

Husbandry Guidelines

For



Chital or Spotted deer

Axis Axis

(Mammalia: Cervidae)

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DISCLAIMER

OCCUPATIONAL HEALTH AND SAFETY RISKS

Chital deer are a flighty animal and need plenty of room to run, feel safe and graze (or mimic) as they do in the wild. If chital deer do not have this room they will be very edgy and will cause problems for keepers. That will then create Occupational health and safety issues with regards to being in the enclosure with them. Give them plenty of room as they may kick but will most likely take off with the herd and become skittish. This is when an escape is most likely. Make sure all fencing is at correct height and that deer have a safe area to retreat to. When approaching deer do so in a quiet manner with no sudden moves but make sure they know you are coming.

Daily cleaning must be done to clear faeces to ensure a clean enclosure and workplace.

Cleaning routines should be carried out with gloves. Hands must also be washed when finished.

A hazpac assessment should be carried out on any possible hazards.

Keeper entrances must be at standing height.

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1 Introduction

I have compiled this husbandry manual for the spotted deer and on my research have found that the captive groups vary so much that a general species manual is not suitable. Therefore I have compiled this manual on the group 1:4 at Taronga Conservation Society Australia. Which is a hand raised group who are worked in this on a daily basis.

Principles can be carried over to other groups but due to the nervousness of these animals not all and therefore separate manuals would be needed.

1.1 ASMP Category

1.2 IUCN Category

1.3 EA Category

Spotted deer are not threatened and are hunted in Australia.

1.4 NZ and PNG Categories and Legislation

1.5 Wild Population Management

1.6 Species Coordinator

1.7 Studbook Holder

2 Taxonomy

2.1 *Nomenclature*

KINGDOM	Amimalia
CHORDATA	Vertebrata
CLASS	Mammalia
ORDER	Artiodactyla(Even-toed ungulate)
SUB ORDER	Ruminantia
FAMILY	Cervidae
GENUS	Axis
SPECIES	Axis axis

2.2 *Subspecies*

- A.a.axis on the indiansubcocontinent
- A.a.ceylonensis of Ceylon
(the axis deer in texas)

2.3 *Recent Synonyms*

None

2.4 *Other Common Names*

French	Chital deer
Spanish	Chital deer
German	Axishirsch
English	Spotted deer

3 Natural History

The first artiodactyls (even-toed ungulates) were present in the Eocene forests. The axis deer are probably descended from small animals like the chevrotains which browse and eat fallen fruit in forests. Like the chevrotains, deer use fermentation in their gut to digest plant material more efficiently - called rumination. As the forests began to open up in the Oligocene, ancestors of deer grew larger and browsed on the vegetation or grazed the new grass. They probably also formed herds for safety against predators. In the Miocene, the first horned deer appeared, with the males having horns to fight rather than using their canine teeth.

(www.bbc.co.uk/nature/wildfacts/factfiles/461.shtml)

Axis deer was introduced to Australia in 1866, Texas in 1932 and Hawaii in 1950 (Graff) or in 1974 (Ables) and in all area has become hunted for game meat and as trophy hunts.



Axis Deer Skull, male, lateral view.

Source - Courtesy of private collector, <http://www.skullsite.co.uk/Axis/axis.htm>



Axis Deer Skull, female, lateral view.

Source - Courtesy of Joey Williams, Skull Collector Extraordinaire,
<http://www.skullsite.co.uk/Axis/axis.htm>

Dental Formula : 0.0.3.3 / 3.1.3.3 (canines incisiform)



Antler of male in first image.

Source - Courtesy of private collector, <http://www.skullsite.co.uk/Axis/axis.htm>

To date, various studies have contributed to the biological knowledge of the Axis deer including: The study of the behaviour of chital deer (*Axis axis*) (Choudhury K.C.R 1966); Characteristics of the oestrous cycle and duration of the gestation in chital (*axis axis*) hinds (Chapple, R.S, A.W, English and R.C Mulley 1933); Population structure and activity rhythm of the spotted deer in Ruhuna National Park, Sri Lanka (de Silva, P.K & M.de Silva. 1922); the daily defecation rate of captive deer (Dinerstein, E and H.T Dublin. 1982)

3.1 Morphometrics

The Spotted deer is considered the most beautiful of all cervids. The deer are born and have for life a bright reddish coat, which is marked with white spots. These spots usually run in uneven longitudinal rows. There is a dark dorsal stripe which runs along the along the deers spine. The under side of the deer are white as are the inner legs and the undertail. (texas)

The dental formula of the deer reported in by Chappale (1989) is:

Incisors 0/3 Canines 0/1 Premolars 3/3 Molars 3/3 = 32

A canine is present at birth on each side of the upper jaw and is later lost.

3.1.1 Mass And Basic Body Measurements

Shoulder height

30 - 38 in (75cm)

Body length

42 - 55 in (110 - 140cm)

Tail length

8 - 12 in (20 - 30 cm)

Weight

165 - 220 lb (75 - 100 kg)

Stags are bigger than hinds

(Hutchins, Michael. Second Ed)

The average weight for mature spotted deer hind range from 46kg in Sri Lanka to 57kg in India.

The stag from 64kg in India to 98kg in Hawaii. (chapple)

3.1.2 Sexual Dimorphism

- Males are larger bodied than does with thicker necks and broader chests.
- Males have antlers which shed annually.
- Males have darker facial markings with a more pronounced "scowling" expression the older they get. (Chomanche Spring Ranch)
- Males have a dark dorsal stripe running down the length of it's back (Albes, 1977; Walker 1964)

3.1.3 Distinguishing Features

- Spotted bucks can be in hard horn any time of the year. They grow and shed antlers through out the year so in one herd there may be a newly shed buck, a hard horn buck and a buck in the velvet. Antlers are usually 22 to 27 inches.

Trophies range from 30 to 36 inches. Axis have a typical antler structure of three points on each side consisting of a main beam, one secondary point halfway up the beam, and a brow tine. Four points on a side are not uncommon. (Chomanche Spring Ranch)

- Chapple (pg8) says the various morphological characteristics reveal that chital are one of the most primitive cervids, having been present during the Pliocene and pleistocene in Europe and Asia. There is a simple three-tined antler reaching about 81cm in length, with only a brow point and a single fork at the extremity, with bez and trez times absent.

3.2 Distribution and Habitat

- Axis deer are native to India but have been introduced to Queensland, Australia, Texas in the United States and Hawaii. Large numbers of free range herds live in these's area.
- In their native lands, the deer occupy grasslands and very rarely move into areas of dense jungle that may occur adjacent to them.
- Short grasslands are an important area for them due to a lack of cover for predators such as the tiger (Moe and Wegge, 1994).
- The forest also provides good foraging with regard to fallen fruit and leaves that are high in nutrients needed by the deer. Therefore, the deer require open areas as well as forested areas within their home ranges for optimum habitat.
- Their total range incorporates a core area of about 32 hectares(ha) surrounded by foraging and cover areas of about 140 ha for females and 195 ha for males (Moe and Wegge, 1994).



<http://www.iucnredlist.org/details/41783/0>

Introduced populations - Grzimek's animal Life Encyclopedia

3.3 Conservation Status

Chital is listed as Least Concern because they inhabit a very wide range within which there are many large populations. Although it is still declining in some sites (particularly outside protected areas), at the species level any such declines are at nowhere near the rate required to qualify for listing even as Near Threatened. (IUCN)

3.4 Longevity

3.4.1 In the Wild

Walker et al. (1964) have reported the usual life span of *Axis axis* to be 10-15 years.

3.4.2 In Captivity

Individuals in captivity have been documented at 20 yrs+. (Crandel 1964)

3.4.3 Techniques Used to Determine Age in Adults

- Deer are aged by examining the teeth of the lower jaw. This is the only accurate field method. Size, color, and antler development may give clues as to general age (young or old), but they are not accurate indicators of age.
- This examination can only truly be carried out post mortem.

4 Housing Requirements

4.1 Exhibit/Enclosure Design

There are no EAPA spatial requirements set in NSW for ungulates in the captive environment. The spotted deer are a flighty animal and need a large flight distance. The exhibit should have tall fences with a perimeter fencing.

4.1 Holding Area Design

In designing holding yards for deer there are factors to be considered:

- A design that be easy to separate into small groups or individuals with many pen areas
- Deer like to move around corners
- Ideally the main area should have concrete floors that are sloped to allow drainage and ease of cleaning.
- A deer crush is essential
- A set of scales is essential and can often be incorporated into a crush
- The design must provide adequate ventilation and air movement with out drafts
- The design must allow adequate lighting
- The site should have electric power and running water
- Gate latches should be designed to minimise opportunity for injury to stock
- Walls inside the shed are usually 2.0 to 2.5 meters high. The bottom 1.2 to 1.5 meters are constructed of solid paneling or similar product. Above the solid paneling boards are spaced to provide horizontal viewing slits for the deer.

Receival yards are used in deer farming and are constructed with solid walls using ply board sheets. There needs to be no protrusions that can injure deer.

The laneways to access holding yards ideally should be narrow but allow the deer's to move freely into the holding yards.

The fallow deer holding and crush area at Taronga Western plains zoo.
Authors own images.



4.2 Spatial Requirements

There are no EAPA spatial requirements set in NSW for ungulates in the captive environment.

4.3 Position of Enclosures

The position of the enclosure is irrelevant as long as the deer have shade from large trees and have a sheltered area for poor weather conditions.

4.4 Weather Protection

The enclosure needs to have a sheltered area for the deer to retreat to in poor weather. There are no size requirements but will need to protect the total number of deers within the exhibit.

4.5 Temperature Requirements

There are no temperature requirements. Deer prefer warmer environments with cool areas and this can be provided with trees as it would replicate the forest.

4.6 Substrate

Preferred substrate materials: mulch and pine chips, dolomite

Other suitable materials: Grass

Materials to avoid: Cement (as the harshness to hoofs and joints)

4.7 Bedding Material

Straw and saw dust are the preferred materials for bedding. Which should be completely changed at least once a week.

Heat lamps offered in bedding area in the cooler months will provide deer with extra warm, especially when fawn are in the herd.

Bedding areas should be under shelter to avoid wet materials.

4.8 Enclosure Furnishings

Suitable furnishings would include large tall trees. Mud wallows and scratching poles would offer enrichment to the chital deer. Large logs and nature items.

5 General Husbandry

5.1 Hygiene and Cleaning

Daily cleaning tasks:

- Spot cleaning faeces
- Cleaning drinking water
- Removing old browse and left over foods

Weekly cleaning tasks:

- Complete change of bedding material

Monthly cleaning tasks:

- Scrub any cement areas

Half yearly

- New substrate - mulching

Cleaning agents suitable: Animal house

Bleach 4% - cleaning holding and cement areas

5.1.1 Pest control

Pest control boxes should be placed in areas in and around enclosure and checked weekly and are refilled and any pest removed.

Disposing of pests – follow intuitions procedures. Taronga's – all dead animals are to be taken to VQC for post modem.

5.2 Record Keeping

All animals should be individually identifiable, with the use of coloured or numbered ear tags. Each animal should have its own file which contains the following information:

- Identification numbers or tags of animals
- ARKS number
- Health problems

- Veterinary examinations
- Veterinary treatments
- Behavioral data
- Reproductive stages, condition and behaviors
- Gene pool information
- Parents
- Birth dates
- Changes in diet
- Movements within and between institutions
- Body mass and measurements.
- History of animal
- Enrichment behaviors and reactions.
- Transfer details
- Individual characteristics

ISIS (International species inventory system) uses the basic biologic information (age, sex, parentage, place of birth, circumstance of death, etc.) to manage genetic and demographic programs for their animal collections.

ARKS (Animal record keeping system) is used by zoo's in the Australasian region and information is available to all zoo's. Information such as age, parents, genetics are available.

5.3 Methods of Identification

- Colour ear tags are the preferred method used in herd animals as it provides a quick and accurate visual determination of which animal you are viewing.
 - Each colour ear tag can represent a family/ gene pool. This is done to avoid inbreeding.
E.g. Red/Pink is the offspring of Red/Yellow as is Red/Blue but Green/Yellow is not.
 - Animals are micro chipped
-



Ear tagging should be under sedation in an adult. Can be done within the first days a life without sedation.

5.4 Routine Data Collection

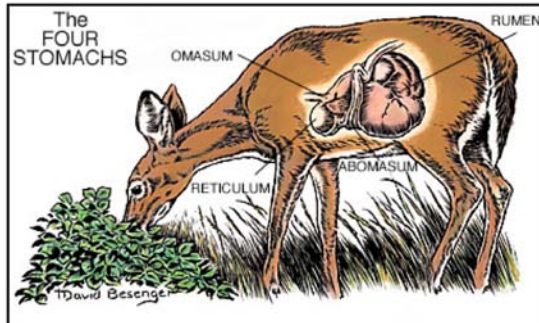
Most information is on deer farming. Some of this information does work for deer in captive intuition but most is for the production of venison. There have been many studies on wild deer and many on farming deer's.

Information that may be acquired for long term studies include

- Weights/growth - development charts
- Contraception/genes/parenting behaviors
- Blood biochemistry

6 Feeding Requirements

Chital deer are ruminant herbivores. (Sub order Ruminantia).



Deer have a four-chambered stomach. The first chamber, called the rumen, is for storage. The rumen allows for the deer to gather a lot of food at once and then digest it later. The deer bring the food back up into their mouth and chew it again. This process is called chewing their cud. It is also called ruminating, named after the rumen. Animals that can do this are called ruminants.

The reticulum is the second stomach chamber. This is where the microorganisms live. The microorganisms attack the chewed food that the deer has eaten. This process is called fermentation. This helps to break the cellulose down into simpler substances that can be absorbed by the deer and the microorganisms. Fermentation produces a gas (methane), which the deer must discharge very regularly.

When deer chew their cud again, mixed in with the digested food are microorganisms. The deer chew the microorganisms and a lot of deer's nutrition comes from them. There are plenty of microorganisms left in the reticulum. This time when it goes back down, the chewed food goes to the third chamber the omasum. This is where water is absorbed.

Finally, the resulting cud enters the last chamber, (the abomasum), where gastric juices continue digestion. Gastric juices are liquids, like the acids in your stomach, that help digest food.

Last, it moves on to the intestines. This is where the food is absorbed by the animal's body. This is where the animal receives the nutrients for his body. The deer's intestines are 28 feet long.

When the animal has absorbed everything it can use, everything that isn't digested is passed off as waste droppings.

6.1 Diet in the Wild

Wild Chital Deer will graze on grasses and browse of leaves from the forest trees. Chital follow troops of Langurs, these monkeys knock nutrient-rich fruits and leaves to the ground while searching for their own food and make them available for Chital.

In addition to plant soft matter, crabs, mushrooms and rarely bark are eaten (IUCNRedlist).

Browse species include live oak and hackberry. (Comanche Spring Ranch).

Captive Diet

Chital deer captive diet – approved by Vets at Taronga conservation society:

Food	Amount per day
Lucerne chaff	1 bucket - 20L per bucket
Lucerne hay	1 pad – 200g
Apples	600 g
Carrots	1400 g
Browse	Old Langer branches daily
Dairy cubes *see appendices	600g BID
Bamboo browse	4 – 8 sticks daily

This is the total daily food intake and should be divided into smaller feeds over the day to replicate grazing in the wild.

Taronga’s feed schedule is as followed:

AM	MIDDAY	PM
Lucerne chaff	Apples and carrots	Lucerne hay
Dairy cubes	Browse	Dairy cubes
Bamboo		

If any more time is allowed the dairy cube ration is feed between AM-Midday and again between Midday – PM.

Preparation



Carrots and apples are cut into small pieces to make easier for the chital to chew.

Suitable browse:

Bamboo

African Olive

Lombardy poplar – *Populus nigra* ‘Halica’

Weeping fig or Benjamin’s fig – *Ficus benjamina*

Camphor Laurel – *Cinnamomumcamphora*
Celtis – *celtisaustralis*
Cotoneater – *cotoneaster lacteus bauhinia*

Fresh drinking water should be available to Chital at all times. A drinking trough off the ground with drainage in a cool shaded area would be the most beneficial.

6.2 Supplements

Supplements are provided daily.

Dairy rations * see appendices

Salt lick or mineral block * see appendices

Block is provided in food trough.

Salt licks

6.3 Presentation of Food

Food that is provided for Chital should be presented in a trough or on a concrete pad or something similar, which can be easily cleaned each day. Feeding shelter should be sheltered.

Scatter feeds and high placed foods can be done to offer enrichment for Chital.

TROUGHS



It is also recommended that if there are dominant individuals in the enclosure to provide a few or one per individual chital to avoid possible injury.

SCATTER FEED



WATER TROUGH



BROWES PLACEMENT



7 Handling and Transport

7.1 Timing of Capture and Handling

The best time to catch up deer and to transport is in the coolest part of the day. This may be first thing in the morning but most probably late afternoon.

In captivity other items may need to be considered. Some listed as followed:

- Opening time of zoo
- Guest's access to enclosure and position of exhibit in zoo
- Procedure taking place
- Effect of viewers to animal
- Fencing off areas
- Available staff
- Correct signage

7.2 Catching

Hessian may be used to herd the deer into the holding yards.

If need to herd hessian length should cover the weight of the exhibit. There should be enough staff to hold hessian taught across the exhibit width. Keepers holding the hessian then walk towards herding area most likely a holding yard.

Nervous deer may need to be darted.

Friendly deer can be trained to be hand injected.

7.3 Capture and Restraint Techniques

These techniques are dependant on the animal. Including such things in its history – hand raised, fears, nature of the chital.

Herding the chital into the holding yards to separate them or catch the individual needed for catching up into the crush area from here the chital can enter a EATA standard container for transport if needed.

Deer's should be herded into raceways and into small pens then into a crush. Extra precautions should be taken into consideration with handling males in rutt, males with antlers and pregnant females.

In most cases deer will be darted with a sedative by vets, a health check will be done before the deer in boxed and will be reversed before departing.

Spotted deer due to their flighty behavior do not like to be held down if not sedated, it can stress the animal out and cause them to lash out and kick with their sharp hoofs causing damage to keeper and themselves. It is best to sedate the animal and carry out examination or hold in a crush area.

7.4 Weighing and Examination

Chital may be weighed in the crush area or may be weighed once sedated.

Chital can be trained to present their feet (one at a time) and to take hand injections, some captive herds allow keepers to get close and even perform daily examinations.

7.5 Release

Chital should be released into a holding area. The best time for this to be done is the coolest part of the day – late afternoon.

Chital within Australia are a feral pest and not to be release into the wild.

7.6 Transport Requirements

Chital being transferred on land, sea and by air have specific requirements these can be found online. [Www.daff.gov.au](http://www.daff.gov.au) . There is also a draft copy of the Australian standards and guidelines for the welfare of animals – land transport of livestock.

Transporting chital within an institution may be darted then put on a stretcher at transported by vehicle.



Box Design

IATA Live animals Regulations – Container requirements 8.3

General container requirements for pet animals, farm livestock and farmed deer or antelope (CR 1-3)

Design and construction

- Containers must allow animals normal behaviors and freedom of movement.
- The container must be well constructed and be able to withstand other freight damaging it or causing the structure to buckle or bend.
- It must be rigid enough to prevent the animal escaping through gaps.
- Constructed by non-toxic materials or wood that may be poisonous.
- The container must be suitable to keep the animal inside at all times and protect the animal from unauthorised access, the door must be constructed so that accidental opening cannot occur from inside or outside.
- The container must not cause the animal any damage to itself. All inside edges must be rounded or smooth.
- The container must be leak proof.
- Spaces to provide ventilation, which can be used as handles as well.

Dimensions and stock density

- Dimensions must be made to suit the animals required for transferring
- The container must allow the animal to stand, turn and lie down in a natural manner.
- It is recommended that 10cm (4 in) overhead space is provided for small chital and 20cm (8 in) for large.

Ventilation

- Must be adequately ventilated on at least three sides, with the majority of the ventilation being provided on the upper part of the container.



7.6.1 Furnishings

Wood shavings or sawdust should be supplied on the floor of the container.

7.6.2 Water and Food

Separate food and water troughs must be provided, either fixed inside or attached so it is accessible for replenishing.

Troughs must have rounded edges.

Shipper's instructions for feeding must be given at time of acceptance and must be fixed to the container and anything given must be recorded.

Water and food should be offered on release.

7.6.3 Animals per Box

One animal per box.

Muti-level containers can be made to IATA standards.

7.6.4 Timing of Transportation

The best time to catch up deer and to transport is in the coolest part of the day. For long transport it would be best to catch up in the afternoon and travel overnight. The vehicle to transport must be air-conditioned or at least have good flowing ventilation system.

7.6.5 Release from Box

Chital should be released into holding area and then walk themselves into the exhibit after the correct quarantine routine.



8 Health Requirements

8.1 Daily Health Checks

- Overall fur condition
- Any unusual patches
- Walking as normal
 - Looking for not weight barring
 - High legged walking or holding leg up
- Any wounds
- Checking the eye
- Watching the deer eat – to see they are all able too
- Look at the feces as removed to check colour and consistency
- Also look at tail and around deer's anus to see if deer are defecating normally

8.2 Detailed Physical Examination

- Weight
- Bloods
- Body condition
- Dental
- Dermatitis
- Hoofs
- Eye condition

8.2.1 Chemical Restraint

Chemical restraint

Can be given through the methods of darting or given through intravenous injection.

Before anaesthesia, deer should be fasted for 12-24 hours, with water available.

There is a lot of information available and published, e.g. Fowler's Zoo and Wild Animal Medicine (1986) and Seal & Bush (1987) in Biology and Management of the Cervidae.

The subject can be divided into three sections, based on the level of restraint, i.e.

Anxiolysis

There is a number of good long acting neuroleptics (LANS) which are valuable for anxiolysis in recently captured deer, especially for transport over long

distances, e.g. perphenazine enanthate (Trilafon) and fluphenazine decanoate (Modacate). However, these should be used carefully, as haloperidol (Serenace) produced severe cataconia in Calamian Deer (*Cervus calamianensis*) that almost resulted in death (W. Pollisco).

Sedation

Sedation can be achieved with xylazine (1-2mg/kg) or azaperone (stresnil), with local analgesia using xylocaine or lignocaine for painful procedures, e.g. velvet antler removal. Effects are dose-dependent.

Immobilization

Immobilization can be achieved with xylazine/ketamine or medetomidine/ketamine, e.g. for removal of hard antler in a dangerous adult male. The other option is a narcotic/tranquilliser combination such as Immobilon (etorphine/ACP) or carefentanil/xylazine. These are probably best for the capture of wild deer, and have the advantage of excellent reversal agents, e.g. naltrexone.

Xylazine has been used successfully on *C. alfredi* at 0.1ml/kg in conjunction with the reversant atipamezole (Antisedan) at 0.1ml/kg (Alcala, 1994); and at 3 – 4mg/kg (W.Pollisco). The medetomidine-ketamine combination is used successfully at Mulhouse Zoo at dosages of 60ug/kg and 2mg/kg respectively; as is a Hellabrunn mixture of xylazine-ketamine (125-100 mg respectively). From 1.0 – 1.5 ml of the latter is used for adult deer. The medetomidine is reversed by atipamezole at 300 ug/kg, and the xylazine by atipamezole at 1 mg/10 mg xylazine.

Areas where anaesthetised or sedated deer are held must be well ventilated.

(Banks.C)

Taronga Zoo Sydney currently uses:

1.5 mg/kg ketamine plus 0.05 mg/kg medetomidine (giving a smooth recovery)
Supplemented with: 1 mg/kg ketamine
Reversed with: 0.25 mg/kg atipamezole

Historically Taronga used:

Ketamine (4mg/kg) plus xylazine (4mg/kg) : antagonize with 0.125mg/kg yohimine

Pers comm.: KVH, T.J Kreeger, 97

Alternate drugs:

0.004mg/kg carfentanil plus 0.125mg/kg xylazine

Reversed with: 100mg naltrexone or naloxone per mg carfentanil given plus 0.125mg/kg yohimbine

2.6 mg/kg Talazol

No reversal

1.7 ml Large animal immobilon plus 30 mg xylazine

reversal: 2 mg diprenorpine per mg etorphine given plus 0.125 mg/kg yohimbine

3mg fentanyl plus 24 mg azaperone plus 30 mg xylazine

reversal: 1mg naloxone per mg fentanyl given plus 2 mg/kg tolazoline

Calm animals only

3mg/kg xylazine

reversal: 0.2 mg/kg yohimbine

Warnings – Opiate drugs

Needing extreme care and human first aid on stand by (carried by nurse) in all cases of use.

Carfentanil

Immobilon

(Kreeger, 97)

When recovering a deer from a sedation or anesthetic they should be held in the sternalrecubancy position as shown:



8.2.2 Physical Examination

Physical restraint

Keepers may be able to restrain Chital for a vet examination without a chemical agent. It is advised that if the deer shows any signs of frustration to abort the procedure.

Herding the chital into the holding yards to separate them or catch the individual needed for catching up into the crush area from here the chital can enter an EATA standard crate for transport if needed.

Extra precautions should be taken into consideration with handling males in rutt, males with antlers and pregnant females.

When deer are young they will be caught up in the first few days of life for a health check and if necessary pulled for hand raising or castrated. Males can be castrated on site under a local anesthetic. Deer will also be micro chipped, tagged, weighed and vaccinated.



MEDICATIONS suitable to use to deer

Tolfedine
Penicillin
Meloxicam
Asprin
Metronidazole
Omeprazole
Clopixol-acuphase

Silvazine cream

Recovering – head up in sternalrecumbency position

8.3 Routine Treatments

Chital can be treated for worms every 3 months with Eraquell Pellets*

They can be given in apple or mixed in the chaff.

If no sign of worms within group and routine feecal's continue to show no worms, worming can be held off until such time where worms appear.

8.4 Known Health Problems

- Taronga Zoo Sydney has a 8 year old deer who is showing signs of cataracts, Left eye appears to be worse than right. Observations and continuing and possible surgery if there is significant detriation(vet/ren)
- Taronga Zoo Sydney has had 3 affected animals with patchy alopecia, the group has been observed and no sighting of barbering within group. external parasites have not been seen to be a problem in the exhibit or within any animal within group. Skin scrapings have been taken.
- I have seen the group at Taronga roll their necks, whether this is a health problem or accocated with their digestion I have not found information as yet.

8.5 Quarantine Requirements

Quarantine

Deer transported to and from captivity will need to be quarantines for at least 31days and then introduced into the group.

Quarantine areas must be cement areas with good drainage. High stable wooden walls and preferably in a quite area with cover and covering an area with darkness to settle the animal. Depending on the deer barrier nursing quarantine areas may be set up and institution policies and procedures will need to be followed.

Deer being a herd animal do like company, if able to quarantine two together will help to settle the pair.

9 Behaviour

9.1 Activity

Like many cervids spotted deer are a social species. A herd may consist of all ages and sexes with interactions between all.

9.2 Social Behaviour

Herd composition

The basic social grouping normally consists of a matriarchal family group, normally consisting of a adult female, her offspring from the previous year and a fawn. The usual herd will consist of a few of these family groups and sometime individual deer will join the group, these are of mixed sexes and ages. Herd sizes can vary from 2 – 15 individuals in Texas. (TEXAS)pg25) or vary from 5 – 38 in India.

During the breeding season immature and adult males will join a herd. Yearling males will leave their mothers and form their own group when their spiking antlers mature.

Yearling females remain with their mothers and may remain with their mother till after their first fawns birth.

Sexually active males will join a female herd to find a receptive female. Males showing signs of old age, possibly incapable of breeding often stay solitary.

Nursery groups of females are often formed with mothers of fawns less then 8 weeks of age,(TEXAS) these groups can be up to 20 females. As fawns reach 8 – 10 weeks these groups separate and join other herds. (TEXAS)

Displays of males

(TEXAS) – Aggressive displays between males are common when males are grouped together, it is more common to see in young and sub adults during their major breeding season and among large dominant males in velvet after the breeding season.

(TEXAS) There are 4 distinct aggressive displays among spotted deer,

A subordinate male showing the head down display

Often used when a new males joins the herd,

A dominate male showing present of threat

Often used by yearling males and follows into a sparing match.

Head up display

Often displayed by dominate males behind subordinate males presenting in the head down display.

Antler threat

Displays of females

Aggressive Behaviour is less common in females (TEXAS) and often occurs due to crowding at feeding time.

9.3 Reproductive Behaviour

Spotted deer are temperate. So the breeding season coincided with optimal conditions for survival for the young.

See 10. Breeding for specifics.

9.4 Bathing

Groom themselves by licking.

Chital can swim

9.5 Behavioural Problems

Captive born adult males who have not been castrated can be very difficult to manage. They become aggressive and use their antlers as weapons. Keepers should not work in the males during the rutt season.

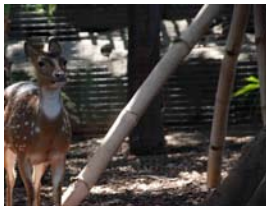
9.6 Signs of Stress

Chital are nervous animals and will take flight when under stress, keepers to leave the area and monitor, contact vets to be on standby in case of escape.

9.7 Behavioural Enrichment

In the wild chital would be foraging for fallen fruits and fresh leaves. In captivity this can be replicated by scattering feeding berries and small browes around exhibit.

Enrichment ideas to replicate natural behaviors have been tried or to be tried (9/6/10) on the group 1.4 at Taronga Zoo Sydney.



Bamboo scratching poles



Brushes



Hanging hessian bag



Smear sticks



High hanging food



Hanging bamboo



Foraging sticks



Foraging log feeder



Shower



Browse matt

Ice blocks

Hanging logs

Twine balls with scents

Paper mache balls with holes containing part of daily intake

9.8 **Introductions and Removals**

Chital are a herd animal females can live in small and or large groups in the wild. So introducing new a new female or females to a captive group of females should be a smooth process. Introducing a new female to a small or an individual may make the process easier on a timid animal.

Males may fight when being added to a mixed group to assert dominance. If any of the females are in breeding season and the male has breeding rights to certain females the males will fight for breeding rights.

Castrated males may not fight for breeding rights creating an easier introduction.

9.9 **Intraspecific Compatibility**(arising or occurring within a species)

Chital are a placid species with males only fighting for breeding rights. Theses fights can be to the death.

9.10 **Interspecific Compatibility** (arising or occurring between species)

TEXES states that there is little if any competition between spotted deer and other ungulates for living space or food.

In the Greenwood Valley ranch and two other ranches located in the Edwards plateau regions, TEXAS, mixed feeding and resting groups were seen between fallow deer, blackbuck antelope, nilgai antelope or mouflon sheep.

Chital have a relationship with Langurs. The langur's drop berries and leaves to the ground which the chital eat, this relationship seems one sided but the two responded to each other alarm calls so early detection of predators probably benefit both.

9.11 Suitability to Captivity

Chital are suitable to captivity, they are herd animals and need a large area to be able to run. They can be very flighty animals and need distances to run.

10 Breeding

10.1 Mating System

Chital do not appear to have a well defined breeding or rutting season and are able to calve and mate during all months of the year.

10.2 Ease of Breeding

In the wild chital are a feral species as they breed through out the year and can repopulate an area in a short period of time.

10.3 Reproductive Condition

10.3.1 Females

Females sexual mature and first breed at 14 -17 months of age but some individuals may show signs of oestrus as early as 10 months of age (Alcala, 1994). Oestrus cycle length is 18 - 20 days throughout the year.

Female are capable of ovulating and concebing soon after giving birth and have the ability to produce three calves in 28 months assuming an avareage calving interval of 275 days, optimal fertility and nutrition. Mean gestation is assumed to be 234 days.

10.3.2 Males

Male reach puberty at 14 months.(1 ½ years old (Cervus alfredi))

- First rutt is after the first hardening of the second antlers.
- Males shed their antler annually at intervals of 10 – 12 months (TEXAS)
- When antlers shed, the area is raw and open and may bleed.
- When the antlers start to grow they do so and develop in what's called the velvet stage as they produce velvet like hair. This is when males can do the most damage to them selves in a fight as they can not protect themselves in this stage.

Antler growth

(TEXAS) antler maturation is due to a development time that increases with the age of the male. Spike-antlered males require less than 3 months; 10 to 19 inch males, 3 to 3.5 months; 20 to 29 inches, 4 – 4.5 months; and 30 plus inch males, 4 to 5.5 months.

Young males attain their first antlers, spikes 1 to 6 inches long at 17 - 20 months of age. Maturation of the first set of adulats antlers usually

occurs at 25 to 28 months. This is a three tined, with the tines well developed and the main beams less than 15 inches. Antler length and weight appears to increase until full potential is reached at 5- 6 years of age. There seems to be a slight decline in antler size after 8- 9 years.

CHAPPLE STATES that In temperate species it is seen that generally the oldest male that casts his antlers first within the herd, presumably so he may be the first to achieve hard antler growth and gain dominance, and to be the first stag in rutting condition for the next mating season. Chapples studied showed some synchrony in antler cycles within herds.

Antler removal

Deers antlers are commonly removed in farming and in captive environments due to the danger of injury to other deer, keepers and themselves. CHAPPLE's studied show that from the amount of regrowth from being cut at 42 and 51 days of growth that it should be done before this.

Polling at several months of age permanently inhibits growth of pedicels and antlers

10.4 Techniques Used to Control Breeding

Castrating of males.
Implanting female

10.5 Occurrence of Hybrids

10.6 Timing of Breeding

Breeding can occur throughout the year.

10.7 Age at First Breeding and Last Breeding

Females can breed from their first oestrous cycle

10.8 Ability to Breed Every Year

Females have the ability to breed yearly as males rutting is all year round as well as the female oestrous cycle.

10.9 Ability to Breed More than Once Per Year

Females are capable of ovulating and conceiving soon after giving birth and have the ability to produce three calves in 28 months assuming an average calving interval of 275 days, optimal fertility and nutrition. Mean gestation is assumed to be 234 days.

10.10 Nesting, Hollow or Other Requirements

The female will hide the fawn in shrubbery while she forages for food.

10.11 Breeding Diet

The chital diet is not increased with pregnant females but Lucerne hay will always be readily available to chital this amount fluctuates on a daily basis.

10.12 Oestrous Cycle and Gestation Period

Females sexual mature and first breed at 14 -17 months of age but some individuals may show signs of oestrous as early as 10 months of age (Alcala, 1994). Oestrous cycle length is 18 - 20 days throughout the year.

10.13 Litter Size

1 fawn is the most common litter size. Twinning is possible.

10.14 Age at Weaning

The group studied by Chapple saw that calves were seen suckling their mothers up to six months of age, although the frequency of suckling decreased steeply from two months. The most rapid periods prior of growth was from birth to three months and this correspond with the period prior to reduced suckling to reduced suckling frequency. This suggests that the natural process of weaning commences early, and that three months of age would be a situation time to wean. Fallow deer are commonly weaned at three months of age, when their live weight is 15-18 kgs. At this age spotted deer are similar in weight.

10.15 Age of Removal from Parents

If pulled for hand raising fawns should be pulled at 3 days of age. (vogelnest)

10.16 Growth and Development

Chapple (1989), Birth weights of chital calves.

Sex	n	mean+/- SD (kg)	Range (kg)
Female	28	3.37 +/- 0.47	2.5 – 4.2
Male	20	3.71 +/- 0.47	2.8 – 4.7
Both	48	3.53 +/- 0.52	

Live weights of spotted hinds to 18 months of age are in the same range as those of fallow does of similar age. Both show the most rapid period of growth from birth to three months, with continued positive growth from birth to three months with continued positive growth to 14 months.

Permanent dentition is acquired at 2 ½ – 3 years of age and adult size is reached at 6 years for females and 4-5 years for males.

Male antler development

Antlers are made from bone like material. Not keratin. Antlers covered in a soft, fuzzy material, called 'velvet' and is important in the growth of them. As they grow in each year, the velvet covering provides blood and nutrients to the growing antler. Once the antlers have fully grown in, the velvet peels off leaving only the bony antler behind.

Males grow and shed antlers annually.

Deer eat antlers which offers them a form of nutrients.

11 Artificial Rearing of Mammals

CERVIDAE – CHITAL & FALLOW DEER HANDRAISING - TWPZ

11.1 Housing

Fawns are to be housed in a heated environment if possible at approx 20 – 25 degrees at all times. This is essential if the animal's health is compromised, if it is not doing very well feeding or it is losing weight.

In any other cases make sure that at least a heat source is available. Eg. Heat lamp or heat mat and that the area is enclosed to ensure the heat is contained to one spot over the bed area.

Ensure that the floor is non-slip (rubber matting is a good option) and that a bed of thick straw is available.

Area should be made of solidwalls and at a reasonable height so that the fawn cannot break through or jump over.

The fawn can have access to an outside yard at about 2 weeks plus (depending on how strong it is) to customize it to sights and sounds.

11.2 Temperature Requirements

Fawns are to be housed in a heated environment if possible at approx 20 – 25 degrees at all times. This is essential if the animal's health is compromised, if it is not doing very well feeding or it is losing weight.

11.3 Diet and Feeding Routine

Routine is very important. Feeding times must be set and adhered to. It is usually better for one person to initiate feeding and to introduce other feeders as soon as possible to avoid neonates imprinting on one person.

All young need to be stimulated to urinate and defecate after each feed by gentle patting – never rub. Ensure they are left clean afterwards.

Milk temperature is to be fed at body temperature.

Time to feed

4 feeds a day, initially for up to 7 days depending on the animals condition, hydration and weight, then follow the weaning chart.

Feeds and weaning

4 feeds	1 st 7 days
3 feeds	2 – 8 weeks
4 feeds	8 – 10 weeks
Wean	10 – 12 weeks

Amount of milk per feed

Feed up to 20% of the animals body weight per day

The milk should be warmed to body temperature and tested prior to being fed.

Colostrum for 24 – 48 hours (day 1 – 2). This is if the deer has not already received it from the mother.

½ Colostrum ½ Deer formula for 24 – 48 hours (day 3-4)

Full strength deer formula

Solid food, i.e. apple, carrot and sweet potato can be introduced to get the animal interested as soon as possible. Soft Lucerne / chaff / meadow hay / dairy meal or stud mix can be offered.

Put a small bowl of water in with the animal from a few days of age.

The above feeds will depend entirely on the time the animal was obtained, the body condition and the temperature of the animal.

Fawn milk formula

1 litre of boiling water

150 gms Full Cream milk powder

2 egg yolks

100mls Thickened cream

Teat

Small deer can start on wombats teats then change to the Biolac deer teats. They can be taught to lap from a bowl eventually.

Birth weight average

Chital: 1.6 – 1.8 Kgs

11.4 Specific Requirements

Fawns should be pulled within the first 3 days of life once they have suckled from the mothers and therefore received colostrums. If there is no remnants umbilical cord the fawn is likely to be older than 3 days.

11.5 Data Recording

Time of feeding

Behaviour of animal

Milk formula

Feed charts

Weights
Teats used
Formula consumed
Any notable events

11.6 Identification Methods

Animals can be tagged.

11.7 Hygiene

Hygiene is of great importance. Bottles and teats need to be washed thoroughly and soaked in sterilising solution (Halasept). Utensils are to be rinsed with pre-boiled water before use. Face wipes are not shared with anus wipes etc. Cloth to be washed daily. All young to be left with a clean mouth after the feed (includes chin, lips etc.)

All equipment used to be feeding the deer and making up the formula must be kept in a bucket of sterilization solution while not in use.

4mls of F10 SC disinfection to 1 litre of water

Rinse all equipment in water before use after it has been soaking in the disinfectant.

Hands to be washed in Aquimcell, before and after feeding.

11.8 Behavioural Considerations

Fawns should be raised individually for at least the first 7 days to ensure imprinting is on the hand raiser not on another fawn.

11.9 Use of Foster Species

Using a foster species would be possible but most likely unnecessary.

11.10 Weaning

2 feeds @ 8 weeks
1 feed @ 10 weeks
Wean @ 12 weeks

11.11 Rehabilitation and Release Procedures

Introducing the fawn to other animals is usually started after about 1 week of age. This is to ensure that the animal has imprinted to the bottle feeder first so it realizes where the food is coming from.

Acknowledgements

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Kimberly vinetteheeran

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12 Bibliography

13 Appendix

At Taronga Sydney food is ordered on a daily food order sheet and is taken to the food preparation office every afternoon by the late shift keeper and food is delivered the next morning to the section listed. Thursday's food order needs to cover the weekend. Standard food orders of fresh fruit and vegetables are delivered every morning.

D & R Dairy rations

Y.S FEEDS PTY LTD

ACN 001 285 543

133-135 Lovell Street, Young NSW 2594

Manufactured from: wheat, Maise, Barley, sorghum, pollard, bran, oats, Lucerne meal, calcium carbonate, fine salt.

ANALSIS

Minimum crude protein..... 14%

Crude fat..... 4.0 %

Maximum crude fibre 7.0 %

Salt 0.5 %

5 in 1 Vaccination

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Palatable wormer

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Each 30g sachet contains 120mg Ivermectin. Dosage calculated by weight.