

HUSBANDRY GUIDELINES AGREEMENT

I agree to my Husbandry Guidelines being reviewed by the Australasian Society of Zookeepers, and if endorsed by the ASZK, to be posted on their website.

| | |
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| Name (please print) | |
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Witness

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Maintenance Schedule For The Brazilian Tapir

Compiled by Renae Zammit, Taronga Zoo

| | |
|----------------------------|---|
| <u>Weekly</u> | |
| Monday | Check rodent baits. Bi-carbonate feed tubs |
| Tuesday | Sweep out feed storage house |
| Wednesday | Clean drains |
| Thursday | Clean under rubber mats |
| Friday | Hose driveway |
| <u>Monthly</u> | |
| 1st week | Hose plants and grass |
| 2nd week | Clean den with Animal house |
| 3rd week | Gerni pond |

Husbandry Guidelines For



(Brazilian Tapir, Mogo Zoo. Photo by M. Hall)

The Brazilian Tapir

Tapirus terrestris

Mammalia: Tapiridae

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Course Name and Number: Certificate III Captive Animals.

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DISCLAIMER

These husbandry guidelines were produced by the compiler/author at TAFE NSW – Western Sydney Institute, Richmond College, N.S.W. Australia as part assessment for completion of Certificate III in Captive Animals, Course number 1068, RUV30204. Since the husbandry guidelines are the result of student project work, care should be taken in the interpretation of information therein, - in effect, all care taken but no responsibility is assumed for any loss or damage that may result from the use of these guidelines. It is offered to the ASZK Husbandry Manuals Register for the benefit of animal welfare and care. Husbandry guidelines are utility documents and are ‘works in progress’, so enhancements to these guidelines are invited.

OCCUPATIONAL HEALTH AND SAFETY RISKS

Some tapirs are extremely aggressive towards conspecific's and to keepers, while others are easily approached and enjoy being scratched. Tapir behavior can be very unpredictable and caution should always be exercised with such powerful animals. There are numerous records of tapir attacks on keepers that have resulted in serious bite wounds and loss of fingers in some cases ²³.

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1 Introduction

Tapirs, as a group, are relatively easy to maintain and breed in captivity, provided one has a good working knowledge of their biology and behavior. It is this lack of information that is largely responsible for many of the medical and behavioral problems that captive tapirs have experienced.²³

When designing minimum husbandry standards for tapirs one must allow for individual variables in behavior, compatibility, climate and degree of keeper interaction. While there will always be a great deal of variability between holding facilities a list of minimum standards should be used as the foundation for any program of successful and humane tapir management.²³

The Brazilian Tapir is considered Near Threatened (IUCN) and is listed on Appendix II of CITES. The Greatest threats to the Brazilian Tapir are Habitat destruction and poaching. Tapirs are one of the first animals to disappear as their large size, large food intake and slow rate of reproduction makes the tapir very vulnerable to changes in the environment.^{16, 23}

At this time there is no conservation program in place for any of the tapir species. It is very fortunate that tapirs do well in captivity and yet it would be very sad that this is the only place these living fossils could survive.^{16, 23}

Zoos can help prevent the extinction of this group in the wild by educating visitors and by actively participating in international projects that protect and preserve the tapir's natural habitats.^{16, 23}

1.1 ASMP Category

According to the ASMP the Brazilian Tapir is classified at management Level 1a (SMP 2007).

1.2 IUCN Category

The Brazilian Tapir is considered Vulnerable across its entire range. The effects of deforestation, hunting, and competition from domestic livestock have all contributed to population declines and fragmentation in the past. Deforestation is increasing in certain parts of the species' range, while subsistence hunting and a developing wild-meat industry may cause further declines in the future. Further survey work is required for the Brazilian Tapir, although guerrilla activities in certain parts of the range make this difficult (*IUCN Red List of Threatened Species 2007.*)

1.3 EA Category

Not Applicable

1.4 NZ and PNG Categories and Legislation

Not Applicable

1.5 Wild Population Management

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At this time there is no conservation program in place for any of the tapir species. It is very fortunate that tapirs do well in captivity and yet it would be very sad that this is the only place these living fossils could survive.^{16, 23}

Zoos can help prevent the extinction of this group in the wild by educating visitors and by actively participating in international projects that protect and preserve the tapir's natural habitats.^{16, 23}

Active Management Plans may include:

- Set up and support community reserves
- Set up and support private reserves
- Develop and manage buffer zones of protected areas
- Work with rural and sport hunters
- Lowland tapirs must be taken off subsistence lists
- Wild caught animals should not be sold as pets
- Set up agro forestry programs
- Manage timber operation
- Reserve design
- Moratorium on captive breeding (IUCN action plan)

1.6 Species Coordinator

Global Species Coordinator: Rick Barongi, Curator,
San Diego Zoo.
ASMP TAG Contact: Justine Powell,
Taronga Zoo.

1.7 Studbook Holder

Justine Powell,
Taronga Zoo.

2. Taxonomy

2.1 Nomenclature

| | |
|----------------|-------------------|
| Class | Mammalia |
| Order | Perissodactyla |
| Family | Tapiridae |
| Genus | <i>Tapirus</i> |
| Species | <i>terrestris</i> |

2.2 Subspecies

There are four species of Tapir in the Tapiridae family.^{2,4}

- The Brazilian Tapir (*Tapirus terrestris*),
- The Malayan Tapir (*Tapirus indicus*),
- The Baird's Tapir (*Tapirus bairdii*) and
- The Mountain Tapir (*Tapirus roulini*).

In Ecuador the Brazilian Tapir has the largest distribution including four sub species.¹

- *Tapirus terrestris aenigmaticus*
- *Tapirus terrestris terrestris*
- *Tapirus terrestris colombianus*
- *Tapirus terrestris spegazzinii*

2.3 Recent Synonyms

The Brazilian Tapir is also known as the South American, Common or Lowland Tapir.^{2,4} The Scientific name *Tapirus terrestris* remains the same for all common names.

2.4 Other Common Names

The Brazilian Tapir is also known as the Lowland, South American or Common Tapir.^{2,4}

3. Natural History

The Brazilian Tapir is the largest natural herbivore that occurs throughout South America.³ Habitat association varies extensively, although the most important habitats tend to be moist, wet or seasonally inundated areas.⁵

The Brazilian Tapir is considered Vulnerable across its entire range. The effects of deforestation, hunting and competition from domestic livestock have all contributed to population declines and fragmentation in the past. Deforestation is increasing in certain parts of the species' range, while subsistence hunting and a developing wild-meat industry may cause further declines in the future⁹.

The Brazilian Tapir plays a key role in ecological processes by recycling nutrients and dispersing seeds from the plants they eat throughout the rainforests and also providing footpaths for other animals to use throughout the forests.⁸

3.1 Morphometrics

3.1.1 Mass And Basic Body Measurements

Adults weights and measurements: ^{4, 8, 10}

| | |
|-------------|--|
| Body Length | 1.8m – 2.5m |
| Tail Length | 5cm – 10cm |
| Height | 77cm – 108cm |
| Weight | 160kg – 250kg for females; 180kg – 295kf for males |

3.1.2 Sexual Dimorphism

Females tend to be larger than males, but there is no evident sexual dimorphism.¹⁰

3.1.3 Distinguishing Features

Brazilian Tapir's have a long flexible proboscis which is used for foraging in the forest and gives Tapir's a good sense of smell.^{4, 8, 11}

This bristly-coated tapir varies in colour from dark brown to grayish-brown, with a dark underside and legs, and lighter cheeks, throat and ear tips. Newborn Tapirs have a dark brown coat with white spots and stripes, which provide good camouflage.^{8, 11}

A prominent, erect mane sits on top of the crest and extends from the forehead to the shoulders. The crest running from the top of the head down the back of the neck is much more pronounced than in other tapir species, giving it a stockier appearance.⁸

Being a part of the Perissodactyla order, the Brazilian Tapir has four toes on the front hooves and three toes on the back hooves.¹¹

3.2 Distribution and Habitat

The Brazilian Tapir occurs throughout South America in countries such as Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname and Venezuela.⁹



Figure 1. Distribution Map of the Brazilian Tapir (*Tapirus terrestris*).¹⁷

The Distribution of the Brazilian Tapir in these ranges is scattered. This poses a problem to natural breeding of the animal as the crossover ranges does not occur as frequently as it did 20 years ago due to habitat destruction.

3.3 Conservation Status

The Brazilian Tapir is considered Vulnerable (VU) Appendix II across its entire range. The effects of habitat destruction, hunting and competition from domestic livestock have all contributed to population declines.⁹

The Brazilian Tapir is at a Lower Risk- near threatened (LR/nt) category of threat and according to the IUCN is a Red List Category although further survey work is required.⁹

The Tapir Taxon Advisory Group (TAG) was approved by the American Association of Zoological Parks and Aquariums (AAZPA) in 1991. Members often work in situ and ex situ conservation efforts. The goal of the TAG and its international counterparts is to assist in the evaluation of both captive and wild status of the family in order to develop a list of priorities.^{9,23}

Zoos can help prevent the extinction of this group in the wild by educating visitors and by actively participating in international projects that protect and preserve the Tapir's natural habitats.¹⁷

3.4 Longevity

3.3.1 In the Wild

The Brazilian Tapir has a life span of approximately 25-30 years in the wild.¹⁹

3.3.2 In Captivity

The Brazilian Tapir has a life span of approximately 30-35 years in captivity.¹⁵ Maximum longevity has been recorded at 37.4 years.¹⁶

3.3.3 Techniques Used to Determine Age in Adults

There is no determining factor of the rate of aging in adult Brazilian Tapirs.¹⁶

4. Housing Requirements

4.1 Exhibit/Enclosure Design

Tapirs require both indoor and outdoor accommodation. It is recommended that enclosures have a holding area that allows keepers to safely enter the enclosures for daily maintenance and to permit the veterinary treatment of the animals if necessary. Tapirs are forest animals and need access to shade throughout the year. They also require a bathing pool.^{4, 18}

Containment barriers may be dry moats, chain-link fencing, stockade fencing or concrete. Slanted or vertical moats are most suitable for public viewing and need to be 2 m deep and 2 m wide or have a 1.2 slope to the vertical outer wall. At least 25% of an outdoor exhibit should be shaded from the sun at any one time of the day. A hard-packed soil or grass substrate is required and tapirs should not be kept on a concrete surface throughout the day for long periods of time.^{16, 23}

4.2 Holding Area Design

It is recommended that each Tapir have an (indoor) holding area. This allows keepers to enter enclosures safely to clean and allows the animals to be separated for any veterinary treatment that may be necessary or any behavioral problems that may occur with the animal.^{18, 23}

Sliding gates should be installed so they can be used without the keeper entering the holding area. Hard or synthetic floor surfaces should not have a rough finish, which might abrade the feet. Concrete should be avoided or covered with a good depth of bark. Rubberised floors indoors are ideal.¹⁸

If the animal is to be kept indoors for a period of time then artificial lighting must be provided for day and night cycles so that the tapir may behave naturally. Lighting must also be adequate for keepers to safely maintain the area.^{4, 18}

Fresh air ventilation must be provided in the housing area to prevent the buildup of noxious gasses¹⁸

4.3 Spatial Requirements

According to the Exhibited Animals protection Act, 1986, the outdoor enclosure for two Tapirs must be 150sqm^{4, 16, 17} and an extra 10sqm for any additional animal.^{4, 16, 18} Indoor areas should have a minimum floor space of 15sqm per animal with a wall height of 2m high with no spaces larger than 10cm.^{4, 16, 23}

There should always be enough space allowed for chasing behavior to be expressed during the breeding season, and when animals are first introduced to each other.^{1, 18}

4.4 Position of Enclosures

Enclosures must be positioned so that any excess water may be removed. Open drains, unless carrying surface water should be outside the enclosure to prevent injury to the Tapir.¹⁸

4.5 Weather Protection

The Brazilian Tapir requires access to shade throughout the year as it is a forest animal.^{4, 18} Zoos with a hotter climate require more shade than zoos with a colder climate; this can be achieved by planting solid trees, providing shade cloths or by providing the Tapir with a horse loose box.¹⁸

The Brazilian Tapir requires access to indoor housing in colder months.⁴

4.6 Temperature Requirements

In warmer months in particular, the Brazilian Tapir requires adequate shade and a bathing pool.²⁰

Indoor housing is required to protect the Tapir particularly in colder climates. It is recommended that indoor housing should be kept between 18 degrees Celsius and 30 degrees Celsius, with humidity levels above 50%, unless an indoor pool is provided.^{s.} At Taronga Zoo, the Tapir dens have a fan heater. When the temperature drops below 18 degrees Celsius a thermostat turns the heater on bringing it up to around 21 degrees celcius.¹⁶

Humidity is not controlled at the exhibits at Taronga Zoo.¹⁶

4.7 Substrate

The substrate for the Brazilian tapir enclosure should consist of hard packed dirt and grass or mulched areas.^{4, 16, 19} Sawdust is not recommended, especially if there is a newborn as the tapir may swallow it, causing digestive problems.^{16, 23}

Hard or synthetic floor surfaces should not have a rough finish which might abrade the feet. Concrete should be avoided or covered with a good depth of bark. Rubberised floors indoors are ideal.¹⁸

In colder climates straw should be placed in the holding area, not only for bedding but to also protect the Tapirs feet.¹⁸

All indoor holding areas should be cleaned and disinfected daily. Animals should be transferred to an adjacent pen during cleaning.²

4.8 Nestboxes and/or Bedding Material

Tapirs require dry absorbent bedding material, such as straw; that is not attractive to eat.^{4, 18}

4.9 Enclosure Furnishings

The exhibit furnishings for the Tapir can range from a few logs, large pebbles and many plants.¹⁶

Besides adequate shade and shelter from the elements, The Brazilian Tapir also requires a pool in the exhibit for bathing and wallowing. The pool not only fulfills behavioral requirements, but for the health of the animal as well. Tapirs frequently defecate in pools, therefore the pools needs to have the capability of being drained and refilled daily. Depriving the Brazilian Tapir of this activity could increase the risk of rectal prolapse, which is common for this animal in captivity.⁴

5. General Husbandry

5.1 Hygiene and Cleaning

Each day the Brazilian Tapir enclosure should be cleaned by removing all faeces, food debris, litter and any foreign objects that may cause harm to the animal. It is recommended that the pool be emptied and refilled each day to encourage behaviors in the wild.^{16, 19}

While the enclosure is being maintained, the animal should be removed from the exhibit into a holding area. Ideally this can be done indoors by coaxing the animal indoors with food rewards and for behavioral reasons the animals should be conditioned to do this.²¹

Indoor enclosures should be built with materials that can be easily cleaned and disinfected. The indoor enclosure should not be entered whilst the Tapir is held inside. The bedding provided should be changed every day or two depending on how soiled the animal has made it and fresh water indoors is required also.²¹

TARONGA ZOO DAILY ROUTINE¹⁶

7:00am

- Lock tapir in den
- Feed Tapir ½ loaf of bread and dairy cubes in den
- Let moat down
- Rake up and dispose of old food
- Weed yard
- Hose out moat
- Close valves for moat
- Start filling up moat with recycled water
- Put sprinklers on around the exhibit to water the plants

8:50am

- Turn sprinklers off
- Turn recycled water off and if needed fill with fresh water
- Put lucerne chaff and the rest of the bread in a container and place in exhibit behind tussock.
- Put any browse up in exhibit
- Let Tapir out on exhibit
- Refill the fresh water container for the Tapir on exhibit
- Hose den and containers and service area

TARONGA ZOO WEEKLY ROUTINE¹⁶

Monday

- Bleach moat and dens and containers and hose off completely
- Hose driveway

ENCLOSURE MAINTAINENCE¹⁶

The maintenance of the Tapir exhibit is quite simple.

- Every six months substrate should be topped up.
- Weeding is done on a daily basis, and plantings are occurring at all times.
- When possible, leaf litter is collected to not only add character to an exhibit but to add softness to the ground.
- The gates and locks need to be graphited regularly.

5.2 Record Keeping

Records of the animal's history must be kept, along with stud information for breeding purposes amongst other zoos.¹⁹

All daily activities must be recorded including any behavioral problems, which occur with the animal, any veterinary treatments given and so on. Because Tapirs often get skin lesions and eye problems, for further research it would be ideal to maintain records so that contributing factors can be assessed adequately.⁴

5.3 Methods of Identification

Since individual tapirs differ little in appearance, animals of the same sex are often difficult to identify. Some have distinguishing marks, such as torn ears or white patches on legs or chest, a more reliable means of identification is desirable. Ear tags are easily ripped out by other tapirs so ear notches are a better choice. A tattoo can be placed on the left inner thigh is also a good method of identification.^{16, 23}

The best method of identification is using a transponder (coded microchip) placed under the skin behind the left ear. Transponders are already in use internationally and are known to work well.^{16, 23}

In the wild, the main method of identifying the Brazilian Tapir is through radio collar.

5.4 Routine Data Collection

All day-to-day activity should be recorded and entered into ARKS. Any abnormal behavior, signs of illness, signs of breeding etc should be entered into a daily report that is reviewed by the veterinarian on a daily basis.

Routine data collection may include:

- Weights of animals
- Any Physical examinations or routine medical treatments done
- Any training or behavioural activities
- Enrichment items given and/or response to this stimuli
- Feeding schedules, if all food was eaten etc.
- Maintenance of enclosures and holding areas

Data collection is important to piece together information about a single animal or tapirs as a group.

6 Feeding Requirements

Tapirs are generalist non-ruminant herbivores that select from various parts of plants including leaves fruits and tubers. Tapirs consume multiple small meals throughout their active periods, a behavior that is, in part, a function of their limited stomach capacity when compared to the ruminant stomach, present in most artiodactylids. As a hindgut fermenter, the tapir's gastrointestinal tract is very similar to that of the horse.⁴

6.1 *Diet in the Wild*

The Brazilian Tapir is both a browser and a grazer, feeding on grasses, aquatic vegetation, leaves, buds, soft twigs and fruits of low growing shrubs.^{16, 22}

As a herbivore, Brazilian Tapirs feed by browsing and grazing on leaves, fruits, buds and shoots and small branches that it tears from trees, grasses and water plants.²²

6.2 *Captive Diet*

Note: Cabbage causes colic.⁷ Refer to Chapter 8.4 Known Health Problems.

Note: Tapirs in captivity have a history of rectal prolapse. Excessive amounts of commercial produce may contribute although the direct cause has yet to be determined.⁹ Wheat bran and greens can help constipation.^{16, 31} Refer to Chapter 8.4 Known Health Problems.

The recommended daily food intake for a mature adult tapir should approximately 4% to 5% of the animal's total body weight. In zoos recommended diets consist of a mixture of alfalfa hay or browse (38%), commercial pelleted feeds (12%) protein feed (20%) and fresh produce such as apples, carrots, yams, potatoes and lettuce (30%).^{4, 7, 22}

Bananas are a favorite of all tapirs, they should only be offered as treats or the animals will not accept other food items. Food should never be placed on soil or sand in the enclosure but offered in separate containers on a cement surface feeding pad to prevent parasite ingestion and possible impaction from soil or sand consumption.^{4, 22} Refer to Chapter 9.7 Behavioral Enrichment.

Pregnant or lactating females and calves require a slightly higher intake of food.²² Refer to Chapter 10.11 Breeding Diet.

All tapirs are dependent on water and should have clean water available to them at all times for drinking. Although they will usually drink from pools, when available, water tubs, automatic waterers and exhibit pools are all suitable for providing a source of fresh water. Tubs or waterers should be secured to prevent tipping/emptying. Water tubs or automatic waterers should be properly positioned and easily accessible to

tapirs of all ages. Tubs and waterers should be cleaned and sanitized daily to ensure the availability of clean drinking water at all times. Multiple water sources may be necessary to ensure that all tapirs and other exhibit species have access to water at all times.⁴

6.3 Supplements

In the wild, Tapir's regularly visit natural salt licks.³ In Captivity a mineral block (horse salt and mineral block containing salt, copper, biotin and Vitamin E) is available at all times.^{7, 16}

Once a week 1/2 a packet of bran with molasses made into mash is provided. This has been given to prevent colic.

6.4 Presentation of Food

Every day at Taronga Zoo, the Keepers prepare the food for the following day.^{7, 16}

Fresh fruit and vegetables should be cut up into bite sized pieces and fed in bowls or troughs or scattered on concrete or rock platforms at various times of the day.^{2, 7, 16}

Browse and Hay scattered around the exhibit floor or hung from bungee rope will encourage natural browsing and grazing behaviours of tapir's.

Banana's, and other high moisture fruits are favoured food items²³ and should be used as rewards or positive reinforcement when training or conditioning Tapir's (e.g. Crate training, conditioning for physical examination).⁹ Refer to Chapter 7.3 and 7.4.

For more information on Presentation of Food refer to Chapter 9.7 Behavioural Enrichment for food enrichment ideas.

7 Handling and Transport

7.1 *Timing of Capture and Handling*

Prior to transportation it is ideal to properly crate train the animal. Crate training does not mean setting up the crate so you can trap the Tapir inside the first time it enters the crate. Several Tapirs have died in shipping crates when not properly acclimated.⁴

Crate training may take weeks or months for the tapir to be completely comfortable in the crate. Even then, with the different temperaments of individual tapir's, some animals will never be completely calm inside a crate. If this is the case then a light sedation administered by the veterinarian may be required prior to shipment.^{1 4} Refer to chapter 7.3 for more information.

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. Only after the tapir can be locked inside the crate for several hours with people and machines moving around should it be shipped.⁴

Tapir calves should not be shipped before the age of six months and should be completely separated from their mother at least one week prior to shipment.⁴

The Animal must be captured and transported at the coolest part of the day.²⁷

7.2 *Catching Bags*

Not Applicable

7.3 Capture and Restraint Techniques

Physical Restraint – Forced Physical restraint is impractical.²⁷ Many Tapirs can become habituated to being scratched and touched. Some tapir's may even be conditioned to allow physical examination whilst they are lying down, although the temperaments of tapir's can vary greatly between individuals. Keepers should exercise caution when working with a tapir that is being “scratched down” as they are capable of inflicting serious injury with their teeth.⁴

Mechanical Restraint - If the tapir is not habituated or trained to lie down for physical examination then mechanical restraint may be required. The easiest way to do this is by conditioning the animal to enter a cattle crush or runway or by crate training the animal. Training may involve several weeks or months of giving the tapir access to the shipping crate or cattle crush. The tapir should never be trapped inside the first time it enters a cattle crush or shipping crate.⁴

Tapirs can also be gently herded with brooms or boards into crushes and crates for treatment and injection.²⁷

Chemical Restraint – Chemical restraint is usually used in order to perform clinical or surgical procedures, transport animals or conduct research in the wild.²⁷

Proper crate training should reduce the need for chemical restraint, although some tapir's will never be completely comfortable in a crate. For extremely hyperactive animals, it may be necessary to lightly sedate the animal prior to shipment but this should only be done in the presence of an experienced veterinarian who is familiar with the drug and dosages for tapirs.⁴

7.4 Weighing and Examination

Detailed physical examinations can be accomplished with the animal standing or gently rubbed down and put in an almost hypnotic state. Foot trims, detailed examinations, TB testing, radiographs and venipuncture can be performed if the animals are trained or habituated to these procedures. Tapirs are generally rubbed along the sides or on the back with a comb or gloved hand, which causes them to lay down.⁴

Cattle scales in a raceway are ideal for weighing and examining tapir's. Conditioning the tapir to become comfortable on the scales will be required. Refer to chapter 7.3 Mechanical restraint.

7.5 Release

If tapir's are removed from another tapir for a long period of time, another introduction will have to be carried out to prevent any injuries to either of the tapirs. It would be decided on the day whether it was safe to reintroduce.¹⁶

7.6 Transport Requirements

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.⁴

To facilitate the safe transport of tapirs it is strongly recommended that:

1. All Tapir holding areas should be connected to a transfer alley that allows for safe and easy transfer of the animal from its stall to a crate or transport trailer
2. Tapirs should not be immobilized for shipments but should be properly crate trained prior to the anticipated date of transfer. This involves giving the Tapir free access to the transfer alley and shipping crate several weeks (longer if possible) before the scheduled shipment day.
3. Tapir crates should be large enough for the animal to stand up and lie down and meet all standards set by IATA (International Air Traffic Association)
4. Crates should have removable guillotine doors at both ends
5. 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.⁴

For air transport, Container Requirement 73 of the IATA Live Animals Regulations should be followed²⁸. Refer to Chapter 7.6.1 Box design for more information.

If the Tapir is not going on an airplane, but by land transport, then a horse or livestock trailer works well.

Because capture and transport are among the most stressful events in an animal's life, ambient noise during transport should be minimized. Most tapirs tend to lie down during transport and may 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.⁴

7.6.1 Box Design

Tapir crates should be large enough for the animal to stand up and lie down but not wide enough to encourage the animal to turn around. The crate should be constructed of one-inch solid wood or metal parts, bolted or screwed together. Metal bracing must be present around the whole container and the interior must be completely smooth and free of potential hazards to the animal. Crates should have numerous ventilation holes with a maximum diameter of 2" along the top and above eye level. Food and water containers must be provided with outside access. Tapir crates should have removable guillotine doors at both ends.⁴

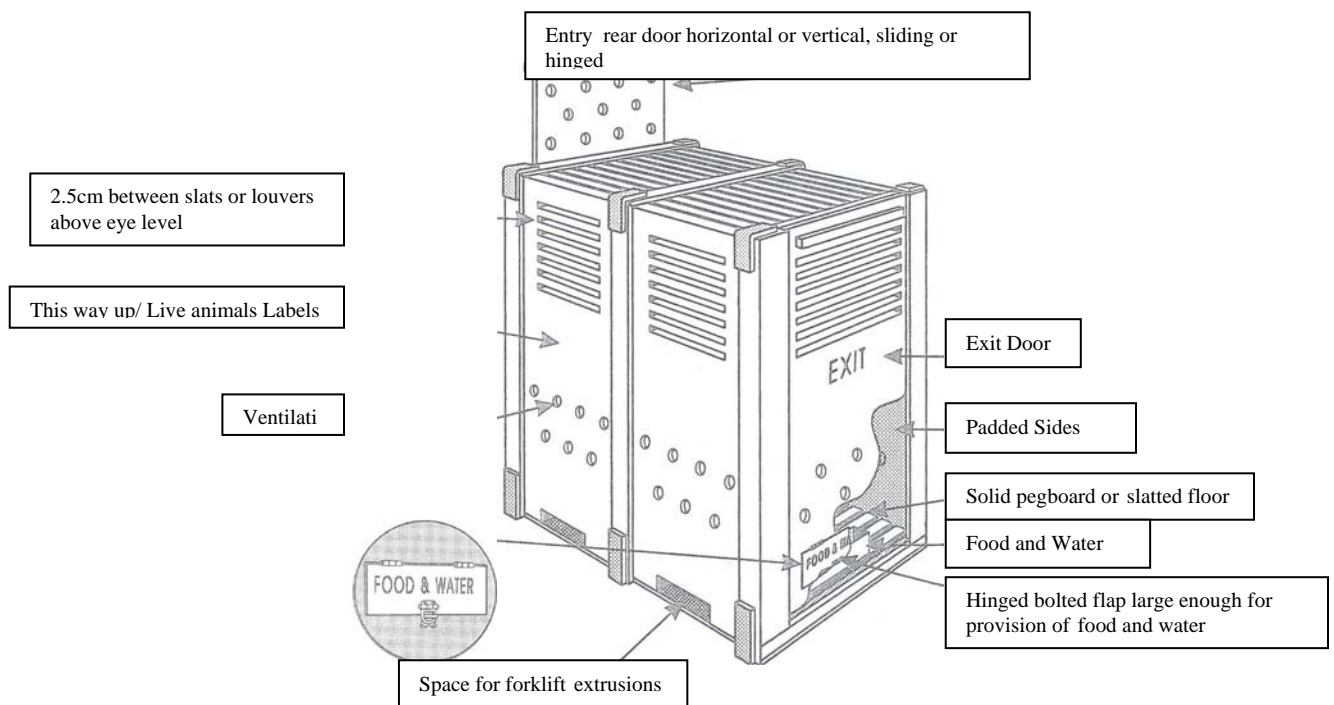


Figure 1. Example of IATA Container (requirement 73).

As shown in Figure 1, IATA states that container construction must meet the following principles of design:

Materials – Wood or metal and rubber, burlap or canvas for padding and light reduction if required.

Dimension – The height and width of the container must allow the animal to stand erect with its head extended. The size of the container must sufficiently restrict movement so that the animal cannot turn around and in so doing trap or injure itself, nor have the space to kick and damage the container.

Frame – Must be made of a minimum of 2.5cm (1 in) solid wood or metal parts, bolted and screwed together. When the weight of the container plus animal exceeds 60kg, additional metal bracing must be present around the whole container.

Sides – Suitable plywood or similar material must closely line the frame to a level slightly above the animals eye over which there must be a louvered or slatted area for ventilation extending to the roof. The interior must be completely smooth.

Floor – The base must be solid and leak-proof, there must be either pegboard or slats bolted to the solid base to give a firm foothold. A droppings tray must be provided under the peg-board or slats to prevent excreta escaping.

Roof – Must be slatted at a width that horns cannot become trapped between the slats. If padding is required, soft material such as shavings can be stuffed under the rubber, canvas or burlap covering.

Doors – Hinged or sliding entry and exit doors must be provided, they must be fastened in such a way that they cannot be accidentally opened. They must have similar ventilation openings as on the sides.

Ventilation – Ventilation louvers or slots, with 2.5cm (1 in) spacing between louvers/slats or holes, with a minimum diameter of 2.5 cm (1 in), must be present, above eye level, on all four sides and the roof of close-boarded containers. Slots and holes must be covered with a fine wire mesh that will not allow any part of the animal, including horns, to protrude.

If the mesh is on the inside of the container all edges must be protected to prevent injury.

Spacer Bars/Handles – Must be made to a depth of 2.5 cm (1 in), and formed from the framework of the container.

Feed and Water Containers – Food and water containers must be provided with outside access from a hinged bolted flap that must be large enough for the entry of a large water dish and/or quantities of appropriate food such as grass hay, roots etc. Refer to Chapter 7.6.3 for more information on Water and Food.

Forklift Extrusions – Must be provided if the total weight of the container plus the animal exceeds 60kg.

If the Tapir is traveling by Land Transport stalls or crates should be darkened in order to reduce the effects of visual stimuli. 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) are likely to be excitable or even 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.⁴

7.6.2 Furnishings

The container should be made to IATA standards as outlined in Chapter 7.6.1 Box Design.

If the trailer floor does not have rubber matting, bedding or other substrate should be provided in either a trailer stall or crate in order to protect the tapir's feet, to provide traction for the animal and also due to the fact that tapir's tend to lay down during transport.⁴

7.6.3 Water and Food

As IATA outlined in Chapter 7.6.1, food and water container must be provided with outside access from a hinged bolted flap that must be large enough for the entry of a large water dish and/or quantities of appropriate food.

On long trips, fresh grass and drinking water should be offered regularly, and water sprayed periodically.²⁷

7.6.4 Animals per Box

Tapirs should be housed one animal per box during the time of transportation.²⁷

7.6.5 Timing of Transportation

Tapir's must be captured and transported at the coolest part of the day²⁷, preferably at night.²⁸ Transport of tapirs in hot temperature extremes is not recommended as it poses a risk to the animal. General upper temperatures permitted for shipment by airlines for live animals are 29° C. It must 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. warmer and that transports should probably not be undertaken at prolonged

ambient temperatures above 32° C²⁷.

7.6.6 Release from Box

Refer to Chapter 7.5 Release if the animal is to be housed with another Tapir.

To release a Tapir from the shipping crate:

- Open the door, and wait for the animal to leave on its own.²⁸
- Put food outside the door; without food in the crate, the animal will most likely go out without strong stimuli.²⁸
- Begin monitoring the animal.

8 Health Requirements

Tapirs generally have few health problems. The most common health problems that occur in captive tapirs are ulcerations and infections of the foot, respiratory diseases, rectal prolapse, eye and skin problems, mandibular 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.²¹

8.1 Daily Health Checks

Observations are generally undertaken during cleaning and feeding each morning and include:

- The Locomotion of the animal - do they appear to be moving freely, signs of limping and bad locomotion are signs of bad nutrition¹. Ulcerations and infections of the foot are common.⁴
- Is the Tapir feeding well? - Is it responsive to fresh food? How much food has it left from the previous night?
- Are the eyes clear and fully open? - Tapirs are prone to degenerations such as corneal opacity and abnormal corneal pigmentations.¹
- General Appearance- No skin lesions or dermatitis visible, the Brazilian Tapir varies in colour from dark brown to a grayish-brown, no skin sloughing, the proboscis is moving freely, feet are free from ulcerations and the webs between the toes are free from lesions.
- Discharges- make sure there are no nasal discharges from the proboscis, no ocular or cloacal discharges noted.
- Consistency of faecal material- Tapirs generally defecate in pools if provided². Faecal matter should not appear sloppy or contain blood; faeces should appear green and leafy.

8.2 Detailed Physical Examination

8.2.1 Chemical Restraint

Chemical restraint is usually used in order to perform clinical or surgical procedures, transport animals or conduct research in the wild.²⁷

Good conditioning techniques can habituate good-tempered Tapirs to being touched and scratched. Some Tapirs will even lie down, allowing physical examination and blood collection. Keepers should exercise caution when working with any tapir, as they are capable of inflicting serious injury with their teeth.⁴

Chemical restraint should only be used in instances of serious injury or aggressive animals and preferably during the milder parts of the day. An experienced Veterinarian who is familiar with the drugs and dosages for Tapirs should carry out immobilization.^{1,4}

The most common way to chemically restrain Tapirs is through the use of etorphine. Other anesthetic include a mixed opioid agonist (butorphenol) and an alpha-2 drenergic agonist works well in tapirs under a variety of circumstances. Good relaxation occurs after about 10 minutes. Intravenous Ketamine can be given if necessary for further restraint. Alpha-2 and narcotic antagonists readily reverse the effects.¹

Refer to the Appendix for further information on immobilization protocols and MSDS.

8.2.2 Physical Examination

Detailed physical examinations can be accomplished with the animal standing or gently rubbed down and put in an almost hypnotic state. Tapirs are generally rubbed along the sides or on the back with a comb or gloved hand, which causes them to lay down.⁴

Physical examinations may include;

- An actual or estimated body weight. Refer to Chapter 7.4 Weighing and Examination.
- Foot trims.
- Detailed inspection of oral, optical and foot pad areas.
- Tuberculosis testing; a tuberculin test should be carried out days prior to an animal entering an enclosure, 30-90 days before arrival into a zoo or during the quarantine period.
- Radiographs and;
- Venipuncture.

These can be performed if the animals are trained or habituated to these procedures.^{1,4} If there is more than one animal, it is important that a permanent method of

identification (microchip, tattoo etc) is used to identify each Tapir correctly.²¹ Refer to Chapter 5.3 Methods of Identification.

8.3 Routine Treatments

Should include:

Blood Collection: A complete blood count (CBC) should be done and all samples should be labeled with species, studbook #, age, sex and date collected.²¹

Faecal Analysis: A faecal float should be done at least every two years to screen for intestinal parasites.¹

TB Testing: A tuberculin test should be carried out days prior to an animal entering an enclosure, 30 – 90 days before arrival into a zoo or during the quarantine period.¹ Refer to Chapter 8.4 Known Health Problems.

Vaccinations: Vaccinations are indicated regionally for tetanus, other clostridial diseases or equine encephalitis. 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 available, the only prevention of EMC is good hygiene, feeding practices and pest control.⁴

8.4 Known Health Problems

Bacterial Diseases

Salmonella sp.

Cause: Generally Poor Hygiene.²⁹

Signs: Diarrhea, causing potentially fatal dehydration, extreme pallor, pneumonia and anorexia.

Prevention: Keep enclosures, holding areas, feeding and watering areas clean. Keepers must practice good hygiene.

Treatment: The treatment of *Salmonella* infections in captive animals is frequently unrewarding. Aggressive fluid therapy is essential, but the size and intractable nature of many tapirs make the delivery of antibiotics and adequate volumes of fluids difficult.²⁹

Enteritis

Cause: *Salmonella spp.* and other strains of bacteria due to poor husbandry, contaminated food or water, fly infested environments.

Signs: Diarrhea, causing severe dehydration, extreme pallor, anorexia and recumbency.

Prevention: Keep enclosures, holding areas, feeding and watering areas clean. Keepers must practice good hygiene.

Treatment: Aggressive fluid therapy is essential, but the size and intractable nature

of many tapirs make the delivery of antibiotics and adequate volumes of fluids difficult.²⁹

Lumpy Jaw (mandibular abscessation)

- Cause: Is thought to occur when coarse feeds cause minor oral lacerations, which allow entry to a variety of bacterial mycotic organisms.^{16, 31}
- Signs: May be noticed when the Tapir is starting to drool.^{16, 31}
- Prevention: Chopping or soaking hay and other food, avoiding poor stemmy hay.^{16, 31}
- Treatment: IV therapy with 20% sodium iodine, three 15mL treatments at 10-day intervals.^{29, 31}

Respiratory Disease (Pneumonia)

- Cause: Environmental stressors (such as change in weather), Stressors such as weaning, dusty environment or contact with other infected animals.
- Signs: Shortness of breath or coughing, nasal discharge, raised temperature, lethargy, pallor, usually preceded by bronchitis.
- Prevention: Reduce stressors, dust in feed and bedding, feeding at ground level to encourage lung drainage.
- Treatment: Antibiotic therapy.³⁰

Tuberculosis (*Mycobacterium tuberculosis* complex)

- Cause: Contracted in a variety of ways and affects many organs of the body; inhalation of the bacilli via infected droplets (i.e. sneezing, coughing etc.) or by ingesting contaminated food or water.
- Signs: TB lesions may not always be seen; so clinical signs are not reliable for diagnosis. Emaciation, lethargy, weakness and death
- Prevention: A tuberculin test should be carried out days prior to an animal entering an enclosure, 30 – 90 days before arrival into a zoo or during the quarantine period.¹ The following is recommended; Flush 20 ml sterile saline in one nostril, collecting the rinse by gravity or aspiration, in a collection vial. Request with speciation a mycobacterial culture. Veterinarians from recipient and shipping institution should determine whether it is necessary to wait for culture results prior to shipment. (May depend on factors such as group history and quarantine capability at recipient institution). Option: 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.⁴
- Treatment: Since the treatment of tuberculosis in animals is controversial and of uncertain practical value, it is essential when considering the health of the rest of the population and of other species in the zoo, to take prophylactic measures to prevent the disease.³¹ Generally there are three approaches to control tuberculosis:

- Euthanasia (the only way of ensuring the eradication of the disease)
- Separate the animal from all others, or
- Treat with drugs (although this is discouraged due to exposure of humans to animals being treated, possible development of drug resistant strains, and the expense to producers).³³

Fungal Diseases

Vesicular Skin Disease

Cause: Unknown.^{4, 29}

Signs: Blistering and superficial skin sloughing of the dorsal midline.^{4, 29} In some cases the animal is weak in the rear limbs and may collapse when attempting to walk.²¹

Prevention: Unknown.

Treatment: 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.⁴

Protozoal Diseases

Intraerythrocytic *Babesia sp.*

Cause: Innoculation by a vector (i.e. Tick)

Signs: Antemortem signs of jaundice.

Prevention: Anti tick treatments. Refer to Ectoparasites; Ticks.

Treatment: A suggested treatment for clinical infections is pyriminidyl bromide, 3.0g and diminazene aceturate, 6.0g.²⁹

Endoparasites

Ascarids (Roundworm)

Cause: Ingestion of contaminated hay or water.

Signs: Visually seen in faeces,

Prevention: Equine De-wormers, regular faecal analysis and regular cleaning of enclosures and holding areas.

Treatment: The use of equine de-wormers. See Appendix.

Capillarids

Cause: Commonly infects rodents. Ingestion of eggs in contaminated hay or water.

Signs: Anorexia, loss of appetite, diarrhea.

Prevention: Equine de-wormers, regular faecal analysis, regular cleaning of enclosures and holding areas, rodent control.

Treatment: The use of equine de-wormers. See Appendix.

Hookworm

Cause: Ingestion of larvae through contaminated hay or water or larvae enters the bloodstream through the skin.

Signs: Anemia, pallor, intermittent diarrhea.

Prevention: Equine De-wormers, regular faecal analysis and regular cleaning of enclosures and holding areas.

Treatment: The use of equine de-wormers. See Appendix.

Tapeworm

Cause: Ingestion of tapeworm eggs or larvae.

Signs: Not generally any clinical signs. Visual signs such as worms in the animal's faeces may be present. Associated with different types of colic.

Prevention: Equine De-wormers, regular faecal analysis and regular cleaning of enclosures and holding areas.

Treatment: The use of equine de-wormers. See Appendix.

Ectoparasites

Ticks

Cause: Can be picked up if the enclosure is overgrown, or other infected animals have been in contact with animals or enclosures.
Ticks are seldom of pathogenic concern significance by themselves. The major veterinary concern is their role as vectors for hemoparasites and other pathogens of domestic animals.²⁹

Signs: Usually gather in the tail folds, around the ears and eyes and around the genitals. Anemia.

Prevention: Anti-tick treatment. See Appendix. Regular maintenance of enclosures (i.e. mowing grass if it grows too long)

Treatment: The use of 1.0 and 0.5% flumethrin pour-on has proved successful for the treatment of black rhinoceroses. It is assumed that similar therapies are as effective and safe in the Tapir.²⁹

Sarcoptic Mange (Scabies)

Cause: Sarcoptic mange mites.

Signs: Dermatitis usually seen on the elbows, hocks, abdomen, and chest; Scaling and crusting of the skin (particularly the ears), enlarged lymph nodes due to rubbing and scratching.

Prevention: Quick identification and treatment to prevent further outbreak.

Treatment: Apply insecticidal cream or lotion.

Biting Flies

- Cause: Usually occurring in warmer months such as summer.²⁹
- Signs: Lesions or hairless patches, usually around ears.²⁹
- Prevention: The use of tropical insect repellants/ preparations such as repellex. See Appendix.
- Treatment: Spray repellex onto affected area.

Viral Diseases

Equine Encephalitides

- Cause: Poor hygiene, feeding practices and pest control.
- Signs: Sudden death
- Prevention: Keep enclosures, holding areas, feeding and watering areas clean. Keepers must practice good hygiene. Good pest control regime.
- Treatment: No specific treatments as antibiotics are not effective.³³

Rabies

- Cause: Rabies is caused by a virus (lyssa virus), which attacks the nervous system and is excreted later in the saliva.
- Signs: Include:
- an initial change from normal behaviour - anxious or irritable, or unusually friendly
 - drooling saliva
 - progression to excitement or aggression, may attack people or other animals
 - possible convulsions
 - paralysis in the final period before death
- Prevention: Rabies vaccination may be appropriate in some areas.⁴
- Treatment: Possible post exposure rabies treatment, although once signs of the disease appear the outcome will likely result in death. Euthanasia may be required to prevent the spread of the disease.

Environmental

Corneal Cloudiness

- Cause: More common in Malayan Tapir; due to excessive light exposure or corneal ulcerations.²⁸
- Signs: Clouded pigmentation of the cornea.
- Prevention: Provide sufficient shade.^{4, 28}
- Treatment: May disappear if the animals are kept in complete shade for three months.^{16, 29} If this is not possible due to exhibit design a visor can be worn by the tapir to protect the cornea. Conditioning techniques must be implemented in order to apply the visor on a daily basis and take the visor off at nightfall.² Oral cu-algestic and cu-algestic drops have been used at Taronga Zoo.¹⁶

Lameness (ulcerations and infections of the foot)

- Cause: Overactivity, a hard substrate or continuously wet concrete can also cause foot problems.²⁹
- Signs: Chronic foot pad ulcers, over-activity during introductions.²⁹
- Prevention: Removal of hard surfaces, include drying of surfaces in daily routines. Provide acceptable substrate. Refer to Chapter 4.7 Substrate.
- Treatment: This can sometimes be fixed by placing the Tapir on softer substrate.^{16, 30}
- It may also be possible to habituate the animal to receive routine treatments of the foot. Spray the affected area with Chlorhex 0.05% or regularly soak the foot in Epsom salts.^{29, 32}

Nutritional

Colitis and Colic

- Cause: Bacterial enterocolitis, intestinal accidents, sand impaction²⁹, it has also been noted that cabbage causes colic in tapir's.⁷
- Signs: Detection of sand in the faeces¹⁶, loss of appetite, increased or decreased gut activity, flatulence and constipation, stretching out or standing and lying down repeatedly.³⁰
- Prevention: Supply mineral blocks as well as plain salt licks to prevent the animals wanting to eat dirt^{16, 31}, do not feed moldy hay, if you need to change feeding patterns, do it gradually.³⁰
- Treatment: Mild constipation can be helped by giving wheat bran, greens to induce diarrhea or by hosing the tapir.^{16, 31}
- Surgery or the following medical treatments.³⁰
- Aggressive intravenous fluid therapy
 - Pain relief as needed
 - Placement of a nasogastric tube
 - Administration of oil
 - Administration of drugs to increase the bowel motility.

Miscellaneous

Rectal Prolapse

- Cause: Diet; feeding poor stemmy, indigestible hay, feeding whole fruits and vegetables and the unavailability of bathing water^{16, 30}, stress.⁴
- Signs: Persistent constipation followed by rectal prolapse.^{16, 30}
- Prevention: Feeding of diced proportions of fruit and vegetables. Bathing water should be available at all times as many tapir's will only defecate fully is allowed to bathe or shower.^{16, 30} Mild constipation can be helped by giving wheat bran and greens.^{16, 30}
- Treatment: Identifying and eliminating the cause is very important. Anesthesia and surgically repairing the rectum; followed by medical management.

Death (neonatal)

- Cause: Most neonatal deaths are due to stillbirths, drowning, and maternal neglect and trauma.⁴
- Signs: Death: No heartbeat, no respiratory response, pale mucus membranes etc.
- Prevention: Suitable birthing environment. Neonates born to primiparous females may need assistance in getting to nurse. Males should be removed and pools drained for 1-3 weeks after birth.²⁹
- Treatment: Not Applicable.

8.5 Quarantine Requirements

Summary of information regarding previous health screens, medical problems, diagnostic test results and treatment should be provided to the receiving zoo. A hard copy and disc of the complete medical record should be sent prior to shipment.⁴

It is suggested that newly acquired tapirs be isolated for a quarantine period prior to introduction to the established collection.⁴ Typically the quarantine period for newly acquired tapirs is a minimum of 30 days, and longer if concerns arise.^{1, 4, 16} The Quarantine period will determine whether the animals are carrying Rabies or any other infectious disease. Tuberculin testing as well as a series of blood and faecal examinations should be conducted on the animals. Faecal examination will determine if the animals are free of endoparasites. Three faecal tests are conducted at intervals of 7 days for the detection of intestinal parasites and two consecutive tests must be negative before the animals are permitted to leave quarantine. The animals must undergo a full clinical examination including haematology, biochemistry and relevant serology tests before they can leave the quarantine area and be placed in an exhibit. The Keepers who are responsible for the husbandry the animal at this time must also look at the behavior patterns of the animals and accustom them to any dietary changes that must be made.¹⁶

Quarantine areas should have a two sided holding facility with an adjoining slide in order to move the tapir across for routine cleaning, if possible a pool or bathing area and in shaded areas. Footbaths at the entryway of the quarantine area are vital in ensuring there is no spread of disease.⁴

9 Behaviour

9.1 Activity

The Brazilian Tapir is primarily nocturnal.¹

In the wild Brazilian Tapirs spend most of their time grazing and foraging in secondary forest. It has also been recorded that they frequent natural salt licks.²⁶

During the day, the Brazilian tapir rests and hides from predators.

In Captivity, the social behavior of tapirs has been found to be largely dependent on individual animal's personalities, past experiences, food availability and size/layout of the enclosure. Some zoos have problems putting just two animals together while other zoos have five to ten animals in the same enclosure (Singapore and Kuala Lumpur).²

Daily observations at Taronga Zoo (1997 and 1999) show that in captivity tapirs spend the majority of their time resting, followed by time spent moving around the exhibit and only a small proportion of time spent feeding.¹⁶

9.2 Social Behaviour

Tapirs are known to be solitary animals and can be quite aggressive toward each other, the only exceptions being mating pairs and females with their offspring. Studies have shown that in the wild Tapirs can co-exist where territories overlap and at salt licks. It is unusual to see more than three animals together.^{16, 26}

In Captivity, the social behavior of tapirs has been found to be largely dependent on individual animal's personalities, past experiences, food availability and size/layout of the enclosure. Some zoos have problems putting just two animals together while other zoos have five to ten animals in the same enclosure (Singapore and Kuala Lumpur).^{4, 23}

9.3 Reproductive Behaviour

Breeding behavior varies greatly and depends on age, experience and compatibility of the breeding pair. Tapir enclosures should be designed so that adult animals can be easily separated and introduced.²

During courtship Tapirs stand head to tail and there is usually some running and biting prior to copulation. Following copulation the female often becomes aggressive towards the male, therefore the breeding/introduction area should be free of potential trip hazards and small openings where a head or leg could become caught. Some tapirs prefer to breed while standing in shallow water, while others will breed on dry land.^{4,16}

9.4 Bathing

Tapirs swim well and take freely to water. In the wild if threatened they will often flee to water, diving and submerging themselves to shake off predators.¹¹ Tapirs can walk on the bottom of river beds.¹⁶

Tapirs bathe regularly in water baths and mud baths to help rid itself of ectoparasites.^{1,9}

9.5 Behavioral Problems

Pacing appears to be the only behavioral problem of Tapirs. At Taronga Zoo this appears to be due to the anticipation of the keepers when feeding.^{16,19}

Generally Tapirs exhibit peaceful behavior. However some individuals may attack without warning and cause serious injury.²

9.6 Signs of Stress

Different Tapir species and individuals can respond differently to the same types of stressors.

The handling of extremely stressed animals should be avoided, as the acute stress can have serious effects on the cardio respiratory system and metabolism.¹⁰

9.7 Behavioral Enrichment

At Taronga Zoo enrichment is given on a daily basis to provide the Tapir with as much opportunity to do the activities which they would in the wild.^{16, 19}

Below is a list of the enrichment activities which are used at Taronga Zoo.^{16, 25}

- Browse is given daily and hung around the exhibit. This includes fig, banana, bamboo and hibiscus.
- Bread is given on a daily basis and is spread around the exhibit on logs and hanging from branches.
- Each meal is put into six feed bins around the exhibit. This keeps the Tapir active so they do not eat from one bin.
- The pond is an activity in itself. Especially in summer, the pond is used quite considerably.
- Fresh Herbs/ spices are scattered/ sprayed around the exhibit.
- Macropod faeces put in the exhibit.
- Smears of Molasses or jam around the exhibit.
- Essential oils sprayed around the exhibit.
- Plastic tub feeders/ Feeder balls filled with favorite fruits and vegetables.
- Toys left on exhibit.
- Molasses ice-blocks.

Other enrichment activities that have been successful in other zoos are

- Hanging up slit jute sacks stuffed with fruit, cut grass, hay and small branches on a coconut rope
- Bringing in hay-bales spiked with fruit, peanuts and small branches tied together with a coconut rope
- Pvc pipe with holes drilled into the top, placed in the bottom of the pond filled with insects.
- Throw pieces of fresh fruit and vegetable in the pool.
- Scatter cut grass in the pool.
- Try difficult or new food (like whole watermelon)

Also providing the animal with no enrichment schedule every so often can also be enriching for the Tapir.^{16, 19, 25}

9.8 Introductions and Removals

Tapirs should not be introduced until they have seen and smelled each other for several weeks through a “howdy” unit. Even when two animals seem compatible, staff should have water hoses and fire hoses available to separate fighting animals during initial introductions. It should be noted that both gender can be the more aggressive, and size is not a determining factor.⁴

9.9 Intraspecific Compatibility

Some zoos have problems putting just two animals together while other zoos have five to ten animals in the same enclosure (Singapore and Kuala Lumpur).²³

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 reintroduced to other tapirs until the calf is three to four months old. 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.²

9.10 Interspecific Compatibility

Tapirs have been kept with a few different species of animals such as Guanaco, Asian Elephant, Agouti, Capybara, peccary, various species of goat, deer and sheep and with birds such as Emu, Rhea, Black-necked storks, Ashy-headed geese and various ducks and swamp birds.¹⁶

They have also been maintained with Hippopotamus and Giant anteater, neither of these options are advisable as in one incident a Tapir was killed by a Hippopotamus and rectal prolapse apparently resulted from a giant anteater probing the Tapirs rectum with its snout.¹⁶

9.11 Suitability to Captivity

Tapirs do well in captivity. They are relatively easy to maintain and breed, provided one has a good working knowledge of their biology and behavior. A lack of information can be largely responsible for many of the medical and behavioral problems that captive tapirs have experienced.^{16,2}

When designing enclosures and holding areas, variables in behavior, compatibility, climate and degree of keeper interaction must be considered.^{2,4}

10. Breeding

10.1 Mating System

Brazilian Tapir's have an unusual mating system in comparison to other exotic ungulates as they appear to be monogamous.

Breeding behavior varies greatly and depends on age, experience and compatibility of the breeding pair. Males will squeal or make clicking noises to attract females, and many pairs of tapirs run and nip prior to copulation therefore precautions should be taken to avoid injuries.⁴

The age of sexual maturity 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. There appear to be no seasonal affect on reproduction. If breeding is desired, adults should be introduced during estrus to insure reproduction.⁴

10.2 Ease of Breeding

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.⁴

Brazilian Tapirs usually mate during two days of the estrus cycle which occurs every 28-32 days.¹

10.3 Reproductive Condition

Tapirs need to be in good physical condition a balanced diet and good hygiene standards can ensure that the condition of the animals is optimum. Breeding behavior varies greatly and depends on age, experience and compatibility of the breeding pair.⁴

10.3.1 Females

Female tapirs are usually good mothers but first time mothers and hand-raised mothers have a higher incidence of maternal neglect of their young.⁴

Female tapirs can exhibit post-partum estrus and are capable of conceiving within one to three months after giving birth. Female tapirs may exhibit post-partum estrus and are capable of conceiving within one to three months after giving birth. The inter-birth interval can be as short as 14 months in captive tapirs.⁴

10.3.2 Males

Male tapir's should be separated from the female several weeks before parturition. Depending on personalities of the parents, females with young can be reintroduced with the male 1-3 months after birth after reintroduction that allows visual and olfactory contact.⁴

10.4 Techniques Used to Control Breeding

The simplest method to control breeding is by separating the male from the female. Tapirs should be separated as early as 15 months of age due to the early age of female maturation.^{1,4}

Castration, contraceptive implants and injections and Oral equine dosage forms of contraception have been used with varying degrees of success in tapirs.^{4,10}

10.5 Occurrence of Hybrids

The Brazilian Tapir and the Baird's Tapir have produced at the San Francisco Zoo around 1969, with a second generation of hybrids produced around 1970.¹⁰

10.6 Timing of Breeding

Tapirs do not have a fixed breeding season. Males will copulate with estrous females at least once during the cycle, and intercourse can last as long as 15-20 minutes. The copulation can take place both in land or in the water.⁴

10.7 Age at First Breeding and Last Breeding

The age of sexual maturity is related to environmental factors, nutrition and medical conditions.⁴ Females have bred as young as 13 months of age, and males as young as 24 months⁴ and last breeding can occur as old as 23-25 years.¹²

10.8 Ability to Breed Every Year

Brazilian Tapirs can reproduce every 18 months^{1,3,10} and no seasonal affect on reproduction has been noted.⁴ If breeding is desired, adults should be introduced during estrus to insure reproduction.^{1,4}

Female tapirs are capable of conceiving within one to three months after giving birth.⁴

10.9 Ability to Breed More than Once Per Year

Under good conditions, a healthy female tapir can reproduce every 18 months^{3,10} with an inter-birth interval as short as 14 months.⁴

10.10 Nesting, Hollow or Other Requirements

Shortly before the birth, females should be separated from the males. Depending on the nature of the parents, females with calves can be introduced with the male up to 3 months after birth. Visual contact is required prior to introduction. Breeding and birthing areas should be free from potential trip hazards and small openings where a head or a leg could become caught. Neonatal deaths from hypothermia, trauma, drowning and septicemia are preventable if the animal is provided with a substrate of compacted soil, rubber pads or straw bedding.^{4,5} Pools should be barricaded to prevent accidental drowning of the neonate.⁴

10.11 Breeding Diet

Tapirs will require a larger diet during breeding and pregnancy. The amount of food required will depend on the individual's body weight and activity.

Vegetables such as carrots, sweet potato, lettuce, bread and mineral salts are ideal.¹³ Pregnant or lactating females and calves require a slightly higher intake of food.^{16,23}

Lactating females should be fed 1.5 times their normal ration¹⁶

10.12 Oestrous Cycle and Gestation Period

The tapir estrus is very difficult to determine. Typically tapirs cycle every 28-32 days and estrus lasts 1-4 days. Tapirs give birth to a single offspring after a gestation of 13 months, 395 to 399 days.^{1,4,10,24}

Fertile estrus is possible 9-27 days after the birth of the calf.^{1,4}

10.13 Litter Size

Brazilian Tapirs usually produce a single offspring, although twinning does occur.^{3,4,23}

10.14 Age at Weaning

Tapir calves can be offered small pieces of fruit and vegetables as early as two weeks of age and completely weaned onto solid foods by four months of age.^{4,24}

10.15 Age of Removal from Parents

A tapir calf can remain with its mother for up to 12 months¹, if you do not require breeding females should be separated from males as early as 15 months.⁴

10.16 Growth and Development

Newborn Tapirs are relatively small at birth and usually weigh between 5 and 11.5 Kilograms.^{1,3,4} Calves should double their body weight within 2-3 weeks.⁴

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 must 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.⁴

All newborn tapirs are similar in appearance, birth weights and growth rates.²² Calves have white stripes and spots on their coat and are completely white on the belly, chest and throat which gradually fade by six months of age.^{1,22} This serves as camouflage against predation in the wild. This coloration begins to fade at 3 months and should have completely disappeared 6 months of age after birth.¹

11. Artificial Rearing of Mammals

Hand rearing should only be considered as a last resort so as to prevent the premature removal of a calf. It has been noted that some cows do not defend their calf vigorously and may push it about roughly, which apparently may stimulate it. This may not indicate rejection.¹⁶ If the cow attacks her calf then it may be necessary to hand raise the calf.¹⁶

Before pulling the calf away from its mother the female should be brushed to see if she would lie down. If so it may be possible to let the calf suckle on the mother. This will depend on the personality of the female. If this does not work hand raising is the last resort.¹⁶

11.1 Housing

A suitable birthing site is very important otherwise neonatal mortality can be high. Newborn calves born onto concrete floors without heating or insulation may die of hypothermia. Bedding straw should be given as this helps in not only keeping the calf warm, but will also provide a non-skid surface for the young when it is trying to stand.^{16, 23}

Wood shavings are NOT recommended as the young might ingest the shavings and might cause gastrointestinal blockages.^{16, 23}

- Small ponds in each den, to prevent rectal prolapse. Tapirs should have access to water at all times.
- A large den and shallow pond for when the female is calving.
- Fully enclosed dens, no gates to ensure warmth in the winter months.
- An indoor viewing area in the exhibit with a heat mat to ensure when the animals from tropical weather.
- A small pond on the way out of the ends to condition the tapirs to do their faeces in the small pond not the large on where the public can see.
- A crush incorporated into their dens.

(Powell, 1999)

11.2 Temperature Requirements

The calving den should be kept at between the temperatures of 21 and 29 degrees Celsius.^{16, 23}

At Taronga Zoo a fan heater will be used along with a heat mat to reach between 21 and 29 degrees Celsius.¹⁶

11.3 Diet and Feeding Routine

The first option would be to try and get the calf to feed from its mother while she is being brushed down. If this doesn't work, then the calf will have to be hand raised.¹⁶

The first option of milk for the calf is its mother's milk. By brushing her it may be possible to hand milk her and give her calf milk. It is very important that the calf has the milk from the mother for the first 48 hours as this will contain colostrum. Prior to parturition blood serum should be taken from the female to ensure that her serum was available if needed. To avoid stress, this should be done well in advance and serum should be frozen until needed.¹⁶

If this is not an option equine colostrum³⁵, evaporated or powdered bovine milk supplemented with vitamins and bone meal can be used.¹⁶

At first the milk should be diluted with water at a ratio of 1:2 increasing to 1:1 after a couple of days with feeds every two to four hours.¹⁶

The calf could be fed using a cross cut calf nipple.¹⁶

Calves can be offered tiny pieces of fruits and vegetables as early as two weeks of age. At three weeks old, they are capable of swimming and, if closely supervised, can be given access to a pool.²³

11.3.1 Amounts Fed

The calf would be fed 10-15% of its body weight with the milk every 3-4 hours for the first week to ensure it was drinking well, then each feed would increase in volume to reduce the times fed. This would be judged on the day depending on the calf's progress.¹⁶

The daily intake of one calf was 1080cm at eight days increasing to 3000cm at 28days in which it remained at this volume until weaning.¹⁶

11.4 Specific Requirements

The den at present has rubber matting with a bed board. Bedding hay would be added on top of the heating mat.¹⁶

11.5 Data Recording

The following should be recorded:

- Weight- weigh initially and then all weight gain/loss at least once a week
- Food intake – number of feeds per day, % of milk formula, amount of food eaten.
- If the calf has urinated or defecated. If not you may have to stimulate this after each feed.

- Anything else that may be notable.

11.6 Identification Methods

As Tapirs generally only have one calf a marking method would not be needed. If the female had two calved and they were the same sex, a stock mark could be used.¹⁶

11.7 Hygiene

All feeding aids such as teats, bottles and spoons should be placed in anti-bacterial solution. Boiled water should be used for mixing milk substitutes. The calf should be able to urinate and defecate on its own, but if it doesn't defecate it can be induced using a soap and water enema.¹⁶

11.8 Behavioural Considerations

One consideration that should be noted that depending on space, the calf will have to be reintroduced to its mother and even the male at a later stage when the calf is around 4-5 months. A reintroduction will need to be done.¹⁶

11.9 Use of Foster Species

Not known.¹⁶

11.10 Weaning

Hand reared calves can be weaned at about three months of age. Solid food can be offered when the calf is very young and can become part of the diet as the calf eats more of these solids. Cod liver oil can be used to help encourage calves to try more solids.^{16, 23}

Tapir calves grow rapidly and are completely weaned by four months of age.^{16, 23, 24} A Malayan Tapir calf was offered small amounts of banana and brown bread. The calf received four feeds of 454g of milk daily plus a small amount of solid for one week, which then the feeds were dropped to three feeds a day.¹⁶

11.11 Rehabilitation and Release Procedures

Not Known.¹⁶

12 Acknowledgements

Greame Phipps
Richmond College of TAFE

Jackie Salkeld
Richmond College of TAFE

Brad Walker
Richmond College of TAFE

Andrew Titmus
Richmond College of TAFE

Justine Powell
Taronga Zoo

Renaë Zammit
Taronga Zoo

Jimmy Saunders
Taronga Zoo

Louise Grosfeldt
Taronga Zoo

Diane Dominique
Taronga Zoo

Katie Hooker
Mogo Zoo

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Foot & Mouth Disease: Archive - November 2001

<http://www.captiveanimals.org/zoos/fmd.htm>

13 Glossary

| | |
|------------------------------|---|
| Clostridial diseases: | Any of various rod-shaped, spore-forming, chiefly anaerobic bacteria of the genus <i>Clostridium</i> , such as the nitrogen-fixing bacteria found in soil and those causing botulism and tetanus. |
| Encephalitis: | Inflammation of the brain. |
| Epiteliocorial: | Tapirs, Hippopotamuses and pigs have an epitheliochorial placenta, a layer of fetal tissue. |
| Colostrum: | The first milk secreted at the time of parturition, differing from the milk secreted later by containing more lactalbumin and lactoprotein, and also being rich in antibodies that confer passive immunity to the newborn. Also called <i>foremilk</i> . |
| Psyllium : | <ol style="list-style-type: none">1. An annual Eurasian plant (<i>Plantago afra</i>) having opposite leaves and small flowers borne in dense spikes.2. The seeds of this plant, widely used as a mild bulk laxative and sometimes added to foods as a dietary source of soluble fiber. |
| Speciation: | The evolutionary formation of new biological species, usually by the division of a single species into two or more genetically distinct ones. |
| Intradermal : | Within or between the layers of the skin: an intradermal injection. |
| Antemortem : | Preceding death |
| Jaundice: | Yellowish discoloration of the whites of the eyes, skin, and mucous membranes caused by deposition of bile salts in these tissues. It occurs as a symptom of various diseases, such as hepatitis, that affect the processing of bile. Also called <i>icterus</i> . |

Appendix A

Anesthetic Protocols and Drug Information Extracted from *The Tapir Veterinary Manual: IUCN/SSC Tapir Specialist Group (TSG) Veterinary Manual*

Butorphanol / Medetomidine

Researcher Patrícia Medici

Applied by DVM Joares A. May Jr., DVM Paulo Rogerio Mangini & DVM George Ortmeier Velastin

Lowland Tapir *Tapirus terrestris* - 15 immobilizations

Morro do Diabo State Park and surrounding forest fragments, São Paulo, Brazil

Protocol: Butorphanol Tartarate (Turbogesic®) 0.15 mg/Kg mixed with Medetomidine (Domitor®) 0.03 mg/Kg plus Atropine (0.025-0.04 mg/Kg), IM, in the same dart (5 ml).

Reversal: Atipamezole 0.06 mg/Kg + Naltrexone 0.6 mg/Kg in the same syringe, IV (slowly).

Comments: Adequate for tapirs captured in pens or pitfalls. This protocol produces adequate chemical restraint for procedures such as radio-tagging and biological sampling. The average induction time is 15 minutes for this protocol. It is important to keep in mind that Medetomidine is commercialized in different concentrations, and whenever possible it is advisable to use higher concentrations.

Further details about this protocol are provided in:

Velastin, G. O.; Mangini, P. R. & Medici, E. P. 2004. Utilização de Associação de Tartarato de Butorfanol e Cloridrato de Medetomidina na Contenção de *Tapirus terrestris* em Vida Livre - Relato de Dois Casos. In: Book of Abstracts of the XXIII Annual Conference of the Brazilian Association of Zoos. Rio de Janeiro, Rio de Janeiro, Brazil.

Tiletamine-Zolazepan, Alpha-2-Adrenergic, Ketamine, and Atropine

DVM Paulo Rogerio Mangini & Researcher Patrícia Medici

Lowland Tapir *Tapirus terrestris* - 6 immobilizations

Morro do Diabo State Park and surrounding forest fragments, São Paulo, Brazil

These protocols that use an anesthetic mixture in a single dart were designed to provide anesthetic safety for animals with corporeal weight between 200 and 300 kg. These protocols are applied when using the darting from distance capture method, producing a short induction time, and adequate chemical restraint for the animal's manipulation.

In all these protocols all the anesthetic drugs are managed in a single mixture, with the use of only one dart. The Ketamine and Alpha-2 agonist are used to dilute Tiletamine-Zolazepan lyophilized powder. In some individuals it is necessary to administer supplementary doses, which are given with Ketamine and the same Alpha-2 agonist used in the original mixture.

The average induction time for this protocol is 5 minutes.

1) Detomidine - 1 dart Detomidine - 0.06-0.04 mg/kg

Ketamine - 0.62-0.41 mg/kg

Atropine - 0.025-0.04 mg/kg

Tiletamine-Zolazepam - 1.25-0.83 mg/kg

2) Romifidine - 1 dart Romifidine - 0.05-0.03 mg/kg

Ketamine - 0.62-0.41 mg/kg

Atropine - 0.025-0.04 mg/kg

Tiletamine-Zolazepam - 1.25-0.83 mg/kg

3) Medetomidine - 1 dart Medetomidine - 0.006-0.004 mg/kg

Ketamine - 0.62-0.41 mg/kg

Atropine - 0.025-0.04 mg/kg

Tiletamine-Zolazepam - 1.25-0.83 mg/kg

Comments: Best results on immobilization, cardio-respiratory parameters and recover are obtained with Medetomidine, followed by Romifidine. Short apnea episodes are observed more frequently using Detomidine protocol. All these protocols are able to knockdown lowland tapirs in a short period of time. The veterinarian in charge of the immobilization is responsible for deciding if the use of Atropine is appropriate or not according to his/her professional experience. It is recommended to associate Atropine in anesthetic protocols that use Alpha-2-agonists, in order to control the cardiac depression and excessive secretions.

Tiletamine-Zolazepan, Alpha-2-Adrenergic, and Atropine

DVM Paulo Rogerio Mangini & Researcher Patrícia Medici

Lowland Tapir *Tapirus terrestris* - 15 immobilizations

Morro do Diabo State Park and surrounding forest fragments, São Paulo, Brazil

These protocols are used to immobilize tapirs captured in pitfalls and box traps, using two (2) darts: First 1 dart with pre-anesthetic drugs (Alpha-2 + Atropine) followed by a second dart containing the Tiletamine-Zolazepam association. The 2-dart protocols calculated doses for animals with corporeal weight between 150 and 350 kg. The average induction time for this protocol is 20 minutes. The reversal of all of the protocols was made with Atipamezole or Yohimbine in the doses of 3 to 5 times plus the Alpha-2 agonist doses used, providing less agitated recovering time.

1) Medetomidine - 2 darts Medetomidine - 0.01-0.008 mg/kg

Atropine - 0.04 mg/kg

Interval of 10 minutes

Tiletamine-Zolazepam - 4.11-5.6 mg/kg

2) Romifidine - 2 darts Romifidine - 0.11-0.09 mg/kg

Atropine - 0.04 mg/kg

Interval of 10 minutes

Tiletamine-Zolazepam - 4.11-5.6 mg/kg

3) Xylazine - 2 darts Xylazine - 0.56-0.42 mg/kg

Atropine - 0.04 mg/kg

Interval of 10 minutes

Tiletamine-Zolazepam - 4.11-5.6 mg/kg

Comments: The protocols are based in the association of dissociative anesthetics, Alpha-2 agonist, benzodiazepines, and atropine. Dosages were calculated using interspecific allometric scaling. Medetomidine was the most used drug, producing the best results obtaining good muscular relaxation and more stable cardio pulmonary parameters, Xylazine produces the worst results with poor muscular relaxation and analgesia. It is important to provide space to patients to recover, usually disturbed with standing and falling periods. Antagonist drugs could provide better recover.

Further details about this protocol are provided in:

Mangini, P. R. & Medici, E. P. 1998. Utilização da Associação de Cloridrato de Medetomidina com Cloridrato de

Tiletamina e Cloridrato de Zolazepam na Contenção Química de *Tapirus terrestris* em Vida Livre - Relato de Dois Casos.

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Nunes, L. A. V.; Mangini, P. R. & Ferreira, J. R. V. 2001. Order Perissodactyla, Family Tapiridae (Tapirs): Capture and Medicine. In: FOWLER, Murray E.; CUBAS, Zalmir Silvino. (Org.). Biology, Medicine and Surgery of South American Wild Animals. Ames, v. 1, p. 367-376.

General Information about Agents Commonly Used for the Chemical Restraint of Tapirs

Alpha-2-Agonists: Medetomidine, Romifidine, Detomidine, and Xylazine

Reversal Drugs: Atipamezole, Yohimbine, Tolazoline

These drugs produce depression of the Central Nervous System (CNS), being classified as sedatives and soft analgesics, with myorelaxation properties. The use of these drugs in tapirs should consider their capability of depressing the thermoregulation. In many species, these drugs produce emesis, however this does not seem common in tapirs. On blood pressure, there is an initial increase followed by a long depression. There are no studies on the blood pressure of tapirs with these drugs, but the experience has shown that the later drop might difficult blood collection from peripheral veins, which may be corrected with the use of atropine. Other circulatory effects include bradycardia and arrhythmias. Short apnea and exposure of the penis have also been reported as common with these drugs. The isolated use of Alpha-2-agonists has proven efficient during a series of chemical restraint procedures. In particular Romifidine has shown the best results, due to the low volume required, low costs and stable cardio respiratory parameters. In general, Alpha-2-agonists have been considered fundamental in the developing of simple and safe anesthetic protocols for tapirs. They have been successfully associated with dissociative drugs, producing deeper anesthesia both in field and captivity. They have also been associated with opioid derivates, producing safe chemical restraint and deep sedation for field capture and handling.

Opioid Derivates: Butorphanol Tartarate, Carfentanil, Etorphine

Reversal Drug: Naloxone

The opioid derivates have been classically used on the restraint and anesthesia of tapirs both in the wild and in captivity. They have been associated with Alpha-2-agonists and/or Ketamine, producing stable cardio respiratory parameters and good analgesia. The anesthetic recovery is smooth and fast, being accomplished naturally or with the use of Naloxone.

Dissociative Drugs: Ketamine, Tiletamine

No specific reversal drugs

The dissociative drugs, derivates of ciclohexamine, may produce amnesia and catalepsy, providing an uncomfortable anesthetic induction and recovery, with ataxia, falls and pedaling movements (especially with Tiletamine = Telazol, Zoletil). The associations of Tiletamine with Alpha-2-agonists in tapirs may produce periods of anesthetic respiratory depression.

Sometimes the periods of apnea may require to be reversed by respiratory massage and respiratory stimulants. When Alpha-2 reversal agents are not used, the anesthetic recovery might be uncomfortable, with oscillations between consciousness and depression.

Atropine

In low doses, Atropine inhibits excessive salivation and respiratory secretions. In moderate doses, Atropine may be used to increase the heart rate. Excessive doses, however, may reduce gastrointestinal and urinary motility. One of its most important uses in tapir anesthesia is to reduce hyper secretion and reverse the blood pressure drop due to Alpha-2-agonists or dissociatives, which hampers blood collection.

Emergency Drugs

It is highly recommended to predetermine the dosage of emergency drugs while planning for the chemical restraint of wild tapirs, so that these drugs are promptly available if needed. The use of Doxapram may be prophylactic in protocols using Alpha-2-agonists, opioids or Telazol/Zoletil, to prevent respiratory depression.

Appendix B

Equine De-Worming/ Anti-Tick Drugs

Drug

Fenbendazole

Trade Name and Recommended Frequency for Dosing (Adult Horse)

- Panacur Equine Granules/Paste (Intervet)
6 weeks
- Panacur Equine Guard (5 day course) (Intervet)
6-12 Months
- Zerofen (Chanelle)
6 weeks

Efficiency

Will kill adult small redworms, their eggs and some immature stages. Some small redworms are resistant to this drug. Five day course effective against inhibited mucosal stages of small redworms. No efficacy against tapeworms.

Drug

Mebendazole

Trade Name and Recommended Frequency for Dosing (Adult Horse)

Telmin (Janssen) – 6 weeks

Efficiency

Will kill adult small redworms. Some small redworms are resistant to this drug. No efficacy against tapeworms.

Drug

Pyrantel embonate

Trade Name and Recommended Frequency for Dosing (Adult Horse)

- Strongid-P
- Granules/Paste (Pfizer)
- Strongid Caramel (Pfizer)
- Pyratape P (Intervet)
- Provid 44% Paste (Chanelle)
- Exodus (Janssen)

4-6 weeks

Efficiency

Will kill adult small redworms.

Not effective against encysted mucosal stages.

Double dose (38mg/kg) will kill tapeworms.

Use anti-tapeworm dose every 6-12 months.

No efficacy against *A. mamillana*

Drug

Ivermectin

Trade Name and Recommended Frequency for Dosing (Adult Horse)

- Eqvalan Paste for Horses (Merial)
- Panomec Paste For Horses (Merial)
- Furexel (Janssen)
- Vectin Horse Paste (Intervet)
- Eraquell (Virbac)
- Noramectin (Norbrook)
- Bimectin (Bimeda) 8-10 weeks

Efficiency

Highly effective against adult small redworms, limited effect against inhibited mucosal stages. No efficacy against tapeworms.

Drug

Moxidectin

Trade Name and Recommended Frequency for Dosing (Adult Horse)

Equest (Fort Dodge) – 13 weeks

Efficiency

High efficacy against adult and developing small redworms. Persistent effect. No efficacy against tapeworms.

Drug

Praziquantel

Trade Name and Recommended Frequency for Dosing (Adult Horse)

Equitape (Fort Dodge) - 6-12 months

Efficiency

Efficacy against tapeworms, including *A. mamillana*.

No efficacy against roundworms

Drug

Praziquantel+Ivermectin

Trade Name and Recommended Frequency for Dosing (Adult Horse)

Equimax (Virbac Eqvalan Duo (Merial) – 6-12 months

Efficiency

High efficacy against tapeworms (including *A. mamillana*). Highly effective against adult small redworms.

Drug

Flumetherin

Trade Name and Recommended Frequency for Dosing (Adult Horse)

Bayticol Pour On Cattle Tickicide

Efficiency

Highly effective in repelling ticks.

For more information visit: www.diagnoteq.com

Appendix C

Miscellaneous Treatment Information

Repellex

Product Name: Repellex 6 Hour Protection Personal Insect Repellent Tropical Strength

Active Constituent/s: 40 g/kg N-octyl bicycloheptene dicarboximide, 191 g/kg diethyltoluamide.

Summary of Use: Tropical strength personal insect repellent spray with 6 hour protection against mosquitoes, repels flies, sandflies, leeches, ticks and other annoying biting insects.

Chlorhex

Product Name: Chlorhex

Active Constituent/s: Chlorhexidine 2% Solution diluted in H₂O

Summary of Use: A topical aqueous cleaning solution for use on horses and dogs for application to superficial cuts, abrasions or insect stings.

- Antibacterial
- Effective against gram-positive and gram-negative bacteria
- Provides residual effect up to 2 days
- Actions not affected by blood, pus, or soaps

Cu- Algesic

Product Name: Cu-algesic Tablets, Cu-algesic Drops

Active Constituent/s: Copper Indomethacin 2 mg

Summary of Use: Oral, Non-Steroidal Anti-Inflammatory Drug (NSAID) with low gastro-intestinal toxicity and rapid excretion.