



**Tapir**  
(Tapiridae)  
**CARE MANUAL**

CREATED BY  
**AZA Tapir Taxon Advisory Group®**  
IN ASSOCIATION WITH  
**AZA Animal Welfare Committee**

## Tapir (Tapiridae) Care Manual

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**Disclaimer:** This manual presents a compilation of knowledge provided by recognized animal experts based on the current science, practice, and technology of animal management. The manual assembles basic requirements, best practices, and animal care recommendations to maximize capacity for excellence in animal care and welfare. The manual should be considered a work in progress, since practices continue to evolve through advances in scientific knowledge. The use of information within this manual should be in accordance with all local, state, and federal laws and regulations concerning the care of animals. While some government laws and regulations may be referenced in this manual, these are not all-inclusive nor is this manual intended to serve as an evaluation tool for those agencies. The recommendations included are not meant to be exclusive management approaches, diets, medical treatments, or procedures, and may require adaptation to meet the specific needs of individual animals and particular circumstances in each institution. Commercial entities and media identified are not necessarily endorsed by AZA. The statements presented throughout the body of the manual do not represent AZA standards of care unless specifically identified as such in clearly marked sidebar boxes.

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## Introduction

### Preamble

AZA accreditation standards, relevant to the topics discussed in this manual, are highlighted in boxes such as this throughout the document (Appendix A).

AZA accreditation standards are continuously being raised or added. Staff from AZA-accredited institutions are required to know and comply with all AZA accreditation standards, including those most recently listed on the AZA website ([www.aza.org](http://www.aza.org)) which might not be included in this manual.

## Taxonomic Classification

Table 1: Taxonomic classification for tapirs

Classification	Taxonomy
Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Perissodactyl
Suborder	Tapiroidea
Family	Tapiridae

## Genus, Species, and Status

Table 2: Genus, species, and status information for tapirs

Genus	Species	Common Name	IUCN Status	AZA Status	CITES STATUS
<i>Tapirus</i>	<i>bairdii</i>	Baird's or Central American tapir	Endangered	Studbook	I
<i>Tapirus</i>	<i>terrestris</i>	Lowland or Brazilian tapir	Vulnerable		II
<i>Tapirus</i>	<i>pinchaque</i>	Mountain or wooly tapir	Endangered		I
<i>Tapirus</i>	<i>indicus</i>	Asian or Malayan tapir	Endangered	Studbook	I

## General Information

The information contained within this Animal Care Manual (ACM) provides a compilation of animal care and management knowledge that has been gained from recognized species experts, including AZA Taxon Advisory Groups (TAGs), Species Survival Plan® Programs (SSPs), biologists, veterinarians, nutritionists, reproduction physiologists, behaviorists and researchers. They are based on the most current science, practices, and technologies used in animal care and management and are valuable resources that enhance animal welfare by providing information about the basic requirements needed and best practices known for caring for *ex situ* tapir populations. This ACM is considered a living document that is updated as new information becomes available and at a minimum of every 5 years.

Information presented is intended solely for the education and training of zoo and aquarium personnel at AZA-accredited institutions. Recommendations included in the ACM are not exclusive management approaches, diets, medical treatments, or procedures, and may require adaptation to meet the specific needs of individual animals and particular circumstances in each institution. Statements presented throughout the body of the manuals do not represent specific AZA accreditation standards of care unless specifically identified as such in clearly marked sidebar boxes. AZA-accredited institutions which care for tapirs must comply with all relevant local, state, and federal wildlife laws and regulations; AZA accreditation standards that are more stringent than these laws and regulations must be met (AZA Accreditation Standard 1.1.1).

### AZA Accreditation Standard

(1.1.1) The institution must comply with all relevant local, state, and federal wildlife laws and regulations. It is understood that, in some cases, AZA accreditation standards are more stringent than existing laws and regulations. In these cases the AZA standard must be met.

The ultimate goal of this ACM is to facilitate excellent tapir management and care, which will ensure superior tapir welfare at AZA-accredited institutions. Ultimately, success in tapir management and care will allow AZA-accredited institutions to contribute to tapir conservation, and ensure that tapirs are in our

future for generations to come. A tapir (pronounced “taper” or “ta-pier”) is a large browsing mammal, roughly pig-like in shape, with a short, prehensile snout. Tapirs inhabit jungle and forest regions of Southern Mexico, South America, Central America, and Southeast Asia. There are four species of tapirs: the Baird's tapir, the lowland tapir, the mountain tapir, and the Asian tapir. All four species of tapir are classified as endangered or vulnerable. Their closest relatives are the other odd-toed ungulates, including horses and rhinoceroses.

**General appearance:** Size varies between types, but most tapirs are about 2 m (7 ft) long, stand about 1 m (3 ft) high at the shoulder, and depending on the species weigh between 150 and 375 kg (330–800 lb). The mountain tapir is the smallest species, and the Asian tapir is the largest. Coats are short and range in color from reddish-brown to grey to nearly black, with the notable exceptions of the Asian Tapir, which has a white saddle-shaped marking on its back, and the mountain tapir, which has longer, woolly fur. All tapirs have oval white-tipped ears, rounded protruding rumps with stubby tails, and splayed hoofed toes with four toes on the front feet and three on the hind feet, which help them walk on muddy and soft ground. Baby tapirs of all types have striped-and-spotted coats for camouflage. Females have a single pair of mammary glands.

**Physical characteristics:** The proboscis of the tapir is highly flexible, and with the ability to move in all directions, it allows the animals to grab foliage that would otherwise be out of reach. Tapirs often exhibit the flehmen response, a behavior in which they raise their snouts and show their teeth in order to detect scents. This response is frequently exhibited by males sniffing for signs of other males or females in estrus in the area. Proboscis length varies among species; Asian tapirs have the longest snouts and lowland tapirs have the shortest. The evolution of tapir proboscis, made up almost entirely of soft tissues rather than bony internal structures, gives the Tapiridae skull a unique form in comparison to other perissodactyls.

Tapirs have brachyodont, or low-crowned, teeth that lack cement. Their dental formula is 3.1.4.3/3.1.3–4.3, totaling 42 to 44 teeth; this dentition is closer to that of equids, who may differ by one less canine than their other perissodactyl relatives rhinoceroses, equids and titanotheres. Their incisors are chisel-shaped with the third large conical upper incisor separated by a short gap from the considerably smaller canine. A much longer gap is found between the canines and premolars, the first of which may be absent.

Tapirs, like horses, are monogastric hindgut fermenters with guttural pouches and non-lobulated kidneys, and lack a gallbladder. They have four hoof-like nails on the front feet and three on the rear feet. Asian tapirs normally have anatomic fibrous connective tissue between the lung and chest wall (similar to the elephant) that is often confused at necropsy with adhesions secondary to pleural disease (Janssen et al., 1999). Tapirs have brown eyes, often with a bluish cast to them, which has been identified as corneal cloudiness, a condition most commonly found in Asian tapirs. The exact etiology is unknown, but the cloudiness may be caused by trauma or excessive exposure to light. Tapirs also have monocular vision. However, the tapir's sensitive ears and strong sense of smell help to compensate for deficiencies in vision.

**Lifecycle:** Young tapirs reach sexual maturity between three and five years of age, with females maturing earlier than males. Under good conditions, a healthy female tapir can reproduce every two years; a single youngster is born after a gestation of about 13 months. The natural lifespan of a tapir in zoos is approximately 25 to 30 years. In the wild it has been estimated to not exceed 24 years. Apart from mothers and their young offspring, tapirs lead almost exclusively solitary lives.

**Behavior:** Although they frequently live in forests, tapirs with access to rivers spend a good deal of time in and under the water, feeding on soft vegetation, taking refuge from predators, and cooling off from the heat. Tapirs near a water source will walk along the riverbed to feed, swim and sink to the bottom, and have been known to submerge themselves under water to allow small fish to pick parasites off their bulky bodies. Along with soaking in fresh water, tapirs often wallow in mud pits which also help to keep them cool and free of insects. In the wild, the tapir's diet consists of fruit, berries and leaves, particularly of young and tender growth. Tapirs are browsers and will spend many of their waking hours foraging along well-worn trails in search of food. Tapirs are largely nocturnal and crepuscular, although the smaller mountain tapir of the Andes is generally more active during the day.

Copulation may occur in or out of water, and in zoos and aquariums mating pairs will often copulate multiple times when the female is in estrus.

**Habitat, predation, and vulnerability:** Adult tapirs are large enough that they have few natural predators, and the thick skin on the backs of their necks helps to protect them from threats such as jaguars, crocodiles, anacondas, and tigers. They are also able to run fairly quickly considering their size and cumbersome appearance. They find shelter in the thick undergrowth of the forest or in water. Hunting for meat and hides has substantially reduced their numbers and, more recently, massive habitat loss has resulted in the conservation watch-listing of all four species. The Endangered Species Act lists all four tapir species as endangered. IUCN classifies the lowland tapir as vulnerable and the Baird's, mountain and Asian tapirs as endangered (see Table 2). Lowland tapirs are listed as CITES II, while mountain, Bairds, and Asian Tapirs are listed as CITES I. Tapirs tend to prefer old growth forests and the food sources that can be found in them, making the conservation of primary woodlands a top priority for tapir conservationists.

## Chapter 1. Ambient Environment

### 1.1 Temperature and Humidity

Animal collections within AZA-accredited institutions must be protected from weather detrimental to their health (AZA Accreditation Standard 1.5.7). Animals not normally exposed to cold weather/water temperatures should be provided heated enclosures/pool water. Likewise, protection from excessive cold weather/water temperatures should be provided to those animals normally living in warmer climates/water temperatures.

#### AZA Accreditation Standard

(1.5.7) The animal collection must be protected from weather detrimental to their health.

**Temperature:** Temperature, ventilation and humidity are related to the ability of the tapir to adapt to *ex-situ* environments. Indoor ventilation systems for tapirs should be able to provide fresh air to meet respiration needs of the animals, control moisture build-up within the structure, move enough air to dilute airborne disease organisms produced within the housing unit and control or moderate temperature extremes. Humidity levels should be kept above 50% unless an indoor pool is provided. Floor temperatures should also be monitored in winter. When designing new buildings in cold climate regions, strong consideration should be given to incorporating mat heat, heating coils or warm water pipes in the concrete floors of the holding stalls.

**Outside:** In general, tapirs are relatively heat tolerant and can tolerate outside temperatures up to 38 °C (100 °F), although they should be protected from prolonged exposure above 35 °C (95 °F). Variables such as rain, snow, sleet and wind chill should be considered when deciding the minimum temperatures tapirs can tolerate, while adult tapirs have little problem with temperatures above freezing (for daylight exhibition) as long as it is not wet and windy. Calves should not go outside in temperatures below 10 °C (50 °F) until they are at least three months old. Adequate shade should be provided in outdoor enclosures, as ocular and dermatological problems are often thought to be caused by excessive sunlight. It is recommended that at least 25% of an outdoor enclosure be shaded from the sun (Janssen & Fowler, 1999). Pools are also recommended as tapirs often use them for bathing, defecation and copulation.

**Indoors:** Stall temperatures should be maintained between 18–29 °C (65–85 °F), and tapirs should be protected from temperatures above 35 °C (95 °F) while indoors if exposure is prolonged.

**Ventilation and Humidity:** A barn with forced air heat should be capable of maintaining 18 °C (65 °F). Complete air changes are recommended about 4 times per hour, and 10–16 times per hour during hot weather conditions.

AZA institutions with exhibits which rely on climate control must have critical life-support systems for the animal collection and emergency backup systems available, while all mechanical equipment should be included in a documented preventative maintenance program. Special equipment should be maintained under a maintenance agreement or records should indicate that staff members are trained to conduct specified maintenance (AZA Accreditation Standard 10.2.1).

#### AZA Accreditation Standard

(10.2.1) Critical life-support systems for the animal collection, including but not limited to plumbing, heating, cooling, aeration, and filtration, must be equipped with a warning mechanism, and emergency backup systems must be available. All mechanical equipment should be under a preventative maintenance program as evidenced through a record-keeping system. Special equipment should be maintained under a maintenance agreement, or a training record should show that staff members are trained for specified maintenance of special equipment.

### 1.2 Light

Careful consideration should be given to the spectral, intensity, and duration of light needs for all animals in the care of AZA-accredited zoos and aquariums. Because of their large size, tapirs are typically kept outside where natural light is available, unless weather or other conditions dictate otherwise. Being forest animals, however, they require access to shade throughout the day, and all outdoor enclosures should have sufficient shade especially in zoos located in warmer climates. Asian tapirs are especially prone to eye problems if inadequate shade is available. When kept indoors for extended periods of time, skylights, fluorescent or incandescent lights are suitable until the animal(s) can be allowed outside again. Tapirs may be diurnal, crepuscular, and/or nocturnal in nature and have no

specific lighting requirements, nor are their breeding habits associated with photoperiod length. They are best maintained on a 12-hour/12-hour light/dark schedule.

### 1.3 Water and Air Quality

AZA-accredited institutions must have a regular program of monitoring water quality for collections of aquatic animals and a written record must document long-term water quality results and chemical additions (AZA Accreditation Standard 1.5.9). Monitoring selected water quality parameters provides confirmation of the correct operation of filtration and disinfection of the water supply available for the collection. Additionally, high quality water enhances animal health programs instituted for aquatic collections.

#### AZA Accreditation Standard

**(1.5.9)** The institution must have a regular program of monitoring water quality for collections of fish, pinnipeds, cetaceans, and other aquatic animals. A written record must be maintained to document long-term water quality results and chemical additions.

Tapirs should have access to clean, potable drinking water at all times. The AZA Tapir TAG defines “potable water” as water that would be appropriate for human consumption as it exists from the tap. Watering devices may consist of exhibit/habitat built-in containers and automatic drinkers. However, automatic watering devices should be used with caution with tapirs, due to the potential for the animals to damage the device or their teeth. Regardless of their size, potable water containers should be cleaned and disinfected daily and built-in streams and pools should be cleaned at least weekly, unless appropriately filtered and disinfected by an institutionally approved filtering system. Algae control can be performed using applications of copper sulphate or simazine, as well as denitrification of the water, although each institution should work with veterinarians to ensure the safety of the tapirs whenever chemical additives are added to the habitat water sources.

Tapirs should generally be exhibited in outdoor exhibits where the frequency of air changes is not applicable, however, air change standards for indoor exhibits should meet or exceed federal standards for air exchanges in dog/cat/primate indoor facilities that require ventilation systems to “to minimize odors, drafts, ammonia levels, and moisture condensation” (AWR, 2005) In colder climates it may be necessary to house tapirs indoors for prolonged periods.

### 1.4 Sound and Vibration

Consideration should be given to controlling sounds and vibrations that can be heard by animals in the care of AZA-accredited zoos and aquariums. In general, tapirs appear adaptable to auditory stimuli within their environments and can acclimate to new noises and vibrations that are slowly introduced and associated with positive stimuli. However, new sounds and/or sources of vibrations (e.g., generators, water filters, construction noise, concerts, etc.) and activities that may create chronic or acute auditory stressors should be eliminated or minimized during sensitive animal management periods (e.g., animal introductions, calf rearing, sick animals).

## Chapter 2. Habitat Design and Containment

### 2.1 Space and Complexity

Careful consideration should be given to exhibit design so that all areas meet the physical, social, behavioral, and psychological needs of tapirs. Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs (AZA Accreditation Standard 1.5.2).

#### AZA Accreditation Standard

(1.5.2) Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs. Display of single specimens should be avoided unless biologically correct for the species involved.

**Indoor quarters:** Tapirs should have both indoor and outdoor components to their holding and exhibit areas. Indoors, each stall should measure at least 3.6 m x 4.5 m (12 ft x 15 ft) or 17 m<sup>2</sup> (180 ft<sup>2</sup>). Stalls should be interconnected by 1.52 m (5 ft) wide sliding gates that can be operated without placing the keeper at risk. Holding areas should be accessible directly from the primary enclosure and arranged in a way to facilitate introduction of animals to each other. There should be one stall for each animal so that animals can be separated for birth, medication, or behavioral problems. Quarters should have one larger stall measuring at least 4.9 x 4.9 m (16 x 16 ft) that can hold both a female and one offspring. If the indoor quarters are larger than this, blind corners or places where aggressive exhibit mates could trap individual tapirs should be avoided.

**Substrates and walls:** Indoor holding pen walls should be a minimum of 2 m (6 ft) high and should be either solid (wood or concrete) or vertical steel bars with less than 20 cm (8 in.) between verticals. Horizontal bars should not be used in order to prevent tapirs from climbing. Floors should be slightly sloped to large covered drains. Zoos in cool or cold climates should have heated floors or provide ample bedding to insulate against cold floors. Floor surfaces should not be rough (i.e., heavy brush finish) in order to avoid abrasions to their soft footpads. Keeping tapirs on concrete or packed earth for prolonged periods of time may cause foot problems and chronic lameness. Some bedding materials such as grass hay or pine shavings can ameliorate the effects of slick surfaces if a sufficiently thick layer is applied. Thin layers of bedding may also exacerbate the hazards posed by slick surfaces. Regardless, if “hay” is used as bedding, coarse hay should be avoided, as tapirs are prone to lumpy jaw syndrome if it is ingested. There are several commercially-available synthetic flooring systems that are proving to hold up well to the foot traffic of large-bodied animals and the rigors of daily use of cleaning and disinfectant agents. Rubberized floor coating should be considered both for insulation and traction as well as to provide a softer surface to prevent arthritis in older animals.

**Water:** Fresh drinking water should be available at all times. If a pool is not available, drinkers should be secured so that they cannot be overturned.

**Pools:** If there is no outdoor pool access and the animal(s) will be kept inside for weeks at a time, an indoor pool is highly recommended. If tapirs are to be permanently housed and exhibited inside, a pool should always be present. Pools in indoor enclosures that house tapirs for long periods of time should be large enough for two adult tapirs and their half grown offspring to completely submerge their bodies. Zoos in warm climates that can allow tapirs access to outside enclosures with pools may not require indoor pools for night-time use; in such cases, the animals should be hosed down daily when not allowed outside. Pools should have gently sloping sides with wide entrances and nonskid surfaces. Pool depths of 4-6 feet are best in order to allow for total submersion.

**Sanitation:** All indoor holding areas should be cleaned and disinfected daily; all pools should be dumped and filled daily unless a filter system is present. Tapirs frequently defecate in their pools and the lack of a pool for this activity may increase the incidence of rectal prolapse.

If housed without a pool, a large water tub/trough should be available to promote normal defecation. Animals should be transferred to an adjacent pen prior to cleaning.

**Outdoor enclosures:** Tapirs are relatively inactive for most of the day but do require ample space for exercise and breeding activity. Enclosures should provide at least 55.7 m<sup>2</sup> (600 ft<sup>2</sup>) for each animal. All zoo visitors should be kept at least three feet away from the primary enclosure. Visual barriers within this space are encouraged to allow animals to voluntarily separate themselves from one another, whether a subordinate animal from a dominant animal or for females to isolate prior to parturition. Outdoor exhibits

should be relatively flat and designed to eliminate narrow spaces and 90-degree angles. Certain individuals can be particularly sensitive to stimuli external to their enclosures or noise intrusions; careful monitoring of these situations is important to prevent injury.

**Substrate:** The surface of outdoor exhibits should be hard packed soil or grass. Tapirs should not be kept on concrete surfaces year-round. Note that some believe packed earth may also lead to chronic foot problems and lameness. Soft substrates in various forms or tilled earth are preferred. Sand can be used but may be ingested and cause subsequent intestinal impaction (Janssen & Fowler, 1999).

**Outside holding:** If individuals are housed off-exhibit for social, medical, or behavioral reasons, outdoor stalls should be significantly larger than indoor ones and measure at least 6 x 6 m (20 x 20 ft) or 37 m<sup>2</sup> (400 ft<sup>2</sup>). Shade should be added if not naturally available. Tapirs frequently defecate in their pools and the lack of a pool for this activity may increase the incidence of rectal prolapse.

If housed without a pool, a large water tub/trough should be available to promote normal defecation. Animals should be transferred to an adjacent pen prior to cleaning.

The same careful consideration regarding exhibit size and complexity and its relationship to the Tapirs overall well-being must be given to the design and size all enclosures, including those used in exhibits, holding areas, hospital, and quarantine/isolation (AZA Accreditation Standard 10.3.3).

#### AZA Accreditation Standard

**(10.3.3)** All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals.

## 2.2 Safety and Containment

Animals housed in free-ranging environments should be carefully selected, monitored, and treated humanely so that the safety of these animals and persons viewing them is ensured (AZA Accreditation Standard 11.3.3).

Animal exhibits and holding areas in all AZA-accredited institutions must be secured to prevent unintentional animal egress (AZA Accreditation Standard 11.3.1). Exhibit design should be considered carefully to ensure that all areas are secure and particular attention must be given to shift doors, gates, keeper access doors, locking mechanisms, and exhibit barrier dimensions and construction.

#### AZA Accreditation Standard

**(11.3.3)** Special attention must be given to free-ranging animals so that no undue threat is posed to the animal collection, free-ranging animals, or the visiting public. Animals maintained where they will be in contact with the visiting public must be carefully selected, monitored, and treated humanely at all times.

**Containment:** Tapirs can be easily maintained with shallow dry slanted moats with a 2 m (6 ft) vertical outer moat wall. Enclosures without moats should also have a minimum of 2 m (6 ft) high barriers. Fences can be wood or chain link (gauge 10 or heavier). Tapirs do not jump up but can easily climb over vertical walls as high as 1.2 m (4 ft). Tapirs are also powerful animals that can push under chain link if it is not properly secured. Hot wire can be used to isolate tapirs from plants and trees but hot wire is not sufficient for containment, nor should it be used in close proximity to water.

#### AZA Accreditation Standard

**(11.3.1)** All animal exhibits and holding areas must be secured to prevent unintentional animal egress.

Exhibits in which the visiting public may have contact with animals must have a guardrail/barrier that separates the two (AZA Accreditation Standard 11.3.6). All zoo visitors should be kept at least 1 m (3') away from the primary tapir enclosure.

#### AZA Accreditation Standard

**(11.3.6)** Guardrails/barriers must be constructed in all areas where the visiting public could have contact with other than handleable animals.

All emergency safety procedures must be clearly written, provided to appropriate staff and volunteers, and readily available for reference in the event of an actual emergency (AZA Accreditation Standard 11.2.3). Each institution should have adequate responses for hurricane, fire, flood etc.

#### AZA Accreditation Standard

**(11.2.3)** All emergency procedures must be written and provided to staff and, where appropriate, to volunteers. Appropriate emergency procedures must be readily available for reference in the event of an actual emergency. These procedures should deal with four basic types of emergencies: fire, weather/environment, injury to staff or a visitor, and animal escape.

Staff training for emergencies must be undertaken and records of such training maintained. Security personnel must be

trained to handle all emergencies in full accordance with the policies and procedures of the institution and in some cases, may be in charge of the respective emergency (AZA Accreditation Standard 11.6.2).

Emergency drills should be conducted at least once annually for each basic type of emergency to ensure all staff is aware of emergency procedures and to identify potential problematic areas that may require adjustment. These drills should be recorded and evaluated to ensure that procedures are being followed, that staff training is effective and that what is learned is used to correct and/or improve the emergency procedures. Records of these drills should be maintained and improvements in the procedures duly noted whenever such are identified. AZA-accredited institutions must have a communication system that can be quickly accessed in case of an emergency (AZA Accreditation Standard 11.2.4).

AZA-accredited institutions must also ensure that written protocols define how and when local police or other emergency agencies are contacted and specify response times to emergencies (AZA Accreditation Standard 11.2.5)

Animal attack emergency response procedures must be defined and personnel must be trained for these protocols (AZA Accreditation Standard 11.5.3).

Animal attack emergency drills should be conducted at least once annually to ensure that the institution's staff know their duties and responsibilities and know how to handle emergencies properly when they occur. All drills need to be recorded and evaluated to ensure that procedures are being followed, that staff training is effective, and that what is learned is used to correct and/or improve the emergency procedures. Records of these drills must be maintained and improvements in the procedures duly noted whenever such are identified (AZA Accreditation Standard 11.5.3).

If an animal attack occurs and injuries result from the incident, a written account outlining the cause of the incident, how the injury was handled, and a description of any resulting changes to either the safety procedures or the physical facility must be prepared and maintained for five years from the date of the incident (AZA Accreditation Standard 11.5.3).

#### **AZA Accreditation Standard**

**(11.6.2)** Security personnel, whether staff of the institution, or a provided and/or contracted service, must be trained to handle all emergencies in full accordance with the policies and procedures of the institution. In some cases, it is recognized that Security personnel may be in charge of the respective emergency (i.e., shooting teams).

#### **AZA Accreditation Standard**

**(11.2.4)** The institution must have a communication system that can be quickly accessed in case of an emergency.

#### **AZA Accreditation Standard**

**(11.2.5)** A written protocol should be developed involving local police or other emergency agencies and include response times to emergencies.

#### **AZA Accreditation Standard**

**(11.5.3)** Institutions maintaining potentially dangerous animals (sharks, whales, tigers, bears, etc.) must have appropriate safety procedures in place to prevent attacks and injuries by these animals. Appropriate response procedures must also be in place to deal with an attack resulting in an injury. These procedures must be practiced routinely per the emergency drill requirements contained in these standards. Whenever injuries result from these incidents, a written account outlining the cause of the incident, how the injury was handled, and a description of any resulting changes to either the safety procedures or the physical facility must be prepared and maintained for five years from the date of the incident.

## Chapter 3. Transport

### 3.1 Preparations

Animal transportation must be conducted in a manner that adheres to all laws, is safe, and minimizes risk to the animal(s), employees, and general public (AZA Accreditation Standard 1.5.11). Safe animal transport requires the use of appropriate conveyance and equipment that is in good working order. Tapirs are regulated as Pachyderms by the USDA (United States Department of Agriculture) and have specific preshipment, quarantine and spraying/dusting regulations for animals prior to being imported. The USDA must also be contacted for post entry coordination and transfer to the receiving institution following importation.

#### AZA Accreditation Standard

**(1.5.11)** Animal transportation must be conducted in a manner that is safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to.

In order to reduce the risk of animal and keeper injuries during tapir transfers and shipments, a few basic features should be incorporated into the holding area and into the design of the shipping crate. Tapir holding areas should be connected to a transfer alley that facilitates the safe and easy transfer of the tapir into a crate or animal trailer. Tapirs should be given free access to the transfer alley and shipping crate several weeks (longer if possible) before the scheduled shipment day. Tapir crates should be large enough for the animal to stand up and lay down but not wide enough to encourage the animal to turn around. It should meet all standards set forth in the 2013 IATA (International Air Traffic Association) regulations, IATA crate # 73. The crate should be constructed of one-inch solid wood or metal parts, bolted or screwed together. Metal bracing should be present around the whole container and the interior should be completely smooth, and free of potential hazards to the animal. Crates should have numerous ventilation holes with a maximum diameter of 5 cm (2 in) along the top and above eye level. Food and water containers should be provided with outside access. Tapir crates should have removable guillotine doors at both ends.

The equipment should provide for the adequate containment, life support, comfort, temperature control, food/water, and safety of the animal(s). During transit, it is best to only include commercial chows of the same brand or manufacturer that the animal is used to eating, not only to reduce stress but also because natural food will quickly be ground into flooring. Extra bags of commercial chows should accompany the animal to assist in any brand change that might occur at the receiving institution.

Bedding or other substrate should be placed in either a trailer stall or crate in order to provide traction for the animal and also for warmth during cold weather. Grass hay is suitable for bedding; pine shavings are not recommended due to the risk of ingestion. The trailer floor should have rubber matting to prevent animals from slipping, if not thick grass hay or other suitable substrate can be spread over the trailer floor.

Safe transport also requires the assignment of an adequate number of appropriately trained personnel (by institution or contractor) who are equipped and prepared to handle contingencies and/or emergencies that may occur in the course of transport. Planning and coordination for animal transport requires good communication among all affected parties, plans for a variety of emergencies and contingencies that may arise, and timely execution of the transport. At no time should the animal(s) or people be subjected to unnecessary risk or danger.

### 3.2 Protocols

Transport protocols should be well defined and clear to all animal care staff. Tapirs should not be immobilized for shipments but should be properly crate trained prior to the anticipated date of transfer. Tapir calves should not be shipped before the age of six months and should be completely separated from their dam at least one week prior to shipment. It has been noted in the wild that tapir calves stay with their dams for over 1 year. Transport of tapirs in either hot or cold temperature extremes is not recommended; either extreme poses an animal welfare risk. General temperatures permitted by airlines for live animals are 7–29° C (45–85° F). It should be noted that even if ambient temperatures are not considered extreme, the temperature inside a trailer or crate can be as much as -12° C (10° F) warmer and that transports should probably not be undertaken at that time.

When a trailer is used for transport, animals should be singly stalled in the trailer, each stall partitioned in such a way that the animal has enough room to lie down and stand up, but not turn around. Too much room allows the animal to turn around or jump up, potentially injuring itself. Food and water

should be provided to animals during transit. Because the animal(s) is likely to be excitable or aggressive, it is best to affix a water container in the trailer stall or crate ahead of time. A trap door or opening should be available to add water or food during transit. The entire stall door should not be opened in order to provide food or water.

Tapirs should be transported in darkened trailer stalls or crates in order to reduce the effects of visual stimuli. Because capture and transport are among the most stressful events in an animal's life, ambient noise during transport should be minimized. In general, tapirs can tolerate a cross-country trip in a transport trailer of up to 5 days. Most tend to lie down during transport and can develop lameness after lying for extended periods so it is important to encourage them to their feet 2–3 times a day. For animals confined to a crate, the transport time should be considerably shortened, two days at a maximum unless international shipments are involved, because their ability to move about is much more restricted.

When a crate is used for transport, the tapir(s) should be properly crate trained prior to shipment. Crate training involves several weeks or months of giving the tapir access to the shipping crate. If a young tapir is with its mother, it should be gradually separated from its mother well before shipping. The keeper should be able to close the animal inside the crate for several hours and be able to move the crate with the tapir inside. There is a great degree of variation in tapir temperaments and some animals may never be completely calm inside a crate. In extremely hyperactive animals it may be necessary to lightly sedate the animal prior to shipment. This should only be done in the presence of an experienced veterinarian who is familiar with the drug and dosages for tapirs. It is also important to verify with the receiving institution that a forklift is available to maneuver the crate into the quarantine area.

## Chapter 4. Social Environment

### 4.1 Group Structure and Size

Careful consideration should be given to ensure that animal group structures and sizes meet the social, physical, and psychological well-being of those animals and facilitate species-appropriate behaviors. Most literature states that tapirs are primarily solitary and nocturnal/crepuscular but recent field observations have shown tapirs to be more tolerant of conspecifics than previously believed. The social behavior of tapirs in zoos and aquariums is largely dependent on individual animal personalities, past experiences, food availability, and the size/layout of enclosure. Some tapirs are extremely aggressive toward conspecifics and keepers, while others are easily approached and enjoy being scratched.

Tapir behavior can be very unpredictable, and caution should always be exercised when entering an exhibit or enclosure with unsedated individuals. There are numerous records of tapir attacks on keepers and veterinarians that have resulted in serious bite wounds and in some cases, the loss of fingers and limbs. Most zoos maintain one adult pair of tapirs that are housed either separately or together. Females should be separated prior to birth of their offspring and not be reintroduced to other tapirs until the calf is 3 to 4 months old.

Tapirs are non-seasonal breeders; timing is not an issue when putting pairs together. In some cases the breeding male can be introduced earlier, while in other instances a reintroduction is not possible until the calf is permanently separated from its dam. For temporary holding and in the absence of a female, some adult males may be housed with their juvenile or sub adult male offspring but this should not be considered a permanent arrangement.

As with other large ungulates, adult male tapirs tend to drive out young males when they are 12–18 months of age. The timing of this “forced” emigration of male adolescents is often dependent on enclosure size. In smaller enclosures, the adult male tends to become intolerant of young males at an earlier age. In any case, young males should be removed from the group prior to one year of age, sooner if the male begins to exhibit signs of aggression. Since adult males may chase juveniles and females in estrus, there should be enough space for animals to voluntarily separate themselves; visual barriers should be present to allow subordinate animals safe areas to rest. There should be no blind cul-de-sacs or other areas where animals can be trapped by conspecifics.

### 4.2 Influence of Others and Conspecifics

Tapirs may be housed in mixed species exhibits if space and furnishing meet the needs of all animals in the enclosure. Examples of neotropical species that have been successfully kept with tapirs include: rhea, capybara, vicuna, and other neotropical camelids brocket deer, waterfowl, wading birds, large tortoises, Patagonian cavies, giant anteater, primates, and even maned wolf. Asian tapirs may be successfully exhibited with muntjac, waterfowl, wading birds and cranes, and primates such as gibbons, langurs, and macaques.

### 4.3 Introductions and Reintroductions

Managed care for and reproduction of animals housed in AZA-accredited institutions are dynamic processes. Animals born in or moved between and within institutions require introduction and sometimes reintroductions to other animals. It is important that all introductions are conducted in a manner that is safe for all animals and humans involved. All introductions should be closely monitored and consider the specific behaviors of the individuals involved. When introducing animals to a new facility, it is preferable to establish them in an off-exhibit holding area before releasing them into a new enclosure. During this acclimation period, the animal adjusts to its new surroundings, food items, keeper staff, and learns the daily routine. When introducing animals to the exhibit they should be permitted to “drift out” into the exhibit at their own pace; they should not be forced into new enclosures, as this may needlessly stress them. The shift doors should be left open so that animals can return to the safety of the holding area. Establishment of scheduled feeding times will facilitate this behavior. New animals should have a period of time that allows them to familiarize themselves with the existing tapir via preliminary introductions that include olfactory, visual, and limited tactile access through a protective barrier. When introducing a male to a female, there is the potential for aggression, as indicated by chasing and squealing. In general, it is best to conduct introductions in a space that is adequate for animals to get away from one another and

with gates or doors that offer shifting opportunities in the event the animals need to be separated from one another.

## Chapter 5. Nutrition

### 5.1 Nutritional Requirements

A formal nutrition program is recommended to meet the nutritional and behavioral needs of all tapirs (AZA Accreditation Standard 2.6.2). Diets should be developed using the recommendations of nutritionists, the Nutrition Scientific Advisory Group (NAG) feeding guidelines (<http://www.aza.org/nutrition-advisory-group/>), and veterinarians as well as AZA Taxon Advisory Groups (TAGs), and Species Survival Plans® (SSP) Programs. Diet formulation criteria should address the animal's nutritional needs, feeding ecology, as well as individual and natural histories to ensure that species-specific feeding patterns and behaviors are stimulated.

Tapirs are primarily browsing herbivores. Free-ranging individuals select broadly across plant taxa, including a diversity of herbaceous species, grasses, shrubs, fruits, twigs, and leaves of trees (Medici et al., 2007; Medici, 2010; Medici, 2011). When the frequency of plant species parts recovered in tapir feces is compared to the occurrence of those species in the habitats studied, the relationship suggests that these animals are selecting for preferred plant species, regardless of that species abundance (Downer, 2001).

The digestive system of the tapir is described as a, ceco-colinic hindgut fermenter, analogous to the domestic horse (*Equus caballus*). Since overeating can result in colic or founder in domestic horses, feeding herbivores with similar gastrointestinal tracts two to three times daily is recommended (Janssen, 2003). The dental formula of *Tapirus terrestris* is I3/3-C1/1-P3-4/3-M3/3. Salivary glands are well developed, a characteristic typical of browsing herbivores. The stomach is small in relation to other portions of the gastrointestinal tract, but more elongated than that of the horse (Stevens, 1988). Epithelia found in the esophageal region (cardia) of the stomach is squamous and nonglandular. The remainder of the stomach epithelia is glandular, increasingly toward the pylorus (Padilla & Dowler, 1994). The small intestine length is 8.2–11 m (27–36 ft) (Padilla & Dowler, 1994). The gall bladder is absent, but the bile duct empties into the duodenum 7.5 cm (2.95 in) from the pylorus. The tapir's hindgut is similar in arrangement to the domestic horse (Stevens, 1988). This is the primary site of alloenzymatic digestion of ingesta by symbiotic bacteria, as well as anaerobic protozoa (Stevens, 1988). Four fibrous teniae create sacculations in the cecum. The colon is enlarged and attached to the cecum by fibrous tissue. The enlarged lumen of both the cecum and proximal colon is the site of alloenzymatic digestion of food materials not degraded by autoenzymatic digestion and absorbed in the small intestine. The distal colon is not attached to surrounding tissues. For additional nutritional information please contact the AZA Tapir TAG Nutrition Advisor:

Mark S. Edwards, Ph.D.  
California Polytechnic State University  
Phone: +1-805-756-2599  
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### 5.2 Diets

The formulation, preparation, and delivery of all diets must be of a quality and quantity suitable to meet the animal's psychological and behavioral needs (AZA Accreditation Standard 2.6.3). Food should be purchased from reliable, sustainable, and well-managed sources. The nutritional analysis of the food should be regularly tested and recorded.

Food preparation must be performed in accordance with all relevant federal, state, or local regulations (AZA Accreditation Standard 2.6.1). The appropriate hazard analysis and critical control points (HACCP) food safety protocols for the diet ingredients, diet preparation, and diet administration should be established for the taxa or species specified. Diet preparation

#### AZA Accreditation Standard

**(2.6.2)** A formal nutrition program is recommended to meet the behavioral and nutritional needs of all species and specimens within the collection.

#### AZA Accreditation Standard

**(2.6.3)** Animal diets must be of a quality and quantity suitable for each animal's nutritional and psychological needs. Diet formulations and records of analysis of appropriate feed items should be maintained and may be examined by the Visiting Committee. Animal food, especially seafood products, should be purchased from reliable sources that are sustainable and/or well managed.

#### AZA Accreditation Standard

**(2.6.1)** Animal food preparations must meet all local, state/provincial, and federal regulations.

staff should remain current on food recalls, updates, and regulations per USDA/FDA (Food and Drug Administration). Remove food within a maximum of 24 hours of being offered unless state or federal regulations specify otherwise and dispose of per USDA guidelines.

If browse plants are used within the animal's diet or for enrichment, all plants must be identified and assessed for safety. The responsibility for approval of plants and oversight of the program should be assigned to at least one qualified individual (AZA Accreditation Standard 2.6.4). The program should identify if the plants have been treated with any chemicals or near any point sources of pollution and if the plants are safe for tapirs. If animals have access to plants in and around their exhibits, there should be a staff member responsible for ensuring that toxic plants are not available.

**AZA Accreditation Standard**

**(2.6.4)** The institution should assign at least one person to oversee appropriate browse material for the collection.

**Supplemental Formula:** In the event that supplemental formula feeding is required, the suggested formula is 96% whole goat's milk, 2% lactose, and 2% whey protein isolate. For additional information please contact:

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Nutritionist  
Nutritional Services Department  
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Foods recommended for *ex situ* tapirs can be divided into three broad categories:

**Roughages:** Any food containing relatively high levels of structural carbohydrates (e.g., fiber). Foods in this broad category appropriate for feeding tapirs would include, but are not limited to: alfalfa hay, grass hays and freshly harvested leafy plant materials. Species offered vary significantly on a regional basis throughout the United States, Canada, and Mexico. Institutions should use their own on-site specialists to develop lists of safe browse plants that are available regionally. Each of these foods provides sources of long-stem, or physically effective, fiber important for gastrointestinal health of hindgut fermenters. As always, when including harvested leafy plant materials in any animal diet, such plants should be evaluated for suitability by a trained professional. Harvest sites should be monitored for injurious agents.

**Concentrates:** Any food containing relatively low levels of fiber (< 20%) and with > 60% total digestible nutrients (TDN). Foods in this broad category appropriate for feeding tapirs would include, but are not limited to, several types of feeds manufactured for herbivores with post-gastric fermentation. Such feeds should be formulated to complement the nutrient composition of the roughages consumed in the balance of the ration. Based on the similarities between the gastrointestinal tract of tapirs and domestic horses, such feeds should contain controlled amounts of hydrolysable carbohydrates (CHO-H) and rapidly fermentable carbohydrates (CHO-F<sub>R</sub>). Again, it is essential that the selection and evaluation of feeds with these characteristics be made under the guidance of individuals professionally trained in nutrition.

**Supplements:** A feed used with another to improve nutrient balance of the total diet. The use of supplements to correct for the nutritional inadequacies of the consumed balance of roughages and concentrates is not necessary, but is often practiced in applied zoo animal programs. Supplements may include any number of items, such as: cultivated fruits, roots, and other plant parts; vitamins; minerals; and even supplemental sources of fiber.

General guidelines (Lintzenich & Ward, 1997) for diets consumed (1.5% BW) by tapirs suggest the following distribution of foods:

Table 3: Recommended Foods

Category	Description	Distribution (90% DM basis)
Roughages	Alfalfa hay, quality grade 1 (> 15.9% CP; < 42.8% NDF)	40–50%
	Grass hays (> 9.8% CP; < 67.4% NDF)	20–30%
Concentrates	Lower fiber herbivore pellet	30%

Table 4: Nutrient Concentrations

Nutrient	Concentration	Nutrient	Concentration
Crude protein, %	14–18	Magnesium, %	0.07–0.10
Vitamin A, IU/kg	1000–3500	Potassium, %	0.27–0.38
Vitamin D, IU/kg	200–500	Sodium, %	0.09–0.27
Vitamin E, mg/kg	120–350	Iron, mg/kg	36–45
Thiamin, mg/kg	2.0–4.5	Zinc, mg/kg	36
Riboflavin, mg/kg	2.0	Copper, mg/kg	9
Calcium, %	0.20–0.65	Manganese, mg/kg	36
Phosphorus, %	0.15–0.34	Selenium, mg/kg	0.09
		Iodine, mg/kg	0.09–0.54

Target dietary nutrient concentrations (90% DM basis) of generalized diet for tapirs (Lintzenich & Ward, 1997)

The following tables (Tables 5-8) are practical diets and target nutrient components for tapirs supporting all life stages. These are not from any one institution, but are common ingredients listed in quantities and proportions based on referenced guidelines.

Table 5: Practical Diet for Baird's Tapir (*Tapirus bairdii*)\*

Item	Description	Amount	Comment
1	High fiber (ADF 25%) herbivore pellet	1300 g	15% CP, 3% Fat, 25 ppm Cu
2	Roots (turnip, carrot, sweet potato)	165 g	May be reserved to reinforce management behaviors
3	Fruit (apple, pear, tomato)	230 g	May be reserved to reinforce management behaviors
<b>Items 1–3 offered AM in holding</b>			
4	Alfalfa hay	665 g	> 18% CP, < 32% ADF
5	Browse, variable species	3–1 m sections	Constant portion of this diet but difficult to quantify mass provided
<b>Items 4–5 offered on exhibit</b>			
6	High fiber (ADF 25%) herbivore pellet	1300 g	15% CP, 3% Fat, 25 ppm Cu
7	Roots (turnip, carrot, sweet potato)	165 g	May be reserved to reinforce management behaviors
8	Fruit (apple, pear, tomato)	230 g	May be reserved to reinforce management behaviors
9	Alfalfa hay	665 g	>18% CP, < 32% ADF
<b>Items 6–9 offered PM in holding</b>			
10	Banana, with peel	325 g	May be reserved to reinforce management behaviors
11	Psyllium fiber	60 g	This supplement was added as prophylaxis against sand colic
<b>Items 10–11 mixed together; offer as indicated</b>			
12	Salt block, plain	ad libitum	Offered in a secure manner that prevents overconsumption

\*Target bodyweight range = 210–275 kg (462–606 lb)

Downer, 2001; Stevens, 1988; Padilla & Dowler, 1994; Lintzenich & Ward, 1997; National Research Council, 2007; Janssen et al., 1999; Murphy et al., 1997; Clauss et al., 2009

Table 6: Nutrient Components Baird's Tapir Diet

Nutrient	Concentration (DMB)	Nutrient	Concentration (DMB)
Crude protein, %	15.5	Calcium,%	0.89
Fat, %	3.0	Phosphorus,%	0.66
Ash, %	10.5	Magnesium, %	0.27
ADF, %	24.4	Potassium, %	1.89
Vitamin A, IU/kg	3961	Sodium, %	0.39
Vitamin D, IU/kg	1209	Iron, mg/kg	261
Vitamin E, mg/kg	249	Zinc, mg/kg	102
Thiamin, mg/kg	4.7	Copper,mg/kg	22
Riboflavin, mg/kg	9.7	Manganese, mg/kg	78
		Selenium, mg/kg	0.36

Downer, 2001; Stevens, 1988; Padilla & Dowler, 1994; Lintzenich & Ward, 1997; National Research Council, 2007; Janssen et al., 1999; Murphy et al.,1997; Clauss et al., 2009

Table 7: Practical Diet for Asian Tapir (*Tapirus indicus*)\*

Item	Description	Amount	Comment
1	High fiber (ADF 25%) herbivore pellet	1300 g	15% CP, 3% Fat, 25 ppm Cu
2	Roots (turnip, carrot, sweet potato)	1000 g	May be reserved to reinforce management behaviors
3	Browse, variable species	1-1m section	Constant portion of this diet but difficult to quantify mass provided
<b>Items 1-3 offered AM in holding</b>			
4	High fiber (ADF 25%) herbivore pellet	2600 g	15% CP, 3% Fat, 25 ppm Cu
5	Roots (turnip, carrot, sweet potato)	1000 g	May be reserved to reinforce management behaviors
6	Greens (dandelion, kale, collard)	350 g	May be reserved to reinforce management behaviors
7	Alfalfa hay	2660 g	> 18% CP, < 32% ADF
<b>Items 4-7 offered PM in holding</b>			
8	Banana, with peel	325 g	May be reserved to reinforce management behaviors
9	Psyllium fiber	60 g	This supplement was added as prophylaxis against sand colic
<b>Items 8-9 mixed together; offer as indicated</b>			
12	Salt block, plain	ad libitum	Offered in a secure manner that prevents overconsumption

\*Target bodyweight range = 365–375 kg (805–827 lb).

Downer, 2001; Stevens, 1988; Padilla & Dowler, 1994; Lintzenich & Ward, 1997; National Research Council, 2007; Janssen et al., 1999; Murphy et al.,1997; Clauss et al., 2009

Table 8: Nutrient Components for Asian Tapir Diet

<b>Nutrient</b>	<b>Concentration (DMB)</b>	<b>Nutrient</b>	<b>Concentration (DMB)</b>
Crude protein, %	16.6	Calcium,%	1.00
Fat, %	1.9	Phosphorus,%	0.56
Ash, %	6.5	Magnesium, %	0.27
ADF, %	25.2	Potassium, %	1.87
Vitamin A, IU/kg	2935	Sodium, %	0.41
Vitamin D, IU/kg	704	Iron, mg/kg	221
Vitamin E, mg/kg	177	Zinc, mg/kg	75
Thiamin, mg/kg	3.3	Copper, mg/kg	18
Riboflavin, mg/kg	5.5	Manganese, mg/kg	62
		Selenium, mg/kg	0.31

Downer, 2001; Stevens, 1988; Padilla & Dowler, 1994; Lintzenich & Ward, 1997; National Research Council, 2007; Janssen et al., 1999; Murphy et al., 1997; Clauss et al., 2009

It should be noted that, with the exception of larger quantities of foods in the Asian tapir diet to support the nutrient and energy demands of a larger body mass, the differences between the two diets are largely a function of animal management and not species-specific nutrient requirements. Those subtle differences in food quantities result in differences in nutrient intake. Again, those differences should not be interpreted as unique species requirements, as no such controlled studies have been conducted. However, they do suggest the variability of nutrient intake under which the species can thrive. Target ranges of nutrients for all life stages are provided above. These ranges are based on known nutrient requirements of the domestic horse (NRC, 2007) and application of diets that support animals in zoos and aquariums.

The two practical diets above demonstrate an example of temporal distribution of foods. These diets are not from a specific institution, but are common ingredients listed in quantities and proportions based on referenced guidelines. Tapirs are continuous feeders and, as suggested by their gastrointestinal tract anatomy, are best suited to consume multiple small meals throughout the day. A minimum of three separate feedings should be encouraged. Overconsumption of certain foods, particularly those high in hydrolysable carbohydrates (e.g., starch, sugar) and/or rapidly fermentable carbohydrates (e.g., fructooligosaccharides, pectins) may result in abnormal fermentation in the hindgut. Such foods, combined with feeding practices inconsistent with the species needs could contribute to colic, torsion or other digestive related pathologies. The formation of enteroliths in two species of tapir has been reported at three AZA institutions in North America. The composition of those enteroliths is chemically dissimilar to struvite enteroliths in horses. Dietary regimes proposed here are consistent with those proposed to reduce the formation of these mineralized foreign bodies in the animal's gastrointestinal tract (Murphy et al., 1997).

All produce should be cut up into bite size pieces and fed fresh daily in individual containers/tubs atop a cement feeding area. All food and water containers should be durable and able to be washed and disinfected daily. To reduce risk from disease and parasites, food items should not be fed on the ground (soil) from which an animal would directly eat.

Scheduled feedings are often used to facilitate training and shifting of individuals, locking the animals into a holding area or for other management needs. 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. When animals are fed together in groups, multiple feeding sites should be offered within the enclosure to prevent dominant individuals from monopolizing the feed and to reduce aggression at feeding time. Presentation of food should extend the time spent feeding. This may include timing of meals, distribution of foods and actual foods selected. Appropriate freshly harvested plant materials are one type of food that has been used to promote increased feeding time in these species.

Animals should be routinely weighed as a response variable to diet management programs. In addition to objective measurement of weight, subjective assessment of animal body condition may be useful in establishing individual target body weight ranges. Scoring systems for both body condition and fecal consistency have been proposed by Clauss et al. (2009).

### 5.3 Nutritional Evaluations

Based on preliminary clinical data, tapirs may have a unique metabolic requirement for copper. The mean serum copper concentration across *ex situ* individuals of the four species consuming presumable adequate diets were 0.21 ug/mL (n = 22). Field results (lowland tapirs in Brazil) found copper concentrations between 14–110 ug/mL in the Atlantic Forest, and between 4–76 ug/mL in the Pantanal (P. Medici, personal communication).

This is compared to 700 ug/mL, which is the mean normal concentration in horses (Janssen et al., 1999). It is important to consider the interactions of copper with other trace minerals, such as sulfur, molybdenum, zinc and iron, when interpreting these values. *Ex situ* tapirs have a history of rectal prolapses (Janssen et al., 1999). The cause has yet to be determined but diets that are low in adequate plant fiber (e.g., excessive amounts of commercial produce) may contribute. To minimize this risk, diets should not include large quantities of fruits and produce; these items can be used as treats, enrichment techniques, and means for giving medicine. As previously mentioned, the gastrointestinal tract anatomy precludes these species to colic, including volvulus, torsion, impaction, and obstruction (Janssen et al., 1999). The importance of adequate intake of foods higher in structural carbohydrates as it relates to promoting normal gut function cannot be emphasized enough. Overconsumption of non-fibrous foods, such as commercial produce, bread, and similar foods should be avoided.

## Chapter 6. Veterinary Care

### 6.1 Veterinary Services

Veterinary services are a vital component of excellent animal care practices. A full-time staff veterinarian is recommended, however, in cases where this is not practical, a consulting/part-time veterinarian must be under contract to make at least twice monthly inspections of the animal collection and to any emergencies (AZA Accreditation Standard 2.1.1). Veterinary coverage must also be available at all times so that any indications of disease, injury, or stress may be responded to in a timely manner (AZA Accreditation Standard 2.1.2). All AZA-accredited institutions should adopt the guidelines for medical programs developed by the American Association of Zoo Veterinarians (AAZV) [www.aazv.org/associations/6442files/zoo\\_aquarium\\_vet\\_med\\_guidelines.pdf](http://www.aazv.org/associations/6442files/zoo_aquarium_vet_med_guidelines.pdf).

For additional veterinary information contact the AZA Tapir TAG veterinary advisors:

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Additional veterinary information can be obtained from:

Dr. Donald Janssen

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Email: [djanssen@sandiegozoo.org](mailto:djanssen@sandiegozoo.org)

Protocols for the use and security of drugs used for veterinary purposes must be formally written and available to animal care staff (AZA Accreditation Standard 2.2.1).

Procedures should include, but are not limited to: a list of persons authorized to administer animal drugs, situations in which they are to be utilized, location of animal drugs and those persons with access to them, and emergency procedures in the event of accidental human exposure.

Animal recordkeeping is an important element of animal care and ensures that information about individual animals and their treatment is always available. A designated staff member should be responsible for maintaining an animal record keeping system and for conveying relevant laws and regulations to the animal care staff (AZA Accreditation Standard 1.4.6).

Recordkeeping must be accurate and documented on a daily basis (AZA Accreditation Standard 1.4.7). Complete and up-to-date animal records must be retained in a fireproof container within the institution (AZA Accreditation Standard 1.4.5) as well as be duplicated and stored at a separate location (AZA Accreditation Standard 1.4.4).

Tapirs generally have few health problems. The most common health problems that occur in managed tapirs are ulcerations and infections of the foot, respiratory diseases, gastrointestinal diseases including rectal prolapse, eye and skin problems, mandibular

#### AZA Accreditation Standard

(2.1.1) A full-time staff veterinarian is recommended. However, the Commission realizes that in some cases such is not practical. In those cases, a consulting/part-time veterinarian must be under contract to make at least twice monthly inspections of the animal collection and respond as soon as possible to any emergencies. The Commission also recognizes that certain collections, because of their size and/or nature, may require different considerations in veterinary care.

#### AZA Accreditation Standard

(2.1.2) So that indications of disease, injury, or stress may be dealt with promptly, veterinary coverage must be available to the animal collection 24 hours a day, 7 days a week.

#### AZA Accreditation Standard

(2.2.1) Written, formal procedures must be available to the animal care staff for the use of animal drugs for veterinary purposes and appropriate security of the drugs must be provided.

#### AZA Accreditation Standard

(1.4.6) A staff member must be designated as being responsible for the institution's animal record-keeping system. That person must be charged with establishing and maintaining the institution's animal records, as well as with keeping all animal care staff members apprised of relevant laws and regulations regarding the institution's animal collection.

#### AZA Accreditation Standard

(1.4.7) Animal records must be kept current, and data must be logged daily.

#### AZA Accreditation Standard

(1.4.5) At least one set of the institution's historical animal records must be stored and protected. Those records should include permits, titles, declaration forms, and other pertinent information.

#### AZA Accreditation Standard

(1.4.4) Animal records, whether in electronic or paper form, including health records, must be duplicated and stored in a separate location.

swellings, dental ailments and parasitic infections. Tuberculosis has been recorded in some animals. Fecal parasite examinations should be made at least twice yearly. Many of these common health problems can be alleviated or eliminated by good husbandry practices including a suitable diet, non-abrasive substrate, adequate outdoor shade, indoor heating and sanitary conditions.

A condition of unknown etiology termed vesicular skin disease has been recorded in a number of zoos. It presents as an acute illness that result in blistering and superficial skin sloughing of the dorsal midline of the animal. In some cases the animal is weak in the rear limbs and may collapse when attempting to walk. With supportive care, most animals recover fully. Biopsy of the skin lesions is helpful in characterizing the nature of the disease. The skin lesions heal rapidly but residual scarring may last for several weeks.

Note that urine is often cloudy and chalky in appearance because of normal urinary calcium excretion seen in most perissodactyls. Blood can be readily obtained from medial saphenous or carpal vein, or jugular vein for large volumes. Plasma fibrinogen is particularly important for evaluating the presence of inflammation in tapirs (Janssen, 2003). Infectious diseases, parasitic diseases, and non-infectious diseases of tapirs are summarized in the references below (see Chapter 6.7 Management of Diseases).

Most neonatal deaths are due to stillbirths, drowning, and maternal neglect and trauma. In adults, most mortalities are due to gastrointestinal diseases including intestinal accidents resulting in colic. It is recommended that a gross necropsy be performed by an experienced veterinarian. Samples for histopathology and other diagnostic testing should be collected during the post-mortem examination. A detailed assessment of major systems and organs and the histopathology findings should be used to guide further studies of post-mortem collected samples. Testes and ovaries can be collected from deceased tapirs immediately post-mortem and gametes recovered for research or long-term cryopreservation and/or in vitro fertilization. The AZA TAG supports these studies and encourages facilities to collect reproductive tracts. The contact for research of this nature is:

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Conservation & Research Center  
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Front Royal, VA 22630  
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Mandibular abscesses are common in tapirs. Respiratory diseases including pneumonia are also a significant cause of illness. Several cases of pulmonary tuberculosis have been reported in tapirs in North American and European zoos. Problems related to the skeleton including foot abscesses; arthritis, osteomyelitis, and degenerative joint disease were commonly reported in North American institutions.

## 6.2 Identification Methods

Ensuring that tapirs are identifiable through various means increases the ability to care for individuals more effectively. Animals must be identifiable and have corresponding ID numbers whenever practical, or a means for accurately maintaining animal records must be identified if individual identifications are not practical (AZA Accreditation Standard 1.4.3).

Tapirs should be identifiable as individuals both by visual appearance and behavior, and through the use of identification microchip transponders. Animal care staff should be able to use the visual appearance of the animals to comment on the health and behavior on a day-to-day basis (e.g., activity, feeding behavior, injuries and other health concerns, etc.). Note that ear tags and notching does not work well for identification as tapirs may sustain multiple ear injuries over time. In addition, tattoos are difficult to read in any location (Janssen, 2003).

The use of transponder microchips placed intramuscularly between the scapulas or behind the ear ensures that animals can be tracked among different zoos and aquariums, and any possible confusion

### AZA Accreditation Standard

**(1.4.3)** Animals must be identifiable, whenever practical, and have corresponding ID numbers. For animals maintained in colonies or other animals not considered readily identifiable, the institution must provide a statement explaining how record keeping is maintained.

due to changing staff within an institution can be clarified. Transponders can be placed in tapir calves during neonatal processing.

AZA member institutions must inventory their tapir population at least annually and document all tapir acquisitions and dispositions (AZA Accreditation Standard 1.4.1). Transaction forms help document that potential recipients or providers of the animals should adhere to the AZA Code of Professional Ethics, the AZA Acquisition/Disposition Policy (see Appendix B), and all relevant AZA and member policies, procedures and guidelines. In addition, transaction forms must insist on compliance with the applicable laws and regulations of local, state, federal and international authorities. All AZA-accredited institutions must abide by the AZA Acquisition and Disposition policy (Appendix B) and the long-term welfare of animals should be considered in all acquisition and disposition decisions. All species owned by an AZA institution must be listed on the inventory, including those animals on loan to and from the institution (AZA Accreditation Standard 1.4.2).

#### AZA Accreditation Standard

(1.4.1) An animal inventory must be compiled at least once a year and include data regarding acquisitions and dispositions in the animal collection.

#### AZA Accreditation Standard

(1.4.2) All species owned by the institution must be listed on the inventory, including those animals on loan to and from the institution. In both cases, notations should be made on the inventory.

Additional regulations may be necessary regarding movements of tapirs that are listed under the Endangered Species Act (ESA, 1973) and the movement of tapirs between institutions or from the wild should abide by all relevant federal requirements. The United States Fish and Wildlife Services (USFWS) must provide permits to transfer tapirs internationally. USFWS will also contact the AZA Tapir Programs prior to approving any permit application, and will consult with the AZA Tapir Breeding and Transfer Plan to determine if it is a planned move.

### 6.3 Transfer Examination and Diagnostic Testing Recommendations

The transfer of animals between AZA-accredited institutions or certified related facilities due to AZA SSP recommendations occurs often as part of a concerted effort to preserve these species. These transfers should be done as altruistically as possible and the costs associated with specific examination and diagnostic testing for determining the health of these animals should be considered.

**Pre-shipment and Quarantine Recommendations:** Whenever possible, pre-shipment testing should be performed within 30–90 days of the anticipated shipping date (note: mycobacterial cultures require at least 60 days for final results). The following protocol advises that specific baseline laboratory tests be performed for the purpose of evaluating current health status. Additional tests are recommended to increase baseline information to determine their significance to tapir health. The final decision for specific procedures should be made in partnership between the shipping and receiving institutions. Any significant abnormal findings should be communicated to the receiving institution in a timely manner.

**History:** Summary of information regarding previous health screens, medical problems, diagnostic test results, and treatment. Electronic medical records should be sent to the receiving institution prior to shipment.

**Exam:** Complete physical exam by a veterinarian. This should include a review of all systems including oral, ophthalmic, and footpad inspections, as well as body weight—actual or estimated. A permanent identification method (e.g., microchip, tattoo, etc.) should be utilized.

**Blood collection:** Complete blood count (CBC) including fibrinogen, serum chemistry panel. Bank minimum of 10 ml serum—all banked samples should be labeled with species, studbook number, age, sex, and date of collection. The AZA TAG veterinarian should be contacted for distribution of biological samples for research purposes, and whole blood should be banked for DNA.

**Parasite screen:** Fecal samples should be examined in the laboratory by direct and flotation methods.

**Enteric pathogen screen:** If indicated based on individual or group history, culture of feces for enteric pathogens, especially *Campylobacter* and *Salmonella* may be useful.

**Contact:** Receiving institution should be contacted with any significant abnormal results and treatments.

**TB Testing:** Tuberculosis (*Mycobacterium bovis* and *M. tuberculosis*) has been seen in North American and European tapirs. Although no validated antemortem test is available, nasal washes under anesthesia are recommended: Flush 20 ml sterile saline in one nostril, collecting the rinse by gravity or aspiration, in a collection vial. Ship by overnight express to National Veterinary Services Laboratory (or other laboratory facility offering comparable procedures) and request mycobacterial culture with speciation (use VS Form 10–4 submission form for NVSL). Veterinarians from recipient and shipping institutions should determine whether it is necessary to wait for culture results prior to shipment (note: may depend on factors such as group history and quarantine capability at recipient institution).

Optional: Perform an intradermal tuberculin test using 0.1 ml ppd bovis in the soft skin in the inguinal region near the nipples. Read the response by palpation in 72 hours. Note that tapirs do not have a true caudal fold, but the skin around the tail is thinner and more pliable than cervical skin, as is the skin in the inguinal and axillary areas (Janssen, et al., 1999). Use of the enzyme-linked immunosorbent assay (ELISA) has shown some promise, but should be evaluated in combination with other tests (Janssen et al., 1999). The Elephant TB STAT-PAK<sup>®</sup> assay and MAPIA<sup>™</sup> (multiple antigen print immunoassay) has shown some potential in black rhinoceros and may be also useful in antemortem diagnosis of tuberculosis in tapirs (Duncan, 2009).

**Vaccination:** Vaccinations are indicated regionally for tetanus, other clostridial diseases, or equine encephalitis. Although tetanus has never been reported in the tapir, tetanus toxoid vaccination is recommended. In addition, although clostridial infections are infrequently reported, the vaccination of *ex situ* animals with multivalent clostridial bacteria should be considered in areas endemic for *Clostridium* sp. (Janssen et al., 1999). There are currently no reports of equine encephalitis in *ex-situ* tapirs, but vaccination against Venezuelan, eastern, and western equine encephalitis in endemic areas is recommended. There have been six tapirs sero positive for equine encephalitis in the wild (Brazil, Atlantic Forest, P. Medici, personal communication 2010; Medici, 2011).

Some institutions may choose to vaccinate for West Nile virus depending on risk assessment. At this writing (2012), no cases of West Nile virus have been reported in tapirs. Rabies vaccination may be appropriate in some areas. Encephalomyocarditis virus (EMC) has occasionally been a problem in zoos in warm climates, with death occurring in some instances. Because no licensed vaccine is available, the only prevention of EMC is good hygiene, feeding practices, and pest control.

## 6.4 Quarantine

AZA institutions must have holding facilities or procedures for the quarantine of newly arrived animals and isolation facilities or procedures for the treatment of sick/injured animals (AZA Accreditation Standard 2.7.1). All quarantine, hospital, and isolation areas should be in compliance with AZA standards/guidelines (AZA Accreditation Standard 2.7.3; Appendix C). All quarantine procedures should be supervised by a veterinarian, formally written and available to staff working with quarantined animals (AZA Accreditation Standard 2.7.2). If a specific quarantine facility is not present, then newly acquired animals should be kept separate from the established collection to prohibit physical contact, prevent disease transmission, and avoid aerosol and drainage contamination. If the receiving institution lacks appropriate facilities for quarantine, pre-shipment quarantine at an AZA or American Association for Laboratory Animal Science (AALAS) accredited institution may be applicable. Local, state, or federal regulations that are more stringent than AZA Standards and recommendation have precedence.

Upon arrival at a new institution, tapirs should be quarantined separately prior to introduction to the established collection. Typically the quarantine period for a newly acquired tapir is 30 days though this period may be longer if health concerns arise. Though quarantine procedures vary from institution to institution, additional examinations, testing and prophylaxis is typically performed during this quarantine period to assure that the newly acquired individual is healthy prior to introduction to the collection. The

### AZA Accreditation Standard

(2.7.1) The institution must have holding facilities or procedures for the quarantine of newly arrived animals and isolation facilities or procedures for the treatment of sick/injured animals.

### AZA Accreditation Standard

(2.7.3) Quarantine, hospital, and isolation areas should be in compliance with standards or guidelines adopted by the AZA.

### AZA Accreditation Standard

(2.7.2) Written, formal procedures for quarantine must be available and familiar to all staff working with quarantined animals.

AZA Tapir TAG veterinarians have considerable experience with the health care of tapirs and may be consulted for the most recent recommendations with respect to preventive medicine, immobilization, or current disease status.

**Zoonotic Diseases and Quarantine:** AZA institutions must have zoonotic disease prevention procedures and training protocols established to minimize the risk of transferable diseases (AZA Accreditation Standard 11.1.2) with all animals, including those newly acquired in quarantine. Keepers should be designated to care only for quarantined animals if possible. If keepers must care for both quarantined and resident animals of the same class, they should care for the quarantined animals only after caring for the resident animals. Equipment used to feed, care for, and enrich animals in quarantine should be used only with these animals. If this is not possible, then all items must be appropriately disinfected, as designated by the veterinarian supervising quarantine before use with resident animals.

**AZA Accreditation Standard**

**(11.1.2)** Training and procedures must be in place regarding zoonotic diseases.

Quarantine durations span of a minimum of 30 days (unless otherwise directed by the staff veterinarian). If additional mammals, birds, reptiles, amphibians, or fish of the same order are introduced into their corresponding quarantine areas, the minimum quarantine period must begin over again. However, the addition of mammals of a different order to those already in quarantine will not require the re-initiation of the quarantine period.

During the quarantine period, specific diagnostic tests should be conducted with each animal if possible or from a representative sample of a larger population (e.g., birds in an aviary or frogs in a terrarium) (see Appendix C). A complete physical, including a dental examination if applicable, should be performed. Animals should be evaluated for ectoparasites and treated accordingly. Blood should be collected, analyzed and the sera banked in either a -70 °C (-94 °F) freezer or a frost-free -20 °C (-4 °F) freezer for retrospective evaluation. Fecal samples should be collected and analyzed for gastrointestinal parasites and the animals should be treated accordingly. Vaccinations should be updated as appropriate, and if the vaccination history is not known, the animal should be treated as immunologically naive and given the appropriate series of vaccinations.

**AZA Accreditation Standard**

**(11.1.3)** A tuberculin testing and surveillance program must be established for appropriate staff in order to ensure the health of both the employees and the animal collection.

A tuberculin testing and surveillance program must be established for animal care staff as appropriate to protect both the health of both staff and animals (AZA Accreditation Standard 11.1.3). Depending on the disease and history of the animals, testing protocols for animals may vary from an initial quarantine test to yearly repetitions of diagnostic tests as determined by the veterinarian. Animals should be permanently identified by their natural markings or, if necessary, marked when anesthetized or restrained (e.g., tattoo, ear notch, ear tag, etc.). Release from quarantine should be contingent upon normal results from diagnostic testing and two negative fecal tests that are spaced a minimum of two weeks apart. Medical records for each animal should be accurately maintained and easily available during the quarantine period.

**AZA Accreditation Standard**

**(2.5.1)** Deceased animals should be necropsied to determine the cause of death. Disposal after necropsy must be done in accordance with local/federal laws.

If a tapir should die in quarantine, a necropsy should be performed on it and the subsequent disposal of the body must be done in accordance with any local or federal laws (AZA Accreditation Standard 2.5.1). Necropsies should include a detailed external and internal gross morphological examination and representative tissue samples from the body organs should be submitted for histopathological examination.

## 6.5 Preventive Medicine

AZA-accredited institutions should have an extensive veterinary program that must emphasize disease prevention (AZA Accreditation Standard 2.4.1). The American Association of Zoo Veterinarians (AAZV) has developed an outline of an effective preventative veterinary medicine program that should be implemented to ensure proactive veterinary care for all animals

**AZA Accreditation Standard**

**(2.4.1)** The veterinary care program must emphasize disease prevention.

([www.aazv.org/associations/6442/files/zoo\\_aquarium\\_vet\\_med\\_guidelines.pdf](http://www.aazv.org/associations/6442/files/zoo_aquarium_vet_med_guidelines.pdf)).

**Routine Medical Assessments:** Standard laboratory tests for equine diseases have not been validated for tapirs; however it is reasonable to assume that they may be valid. Opportunistic exams could be performed either during scratch-down procedures or immobilizations, and should include a general examination (again, focusing on feet and dentition), blood work (CBC/Chem), +/- vaccinations or routine TB testing if warranted. Tapirs can be moved to hospital locations for health care or quarantine purposes as required by the animal's conditions and available facility. However if medical care can be provided without disrupting the pair or group dynamics, it is preferred to allow the individual to remain within or near its social unit.

**Neonatal examinations:** May be useful to assess the general health of the neonate as well as determine immunoglobulin status.

**Preshipment testing:** Should include a physical examination with emphasis on oral, ophthalmic, and foot pad examination, fecal sample for gastrointestinal parasites, fecal culture (if indicated based on individual or group history) particularly for *Campylobacter* and *Salmonella*, TB testing, blood sampling for a CBC and biochemistry with fibrinogen, and vaccinations if warranted.

**Vaccinations:** Some recommend vaccinating for equine encephalitides, Encephalomyocarditis, tetanus and other clostridial diseases. Consideration should be given to history within the group and regional prevalence.

As stated in the Chapter 6.4, AZA institutions must have zoonotic disease prevention procedures and training protocols established to minimize the risk of transferable diseases (AZA Accreditation Standard 11.1.2) with all animals. Keepers should be designated to care for only healthy resident animals, however if they need to care for both quarantined and resident animals of the same class, they should care for the resident animals before caring for the quarantined animals. Care should be taken to ensure that these keepers are "decontaminated" before caring for the healthy resident animals again. Equipment used to feed, care for, and enrich the healthy resident animals should only be used with those animals.

Animals that are taken off zoo/aquarium grounds for any purpose have the potential to be exposed to infectious agents that could spread to the rest of the institution's healthy population. AZA-accredited institutions must have adequate protocols in place to avoid this (AZA Accreditation Standard 1.5.5).

Also stated in Chapter 6.4, a tuberculin testing and surveillance program must be established for animal care staff, as appropriate, to protect the health of both staff and animals (AZA Accreditation Standard 11.1.3). Depending on the disease and history of the animals, testing protocols for animals may vary from an initial quarantine test, to annual repetitions of diagnostic tests as determined by the veterinarian. To prevent specific disease transmission, vaccinations should be updated as appropriate for the species.

#### AZA Accreditation Standard

(11.1.2) Training and procedures must be in place regarding zoonotic diseases.

#### AZA Accreditation Standard

(1.5.5) For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the collection from exposure to infectious agents.

#### AZA Accreditation Standard

(11.1.3) A tuberculin testing and surveillance program must be established for appropriate staff in order to ensure the health of both the employees and the animal collection.

## 6.6 Capture, Restraint, and Immobilization

The need for capturing, restraining and/or immobilizing a tapir for normal or emergency husbandry procedures may be required. All capture equipment must be in good working order and available to authorized and trained animal care staff at all times (AZA Accreditation Standard 2.3.1).

Many tapirs are tractable and become habituated to being scratched and rubbed along the dorsum, ventral abdomen, neck, and jaw line. They may respond to this by lying down and allowing limited examinations, injections, and venipuncture. Tapirs also respond to positive reinforcement for management procedures. Temperaments of individuals vary greatly; however,

#### AZA Accreditation Standard

(2.3.1) Capture equipment must be in good working order and available to authorized, trained personnel at all times.

one should exercise caution when working with any tapir that is being “scratched down” as they are capable of inflicting serious injury with their teeth (Janssen, 2003).

**Anesthesia:** Tapirs rarely regurgitate under anesthesia; however, withholding food and water for 18–24 hours pre-immobilization is recommended to reduce gastrointestinal volume. Tapirs generally do well in lateral recumbency and the head and neck do not need to be elevated. Supplemental oxygen via mask or nasal cannulation at 6–10L/min is recommended. Current recommended anesthetic regimens include a mixed opioid agonist (Butorphanol at 0.15 mg/kg IM) and an alpha-2 adrenergic agonist (Xylazine at 0.3 mg/kg IM or Detomidine at 0.05 mg/kg IM). Significant relaxation is observed at about 10 minutes; Ketamine (0.25–0.5 mg/kg IV) can be used for further restraint if needed (Janssen, 2003).

Alpha-2 and narcotic antagonists (e.g. Yohimbine at 0.3 mg/kg IV and Naltrexone, at 0.6 mg/kg respectively) are used to reverse the anesthetic effects (Janssen, 2003). Consult Janssen references for other anesthetic options. Sedation of tapirs for minor standing procedures or to ease introductions can be accomplished with Azaperone (1.0 mg/kg IM), or less reliably with Xylazine (1.0 mg/kg IM) (Janssen et al., 1999).

## 6.7 Management of Diseases, Disorders, Injuries and/or Isolation

AZA-accredited institutions should have an extensive veterinary program that manages animal diseases, disorders, or injuries and has the ability to isolate these animals in a hospital setting for treatment if necessary. Tapir keepers should be trained for meeting the animal’s dietary, husbandry, and enrichment needs, as well as in restraint techniques, and recognizing behavioral indicators animals may display if their health becomes compromised (AZA Accreditation Standard 2.4.2). Protocols should be established for reporting these observations to the veterinary department. Tapir hospital facilities should have x-ray equipment or access to x-ray services (AZA Accreditation Standard 2.3.2), contain appropriate equipment and supplies on hand for treatment of diseases, disorders or injuries, and have staff available that are trained to address health issues, manage short and long term medical treatments and control for zoonotic disease transmission.

### AZA Accreditation Standard

(2.4.2) Keepers should be trained to recognize abnormal behavior and clinical symptoms of illness and have knowledge of the diets, husbandry (including enrichment items and strategies), and restraint procedures required for the animals under their care. However, keepers should not evaluate illnesses nor prescribe treatment.

### AZA Accreditation Standard

(2.3.2) Hospital facilities should have x-ray equipment or have access to x-ray services.

In general, tapirs tend to be fairly hardy animals. Loss of appetite, increased inactivity and lethargy, or even increased aggression, can all indicate a potential health issue. Following husbandry/nutritional guidelines, implementing a routine preventative medicine program, and communicating with the AZA Tapir Programs all are recommended approaches to help institutions maintain healthy *ex situ* tapir populations. Medical problems and necropsy reports should be reported to the AZA Tapir TAG Program Veterinary Advisor for summary and analysis, so that all facilities can benefit from this information. The most common health problems that occur in zoo tapirs are ulcerations and infections of the foot, respiratory diseases, gastrointestinal diseases including rectal prolapse, eye and skin problems, mandibular swellings, dental ailments, and parasitic infections.

**Chronic Diarrhea:** *Salmonella*, *Campylobacter*, *Giardia*; note that ciliates are probably normal protozoan inhabitants, inappropriate diet (especially excessive produce).

**Colic:** Acute bacterial enterocolitis; intestinal volvulus, torsion, obstruction, impaction (sand impactions have been reported— this can be prevented by not feeding off of sandy substrate). One case of cecocolonic tympany is reported.

**Rectal Prolapse:** Multiple reports in tapirs, most often in Asian tapirs. It has been successfully repaired with both internal and temporary external fixation. The cause is unknown, but it is likely that inappropriate diets, lack of water, or stress are contributing factors. It appears to be less common than in the past 10-20 years.

**Mandibular Abscessation:** Often referred to as “lumpy jaw,” it occurs frequently in tapirs, and is difficult to treat. It is most often a result of molar apical abscesses or periodontal disease. It may become chronic and can be a serious problem if results in osteomyelitis, which can lead to systemic infection and death. A

biopsy of lesions is recommended, as mandibular fibrosarcoma has been reported in an Asian tapir. Treatment is most successful if the affected tooth is either removed or treated endodontically. Surgical debridement of any affected bone and long-term antibiotics may be warranted.

**Enteroliths:** Vivianite and newberyite composition occurs occasionally in zoos and aquariums. These may pass spontaneously or cause colic, and may be prevented by diets that acidify intestinal contents.

**Oral Mass:** One case of squamous cell carcinoma was reported in an Asian tapir, but successfully treated with intralesional fluorouracil.

**Oropharyngeal Abscessation:** Similar to oral necrobacillosis; oral trauma may be a primary factor.

**Pancreatitis / Acute Pancreatic Necrosis:** Three reported cases.

**Eosinophilic Enterocolitis:** Two reported cases. Insufficient data to determine whether analogous to eosinophilic gastroenteritis observed in horses.

**Respiratory Diseases:** Upper airway disease such as bacterial rhinitis, guttural pouch infection, or lower airway disease such as bacterial pneumonia, pulmonary tuberculosis, coccidiomycosis, and laryngeal abscessation. Common bacterial respiratory pathogens include *Streptococcus*, *Klebsiella*, *Corynebacteria*, *Actinomyces*, and *Fusobacterium*. Septicemic/Embolic pneumonias predominate over bronchopneumonias.

**Skin and Hoof Disease:** Dermatological problems are often thought to be caused by excessive sunlight. Foot problems often due to improper/hard substrate; sole abscesses are not uncommon.

**Vesicular Skin Disease:** This common skin disease, apparently unique to tapirs, affects both male and female tapirs with a higher recurrence in females. The cause is unknown and it affects tapirs kept in both indoor and outdoor enclosures. The syndrome is variable, but is characterized by the occurrence of lesions over the dorsal thoracic and lumbosacral regions. The lesions begin as coalescing papules and vesicles that rupture, releasing serosanguinous fluid. Neurological signs are often present simultaneously and include hind limb ataxia and lameness, or syncope-like episodes. The animal continues to eat normally. It usually resolves spontaneously—the signs diminish within a few days, and approximately one week after presentation, superficial skin sloughing occurs. The underlying skin heals quickly.

**Acute Lameness:** Common, nearly always caused by over wearing of footpads. Can lead to severe pad and sole ulceration, usually caused by over-activity on hard substrate.

**Corneal Cloudiness/Keratitis:** Seen frequently in tapirs, especially in Asian tapirs. The cause is unknown, but probably a combination of trauma and excessive exposure to light may be infectious, possibly herpes virus. Sometimes associated with corneal ulceration. It has been prevented by providing adequate shade.

**Genitourinary Infection/Neoplasia:** Has been reported in tapirs. Females often have a milky vaginal discharge do not confuse with the normal cloudy, chalky urine of the species (similar to that of horses and rhinos).

**Hemochromatosis:** Similar to syndrome in black rhinos, possibly common in tapirs. Have seen increased serum iron and ferritin levels compared to free-ranging Baird's tapirs. The significance is unknown.

**Sudden, Unexpected Death:** Rare, but can be caused by intestinal accidents and Encephalomyocarditis infection.

**Chronic Weight Loss:** Warning signs of serious disease including renal failure, dental disease, tuberculosis, and chronic bacterial pneumonia.

**Herpes virus:** (equi type 1, presumptive) Presumable exposure to infected equids, infection has been described in a group of *ex situ* Asian and mountain tapirs, and caused the death of one Asian tapir in advanced pregnancy; manage with vaccination if continued problems are documented.

**Encephalomyocarditis Virus:** Endemic in Southeastern US, rodent vector; causes sudden death.

**Tuberculosis:** *Mycobacterium bovis* or *tuberculosis*; weight loss, cough, dyspnea; diagnose via nasal wash, thoracic radiographs, bronchoscopy, and TB skin test. Tapirs are also affected by *Mycobacterium pinnipedii*. This is a new member of *Mycobacterium tuberculosis* complex, and it is a specific mycobacteria from pinnipeds that was discovered and identified by Australian and Argentinean researchers (Bernardelli et al., 1996; Bastida et al., 1999; Cousins et al., 2003). There are reports that *T. indicus* and *T. terrestris* in zoos were affected by *M. pinnipedii* (Bastida et al., 2011).

**Bacterial Enteritis:** *Salmonella*, *Campylobacter*; spread by direct transmission from enclosure-mates or pest vectors; has also been reportedly caused by B-hemolytic *Streptococcus* in an Asian tapir; vomiting, diarrhea, can result in septicemia; treated with antibiotics and transfaunation. Note that the normal enteric protozoal flora of tapirs may include ciliophora, mastigophora, and *Balantidium* and *Giardia* sp. the latter two organisms are also known to cause watery diarrhea in the tapir.

**Foot and Mouth disease:** Documented in South American and Asian tapirs in an outbreak at a European zoo, interdigital lesions were the principal clinical sign (Ramsay & Zainuddin, 1993).

**Fungal Coccidioidomycosis:** Caused the death of wild-caught 25 year-old *ex situ* South American tapir; caused by inhalation of infective stage in endemic areas and immunosuppression; signs include anorexia, weight loss, cough, dyspnea; diagnose with serology and cytology/culture; treat with antifungals (itraconazole) (Dillehay & MacKenzie, 1985). There is a case of a 25 year old, wild caught male South American tapir from Ecuador which was shipped at approximately 5 years of age to a US zoo. This animal had a 3 day history of lethargy, dyspnea, and anorexia. Weight loss was observed over a 3 week period. Despite intensive therapy, the tapir died. A necropsy was performed, and on the basis of histological and morphological examination, disseminated coccidioidomycosis was determined to be the cause of death. The liver contained pyogranulomas with numerous foreign body-type cells which contained spherules. The diagnosis was confirmed by positive staining of deparaffinized and trypsinized sections, using fluorescence-conjugated anti-globulins specific for the tissue of *Coccidioides immitis*. The course of the disease was similar to that reported in horses and cattle. Lung lesions were not seen. It was concluded that the tapir probably became infected in Ecuador where it was captured approximately 20 years earlier. Coccidioidomycosis is a respiratory/fungal disease that is indigenous in Ecuador (Dillehay & MacKenzie, 1985).

**Amebic Meningoencephalitis:** *Naegleria fowleri*; parasite settles in cerebrum, cerebellum, and lungs; dry cough, lethargy, coma; diagnose with immunohistochemistry (IHC).

**Scabies:** *Sarcoptes tapiri*, hair loss; diagnose with skin scrapings and biopsy.

**Dermatophytosis:** *Microsporum gypseum*, *M. canis*, *Trichophyton tonsurans*; *M. canis* can cause severe infections in the mountain tapir resulting in alopecia of body and proximal extremities; responds to griseofulvin 10 mg/kg x 50 days.

**Fasciola hepatica:** Has been associated with hepatic cirrhosis and the death of an *ex situ* lowland tapir. Trematodes in the bile duct were an incidental finding in an *ex situ* Asian tapir.

**Tapeworms:** Seldom of clinical importance; *ex-situ* mountain tapirs can be infected with *Paranoplocephala* spp., which responds to Chlorsalicylamide 100 mg/kg PO.

**Nematodiasis:** *Strongyloides*; strongylids are common ascarid parasites of tapirs; *Capillaria hepatica* was an incidental finding in the liver of a lowland tapir; *Brachyclonus indicus* is thought to have caused the death of an Asian tapir. Treatments include Mebendazole 8 mg/kg or Thiabendazole 50–60 mg/kg PO once, repeated in 2 weeks; alternatively Ivermectin at 0.2 mg/kg or Levamisole at 10 mg/kg PO once.

**Armillifer moniliformis:** Cysts containing the nymphs of this pentasome recovered from a wild-caught Asian tapir.

**Babesia sp:** Intraerythrocytic parasite that has been found in a recently imported Asian tapir; antemortem signs of icterus and anemia, not speciated but resembling *Babesia equi*.

**Trypanosoma:** Found at necropsy of an Asian tapir.

**Schistosomiasis:** Affects liver and intestines, diarrhea and death; may see granulomatous hepatitis and hemorrhagic enteritis on necropsy.

**Blood-Sucking Moth:** *Calpe eustrigata*; ectoparasite of an Asian tapir in Southeast Asia.

AZA-accredited institutions must have a clear process for identifying and addressing tapir animal welfare concerns within the institution (AZA Accreditation Standard 1.5.8) and should have an established Institutional Animal Welfare Committee. This process should identify the protocols needed for animal care staff members to communicate animal welfare questions or concerns to their supervisors, their Institutional Animal Welfare Committee or if necessary, the AZA Animal Welfare Committee. Protocols should be in place to document the training of staff about animal welfare issues, identification of any animal welfare issues, coordination and implementation of appropriate responses to these issues, evaluation (and adjustment of these responses if necessary) of the outcome of these responses, and the dissemination of the knowledge gained from these issues.

**AZA Accreditation Standard**

**(1.5.8)** The institution must develop a clear process for identifying and addressing animal welfare concerns within the institution.

Given the wide variety of zoos and aquariums that house tapirs the AZA Tapir TAG cannot provide specific recommendations for the best approaches to take in order to communicate animal welfare issues effectively within every institution. All animal caretakers that work with tapirs should be aware of institutional protocols in place for them to identify, communicate and address potential animal welfare issues that are associated with the care and management of tapirs.

AZA-accredited zoos and aquariums provide superior daily care and husbandry routines, high quality diets, and regular veterinary care, to support tapir longevity; in the occurrence of death however, information obtained from necropsies is added to a database of information that assists researchers and veterinarians in zoos and aquariums to enhance the lives of tapirs both in their care and in the wild. As stated in Chapter 6.4, necropsies should be conducted on deceased tapirs to determine their cause of death, and the subsequent disposal of the body must be done in accordance with local, state, or federal laws (AZA Accreditation Standard 2.5.1). Necropsies should include a detailed external and internal gross morphological examination and representative tissue samples from the body organs should be submitted for histopathological examination. The AZA and American Association of Zoo Veterinarians (AAZV) website should be checked for any AZA Tapir Programs approved active research requests that could be filled from a necropsy.

**AZA Accreditation Standard**

**(2.5.1)** Deceased animals should be necropsied to determine the cause of death. Disposal after necropsy must be done in accordance with local/federal laws.

The most common causes of death from neonatal mortalities are stillbirths, due to maternal behavior (e.g., neglect or trauma) or undetermined. Other causes of neonatal mortality: aspiration pneumonia in hand-reared neonates, accidental drowning, septicemia, necrotizing bacterial enteritis, cecocolonic tumpany, and atresia ani. The majority of adult mortalities are due to gastrointestinal disease, mostly noninfectious. Overall, regardless of age group, infectious respiratory disease was found to be responsible for the majority of deaths. Most were bacterial pneumonias (Fowler & Miller, 2003).

**Euthanasia and Necropsies:** The AZA Tapir TAG currently does not have any specific protocols for tapir euthanasia within zoos and aquariums. Veterinarians at each institution are encouraged to contact the AZA Tapir TAG Program Veterinary Advisors for more specific information or advice on the most effective, safe, and humane approaches. Institutions should also refer to the AZA Acquisition and Disposition Policy for more information. Each institution housing tapirs should have an euthanasia protocol in place, developed by the veterinary team, in case euthanasia becomes necessary in a particular situation. The AZA Animal Welfare Committee also encourages each institution to develop a process to determine when elective euthanasia might be appropriate from a quality of life perspective, taking into account behavioral, health social, and nutritional and animal caretaker perspectives. Examples of approaches used by institutions are available from the AZA Animal Welfare Committee.

## Chapter 7. Reproduction

### 7.1 Reproductive Physiology and Behavior

It is important to have a comprehensive understanding of the reproductive physiology and behaviors of the animals in our care. This knowledge facilitates all aspects of reproduction, artificial insemination, birthing, rearing, and even contraception efforts that AZA-accredited zoos and aquariums strive to achieve. For assessing the reproductive state, progesterone values in non-gravid females are generally  $<2 \times 10^4$  ng/ml, whereas the progesterone values for gravid females are generally  $\sim 1.5\text{--}5 \times 10^4$  ng/ml.

Contraception methods that have been used in tapirs with varying degrees of success:

- Separate male from female;
- Castration;
- Melengestrol acetate implants;
- Medroxyprogesterone acetate injections;
- Altrenogest oral contraceptive.

Consult with AZA Contraception Center for more information.

**Calving:** Precisely predicting the time of birth is difficult in tapirs. Vulvar edema and a mucoid discharge may precede parturition by 2–3 weeks. The udder will also become enlarged in the last few weeks and, sometimes, there is colostrum secretion of the mammary glands.

The female should be isolated from the male shortly before birth and remain separate with the calf for at least one week after birth. In the case that the male disturbs the female, the male should be separated from the female at least 3 or 4 months before the supposed date of birth. Handling will be different in each case, as there have been instances in zoos where the male is kept next to the female without problems (Quse et al., 2004). Parturition happens on the ground, and labor can last approximately 2 hours. After the birth the female usually eats the placenta. Pools should be drained prior to suspected impending birth, and remain drained for 1–3 weeks after birth.

Tapirs usually give birth to a single calf although twinning does occur and may result in dystocia. The calf is born head first, and weighs about 5 to 8 kg (11–17.67 lbs) for neotropical species (Baird's tapir and South American tapir) and about 10kg (22 lbs) for Malayan tapir (Shoemaker et al., 2003). Healthy calves should be standing within a few hours of birth. The birthing environment is critical for neonatal survival. Neonatal deaths from hypothermia, trauma, drowning, and septicemia are preventable. A proper substrate of compacted soil, rubber pads, or straw bedding is crucial to prevent hypothermia and splaying. Nursing occurs with the dam in lateral recumbency and should start within the first 2–5 hours after birth. Neonatal examinations can be useful for assessing general health and determining the success of immunoglobulin transfer from the dam. It can be a challenge to collect blood from a struggling newborn tapir. The jugular vein is usually the best site for venipuncture in a neonate. Glutaraldehyde coagulation performed on serum will test for the presence of adequate immunoglobulin in tapirs. In cases where the calf fails to nurse, it is often possible to encourage the female to lie down and then place the calf on the nipple. Another possibility is to collect colostrum milking the female and then feed the calf.

**Birth and Maternal Care:** All species of tapirs are very similar in their reproductive biology and behavior. The tapir females are polyestrous annual and the oestrus cycle, in general, repeats every 28 to 32 days; this period last 1 to 4 days (Barongi, 1993; Brown et al., 1994). Females usually give birth to a single offspring after a gestation of 13–14 months. Estrus length is 1–4 days. Males will copulate with estrous females at least once during the cycle and intromission can last as long as 15–20 minutes. The age of sexual maturity is usually 2–4 years but is related to environmental factors, nutrition, and medical conditions. Females have bred as young as 13 months of age, and males as young as 24 months. Given the early age of female maturation, females should be separated from males (siblings, sires, or any other male) by the age of 15 months (Barongi, 1993). There appears to be no seasonal effect on reproduction. If breeding is desired, adults should be introduced during estrus to ensure reproduction. Breeding behavior varies greatly and depends on age, experience, and compatibility of the breeding pair. Many pairs of tapirs run and nip prior to copulation and precautions should be taken to avoid injuries. Breeding/introduction areas should be free of potential trip hazards and small openings where a head or leg could become caught. Some tapirs breed while standing in shallow water while others will breed on dry land. Female tapirs can exhibit post-partum estrus and are capable of conceiving within 1 to 3 months

after giving birth. The inter-birth interval can be as short as 14 months in *ex situ* tapirs. Females resumed cycling  $16.2 \pm 2$  days after parturition and, on two occasions, females became pregnant during the first postpartum estrous (Brown et al., 1994).

Within 7 to 10 days the tapir calves begin to incorporate solid food with some leaves of alfalfa or another vegetable. Tapir calves are completely weaned (on solid foods) by 4 to 6 months of age. All newborn tapirs have a natal coat of white stripes and spots and are completely white on the belly, chest, and throat. This serves as camouflage against predation in the wild. This coloration begins to fade at 3 - 4 months and is completely gone by 12 months of age when they have the same coat color as adult tapirs.

## 7.2 Assisted Reproductive Technology

The practical use of artificial insemination (AI) with animals was developed during the early 1900s to replicate desirable livestock characteristics to more progeny. Over the last decade or so, AZA-accredited zoos and aquariums have begun using AI processes more often with many of the animals residing in their care. AZA Studbooks are designed to help manage animal populations by providing detailed genetic and demographic analyses to promote genetic diversity with breeding pair decisions within and between our institutions. While these decisions are based upon sound biological reasoning, the efforts needed to ensure that transports and introductions are done properly to facilitate breeding between the animals are often quite complex, exhaustive, and expensive, and conception is not guaranteed.

AI has become an increasingly popular technology that is being used to meet the needs identified in the AZA Studbooks without having to re-locate animals. Males are trained to voluntarily produce semen samples and females are being trained for voluntary insemination and pregnancy monitoring procedures such as blood and urine hormone measurements and ultrasound evaluations. Techniques used to preserve and freeze semen has been achieved with a variety of, but not all, taxa and should be investigated further. Currently, there has not been any successful artificial insemination of tapirs, and no protocols are in place to address this subject.

## 7.3 Pregnancy and Parturition

It is extremely important to understand the physiological and behavioral changes that occur throughout an animal's pregnancy. As even advanced pregnancies may not be obvious, pregnancy can be detected by means of urinary and fecal steroid analysis. Transabdominal and rectal ultrasonography can also be used to diagnose and monitor advanced pregnancies. Note that one lowland tapir fetus at 11-months gestation had a cranial diameter of 6.5 cm (2.56 in) on ultrasonography (Janssen et al., 1999).

There is no point-in-time pregnancy test for tapirs; one could look at progesterone over a month or so as the cycle seems to last about 30 days, but the levels can be quite variable. Progesterone levels appear to be low, even in luteal phase and pregnancy. In zoos, tapir females respond well to different operant conditioning techniques and allow one to take blood samples from the cephalic or medial saphenous veins. In these cases, the main pregnancy diagnosis methods are represented by the blood serum hormone concentration and ultrasonography studies.

Progesterone values higher than 2.5 ng/ml are suspicious of pregnancy, although it should be confirmed by doing three tests over 15 days to confirm or discard it (Brown et al., 1994). If the values increase in the consecutive tests then a secure pregnancy can be diagnosed and there will be almost 13 months to control the gestation evolution (Brown et al., 1994).

In pregnant females of Lowland tapirs (*T. terrestris*) the progesterone serum concentrations show increases and decreases along the whole gestation, registering minimum values of 2.67 ng/ml on the first period of the gestation, and maximum values of 22.6 ng/ml on the last period (Quse et al., 2004). On the same period the estrogens serum concentrations show uniform behaviour, with values of 20 to 30 pg/ml, the last one corresponded to a few hours before the parturition (Quse et al., 2004).

Between 7 and 10 days before the parturition both hormones reach a maximum level, and then they decrease drastically in the hours prior to parturition (Quse et al., 2004). A similar behaviour shows the estrogen values in the Baird's tapir were 85 to 131 pg/ml (Brown et al., 1994) higher than in the South American tapir.

In South American tapirs, the cortisol at the end of the gestation seems not to play an important role in initiating parturition as its serum concentrations do not show significant changes (Quse et al., 2004).

Ultrasonography study is another potential pregnancy diagnostic tool, and may reveal fetal development and viability. This study can begin around day 30 to 45 of the pregnancy diagnostic by a

serologic method. The transducer should be of 3.5 to 5 MHz, and be placed on the ventral belly region and then crossed over the whole zone to visualize the fetal images. The female belly will have to be wet with alcohol to decrease the air coat that is between the skin and the hair and gel should be spread out on the transducer and on the skin (P. Fernandez Jurado, personal communication, 2004).

The recommended measurements to determine the fetal development would be the biparietal and the thoracic diameter. Also, it is important to register the total length of the fetus. In *T. terrestris*, the biparietal diameter of a 6 month fetus could be about 3.02 cm (1.19 in), the abdominal diameter at gastric axis level could be 7.25 cm (2.85 in), the thoracic dorsum ventral could be 6.5 cm (2.56 in) and the total length could be 20 cm (7.87 in) (P. Fernandez. Jurado, personal communication, 2004).

## 7.4 Birthing Facilities

As parturition approaches, animal care staff should ensure that the mother is comfortable in the area where the birth will take place, and that this area is “baby-proofed.” Neonatal mortality is high unless a suitable birthing environment is available (Janssen, 2003). Females should be separated from the male(s) several weeks before parturition. Note that vulvar edema and mucoid discharge may precede parturition by 2–3 weeks; the udder may also become enlarged. Pools should be barricaded to prevent accidental drowning of the neonate. Depending on personalities of the parents, females with young can be reintroduced to the male 1–3 months after birth after first allowing visual and olfactory contact. Female tapirs are usually good mothers but first time mothers and hand-raised mothers have a higher incidence of maternal neglect of their young.

Tapirs give birth after a short labor period. Calves are relatively small at birth and usually weigh between 4.9–11 kg (11–25 lb). Calves are usually able to stand within one to two hours after birth and should make frequent attempts to find the mother's nipple. Mothers should lie on their sides to allow the calf to nurse. Inexperienced mothers may need to be scratched down on their sides and the calf manually positioned on the nipple. Nursing should occur within the first 2–5 hours after birth. Mothers nurse their calves five to ten times every 24 hours. Each nursing bout can last as long as 10–15 minutes. It is common for both calf and dam to fall asleep in the nursing position. Newborn tapirs grow very rapidly and should double their body weight within 14–21 days of birth. They can be offered tiny pieces of fruit and vegetables as early as two weeks of age. Newborn calves should be provided with a warm enclosure (21–29 °C [70–85 °F]) and should never be left to lie on bare (cold) concrete. Hard packed dirt floors or hay bedding provides insulation and a non-slip surface for the unstable newborn. Pine shavings are not good material for maternity stalls as they can be ingested by the calf and cause gastrointestinal blockages.

Tapir calves should not have access to a pool for at least one week after birth. After that, depending on the design of the pool and temperature of the water, young tapirs are strong swimmers.

**Neonatal Death:** Causes include drowning, hypothermia, and failure of passive transfer/septicemia. Causes include failure to nurse from primiparous females, and it can be prevented by suitable birthing environment. It is suggested to remove the male and drain the pool for 1–3 weeks after birth.

**Neonatal Isoerythrolysis:** Reported in two neonates from the same Baird's tapir pair, acquired by feeding of maternal or equine colostrums to sensitized neonate; causes hemolytic anemia. This can be prevented by agglutination testing of colostrum in suspect animals.

## 7.5 Assisted Rearing

Although mothers may successfully give birth, there are times when they are not able to properly care for their offspring, both in the wild and in zoo populations. Fortunately, animal care staffs in AZA-accredited institutions are able to assist with the rearing of these offspring if necessary.

Although females should be allowed to raise their young if possible, newborn tapirs can be hand-reared when females show no interest in nursing or the death of the mother. Hand-raised young are still likely to breed and behavioral problems are not as likely as with other, more social species. Regardless of rearing technique, hand or parent, a general health exam should be conducted 1-3 days after birth to assess overall condition of the neonate, including heart and lung auscultation, hydration, suckling response, temperature (hyper- or hypothermia), herniated umbilicus, blood values, and immunoglobulin status. The umbilicus should be dipped in a solution of 2% iodine in order to prevent infection. Calves should be weighed on a regular basis to monitor growth. Transfaunation (feeding strained feces from

normal tapirs) has been useful to encourage growth of normal flora in young tapirs raised in isolation (Janssen et al., 1999), and 0/22% orally at standard equine dose has been used with varying degrees of success in tapirs.

## 7.6 Contraception

Many animals cared for in AZA-accredited institutions breed so successfully that contraception techniques are implemented to ensure that the population remains at a healthy size. In some cases it is desirable to prevent reproduction in tapirs that are genetically well represented in the zoo and aquarium population. If possible, separating the male from the female is the simplest approach. Castration, melengestrol acetate implants, medroxyprogesterone acetate (Depo-Provera, Upjohn) injections (5.0 mg/kg every 3 months), and altrenogest (Egumate<sup>®</sup> 0/22%) orally at standard equine dose have been used with varying degrees of success in tapirs. Regumate is a hormonal product. It is best to check the current recommendations of the AZA Contraceptive Advisory Group prior to initiating contraception.

## Chapter 8. Behavior Management

### 8.1 Animal Training

Classical and operant conditioning techniques have been used to train animals for over a century. Classical conditioning is a form of associative learning demonstrated by Ivan Pavlov. Classical conditioning involves the presentation of a neutral stimulus that will be conditioned (CS) along with an unconditioned stimulus that evokes an innate, often reflexive, response (US). If the CS and the US are repeatedly paired, eventually the two stimuli become associated and the animal will begin to produce a conditioned behavioral response to the CS.

Operant conditioning uses the consequences of a behavior to modify the occurrence and form of that behavior. Reinforcement and punishment are the core tools of operant conditioning. Positive reinforcement occurs when a behavior is followed by a favorable stimulus to increase the frequency of that behavior. Negative reinforcement occurs when a behavior is followed by the removal of an aversive stimulus to also increase the frequency of that behavior. Positive punishment occurs when a behavior is followed by an aversive stimulus to decrease the frequency of that behavior. Negative punishment occurs when a behavior is followed by the removal of a favorable stimulus also to decrease the frequency of that behavior. AZA-accredited institutions are expected to utilize reinforcing conditioning techniques to facilitate husbandry procedures and behavioral research investigations.

The AZA Tapir TAG recommends that all tapir training be performed through positive reinforcement and patience. A husbandry-training program should be implemented for more effective health care and trained behaviors can include separations, shifting between habitat area, crating, physical/medical exams, oral exams, foot exams, x-rays, sonography, injections, weights, unrestrained blood sampling, sample collection and blood pressure monitoring. These behaviors should be identified and prioritized in coordination with veterinarians and curators. A husbandry training program not only aids in the early diagnosis and simple treatment of minor injuries or medical problems, but can also be enriching, because it mentally and physically challenges the tapir to solve problems and perform specific behaviors. Tapirs can be easily trained to tolerate close proximity to caretakers. Training techniques can be used to induce individuals to approach habitat sides/barriers for visual inspection and vaccination or contraceptive injections. Operant conditioning can be used to promote natural behavior, and encourage better utilization of the habitat by the tapirs. Most tapirs are food motivated and can be trained to shift to other quarters when offered favorite food items.

**Training Protocol:** Before starting to train a new behavior, it is important to develop a training plan for shaping the desired behavior (see [www.animaltraining.org](http://www.animaltraining.org) for more information on setting up a training plan). The training plan should include the identity of the primary trainer, steps needed to reach the desired end, the proper cue SD, and the criteria for the final behavior. It is recommended to include the veterinary and management staff in the development of the training plan. During training, it is important for keepers to avoid putting their fingers in the tapir's mouths.

Teaching animals how to problem solve, increasing their level of activity and making learning a positive experience are important parts of the training process. A trusting, cooperative, respectful relationship needs to be developed with the tapirs before any true training progress can be made. Animal caretakers should concentrate on the constructive process of training such as strengthening their positive relationship and rapport with the tapirs by using a calm, pleasant voice and avoiding any sudden movement or loud noises which may upset the tapirs. By taking small steps and attainable approximations toward some final behavior, rewarding the tapir's apparent motivation and attitude, teaching the basics of operant conditioning to the tapirs, making learning interesting and allowing the animals every opportunity to succeed, the training process can become a positive, constructive and stimulating experience.

**Training Area:** Both the exhibit and holding areas should be designed to include a training area that allows the tapirs and keepers to interact. Installing a squeeze chute has facilitated training at some zoos.

**Undesirable Behaviors:** Positive punishment should not be used in tapir training, but 'time-outs' are a suitable form of negative punishment. Animal care staff should not attempt to discourage unwanted behaviors, but should instead ignore them and reinforce behaviors that are inconsistent with these behaviors. Trainers should be careful to avoid inadvertently reinforcing undesirable behaviors like

stereotypy and aggression. Husbandry behaviors that have been successfully trained using reinforcing conditioning techniques with tapirs include scale training and stationing for medical examinations.

## 8.2 Environmental Enrichment

Environmental enrichment, also called behavioral enrichment, refers to the practice of providing a variety of stimuli to the animal's environment, or changing the environment itself to increase physical activity, stimulate cognition, and promote natural behaviors. Stimuli, including natural and artificial objects, scents, and sounds are presented in a safe way for the tapir to interact with. Some suggestions include providing food in a variety of ways (i.e., frozen in ice or in a manner that requires an animal to solve simple puzzles to obtain it), using the presence or scent/sounds of other animals of the same or different species, and incorporating an animal training (husbandry or behavioral research) regime in the daily schedule.

Enrichment programs for tapirs should take into account the natural history of the species, individual needs of the animals, and facility constraints. The tapir enrichment plan should include the following elements: goal setting, planning and approval process, implementation, documentation/record-keeping, evaluation, and subsequent program refinement. The tapir enrichment program should ensure that all environmental enrichment devices (EEDs) are "tapir" safe and are presented on a variable schedule to prevent habituation. AZA-accredited institutions must have a formal written enrichment program that promotes tapir-appropriate behavioral opportunities (AZA Accreditation Standard 1.6.1).

### AZA Accreditation Standard

(1.6.1) The institution must have a formal written enrichment program that promotes species-appropriate behavioral opportunities.

Tapir enrichment programs should be integrated with veterinary care, nutrition, and animal training programs to maximize the effectiveness and quality of animal care provided. AZA-accredited institutions must have specific staff members assigned to oversee, implement, train, and coordinate interdepartmental enrichment programs (AZA Accreditation Standard 1.6.2).

### AZA Accreditation Standard

(1.6.2) The institution must have a specific staff member(s) or committee assigned for enrichment program oversight, implementation, training, and interdepartmental coordination of enrichment efforts.

Enrichment should be based on desirable behavioral goals for the tapirs and be evaluated on a regular basis. Enrichment approval process developed by institutions should include veterinarians, nutritionists (for enrichment that are food-based or can be ingested), curatorial staff, and animal keepers. Enrichment has been shown to have a particularly positive influence on the behavior of animals. Approved enrichment items at some institutions include: spices, scents, balls, plastic PVC feeders, ice, seasonal fruit and/or vegetables, and browse.

## 8.3 Staff and Animal Interactions

Animal training and environmental enrichment protocols and techniques should be based on interactions that promote safety for all involved. Most tapirs quickly adapt to daily routines, shifting readily between habitat areas, as well as participating in training to allow routine and non-routine veterinary tasks to be performed. Staff should be attentive to any changes in appearance, appetites, behavior, and stool/feces of the tapirs under their care. Ideally, the holding area and the habitat should provide staff with the opportunity to observe the tapirs at least twice daily. Tapirs may recognize familiar keepers by their voice, scent, movement, and other behaviors, and respond differently to familiar and unfamiliar staff members. Tapirs can be worked in a protected or unprotected contact setting depending on individual temperament and institutional policies. It is important for staff to understand that tapirs can become easily startled and react aggressively. Caution should be taken when working in the same space as the tapirs. It is not recommended to enter the same space with a dam and young.

## 8.4 Staff Skills and Training

Tapir staff members should be trained in all areas of tapir behavior management. Funding should be provided for tapir staff to attend AZA continuing education courses, and related meetings, AZA conferences, and other professional opportunities. A reference library appropriate to the size and complexity of the institution should be available to all staff and volunteers to provide them with accurate information on the behavioral needs of the animals with which they work.

## Chapter 9. Program Animals

### 9.1 Program Animal Policy

AZA recognizes many public education and, ultimately, conservation benefits from program animal presentations. AZA's Conservation Education Committee's Program Animal Position Statement (Appendix D) summarizes the value of program animal presentations.

For the purpose of this policy, a program animal is described as an animal presented either within or outside of its normal exhibit or holding area that is intended to have regular proximity to or physical contact with trainers, handlers, the public, or will be part of an ongoing conservation education/outreach program.

Program animal presentations bring a host of responsibilities, including the welfare of the animals involved, the safety of the animal handler and public, and accountability for the take-home, educational messages received by the audience. Therefore, AZA requires all accredited institutions that give program animal presentations to develop an institutional program animal policy that clearly identifies and justifies those species and individuals approved as program animals and details their long-term management plan and educational program objectives.

AZA's accreditation standards require that the conditions and treatment of animals in education programs must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, sound and environmental enrichment, access to veterinary care, nutrition, and other related standards (AZA Accreditation Standard 1.5.4). In addition, providing program animals with options to choose among a variety of conditions within their environment is essential to ensuring effective care, welfare, and management. Some of these requirements can be met outside of the primary exhibit enclosure while the animal is involved in a program or is being transported. For example, housing may be reduced in size compared to a primary enclosure as long as the animal's physical and psychological needs are being met during the program; upon return to the facility the animal should be returned to its species-appropriate housing as described above.

#### AZA Accreditation Standard

**(1.5.4)** A written policy on the use of live animals in programs must be on file. Animals in education programs must be maintained and cared for by trained staff, and housing conditions must meet standards set for the remainder of the animals in the institution, including species-appropriate shelter, exercise, social and environmental enrichment, access to veterinary care, nutrition, etc. Since some of these requirements can be met outside of the primary enclosure, for example, enclosures may be reduced in size provided that the animal's physical and psychological needs are being met.

### 9.2 Institutional Program Animal Plans

AZA's policy on the presentation of animals is as follows: AZA is dedicated to excellence in animal care and welfare, conservation, education, research, and the presentation of animals in ways that inspire respect for wildlife and nature. AZA's position is that animals should always be presented in adherence to the following core principles:

- Animal and human health, safety, and welfare are never compromised.
- Education and a meaningful conservation message are integral components of the presentation.
- The individual animals involved are consistently maintained in a manner that meets their social, physical, behavioral, and nutritional needs.

AZA-accredited institutions which have designated program animals are required to develop their own Institutional Program Animal Policy that articulates and evaluates the program benefits (see Appendix E for recommendations). Program animals should be consistently maintained in a manner that meets their social, physical, behavioral, and nutritional needs. Education and conservation messaging must be an integral component of any program animal demonstration (AZA Accreditation Standard 1.5.3).

#### AZA Accreditation Standard

**(1.5.3)** If animal demonstrations are a part of the institution's programs, an educational/conservation message must be an integral component.

The AZA Tapir TAG recommends the following key messages for AZA member institutions to use in their educational efforts relating to tapirs:

1. Tapirs serve as key seed dispersers in a wide range of habitats.
2. Tapirs face significant challenges to survival in the wild.

3. Scientists around the world, many affiliated with AZA institutions, are dedicated to learning more about tapirs in order to conserve them.
4. Tapir conservation depends on local community members and other stakeholders valuing wildlife.
5. AZA-accredited zoos and aquariums play a key role in the conservation of tapirs.

Given the dangerous and unpredictable nature of tapirs, this species should not be involved in conservation/education programs outside of their enclosures, but may be involved in animal training demonstrations that zoo visitors can observe, whether out on exhibit or during 'behind the scenes' tours. The provision of enrichment to tapirs in the view of the public could also be considered an educational program based on the definition of 'program animals' provided in section 9.1.

Animal care and education staff should be trained in program animal-specific handling protocols, conservation and education messaging techniques, and public interaction procedures. These staff members should be competent in recognizing stress or discomfort behaviors exhibited by the program animals and should be able to address any safety issues that arise.

Animal program protocols: Only animal caretakers that have received training within the institution relevant to working with tapirs should be involved in any animal training demonstrations, and specific protocols should be developed and implemented to ensure that animal care staff remains safe and focused on the animals during any demonstrations. The presence of zoo or aquarium visitors should not distract animal caretakers during protected contact interactions with the animals. Although unlikely with tapirs kept within their enclosures, animal care staff should be competent in recognizing stress or discomfort behaviors exhibited by any animals used in programs/demonstrations (e.g., increased aggression between animals, abnormal stereotypic behaviors), and be able to communicate these issues effectively using institution-specific animal care protocols so that welfare or safety concerns can be specifically addressed. Animal care staff members involved in tapir 'programs' should be trained in conservation and education messaging techniques, and public interaction procedures.

Animal care and education staff should be trained in program animal-specific handling protocols, conservation, and education messaging techniques, and public interaction procedures. These staff members should be competent in recognizing stress or discomfort behaviors exhibited by the program animals and be able to address any safety issues that arise.

Program animals that are taken off zoo or aquarium grounds for any purpose have the potential to be exposed to infectious agents that could spread to the rest of the institution's healthy population. AZA-accredited institutions must have adequate protocols in place to avoid this (AZA Accreditation Standard 1.5.5).

Careful consideration must be given to the design and size of all program animal enclosures, including exhibit, off-exhibit holding, hospital, quarantine, and isolation areas, such that the physical, social, behavioral, and psychological needs of the species are met and species-appropriate behaviors are facilitated (AZA Accreditation Standard 10.3.3; AZA Accreditation Standard 1.5.2).

Similar consideration needs to be given to the means in which an animal will be transported both within the Institution's grounds, and to/from an off-grounds program. Animal transportation must be conducted in a manner that is lawful, safe, well planned, and coordinated, and minimizes risk to the animal(s), employees, and general public (AZA Accreditation Standard 1.5.11).

### 9.3 Program Evaluation

AZA-accredited institutions which have Institutional Program Animal Plan are required to evaluate the efficacy of the plan routinely (see Appendix E for recommendations). Education and conservation messaging content retention, animal health and well-

#### AZA Accreditation Standard

**(1.5.5)** For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the animals at the institution from exposure to infectious agents.

#### AZA Accreditation Standard

**(10.3.3)** All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals. AZA housing guidelines outlined in the Animal Care Manuals should be followed.

#### AZA Accreditation Standard

**(1.5.2)** All animals must be housed in enclosures and in appropriate groupings which meet their physical, psychological, and social needs. Wherever possible and appropriate, animals should be provided the opportunity to choose among a variety of conditions within their environment. Display of single specimens should be avoided unless biologically correct for the species involved.

being, guest responses, policy effectiveness, and accountability and ramifications of policy violations should be assessed and revised as needed.

**AZA Accreditation Standard**

**(1.5.11)** Animal transportation must be conducted in a manner that is safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to. Planning and coordination for animal transport requires good communication among all involved parties, plans for a variety of emergencies and contingencies that may arise, and timely execution of the transport. At no time should the animal(s) or people be subjected to unnecessary risk or danger.

## Chapter 10. Research

### 10.1 Known Methodologies

AZA believes that contemporary tapir management, husbandry, veterinary care and conservation practices should be based in science, and that a commitment to scientific research, both basic and applied, is a trademark of the modern zoological park and aquarium. AZA-accredited institutions have the invaluable opportunity, and are expected, to conduct or facilitate research both in *in situ* and *ex situ* settings to advance scientific knowledge of the animals in our care and enhance the conservation of wild populations. This knowledge might be achieved by participating in AZA Taxon Advisory Group (TAG) or Species Survival Plan<sup>®</sup> (SSP) Program sponsored research, conducting original research projects, affiliating with local universities, and/or employing staff with scientific credentials (AZA Accreditation Standard 5.3). There is on-going paleontological research at East Tennessee State University, the South Carolina State Museum and in Texas.

Research investigations, whether observational, behavioral, physiological, or genetically based, should have a clear scientific purpose with the reasonable expectation that they will increase our understanding of the species being investigated and may provide results which benefit the health or welfare of animals in wild populations. Many AZA-accredited institutions incorporate superior positive reinforcement training programs into their

routine schedules to facilitate sensory, cognitive, and physiological research investigations and these types of programs are strongly encouraged by the AZA.

AZA-accredited institutions are required to have a clearly written research policy that identifies the types of research being conducted, methods used, staff involved, evaluations of the projects, the animals included, and guidelines for the reporting or publication of any findings (AZA Accreditation Standard 5.2). Institutions must designate a qualified individual to oversee and direct its research program (AZA Accreditation Standard 5.1). If institutions are not able to conduct in-house research investigations, they are strongly encouraged to provide financial, personnel, logistical, and other support for priority research and conservation initiatives identified by Taxon Advisory Groups (TAGs) or Species Survival Plan<sup>®</sup> (SSP) Programs.

#### AZA Accreditation Standard

(5.3) Institutions should maximize the generation of scientific knowledge gained from the animal collection. This might be achieved by participating in AZA TAG/SSP sponsored research when applicable, conducting original research projects, affiliating with local universities, and/or employing staff with scientific credentials.

#### AZA Accreditation Standard

(5.2) Institutions must have a written policy that outlines the type of research that it conducts, methods, staff involvement, evaluations, animals to be involved, and guidelines for publication of findings.

#### AZA Accreditation Standard

(5.1) Research activities must be under the direction of a person qualified to make informed decisions regarding research.

### 10.2 Future Research Needs

This Animal Care Manual is a dynamic document that will need to be updated as new information is acquired. Knowledge gaps have been identified throughout the Manual and are included in this section to promote future research investigations. Knowledge gained from areas will maximize AZA-accredited institutions' capacity for excellence in animal care and welfare as well as enhance conservation initiatives for the species.

#### Chapter 1. Ambient Environment

1.4. Sound and Vibration: A more complete understanding of the sensitivity of tapirs to sounds and vibrations and the effects on their well-being is an area in need of additional research.

#### Chapter 6. Veterinary Care

6.7. Management of disease: Additional studies are needed to determine the effects of and treatment for infectious diseases that affect both wild and managed populations of tapirs.

Additional information is necessary for all managed species of tapirs around the world a Tapir Health Assessment Survey is in progress Contact TSG Veterinary Committee Chair Viviana Quse.

#### Chapter 7. Reproduction

7.1 Reproductive Physiology and Behavior: Additional information is necessary with regards to tapir reproductive cycles, the following studies are in progress:

- Validation of fecal samples for non-invasive pregnancy testing (hormone levels different than in serum) in tapirs. Contact Amanda Guthrie, DVM Virginia Zoo.
- Research for long-term cryopreservation and/or in vitro fertilization. There is little information pertaining to fundamental reproductive biology of tapirs. A thorough understanding of both male and female reproduction is vital for developing various assisted reproductive technologies including artificial insemination and sperm cryopreservation. Sperm cryopreservation also serves as insurance against catastrophic loss of genetically valuable animal.
- Testes and ovaries can be collected from deceased tapirs (neonate, prepubertal, and adults) immediately post-mortem and gametes recovered for research or long-term cryopreservation and/or in vitro fertilization. Contact Budhan Pukazhenth, Ph.D. Smithsonian's National Zoo.

## **Chapter 8. Behavior Management**

8.1 Enrichment and training: Enrichment and training strategies that contribute to improved management of tapirs need to be compiled and reviewed.

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## References

- AWR (Animal Welfare Regulations). (2005). Animal Welfare Act, 7 U.S.C. Animal Welfare Regulations, 9CFR Chapter 1, subchapter A, Parts 1-4.
- Barongi R. (1993). Husbandry and conservation of tapirs. *International Zoo Yearbook*, 32:7-15.
- Bastida R, Guichón R y Quse V. (2010). Escenarios para el origen y dispersión de la tuberculosis en Patagonia Austral y Tierra del Fuego. Nuevos actores y líneas de evidencia. Mendoza: XVII Congreso Nacional de Arqueología Argentina.
- Bastida R., Quse V. y Guichón R. (2011). La tuberculosis en grupos de cazadores recolectores de Patagonia y Tierra del Fuego: Nuevas alternativas de contagio a través de la fauna silvestre. *Revista Argentina de Antropología Biológica*, 13, 1.
- Bitgood, S., Patterson, D., & Benefield, A. (1986). Understanding your visitors: ten factors that influence visitor behavior. Annual Proceedings of the American Association of Zoological Parks and Aquariums (pp. 726–743).
- Bitgood S., Patterson D., & Benefield A. (1988). Exhibit design and visitor behavior. *Environment and Behavior*, 20(4), 474–491.
- Brown J., Citino, S; Shaw J., Miller, C. (1994). Endocrine Profiles during the Estrous Cycle and Pregnancy in the Baird's Tapir (*Tapirus bairdii*). *Zoo Biology*, 13, 107-117.
- Cousins D., Bastida R., Cataldi A., Quse V., Redrobe S., Dow S., Duignan P., Murray A., Dupont C., Ahmed N., Collins D., Butler W., Dawson D., Rodríguez D., Loureiro J., Romano Ml., Alito A., Zumárraga M., Bernardelli A. (2003). Tuberculosis in seals caused by a novel member of the *Mycobacterium tuberculosis* complex: *Mycobacterium pinnipedii* sp.nov. *International Journal of Systematic and Evolutionary Microbiology* 53,1305-1314.
- Churchman D. (1985). How and what do recreational visitors learn at zoos? Annual Proceedings of the American Association of Zoological Parks and Aquariums (pp.160-167).
- Clauss M., Wilkins T., Hartley A., & Hatt J.M. (2009). Diet composition, food intake, body condition, and fecal consistency in captive tapirs (*Tapirus* sp.) in UK Collections. *Zoo Biology*, 27, 1–13.
- Conway W. (1995). Wild and zoo animal interactive management and habitat conservation. *Biodiversity and Conservation*, 4, 573–594.
- Davison V.M., McMahon L., Skinner T.L., Horton C.M., & Parks B.J. (1993). Animals as actors: take 2. Annual Proceedings of the American Association of Zoological Parks and Aquariums (pp. 150–155).
- Dillehay D. L., Boosinger T. R., & MacKenzie S. (1985). Coccidioidomycosis in a tapir. *Journal of the American Veterinary Medical Association*, 187(11), 1233-1234.
- Downer C.C. (2001). Observations on the diet and habitat of the mountain tapir (*Tapirus pinchaque*). *Journal of Zoology (London)*, 254, 279–291.
- Duncan A. E., Lyashchenko K., Greenwald R., Miller M., & Ball R. (2009). Application of Elephant TB STAT-PAK assay and MAPIA (multi-antigen print immunoassay) for detection of tuberculosis and monitoring of treatment in black rhinoceros (*Diceros bicornis*). *Journal of Zoo and Wildlife Medicine*, 40(4), 781-5.
- Fowler M.E. & Miller R.E. (2003). Tapiridae. In: *Zoo and Wild Animal Medicine* (5<sup>th</sup> Edition) (pp.569-577). (Eds.). Philadelphia, PA: W.B. Saunders.
- Janssen D. & Michelet S. (1995). Bibliography of Tapiridae. San Diego, CA: San Diego Zoo Veterinary Department.
- Janssen D.L. (2003). Tapiridae. In: M.E. Fowler & R.E. Miller (Eds.). *Zoo & Wild Animal Medicine* (5<sup>th</sup> edition) (pp. 569–577). Philadelphia, PA: W.B. Saunders.

- Janssen D.L., Rideout B.R., & Edwards M.S. (1999). Tapir Medicine. In: M.E. Fowler & R.E. Miller (Eds.), *Zoo and Wildlife Medicine* 4<sup>th</sup> edition (pp. 562–568). Philadelphia, PA: W.B. Saunders.
- Johnston R.J. (1998). Exogenous factors and visitor behavior: a regression analysis of exhibit viewing time. *Environment and Behavior*, 30(3), 322–347.
- Lintzenich B.A., & Ward A.M. (1997). Hay and Pellet Ratios: Considerations in Feeding Ungulates. *Nutrition Advisory Group Handbook Fact Sheet*. Retrieved from [http://www.nagonline.net/Technical%20Papers/NAGFS00697Hay\\_PelletsJONIFEB24,2002MODIFIED.pdf](http://www.nagonline.net/Technical%20Papers/NAGFS00697Hay_PelletsJONIFEB24,2002MODIFIED.pdf)
- MacMillen O. (1994). Zoomobile effectiveness: sixth graders learning vertebrate classification. Annual Proceedings of the American Association of Zoological Parks and Aquariums (pp. 181–183).
- Medici E. P. (2010). *Assessing the Viability of Lowland Tapir Populations in a Fragmented Landscape*. Ph.D. Dissertation. Durrell Institute of Conservation and Ecology (DICE), University of Kent. Canterbury, UK.
- Medici E. P. (2011). Family Tapiridae (TAPIRS). In: D.E. Wilson & R.A. Mittermeier. *Handbook of the Mammals of the World - Volume 2: Hoofed Mammals*. Lynx Edicions, Spain.
- Medici E. P.; Desbiez A. L. J.; Gonçalves da Silva A.; Jerusalinsky L.; Chassot O.; Montenegro O. L.; Rodríguez J. O.; Mendoza A.; Quse V. B.; Pedraza C.; Gatti A.; Oliveira-Santos L. G. R.; Tortato M. A.; Ramos Jr., V.; Reis M. L.; Landau-Remy G.; Tapia A.; Morais A. A. (2007). Lowland Tapir (*Tapirus terrestris*) Conservation Action Plan. IUCN/SSC Tapir Specialist Group (TSG) & IUCN/SSC Conservation Breeding Specialist Group (CBSG).Morga J.M., & Hodgkinson M. (1999). The motivation and social orientation of visitors attending a contemporary zoological park. *Environment and Behavior*, 31(2), 227–239.
- Murphy M.R., Masters J.M., Moore D.M., Glass H.D., Hughes R.E., & Crissey S.D. (1997). Tapir (*Tapirus*) enteroliths. *Zoo Biology*, 16, 427–433.
- NRC (National Research Council). (2007). *Nutrient Requirements of Horses* (6<sup>th</sup> Revised Edition). Washington DC: National Academy Press.
- Padilla M. & Dowler R.C. (1994). *Tapirus terrestris*. *Mammal Species*, 481, 1–8.
- Povey K.D. (2002). Close encounters: the benefits of using education program animals. Annual Proceedings of the Association of Zoos and Aquariums (pp. 117–121).
- Povey K.D., & Rios, J. (2002). Using interpretive animals to deliver affective messages in zoos. *Journal of Interpretation Research*, 7, 19–28.
- Quse V; Francisco E; Gachen G; Fernandez Jurado P. (2004). Hormonal and ultrasonograph studies during the pregnancy of Lowland Tapir. In: Proceedings of the Second International Tapir Symposium, pp. 58.
- Ramsay E. & Zainuddin Z. (1993). Infectious diseases of the rhinoceros and tapir. *Journal of Zoo and Wildlife Medicine*, 3, 459-466.
- Sherwood K.P., Rallis S.F., & Stone J. (1989). Effects of live animals vs. preserved specimens on student learning. *Zoo Biology*, 8, 99–104.
- Shoemaker A. H; Barongi R., Flanagan J., Janssen D., Hernandez-Divers S. (2003). Husbandry Guidelines for Keeping Tapirs in Captivity. Tapir Specialist Group. [www.tapirs.org/Downloads/standards/tapir-TAG-husband-stan-en.doc](http://www.tapirs.org/Downloads/standards/tapir-TAG-husband-stan-en.doc).
- Stevens C.E. (1988). *Comparative Physiology of the Vertebrate Digestive System*. New York, NY: Cambridge University Press.
- Wolf R.L., & Tymitz B.L. (1981). Studying visitor perceptions of zoo environments: a naturalistic view. In: P.J.S. Olney (Ed.), *International Zoo Yearbook* (pp.49–53). Dorchester: The Zoological Society of London.

Yerke R., & Burns A. (1991). Measuring the impact of animal shows on visitor attitudes. Annual Proceedings of the American Association of Zoological Parks and Aquariums (pp. 532–534).

Yerke R., & Burns A. (1993). Evaluation of the educational effectiveness of an animal show outreach program for schools. Annual Proceedings of the American Association of Zoological Parks and Aquariums (pp. 366–368).

**Personal Communications:**

Jurado, Fernandez P., Universidad Nacional de Buenos Aires, 2004

Medici, P., Chair IUCN/SSC Tapir Specialist Group, 2010.

## Appendix A: Accreditation Standards by Chapter

The following specific standards of care relevant to tapirs are taken from the AZA Accreditation Standards and Related Policies (AZA, 2011) and are referenced fully within the chapters of this animal care manual:

### General Information

- (1.1.1)** The institution must comply with all relevant local, state, and federal wildlife laws and regulations. It is understood that, in some cases, AZA accreditation standards are more stringent than existing laws and regulations. In these cases the AZA standard must be met.

### Chapter 1

- (1.5.7)** The animal collection must be protected from weather detrimental to their health.
- (10.2.1)** Critical life-support systems for the animal collection, including but not limited to plumbing, heating, cooling, aeration, and filtration, must be equipped with a warning mechanism, and emergency backup systems must be available. All mechanical equipment should be under a preventative maintenance program as evidenced through a record-keeping system. Special equipment should be maintained under a maintenance agreement, or a training record should show that staff members are trained for specified maintenance of special equipment.
- (1.5.9)** The institution must have a regular program of monitoring water quality for collections of fish, pinnipeds, cetaceans, and other aquatic animals. A written record must be maintained to document long-term water quality results and chemical additions.

### Chapter 2

- (1.5.2)** Animals should be displayed, whenever possible, in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs. Display of single specimens should be avoided unless biologically correct for the species involved.
- (10.3.3)** All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals.
- (11.3.3)** Special attention must be given to free-ranging animals so that no undue threat is posed to the animal collection, free-ranging animals, or the visiting public. Animals maintained where they will be in contact with the visiting public must be carefully selected, monitored, and treated humanely at all times.
- (11.3.1)** All animal exhibits and holding areas must be secured to prevent unintentional animal egress.
- (11.3.6)** Guardrails/barriers must be constructed in all areas where the visiting public could have contact with other than handleable animals.
- (11.2.3)** All emergency procedures must be written and provided to staff and, where appropriate, to volunteers. Appropriate emergency procedures must be readily available for reference in the event of an actual emergency. These procedures should deal with four basic types of emergencies: fire, weather/environment; injury to staff or a visitor; animal escape.
- (11.6.2)** Security personnel, whether staff of the institution, or a provided and/or contracted service, must be trained to handle all emergencies in full accordance with the policies and procedures of the institution. In some cases, it is recognized that Security personnel may be in charge of the respective emergency (i.e., shooting teams).
- (11.2.4)** The institution must have a communication system that can be quickly accessed in case of an emergency.
- (11.2.5)** A written protocol should be developed involving local police or other emergency agencies and include response times to emergencies.
- (11.5.3)** Institutions maintaining potentially dangerous animals (sharks, whales, tigers, bears, etc.) must have appropriate safety procedures in place to prevent attacks and injuries by these animals. Appropriate response procedures must also be in place to deal with an attack resulting in an injury. These procedures must be practiced routinely per the emergency drill requirements contained in these standards. Whenever injuries result from these incidents, a written account outlining the cause of the incident, how the injury was handled, and a description of any resulting changes to either the safety procedures or the physical facility must be prepared and maintained for five years from the date of the incident.

### Chapter 3

**(1.5.11)** Animal transportation must be conducted in a manner that is safe, well-planned and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to.

### Chapter 5

**(2.6.2)** A formal nutrition program is recommended to meet the behavioral and nutritional needs of all species and specimens within the collection.

**(2.6.3)** Animal diets must be of a quality and quantity suitable for each animal's nutritional and psychological needs. Diet formulations and records of analysis of appropriate feed items should be maintained and may be examined by the Visiting Committee. Animal food, especially seafood products, should be purchased from reliable sources that are sustainable and/or well managed.

**(2.6.1)** Animal food preparations must meet all local, state/provincial, and federal regulations.

**(2.6.4)** The institution should assign at least one person to oversee appropriate browse material for the collection.

### Chapter 6

**(2.1.1)** A full-time staff veterinarian is recommended. However, the Commission realizes that in some cases such is not practical. In those cases, a consulting/part-time veterinarian must be under contract to make at least twice monthly inspections of the animal collection and respond as soon as possible to any emergencies. The Commission also recognizes that certain collections, because of their size and/or nature, may require different considerations in veterinary care.

**(2.1.2)** So that indications of disease, injury, or stress may be dealt with promptly, veterinary coverage must be available to the animal collection 24 hours a day, 7 days a week.

**(2.2.1)** Written, formal procedures must be available to the animal care staff for the use of animal drugs for veterinary purposes and appropriate security of the drugs must be provided.

**(1.4.6)** A staff member must be designated as being responsible for the institution's animal record-keeping system. That person must be charged with establishing and maintaining the institution's animal records, as well as with keeping all animal care staff members apprised of relevant laws and regulations regarding the institution's animal collection.

**(1.4.7)** Animal records must be kept current, and data must be logged daily.

**(1.4.5)** At least one set of the institution's historical animal records must be stored and protected. Those records should include permits, titles, declaration forms, and other pertinent information.

**(1.4.4)** Animal records, whether in electronic or paper form, including health records, must be duplicated and stored in a separate location.

**(1.4.3)** Animals must be identifiable, whenever practical, and have corresponding ID numbers. For animals maintained in colonies or other animals not considered readily identifiable, the institution must provide a statement explaining how record keeping is maintained.

**(1.4.1)** An animal inventory must be compiled at least once a year and include data regarding acquisitions and dispositions in the animal collection.

**(1.4.2)** All species owned by the institution must be listed on the inventory, including those animals on loan to and from the institution. In both cases, notations should be made on the inventory.

**(2.7.1)** The institution must have holding facilities or procedures for the quarantine of newly arrived animals and isolation facilities or procedures for the treatment of sick/injured animals.

**(2.7.3)** Quarantine, hospital, and isolation areas should be in compliance with standards or guidelines adopted by the AZA.

**(2.7.2)** Written, formal procedures for quarantine must be available and familiar to all staff working with quarantined animals.

**(11.1.2)** Training and procedures must be in place regarding zoonotic diseases.

**(11.1.3)** A tuberculin testing and surveillance program must be established for appropriate staff in order to ensure the health of both the employees and the animal collection.

**(2.5.1)** Deceased animals should be necropsied to determine the cause of death. Disposal after necropsy must be done in accordance with local/federal laws.

**(2.4.1)** The veterinary care program must emphasize disease prevention.

**(1.5.5)** For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the collection from exposure to infectious agents.

- (2.3.1)** Capture equipment must be in good working order and available to authorized, trained personnel at all times.
- (2.4.2)** Keepers should be trained to recognize abnormal behavior and clinical symptoms of illness and have knowledge of the diets, husbandry (including enrichment items and strategies), and restraint procedures required for the animals under their care. However, keepers should not evaluate illnesses nor prescribe treatment.
- (2.3.2)** Hospital facilities should have x-ray equipment or have access to x-ray services.
- (1.5.8)** The institution must develop a clear process for identifying and addressing animal welfare concerns within the institution.

#### **Chapter 8**

- (1.6.1)** The institution must have a formal written enrichment program that promotes species-appropriate behavioral opportunities.
- (1.6.2)** The institution must have a specific staff member(s) or committee assigned for enrichment program oversight, implementation, training, and interdepartmental coordination of enrichment efforts.

#### **Chapter 9**

- (1.5.4)** A written policy on the use of live animals in programs should be on file. Animals in education programs must be maintained and cared for by trained staff, and housing conditions must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, social and environmental enrichment, access to veterinary care, nutrition, etc. Since some of these requirements can be met outside of the primary enclosure, for example, enclosures may be reduced in size provided that the animal's physical and psychological needs are being met.
- (1.5.3)** If animal demonstrations are a part of the institution's programs, an education and conservation message must be an integral component.
- (1.5.5)** For animals used in offsite programs and for educational purposes, the institution must have adequate protocols in place to protect the rest of the collection from exposure to infectious agents.
- (10.3.3)** All animal enclosures (exhibits, holding areas, hospital, and quarantine/isolation) must be of a size and complexity sufficient to provide for the animal's physical, social, and psychological well-being; and exhibit enclosures must include provisions for the behavioral enrichment of the animals.
- (1.5.2)** Animals should be displayed in exhibits replicating their wild habitat and in numbers sufficient to meet their social and behavioral needs. Display of single animals should be avoided unless biologically correct for the species involved.
- (1.5.11)** Animal transportation must be conducted in a manner that is safe, well planned, and coordinated, and minimizes risk to the animal(s), employees, and general public. All applicable local, state, and federal laws must be adhered to. Planning and coordination for animal transport requires good communication among all involved parties, plans for a variety of emergencies and contingencies that may arise, and timely execution of the transport. At no time should the animal(s) or people be subjected to unnecessary risk or danger.

#### **Chapter 10**

- (5.3)** Institutions should maximize the generation of scientific knowledge gained from the animal collection. This might be achieved by participating in AZA TAG/SSP sponsored research when applicable, conducting original research projects, affiliating with local universities, and/or employing staff with scientific credentials.
- (5.2)** Institutions must have a written policy that outlines the type of research that it conducts, methods, staff involvement, evaluations, animals to be involved, and guidelines for publication of findings.
- (5.1)** Research activities must be under the direction of a person qualified to make informed decisions regarding research.

## Appendix B: Acquisition/Disposition Policy

**I. Introduction:** The Association of Zoos and Aquariums (AZA) was established, among other reasons, to foster continued improvement in the zoological park and aquarium profession. One of its most important roles is to provide a forum for debate and consensus building among its members, the intent of which is to attain high ethical standards, especially those related to animal care and professional conduct. The stringent requirements for AZA accreditation and high standards of professional conduct are unmatched by similar organizations and also far surpass the United States Department of Agriculture's Animal and Plant Health Inspection Service's requirements for licensed animal exhibitors. AZA member facilities must abide by a Code of Professional Ethics - a set of standards that guide all aspects of animal management and welfare. As a matter of priority, AZA institutions should acquire animals from other AZA institutions and dispose of animals to other AZA institutions.

AZA-accredited zoological parks and aquariums cannot fulfill their important missions of conservation, education and science without living animals. Responsible management of living animal populations necessitates that some individuals be acquired and that others be removed from the collection at certain times. Acquisition of animals can occur through propagation, trade, donation, loan, purchase, capture, or rescue. Animals used as animal feed are not accessioned into the collection.

Disposition occurs when an animal leaves the collection for any reason. Reasons for disposition vary widely, but include cooperative population management (genetic or demographic management), reintroduction, behavioral incompatibility, sexual maturation, animal health concerns, loan or transfer, or death.

The AZA Acquisition/Disposition Policy (A/D) was created to help (1) guide and support member institutions in their animal acquisition and disposition decisions, and (2) ensure that all additions and removals are compatible with the Association's stated commitment to "save and protect the wonders of the living natural world." More specifically, the AZA A/D Policy is intended to:

- Ensure that the welfare of individual animals and conservation of populations, species and ecosystems are carefully considered during acquisition and disposition activities;
- Maintain a proper standard of conduct for AZA members during acquisition and disposition activities;
- Ensure that animals from AZA member institutions are not transferred to individuals or organizations that lack the appropriate expertise or facilities to care for them.
- Support the goal of AZA's cooperatively managed populations and associated programs, including Species Survival Plans (SSPs), Population Management Plans (PMPs), and Taxon Advisory Groups (TAGs).

The AZA Acquisition/Disposition Policy will serve as the default policy for AZA member institutions. Institutions may develop their own A/D Policy in order to address specific local concerns. Any institutional policy must incorporate and not conflict with the AZA acquisition and disposition standards.

Violations of the AZA Acquisition/Disposition Policy will be dealt with in accordance with the AZA Code of Professional Ethics. Violations can result in an institution's or individual's expulsion from membership in the AZA.

**II. Group or Colony-based Identification:** For some colonial, group-living, or prolific species, such as certain insects, aquatic invertebrates, schooling fish, rodents, and bats, it is often impossible or highly impractical to identify individual specimens. These species are therefore maintained, acquisitioned, and disposed of as a group or colony. Therefore, when this A/D Policy refers to animals or specimens, it is in reference to both individuals and groups/colonies.

**III. Germplasm:** Acquisition and disposition of germplasm should follow the same guidelines outlined in this document if its intended use is to create live animal(s). Ownership of germplasm and any resulting animals should be clearly defined. Institutions acquiring or dispositioning germplasm or any animal parts or samples should consider not only its current use, but also future possible uses as new technologies become available.

IV(a). General Acquisitions: Animals are to be acquisitioned into an AZA member institution's collection if the following conditions are met:

1. Acquisitions must meet the requirements of all applicable local, state, federal and international regulations and laws.
2. The Director or Chief Executive Officer of the institution is charged with the final authority and responsibility for the monitoring and implementation of all acquisitions.
3. Acquisitions must be consistent with the mission of the institution, as reflected in its Institutional Collection Plan, by addressing its exhibition/education, conservation, and/or scientific goals.
4. Animals that are acquired for the collection, permanently or temporarily, must be listed on institutional records. All records should follow the Standards for Data Entry and Maintenance of North American Zoo and Aquarium Animal Records Databases®.
5. Animals may be acquired temporarily for reasons such as, holding for governmental agencies, rescue and/or rehabilitation, or special exhibits. Animals should only be accepted if they will not jeopardize the health, care or maintenance of the animals in the permanent collection or the animal being acquired.
6. The institution must have the necessary resources to support and provide for the professional care and management of a species, so that the physical and social needs of both specimen and species are met.
7. Attempts by members to circumvent AZA conservation programs in the acquisition of SSP animals are detrimental to the Association and its conservation programs. Such action may be detrimental to the species involved and is a violation of the Association's Code of Professional Ethics. All AZA members must work through the SSP program in efforts to acquire SSP species and adhere to the AZA Full Participation policy.
8. Animals are only to be acquired from sources that are known to operate legally and conduct their business in a manner that reflects and/or supports the spirit and intent of the AZA Code of Professional Ethics as well as this policy. Any convictions of state, federal, or international wildlife laws should be reviewed, as well as any previous dealings with other AZA-accredited institutions.
9. When acquiring specimens managed by a PMP, institutions should consult with the PMP manager.
10. Institutions should consult AZA Wildlife Conservation and Management Committee (WCMC)-approved Regional Collection Plans (RCPs) when making acquisition decisions.

IV(b). Acquisitions from the Wild: The maintenance of wild animal populations for education and wildlife conservation purposes is a unique responsibility of AZA member zoos and aquariums. To accomplish these goals, it may be necessary to acquire wild-caught specimens. Before acquiring animals from the wild, institutions are encouraged to examine sources including other AZA institutions or regional zoological associations.

When acquiring animals from the wild, careful consideration must be taken to evaluate the long-term impacts on the wild population. Any capture of free-ranging animals should be done in accordance with all local, state, federal, and international wildlife laws and regulations and not be detrimental to the long-term viability of the species or the wild or captive population(s). In crisis situations, when the survival of a population is at risk, rescue decisions are to be made on a case-by-case basis.

V(a). Disposition Requirements – living animals: Successful conservation and animal management efforts rely on the cooperation of many entities, both within and outside of AZA. While preference is given to placing animals within AZA member institutions, it is important to foster a cooperative culture among those who share the primary mission of AZA-accredited facilities. The AZA draws a strong distinction between the mission, stated or otherwise, of non-AZA member organizations and the mission of professionally managed zoological parks and aquariums accredited by the AZA.

An accredited AZA member balances public display, recreation, and entertainment with demonstrated efforts in education, conservation, and science. While some non-AZA member organizations may meet minimum daily standards of animal care for wildlife, the AZA recognizes that this, by itself, is insufficient to warrant either AZA membership or participation in AZA's cooperative animal management programs. When an animal is sent to a non-member of AZA, it is imperative that the member be confident that the animal will be cared for properly.

Animals may only be disposed of from an AZA member institution's collection if the following conditions are met:

1. Dispositions must meet the requirements of all applicable local, state, federal and international regulations and laws.
2. The Director or Chief Executive Officer of the institution is charged with the final authority and responsibility for the monitoring and implementation of all dispositions.
3. Any disposition must abide by the Mandatory Standards and General Advisories of the AZA Code of Professional Ethics. Specifically, "a member shall make every effort to assure that all animals in his/her collection and under his/her care are disposed of in a manner which meets the current disposition standards of the Association and do not find their way into the hands of those not qualified to care for them properly."
4. Non-domesticated animals shall not be disposed of at animal auctions. Additionally, animals shall not be disposed of to any organization or individual that may use or sell the animal at an animal auction. In transactions with AZA non-members, the recipient must ensure in writing that neither the animal nor its offspring will be disposed of at a wild animal auction or to an individual or organization that allows the hunting of the animal.
5. Animals shall not be disposed of to organizations or individuals that allow the hunting of these animals or their offspring. This does not apply to individuals or organizations which allow the hunting of only free-ranging game species (indigenous to North America) and established long-introduced species such as, but not limited to, white-tailed deer, quail, rabbit, waterfowl, boar, ring-necked pheasant, chukar, partridge, and trout. AZA distinguishes hunting/fishing for sport from culling for sustainable population management and wildlife conservation purposes.
6. Attempts by members to circumvent AZA conservation programs in the disposition of SSP animals are detrimental to the Association and its conservation programs. Such action may be detrimental to the species involved and is a violation of the Association's Code of Professional Ethics. All AZA members must work through the SSP program in efforts to deacquisition SSP species and adhere to the AZA Full Participation policy.
7. Domesticated animals are to be disposed of in a manner consistent with acceptable farm practices and subject to all relevant laws and regulations.
8. Live specimens may be released within native ranges, subject to all relevant laws and regulations. Releases may be a part of a recovery program and any release must be compatible with the AZA Guidelines for Reintroduction of Animals Born or Held in Captivity, dated June 3, 1992.
9. Detailed disposition records of all living or dead specimens must be maintained. Where applicable, proper animal identification techniques should be utilized.
10. It is the obligation of every loaning institution to monitor, at least annually, the conditions of any loaned specimens and the ability of the recipient to provide proper care. If the conditions and care of animals are in violation of the loan agreement, it is the obligation of the loaning institution to recall the animal. Furthermore, an institution's loaning policy must not be in conflict with this A/D Policy.
11. If live specimens are euthanized, it must be done in accordance with the established policy of the institution and the Report of the American Veterinary Medical Association Panel on Euthanasia (Journal of the American Veterinary Medical Association 218 (5): 669-696, 2001).
12. In dispositions to non-AZA members, the non-AZA member's mission (stated or implied) must not be in conflict with the mission of AZA, or with this A/D Policy.
13. In dispositions to non-AZA member facilities that are open to the public, the non-AZA member must balance public display, recreation, and entertainment with demonstrated efforts in conservation, education, and science.
14. In dispositions to non-AZA members, the AZA members must be convinced that the recipient has the expertise, records management practices, financial stability, facilities, and resources required to properly care for and maintain the animals and their offspring. It is recommended that this documentation be kept in the permanent record of the animals at the AZA member institution.
15. If living animals are sent to a non-AZA member research institution, the institution must be registered under the Animal Welfare Act by the U.S. Department of Agriculture Animal and Plant Health Inspection Service. For international transactions, the receiving facility should be registered by that country's equivalent body with enforcement over animal welfare.
16. No animal disposition should occur if it would create a health or safety risk (to the animal or humans) or have a negative impact on the conservation of the species.

17. Inherently dangerous wild animals or invasive species should not be dispositioned to the pet trade or those unqualified to care for them.
18. Under no circumstances should any primates be dispositioned to a private individual or to the pet trade.
19. Fish and aquatic invertebrate species that meet ANY of the following are inappropriate to be disposed of to private individuals or the pet trade:
  - a. Species that grow too large to be housed in a 72-inch long, 180 gallon aquarium (the largest tank commonly sold in retail stores)
  - b. Species that require extraordinary life support equipment to maintain an appropriate captive environment (e.g., cold water fish and invertebrates)
  - c. Species deemed invasive (e.g., snakeheads)
  - d. Species capable of inflicting a serious bite or venomous sting (e.g., piranha, lion fish, blue-ringed octopus)
  - e. Species of wildlife conservation concern
20. When dispositioning specimens managed by a PMP, institutions should consult with the PMP manager.
21. Institutions should consult WCMC-approved RCPs when making disposition decisions.

V(b). Disposition Requirements – dead specimens: Dead specimens (including animal parts and samples) are only to be disposed of from an AZA member institution's collection if the following conditions are met:

1. Dispositions of dead specimens must meet the requirements of all applicable local, state, federal and international regulations and laws.
2. Maximum utilization is to be made of the remains, which could include use in educational programs or exhibits.
3. Consideration is given to scientific projects that provide data for species management and/or conservation.
4. Records (including ownership information) are to be kept on all dispositions, including animal body parts, when possible.
5. SSP and TAG necropsy protocols are to be accommodated insofar as possible.

VI. Transaction Forms: AZA member institutions will develop transaction forms to record animal acquisitions and dispositions. These forms will require the potential recipient or provider to adhere to the AZA Code of Professional Ethics, the AZA Acquisition/Disposition Policy, and all relevant AZA and member policies, procedures and guidelines. In addition, transaction forms must insist on compliance with the applicable laws and regulations of local, state, federal and international authorities.

## Appendix C: Recommended Quarantine Procedures

**Quarantine facility:** A separate quarantine facility, with the ability to accommodate mammals, birds, reptiles, amphibians, and fish should exist. If a specific quarantine facility is not present, then newly acquired animals should be isolated from the established collection in such a manner as to prohibit physical contact, to prevent disease transmission, and to avoid aerosol and drainage contamination.

Such separation should be obligatory for primates, small mammals, birds, and reptiles, and attempted wherever possible with larger mammals such as large ungulates and carnivores, marine mammals, and cetaceans. If the receiving institution lacks appropriate facilities for isolation of large primates, pre-shipment quarantine at an AZA or American Association for Laboratory Animal Science (AALAS) accredited institution may be applied to the receiving institutions protocol. In such a case, shipment must take place in isolation from other primates. More stringent local, state, or federal regulations take precedence over these recommendations.

**Quarantine length:** Quarantine for all species should be under the supervision of a veterinarian and consist of a minimum of 30 days (unless otherwise directed by the staff veterinarian). Mammals: If during the 30-day quarantine period, additional mammals of the same order are introduced into a designated quarantine area, the 30-day period must begin over again. However, the addition of mammals of a different order to those already in quarantine will not have an adverse impact on the originally quarantined mammals. Birds, Reptiles, Amphibians, or Fish: The 30-day quarantine period must be closed for each of the above Classes. Therefore, the addition of any new birds into a bird quarantine area requires that the 30-day quarantine period begin again on the date of the addition of the new birds. The same applies for reptiles, amphibians, or fish.

**Quarantine personnel:** A keeper should be designated to care only for quarantined animals or a keeper should attend quarantined animals only after fulfilling responsibilities for resident species. Equipment used to feed and clean animals in quarantine should be used only with these animals. If this is not possible, then equipment must be cleaned with an appropriate disinfectant (as designated by the veterinarian supervising quarantine) before use with post-quarantine animals.

Institutions must take precautions to minimize the risk of exposure of animal care personnel to zoonotic diseases that may be present in newly acquired animals. These precautions should include the use of disinfectant foot baths, wearing of appropriate protective clothing and masks in some cases, and minimizing physical exposure in some species; e.g., primates, by the use of chemical rather than physical restraint. A tuberculin testing/surveillance program must be established for zoo/aquarium employees in order to ensure the health of both the employees and the animal collection.

**Quarantine protocol:** During this period, certain prophylactic measures should be instituted. Individual fecal samples or representative samples from large numbers of individuals housed in a limited area (e.g., birds of the same species in an aviary or frogs in a terrarium) should be collected at least twice and examined for gastrointestinal parasites. Treatment should be prescribed by the attending veterinarian. Ideally, release from quarantine should be dependent on obtaining two negative fecal results spaced a minimum of two weeks apart either initially or after parasiticide treatment. In addition, all animals should be evaluated for ectoparasites and treated accordingly.

Vaccinations should be updated as appropriate for each species. If the animal arrives without a vaccination history, it should be treated as an immunologically naive animal and given an appropriate series of vaccinations. Whenever possible, blood should be collected and sera banked. Either a -94°F (-70°C) frost-free freezer or a -4°F (-20°C) freezer that is not frost-free should be available to save sera. Such sera could provide an important resource for retrospective disease evaluation.

The quarantine period also represents an opportunity to, where possible, permanently identify all unmarked animals when anesthetized or restrained (e.g., tattoo, ear notch, ear tag, etc.). Also, whenever animals are restrained or immobilized, a complete physical, including a dental examination, should be performed. Complete medical records should be maintained and available for all animals during the quarantine period. Animals that die during quarantine should have a necropsy performed under the supervision of a veterinarian and representative tissues submitted for histopathologic examination.

**Quarantine procedures:** The following are recommendations and suggestions for appropriate quarantine procedures for tapirs]:

*Tapirs:*

Required:

1. Direct and floatation fecals
2. Vaccinate as appropriate

Strongly Recommended:

1. CBC/sera profile
2. Urinalysis
3. Appropriate serology (FIP, FeLV, FIV)
4. Heartworm testing in appropriate species

## Appendix D: Program Animal Policy and Position Statement

### Program Animal Policy

*Originally approved by the AZA Board of Directors – 2003*

*Updated and approved by the Board – July 2008 & June 2011*

The Association of Zoos & Aquariums (AZA) recognizes many benefits for public education and, ultimately, for conservation in program animal presentations. AZA's Conservation Education Committee's *Program Animal Position Statement* summarizes the value of program animal presentations (see pages 42-44).

For the purpose of this policy, a Program Animal is defined as “an animal whose role includes handling and/or training by staff or volunteers for interaction with the public and in support of institutional education and conservation goals”. Some animals are designated as Program Animals on a full-time basis, while others are designated as such only occasionally. Program Animal-related Accreditation Standards are applicable to all animals during the times that they are designated as Program Animals.

There are three main categories of Program Animal interactions:

1. On Grounds with the Program Animal Inside the Exhibit/Enclosure:
  - i. Public access outside the exhibit/enclosure. Public may interact with animals from outside the exhibit/enclosure (e.g., giraffe feeding, touch tanks).
  - ii. Public access inside the exhibit/enclosure. Public may interact with animals from inside the exhibit/enclosure (e.g., lorikeet feedings, ‘swim with’ programs, camel/pony rides).
2. On Grounds with the Program Animal Outside the Exhibit/Enclosure:
  - i. Minimal handling and training techniques are used to present Program Animals to the public. Public has minimal or no opportunity to directly interact with Program Animals when they are outside the exhibit/enclosure (e.g., raptors on the glove, reptiles held “presentation style”).
  - ii. Moderate handling and training techniques are used to present Program Animals to the public. Public may be in close proximity to, or have direct contact with, Program Animals when they're outside the exhibit/enclosure (e.g., media, fund raising, photo, and/or touch opportunities).
  - iii. Significant handling and training techniques are used to present Program Animals to the public. Public may have direct contact with Program Animals or simply observe the in-depth presentations when they're outside the exhibit/enclosure (e.g., wildlife education shows).
3. Off Grounds:
  - i. Handling and training techniques are used to present Program Animals to the public outside of the zoo/aquarium grounds. Public may have minimal contact or be in close proximity to and have direct contact with Program Animals (e.g., animals transported to schools, media, fund raising events).

*These categories assist staff and accreditation inspectors in determining when animals are designated as Program Animals and the periods during which the Program Animal-related Accreditation Standards are applicable. In addition, these Program Animal categories establish a framework for understanding increasing degrees of an animal's involvement in Program Animal activities.*

*Program animal presentations bring a host of responsibilities, including the safety and welfare of the animals involved, the safety of the animal handler and public, and accountability for the take-home, educational messages received by the audience. Therefore, AZA requires all accredited institutions that make program animal presentations to develop an institutional program animal policy that clearly identifies and justifies those species and individuals approved as program animals and details their long-term management plan and educational program objectives.*

*AZA's accreditation standards require that education and conservation messages must be an integral component of all program animal presentations. In addition, the accreditation standards require that the conditions and treatment of animals in education programs must meet standards set for the remainder of the animal collection, including species-appropriate shelter, exercise, appropriate environmental enrichment, access to veterinary care, nutrition, and other related standards. In addition, providing program animals with options to choose among a variety of conditions within their environment is*

*essential to ensuring effective care, welfare, and management. Some of these requirements can be met outside of the primary exhibit enclosure while the animal is involved in a program or is being transported. For example, free-flight birds may receive appropriate exercise during regular programs, reducing the need for additional exercise. However, the institution must ensure that in such cases, the animals participate in programs on a basis sufficient to meet these needs or provide for their needs in their home enclosures; upon return to the facility the animal should be returned to its species-appropriate housing as described above.*

## **Program Animal Position Statement**

*Last revision 1/28/03*

*Re-authorized by the Board June 2011*

The Conservation Education Committee (CEC) of the Association of Zoos and Aquariums supports the appropriate use of program animals as an important and powerful educational tool that provides a variety of benefits to zoo and aquarium educators seeking to convey cognitive and affective (emotional) messages about conservation, wildlife and animal welfare.

Utilizing these animals allows educators to strongly engage audiences. As discussed below, the use of program animals has been demonstrated to result in lengthened learning periods, increased knowledge acquisition and retention, enhanced environmental attitudes, and the creation of positive perceptions concerning zoo and aquarium animals.

### **Audience Engagement**

Zoos and aquariums are ideal venues for developing emotional ties to wildlife and fostering an appreciation for the natural world. However, developing and delivering effective educational messages in the free-choice learning environments of zoos and aquariums is a difficult task.

Zoo and aquarium educators are constantly challenged to develop methods for engaging and teaching visitors who often view a trip to the zoo as a social or recreational experience (Morgan and Hodgkinson, 1999). The use of program animals can provide the compelling experience necessary to attract and maintain personal connections with visitors of all motivations, thus preparing them for learning and reflection on their own relationships with nature.

Program animals are powerful catalysts for learning for a variety of reasons. They are generally active, easily viewed, and usually presented in close proximity to the public. These factors have proven to contribute to increasing the length of time that people spend watching animals in zoo exhibits (Bitgood, Patterson and Benefield, 1986, 1988; Wolf and Tymitz, 1981).

In addition, the provocative nature of a handled animal likely plays an important role in captivating a visitor. In two studies (Povey, 2002; Povey and Rios, 2001), visitors viewed animals three and four times longer while they were being presented in demonstrations outside of their enclosure with an educator than while they were on exhibit. Clearly, the use of program animals in shows or informal presentations can be effective in lengthening the potential time period for learning and overall impact.

Program animals also provide the opportunity to personalize the learning experience, tailoring the teaching session to what interests the visitors. Traditional graphics offer little opportunity for this level of personalization of information delivery and are frequently not read by visitors (Churchman, 1985; Johnston, 1998). For example, Povey (2001) found that only 25% of visitors to an animal exhibit read the accompanying graphic; whereas, 45% of visitors watching the same animal handled in an educational presentation asked at least one question and some asked as many as seven questions. Having an animal accompany the educator allowed the visitors to make specific inquiries about topics in which they were interested.

## Knowledge Acquisition

Improving our visitors' knowledge and understanding regarding wildlife and wildlife conservation is a fundamental goal for many zoo educators using program animals. A growing body of evidence supports the validity of using program animals to enhance delivery of these cognitive messages as well.

- MacMillen (1994) found that the use of live animals in a zoomobile outreach program significantly enhanced cognitive learning in a vertebrate classification unit for sixth grade students.
- Sherwood and his colleagues (1989) compared the use of live horseshoe crabs and sea stars to the use of dried specimens in an aquarium education program and demonstrated that students made the greatest cognitive gains when exposed to programs utilizing the live animals.
- Povey and Rios (2002) noted that in response to an open-ended survey question (“Before I saw this animal, I never realized that . . .”), visitors watching a presentation utilizing a program animal provided 69% cognitive responses (i.e., something they learned) versus 9% made by visitors viewing the same animal in its exhibit (who primarily responded with observations).
- Povey (2002) recorded a marked difference in learning between visitors observing animals on exhibit versus being handled during informal presentations. Visitors to demonstrations utilizing a raven and radiated tortoises were able to answer questions correctly at a rate as much as eleven times higher than visitors to the exhibits.

## Enhanced Environmental Attitudes

Program animals have been clearly demonstrated to increase affective learning and attitudinal change.

- Studies by Yerke and Burns (1991) and Davison and her colleagues (1993) evaluated the effect live animal shows had on visitor attitudes. Both found their shows successfully influenced attitudes about conservation and stewardship.
- Yerke and Burns (1993) also evaluated a live bird outreach program presented to Oregon fifth-graders and recorded a significant increase in students' environmental attitudes after the presentations.
- Sherwood and his colleagues (1989) found that students who handled live invertebrates in an education program demonstrated both short and long-term attitudinal changes as compared to those who only had exposure to dried specimens.
- Povey and Rios (2002) examined the role program animals play in helping visitors develop positive feelings about the care and well-being of zoo animals.
- As observed by Wolf and Tymitz (1981), zoo visitors are deeply concerned with the welfare of zoo animals and desire evidence that they receive personalized care.

## Conclusion

Creating positive impressions of aquarium and zoo animals, and wildlife in general, is crucial to the fundamental mission of zoological institutions. Although additional research will help us delve further into this area, the existing research supports the conclusion that program animals are an important tool for conveying both cognitive and affective messages regarding animals and the need to conserve wildlife and wild places.

## Acknowledgements

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## References

- Bitgood, S., Patterson, D., & Benefield, A. (1986). Understanding your visitors: ten factors that influence visitor behavior. *Annual Proceedings of the American Association of Zoological Parks and Aquariums*, 726-743.
- Bitgood, S., Patterson, D., & Benefield, A. (1988). Exhibit design and visitor behavior. *Environment and Behavior*, 20 (4), 474-491.

- Churchman, D. (1985). How and what do recreational visitors learn at zoos? Annual Proceedings of the American Association of Zoological Parks and Aquariums, 160-167.
- Davison, V.M., McMahon, L., Skinner, T.L., Horton, C.M., & Parks, B.J. (1993). Animals as actors: take 2. Annual Proceedings of the American Association of Zoological Parks and Aquariums, 150-155.
- Johnston, R.J. (1998). Exogenous factors and visitor behavior: a regression analysis of exhibit viewing time. *Environment and Behavior*, 30 (3), 322-347.
- MacMillen, Ollie. (1994). Zoomobile effectiveness: sixth graders learning vertebrate classification. Annual Proceedings of the American Association of Zoological Parks and Aquariums, 181-183.
- Morgan, J.M. & Hodgkinson, M. (1999). The motivation and social orientation of visitors attending a contemporary zoological park. *Environment and Behavior*, 31 (2), 227-239.
- Povey, K.D. (2002). Close encounters: the benefits of using education program animals. Annual Proceedings of the Association of Zoos and Aquariums, in press.
- Povey, K.D. & Rios, J. (2002). Using interpretive animals to deliver affective messages in zoos. *Journal of Interpretation Research*, in press.
- Sherwood, K. P., Rallis, S. F. & Stone, J. (1989). Effects of live animals vs. preserved specimens on student learning. *Zoo Biology* 8: 99-104.
- Wolf, R.L. & Tymitz, B.L. (1981). Studying visitor perceptions of zoo environments: a naturalistic view. In Olney, P.J.S. (Ed.), *International Zoo Yearbook* (pp.49-53). Dorchester: The Zoological Society of London.
- Yerke, R. & Burns, A. (1991). Measuring the impact of animal shows on visitor attitudes. Annual Proceedings of the American Association of Zoological Parks and Aquariums, 532-534.
- Yerke, R. & Burns, A. (1993). Evaluation of the educational effectiveness of an animal show outreach program for schools. Annual Proceedings of the American Association of Zoological Parks and Aquariums, 366-368.

## Appendix E: Developing an Institutional Program Animal Policy

*Last revision 2003*

*Re-authorized by the Board June 2011*

### Rationale

Membership in AZA requires that an institution meet the AZA Accreditation Standards collectively developed by our professional colleagues. Standards guide all aspects of an institution's operations; however, the accreditation commission has asserted that ensuring that member institutions demonstrate the highest standards of animal care is a top priority. Another fundamental AZA criterion for membership is that education be affirmed as core to an institution's mission. All accredited public institutions are expected to develop a written education plan and to regularly evaluate program effectiveness.

The inclusion of animals (native, exotic and domestic) in educational presentations, when done correctly, is a powerful tool. CEC's **Program Animal Position Statement** describes the research underpinning the appropriate use of program animals as an important and powerful educational tool that provides a variety of benefits to zoo and aquarium educators seeking to convey cognitive and affective messages about conservation and wildlife.

Ongoing research, such as AZA's Multi-Institutional Research Project (MIRP) and research conducted by individual AZA institutions will help zoo educators to determine whether the use of program animals conveys intended and/or conflicting messages and to modify and improve programs accordingly and to ensure that all program animals have the best possible welfare.

When utilizing program animals our responsibility is to meet both our high standards of animal care and our educational goals. Additionally, as animal management professionals, we must critically address both the species' conservation needs and the welfare of the individual animal. Because "wild creatures differ endlessly," in their forms, needs, behavior, limitations and abilities (Conway, 1995), AZA, through its Animal Welfare Committee, has recently given the responsibility to develop taxon- and species-specific animal welfare standards and guidelines to the Taxon Advisory Groups (TAG) and Species Survival Plan® Program (SSP). Experts within each TAG or SSP, along with their education advisors, are charged with assessing all aspects of the taxons' and/or species' biological and social needs and developing Animal Care Manuals (ACMs) that include specifications concerning their use as program animals.

However, even the most exacting standards cannot address the individual choices faced by each AZA institution. Therefore, each institution is required to develop a program animal policy that articulates and evaluates program benefits. The following recommendations are offered to assist each institution in formulating its own Institutional Program Animal Policy, which incorporates the AZA Program Animal Policy and addresses the following matters.

### The Policy Development Process

Within each institution, key stakeholders should be included in the development of that institution's policy, including, but not limited to representatives from:

- the Education Department
- the Animal Husbandry Department
- the Veterinary and Animal Health Department
- the Conservation & Science Department
- the Behavioral Husbandry Department
- any animal show staff (if in a separate department)
- departments that frequently request special program animal situations (e.g., special events, development, marketing, zoo or aquarium society, administration)

Additionally, staff from all levels of the organization should be involved in this development (e.g., curators, keepers, education managers, interpreters, volunteer coordinators).

To develop a comprehensive Program Animal Policy, we recommend that the following components be included:

### **I. Philosophy**

In general, the position of the AZA is that the use of animals in up close and personal settings, including animal contact, can be extremely positive and powerful, as long as:

1. The use and setting is appropriate.
2. Animal and human welfare is considered at all times.
3. The animal is used in a respectful, safe manner and in a manner that does not misrepresent or degrade the animal.
4. A meaningful conservation message is an integral component. Read the AZA Board-approved Conservation Messages.
5. Suitable species and individual specimens are used.

Institutional program animal policies should include a philosophical statement addressing the above, and should relate the use of program animals to the institution's overall mission statement.

### **II. Appropriate Settings**

The Program Animal Policy should include a listing of all settings both on and off site, where program animal use is permitted. This will clearly vary among institutions. Each institution's policy should include a comprehensive list of settings specific to that institution. Some institutions may have separate policies for each setting; others may address the various settings within the same policy. Examples of settings include:

- I. On-site programming
  - A. Informal and non-registrants:
    1. On-grounds programming with animals being brought out (demonstrations, lectures, parties, special events, and media)
    2. Children's zoos and contact yards
    3. Behind-the-scenes open houses
    4. Shows
    5. Touch pools
  - B. Formal (registration involved) and controlled settings
    1. School group programs
    2. Summer Camps
    3. Overnights
    4. Birthday Parties
    5. Animal rides
    6. Public animal feeding programs
- II. Offsite and Outreach
  1. PR events (TV, radio)
  2. Fundraising events
  3. Field programs involving the public
  4. School visits
  5. Library visits
  6. Nursing Home visits (therapy)
  7. Hospital visits
  8. Senior Centers
  9. Civic Group events

In some cases, policies will differ from setting to setting (e.g., on-site and off-site use with media). These settings should be addressed separately, and should reflect specific animal health issues, assessment of distress in these situations, limitations, and restrictions.

### III. Compliance with Regulations

All AZA institutions housing mammals are regulated by the USDA's Animal Welfare Act. Other federal regulations, such as the Marine Mammal Protection Act, may apply. Additionally, many states, and some cities, have regulations that apply to animal contact situations. Similarly, all accredited institutions are bound by the AZA Code of Professional Ethics. It is expected that the Institution Program Animal Policy address compliance with appropriate regulations and AZA Accreditation Standards.

### IV. Collection Planning

All AZA accredited institutions should have a collection planning process in place. Program animals are part of an institution's overall collection and must be included in the overall collection planning process. The AZA Guide to Accreditation contains specific requirements for the institution collection plan. For more information about collection planning in general, please see the Collection Management pages in the Members Only section.

The following recommendations apply to program animals:

1. Listing of approved program animals (to be periodically amended as collection changes). Justification of each species should be based upon criteria such as:
  - Temperament and suitability for program use
  - Husbandry requirements
  - Husbandry expertise
  - Veterinary issues and concerns
  - Ease and means of acquisition / disposition according to the AZA code of ethics
  - Educational value and intended conservation message
  - Conservation Status
  - Compliance with TAG and SSP guidelines and policies
2. General guidelines as to how each species (and, where necessary, for each individual) will be presented to the public, and in what settings
3. The collection planning section should reference the institution's acquisition and disposition policies.

### V. Conservation Education Message

As noted in the AZA Accreditation Standards, if animal demonstrations are part of an institution's programs, an educational and conservation message must be an integral component. The Program Animal Policy should address the specific messages related to the use of program animals, as well as the need to be cautious about hidden or conflicting messages (e.g., "petting" an animal while stating verbally that it makes a poor pet). This section may include or reference the AZA Conservation Messages.

Although education value and messages should be part of the general collection planning process, this aspect is so critical to the use of program animals that it deserves additional attention. In addition, it is highly recommended to encourage the use of biofacts in addition to or in place of the live animals. Whenever possible, evaluation of the effectiveness of presenting program animals should be built into education programs.

### VI. Human Health and Safety

The safety of our staff and the public is one of the greatest concerns in working with program animals. Although extremely valuable as educational and affective experiences, contact with animals poses certain risks to the handler and the public. Therefore, the human health and safety section of the policy should address:

1. Minimization of the possibility of disease transfer from non-human animals to humans, and vice-versa (e.g., handwashing stations, no touch policies, use of hand sanitizer)
2. Safety issues related to handlers' personal attire and behavior (e.g., discourage or prohibit use of long earrings, perfume and cologne, not eating or drinking around animals, smoking etc.)

AZA's Animal Contact Policy provides guidelines in this area; these guidelines were incorporated into accreditation standards in 1998.

## VII. Animal Health and Welfare

Animal health and welfare are the highest priority of AZA accredited institutions. As a result, the Institutional Program Animal Policy should make a strong statement on the importance of animal welfare. The policy should address:

1. General housing, husbandry, and animal health concerns (e.g. that the housing and husbandry for program animals meets or exceeds general AZA standards and that the physical, social and psychological needs of the individual animal, such as adequate rest periods, provision of enrichment, visual cover, contact with conspecifics as appropriate, etc., are accommodated).
2. Where ever possible provide a choice for animal program participation, e.g., retreat areas for touch tanks or contact yards, evaluation of willingness/readiness to participate by handler, etc.)
3. The empowerment of handlers to make decisions related to animal health and welfare; such as withdrawing animals from a situation if safety or health is in danger of being compromised.
4. Requirements for supervision of contact areas and touch tanks by trained staff and volunteers.
5. Frequent evaluation of human / animal interactions to assess safety, health, welfare, etc.
6. Ensure that the level of health care for the program animals is consistent with that of other animals in the collection.
7. Whenever possible have a “cradle to grave” plan for each program animal to ensure that the animal can be taken care of properly when not used as a program animal anymore.
8. If lengthy “down” times in program animal use occur, staff should ensure that animals accustomed to regular human interactions can still maintain such contact and receive the same level of care when not used in programs.

## VIII. Taxon Specific Protocols

We encourage institutions to provide taxonomically specific protocols, either at the genus or species level, or the specimen, or individual, level. Some taxon-specific guidelines may affect the use of program animals. To develop these, institutions refer to the Conservation Programs Database.

Taxon and species -specific protocols should address:

1. How to remove the individual animal from and return it to its permanent enclosure, including suggestions for operant conditioning training.
2. How to crate and transport animals.
3. Signs of stress, stress factors, distress and discomfort behaviors.

Situation specific handling protocols (e.g., whether or not animal is allowed to be touched by the public, and how to handle in such situations)

1. Guidelines for disinfecting surfaces, transport carriers, enclosures, etc. using environmentally safe chemicals and cleaners where possible.
2. Animal facts and conservation information.
3. Limitations and restrictions regarding ambient temperatures and or weather conditions.
4. Time limitations (including animal rotation and rest periods, as appropriate, duration of time each animal can participate, and restrictions on travel distances).
5. The numbers of trained personnel required to ensure the health and welfare of the animals, handlers and public.
6. The level of training and experience required for handling this species
7. Taxon/species-specific guidelines on animal health.
8. The use of hand lotions by program participants that might touch the animals

## IX. Logistics: Managing the Program

The Institutional Policy should address a number of logistical issues related to program animals, including:

1. Where and how the program animal collection will be housed, including any quarantine and separation for animals used off-site.
2. Procedures for requesting animals, including the approval process and decision making process.
3. Accurate documentation and availability of records, including procedures for documenting animal usage, animal behavior, and any other concerns that arise.

## **X. Staff Training**

Thorough training for all handling staff (keepers, educators, and volunteers, and docents) is clearly critical. Staff training is such a large issue that many institutions may have separate training protocols and procedures. Specific training protocols can be included in the Institutional Program Animal Policy or reference can be made that a separate training protocol exists.

It is recommended that the training section of the policy address:

1. Personnel authorized to handle and present animals.
2. Handling protocol during quarantine.
3. The process for training, qualifying and assessing handlers including who is authorized to train handlers.
4. The frequency of required re-training sessions for handlers.
5. Personnel authorized to train animals and training protocols.
6. The process for addressing substandard performance and noncompliance with established procedures.
7. Medical testing and vaccinations required for handlers (e.g., TB testing, tetanus shots, rabies vaccinations, routine fecal cultures, physical exams, etc.).
8. Training content (e.g., taxonomically specific protocols, natural history, relevant conservation education messages, presentation techniques, interpretive techniques, etc.).
9. Protocols to reduce disease transmission (e.g., zoonotic disease transmission, proper hygiene and hand washing requirements, as noted in AZA's Animal Contact Policy).
10. Procedures for reporting injuries to the animals, handling personnel or public.
11. Visitor management (e.g., ensuring visitors interact appropriately with animals, do not eat or drink around the animal, etc.).

## **XI. Review of Institutional Policies**

All policies should be reviewed regularly. Accountability and ramifications of policy violations should be addressed as well (e.g., retraining, revocation of handling privileges, etc.). Institutional policies should address how frequently the Program Animal Policy will be reviewed and revised, and how accountability will be maintained.

## **XII. TAG and SSP Recommendations**

Following development of taxon-specific recommendations from each TAG and SSP, the institution policy should include a statement regarding compliance with these recommendations. If the institution chooses not to follow these specific recommendations, a brief statement providing rationale is recommended.