination should be performed at the neonatal exam to detect the occurrence or both congenital and noncongenital defects.
 - 3.2.7.6 The umbilicus should be dipped in iodine in order to prevent naval infection.
 - 3.2.7.7 The sex of the newborn can be determined at the time of the neonatal examination if not determined earlier.
 - 3.2.7.8 A birth weight should be taken on the newborn to ensure that the foal is within the normal range for newborns of the species.
 - 3.2.7.9 The neonatal exam should be performed as quickly as possible and out of sight of the dam. When the examination is completed, the foal should be returned immediately to its mother. The interactions of mare and foal should be monitored to ensure that maternal bonding and foal nursing was not negatively affected by the examination.
- 3.2.8 Management during pregnancy

- 3.2.8.1 The pregnant mare's condition should be monitored throughout gestation. The daily ration may need to be increased as gestation progresses and energy needs increase.
- 3.2.8.2 Pregnant mares should receive prenatal vaccinations for equine herpesvirus type-1 (rhinopneumonitis) at 5, 7 and 9 months of gestation.
- 3.2.9 Geriatric considerations – Wild equids can live to be 20-30 years old in captive situations where nutrition is reliable, the stress level is low and there are no natural predators.
 - 3.2.9.1 Special consideration should be given during inclement weather to aged individuals. The tolerance for weather and temperature extremes is reduced in aged animals and protection from the elements (shade, shelter, bedding, supplemental heat) might be needed more frequently for these individuals than for other members of the herd.
 - 3.2.9.2 Special care should be taken to monitor the condition of aged equids. As they age, arthritis could become an issue and pain should be managed, if possible, through the use of analgesics.
 - 3.2.9.3 As an equid becomes older and moves around less, natural hoof wear may not occur and more frequent trimming may be necessary to avoid overgrowth and severe hoof deformities and problems.

4. REPRODUCTION

- 4.1 Cycles can be tracked and pregnancy can be determined and tracked via immunoassay of sequential fecal, urine or serum samples.
- 4.2 Equid introductions are fully described in Section 2.2.5.
- 4.3 Management of mares nearing parturition and of foals
 - 4.3.1 Mare management
 - 4.3.1.1 There is typically no need to isolate parturient mares from the mare herd. In general experienced mares successfully give birth and raise young within the herd. Dominant mares may occasionally interfere with new mothers and mare/foal bonding. First time mothers and/or mares with poor foal rearing history may be temporarily isolated from the herd (preferably prior to parturition) in a confined area to promote mare/foal bonding and focus following parturition.
 - 4.3.1.2 Stallions exhibit variable behavior within the herd making it a challenge to give general recommendations. Some stallions are extremely tolerant and may be managed with the herd at all times, including during parturition. Other stallions are more aggressive to mares and may be untrustworthy around foals. Some stallions are so aggressive that they can only be introduced to mares for breeding purposes. Depending on the temperament of the herd stallion, it may be necessary to separate the stallion from the mare

prior to parturition to prevent harassment of the laboring mare and to ensure the safety and well-being of the newborn foal. See Section 1.4.1.3 for a description of the facilities recommended to accommodate this separation.

- 4.3.1.3 Pregnant and lactating mares may need additional energy depending on body condition.
 - 4.3.1.4 Dystocia occurs in wild equids especially with young mares or first-time mothers often resulting in death of both the mare and the foal. Care should be taken to provide adequate nutrition levels during pregnancy to avoid obesity and large foal size, which could cause mares to have difficulty with delivery.
 - 4.3.1.5 A mare close to parturition should be monitored closely for signs of labor and difficult delivery and intervention by trained veterinarians and caretakers may be necessary to ensure a successful delivery.
 - 4.3.1.6 Most equid births occur at night when caretakers are not present. Time-lapse video with infrared lighting has been utilized to monitor mares 24 hr per day in order to observe behavior and monitor labor throughout the night. Early signs of difficult labor or dystocia can sometimes be observed on video and intervention can be initiated to ensure a successful delivery.
- 4.3.2 Foal management
- 4.3.2.1 Foals are generally precocial and will follow their dams and join the herd as soon as they are able to walk (usually within 1 hr post-partum).
 - 4.3.2.2 In general, no special considerations, preparations or facilities need to be provided to manage foals beyond what is already recommended for the normal management of the herd.
 - 4.3.2.3 Inclement weather or rain at time of parturition may affect the foal due to the onset of hypothermia in the newborn under these conditions. If the weather is excessively cold or there is excessive precipitation, the mare and foal should be carefully monitored and placed in sheltered holding or barns with appropriate bedding and supplemental heat, if needed.
 - 4.3.2.4 Special consideration should be given during inclement weather to foals under a year of age. The tolerance for weather and temperature extremes is reduced in young animals and protection from the elements (shade, shelter, bedding, supplemental heat) may be needed more frequently for these individuals than for adult members of the herd.
 - 4.3.2.5 It is advisable to perform the neonatal exam at 24 hr of age if mare/foal bonding seems to be appropriate at that time. Equid foals become difficult to manually capture and restrain for this examination due to their rapidly increasing strength and mobility during the few days of life.
 - 4.3.2.6 Neonatal examinations are fully described in Section 3.2.7.

- 4.3.2.7 Foals should be vaccinated for tetanus, equine herpesvirus type-1 (rhinopneumonitis) and encephalomyelitis at 12-16 weeks of age and boosted 4 weeks later.
- 4.4 Hand rearing of foals is, in general, not necessary. If possible, hand rearing should be avoided, as hand-reared equids are likely to be more aggressive towards and less intimidated by humans as adults. Hand-reared stallions can be particularly aggressive and dangerous.
 - 4.4.1 Reasons for hand-rearing
 - 4.4.1.1 Maternal rejection may occur due to inexperience, health issues or mismanagement of the mare/foal. It is recommended to socialize primiparous mares to experienced mares with foals. Dominant mares may occasionally interfere with new mothers and mare/foal bonding. First time mothers and/or mares with poor foal-rearing history may be temporarily isolated from the herd (preferably prior to parturition) in a confined area to promote mare/foal bonding and focus following parturition and reduce the risk of maternal rejection.
 - 4.4.1.2 In the case of illness, injury or death of the mare, hand rearing of a foal may be necessary.
 - 4.4.1.3 In rare cases though not generally recommended, hand rearing is opted for electively for management reasons.
 - 4.4.2 Hand-rearing protocol for equids
 - 4.4.2.1 Neonate equids receive important antibodies naturally through mother's milk during the first 36 hours after parturition. Rejected or weak foals may not receive these antibodies and hand-rearing protocols should try to provide for this. Frozen or fresh domestic equid colostrum may be substituted. Synthetic colostrum may also be used. Colostrum or substitutes are recommended to be bottle- or tube-fed for the first 24-48 hours of the foal's life.
 - 4.4.2.2 There are several commercial milk replacers which would be suitable for hand-rearing wild equid foals.
 - 4.4.2.3 Feeding intake is generally prescribed at 10% of body weight per day, though this amount is flexible and should be adjusted as needed according to appetite, weight gain/loss and stool consistency.
 - 4.4.2.4 Mother-reared foals nurse frequently throughout the day. It is recommended that hand-rearing mimic natural rearing as much as possible, so multiple feedings should be offered over a 24 hr period.
 - 4.4.2.4.1 Neonates- first week of life - 6 feedings per 24 hrs, with feedings generally spread over a 24 hr period until foal is stable and accepting formula well.
 - 4.4.2.4.2 Foals- 1-3 weeks of age - 5-6 feedings per 24 hrs, generally spread over a 12 hr period.
 - 4.4.2.4.3 Foals- 3-6 weeks of age - 4-5 feedings per 24 hrs, generally spread over a 12 hr period.

- 4.4.2.4.4 Foals- 6-14 weeks - 3-4 feedings per 24 hrs, generally spread over a typical 8 hr workday.
 - 4.4.2.4.5 Foals- 14 weeks – weaning – 2 feedings per day, generally spread over a typical 8 hr workday.
 - 4.4.2.4.6 Weaning completely from formula to solid foods generally occurs around 5 months of age.
 - 4.4.2.5 Equid foals begin to mouth and consume solid feeds at an early stage. Commercial pellets and hay should be provided at an early age to encourage experimentation and ingestion of solid foods.
 - 4.4.2.6 Once feeding schedules and foal health have stabilized, hand reared equids may be introduced to other members of the herd to promote normal equid socialization and minimize human/foal bonds. Careful assessment should be made prior to and during such introductions as adults, particularly stallions, may be aggressive to the motherless foal. A preliminary introduction period including visual, olfactory and limited tactile contact is highly recommended and a careful assessment should be made prior to a full introduction.
- 4.5 Contraception is an acceptable means of managing equid populations in captivity.
- 4.5.1 Separation of sexes is the most commonly used and most recommended method of preventing breeding in wild equids. Facilities to separate and isolate the stallion should be available to make separation possible. See Section 1.4.1.3 for a description of the facilities recommended to accommodate this separation
 - 4.5.2 Castration of stallions is a successful and non-reversible contraception technique.
 - 4.5.3 Vasectomy of stallions is another option to prevent pregnancies. Although vasectomy reversal may be possible, it would be difficult and results could not be guaranteed. Vasectomies are generally considered to be a permanent, non-reversible method of contraception for equids and return vasectomized stallions to production is not typically attempted.
 - 4.5.4 PZP is the chemical contraception method for equids, as recommended by the AZA Contraception Advisory Group. PZP generally produces successful contraception with equids, though contraceptive failure has been recorded and pregnancies in individuals treated with PZP have been documented. PZP is generally reversible, although the inability to return to production in individuals treated with PZP has been documented. Long-term effects of PZP have not been well documented in wild equids.
 - 4.5.5 Melangestrol acetate (MGA) implants, or oral MGA milled in grain, are not yet considered successful and safe means of contraception in equids.

5. BEHAVIOR MANAGEMENT

- 5.1 Informal operant conditioning and acclimation techniques have been often successfully applied to the routine husbandry and daily care of equids.

- 5.1.1 Equids learn quickly and are easily trained to a daily routine with acclimation and positive reinforcement.
- 5.1.2 Husbandry activities that can quickly become routine for equids using behavioral management techniques may include calm and orderly shifts into and out of the enclosures, voluntarily separation of individuals from the herd, tolerance of close proximity of caretakers and approaching caretakers to allow visual inspection.
- 5.2 Behavioral management techniques have also been successful in successfully performing non-routine husbandry procedures on non-anesthetized individuals on a limited basis.
 - 5.2.1 Non-routine husbandry activities and procedures can also be successful using behavioral management techniques, such as crate/trailer training, presentation of specific parts of the body for tactile inspection, medical treatment and/or collection of blood samples, acceptance of IM injections, voluntarily stepping onto a scale for measurement of body weight, heart and lung auscultation, rectal temperatures, etc. These non-routine behavior management procedures are often designed and implemented by caretakers for individual equids and/or facilities, but are rarely documented or standardized.
- 5.3 Equid introductions are fully described in Section 2.2.5.
- 5.4 Facility design can be extremely important when considering the use of behavior management techniques with equids.
 - 5.4.1 When training an equid to enter a new area, the individual or herd should have a clear line of sight into the area it/they are expected to enter. If the animals must pass through a shift alley, the alley should not have sharp/blind corners.
 - 5.4.2 When training an equid to a non-routine husbandry procedure, it is important to have appropriate facilities to protect the animal and the trainer. Restraint chutes, runways, barred stall fronts and/or access panels in the stall front might be appropriate for behavioral management training purposes.
- 5.5 Modern accepted methods of operant conditioning work well for equids.
 - 5.5.1 Animal caretakers and managers should be included in each step of the behavioral management program framework.
 - 5.5.2 Goals should be set and training plans should be developed prior to initiating a behavioral management program.
 - 5.5.3 Consistent training methods, positive rewards and regular training sessions increase the success of any behavior management program.
 - 5.5.4 Finding the appropriate positive reinforcement (preferred food item or other reward) is often the key to the success of any behavior management program. Food is often the primary motivator for equids.
 - 5.5.5 Equids can be target trained for many routine and non-routine purposes, such as:
 - 5.5.5.1 Shifting to/from exhibit or from stall to
 - 5.5.5.2 Positioning an equid on a scale to obtain a weight

- 5.5.5.3 Positioning an animal to allow for tactile contact of specific body parts (neck, ear, rump, etc)
- 5.5.5.4 Acclimating an equid to allow more invasive and less positive contact (injections, wound treatment, blood draws, etc)
- 5.6 Technical skills and competencies needed by the staff to successfully maintain wild equids in captivity include:
 - 5.6.1 Understanding the natural history, behavior and social structure of the equid species under their care
 - 5.6.2 Understanding of general principles of operant conditioning
 - 5.6.3 Understanding of equid facility and enclosure design
- 5.7 Wild equids in captivity benefit from environmental enrichment. Enrichment encourages equids to act more naturally, enables them to work for food, adds more interest to the daily routine and reduces the occurrence of stereotypic behaviors such as pacing, cribbing, etc.
 - 5.7.1 Equid enclosures should include objects such as trees, stumps, deadfalls, rocks and natural vegetation placed irregularly throughout the exhibit to enhance the daily routines of the animals. These objects should be moved, if possible, on a regular basis to stimulate interest and change pathways.
 - 5.7.2 Equids enjoy rolling/dusting themselves, so a rolling area of dirt, mulch or similar material is appreciated.
 - 5.7.3 Provisioning the enclosure with browse, hidden food items, herbs, and scents on a random basis enhances the habitat for the animals.
 - 5.7.4 Enrichment should be provided on a random basis. If it is provided too often or on a regular schedule, the animals become desensitized and the enrichment is no longer enriching.
 - 5.7.5 Food enrichment items should not be offered in such quantities as to decrease consumption of the carefully balanced base diet. To avoid obesity, the caloric content of enrichment foods should be factored into the overall daily ration.

6. DOCUMENTATION

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