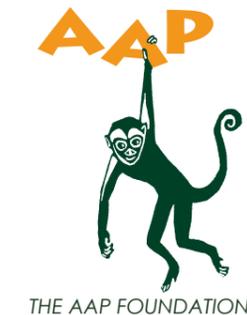




CAPTIVE CARE STANDARDS

AN OVERVIEW OF STANDARDS FOR THE KEEPING OF WILD ANIMALS IN CAPTIVE CARE SETTINGS IN MALAWI





WRITTEN BY

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GLOSSARY

- Abnormal behaviour** Unnatural animal behaviour which is generally due to the inability to cope with a particular combination of internal and/or external stimuli. Abnormal behavior often expresses itself in repetitive behaviours without obvious goal or function, self-inflicting behaviours or apathy.
- Animal welfare** The extent to which an animal is able to meet its physical or psychological needs by being able to live in harmony with its environment.
- Act** The National Parks and Wildlife Act 2017 (as amended).
- Captivity** Any setting whereby an animal is being kept in a confined area, where it is dependent on regular human care and support to fulfil its basic physical and psychological needs.
- Caretaker** A person who provides daily care to an animal to fulfil its physical and psychological needs.
- Chute** A restricted area within an enclosure which contains one or more hydraulic or movable barriers that can “squeeze” together to restrict an animal’s movement.
- Director** The Director of the Department of National Parks and Wildlife.
- Domesticated animal** An animal species which has been tamed as a result of being kept and bred under human controlled conditions, generally for production or companionship purposes.
- Education facility** A facility whereby wild animals are kept for professional education purposes, e.g. a university.
- Enclosure** The primary accommodation in which a wild animal is confined, such as a cage or fenced off area.
- Enclosure barrier** Any kind of physical barrier which helps to contain an animal in a restricted area.
- Enclosure furniture** All natural and unnatural structures within an enclosure which allow an animal to express its species-specific behaviours, e.g. providing opportunities to hide, climb, swim, rest and shelter.
- Enclosure infrastructure** The combination and connectivity of the main enclosure, shift yards, indoor rooms and hatches.
- Enrichment** An animal husbandry principle that helps to improve the quality of life of captive animals by identifying and providing behavioural stimuli necessary for optimal psychological and physiological well-being.
- Non-native species** A species that historically did not occur in the ecosystem of a specific location or region.
- Private facility** A person who keeps for personal reasons one or more animals in captivity on private property.
- Protective contact method** The practice of animal husbandry whereby there always remains a physical barrier between the caretaker and the animal.
- Public facility** Any facility whereby wild animals are kept in captivity and the public has the opportunity to see the animals, whether paid or free of charge.
- Quarantine** A designated, isolated area to temporarily hold animals on arrival at a facility, or when they are suspected of suffering from an infectious/contagious disease, with the aim of providing an opportunity to screen the animals for diseases.
- Quarantine time** The time required to keep an animal in isolation to determine if it is free of any infectious diseases.
- Standards** The Standards for the Keeping of Wild Animals in Captivity as referred to in section 54A (3) of the National Park and Wildlife Act (Amendment 2017).
- State registered veterinarian** A Malawian or international veterinarian who is registered under the Department of Animal Health and Livestock Development as a legal practicing veterinarian in Malawi.
- Surplus animal** An animal which can no longer be kept in a group or facility due to behavioural or capacity reasons.
- Wild animal** An animal species that has not been domesticated.
- Wildlife farm** A captive care setting where wild animals are commercially bred with the purpose of producing products like meat, skin or fur.
- Wildlife ranch** A fenced-off area of land where animals are able to live freely and do not, or to a limited extent, depend on human intervention for their survival.
- Wildlife rehabilitation** The process of treatment and care of orphaned, sick, injured or confiscated wild animals with the aim of releasing them back into the wild whenever appropriate and feasible.
- Wildlife rescue centre** A centre which takes in and provides care for orphaned, injured and/or confiscated wild animals in distress.
- Zoo** A facility with indoor and/or outdoor enclosures where living wild animals are kept for public exhibition.
- Zoonotic diseases** An infectious disease that can be transmitted from animals to humans.

ABBREVIATIONS

- AZA** American Zoo Association
DAHLD Department of Animal Health and Livestock Development
DNPW Department of National Parks and Wildlife
EAZA European Association of Zoos and Aquaria
GFAS Global Federation of Animal Sanctuaries
LSPCA Lilongwe Society for the Protection and Care of Animals
LUANAR Lilongwe University of Agriculture and Natural Resources
LWC Lilongwe Wildlife Centre
LWT Lilongwe Wildlife Trust
PASA Pan African Sanctuary Alliance
WESM Wildlife and Environmental Society of Malawi

SECTION I

SCOPE OF THE STANDARDS

Introduction

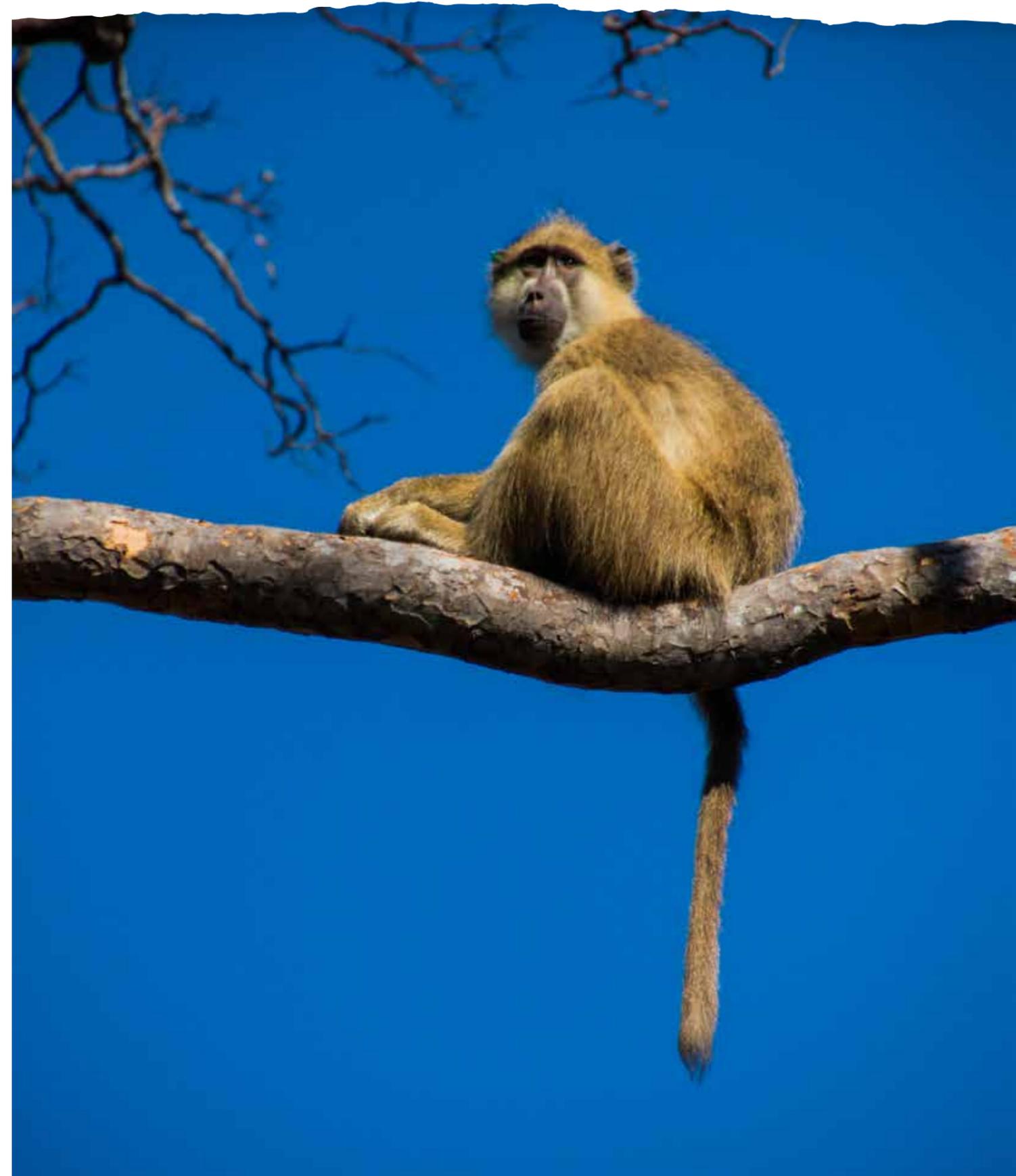
This document sets out the Standards for the Keeping of Wild Animals in Captivity in Malawi (the ‘Standards’). It details the regulations for the minimum required conditions and requirements to keep wild animals in captivity, whereby captivity is defined as:

‘Any setting whereby an animal is being kept in a confined area, where it is depending on regular human care and support to fill its basic physical and psychological needs.’

These Standards apply to all facilities where wild animals are kept in captivity. This includes: public facilities or attractions (such as zoos or lodges where animals are being kept on display); education facilities (such as institutions, like universities, where animals are kept for professional education purposes); wildlife rescue centres; and private facilities whereby wild animals are kept in captivity on private property.

The content of the Standards is based on existing international standards and publications with regards to keeping wild animals in captivity. For those groups or species where no existing standards are available, the Standards are based on general species literature as well as existing knowledge of specialists.

Under Section 83 of the National Parks and Wildlife Act 2017 it is an offence to cause unnecessary or undue suffering to any wild animal, whether that animal lives in the wild or is being kept in captivity. These Standards will be used by authorities when assessing potential offences of “unnecessary and/or undue suffering”. They also provide guidance for the issuing of Captivity Licenses under Section 54(A) of the National Parks and Wildlife Act 2017.



1. With reference to Section 54A (3) of the National Park and Wildlife Act (Amendment 2017, hereafter called the ‘Act’), the Standards for the Keeping of Wild Animals in Captivity (hereafter called the ‘Standards’) provide regulations with regard to the minimum required conditions and requirements to keep wild animals in captivity. The Standards also provide further meaning to the conditions to obtain an animal captivity license as described in Section 54A (1) of the Act.

2. Despite not being further mentioned within the Standards, wild animals being kept in captivity should be lawfully obtained subject to the provisions of the Act. According to Section 47, any person who takes a wild animal without the required license commits an offence. Therefore an animal captivity license needs to be acquired before acquisition of the animal(s). In the same line it is worth noting that under Section 83 of the Act it is an offence to cause unnecessary or undue suffering to any wild animal, whether than animal lives in the wild or is being kept in captivity and that these Standards will be used by authorities when assessing potential offences of “unnecessary and/or undue suffering”.

3. The Standards focus on keeping wild animals in captivity in a responsible way from both animal and human perspectives. The following criteria are hereby taken into account:

The welfare of wild animals

This aspect is addressed by setting minimum standards to meet the animals’ physical and psychological needs. Wild animals have complex needs that are closely tied to their natural diet, environment and behaviour in the wild. The needs of these animals are not always very well known. It can be difficult, if not impossible in some cases, for the average owner to provide for these needs. Animals can easily suffer physically or mentally as a result of poor husbandry.

Public health and safety

This aspect is addressed by setting minimum standards for husbandry and housing to eliminate or minimise certain risks. Public health and safety risks can arise because wild animals may possess certain threats which can result from poor husbandry or housing. Another potential risk factor is that wild animal can be common reservoirs of zoonotic diseases.

4. The scope of these Standards focus on wild animals which are kept in captivity, whereby captivity is defined as:

“Any setting whereby an animal is being kept

in a confined area, where it is dependent on regular human care and support to fulfil its basic physical and psychological needs.”

The Standards apply to all captive care facilities where wild animals are kept in captivity and, in particular:

- Public facilities or attractions such as zoos or lodges where animals are kept on display.
 - Education facilities such as institutions like universities where animals are kept for professional education purposes.
 - Wildlife rescue centres: professionally run rescue and rehabilitation facilities which aim to help wild animals in distress.
 - Private facilities owned by individuals who, for personal reasons, keep one or more animals in captivity on private property. Animals are kept indoors or outdoors in an enclosure or confined area or free-roaming in a confined garden area.
5. The Standards exclude wildlife farms and ranches. Although wildlife farms can keep wildlife in small confined areas, their main purpose is to produce animal products like meat, skin or fur. The keeping of wildlife for production reasons requires a different set of standards and is therefore beyond the scope of these guidelines.

Wildlife ranching is generally defined as the keeping of wildlife in a managed, fenced-off area of land, where animals are free-roaming with a minimum amount of human intervention. Although technically animals are confined in a fenced-off area, the difference with the Standards is that animals in game ranches are generally self-sufficient and therefore human intervention is kept to a minimum.

6. The taxonomic families of wild animals and their species targeted by the Standards are:

- Those species of mammals which are listed under the National Parks and Wildlife Act (Amendment 2004) as Protected Species.
- Those species of mammals which are native or non-native, but are known to be commonly kept in captive care settings as described under section 1.3.

An overview of the species and families of species being addressed by the Standards can be found in Appendix I.

7. The content of the Standards is based on existing international standards and publications with regards to keeping wild animals in captivity.

For those groups or species where no existing standards are available, the Standards are based on general species literature as well as existing knowledge of specialists. Wherever required or desirable, the Standards are adapted to address the welfare and health and safety aspects of keeping wild animals in captivity.

8. The Standards provide a set of general standards for keeping wild animals in captivity. These standards must be met by each individual person or institute keeping wild animals in captivity. The set of general standards is provided in section II and covers the following aspects:

- Management requirements
- Enclosure requirements
- Husbandry requirements
- Nutritional requirements
- Veterinary requirements
- Health and safety requirements

9. The Standards should be considered the minimum requirement for adequate welfare and health and safety criteria. These minimum requirements also depend on the specific circumstances in which a wild animal is being kept, e.g. group composition, location of the enclosure, history of the animals and the purpose of keeping the animals in captivity. Therefore the requirements for keeping certain wild animals in captivity can be higher than as determined by the Standards.

10. The Standards classify wildlife mammal species based on their requirements and feasibility to be kept in captivity. The classification is undertaken by a technical expert committee by applying the scoring tool as presented in Appendix 2. As a result all species covered by the Standards are categorised in one of the following four classes:

Class A species: Those species for which there is a relatively small risk that their welfare will be affected by captivity and/or they form a risk for human health and safety. For these species, it is generally easier to meet the conditions required to minimise any existing risks and usually no specialised knowledge or expertise is required to do so.

Class B species: Those species for which there is a modest risk that their welfare will be affected by captivity and/or they form a risk for human health and safety. For these species, it is possible to minimise these risks to an acceptable level when existing knowledge and expertise is applied by holders who have sufficient knowledge, expertise and resources.

Class C species: Those species for which there is a high risk that their welfare will be affected by captivity and/or they form a serious risk for human health and safety. In theory it may be possible to minimise these risks if the right expertise is fully applied and all resources are available. However, even under these conditions it can remain challenging to meet the welfare criteria and/or fully eliminate all associated health and safety risks. Species within this class should usually only be kept by professionals who have the proven knowledge and skills to provide these animals with the best possible care standards.

Class D species: Those species for which there is a very high risk that their welfare will be seriously affected by captivity and/or they form a very serious risk for human health and safety, even when all existing knowledge on how to keep these wild animals in captivity is applied. Species within this class should never be kept in captivity, unless for emergency rescue or conservation purposes. In case of the latter, captive care should only be allowed by specialists.

The classification of each mammal species is included within the Standards under Section III.

11. Based on the above classifications, the Standards give direction with regard to the likely legal requirements for keeping wild animals in captivity without causing them “undue and/or unnecessary suffering”. Therefore, the Standards provide guidance for the issuing of captivity licenses under Section 54(A) of the National Parks and Wildlife Act of Malawi (as amended). To help achieve this, all species within the Standards have been categorised in one of the following categories to help guide authorities and stakeholders, including the general public, as to whether an animal can be kept in captivity without causing it “undue and unnecessary suffering” and/or it posing a risk to health and safety:

Category I: Generally should be allowed to be kept by private persons and institutions in captivity without a captivity licence.

Category II: Generally should be allowed to be kept by private persons and institutions under the condition that a captivity licence is provided based on the Standards being set.

Category III: Generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/ or conservation purposes.

A complete overview of the species per category is provided in Section IV.

12. Native and non-native species to Malawi which are currently not listed in one of the categories indicated should generally not be allowed to be kept in captivity until further assessments have been made and a set of captive care standards for that species has been assigned, unless special exemption is granted by the Director of the DNPW (hereafter called the 'Director'). With regard to non-native species it is highly recommended to maintain a very cautious and restrained policy with regard to proving captivity licenses.

13. The Standards as presented cover all facilities as indicated under article 3 whereby wild animals are kept in captivity. However there might be emergency situations where there is a need to temporarily keep a wild animal in a captive care setting for rescue or conservation purposes where the Standards cannot be met straight away. In such cases permission for a temporary license can be submitted to the Director. A temporary license to keep a wild animal in captivity should not exceed a maximum period of three months and the conditions in which the animal is kept should be monitored and approved by a state registered veterinarian.

SECTION II

GENERAL STANDARDS FOR THE KEEPING OF WILD ANIMALS IN CAPTIVITY



This section provides a set of general standards for keeping wild animals in captivity. These standards must be met by each individual person or institute keeping wild animals in captivity.

1. Management requirements

1.1 The facility must at all time have (a) caretaker(s) with adequate and verifiable species-specific training, experience and/or knowledge to provide the animals with highest levels of welfare and minimises all associated health and safety risks.

1.2 Any person or institution which keeps or wants to keep wild animals needs to be in possession of a management plan for the facility. A management plan should at least contain the following information:

- Description and main goals of the facility
- Purpose of the animals to be kept
- Species and (maximum) number of individuals per species to be kept
- Animal acquisition policy (if relevant)
- Enclosure facilities and design
 - Size and dimensions
 - Infrastructure
 - Barriers
 - Furnishing
 - Ground surface
 - Climate control
- Species/population management plan
 - Group structure(s)
 - Reproduction
- Caretaker staff, including species-specific training, experience and/or knowledge
- Animal care policy
 - Welfare management
 - Veterinary care
 - Nutrition
 - Animal handling
 - Enclosure hygiene
 - Record keeping
- Health and safety policy
 - Emergency policies
 - Staff health and safety
 - Procedures for dangerous animals
- Visitor policy
- Financial plan
 - Yearly budget
 - Funding strategy

1.3 Any facility keeping wild animals under a captivity license should at least keep the following records:

- Animal species being kept including birth, deaths, arrivals and departures
- Animals' origin

- Previous locations and/or owners
- Wild or captive born
- Dates of acquisition
- Date of birth (when known)
- Sex
- Animal identification e.g.:
 - Photo
 - Microchip
 - Identification tags/rings
 - Tattoo
- Veterinary records
 - Treatment
 - Health checks data
 - Vaccinations
 - Necropsy reports

1.4 Besides the records as indicated in 1.3, public facilities, educational facilities and wildlife sanctuaries also need to keep records of:

- Total number of individuals kept per species
- Up-to-date overview of group compositions
- Daily husbandry records
 - Animal behavioural records
 - Animal physical records
 - Medical records
 - Feeding records

2. Enclosure requirements

2.1 All wild animals need to be housed in an enclosure suitable for the particular species, taking into account the age, history and medical status of the animal(s). The enclosure needs to meet the minimum requirements in size and dimensions, as well as have the appropriate furnishing to:

- Allow sufficient and appropriate exercise for the particular species;
- Avoid individual animals being unnecessarily dominated by other group members and consequently have insufficient access to required resources;
- Avoid the risk of long-term conflicts between herd or group members or between different species in mixed exhibits;
- Provide the opportunity for the animals to be out of sight and not be unnaturally provoked by the viewing public or any other animals surrounding the enclosure;
- Avoid an unacceptable build-up of parasites and other pathogens.

2.2 For those animals which are kept socially, the facility should provide appropriate accommodation for animals which are in need of

temporarily housing separate from the group (for instance in case of illness or injury). Temporary housing separate from the group should not exceed a period of three months. In case there is a need to separate an animal for a longer period of time, written permission is required from the Director. A written request to extend the period needs to be accompanied by a situation report from a state registered veterinarian.

2.3 Quarantine enclosures are allowed to differ in size and dimensions from the minimum requirements set in these Standards. The length of time that an animal is kept in quarantine should not exceed the period of three months. In case there is a need to keep an animal in quarantine for a longer period of time, written permission is required from the Director. A written request to extend the period needs to be accompanied by a situation report from a state registered veterinarian.

2.4 In the case that more than one species is kept in the same enclosure and use the enclosure space in the same way, the minimum size in space and dimension of that enclosure for all individual animals must be based on the requirements set for the species with the highest requirements in the Standards.

2.5 In the case that more than one species is kept in the same enclosure and use the enclosure space in a clearly different way, the minimum size in space and dimension of that enclosure must be based on the number and the requirements of the species with the highest required standards in the Standards. In such cases there is no need to add further enclosure space for species with lower requirements in terms of enclosure space and dimensions, unless the total space provided is compromised for that particular species.

2.6 Enclosures and enclosure barriers need to be designed and constructed to contain the animal in a safe and secure way and to ensure that the enclosure and barriers do not present danger or risk of injury to the animal or negatively affect the general health of the animal(s) being kept.

2.7 All enclosure furniture should be constructed and maintained in such a way that it does not present a (potential) danger or risk of injury to the animal or negatively affect the general health of the animal(s) being kept.

2.8 The enclosure needs to be constructed in a way that it is possible to clean and maintain the enclosure without creating a stressful or dangerous situation for the animal(s) as well as the caretaker.

2.9 The ground surface of the enclosure needs to be of such a structure that it supports the species-specific way of moving and does not present a (potential) danger or risk of injury to the animal or negatively affect the general health of the animal(s) being kept.

2.10 The climate conditions (like temperature, humidity, ventilation, and lighting) in the enclosure need to fall within the tolerance range of the particular species being kept.

2.11 The enclosures need to be provided with sufficient shelter to protect all animals from inclement weather conditions, such as heavy rains, wind and direct sun. This can be achieved by providing natural structures (trees, shrubs, logs, rocks) or artificial structures (barns, shelters, etc.).

2.12 Animals should not be housed in direct and/or visibly adjoining enclosures if this housing arrangement may cause or is causing undue or unnecessary long term suffering and stress.

2.13 Any enclosure needs to be constructed and situated in such a way as to prevent predators from entering or approaching the enclosure of the animal(s) and in such a way as to keep other harmful animals out.

3. Husbandry requirements

3.1 Animals should only be handled by, or under the supervision of, a caretaker who is competently trained and authorised. All handling of the animals need to be done with care, in a way which will avoid unnecessary discomfort, behavioral stress or actual physical harm to animals.

3.2 All animals must be kept in way that their species-specific physical and psychological requirements are met, as outlined in the Standards. Such requirements have been based on the natural living conditions of the species, scientific knowledge as well as existing captive care reference guides available. Examples of requirements to be taken into account are:

- Social organisation
- Diet
- Structure of the ground surface on which the animal(s) is kept
- Availability of open water for swimming/bathing
- Appropriate resting places (den/nest/sleep trees)
- Appropriate furniture
- Sufficient and appropriate opportunities to hide

3.3 For animals being kept in groups, group structures should resemble, as much as possible, the natural social organisation of the species.

Where this is not possible, animals should be kept in a group composition whereby all individuals are compatible with each other. In either case, the group will need to be observed by the caretaker to determine mutual tolerance amongst the individuals. Any animals under long-term social stress should be removed from the group. Social animals should generally not be kept alone or in group combinations which lead to undue or unnecessary suffering, stress or discomfort. For individual social animals which cannot be kept in a social group composition for a period of more than three months, serious and demonstrable effort needs to be undertaken in order to move the animal(s) to a setting where it (potentially) can live in a social group. Long-term solitary keeping of a social animal is only allowed in exceptional circumstances and after written permission is provided by the Director. A written request needs always to be accompanied by a situation report from a state registered veterinarian. Approval in such a case should only be allowed if the living conditions of the animal(s) do not lead to undue or unnecessary suffering.

3.4 The reproduction of animals in captivity can contribute positively to the welfare of the animals. Reproductive and parental behaviour fulfils a basic need of many species and often provides a positive stimuli to a group's social interactions and cohesion. However, unrestricted reproduction in captivity can also lead to surplus animals e.g. too many individuals in relation to the available enclosure space or an undesirable group composition. Therefore, reproduction should be sustainable and only allowed if a pre-defined plan for the offspring has been agreed with DNPW and is included in the issued captivity license. Therefore, the reproduction of wild animals in captivity should only be allowed under controlled circumstances and should never lead to surplus animals. In those cases where reproduction is not desirable or should be restricted, the animals must be provided with contraception that is appropriate for that species.

3.5 Two or more different species should only be allowed to be kept together in one enclosure if they are able to live in harmony and one or more of the species are not compromised in their species-specific physical or psychological needs.

3.6 To create a varied environment, any enclosure must provide sufficient and appropriate environmental stimuli to ensure the psychological wellbeing of the animal(s). Where an enclosure does not provide sufficient stimuli on its own, additional species-specific environmental enrichment must be provided to ensure the wellbeing of the animal and prevent undue

or unnecessary suffering. Enrichment is an important tool to stimulate natural behaviour repertoires of animals in captivity and to help meet the physical and psychological needs of the animal. All animals in captivity must always receive adequate and appropriate enrichment.

3.7 To ensure the safety of the animal in an enclosure, all barriers and enclosure furniture must be checked on a regular basis to ensure that it is safe and of adequate strength to prevent escapes or potential hazardous situations for the animal(s). In case of any potential hazardous situations, appropriate action need to be taken as soon as possible to restore a safe environment.

3.8 Animals which can (potentially) represent a danger to the environment if they escape should always be kept in an enclosure which is specifically designed to contain that particular species. The door/entrance, as well as the locking system, should be of sufficient strength to safely contain the animal. Wherever possible a double door system is put in place to prevent escapes while entering the enclosure.

3.9 To ensure enclosure hygiene and minimise disease hazards, uneaten perishable food should be removed within a timeframe appropriate for the type of foodstuff and size of enclosure, prior to molding or contamination. Animal waste must be removed from the enclosure as often as necessary to prevent disease transmission, and water reservoirs, food containers and feeding areas must be cleaned on a daily basis. Proper sanitation is an important element of pest control and disease prevention and must be properly implemented at all times.

4. Nutrition requirements

4.1 Food, water and milk (whenever required) must be provided so that it always meets the nutritive value and quantity required for the particular species and for individual animals within each species. When providing food, water or milk, the caretaker must keep in mind the condition, size and age of each animal as well as the need to adapt the diet and quantities to specific species-specific circumstances (e.g. fast days or seasonal variation) and special diets for individual animals (e.g. animals undergoing a course of veterinary treatment, pregnant or lactating animals).

4.2 The nutritional status of the animal must also be checked and evaluated on a regular basis. In case of any nutritional shortfall, the diet, quantity of food provided and/or the way the food is presented must be adapted so that all subsequent

feeding/watering of the animal(s) meets its nutritional requirements.

4.3 The number of feeds and time of food being presented should resemble and support the natural foraging and feeding patterns of the animals being kept.

4.4 To prevent contamination, all animal food and drink supplies must be stored and prepared under appropriate and hygienic conditions. This entails, for instance, food to be stored in a way that it is inaccessible by vermin and always prepared on a clean surface and with clean kitchen utilities. Separate cutting boards, utensils and food preparation surfaces must be used when meats, fish and vegetable produce diets are prepared in a common kitchen area.

4.5 In cases where animals are socially housed, animal food must be provided in such a way that all animals have access to it and that all animals are able to acquire a sufficient amount and variety of food. In case there are one or more animals not able to feed properly, appropriate action must be taken to resolve this issue.

4.6 Uncontrolled feeding by visitors should not be permitted. Where feeding by visitors is permitted this should be on a selective basis and only with suitable food, with approval from management, and under supervision from trained caretakers.

5. Veterinary care requirements

5.1 To obtain a captivity license, the applicant must obtain a letter from a qualified and state registered veterinarian in Malawi, wherein he/she states to provide the required health care for the animal the license is requested for.

5.2 In any case where an animal being kept is showing health problems, the holder of the animal must consult a state registered veterinarian to assess the animal and provide appropriate treatment.

5.3 Public facilities, educational facilities, wildlife sanctuaries or any other facility keeping C or D class species should ideally have a wildlife experienced veterinarian within their staff. When such a person is not available within the organisation, an affiliated wildlife experienced veterinarian must be available on consultancy basis.

5.4 Privately run facilities with less than 10 animals of class A or B exempted, each captive care facility must have veterinary policies and Standard Operation Procedures (SOPs) which cover preventative health care as well as treatment

procedures for ill or injured animals. Policies and procedures must cover transmission of diseases between animals and/or staff members and animals. All these procedures must be approved by DNPW and DAHLD as a minimum and ideally an international regulatory body.

5.5 Any captive care facility must have appropriate facilities and procedures in place in order to adequately and safely quarantine new animal arrivals. New animal arrivals must be kept in quarantine for the time as appropriate for that particular species. Quarantined animals must be proven, by a qualified and registered veterinarian, to be free of diseases before they are allowed to leave the quarantine facility.

5.6 To ensure their physical and psychological wellbeing, all animals must be checked on a daily basis by a qualified and/or experienced caretaker, whereby special attention is paid to their physical condition and general demeanour. In case of a public facility, animal rescue centre or other professional animal facility, daily records of these inspections must be kept on file.

5.7 In case of an unnatural death or when the cause of the death is unknown, the holder of the animal(s) must consult an affiliated state registered veterinarian to discuss the situation and procedures that will be required following the death of the animal(s). In any case where the death of the animal is related to a (suspected) infectious disease, DNPW and DALHD will need to be informed straight away.

5.8 In case of a public facility, the animals should not be manipulated in any negative or unnatural way to entertain the public.

6. Health and safety requirements

6.1 Where the facility keeps animals which represent a potential risk for the health and safety of people and/or the natural environment (e.g. exotic species), a thorough emergency protocol needs to be in place which describes, in detail, the actions that will be taken in the event of an escape. Caretaker staff must have a thorough understanding of the procedures and potential risks of working with the specific species and training records must be kept.

6.2 Privately run facilities with less than 10 animals of class A or B exempted, each captive care facility needs to have a disaster preparedness plan in place to cover emergency procedures in the event of a natural disaster (fire, flood, etc). Caretaker staff must have a thorough understanding of the procedures and potential risks of working with the specific species and

training records must be kept.

6.3 When taking care of (potentially) dangerous animals, caretakers must work according to the 'protected contact' method, or whenever appropriate, wear appropriate protective clothing. 'Protected contact' in this case means that caretakers should not share the same physical space with the animals without the benefit of some type of barrier.

6.4 Animal capture and restraint should only be done by, or under the supervision of, competent and skilled caretakers and in accordance with standard methods that have been approved for the species needing to be captured/restrained. Appropriate catching equipment and protective gear must be used to prevent and unnecessary harm of the caretaker or animal(s).

6.5 To prevent potential disease transmission, caretakers must be provided with appropriate protective clothing and equipment for cleaning animal enclosures and in situations where hands-on contact with an animal is required (e.g. medical procedures, animal capture).

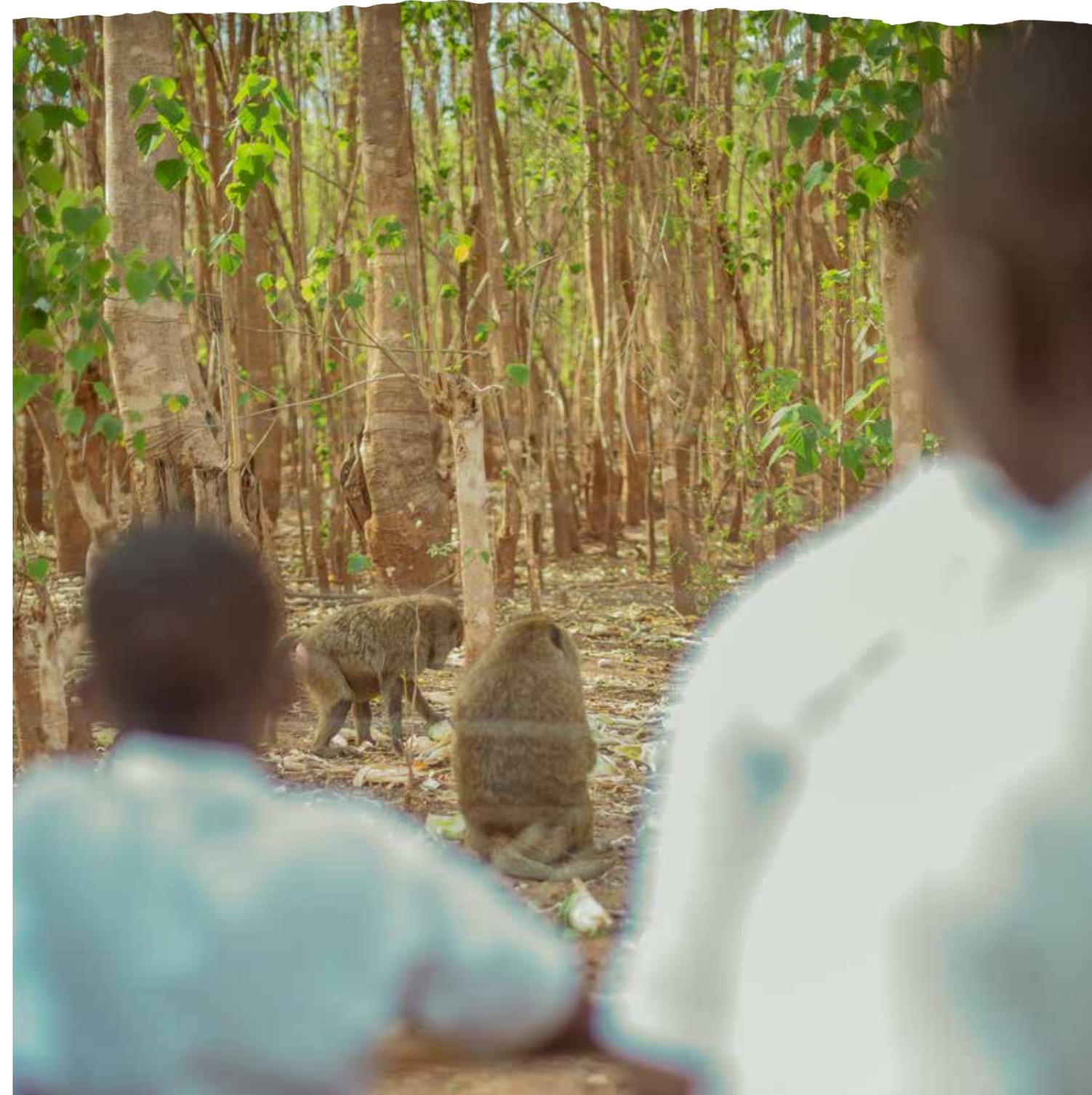
6.6 For those species which are known to be susceptible to zoonotic diseases e.g. primates, caretakers should be, whenever reasonably possible, vaccinated, with their consent, against most common zoonotic diseases and also receive periodic health checks.

6.7 In the case of a public facility, any direct contact between visitors and animals should be prohibited. Appropriate secondary barriers need to be in place around the enclosure which prevent any direct contact between visitors and animals.

6.8 In the case of a public facility, appropriate signage should be in place indicating rules on how to behave in the presence of the animals with the aim of preventing any negative impacts on the welfare of the animals and ensuring the safety of the visitors.

SECTION III

STANDARDS PER TAXONOMIC FAMILY AND SPECIES



Standards per taxonomic family and species

This section provides minimum care standards for each taxonomic family of mammal species covered by the Standards. In addition and wherever possible, species-specific standards are provided where the standards for species within a certain taxonomic family differ from each other and therefore the species requires more specification.

Aspects covered in this section are:

- Enclosure requirements
- Husbandry requirements
- Nutritional requirements
- Veterinary requirements
- Health and safety requirements

A complete overview of families and species covered in this section is provided in Appendix 1.

Besides the minimum care standards, each species is also classified based on their requirements and feasibility of being kept in captivity. The methodology used for the classification is presented in Appendix 2.

1. SUIDAE (PIGS)

Species and classification

Common name	Scientific name	Classification
Bushpig	<i>Potamochoerus larvatus</i>	B
Common warthog	<i>Phacochoerus africanus</i>	B

1.1 Enclosure requirements

Size and dimensions

The main enclosure should measure no less than 300m² for one or two individuals. An additional 50m is required for each additional animal.

The shift yard should measure no less than 50m². A shelter as part of the shift yard should measure no less than 8m² each.

Infrastructure

In addition to the main enclosure, there is a need to have at least one shift yard with shelter which can serve as hiding space during inclement and extreme weather.

A shift yard enables secure separation of animals for medical treatment or introduction of new individuals. The shift yard can be part of the main enclosure and should in that case have two entrance/exits gates to prevent animals being cornered.

If the main enclosure doesn't provide sufficient natural hiding places (e.g. trees, rock formation) additional shelters will need to be placed in the main enclosure.

Barriers

For the enclosure barrier, solid (concrete/rock) walls, chain-link or welded mesh as well as post and rail fencing can be used. For the height a minimum of 1.2m is required. Mesh size should be no bigger than 10x10cm. When post and rail fencing is used, the space between the rails should be no more than 15cm.

Suids are excellent diggers, and therefore any fence line construction should go at least 60cm deep into the ground. To prevent digging, electrical off-set wires can be used with a minimum gauge of 12 and 7.5 KV.

Furniture

Appropriate complexity should be provided through the use of various natural and artificial materials in the enclosure that encourage normal behaviour patterns, minimise any abnormal behaviour and avoid animal confrontation and

aggression. This can be in the form of logs, walls, boulders and man-made structures. Logs should be placed and secured in a manner that prevents rolling or falling onto animals. Rocks and logs should also be provided to allow rubbing and scratching.

The enclosure should provide sufficient shade in terms of vegetation through trees or shelters. Wherever live vegetation is used it is recommended to protect the vegetation through barriers or electric wires.

As suids need to be able to wallow for skin care and to prevent overheating, sufficient wallows need to be made available in the enclosure to enable this behaviour. Additional pools are recommended.

Ground surface

All outdoor enclosures must have a natural substrate providing sufficient areas for ground feeding and rooting. When appropriate ground for natural feeding and rooting is limited, additional organic materials like grasses, straw and hay need to be provided.

The floor surface must also be provided with a sufficient amount of grass or hay for nesting.

Climate control

Under normal Malawian weather conditions suids should be able to be kept outside throughout the year. Shelter however should be made available at different places in the enclosure to protect the animals from sun, wind and inclement weather.

Shade and shelter can be created through man-made structures or natural structures like hollow logs, rock overhangs, underground dens and shade bushes/trees.

1.2 Husbandry requirements

Care standards

Suids are intelligent animals. Adequate welfare standards in captivity can be met through appropriate husbandry and management procedures. This includes appropriate housing and enclosure design, environmental enrichment

programmes and a balanced diet to meet nutritional requirements.

To achieve high standards of welfare suids must be provided with opportunities to root, bathe, wallow, forage for food, and play by providing species-appropriate rooting/digging areas, water features and/or mud wallows, bedding materials, a variety of plants, logs and substrates as well as the availability of sufficient places to hide and rest in comfort.

Social organisation

Warthogs usually live in family groups of related females and their offspring or as a group of related females with one male. Bush pigs usually live in one male harem groups or in family groups with one male and female and their offspring. In captivity it is possible for both species to keep multiple females together with their offspring. Generally it is recommended not to have more than one male with the group. When more males are present, it is required to have opportunities to separate the males whenever required. Given their social nature suids should generally not be housed on their own.

Animal monitoring

Daily monitoring is required to quantify and measure the welfare of individual animals through monitoring of their nutritional, physical and social condition. Qualified personnel must conduct daily observations to monitor for signs of physical or behavioural abnormalities. Any unusual activities should be recorded in designated reports.

Catching/Handling

Suids can under certain circumstances be trained to enter chutes/crush cages to accept specific non-painful handling and medical procedures without prior sedation. However, even with training, they can be highly volatile with a propensity for intense and unpredictable reactions. Training animals for this kind of purpose should only be done by very experienced caretakers. Where it is not possible to train the animal to come into a small confined area, the best way to handle it is under sedation. Sedation can be provided using a dart gun/blow pipe.

Enclosure hygiene

Animal waste should be removed on a daily basis to prevent contamination of the animal, minimise disease hazards and reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent build-up. All water

reservoirs should be cleaned on a daily basis and provided with fresh potable water.

1.3 Nutritional requirements

Diet

As a basic diet a variety of tuber vegetables, carrot, nuts and fruit must be offered following species-specific needs. The fresh produce portion of the diet should lean more heavily towards vegetables and not be primarily over-ripe and/or sugary fruits. Rotation of food items, including seasonally available fruits and vegetables, is recommended. Corncoobs, whole potatoes and other large, hard foods should be cut in pieces to prevent choking.

Although commercially available diets generally provide sufficient nutritional value, they do not meet behavioural foraging needs. Where a commercial diet is provided it should be complemented with a variety of fresh items. Where possible suids must be allowed to browse or graze on pasture, scrub or forest lands. When the enclosure doesn't allow natural browsing, freshly cut plant material including grasses, leaves, nuts and berries should be provided.

Food presentation

Suids should be fed the non-browse/grasses portion of their diet a minimum of twice daily during the active feeding time of the species housed. They should, however, have access to browse or other natural plant material throughout the day and night, to encourage normal foraging behaviour and reduce the incident of abnormal behaviour. Food must be provisioned at multiple feeding sites throughout enclosures to ensure all animals have access and to reduce or eliminate aggression that results from competition for food resources, especially preferred items.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration.

1.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination will likely need to be done under anaesthesia. Ideally the animal will have been trained in a chute to undergo physical examinations
- Complete Blood Count (CBC), serum

chemistry analysis

- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Other tests

- African Swine Fever, Classical Swine Fever
- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, tattoos, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including hair coat, eyes, all appendages/hoooves etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years. Ideally animals would be trained in a chute system. Anaesthesia should not be necessary unless invasive samples need to be taken.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Other tests

- African Swine Fever, Classical Swine Fever
- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the

animal is under anaesthesia.

Vaccinations

- Rabies
- Tetanus
- +/- Leptospirosis, brucellosis

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. However, routine deworming may not be necessary and may actually upset gastrointestinal flora balance.

Special concerns

Suids are susceptible to Salmonella and may be susceptible to Influenza viruses. Brucellosis and FMD (foot and mouth disease) are both present in Malawi and thus should be considered if an animal is showing any signs. Wild suids are the main hosts of African Swine Fever and Classical Swine Fever as well as Trypanosomiasis. Should any animal test positive for any of these viruses, the DAHLD should be notified immediately.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post mortem by a veterinarian or a similarly qualified individual. The carcass should be disposed of appropriately (incinerated).

1.5 Health and safety requirements

Potential risks

Under certain circumstances, especially when they feel threatened, suids can be aggressive and inflict serious injuries.

Preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals. Due to the potential susceptibility of suids to Influenza viruses, keepers with symptoms of respiratory disease should refrain from working with these animals while ill.

Safety measures

Generally animals should be cared for according to the protective contact method. Personal protective equipment should be provided to each caretaker. Where caretakers need to enter the enclosure it is highly recommended that the dominant male be locked in the shift yard. People must never corner animals or approach females with young. Suids generally require care from experienced and well trained caretakers.

2. HIPPOPOTAMIDAE (HIPPOPOTAMUS)

Species and classification

Common name	Scientific name	Classification
Hippopotamus	<i>Hippopotamus amphibius</i>	C

2.1 Enclosure requirements

The Hippopotamus (hippos) are big mammals with a weight of up to 2,500 kg (average 1,300 kg) for females and 3,200 kg (average 1,600 kg) for males. Considering the size of these animals it is vital that the enclosure space provided is of sufficient size and strength to contain them while meeting their physical and psychological needs.

Size and dimensions

Because of their size, hippos are preferably kept in open space enclosures, which provide sufficient complexity to provide behavioural stimulation. Many factors influence the minimum space required for a group of hippos including, but not limited to: group size, group composition, and enclosure complexity. The following measures provide minimum standards. Captive care facilities should provide as much space as possible.

The main enclosure should measure no less than 1200m² for one animal. For each additional animal another 300m² is required.

A shift yard should measure no less than 225m² for one animal and 300m² for two animals.

A shelter should measure no less than 100m² for one animal and 15m² for two animals.

Infrastructure

In addition to the main enclosure, there needs to be at least one shift yard as well as a shelter which can serve as night housing and/or secure space during inclement and extreme weather.

A shift yard allows animals to be locked up during cleaning of the main enclosure, separating animals for medical treatment or the introduction of new individuals. The shift yard should be next to the main enclosure and have two entrance/exits gates to prevent animals being cornered.

Barriers

Moats, solid concrete barriers or strong steel pipes are used as the primary barrier for hippos. The primary barrier should be a minimum of 1.5m high. When using steel pipe the space between the horizontal pipes should not be bigger than

25-30cm. Alternatively, steel pipes can be placed vertically in the ground with the posts spaced 35-30cm apart.

Enclosure gates can be the weakest points of the exhibit so adequate hinges and lock strength are very important. Interior doors should be constructed of heavy-gauge steel or pipe that is hinged or sliding. Sliding gates are optimal as they have the ability for partial opening, and should be a minimum of 1.8m wide and 2m high.

Furniture

Hippos naturally spend most of their day in water and therefore require constant access to water. The water body should be big enough to accommodate all individuals without causing aggression. As a standard water surface should not be less than 225m² per individual animal. Depth of the pool should be from 1.5-2.5m. The entrance to the water should be gradual and have a non-slip surface to enable the animals to enter and exit the water safely.

Besides water hippos also require an area with mud or clay to allow wallowing for skin care and body temperature regulation. The size of mud wallows should be adapted to the number of animals in the exhibit so that sufficient space is provided for each individual.

Visual and physical barriers are also required to help reduce stress and aggression by permitting animals to separate themselves from others during introductions or in group situations. Barriers should be large and high enough to provide so-called safe zones that allow an animal to pass out of sight. Types of visual barriers can include big rocks/boulders, logs as well as trees and natural plantings.

Ground surface

The surface of the enclosure should consist as much as possible of natural substrate like grass, limestone, sand, and other natural material combinations.

Climate control

Under normal Malawian weather conditions hippos should be able to be kept outside throughout the year. The animals should,

however, have constant access to mud wallows and shelter space for temperature regulation and for protection against inclement weather conditions.

2.2 Husbandry requirements

Care standards

Hippos are large, strong animals which can be aggressive. Mistakes made in daily routines or during animal introductions can easily lead to dangerous situations for the animal or the environment. Hippo keepers should have as much formal training and experience as possible and should be familiar with their behaviour and husbandry requirements.

Social organisation

Hippos are gregarious animals and the most common combination kept in captivity is one male with multiple females or just a group of females. Hippos should not be kept alone. Although dominant males sometimes accept young bachelor males, this is not recommended in a captive care setting.

Animal monitoring

Hippos require daily monitoring and record keeping. Areas of importance are their general health and body condition, (social) behavioural aspects and food consumption.

Catching/Handling

Handling and restraint of hippos is only done through the protective contact method. The best method to handle, examine and treat a hippo is by using so-called 'chutes' or 'crush' cages. A chute is a small restricted area in which contains one or more hydraulic barriers that will "squeeze" together to restrict an animal's movement. In general, major chute design considerations include strength, durability, type and function. To reduce stress a chute should be designed in such a way that it is part of the enclosure and the animal passes it on a daily basis as a routine.

Enclosure hygiene

Animal waste should be removed on a daily basis to prevent contamination of the animals contained, to minimise disease hazards and to reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent build-up. All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

2.3 Nutritional requirements

Diet

Hippos are herbivorous foregut fermenters, with the vast majority of the food eaten being grass. In captivity these animals should be provided with sufficient high quality hay. As a standard, hippos should be provided with about 1.5% of their bodyweight in grass/hay (dry matter). For enrichment it is highly recommended to provide an enclosure which is big enough to provide the animal with natural grazing areas.

Food presentation

Food is provisioned at multiple feeding sites throughout enclosures to ensure all animals have access and to reduce or eliminate aggression that results from competition for food resources. To prevent sand/dust compaction the food should be offered on a concrete pad or in livestock troughs or bins.

Food handling

Food should be stored in a clean and dry place to prevent mouldy or dusty hay which can cause problems.

2.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination preferably in a chute system.
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Additional tests

- Tuberculosis test
- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, tattoos.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including skin condition, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years in a chute system. Anaesthesia should not be necessary unless invasive samples need to be taken.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Additional tests

- Tuberculosis test
- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Tetanus
- +/-clostridial diseases, anthrax, brucella, leptospirosis, other diseases as per risk of exposure

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. However, routine deworming may not be necessary and may actually upset gastrointestinal flora balance.

Special concerns

Beta-haemolytic and gamma-non-haemolytic streptococcal infections are the most common reported bacterial infections in captive

animals. Antibodies to Bovine Herpesvirus 2 (BHV2), Rinderpest virus, infectious Bovine Rhinotracheitis virus (IBR) and Contagious Bovine Pleuropneumonia virus have been found in wild hippos.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem by a veterinarian. The carcass should be disposed of appropriately.

2.5 Health and safety requirements

Potential risks

Despite their bulky and sluggish appearance, hippos can be aggressive and dangerous, especially under stressful or unexpected circumstances.

Preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals.

Safety measures

Handling and training of the animals should always be performed according to the protective contact method and within appropriate and especially designated facilities. All slides, doors, gates must be kept closed and securely fastened at all times; ideally a double-gated system is in place. Locks and security of slides, gates and doors should be double-checked after each use and inspected regularly. Catching of all felids should be done through conditioning the animal to a catching/squeeze cage or by chemical restraint through darting. Caretakers should always keep a safe distance to the enclosure barrier.

In order to ensure safety and to properly meet the requirements of management, it is recommended that more than one keeper is responsible for the care of these animals on a daily basis. Keeper interaction should be restricted to designated areas and should be conducted according to the protective contact method. Consistency of routine is vital. Emergency protocols for escapes should be in place and caretakers should have full knowledge and understanding of the required procedures.

In case the public has viewing access to the enclosure, a physical barrier should be present to keep people at least three meters from the enclosure barrier. The enclosure barrier should be constructed in such a way that people are not able to pass the barrier.

3. BOVIDAE (ANTELOPE)

For these standards the Malawian species of the bovidea family are split up in the categories as indicated below:

Duiker, bushbuck, and dwarf antelopes

Common name	Scientific name	Classification
Common duiker	<i>Sylvicapra grimmia</i>	C
Red forest duiker	<i>Cephalophus natalensis</i>	C
Bushbuck	<i>Tragelaphus scriptus</i>	C
Sharpe's grysbuck	<i>Raphicerus sharpei</i>	C
Suni	<i>Neotragus moschatus</i>	C
Oribi	<i>Ourebia ourebi</i>	C
Klipspringer	<i>Oreotragus oreotragus</i>	C

Smaller antelopes < 120 kg

Common name	Scientific name	Classification
Impala	<i>Aepyceros melampus</i>	C
Puku	<i>Kobus vardonii</i>	C
Southern reedbuck	<i>Redunca arundinum</i>	C
Nyala	<i>Tragelaphus angasii</i>	C

Large antelopes and Bovinae > 120 kg

Common name	Scientific name	Classification
Waterbuck	<i>Kobus ellipsiprymnus</i>	B
Roan antelope	<i>Hippotragus equinus</i>	B
Sable antelope	<i>Hippotragus niger</i>	B
Lichtenstein's hartebeest	<i>Alcelaphus lichtensteinii</i>	B
Blue wildebeest	<i>Connochaetes taurinus</i>	B
Common eland	<i>Tragelaphus oryx</i>	B
Greater kudu	<i>Tragelaphus strepsiceros</i>	B
African buffalo	<i>Syncerus caffer</i>	B

3.1 Enclosure requirements

Size and dimensions

Bovids must be provided with appropriate space, in terms of diversity and complexity, to allow for expression of normal behaviours. Bovids must also be provided with sufficient opportunity and space to exercise daily and have freedom of movement so as to reduce stress and maintain good physical condition.

If put on public view, the animal should only be visible from one side and should be given the means to distance themselves from the public.

Duikers, bushbucks and dwarf antelopes

The main enclosure should measure no less than 250m² for one or two animals. A shift yard should measure no less than 36m².

Smaller antelopes

The main enclosure should measure no less than 900m² for a group up to three animals. An additional 100m² should be added for each additional individual. A shift yard should measure no less than 100m².

Medium- and large-sized antelopes and bovinæ

The main enclosures for waterbucks, roan antelopes, sables, hartebeests, wildebeests and kudus should measure no less than 1400m² for a group up to three animals. An additional 150m² should be added for each additional individual. A shift yard should not measure less than 150m².

The enclosure for elands and buffalos should measure no less than 1800m² for a group of up to three animals. An additional 200m² should be added for each additional individual. A shift yard should measure no less than 150m².

Infrastructure

Besides the main enclosure, at least one more additional area should be provided to separate one or more animals from the group whenever required. This can be in the form of an outdoor pen or a barn/shelter. The pen should not be any smaller than a quarter of the size of the main enclosure and should have at least two gates towards the main enclosure to prevent animals being cornered.

If put on public view, animals should only be visible from one side and should be given the means to distance themselves from the public. The latter can be done through providing sufficient visual barriers.

Barriers

The fence line should be constructed in such a way that it protects the animals from predators on the outside of the enclosure. This can be achieved by the fence line being dug into the ground and/or by using electrified wires on the outside of the enclosure.

An additional barrier should keep the viewing public at a distance of at least 2m from the enclosure fence line.

Duikers, bushbucks and dwarf antelopes

Enclosure barriers can be made of chain link fence (12 gauge), mesh, concrete or wood and should have a minimum height of 1.8m. Mesh size should not exceed 15x15cm to prevent animals getting stuck in the fence line. Electrical wires should not be used to contain these animals as it might stress an animal in such a way that it can injure itself.

Smaller antelopes

Enclosure barriers can be made of chain link fence (12 gauge), concrete, bricks or wooden/metal beams (post and rail fencing) and should have a minimum height of 2m for puku, reedbuck and nyala and 2.5m for impala. Electrical wires should not be used to contain these animals as it might stress an animal in such a way that it could injure itself.

Medium- and large-sized antelopes and bovinæ

Enclosure barriers for waterbucks, roan antelopes, sables, hartebeests, wildebeests, kudus and elands can be made of chain link fence (4-6 gauge), concrete, bricks or wooden/metal beams (post and rail fencing) and can be in combination with electric wire (minimum of 3000 Volt, 32 Joule) to contain the animals. The barrier should have a minimum height of 1.8m.

For buffalos extra attention should be given

to the strength of the barrier. Barriers can be made of steel pipe or hard wood (post and rail fencing), upright wooden logs or solids concrete/rock. Chain link fence (4-6 gauge) can be used in combination with a secondary fence line (electric wires or post and rail fencing).

Furniture

The enclosure should provide as much as complexity as possible in terms of vegetation and/or structures. This can be achieved by providing a variety of trees and bushes, logs, walls, boulders and man-made structures. The enclosure should also provide sufficient shade for all animals present in the enclosure. This can be achieved through vegetation in combination with man-made shelters.

Medium and large sized antelopes require access to a water source large enough for bathing. Buffalos should have access to sufficient water sources for bathing or mud wallowing.

Ground surface

The outside enclosure should consist of a natural substrate consistent with the site. Where possible natural pasture is kept and rotated, providing the animals with grazing opportunities and natural resting surfaces.

Climate control

The enclosure should provide sufficient shelter to protect each animal from inclement weather. This can be provided through means of a barn, shelter or thick bushes/vegetation and trees.

3.2 Husbandry requirements

Care standards

All members of the bovidae family are generally social and grazing animals are often found in large flocks or herds. These animals benefit from access to pasture and browse for grazing and walking in pairs or groups. Many species are prone to stress-related illness and injury. Habitat design and husbandry techniques should take this into account.

Social organisation

As most bovids are gregarious by nature, animals should be kept in a social environment which resembles as much as possible the natural group composition of that species. In cases where more species are being kept together special attention needs to be given to ensure that the species are compatible with each other.

Duikers, bushbucks and dwarf antelopes

All duikers, bushbucks and dwarf antelopes are solitary animals, but are able to be kept in pairs or sometime trios when there is mutual tolerance amongst the individuals and sufficient space. Adult males are territorial and should not be kept together in one enclosure. Fighting amongst males can easily lead to fatal injuries.

Smaller antelopes

Impalas and puku are gregarious animals and should not be kept in groups of less than three individuals. Groups should not contain more than one adult male in order to prevent fighting.

Southern reedbucks live in monogamous pairs and serious effort needs to be undertaken to keep these animals according to their natural social way of living.

Nyala females form small herds of 2-3 females with their offspring. Nyalas should not be kept alone and a minimum of two animals is required.

Medium- and large-sized antelopes and bovinæ

All of the larger antelopes and bovinæ are gregarious and should not be kept in herds of less than three animals. An exception is the kudu which can be kept in pairs (two females or a female with her offspring).

Generally all species can be kept in herd of females with their offspring. In addition one male can be added to the herd, but careful observations are required to establish that the male is not disturbing the stability of the herd, causing stress and potential injuries. In such cases the male should be (temporarily) separated from the group.

Animal monitoring

Daily monitoring is required to quantify and measure the welfare of individual animals through monitoring of nutritional, physical and social conditions. Qualified personnel must conduct daily observations to monitor for signs of physical or behavioural abnormalities. Any abnormalities should be recorded in designated reports

Catching/Handling

Unless the animals are very much habituated to humans, catching and handling of duikers, bushbucks, dwarf antelopes as well as all the smaller antelope species should be avoided as much as possible or performed with great care. The stress caused by catching can have serious negative consequences for the animals. Therefore any capture or restrain should be carried out in a manner that does not cause trauma, overheating, excessive cooling, physical harm, or

unnecessary discomfort, and minimises physical and psychological stress as much as possible. The safest methods are through training and habituation of the animal to handling or chemical immobilisation through darting. Animals which are habituated to handling can be physically restrained for a short period of time or chemically restrained through hand injection.

Enclosure hygiene

Animal waste should be removed on a daily basis to prevent contamination of the animal, to minimise disease hazards and to reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent buildup. Food leftovers should be removed as often as required for the type of food and prior to moulding or contamination. In hot weather conditions this still means that food leftovers should be removed daily. All water reservoirs are cleaned on a daily basis and provided with fresh potable water.

3.3 Nutritional requirements

Diet

All bovid diets must be of a quality, quantity and variety suitable for each animal's nutritional and psychological needs. Wherever possible commercial pellets appropriate for the species are provided. In addition fresh hay and browse is provided ad libitum on a daily basis. Ideally the enclosure should provide live trees, shrubs and grasses to allow natural browsing. Trace mineral blocks should be provided in the enclosure to provide essential mineral nutrients.

Diets of individual animals should be modified to match the physiological state of the animal as it changes over time. Therefore the diet should be prepared with consideration for the age and life stage, species, condition, and size of the ruminant. Fresh, clean water should be available at all times. Water supply points should be sufficient to provide all animals with drinking water. Smaller artificial water reservoirs should be cleaned and refilled on a daily basis.

Duikers, bushbucks and dwarf antelopes

Ideally the enclosure should offer a wide variety of bushes, grasses and flowers, allowing the animals to naturally browse. When existing vegetation provides insufficient nutrients or is not available, the diet besides pellets should consist of good quality hay, mixed grains, vegetables and a variety of browse. Animal protein such as eggs should be offered in low amounts. As most fruits are high in sugar these should only be offered in low quantities.

Old leftover food should be removed from the enclosure on a daily basis to prevent contamination and attract vermin.

Smaller antelopes

Impalas, pukus and reedbucks are all grazers and ideally the enclosure should provide natural grass for these animals to feed on. If not, the diet besides pellets should consist of good quality hay, mixed grains, vegetables and a variety of browse, the latter mainly for impalas and nyalas which also feed on foliage, forbs, shoots and seeds pods.

The day's food rations should be broken down into at least two, and preferably three, feedings in order to promote normal digestive tract activity and to mimic more natural feeding patterns. Food items should be fed out in elevated feed pans or above-ground hayracks to avoid sand and gravel impaction and/or parasitic infections caused by faecal-oral contamination.

To avoid competition and monopolising food, multiple feeding sites well-spaced within the enclosure should be utilised to prevent dominant individuals from monopolising feed.

Medium- and large-sized antelopes and bovinæ

Almost all big antelopes and bovinæ as indicated are predominantly grazers, and to a lesser extent browsers. Their diet should consist of good quality hay supplemented with commercial herbivore concentrate pellets. A selection of seasonal browse must be added whenever available.

An exception within this group is the greater kudu which is a pure browser. Kudus should be provided with a selection of good quality hay, herbivore pellets, mixed grains, vegetables and a variety of browse.

The day's food rations should be broken down into at least two, and preferably three, feedings in order to promote normal digestive tract activity and to mimic more natural feeding patterns. Food items should be fed out in elevated feed pans or above-ground hayracks to avoid sand and gravel impaction and/or parasitic infections caused by fecal-oral contamination.

To avoid competition and monopolising food, multiple feeding sites well-spaced within the enclosure should be utilised to prevent dominant individuals from monopolising feed.

Food presentation

Unless sufficient food is naturally available within the enclosure, bovids are fed as often as required for the species to support natural feeding activity patterns. Whenever required, individual animals

are separated from the group and fed to make sure all animals receives sufficient nutrition. As bovids spend most of their active hours on feeding, food should be presented in such a way that natural foraging is encouraged as much as possible.

Food handling

Separate and secure facilities should be provided for the proper and hygienic storage of food. Food should be protected against dampness, deterioration and mould and from contamination by insects, birds, rodents or other animals.

3.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint in a chute system.
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, tattoos (ear), ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/hooves, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations, recommended

- Rabies
- Tetanus
- Clostridial vaccinations
- +/- Anthrax, Bovine Viral Diarrhoea, Leptospirosis, Parainfluenza, other diseases as per risk of exposure

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Common problems of captive ruminants can include dental disease, abnormal hoof growth, and poor body/coat condition. Husbandry problems including improper feed items, deficiencies in protein and macro and micro minerals, and inappropriate substrates for these animals can contribute to these problems.

Bovine tuberculosis (*Mycobacterium bovis*) is endemic in Malawi along with brucellosis (*Brucella* spp.) and should be considered in any antelope that come from farms where they may have cohabitated with cattle, sheep, or goats. FMD (foot and mouth disease) is also present in Malawi. Other diseases of significance in bovids include Bluetongue, Bovine Viral Diarrhoea, Leptospirosis, and Theileriosis, however the prevalence of these diseases in Malawi is unknown at present. Should any animal exhibit clinical signs of or test positive for any of these diseases, the DAHLD should be immediately notified.

Post-mortem

All animals that have died of natural causes or

have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. All organ systems should be checked. In antelopes, organs affected by tuberculosis – lungs, liver, mediastinal lymph nodes – should be given special examination. The carcass should be disposed of appropriately (incineration).

3.5 Health and safety requirements

Potential risks

All horned antelopes may pose a risk to their caretakers through goring if they are handled inappropriately. Larger antelopes may also trample people who approach with undue care. The hooves of small antelopes that are manually restrained can also cause severe lacerations. If in an enclosure with antelope, be wary of frightening them – they can easily injure themselves trying to get away.

Preventative healthcare

Caretakers should be screened for TB prior to having direct contact with the animals.

Safety measures

Adult bulls of all large antelopes should be approached with care. Working hands-on with male buffalos should always be conducted according to the 'protective contact' method. This means that caretakers should not share the same physical space with the animals without the benefit of some type of barrier. Caretakers should also be wary of working in close proximity to females, especially females with calves.

Capture and restraint of the larger antelopes and buffalos can be done best by separating the animal in a pen. Whenever possible the facility should have a chute in which the animal can be restrained and immobilised whenever required. Whenever these kind of facilities are not available the best way to capture the animal is through chemical immobilisation using a dart gun.

Enclosure barriers and gates should be checked on a daily basis to ensure full and smooth functionality. All slides, doors and gates in ruminant areas are kept closed and securely fastened at all times unless needed for ruminant access.

In case the public has viewing access to the enclosure, a physical barrier should be present to keep people at least three meters from the enclosure barrier. The enclosure barrier should be constructed in such a way that people are not able to pass the barrier.

4. GIRAFFIDAE (GIRAFFE)

Species and classification

Common name	Scientific name	Classification
Southern giraffe	<i>Giraffa giraffe</i>	C
Masai giraffe / Rhodesian giraffe	<i>Giraffa tippelskirchi</i>	C
Reticulated giraffe	<i>Giraffa reticulata</i>	C
Northern giraffe	<i>Giraffa camelopardis</i>	C

All giraffe species are categorized as a Category III species, and are generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

4.1 Enclosure requirements

Size and dimensions

The recommended size of a giraffe enclosure depends on the number of individuals, and ages and sexes of the individuals kept. Due to their large size a sufficient area is required to provide enough space for all individuals to lie down, to get up easily and to move about.

The main enclosure should measure no less than 1800m² for up to three animals. For each additional animal 400m² should be added to the enclosure. A separation pen should measure no less than 150m².

Infrastructure

Enclosures should provide arrangements for the separation of one or more giraffes. For groups up to three individuals the facility should have at least one separation pen in addition to the main enclosure. Facilities which house bigger groups should have two or more separation pens depending on the size of the group. More separation pens should be present when keeping larger numbers of individuals. The connecting separation pens should have at least two gates connecting the pen to the main enclosure and/or other pens.

Enclosure design depends heavily on the group of individuals housed. Small breeding herds or single sex herds generally require less space than big breeding herds (e.g. two males with 3-4 females and their calves). Large breeding herds require additional space with the enclosure divided so that each adult male can move in separate but connecting enclosures of 1800m² each. Any connecting corridors or pathways between enclosures should measure at least 2.5m wide to allow for easy movement.

In addition to the main enclosure, there is a need for a protective shelter for use during night and

wet/cold weather. This shelter must be big enough for all individuals to lie down, to get up easily and to move about. Herds with multiple males require bigger or multiple shelters to prevent competition. Shelters must be a minimum of 4m high.

Barriers

For the enclosure barrier, solid (rock/concrete) walls, wooden poles, chain-link or welded mesh as well dry moats can be used.

Fences must be very strong and should be free of protruding bolts, screws and nails. The bottom range of the fence up to 1m should be made of solid material to prevent hooves becoming trapped. Otherwise fence wire should not be wider than 10cm. Electric wires can be used in combination with mesh fencing to prevent the animal from breaking through. Electric fencing as the only confinement barrier is strongly discouraged, as it cannot prevent animals from escaping. Fences must be highly visible as giraffes will run without looking carefully when spooked and should therefore be a minimum of 2m high.

When using a dry moat it should be made with a gradual slope on the inside so the animals can move in and out without difficulties. The moats should be no less than 2.5m high as a vertical wall on the outer perimeter. Ditches with vertical walls on both sides are considered dangerous and are strongly discouraged. Water moats are also not recommended, presenting a risk of water contamination, slipping and drowning, especially to young animals.

Furniture

The enclosure should as closely as possible reflect a natural environment and provide sufficient vegetation to promote natural browsing. The natural vegetation also provides a physical barrier to separate individuals from others during introductions or in group situations. Barriers should be large and high enough to

provide so-called safe zones that allow an animal to pass out of sight. To protect animals from inclement weather conditions and provide shade shelters should be made available throughout the enclosure. One or more water sources should be available for the animals to drink from. To promote locomotion, feeding stations should be available throughout the enclosure.

Ground surface

The ground surface should consist of a natural substrate consistent with the site. The surface should be well-drained and reasonably levelled with slopes of no more than 40 degrees. Hard, abrasive, but non-slip surfaces should be used on walkways to prevent overgrown hooves (e.g. gravel/dolomite). Sleeping surfaces within the shelter should be soft e.g. straw, sawdust or mulch.

Climate control

Giraffes are very susceptible to the cold and colder temperatures affect their energy demands. Under normal Malawian weather conditions giraffes should be able to be kept outside throughout the year. At colder temperatures (below 18 degrees Celsius) or during poor weather, animals will need shelter in the form of natural vegetation or a roofed area. During hot sun they will also require shade.

4.2 Husbandry requirements

Care standards

Sufficient work experience and knowledge of the species biology, behaviour and specific husbandry needs is required to meet the specific needs of these animals in a captive care setting. Giraffes are difficult to keep to a reasonable standard due to their large natural home ranges and repetitive daily routine in captivity. Social tensions in limited spaces produce a stressful environment and abnormal behaviours often develop such as pacing, head twirling and tongue playing.

Various strategies can help to minimise this problem:

- Provide large enclosures with sufficient space for animals to avoid each other.
- Provide a view or window to allow giraffes to visually orient themselves and observe their surroundings.
- Combining giraffes in mixed species enclosures is an effective form of enrichment. Giraffes have been kept with a variety of other species both large and small, such as assorted larger antelopes,

zebras, camels, water buffaloes, rhinos, ostriches, and geese.

- Natural foraging behaviour and, more specifically, maximising use of the tongue provides the best kind of natural enrichment. Plenty of natural browse should be provided and enrichment devices can be designed with small openings just large enough for the tongue to find and retrieve food items.

Social organisation

Giraffes are gregarious, non-territorial animals forming very loose, open herds of up to 50 in number. They are socially aloof, forming no lasting bonds with fellow herd members. They are, however, more at ease when housed together with one or more individuals and it is recommended to keep no less than three giraffes together.

Different options exist in regards to herd social structures:

Small breeding herds

1 adult male, 2-3 adult females plus calves.

Large breeding herd

2+ more adult males, 4+ more adult females plus calves.

Single sex group

Either only males or only females.

Any introductions of new animals should be done gradually, allowing individuals to familiarise themselves in adjacent enclosures prior to the actual introduction, to ensure compatibility. This process should be supervised by an experienced caretaker.

Male giraffes do not commonly partake in serious fighting but it is important that they have space to keep out of each other's way. Evenly matched males competing over a female in a limited space can lead to abnormal behavioural patterns e.g. increased 'necking' behaviour.

Animal monitoring

Giraffes in captive care facilities require close monitoring and record keeping by experienced caretakers, who are often able to detect slight changes in an animal that may be the only outward signs of illness. Observations of the giraffe's physical state and appearance, any changes in behaviour, and whether or not it is eating, drinking, urinating and defecating normally should be made daily. Monitoring of daily food intake and regularly weighting giraffes provide good health indicators. Any health concerns should be brought to the attention

of a veterinarian as quickly as possible. Close monitoring is vital when changing a group structure or introducing new animals.

Catching/Handling

Giraffes can be very difficult to handle safely due to their long leg reach, and they are able to kill or significantly injure a person with one kick. Physical restraint of a giraffe can also lead to high stress levels in the animal, which can be difficult to identify as the animal may seem calm, but can result in collapse and fatality.

Giraffes can be conditioned to a chute or crush cage to be restrained for various procedures, including injections, blood collection, hoof work and reproductive manipulation. Individual giraffes require considerable training to accept procedures in a crush, and although time consuming it is still the preferred method of restraint and considered far safer than an anaesthetic. The giraffes should pass through the chute/crush cage daily to become accustomed to the facility from a young age.

Immobilisation or anaesthesia of giraffes have long been considered high risk, due to their unique physiology and anatomy, which may cause life-threatening problems during anaesthesia and logistical problems due to the large size of the animal when it becomes recumbent upon induction.

Enclosure hygiene

Giraffe faeces needs to be raked up and removed from enclosures on a daily basis. Giraffe urine on bedding should also be removed with the soiled bedding material. Depending on the amount and type of house bedding, it does not generally need frequent changing. Due to the volume of bedding (and cost and labour) it should be completely replaced on a monthly or quarterly basis.

Giraffes should be fed at a height of 2-3m above the ground, which will necessitate keeper access to hay feeders for cleaning. Old stalks or feed dust should not be allowed to accumulate in or under hayracks. Complete emptying and rotation of hayracks on a weekly basis is preferred. Food buckets and troughs should be washed out and scrubbed with water daily. A fresh, clean supply of water is required at all times, and water troughs should be cleaned out as required.

4.3 Nutritional requirements

Diet

In most cases captive giraffes are fed a pelleted

ration (made from a variety of cereals and grains, with vitamins and minerals added), lucerne hay, browse branches and small amounts of fruit and vegetables. Alfalfa hay is commonly used in giraffe diets although can vary considerably in quality. Lucerne hay must always be supplemented with additional feeds. Grass hay should not be intended to be a major proportion of the giraffes' diet. Mineral salt blocks should also be provided at all times and there should be a permanent supply of fresh water.

For adult giraffes the volume of food offered should be 1.5-2% of the giraffe's body weight. Browse (especially the leaves and shoots) should be provided ad libitum being the giraffe's natural diet (inc. acacia, eucalyptus, willow, elm, coprosma, fig, prunus, myoporum, palm and cassurina). The actual consumed roughage quantities from the browse should form 60-70% of all dry matter consumed.

Any sudden changes to a provided diet should be strictly avoided and instead gradually changed over a longer period of time.

Food presentation

In the wild giraffes will move constantly, spending all day locating food and feeding. In captivity, food should be provisioned at multiple feeding sites throughout the enclosure to promote locomotion and natural foraging behaviour, ensuring that all animals have access and to reduce or eliminate stress that results from competition for food resources. It is important that food is presented on a regular basis throughout the day.

Vegetables should be prepared into small pieces to avoid a risk of choking or throat obstruction. Food (browse and hay) should be presented at different heights, at 2-3m from the ground where all aged giraffes can reach it easily. Vegetables and pellets can be fed in troughs. Devices can be designed for both formats with small openings (not exceeding 4.5cm), just large enough for the giraffe's tongue to find and retrieve food items, designed to promote use of the tongue. String hay feeders used with horses are not suitable and tend to be ingested. Ideally each rack or trough should contain a different feedstuff.

Food handling

Food storage in a clean and dry location is important to prevent mouldy or dusty hay which can cause problems. Browse should be as fresh as possible to maintain sufficient nutrients.

4.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination should be possible to do in a chute. If the giraffe proves intractable, a standing sedation can be used.
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/hooves, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. However, routine deworming may not be necessary and may actually upset gastrointestinal flora balance.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years. Ideally animals would be trained in a chute system +/- standing sedation. Anaesthesia should

not be necessary unless invasive samples need to be taken.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture
- Tuberculosis test (caudal tail fold)

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Tetanus
- Clostridial diseases
- +/- Bluetongue, Rotavirus, Coronavirus, depending on disease risk

Special concerns

Common problems of captive ruminants can include dental disease, abnormal hoof growth, foot rot, and poor body/coat condition. Husbandry problems including improper feed items, deficiencies in protein and macro and micro minerals, and inappropriate substrates for these animals can contribute to these problems. Due to their selective browsing habits, captive diets for giraffes can lead to many serious digestive health problems.

Bovine tuberculosis (*Mycobacterium bovis*) is endemic in Malawi along with brucellosis (*Brucella* spp.) and FMD (foot and mouth disease). Other diseases of significance in giraffes may include Leptospirosis and Theileriosis, Malignant Catarrhal Fever (MCF) and Bovine Viral Diarrhoea/Mucosal Disease complex (BVD/MD), and Leucosis; however the prevalence of these diseases in Malawi is unknown at present. Due to a high susceptibility to MCF it is strongly discouraged to house sheep or wildebeest together with giraffes. Should any animal test positive for any of these diseases, the DAHLD should be immediately notified.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem by a veterinarian or a similarly qualified,

experienced individual. The carcass should be disposed of appropriately.

4.5 Health and safety requirements

Potential risks

Giraffes can be very difficult to handle safely due to their long leg reach, and are able to kill or significantly injure a person with one kick.

When allowing people in close proximity of giraffes, their flight instinct must be considered. The animals must have a view over any approaching people to avoid situations leading to fear and panic. There should always be areas where the animals can avoid contact with people to avoid too much disturbance.

Staff preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals.

Safety measures

It is generally safe for animal caretakers to go into a large outdoor enclosure on foot with giraffes. Handling and training of the animals however should always be performed according to the protective contact method and within appropriate and especially designated facilities. All slides, doors, gates should be kept closed and securely fastened at all times; ideally a double-gated system is in place. Locks and security of slides, gates and doors are double-checked after each use and inspected regularly.

In order to ensure safety and to properly meet the requirements of management, it is recommended that more than one keeper is responsible for the care of these animals on a daily basis. Keeper interaction should be restricted to designated areas and should be conducted according to the protective contact method. Consistency of routine is vital. Emergency protocols for escapes should be in place and caretakers should have full knowledge and understanding of the required procedures.

In cases where the public has viewing access to the enclosure, a physical barrier should be present to keep people at least 4m from the enclosure barrier. The enclosure barrier should be constructed in such a way that people are not able to pass the barrier.

5. EQUIDAE (HORSES)

Species and classification

Common name	Scientific name	Classification
Burchell's zebra	<i>Equus burchellii</i>	B

5.1 Enclosure requirements

Size and dimensions

The enclosure needs to be big enough to allow running, play fighting, play running and explorative behaviour. The enclosure should be big enough to allow individuals to separate themselves from the group, which is particularly important for males.

The main enclosure should measure no less than 900m² for a group up to three females. An additional 100m² should be added for each additional individual. When a male is kept with the females the enclosure should measure no less than 1000m² for a group up to three individuals with an additional 100m² for each additional animal.

A shift yard should measure no less than 100m². A shelter as part of the shift yard should measure no less than 15m² each.

Infrastructure

In addition to the main enclosure, there is a need to have at least one shift yard with shelter which can serve as hiding space during inclement and extreme weather.

A shift yard enables animals to be locked up and separated for medical treatment or the introduction of new individuals. The shift yard can be part of the main enclosure and should in that case have two entrance/exits gates to prevent animals being cornered.

If the main enclosure doesn't provide sufficient natural hiding places (e.g. trees, rock formation) additional shelters will need to be placed in the main enclosure or one or more stables will need to be provided.

Barriers

Fencing as well as dry moats are both used for containing zebra in captivity. When using dry moat they should be made with a gradual slope so the animals can move in and out without difficulties.

For fencing both a post and rail barrier as well as mesh fencing (chain link or welded mesh) can be used. The minimum height of the fence should be 1.8m. If mesh is being used, wire should not be less than 9-gauge. When using post and rail

barriers the distance between the rails should not be more than 30cm.

Furniture

The enclosure should provide as much complexity as possible in terms of vegetation and/or structures (e.g. fallen logs, bushes, tall grass, rocks) to:

- Increase the complexity of the enclosure and promote exploration behaviour.
- Support conflict resolution within the group.
- Provide the opportunity for the animals to be out of sight and not to be unnaturally provoked by the viewing public or other animals surrounding the enclosure.

The enclosure should also provide sufficient shade for all animals present in the enclosure. This can be achieved through natural vegetation in combination with man-made shelters.

Ground surface

Outside enclosures for zebra should consist of a natural substrate. Ideally part of the enclosure should provide grass to enable the animals to feed on natural vegetation. Outside enclosures should also have sandy areas for resting and playing behaviour. Compacted sandy areas are preferred for rolling.

Climate control

Under normal Malawian weather condition Burchell's zebras should be able to be kept outside throughout the year. On colder nights (below 10 degrees Celsius) animals will need shelter in the form of natural vegetation or a roofed area. Shelter should also be available to protect the animals from inclement weather conditions.

5.2 Husbandry requirements

Care standards

Generally Burchell's zebras are not hard to keep when provided with sufficient enclosure space to express natural behaviour and avoid conflicts. Recommendations for combinations of animals being kept should be followed up. Introductions of new animals in a herd should be performed with care and only under the supervision of an experienced caretaker.

Social organisation

Plains zebras are harem-forming equids with the herd stallion playing an important role in the social unity of the family. He is the dominant animal in the group, responsible for the spatial proximity of the harem, and is sometimes observed to intervene in quarrels between the females. Plains zebras should ideally be kept in harem groups of one adult male and several adult females with their offspring.

Keeping plains zebras in male-female pairs is not recommended. Zebra stallions easily get bored and can start to pester females.

Plains zebras can be kept in all-female groups. This might be a good solution for facilities that want to prevent their zebras from breeding, yet do not want to castrate the stallion. However, as mentioned above, the stallion plays an important role for the social unity of the breeding group and should therefore be kept with the females whenever possible.

As zebras are gregarious by nature, it is not advisable to keep a stallion solitary over a longer period of time. Failure to provide companions may result in abnormal behaviour patterns, such as pacing, wind sucking, self-mutilation, aggressive behaviour, etc. If it is not possible to keep the stallion with females, the male should be kept with other stallions, either with other plains zebra stallions, or with stallions from other equid species.

Animal monitoring

Zebras in captive care facilities require daily monitoring and record keeping. Areas of importance are their general health and body condition, (social) behavioural aspects and food consumption.

Catching/Handling

Zebras can, to a certain extent, be trained to enter stalls, chutes, and trailers to accept specific non-painful medical procedures without prior sedation. However, even with training, they can be highly volatile with a propensity for intense and unpredictable reactions that can lead to severe physical trauma to the animal and, potentially, death. Training animals for this kind of purpose should only be done by very experienced caretakers. Wherever it is not possible to train the animal to come into a small confined area, the best way to handle the animal is under sedation. Sedation can be provided using a dart gun/blow pipe.

Enclosure hygiene

Animal waste should be removed on a daily

basis to prevent contamination of the animals contained, to minimise disease hazards and to reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent build-up.

All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

5.3 Nutritional requirements

Diet

In captivity grass or hay is the basic food source for zebras, of which approximately 4kg should be offered per animal ad libitum throughout the day. In addition to grass, hay and straw, 0.5-2kg of horse pellets or grains (such as pressed barley, maize, oats, or wheat bran), 0.25-0.5kg of vegetables (e.g. carrots, cabbage), and similar amounts of fruits (e.g. apples) should be offered to each animal per day. Freshly cut branches of various tree species can be offered for gnawing on a regular basis in the outdoor exhibit.

A saltlick should be available at all times, while vitamins and minerals should regularly be added to the diet. In addition fresh potable water should permanently be available at sufficient places in the enclosure.

Food presentation

Food is provided at multiple feeding sites throughout enclosures to ensure all animals have access and to reduce or eliminate aggression that results from competition for food resources. To prevent sand/dust compaction the food should be offered on a dust free, dry, hard surface or in livestock troughs or bins.

As zebras feed up to 70% of time during the whole day, it is important that food is presented on a regular basis throughout the day.

Food handling

Food storage in a clean and dry location is important to prevent mouldy or dusty hay which can cause problems.

5.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination will likely need to be done under anaesthesia. Ideally animals will be trained to come into a chute.
- Complete Blood Count (CBC), serum chemistry analysis

- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Other tests

- African horse sickness, Equine Herpes Virus, and Equine Infectious Anaemia
- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, ear notches. Due to individually unique stripe patterns, zebras may be photographed and identified via their lateral and rear stripe patterns.

Routine/preventative health guidelines

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/hoves, etc
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations recommended

Hands-on physical examinations should be performed on each animal every two years. Ideally animals should be trained in a chute system. Anaesthesia should not be necessary unless invasive samples need to be taken.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Other tests

- African Horse Sickness, Equine Herpes Virus and Equine Infectious Anaemia
- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and

identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Tetanus
- +/- Equine Rhinopneumonitis, Influenza, other diseases as determined by risk

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. However, routine deworming may not be necessary and may actually upset gastrointestinal flora balance.

Special concerns

Brucellosis and FMD (foot and mouth disease) are both present in Malawi and thus should be considered if an animal is showing any signs of either disease. Since zebras are carriers for African Horse Sickness, Equine Herpes Virus and Equine Infectious Anaemia, serological testing should be done to assess presence of these viruses if an outbreak is suspected in local susceptible animals. Zebras are also susceptible to Anthrax, Equine Rhinovirus, Rift Valley, and Equine Herpes Virus. Should any animal test positive for any of these viruses, the DAHLD should be immediately notified.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a complete post-mortem by a veterinarian or other similarly qualified individual. The carcass should be disposed of appropriately (incinerated).

5.5 Health and safety requirements

Potential risks

Zebras can deliver a powerful kick and may do so when cornered, such as in a stall or another confined space. They will usually prefer to escape and may injure themselves trying to get away if cornered.

Preventative healthcare

All caretakers should be screened for TB and vaccinated for rabies prior to first contact with the animals.

Safety measures

The handling of adult zebras should always be done through the protected contact method. When caretakers enter the enclosure they have to make sure animals are never cornered. For zebras being kept on public display, a second barrier is required to keep the public on a distance of at least 2m from the primary barrier.

6. RHINOCEROTIDEA (RHINOCEROS)

Species and classification

Common name	Scientific name	Classification
Black rhinoceros	<i>Diceros bicornis</i>	C

Rhinoceros are categorized as a Category III species, and are generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

6.1 Enclosure requirements

Black rhinos are big land animals (800 to 1350kg). Because of their size, black rhinos are preferably kept in open space enclosures which provide sufficient complexity to provide behavioural stimulation.

Size and dimensions

Many factors influence the minimum space required for a group of rhinos including, but not limited to: group size, group composition, and enclosure complexity. The following measures provide minimum standards but captive care facilities should provide as much space as possible.

The main enclosure should measure no less than 1200m² for one animal. For each additional animal another 300m² is required.

A shift yard should measure no less than 300m² for one animal and 400m² for two animals.

A shelter should measure no less than 100m² for one animal and 150m² for two animals.

Infrastructure

In addition to the main enclosure, there is a need to have at least one shift yard as well as a shelter which can serve as night housing and/or secure space during inclement and extreme weather.

A shift yard enables animals to be locked up during cleaning of the main enclosure, separating animals for medical treatment or the introduction of new individuals. The shift yard should be next to the main enclosure and have two entrance/exits gates to prevent animals being cornered.

A shelter serves as a night house and/or secure space during inclement and extreme weather.

Barriers

Moats, solid concrete barriers or strong steel pipe should be used as the primary barrier for rhinos. The primary barrier should have a minimum height of 1.5m. When using steel pipe (or alternatively steel cables) the space between

the horizontal pipes should not be bigger than 25-30cm. Alternatively steel pipes can be placed vertically in the ground with the posts spaced 35-30cm apart. A secondary fence line can be used to separate individuals or keep aggressive animals at a distance from the primary fence line. Vertical steel poles or electric fencing can be used for this purpose. For electric fencing high tensile wire of at least 20 gauge is required. Electric fence energizers must emit at least 9,000V.

As enclosure gates can be the weakest points of the exhibit, adequate hinges and lock strength are very important. Interior doors should be constructed of heavy-gauge steel or pipe that is hinged or sliding. Sliding gates are optimal, as they have the ability for partial opening, and should be a minimum of 1.8m wide and 2m high.

Furniture

Black rhinos need access to mud wallows for skin health, temperature regulation and behavioural enrichment. The size and number of mud wallows required should be adapted based on the number of animals in the exhibit so that sufficient space is provided for each individual.

Besides mud wallows visual and physical barriers are required to help reduce stress and aggression by permitting animals to separate themselves from others during introductions or in group situations. Barriers should be large and high enough to provide so called 'safe zones' that allow an animal to pass out of sight. Types of visual barriers can include large rocks/boulders, logs as well as trees and natural plantings. Trees and plantings may be protected from rhinos by pipe caging, rock aprons or barrier fencing.

Ground surface

The surface of the enclosure should consist as much as possible of natural substrate like grass, limestone, sand, and other natural material combinations. The surface should be well drained with adequate footing.

Climate control

Under normal Malawian weather condition rhinos

should be able to be kept outside throughout the year. The animals should, however, have constant access to mud wallows and shelter space for temperature regulation and protection against inclement weather conditions.

6.2 Husbandry requirements

Care standards

Rhinos are large, strong animals which can become aggressive. Mistakes made in daily routines or during animal introductions can easily lead to dangerous situations for the animal or the environment. Rhino keepers should have as much formal training and experience as possible and should be familiar with rhino behaviour and husbandry.

Social organisation

In captivity rhinos can be kept as solitary animals, but preferably in a social setting. The best combinations are 2-3 females or one male with one female. For breeding one male can be kept with two or three females or two couples (2.2) can also be housed together as long as sufficient space is provided. Females with calves should be kept separate from other adult rhinos.

Animal monitoring

It is important that all individuals are being monitored on a daily basis. Monitoring of and interaction with the animals always needs to be done by experienced and qualified caretakers who know the individual animals. Records on behaviour and feeding should be kept on a daily basis. Besides monitoring the animals' behaviour, the enclosure should also be inspected on a daily basis for technical problems and broken structures.

Catching/Handling

Handling and restraint of rhinos is only done through the protective contact method. The best method to handle, examine and treat a rhino is by using so-called 'chutes'. A chute is a small restricted area which contains one or more hydraulic barrier that will "squeeze" together to restrict an animal's movement. Special attention in the design for rhinos needs to go to strength, durability, and functionality. To reduce stress a chute should be designed in such a way that it is part of the enclosure and the animal passes it on a routine daily basis.

Enclosure hygiene

Animal waste should be removed on a daily basis to prevent contamination of the animals

contained therein, to minimise disease hazards and to reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent build-up.

All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

6.3 Nutritional requirements

Diet

A variety of leafy greens, vegetables and fruit should be offered as a component of the basic diet. In addition high quality hay and browse also form an important part of the diet for rhinos.

Food presentation

Food is provided at multiple feeding sites throughout enclosures to ensure all animals have access and to reduce or eliminate aggression that results from competition for food resources, especially preferred items. To prevent sand/dust compaction the food should be offered on a concrete pad or in livestock troughs or bins.

Food handling

Food storage in a clean and dry location is important to prevent mouldy or dusty hay which can cause problems.

6.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination preferably in a chute system.
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, ear notches.

Routine/Preventative health requirements

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including skin condition, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years in a chute system. Anaesthesia should not be necessary unless invasive samples need to be taken.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture
- Tuberculosis test

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Tetanus
- +/- Leptospirosis, clostridial diseases, anthrax, brucella, other diseases as per risk of exposure

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. However, routine deworming may not be necessary and may actually upset gastrointestinal flora balance.

Special concerns

Anaphylaxis following vaccination has been observed in rhinos; animals should be monitored for 30 minutes post injection. Foot

problems may develop in captive rhinos held on inappropriate surfaces. Salmonella, tuberculosis; gastrointestinal problems and skin problems tend to be among the most common illnesses observed in captive rhinos.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem by a veterinarian. The carcass should be disposed of appropriately.

6.5 Health and safety requirements

Potential risks

Because of their strength and nature, rhinos can be dangerous and need to be approached with care.

Preventative healthcare

All staff members should undergo preventative TB screening prior to being in direct contact with the animals.

Safety measures

Handling and training of the animals should always be performed according to the protective contact method and within appropriate and especially designated facilities. All slides, doors, gates should be kept closed and securely fastened at all times; ideally a double-gated system will be in place. Locks and security of slides, gates and doors should be double-checked after each use and inspected regularly. Catching should be done through conditioning the animal to a catching/squeeze cage or by chemical restraint through darting. Caretakers should always keep a safe distance to the enclosure barrier.

In order to ensure safety and to properly meet the requirements of management, it is recommended that more than one keeper is responsible for the care of these animals on a daily basis. Keeper interaction should be restricted to designated areas and should be conducted according to the protective contact method. Consistency of routine is vital. Emergency protocols for escapes should be in place and caretakers should have full knowledge and understanding of the required procedures.

In cases where the public has viewing access to the enclosure, a physical barrier should be present to keep people at least 3m from the enclosure barrier. The enclosure barrier should be constructed in such a way that people are not able to pass the barrier.

7. ELEPHANTIDAE (ELEPHANTS)

Species and classification

Common name	Scientific name	Classification
African bush elephant	<i>Loxodonta Africana</i>	D

African bush elephants are categorised as a Category III species, and are generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

7.1 Enclosure requirements

Due to their size, social organisation and high intelligence, elephants require large enclosures in combination with sufficient and adequate infrastructure and furniture. Insufficient care and management of captive elephants can easily lead to physical and psychological abnormalities. The minimum enclosure requirements to keep elephants in captivity can vary due to characteristics of animals, social dynamics, history and health of an animal. The standards given here are therefore minimum standards and should be adjusted in case any abnormalities occur.

Size and dimensions

The main enclosure should measure no less than 2400m², independent of the number of animals. For each independent animal of above four years old and adult cows (without calves), the minimum accounted space should be 600m² per individual. For adult cows with a calf up to four years old, the minimum allocated space is 1000m². For enclosures above 3000m² an additional 400m² is required for each individual animals of above four years old.

Bulls that have regular access to the female herd require a minimum (separate) enclosure of 1000m². For each adult bull of eight years or more, the minimum accounted space is 600m² per individual. For young bulls kept in a group of up to four individuals the required enclosure space is no less than 2400m², independent of the number of animals. For each individual bull the accounted space is 600m² per individual.

A shift yard should measure no less than 500m².

For the indoor enclosure the minimum required group space should not be less than 330m² for a group of up to four animals of above four years old and adults cows (without calves). The minimum accounted space per individual is 75m². When a bull is kept inside (with or without cows), the minimum accounted space per bull is 100m².

Individual box space per adult individual or animals above four years (with or without calves up to four years old) should be 33m².

Infrastructure

The enclosure should provide the ability to manage the elephant herd in a flexible manner, allowing separation of groups or individuals as required. Therefore, besides the main outdoor enclosure, an indoor enclosure is required where individual animals as well as the whole herd can be temporarily housed for a short period of time.

The outside enclosure should have at least one shift yard which is large enough to temporarily house one or more individuals. In cases where adult elephant bulls are being kept, a separate enclosure needs to be available to separate the male from the group. In such cases, however, it is important that there are opportunities for tactile, olfactory, visual, and/or auditory interaction with other elephants. Where more than one adult male is being kept, there should be a possibility to split the individuals using a shift yard.

The indoor enclosure should provide a communal indoor area and provide the opportunity to separate the animals into individual boxes for husbandry purposes.

Barriers

Solid concrete or rock walls, horizontal steel rails pipe or dry moats should be used as the primary barriers to contain elephants. All materials must be strong enough to withstand elephant strength. The barrier should be not less than 2m high when only cows and juveniles are being kept. For adult bulls a minimum height of 2.4m is required for the primary barrier.

When using dry moats, special attention needs to be given to prevent animals injuring themselves. When the moat is designed for animals to enter it, it should be wide enough for an adult elephant to stand, turn and move in and should provide sufficient exit points. The edge of the slope on the enclosure side should be made as gradual as possible to allow animals easy access. When the moat is designed as a steep barrier, adequate barriers need to be provided to prevent animals from falling down.

A secondary fence line can be used to separate or keep aggressive animals at a distance or put in front of moats or primary fence lines. Vertical steel poles or electric fencing can be used for this purpose. For electric fencing high tensile wire of at least 20 gauge is required. Electric fence energizers must emit at least 9,000 V.

Enclosure gates are usually the weakest points of the exhibit and therefore adequate hinges and lock strength are very important. Interior doors should be constructed of heavy-gauge steel or pipe that is hinged or sliding. Sliding gates are optimal, as they have the ability for partial opening, and should be a minimum of 1.8m wide and 2m high.

Furniture

It is important that all enclosure structures are placed in such a way that the whole surface is used in an optimal way. Water pools, shades and hides should therefore be spread out to stimulate activity and decrease competition. The structures should stimulate natural, species-specific behaviour as much as possible and help to decrease stress and aggression amongst members of the herd. Bushes, big logs and rocks can be used to give structure to the enclosure and provide visual barriers. Tree stumps, rocks and concrete pillars can be placed to provide the animals with different options to rub themselves, a behaviour required to maintain the skin. Inside and outside the enclosure there should be sufficient 'loose' floor materials like grass, hay and sand for the animals to manipulate.

Elephants require adequate shelters to protect themselves from inclement weather, especially the hot sun. Big trees or artificial shelters should be spread out through the enclosure and should give all animals the opportunity to seek shelter at the same time.

For thermoregulation and skin care purposes elephants require a combination of water, mud and sand. The outside enclosure should provide one or more bathing pools. It is important that the water available is sufficient to provide access for all animals at the same time. For a group up to four adult elephants the surface of the pool should therefore not be smaller than 60m² with another 10m² for each additional animal. The pool should reach a minimum depth of 80-120cm to allow elephants to properly wallow and be constructed with round edges and no corners. Exit and entrance points should have a gentle slope of no more than 30 degrees or have steps wide enough for adult elephants and small enough for baby elephants to step up or down. In addition there is a need for multiple entrance and exit points to

prevent one elephant preventing other elephants from entering or exiting.

For such intelligent animals there needs to be an enrichment programme which provides a variety of manipulative enclosure objects. The objects need to be regularly replaced with new objects to provide continuous stimulation.

Ground surface

The ground surface of the outside and inside enclosure requires a variety of harder and softer substrates in order to maintain the condition of the footpaths and to stimulate natural behaviours like foraging, wallowing, bathing digging and resting. Substrates often used are soil, sand and grass. The inside enclosure should consist of at least 50% sand, with additional harder surfaces made of materials like tarmac, brick or rubber. Concrete is not recommended as this can become very slippery.

The floor of the inside enclosure should be quick drying and well drained to prevent foot problems and contamination.

Climate control

The animals should have access to shade at all times, especially when exposed to direct sunlight. Shade can be provided by trees/vegetation or artificial structures. It is important that there is sufficient shelter available for all animals to find shade without causing stress.

7.2 Husbandry requirements

Care standards

Due to their intelligence, physical size and strength as well as their high social requirements elephants require a high level of care with regard to housing, environmental enrichment, feeding and social interactions. Keeping elephants requires a high level of knowledge of the natural behaviour of these animals, as well as knowledge and experience of how to meet the species-specific needs of these animals in captivity. An environmental enrichment plan is essential in order to stimulate natural behaviour for both the inside and outside enclosure. Rotation of furniture is needed based on the elephant's behaviour which makes it complicated and more difficult to keep these animals.

Social organisation

In the wild elephants live in complex social systems. A herd usually consists of one or more matrilineal systems in which related females live together. Females generally remain for most of their life

within the matriline. Males leave their natal herd when they reach adulthood and subsequently live mostly in solitary or in a bull group. Males do associate with female herds when one or more of the cows are in oestrus.

A captive group of elephants should, if possible, be built around a matriline as this resembles their natural organisation. Females and daughters should, whenever possible, not be split from each other. Basically a group of elephants should consist of at least four individuals. Groups of three individuals are possible, but need to be intensively observed because of a higher risk of aggression. Generally, a group of related females will remain most stable. In breeding facilities a single male can be held with more females. Males can be split from the group whenever required, but should not be kept in complete isolation. Two or more males can also be housed together, but will also require intense observations.

Animal monitoring

Because of their size, strength and complex social behaviour, elephants in captivity require constant monitoring to ensure their wellbeing. All elephants must be visually inspected and behaviourally assessed on a daily basis. Reports should include observations such as condition of urine and faeces, eating and drinking patterns, administration of medications (if any), and general condition and behaviour.

Catching/Handling

Elephants should only be handled or treated according to the protective contact method. An elephant can be best treated using a restraining device or chute. To reduce stress a restraining device or chute should be designed in such a way that it is part of the enclosure and the animal is made comfortable with the facility through positive reinforcement training and habituation. The caretakers must be able to demonstrate a method of restraint that allows husbandry, veterinary, and potentially reproductive procedures to occur in a safe and efficient manner. The use of chains and shackles should be minimised as much as possible.

For these procedures, the facility will need to have SOPs which explain how to restrain and handle the animals, while diminishing any negative impact on the welfare of the animal. Procedures like this should only be done in the presence of two experienced and knowledgeable caretakers.

Enclosure hygiene

Animal waste should be removed on a daily

basis to prevent contamination of the animals contained therein, to minimise disease hazards and to reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent build-up.

All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

7.3 Nutritional requirements

Diet

Elephants are herbivores and can eat up to 300-400kg of food a day. Their diet consists mainly of different kind of grasses and fresh browse, supplemented with roughage and a smaller amount of tuber vegetables, fruit and vegetables. Elephants must be provided with browse material large enough to avoid molar impaction and rotation. Since elephant teeth migrate forward (not vertically), it is important that the right type of food is offered to promote dental health and allow for natural progression of each molar. The diet must be developed under the direction of a nutritionist or veterinarian.

Elephants have the tendency in captivity to become obese. It is therefore important that the food offered is generally not too high in energy levels. This will allow elephants to be kept busy eating over a long period of time while not becoming too heavy.

Besides a well-balanced diet elephants should have always unrestricted access to fresh potable water.

Food presentation

In the wild elephants spend up to 16 hours a day foraging. To prevent boredom, it is important that food and feeding methods encourage natural feeding patterns as much as possible. Food should therefore be provided at multiple times throughout the whole day and at several locations simultaneously to reduce or eliminate aggression that results from competition for food resources, especially preferred items. To prevent sand/dust compaction the food should be offered on a concrete pad or in livestock troughs or bins. Ideally different ways to deliver food to elephants during the day and night should be implemented (e.g. changing animal care staff schedules, automated feeders, hanging feeder nets, etc.)

Food handling

Food storage in a clean and dry facility is important to prevent mouldy or dusty grass

or browse which can cause problems. It is important that hay is of good quality, properly dried and cured. Purchased hay should be green and leafy, have fine, pliable stems and be free of weeds, insects, mould, twine, wire, or any other foreign objects. Hay should be visually inspected before delivery.

7.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination may be possible to do in a chute. If the elephant proves intractable, a standing sedation may be used.
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture
- Tuberculosis test/culture

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, ear notches. A semi-permanent method is using spray-paint on the rear of the animal.

Routine/Preventative healthcare

Visual examinations required

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including skin condition, eyes, all appendages/feet/nails, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. However, routine deworming may not be necessary and may actually upset gastrointestinal flora balance.

Physical examinations

A physical examinations would ideally be performed on each animal every two years. Ideally animals would be trained in a chute system +/- standing sedation. Anaesthesia should not be necessary unless invasive samples need to be taken.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Tetanus
- +/- Anthrax, Elephant Pox, Food and Mouth Disease, depending on disease risk

Special concerns

Captive elephants are prone to foot problems due to decreased activity and inadequate substrate, among other reasons. Ideally, feet should be inspected on a daily basis. Captive elephants also may experience cracks, splitting, or trauma to their tusks. Elephants are very susceptible to tuberculosis and captive individuals should have trunk washes for culture on an annual basis.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem by a veterinarian where possible. The carcass should be disposed of appropriately.

7.5 Health and safety requirements

Potential risks

Elephants are large, strong animals and can,

under certain circumstances, respond in an unpredictable way. There are many known cases of severe injuries and even death of caretakers in captive care settings. This is due to a variety of causes including inexperienced handling, animals responding to unexpected events, inadequate facilities and unreliable behaviour of certain individuals. Generally adult bull elephants are seen as more unpredictable and aggressive in comparison to cows.

Preventative healthcare

Caretakers should be screened annually for TB.

Safety measures

Handling and training of elephants should always be performed according to the protective contact method and within appropriate and especially designated facilities. All slides, doors, gates should be kept closed and securely fastened at all times; ideally a double-gated system should be in place. Locks and security of slides, gates and doors should be double-checked after each use and inspected regularly. Any area where staff and elephants are in close proximity should have clear safe zones or a protective barrier.

In order to ensure safety and to properly meet the requirements of management, it essential that more than one keeper is responsible for the care of these animals on a daily basis. Consistency of routine is vital. Detailed emergency protocol for escapes should be in place and caretakers should have full knowledge and understanding of the required procedures.

In cases where the public has viewing access to the enclosure, a physical barrier should be present to keep people at least 4m from the enclosure barrier. The enclosure barrier should be constructed in such a way that people are not able to pass the barrier.

8. ORYCTEROPODIDAE (AARDVARK)

Species and classification

Common name	Scientific name	Classification
Aardvark	<i>Orycteropus afer</i>	C

8.1 Enclosure requirements

Size and dimensions

The enclosure should measure no less than 300m² per pair of compatible aardvarks.

A shift yard should measure no less than 25m².

Infrastructure

When being kept in groups it is recommended to have a shift yard available to separate animals for management purposes such as medical treatment or the introduction of new individuals.

Barriers

Aardvarks are excellent diggers and in the wild their burrows reach to 6m deep into the ground. To prevent escapes it is therefore vital to sink the perimeter fence or wall into the ground up to a depth not less than 80cm. Concrete or mesh-wire should be placed at the same depth under the whole surface. Mesh wire should not be wider than 8x8cm and not less than 12 gauge.

For the upright barrier a solid wall (concrete, bricks, wood) can be used as well as mesh wire. The height of the barrier should not be less than 1.2m.

Furniture

Appropriate complexity should be provided through the use of various natural and artificial materials in the enclosure to encourage normal behaviour patterns, minimise any abnormal behaviour and avoid potential aggression between individuals. This can be in the form of logs, walls, boulders and man-made structures. Logs should be placed and secured in a manner that prevents rolling or falling onto animals. Rocks and logs should also be provided to allow rubbing and scratching.

The enclosure should provide sufficient shade in terms of vegetation through trees or shelters. Wherever live vegetation is used it is recommended to protect the vegetation through barriers or electric wires. Aardvarks like water so a shallow pool is therefore recommended.

For sleep and rest an artificial denning box (burrow) will need to be provided. To provide the

animals with sufficient comfort the box should provide at least 2m² of indoor space and a loose soft substrate (sand, saw dust) for the animal to lie on.

Ground surface

The ground surface must be of a natural surface consistent with the site. At least one third of the enclosure should consist of loose sandy soil or any other substrate which allows the animals to dig.

Climate control

Under normal Malawian weather conditions aardvarks should be able to be kept outside throughout the year as long as sufficient and appropriate opportunities are given to rest and hide. There needs to be at least one artificial burrow for one or two animals. For bigger groups additional burrows will need to be provided. Artificial burrows need to be in shady areas to prevent overheating.

8.2 Husbandry requirements

Care standards

Aardvarks have a very distinctive biology and adequate welfare standards in captivity can only be met through appropriate husbandry and management procedures. Wild aardvarks are used to travelling 8-10km per night. Insufficient space, enclosure complexity and behaviour stimulation can lead to boredom and consequently abnormal behaviour. Appropriate housing and enclosure design, environmental enrichment programmes and a balanced diet to meet nutritional requirements are therefore essential. The knowledge and techniques needed to keep these animals in captivity is not generally available and needs to be acquired through existing reputable captive care facilities which keep aardvarks.

Social organisation

Knowledge with regard to social behaviour and organisation is relatively limited. Generally aardvarks are solitary animals and therefore can be kept on their own. In captivity this species if often, however, kept in small compatible groups of up to four animals. Successful combinations are one male/one female, one male/multiple females or two males/two females. Single sex groups

are also possible if the animals are compatible. Groups with more males than females are not recommended.

Despite the fact that these animals are solitary in the wild, it is recommended to keep them in small compatible groups in captivity as this will provide them with more stimuli and hence prevent boredom.

Animal monitoring

Daily monitoring is required to quantify and measure the welfare of individual animals through monitoring of nutritional, physical and social conditions. Seeing as aardvarks are nocturnal, direct monitoring can sometimes be more difficult to achieve. Alternatively cameras can be used to acquire the required information.

Catching/Handling

The method used to catch and handle aardvarks should depend on the purpose of the animal being kept in captivity. Aardvarks can become very used to the presence of humans and can, under certain circumstances, be trained to enter a crush cage or transport box. Habituation to people is, however, not desired if rehabilitation and release is the end goal. Wherever it is not possible to train the animal to come into a small confined area, the best way to handle the animal is under sedation. Sedation can be provided using a dart gun/blow pipe. Training and sedation of these animals should only be conducted by experienced and qualified people.

Enclosure hygiene

Animal waste should be removed on a daily basis to prevent contamination of the animal, to minimise disease hazards and to reduce odours. Soiled bedding material and substrate should be removed and replaced with fresh materials daily, or as needed to prevent build-up. All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

8.3 Nutritional requirements

Diet

Aardvarks are specialised ant and termite eaters, which, in the wild, make up the vast majority of their diet. In a captive care setting, however, it is not possible to provide aardvarks with sufficient ants and/or termites to reach their nutritional requirements. Alternatively they can be provided with a pulp which consists of a high proportion of mainly light digestible proteins with additional fruits. Alternatively animals can

be given an artificial diet which typically consists of milk, water, ground meat, and/or meat-based products such as frozen feline diet, mink chow or dry dog food, hard-boiled egg, protein powder, baby cereal, and a mineral-vitamin supplement. All ingredients are mixed in a blender to the consistency of a thick gruel.

Food presentation

As wild aardvarks spend a significant amount of their active time foraging, it is important to find ways to keep captive aardvarks occupied through appropriate feeding techniques. Feeding times should be spread out as much as possible over their active time, and there should be no less than two feeds a day. Food should be offered at different places in the enclosure to stimulate exploration and locomotion. Besides the normal feedings it is highly recommended to provide enrichment feeds on a daily basis. Ideal enrichment feeds are crickets or mealworms scattered through the enclosure or offered in a feeding ball.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration.

8.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, tattoos, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six

months. This visual examination should include:

- Body condition score, including skin/hair, eyes, all appendages/digits/nails, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- +/- Rabies

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Due to their very specific feeding ecology, it may be difficult to provide captive aardvarks with an appropriate diet; malnutrition may be a concern.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. The carcass should be disposed of appropriately (incineration).

8.5 Health and safety requirements

Safety measures

Animals should be handled with care, and protective clothing (gloves) should be worn.

9. CERCOPITHECIDAE (OLD WORLD MONKEYS)

Species and classification

Common name	Scientific name	Classification
Vervet monkey	<i>Chlorocebus pygerythrus</i>	C
Yellow baboon	<i>Papio cynocephalus</i>	C
Blue monkey	<i>Cercopithecus mitis</i>	C

9.1 Enclosure requirements

Old World primates are highly intelligent animals with diverse and complex needs that are not easily met in a captive care setting. Their enclosure needs, with regard to size and design, should take into account the natural species-specific requirements. This needs to be achieved through sophisticated structures which make optimal use of the entire spatial dimensions of the enclosure.

Other than when being transported or for medical reasons, Old World primates should be kept at all times in secure enclosures or other appropriate facilities in which they have the opportunity to move freely and are able to express their species-specific behaviours.

Size and dimensions

Yellow baboons

The main enclosure should measure no less than 225m² for a group up to three animals. For each additional animal another 75m² is required. The height of the enclosure should not be less than 3m.

A shift yard should measure no less than 36m².

Vervets/Blue monkeys

The main enclosure should measure no less than 150m² for a group up to three animals. For each additional animal another 50m² is required. As vervets and blue monkeys are arboreal species the height of the enclosure should be no less than 3.5m.

A shift yard should measure no less than 25m².

Infrastructure

For mutual tolerance amongst group members it is important that the enclosure has multiple visual barriers as well as the possibility to split individuals up through side enclosures (like inside enclosures/shift yards). These are required to:

- increase the complexity of the enclosure and promote exploration behaviour;
- support conflict resolution within the group

and provide opportunities to individual animals to avoid certain other group members;

iii) support step-by-step introduction techniques for new animals.

In addition to the main enclosure a minimum of one, ideally two shift/night rooms should be available.

Barriers

Yellow baboons

Baboons are large, powerful, agile and dexterous primates capable of digging, chewing, tearing and damaging the sturdiest of enclosure structures and fence lines. The fence line should be at least 9 gauge wire and not show any weaknesses. With open top enclosures the fence line can be provided with electrified wires with a voltage being not less than 4.5KV to prevent escape. Alternatively the fence line can be provided with a 1.2m smooth surface at the top, ideally with an overhang to the inside of the enclosure of 75cm. Appropriate measures should be taken to prevent the baboons from digging underneath the fence line.

Vervets/Blue monkeys

Vervets and blue monkeys can climb well and jump far. The fence line should therefore be designed with these aspects in mind. Closed-top enclosures ensure the best guarantee against escapes, but generally limit the opportunity to climb. With open-top enclosures the fence line should at least be 3m high. To prevent climbing out the fence line should be provided with electrified wires with at least 3.0 KV. Alternatively the fence line can be provided with a 1.8m smooth surface at the top, ideally with an overhang to the inside of the enclosure of 75cm.

Furniture

The enclosure should provide sufficient structures (shelters, visual barriers) for animals to withdraw themselves from the group when desirable.

Yellow baboons

Despite baboons mainly living on the ground, they require opportunities to climb and rest away from the ground. Therefore the enclosure should

provide solid climbing structures with sufficient horizontal branches/beams as well as resting platforms which provide the opportunity to sit socially with other individuals.

Vervets/Blue monkeys

Vervets and blue monkeys are mainly arboreal and need climbing structures which use the total spatial dimension of the enclosure.

Ground surface

The ground surface of the main enclosure should consist out of natural substrate or sand. Concrete floors are not suitable for long-term housing facilities.

Climate control

Old World monkeys have a high tolerance in terms of climate range. The enclosure should, however, provide opportunities to hide from inclement or extreme weather (heavy rains, hot sun). If there is only an inside enclosure it should provide optimal daylight (including sun) and ventilation to guarantee the wellbeing of the animal.

9.2 Husbandry requirements

Care standards

Primates are highly intelligent and to properly keep and manage them in captivity a high level of knowledge and experience is required to meet their needs. To stimulate their cognitive abilities the enclosure should provide a complex environment that stimulates a wide range of natural primary behaviours and species-specific senses to the highest extent possible. This can, for instance, be achieved by providing as much natural vegetation as possible, offering food in a natural and challenging way or by providing manipulative objects. The animals should have the opportunity to avoid humans outside of the enclosure.

Social group structures amongst primates are complex and therefore need specific care requirements. Individual social relationships and group stability can change quickly. Therefore constant monitoring of the group is required to be able to respond quickly to situations which require intervention.

Social organisation

For social development, especially amongst infants and juveniles, it is essential that animals are kept in social groups which resemble the natural composition of the species as closely as possible. Failure to provide a normal social environment can lead to poor development

of social skills and consequently abnormal behavioural patterns.

When primates are kept in captivity, the number of individuals per available space and the mutual tolerance of the individuals in the group should be taken into account. Social bonding and group cohesion are important aspects for the welfare of the animal. Animals subjected to ongoing aggression or psychological pressure should be removed from the group.

Yellow baboons

Yellow baboons live naturally in multi male/multi female groups. In captivity ideally a few (1-3) adult males are kept with multiple females and juveniles. It is highly recommended to have more adult females than males in a captive group. Single sex groups can be held under specific circumstances, but only if there is mutual tolerance amongst the individuals.

Vervets/Blue monkeys

Vervets live naturally in multi male/multi female groups, while blue monkeys generally occur in groups of one male and multiple females. It is highly recommended to have more adult females than males in a captive group. Single sex groups can be held under specific circumstances, but only if there is mutual tolerance amongst the individuals.

Animal monitoring

Being highly intelligent animals living in complex social structures, Old World monkeys require close monitoring and record keeping by experienced caretakers. Daily observations should cover social interactions, the animals' physical condition and appearance, food intake and faeces.

Close monitoring is vital when changing a group structure or introducing new animals. Competition between individuals and group aggression towards individuals is very common amongst Old World monkeys and requires daily monitoring.

Catching/Handling

Yellow baboons

Baboons are large, powerful primates. Therefore manual capture and restraint should not be attempted for individuals above the age of three years. Manual capture and restraint of younger animals is also not attempted when multiple older animals are present in an enclosure. The safest and least stressful method to capture and restrain an adult baboon is through conditioning to enter a squeeze/catching cage. Alternatively the animal can be taken into an indoor enclosure/room and

sedated through chemical immobilisation using a blow pipe or dart gun. If using this method the animal should not have the opportunity to climb up high, to prevent it from falling down.

Vervets/Blue monkeys

The safest and least stressful method to capture and restrain vervets/blue monkeys is through conditioning to enter a squeeze/catching cage. When a catching cage is not available, the use of a net is recommended for the catching of juvenile males and juvenile and adult females. Adult or sub-adult males should never be caught with a net. In these cases the use of a catching cage or chemical sedation using a dart is recommended. Darting should always be conducted in a confined space where the animal does not have the opportunity to climb to higher areas, to prevent it from falling down.

Enclosure hygiene

Indoor rooms should be cleaned on a daily basis and uneaten perishable food and faeces should be removed. Dirty surfaces should be cleaned using an appropriate disinfectant. In the outside enclosure food leftovers should be removed as often as required for the type of food and prior to moulding or contamination. In hot weather conditions food leftovers should be removed daily. All water reservoirs should be cleaned on a daily basis and filled with fresh, potable water.

9.3 Nutritional requirements

Diet

Primates need constant access to clean water. Where the group exceeds the number of 10 individuals more water facilities need to be available.

Baboons

Baboon diets consist of a mixture of different vegetables, with different kinds of fruits, corn and animal protein (egg, meat). Where commercial monkey biscuits are available these should be added on a daily basis to provide a well-balanced diet. The diet should never, however, consist only of monkey biscuits due to the fact that pallets do not stimulate natural foraging.

Vervets/Blue monkeys

The diet for vervets and blue monkeys should consist mainly of a mixture of different vegetables, fruits, leaves and grasses and, in lower amounts, corn and animal protein (insects, eggs). Where commercial monkey biscuits are available these should be added on a daily basis to provide a well-balanced diet. The diet should never, however, consist only of monkey biscuits due to the fact that

pallets do not stimulate natural foraging.

Food presentation

Food should be scattered through the enclosure. There should be a minimum of two feedings a day.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods must be kept under refrigeration or for a short period of time in vermin-proof containers. Animal products should come from reliable sources and kept refrigerated/frozen.

9.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 46 days.

Recommended tests

- Full physical examination under anaesthesia (to ensure proper testing, see the following)
- Tuberculosis test: all primates should be tested for exposure to *Mycobacterium tuberculosis*. The recommended way to do this is by injecting Bovine PPD into the left upper eyelid and Avian PPD into the right upper eyelid at Day one and Day 43 of quarantine.
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, tattoos, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under anaesthesia.

Recommended tests

- Full physical examination
- Tuberculosis
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under anaesthesia.

Vaccinations

The following vaccinations are recommended:

- Rabies
- Tetanus
- Measles (only, not the MMR measles/mumps/rubella combination)
- +/- Leptospirosis, pneumococcus, depending on

local disease risk

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Selected zoonotic and anthroponotic diseases of concern are listed below in [Table 9.4](#).

Monkeys may also be susceptible to a variety of zoonotic respiratory viral and bacterial pathogens.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. All organ systems should be checked. In primates, organs affected by tuberculosis – lungs, liver, mediastinal lymph nodes – should be given special examination. Should any animal show post-mortem signs of tuberculosis, the DAHLD should be immediately notified. The carcass should be disposed of appropriately (incineration).

9.5 Health and safety requirements

Potential risks

Baboons are large, powerful primates and need to be treated with care and respect. (Sub) adult males can be especially aggressive.

Preventative healthcare

All staff working in direct contact with monkeys should be screened annually for tuberculosis. In addition, staff should maintain up-to-date vaccinations for rabies and tetanus. Staff showing signs of respiratory disease should refrain from working with primates and preparing their food. If this is not possible, staff should wear a face mask and keep interactions to a minimum.

Safety measures

Quarantine enclosures should only be entered when empty. Protective clothing - like gumboots, overalls and gloves - should always be worn.

During the quarantine period direct contact between humans and primates should be prevented, unless required for veterinary or husbandry care. In cases where direct contact is required this should only be performed by well-trained and qualified staff.

Direct physical interaction should not be allowed, with the exception of performing essential veterinary, husbandry or management activities. Fence lines and barriers should be constructed in such a way that the public are not able to touch the animals.

Entrance doors to the enclosure, especially when it contains sub-adult or adult males, should always be constructed with a lock and a minimum of two double bars to prevent animals escaping. Ideally a double-gated system should be in place to prevent escapes while people are entering or leaving the enclosure.

Yellow baboons

Baboons are large, powerful primates. Manual capture and restraint should not be attempted for individuals above the age of three years. Manual capture and restraint of younger animals should also be avoided when multiple older animals are present in an enclosure. The safest method to capture and restrain baboons is through conditioning to enter a squeeze/catching cage or through chemical immobilisation using a blow pipe or dart gun.

Vervets/blue monkeys

The safest method to capture and restrain vervets/blue monkeys is through conditioning to enter a squeeze/catching cage. When a catching cage is not available, the use of a net is recommended for the catching of juvenile males and juvenile and adult females. Adult or sub-adult males should never be caught with a net. The use of a catching cage or chemical sedation using a dart is in these cases recommended.

Table 9.4

Organisms	Organ system(s)	Route of transmission	Origins (Zoonotic, Anthroponotic, or Both)	Diagnosis
Faecal helminthes: hookworms, strongyloides, roundworms	Gastrointestinal	Faecal – oral	Both	Microscopic faecal examination (direct, float, centrifugation)
Faecal bacteria: Salmonella, Shigella, Yersinia, Klebsiella, etc.	Gastrointestinal	Faecal – oral	Both	Faecal pathogen culture
Faecal protozoa (Balantidium coli, Entamoeba spp., Giardia spp., etc.)	Gastrointestinal	Faecal – oral	Both	Microscopic faecal examination (direct)
Mycobacterium tuberculosis	Respiratory	Respiratory secretions	Anthroponotic	Intradermal (eyelid) testing, culture

10. GALAGONIDAE (GALAGO)

Species and classification

Common name	Scientific name	Classification
Greater galago	<i>Otolemur crassicaudatus</i>	C
Southern lesser galago	<i>Galago moholi</i>	C

10.1 Enclosure requirements

Size and dimensions

Lesser galago: A minimum of 36m² and a height of 3m is required for 1-2 compatible animals for the main enclosure. An additional 4m² is required for each additional animal. A shift room should be no less than 4m².

Greater galago: A minimum of 54m² and a height of 3m is required for 1-2 compatible animals for the main enclosure. An additional 5m² is required for each additional animal. A shift room should be no less than 6m².

Infrastructure

Galagos can be housed in a single room enclosure, as long as the animals have sufficient and appropriate hiding and sleeping sites. For the introduction of new individuals a shift yard is essential in addition to the main enclosure.

Barriers

Galagos are arboreal species and can jump relatively far. To prevent escapes these species should be kept in closed top enclosures when the enclosures are small. Open top enclosures can be used for larger enclosures, as long as the vegetation is far enough from the fence line to prevent the animals from escaping. For both closed and open top enclosures the minimum height of the fence should be no less than 3m. When the enclosure is open top, the top of the fence line should be made of a non-grip surface with the top 80cm angling towards the inside of the enclosure.

For lesser galagos the mesh should be no bigger than 15x15mm and a minimum of 12 gauge. For greater galagos the mesh size should be no bigger than 25 x25mm and a minimum of 12 gauge.

Electric fence wire should not be used for these species.

Furniture

Galagos are arboreal species which spend most of

their time off the ground. When moving around lesser galagos often leap from one branch to another, while greater galagos move along the branches in a walking or running motion and only make short jumps when trying to move rapidly.

Because of their arboreal nature, galagos should be provided with an extensive network of branches and natural or artificial climbing elements which allow them to move in a three-dimensional environment. Climbing structures should make optimal use of the enclosure space to accommodate an array of locomotory and foraging behaviours, as well as appropriate sleeping and resting areas. The latter should be created by providing thick branches, platforms and nest boxes at multiple sites throughout the enclosure. Sleeping and resting areas should be well covered by natural vegetation or artificial materials (e.g. shade cloth, hessian) and should be provided with a layer of soft bedding materials like grasses, leaves and wood shavings.

As galagos are nocturnal animals, resting and sleeping sites should be well covered and in shady areas which are also protected against inclement weather like direct sun and rain. Visual barriers should be available throughout the whole enclosure to avoid confrontation or aggression, and should include climbing structures, fallen logs, walls, shade structures, topography and large enrichment items.

Ground surface

For galagos the ground surface of the enclosure should consist of natural substrate consistent with the site. It is recommended that the substrate be supplemented with organic materials including, but not limited to, soils, sand, leaf litter, bark mulch, grasses, straw, hay and wood shavings.

Climate control

Under normal Malawian weather conditions lesser and greater galagos should be able to be kept outside throughout the year. Shelter and shade should, however, be provided to protect animals from inclement weather conditions like sun, wind or rain.

10.2 Husbandry requirements

Care standards

Galagos are nocturnal animals which have very specific needs with regard to their housing, social environment and nutrition. To keep these intelligent animals occupied an appropriate enrichment programme needs to be in place. Adequate knowledge of their biology, behaviour and specific husbandry needs is required to meet their specific needs in captive care settings.

Social organisation

Lesser galagos: generally not much is known about the social organisation of lesser galagos. They are often seen on their own, but are also known to associate with each other. Females sleep together in small groups, sometimes in the presence of the dominant male.

In captivity lesser galagos can be kept on their own, but preferably in small groups of compatible individuals. Groups are composed of several females with or without one adult male. It is not recommended to keep more than one male per enclosure.

Greater galagos: The social organisation of greater galagos does not significantly differ from the lesser galagos. They are also often seen on their own, but individuals do associate with each other. In captivity it is important to make sure that individuals are able to get along with each other. The best combination is one male with one or more females. Females can also be kept together, though agonistic behaviours among females do occur. It is not recommended to keep more than one adult male per enclosure.

Animal monitoring

Galagos are nocturnal and generally not active during the day. This often makes it hard to monitor them properly. Daily observation of food consumption and consistency of the faeces does, however, provide important information about the health status of the animal and accurate records need to be kept. The physical condition of the animal should be assessed at least twice a week. Abnormal behaviours like pacing or aggression should be noted straight away and appropriate action taken to prevent them.

Catching/Handling

Whenever possible the catching of galagos should be done through habituating or training the animals to enter a kennel or catching cage. Training or habituation should always

be performed through positive reinforcement. Aversive techniques to chase animals in a small room or kennel should be avoided as these animals are very susceptible to stress. Whenever working with a catching cage is not possible, a catching net can be used, but with care. Chasing the animals should be kept to an absolute minimum and if the animal cannot be caught within two minutes, the attempt should be aborted to give the animal the change to recover. Ideally animals should be caught while they are sleeping in their nest box or hiding place.

Manual restraint of the animal should remain as short as possible. For longer procedures (more than five minutes) chemical restraint is recommended.

Enclosure hygiene

As galagos are susceptible to stress, cleaning should be minimised, as long as this does not compromise hygiene. Uneaten perishable food should be removed within a timeframe appropriate for the type of foodstuff and prior to moulding or contamination. In hot weather conditions food leftovers should be removed daily. All water reservoirs should be cleaned on a daily basis and fresh potable water provided.

Soiled bedding material and animal waste should be removed from the ground on a regular basis to prevent contamination. This generally can be done every 2-3 days. Cleaning branches can cause stress to the animals as these are often used for scent marking to identify their territory. Therefore it is recommended to clean only part (up to one third) of the climbing structures and resting places at a time.

10.3 Nutritional requirements

Diet

In the wild lesser galagos generally feed on small reptiles and insects including beetles, grasshoppers, scorpions, butterflies and moths. Acacia gum is also a substantial part of their diet. Greater galagos feed on gums, fruits and insects. The composition of their diet in the wild varies with the location; in certain areas insects have been estimated to comprise 5% of their diet, while in another areas insects counted for up to 50-70% of their diet.

The diet for captive galagos should meet the required nutritional value and therefore be created in consultation with a veterinarian. Food consumption and animal composition need to be carefully monitored to ensure the health of the animals.

Food presentation

Galagos should be fed in accordance with their species-typical activity pattern. Night active animals should be fed at dusk while day active animals can be fed in the early morning. Food should be offered from the ground at different locations throughout the enclosure to encourage movement and exploration. It is strongly recommended to provide food in an enriching way to stimulate activity and provide challenge.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration or, for a short period of time, in vermin-proof containers. Animal products should come from reliable sources and kept refrigerated/frozen.

10.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 46 days.

Recommended tests

- Full physical examination under anaesthesia
- Tuberculosis test: all primates should be tested for exposure to *Mycobacterium tuberculosis*. The recommended way to do this is by injecting Bovine PPD into the left upper eyelid and Avian PPD into the right upper eyelid at Day 1 and Day 43 of quarantine.
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes,

all appendages/digits, etc.

- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under anaesthesia.

Recommended tests:

- Full physical examination
- Tuberculosis
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Faecal pathogen culture

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under anaesthesia.

Vaccinations

- Rabies
- Tetanus
- Measles (only, not MMR combo with measles/mumps/rubella)

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Galagos can carry very similar zoonotic and anthroponotic organisms to other non-human primates. Selected zoonotic and anthroponotic diseases of concern are listed in [Table 10.4](#).

Bushbabies may also be susceptible to a variety of zoonotic respiratory viral and bacterial pathogens.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a

Table 10.4

Organisms	Organ system(s)	Route of transmission	Origins (Zoonotic, Anthroponotic, or Both)	Diagnosis
Faecal helminthes: hookworms, strongyloides, roundworms	Gastrointestinal	Faecal – oral	Both	Microscopic faecal examination (direct, float, centrifugation)
Faecal bacteria: Salmonella, Shigella, Yersinia, Klebsiella, etc	Gastrointestinal	Faecal – oral	Both	Faecal pathogen culture
Faecal protozoa (Balantidium coli, Entamoeba spp., Giardia spp., etc)	Gastrointestinal	Faecal – oral	Both	Microscopic faecal examination (direct)
<i>Mycobacterium tuberculosis</i>	Respiratory	Respiratory secretions	Anthroponotic	Intradermal (eyelid) testing, culture

similarly experienced, qualified person. All organ systems should be checked. In primates, organs affected by tuberculosis – lungs, liver, mediastinal lymph nodes – should be given special examination. The carcass should be disposed of appropriately (incineration).

10.5 Health and safety requirements

Potential risks

Galagos are not aggressive toward humans but strenuously resist physical restraint. Handling animals needs to be done with care.

Preventative healthcare

All caretakers should be screened for TB and vaccinated for rabies. Due to the potential susceptibility of bushbabies to zoonotic viruses and bacteria that affect the respiratory system (e.g. influenza viruses) keepers with symptoms of respiratory disease should refrain from working with these animals while ill.

Safety measures

Protective clothing is required while handling these animals. Handling should only be done by experienced caretakers.

11. FELIDAE (CATS)

Species and classification

Common name	Scientific name	Classification
Caracal	<i>Caracal caracal</i>	B
Wildcat	<i>Felis silvestris</i>	B
Serval	<i>Leptailurus serval</i>	B
Lion	<i>Panthera leo</i>	D
Leopard	<i>Panthera pardus</i>	D

Lions and leopards are categorised as Category III species, and are generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

11.1 Enclosure requirements

Other than when being transported or for medical reasons, felids should be kept in secure enclosures at all times. Felids are powerful animals that require large spaces to accommodate their natural behaviours. In addition to ample size, felid enclosures must also provide physical challenge and sufficient environmental complexity. Housing felids in inadequately sized and enriched enclosures can result in stress to individual animals that are unable to express natural behaviours, including the ability to retreat from disturbance.

Size and dimensions

Ideally felids should be kept in open space settings, where they have enough acreage per cat for the species being housed, with trees or other suitable substrate to ensure healthy claws.

Wildcats

The main enclosure should measure no less than 175m² for one animal. For each additional animal, another 75m² is required. If using a closed top enclosure, the vertical dimension of the main enclosure should be no less than 2.5m.

Indoor rooms should not be smaller than 20m² with a vertical height of 2m.

Shift yards or outdoor pens can be part of the outside enclosure and should not be smaller than 50m².

Servals and caracals

The main enclosure should measure no less than 300m² for one animal. For each additional animal another 100m² is required. If using a closed top enclosure, the vertical dimension of the main enclosure should be no less than 2.5m.

Indoor rooms should be no smaller than 25m² with a vertical height of 2.2m.

Shift yards or outdoor pens can be part of the outside enclosure and should not be smaller than 60m².

Lions and leopards

The main enclosure should measure no less than 1600m² to house one leopard or up to three lions. For each additional lion an additional 400m² is required. If using a closed top enclosure, the vertical dimension of the main enclosure should be no less than 5m.

Indoor rooms should be no smaller than 50m² with a vertical height of 2.5m.

Shift yards or outdoor pens can be part of the outside enclosure and should be no smaller than 150m².

Infrastructure

To be able to temporarily house sick or injured animals, as well as to facilitate new animal introductions, a minimum of two other enclosure areas are required next to the main enclosure. At least one of these areas needs to be an indoor room, with the option for the second one to be a shift yard or outdoor pen. Both areas should be connected to the main enclosure.

In the case of lions a minimum of two indoor enclosures is required for groups of up to three animals. For bigger groups at least three indoor enclosures are required.

Barriers

Wildcats, servals and caracals

Metal fencing or solid barriers can be used as barriers to contain wildcats, servals and caracals. Moats are not recommended to contain these species.

When using fencing, a minimum of 12 gauge chain link or wire mesh is required with a mesh size not

larger than 60x60mm (50x50mm for wildcats). Escape can be prevented by digging the fence line so that it is buried 50cm underground. For closed top enclosures, the top should be made of mesh with the same strength as the side barriers.

With open top enclosures, the barrier should prevent the animal from climbing out. This barrier should be at least be 2.5m. In case of a mesh barrier, escapes can be prevented by creating an inside overhang on top of the fence line or by using electrified wires. An overhang to the inside should measure a minimum of 75cm. When using electric wires the minimum voltage should be 3.5Kv.

Leopards

Metal fencing or solid barriers can be used as barriers to contain leopards. Moats are not recommended to contain these species.

When using fencing, a minimum of 9 gauge chain link or wire mesh is required with a mesh size no larger than 75x75mm. To prevent escape, dig the fence line so that it is buried 80cm underground. With closed top enclosures, the top should be made of mesh with the same strength as the side barriers.

With open top enclosures, the barrier should prevent the animal from climbing out. This barrier should be at least 4m high. With mesh barriers escapes can be prevented by creating an inside overhang on top of the fence line and/or by using electrified wires. An overhang to the inside should measure of minimum 75cm. When using electric wires the minimum voltage should be 6Kv.

Lions

Dry moats, metal fencing and solid barriers can be used to contain lions.

When using a moat the minimum depth should be 5m and the width not less than 7.5m.

When using fencing, a minimum of 8 gauge chain link or wire mesh is required with a mesh size no larger than 75x75mm. To prevent escapes, the fence line should be buried 90cm underground. For closed top enclosures, the top should be made of mesh with the same strength as the side barriers.

To prevent escapes, it is highly recommend to use electrified wire on the fence line with a voltage not less than 6Kv.

Furniture

In general enclosures for felids should provide a varied environment as much as possible. Ideally a

combination of natural vegetation (trees, bushes), climbing structures, rocks, platforms and hides should be used.

Wildcats, servals and caracals

All of these species are good climbers and climbing opportunities should be provided using natural vegetation or manmade structures. Where closed top enclosures are provided, the total vertical space should be optimally used. Visual barriers (bushes, grass, manmade structures) should provide the animals with the opportunity to hide from conspecifics as well as from people outside of the enclosure. Animals should, at most times, also have access to the inside room. Ideally also a hide (shelter) should be provided in the outside enclosure.

Leopards

Leopards are good climbers and climbing opportunities should be provided using natural vegetation/materials or manmade structures. This should include platforms or branches which allow resting, sleeping, social behaviour as well as feeding behaviours. The enclosure must provide sufficient visual barriers (vegetation, logs, rocks, manmade structures) to allow the animals to hide. Large wooden objects should also be available for scratching and scent marking. Animals should, at all times, have access to the inside room.

Lions

The main enclosure should provide a mixture of natural and/or manmade structures which give lions the opportunity to be out of sight from other group members or people. Hills, trees, shrubs, branches, rocks and stumps are good examples of enclosure furniture for lions, and can be used for shade as well as for territorial marking. Large wooden objects should also be available for scratching. Lions like to lie down away from the ground and logs, rocks and/or platform constructions should provide the opportunity to do so. Animals should, at most times, have access to the inside room.

Ground surface

Outdoor enclosures should as much as possible have a natural substrate. The substrate should drain well and be supplemented with organic materials including, but not limited to, soils, sand, leaf litter, bark mulch, grasses, straw or hay. All indoor enclosures should have a non-slip concrete floor sloped to a drain as well as a wooden platform for sleeping and resting. For older animals appropriate bedding materials must be provided in sufficient amount/depth to prevent contact with the concrete.

Climate control

Generally all species under these standards are used to the different seasons of the Malawian climate. Additional climate control measures are not required. Animals should, however, have access to the inside rooms throughout most hours of the day so that they can hide from inclement weather conditions. The main enclosure structures should also provide sufficient shade and opportunities to hide from wind and rain.

11.2 Husbandry requirements

Care standards

Felids are intelligent animals which require high standards of care to meet their species-specific needs. A lack of good husbandry and housing facilities can easily lead to abnormal behaviour and diminished welfare. Therefore care of these animals should only be provided by well-trained and experienced caretakers.

Social organisation

Wildcats, caracals, servals and leopards

These species are generally solitary and can be kept on their own in captivity. Couples (male/female) can sometimes be housed together when animals are compatible and all individuals have ample space to retreat and hide as needed while social tensions are resolved. Introductions of these species should always be performed with the greatest care and only under supervision of well trained and experience caretakers. Females and young can generally be easily kept together up to the age that the offspring would naturally start to disperse.

Lions

Lions can be housed in any one of the following ways:

- a female with her sub-adult offspring;
- a compatible pair, with or without sub-adult offspring;
- a single-sex group;
- a juvenile group while all animals remain under breeding age; or
- a pride (one male – multiple females)

In all combinations special attention needs to be given to mutual relationships, and experienced caretakers should be constantly monitoring whether the individuals are compatible with each other. Introductions of these species should always be performed with the greatest of care.

Animal monitoring

It is important that all individuals are monitored

on a daily basis. Special attention is given to their physical status and social relationships (whenever relevant). Monitoring of the animals always needs to be done by experienced and qualified caretakers who know the individual animals.

Catching/Handling

Capture and handling of felids is generally very stressful for the animal and should only be done if required for veterinary care, management reasons or transport.

The safest and least stressful method to capture and restrain a felid is through conditioning to enter a catching cage or lockout area that is easily accessible on all sides. Animals which need sedation can also be darted by an experienced veterinarian.

Hand or net catching of felids, even the smaller species, is not recommended.

Enclosure hygiene

Indoor enclosures must be cleaned on a daily basis and animal waste and food leftovers must be removed. Areas where animals have been eating, defecating or urinating must be well scrubbed with water and disinfected with soap. Bedding should be turned around on a daily basis and renewed at least every week. Generally food leftovers inside and outside should be removed within 24 hours after being provided. The outside enclosure should be cleaned at least twice a week and faeces removed.

All water reservoirs must be cleaned on a daily basis and provided with fresh potable water.

11.3 Nutritional requirements

Diet

Ideally felids should be offered a selection of whole prey species. When mainly slab meat or boneless meat is provided, a properly calculated amount of calcium carbonate and multi vitamins must be supplemented. If available, commercial feline supplements can be added to the meat. In general it is highly recommended to feed all felids bones on a regular basis, for dental health as well as a source of enrichment for the animal.

Food presentation

Felids, except lions, should be fed on a daily basis. Food should be offered at the time of day animals are active, which is generally between dusk and dawn. Therefore for these species food is best provided by the end of the afternoon.

Lions can be fed on a daily basis or on a weekly rotation schedule with one or two fasting days. When feeding more lions, special attention needs to be given on how to present the food. All animals should have access to food, and feeding should not lead to unnecessary aggression.

Whenever possible and appropriate, food should be presented in such a way that the animal has to make effort to acquire the food. This can be done by hiding the food, presenting food at random places in the enclosure, and also hanging food higher up or dragging it through the enclosure.

All felids should have access to clean potable water at all times in their indoor and outdoor enclosure.

Food handling

Unless the food is provided fresh, meat should always be stored in a deep freeze. Items frozen for later use must be dated and labelled. Food must always be fed within 24 hours of thawing. Diets must be prepared in a safe and hygienic manner to reduce the possibility of contamination or spoilage. Meat and fish should be prepared using separate cutting boards, utensils and food preparation surfaces.

11.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, tattoos, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis,

but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Additional tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Panleukopenia, rhinotracheitis, and calicivirus, herpesvirus (all vaccines should be killed only)
- Canine distemper virus (killed) based on species and disease risk

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Rabies and distemper are two diseases of concern in carnivores and should be on the list of differentials for any animals showing neurological signs or unexplained lethargy or depression. Since canine distemper is prevalent in companion animals in Malawi, vaccination of lions especially against this disease is recommended. Echinococcus sp is a zoonotic tapeworm that can be shed in the faeces of carnivores. Common

diseases of geriatric captive felids are dental disease, renal disease and diabetes mellitus.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. If an animal showing neurologic signs dies, the head should be immediately sent for rabies testing. The carcass should be disposed of appropriately (incineration).

11.5 Health and safety requirements

Potential risks

All felids are, depending on age and species, to a certain extent dangerous to work with and need to be looked after with extreme care and suitable protective measures. Any mistakes made in direct contact, especially with lions and leopards, can lead to serious and even lethal injuries.

Preventative healthcare

All personnel in direct contact with carnivores should be rabies vaccinated. Personal protective equipment should be provided to each caretaker.

Safety measures

Handling and training of the animals should always be performed according to the protective contact method and within appropriate and especially designated facilities. All slides, doors and gates should be kept closed and securely fastened at all times; ideally a double-gated system should be in place. Locks and security of slides, gates and doors should be double-checked after each use and inspected on a daily basis. Under no circumstances should caretakers enter the same area as a lion or leopard, unless the animal is sedated by a qualified veterinarian. Catching of all felids should be done through conditioning the animal to a catching/squeeze cage or by chemical immobilisation through darting. Caretakers should always keep a safe distance from the enclosure barrier.

In order to ensure safety and to properly meet the management requirements of lions and leopards, it is essential that more than one keeper is responsible for the care of these animals on a daily basis. Consistency of routine is vital. Detailed emergency protocol for escapes should be in place and caretakers should have full knowledge and understanding of the required procedures.

In cases where the public has viewing access to the enclosure, a physical barrier should be present

to keep people at least 3m from the enclosure barrier. The barrier should be constructed in such a way that people are not able to pass it.

Escape protocols should be in place when keeping felids and all caretakers should be familiar with how to act during an escape.

12. VIVERRIDAE/NANDINIIDAE (GENETS/CIVETS)

Species and classification

Common name	Scientific name	Classification
African civet	<i>Civettictis civetta</i>	B
Common genet	<i>genetta genetta</i>	B
African palm civet	<i>Nandinia binotata</i>	B

12.1 Enclosure requirements

Careful consideration should be given to the design of enclosures for genets and civets so that all areas meet the physical, social, behavioural and psychological needs of the species. Ideally the enclosure environment should resemble the natural living conditions for the species as much as possible.

Size and dimensions

Enclosure sizes are based on the species size, behavioural repertoire, home range size, activity pattern and daily movements, and professional experience with ex situ populations of these species. The following sizes and dimensions are minimum standards:

Genet/Palm civet

30m² for one individual animal, 40m² for a pair. The enclosure height should be no less than 2.5m. When a shift yard is available for introductions, the space should be no less than 9m² in addition to the main enclosure.

African civet

90m² for one individual animal with an additional 30m² for a pair. When a shift yard is made available for introduction, the space should be no less than 16m² in addition to the main enclosure.

Infrastructure

Generally genets and civets can be housed in a single room enclosure, as long as the animals have sufficient and appropriate hides and sleeping sites. For the introduction of new individuals a shift yard is essential in addition to the main enclosure.

Barriers

Genet/Palm civets

These species are arboreal and are best kept in a closed top enclosure. When being kept in an open top enclosure part of the wall should be made of non-grip surface. These species jump easily from branch to branch so vegetation should not allow the animals to escape.

Generally, mesh is recommended for these species, but can be combined with other materials such as concrete or wood. The mesh should not

be bigger than 2.5x2.5cm and have a thickness of not less than 9 gauge. The barrier should at least go 35cm into the ground. Alternatively, a concrete apron can be poured at the base of the fence and extended 35cm on each side of the fence.

African civets

Mesh or strong solid barriers can be used to contain African civets. The mesh should be no less than 5x5cm with a thickness of no less than 9 gauge. The barrier should at least go 50cm deep into the ground ending no less than 50cm into the enclosure away from the main barrier. A concrete apron can also be used for this species, but should cover at least 50cm on each side of the main barrier.

Furniture

Enclosure complexity is very important for these species and should be provided through the use of various natural and artificial materials to encourage normal behaviour patterns, minimise any abnormal behaviour and avoid confrontation and aggression.

A shelter needs to be provided for each individual animal, big enough to offer enough space for two adult individuals (if relevant). African genets and palm civets also need sufficient horizontal branches and shelves which can be used for sleeping or resting. However, African civets are terrestrial and need resting and hiding places on the ground.

Besides the hides, the quality of space is very important for all genets and civets. This can be achieved by using hollow logs, providing digging sites, natural trees, bushes and vines. All these structures should provide sufficient cover to hide and be out of side of conspecifics or humans.

A permanent shallow pool or stream is also recommended for African genets.

Ground surface

The ground of the enclosure, for the most part, should consist of natural substrates consistent with the site. The substrate may be supplemented with organic materials including, but not limited to, soils, sand, leaf litter, bark mulch, grasses, straw and hay. African civets are real diggers, so

the substrate should allow them to dig in several places in the enclosure.

Climate control

Under normal Malawian weather conditions all genets and civets should be able to be kept outside throughout the year. Shelter and shade should, however, be provided to protect animals from inclement weather conditions like sun, wind or rain.

12.2 Husbandry requirements

Care standards

Genets and civets are intelligent animals and require thoughtful design and husbandry to ensure a good quality of life. Housing these species in inadequately sized enclosures can result in social stress and/or stress to individual animals unable to express natural behaviours, including the ability to retreat from disturbance. Behavioural indicators of stress can include heightened aggression, pacing and other repetitive behaviours. Therefore all caretakers should have decent knowledge of the biology, behaviour and husbandry needs of these species.

Social organisation

Generally most species of genets and civets are solitary, and can be housed as such. However, it is possible, under certain conditions, to keep pairs in captivity. When keeping pairs the housing conditions need to provide the animals with sufficient shelter and cover to get away from each other. When introducing new individuals a satellite enclosure is required to allow gradual introduction and reduce aggression.

Animal monitoring

As all species of genets and civets are nocturnal they can be difficult hard to monitor. Daily observation of eating and faeces will, however, give important information about the health status of the animals. Their general condition should be assessed at least twice a week and abnormal behaviours, like pacing or aggression, should be noted straight away and appropriate action taken to prevent them.

Catching/Handling

Catching or handling these species should be done by habituating or training the animals to come into a kennel or catching cage. Aversive techniques to chase animals in a small room or kennel should be avoided as these animals can become easily stressed or aggressive. The protective contact method is highly recommended and entering the enclosure should always be done

with care, making sure the animal is not cornered and that the caretaker stays outside of its flight distance.

Enclosure hygiene

Uneaten perishable food must be removed within a timeframe appropriate for the type of foodstuff and prior to moulding or contamination. All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

12.3 Nutritional requirements

Diet

African genets are mainly carnivores and should be provided with a mixture of whole prey like mice, day chicks, crickets, meal worms, feline cat food, egg, and a mixture of fruit and veg. Offering whole prey is important from a nutritional point of view as well as dental care.

African civets are omnivorous and can be provided with a nutritionally complete, commercially available feline diet, rodents, fruits, corn, day-old chicks and eggs.

Palm civets are mainly fruit eaters and should be given a variety of lower sugar fruits complemented with about 10% of animal protein which can be offered in the form of day old chicks, mice or eggs.

Food presentation

Genets and civets should be fed in accordance with their species-typical activity pattern. Genets and civets are generally nocturnal animals, but in captivity their activity patterns can be reversed. Night active animals should be fed at dusk while day active animals can be fed in the early morning. Whole prey (e.g. mice), insects, and favourite fruit/forage items can be placed around the enclosure to encourage movement and exploration; this is important for animals of all ages but can be particularly useful in encouraging movement for older animals. Foods can be hidden in locations that fit with the animal's natural feeding style (i.e., ground feeders vs. arboreal feeders).

Genets will eagerly forage for scattered items, especially mealworms, pinkie rats, live crickets as well as fruit and vegetables. They will also benefit from receiving whole prey such as rodents and chickens.

Food handling

Dry goods must be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration or for a short period of time in vermin-proof containers.

Meat products should come from a reliable source and kept refrigerated/frozen.

12.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags and microchips.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Canine Distemper Virus (killed)
- +/- Canine Parvovirus, Civets (killed)
- +/- Leptospirosis, Feline Panleukopenia, Canine Adenovirus, depending on disease risk

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Rabies and distemper are two diseases of concern in carnivores and should be on the list of differentials for any animals showing neurological signs or unexplained lethargy or depression. Captive viverrids may be prone to obesity and/or malnutrition.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. If an animal showing neurologic signs dies, the head should be immediately sent for rabies testing. The carcass should be disposed of appropriately (incineration).

12.5 Health and safety requirements

Potential risks

These small mesocarnivores can be difficult to manually restrain and can inflict serious bites, even through leather gloves.

Preventative healthcare

All personnel in direct contact with carnivores should be rabies vaccinated. PPE (gloves) should also be worn when working with carnivores.

Safety measures

For these species it is highly recommended to work according to the protective contact method. In case capture or restraint is required, this can best be done through training or habituating animals to come into catching cages or kennels. Net catching is not recommended.

13. HERPESTIDAE (MONGOOSES)

Species and classification

Common name	Scientific name	Classification
White-tailed mongoose	<i>Ichneumia albicauda</i>	B
Marsh mongoose	<i>Atilax palidinosus</i>	B
Egyptian mongoose	<i>Herpestes ichneumon</i>	B
Dwarf mongoose	<i>Helogale parvula</i>	B
Banded mongoose	<i>Mungos mungo</i>	B
Slender mongoose	<i>Galerella sanguinea</i>	B

13.1 Enclosure requirements

Careful consideration should be given to the enclosure design for mongooses so that all areas meet the physical, social, behavioural and psychological needs of the species. Ideally the enclosure environment should resemble the natural living conditions for the species as much as possible.

Size and dimensions

Enclosure size should be based on the species size, behavioural repertoire, home range size, activity pattern, daily movements, and professional experience with ex situ populations of these species. The following sizes and dimensions are minimum standards:

Dwarf mongooses

30m² for a stable (compatible) group up to five animals. For each additional animal 4m² should be added. The enclosure height should be no less than 2.1m. Each shift yard should be no less than 4m² in addition to the main enclosure.

Slender mongooses

30m² for each individual or pair. The enclosure height should be no less than 2.4m. Each shift yard should be no less than 4m² in addition to the main enclosure.

Banded mongooses

45m² for a stable (compatible) group up to five animals. For each additional animal 4m² should be added. The enclosure height should be no less than 2.1m. Each shift yard should be no less than 4m² in addition to the main enclosure.

White-tailed, Egyptian and marsh mongooses

50m² for each individual or pair. For each additional animal 6m² should be added. The enclosure height should be no less than 2.4m. Each shift yard should be no less than 6m² in addition to the main enclosure.

Infrastructure

Generally mongooses can be housed in a single room enclosure as long as the group is compatible. It is, however, recommended to have one or two shift yards to manage the group, especially for the more gregarious species. A shift yard is required for the introduction of new individuals.

Barriers

Mongooses are known to be very good diggers, so it is important to sink the perimeter fence or wall no less than 80cm into the ground. Concrete or mesh-wire should be placed at the same depth under the whole surface. For *dwarf and slender mongooses* mesh wire should be no less than 12 gauge and no more than 1.5cm wide. For *other mongoose species* wire should be no less than 12 gauge and no more than 2.5cm wide.

Mongooses are also very good climbers. It is therefore strongly recommended to keep these animals in closed-top enclosures. Concrete or mesh wire should be used as barriers. For *dwarf and slender mongooses* mesh wire should be no less than 12 gauge and no more than 1.5cm wide. For *other mongoose species* the wire should be no less than 12 gauge and no more than 2.5cm wide. When an open top enclosure is provided, the barrier should consist of a non-grip wall no less than 1m at the bottom of the fence for dwarf and slender mongooses and 1.4m for other species. Where open top enclosures are used, it should be kept in mind that these species jump easily from branch to branch and so vegetation should not allow the animals to escape.

Furniture

Enclosure complexity is very important for these species and should be provided through the use of various natural and artificial materials to encourage normal behaviour patterns, minimise any abnormal behaviour and avoid confrontation and aggression. The furniture of the enclosure is

also important to provide sufficient opportunities for scent marking, which is an important social behaviour of mongoose.

Mongooses like climbing and therefore an extensive network of branches is recommended. Branches should ideally vary in size and stability. Nest boxes, feeding plateaus, water reservoirs and covered sleeping/hiding spots should be located on the ground for all mongoose species. Appropriate ground cover like bushes, rocks, (artificial) termite mounts and pipes are also required throughout the enclosure. Nest boxes or artificial burrows should be big enough for the social species (dwarf, banded, white-tailed and Egyptian mongooses) to provide sufficient space for all individuals. If more than one nest box or burrow is available, these should ideally be interconnected.

Marsh mongooses in particular like shallow water pools and streams, which are recommended to encourage natural behaviour. For other species one or two water reservoirs for each enclosure are sufficient.

Ground surface

A substantial part of the enclosure should consist of a natural substrate which allows the animals to dig and make burrows. Suitable substrates include soil, soft sand, grass, mulch, leaves, straw and hay.

Climate control

Under normal Malawian weather conditions all mongoose species should be able to be kept outside throughout the year. Shelter and shade should, however, be provided to protect animals from inclement weather conditions like sun, wind or rain.

13.2 Husbandry requirements

Care standards

Mongooses are intelligent animals and require thoughtful design and husbandry to ensure a good quality of life. As they are good diggers and climbers, the enclosure needs to be also constructed in such a way that the animals are properly enclosed and daily care procedures don't give them the opportunity to escape. It is therefore paramount for caretakers to be familiar with the behaviour and general biology of these species.

Social organisation

The social organisation of mongooses depend on the individual species. Gregarious species should not be kept on their own (unless required for

medical treatment), whereas other species can be housed as solitary animals.

Dwarf mongooses

Dwarf mongooses are highly gregarious and naturally live in packs. They are best kept in small packs of related individuals (on average 8-9 individuals). Unrelated animals can be added to the group, but care needs to be given to the introduction process. Usually there is one dominant breeding pair, which form the centre of the pack. The pack can contain more than one adult male, as long as the individuals are compatible with each other. Usually it is safer to keep more adult females than males.

Banded mongooses

Banded mongooses are highly gregarious and live in a matriarchal society. Banded mongooses typically have 10-20 individuals in a colony. Colonies with a 50/50 male to female ratio or with more males than females appears to work best.

Slender mongooses

Slender mongooses are best kept as solitary animals or in a compatible pair (male/female).

White-tailed mongooses

White-tailed mongooses are best kept as solitary animals or in a group of compatible, related females. Male/female or male/male combinations are not recommended.

Egyptian mongooses

Egyptian mongooses can be kept as solitary animals or in small groups of related females with or without one adult male. It is not recommended to keep multiple adult males in one enclosure.

Marsh mongooses

Marsh mongooses can be kept as solitary animals or in a compatible pair (male/female).

Animal monitoring

It is important that daily observations and records are kept of feeding behaviour, physical condition, and faeces, as well as social stability and relations within the group. Extra attention needs to be given to subordinate individuals to make sure they maintain a good body condition and don't receive too much aggression.

Catching/Handling

It is important that a trustworthy relationship is developed between the caretaker and the animals. Animals can be caught with small (appropriate to the species) compatible catching cages or with a net.

Enclosure hygiene

Food and water containers should be cleaned on a daily basis. Enclosure furniture, including tunnels and nest boxes, should not be included in the daily cleaning regime because these species scent mark their territory and thorough cleaning of their home space may disturb them. Therefore it is recommended to only clean one quarter of the enclosure furniture at the time. Uneaten perishable food should be removed within a timeframe appropriate for the type of foodstuff and prior to moulding or contamination.

13.3 Nutritional requirements

Diet

Generally mongooses consume a wide range of food items in captivity including vertebrates (mice, day chicks), eggs, fish, invertebrates (mealworms, crickets, grasshoppers, beetles), dry cat food and some fruit and vegetables (carrot, sweet potato, corn, apple). Offering whole prey is important from a nutritional point of view, but also for dental care and enrichment.

Food quantities need to be established by a veterinarian or nutritionist, based on the animal needs as well as local availability.

Food presentation

Mongooses should be fed in accordance with their species-typical activity pattern. Nocturnal animals are generally fed prior to the night whereas diurnal animals are fed in the morning. It is recommended to offer the diet in several (minimum of two) feedings over the active time period. Most mongoose references in these standards are diurnal, except the white-tailed mongoose and the marsh mongoose, which are nocturnal.

Whole prey (e.g. mice), insects, and favourite fruit/forage items should be placed on feeding plateaus at different locations in the enclosure to encourage movement and exploration and prevent aggression because of competition.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods must be kept refrigerated or for a short periods of time in vermin-proof containers. Meat products should come from a reliable source and kept refrigerated/frozen.

13.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. Microchips are preferred for identification of individuals.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- +/- Rabies

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Mongooses have been known to carry leptospirosis and social mongoose (e.g. banded and dwarf mongoose) may maintain tuberculosis within their family groups. Rabies and distemper are two diseases of concern in carnivores and should be on the list of differentials for any animals showing neurological signs or unexplained lethargy or depression.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. If an animal showing neurologic signs dies, the head should be immediately sent for rabies testing. The carcass should be disposed of appropriately (incineration).

13.5 Health and safety requirements

Potential risks

Mongooses may be difficult to manually restrain and may be prone to biting, even through leather gloves.

Preventative healthcare

Caretakers should be vaccinated for rabies prior to having direct contact with the animals.

Safety measures

Mongooses are good diggers and climbers. Their enclosure therefore needs to be constructed in such a way that the animals are properly enclosed and daily care procedures don't give them the opportunity to escape. Ideally a double-door system should be in place. Animals can be caught with small (for the species) compatible catching cages or with a net. Caretakers should at all times be provided with appropriate personal protective equipment.

14. HYAENIDAE (HYENAS)

Species and classification

Common name	Scientific name	Classification
Spotted hyena	<i>Crocuta crocuta</i>	C

14.1 Enclosure requirements

Other than when being transported or for medical reasons, hyenas should be kept in secure enclosures at all times. Hyenas are active, intelligent and powerful animals that require large spaces to accommodate their natural behaviours. In addition to ample size, felid enclosures must provide a physical challenge and sufficient environmental complexity. Housing hyenas in inadequately sized/enriched enclosures can result in social stress and/or stress to individual animals as a result of being unable to express natural behaviours, including the ability to retreat from disturbance.

Size and dimensions

The main enclosure should measure no less than 1,600m² to house up to three hyenas. For each additional hyena an additional 400m² is required. Hyenas are best housed in open top enclosures.

Indoor rooms should be no smaller than 50m² with a vertical height of 2.5m.

Shift yards or outdoor pens can be part of the outside enclosure and should be no smaller than 150m² each.

Infrastructure

To be able to temporarily house sick or injured animals, as well as to facilitate new animal introductions, a minimum of two additional enclosure areas are required, besides the main enclosure. At least one of these areas needs to be an indoor room, with the option for the second one to be a shift yard or an outdoor pen. Both areas should be connected to the main enclosure.

Barrier

A mesh wire or solid (concrete) wall can be used as a barrier to contain hyenas. Moats are not recommended to contain these species.

For mesh wire a minimum of 8 gauge chain link or wire mesh is required with a mesh size not larger than 60x60mm. To prevent an outbreak by digging, the fence line should be buried 80cm underground and 50cm inward to the enclosure. It is highly recommended to install an electrified

wire 50cm from the main fence line, 35cm above the ground. Voltage should not be less than 6KV.

Furniture

Spotted hyenas live in social groups which are characterised by a strict dominance hierarchy. To encourage exploration behaviour and scent marking, but also to provide sufficient opportunities for animals to move out of each other's sight to support conflict resolution and reduce stress, it is essential that the enclosure provides a varied environment with sufficient physical barriers.

All enclosures should be provisioned with objects to support these species-specific behaviours and requirements. Trees, wooden logs and rocks should be provided throughout the enclosure. Soft, unnatural materials (e.g. rubber, plastic) are inappropriate for furnishing or enrichment as they are easily destroyed and animals might swallow the pieces.

Ideally the natural surface and infrastructure of the enclosure should allow the animals to dig their own dens. Alternatively one or more artificial dens can be provided. A den should be big enough to house all of the clan members. Special attention needs to be given to the fact that the den should not be able to fill up with water during the rainy season.

Water elements are frequently used for bathing and therefore highly recommended to enrich the captive environment.

Ground surface

Outdoor enclosures should have a natural substrate as much as possible. The substrate should drain well and be supplemented with organic materials including, but not limited to, soils, sand, leaf litter, bark mulch, grasses, straw or hay. All indoor enclosures should have a non-slip concrete floor sloped to a drain as well as a wooden platform for sleeping and resting.

Climate control

Hyenas are strong animals and have a high tolerance in terms of climate range. The enclosure, however, should provide opportunities to hide

from inclement or extreme weather (heavy rains, hot sun), such as an appropriate denning area, bushes, rocks, and an indoor enclosure.

14.2 Husbandry requirements

Care standards

Spotted hyenas are highly intelligent and social animals which require high standards of care to meet their species-specific needs. A lack of good husbandry and housing facilities can easily lead to abnormal behaviour and diminished welfare. Care of these animals should therefore only be provided by well-trained and experienced caretakers.

Social organisation

The social composition of a group can vary widely. In the wild, spotted hyenas form permanent, multi-male, multi-female groups that are composed of one or several matrilineal groups of adult females and their young. As adults, some males will disperse and join other clans. In captivity several combinations are possible, but generally it is not recommended to keep more than 5-6 hyenas in one enclosure to avoid competition and related aggression. One or more females with their offspring and one adult male is a combination which can work well. Introducing new, unrelated individuals should be done with great care and is not without risk. New animals should always be first introduced through adjacent enclosures which provide the opportunity to see the existing group and the newcomer interact. The introduction of new members should always be conducted by experienced caretakers who are familiar with the full behavioural repertoire of these animals.

Animal monitoring

It is important that all individuals are monitored on a daily basis. Special attention should be given to their physical status and social relationships. Daily records should be kept with regard to social interactions, feeding behaviour and any occurrence of abnormal behaviours. Monitoring always needs to be done by experienced and qualified caretakers who know the individual animals.

Catching/Handling

Handling hyenas should always be performed according to the protective contact method or while the animal is sedated. Adult hyenas can sometimes be habituated or trained through positive reinforcement to enter small areas or even catching cages. Caretakers can build up a

positive relationship with individual animals when required. The method of choice depends on the purpose for which the animals are being held. Animals that are not being trained can be best sedated through darting once separated from other individuals. Chemical immobilisation of the animal should always be undertaken by an experienced and qualified veterinarian.

Enclosure hygiene

Indoor enclosures and holding pens must be cleaned on a regular basis, with the main focus on removing food leftovers, dirty substrate and faeces. However, enclosures should not be so intensely cleaned as to remove all traces of scent markings. In general all furniture should be kept clean but enough scent should be left on them for the animals to recognise them. Alternatively every day a different quarter of the indoor enclosure or pen should be properly cleaned to prevent wiping out all scent marks at the same time. However, as hyenas generally use their water pools intensively and often drag their food into the water, all water reservoirs should be cleaned on a daily basis to prevent contamination.

14.3 Nutritional requirements

Diet

Ideally hyenas are fed whole or part of whole animal carcasses, including bones and intestines. Examples of suitable food species are goat, chicken, guinea fowl and cow. Slab meat (like beef) can also be provided, but this requires the necessary additional vitamins and minerals to prevent deficiencies. When only slab meat is provided, it is still essential to add bones at a minimum frequency of three times a week for dental care, calcium requirements and enrichment purposes.

Food presentation

Hyenas are generally fed once a day. For healthy adult animals it is recommended to introduce one or two fasting days per week to prevent obesity. Depending on group size and structure, food can be spread out through the enclosure to allow lower ranked animals to have access. If food is only provided at one location, escape routes must be present to allow subordinate individuals to avoid aggression during feeding. If possible, it is recommendable to 'hide' the food at different locations throughout the enclosure for enrichment purposes. Bones or 'prey' can also be buried to elicit natural searching and scavenging behaviours.

Food handling

Unless the food is provided fresh, meat should always be stored deep frozen. Items frozen for later use must be dated and labelled. Food should always be fed within 24 hours of thawing. Diets should be prepared in a safe and hygienic manner to reduce the possibility of contamination or spoilage. Meat must be prepared using separate cutting boards, utensils and food preparation surfaces.

14.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be

performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- Canine distemper (killed)
- +/- Feline Panleukopenia (killed)

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Rabies and distemper are two diseases of concern in carnivores and should be on the list of differentials for any animals showing neurological signs or unexplained lethargy or depression.

Echinococcus sp is a zoonotic tapeworm that can be shed in the faeces of carnivores. Since hyenas gnaw on bones, fractured teeth and tooth root abscesses are not uncommon. The oral cavity should be well examined whenever an animal is under anaesthesia.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. If an animal showing neurologic signs dies, the head should be immediately sent for rabies testing. The carcass should be disposed of appropriately (incineration).

14.5 Health and safety requirements

Potential risks

Hyenas are large, powerful animals that can easily cause injury to other hyenas or humans.

Any mistakes made in direct contact can lead to serious and even lethal injuries.

Preventative healthcare

Caretakers should be vaccinated against rabies and provided with personal protective equipment.

Safety measures

Handling and training of hyenas should always be performed according to the protective contact method and within appropriate and especially designated facilities. All slides, doors and gates should be kept closed and securely fastened at all times; ideally a double-gated system should be in place. Locks and security of slides, gates and doors should be double-checked after each use and inspected on a daily basis. Under no circumstances should caretakers enter the same area as a hyena, unless the animal is sedated by a qualified veterinarian. Catching of hyenas should be done through conditioning the animal to a catching/squeeze cage or by chemical immobilisation through darting.

Great care should be taken when hand-raising young hyenas as they may become very tame toward humans. Nevertheless, they are very capable of injuring their caretakers and therefore entering enclosures with hyenas should be prohibited.

Where the public has viewing access to the enclosure, a physical barrier should be present to keep people at least 3m from the enclosure barrier. It should be constructed in such a way that people are not able to pass the barrier.

Escape protocols should be in place when keeping hyenas and all caretakers should be familiar with how to act during an escape.

15. CANIDAE (DOGS/FOXES)

Species and classification

Common name	Scientific name	Classification
Side-striped jackal	<i>Canis adustus</i>	B
African wild dog	<i>Lycaon pictus</i>	D

Wild dogs are categorised as a Category III species, and are generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

15.1 Enclosure requirements

Size and dimensions

Jackals

The minimum required main enclosure space for one or two adult jackals is 400m² with an additional 100m² for each additional animal.

Shift yards and indoor rooms should measure no less than 50m² each.

Wild dogs

The minimum required main enclosure space for a single-sex group of up to three individuals is 1600m² with an additional 200m² for each additional adult individual.

The minimum required enclosure space for a couple (male/female) is 1400m² with an additional 200m² for each additional adult individual.

Shift yards and indoor rooms should measure no less than 65m² each.

Infrastructure

Jackals

At least one, but ideally two additional areas should be connected to the main enclosure for management purposes. Additional areas can be in the form of shift yards or indoor rooms or a combination of both. With breeding groups, two additional areas are required. Main enclosures, shift yards and indoor rooms should be connected with each other through hatches. Where there is only one shift yard available without an indoor room, the shift yard needs to provide sufficient shelter to protect all animals from inclement weather conditions.

Wild dogs

Enclosure facilities for wild dogs depend on the number of animals being kept and the composition of the group. More areas are required to support the process of integrating or grouping animals.

For a single-sex group of up to three adult animals as well as for a couple (male/female), at least one, but ideally two additional areas are required. Additional areas can be in the form of shift yards or indoor rooms or a combination of both. The main enclosure, shift yard and indoor room should be interconnected through hatches. Where there is only one shift yard available without an indoor room, it needs to provide sufficient shelter to protect animals from inclement weather conditions.

For single-sex groups (up to five adult individuals) and one generation breeding groups (a couple with offspring) at least two additional areas are required, of which one is an indoor room. For bigger groups more shift yards or indoor rooms might be required depending on group composition and compatibility of the individuals.

Barrier

Mesh wire fencing, solid walls and dry moats can be used to contain jackals and wild dogs. Water moats are generally not recommended for jackals and wild dogs because of their swimming capabilities.

Jackals

Mesh wire should be at least 12 gauge and no wider than 50x50mm. The fence should measure at least 2.5m high and be sunk into the ground by no less than 90cm. Solid walls should be at least 2.5m high with the top 1.5m being smooth and non-climbable. Dry moats should be no less than 5.5m wide and 3.5m high on the exterior side. The slope from the interior should be no steeper than 30 degrees.

Wild dogs

Mesh wire fence lines for wild dogs should be constructed of mesh not thinner than 12 gauge and maximum 50mm x 50 mm wide. To prevent the dogs from digging themselves out, mesh wires should be sunk into the ground angling towards the inside of the enclosure and up to a depth of no less than 90cm. The vertical height of the fence

should be at least 2.5m with an additional 0.9m angling inwards at an angle of 35-45 degrees. Alternatively the vertical height can be up to 3.5m, in which case the overhang is not required.

When using solid walls, the height should be no less than 3.5m with the top 2.5m being smooth, providing no grip for animals to climb on. Dry moats should be no less than 5.5m wide and 4.5m high on the exterior side. The slope from the interior should be no steeper than 30 degrees.

Electrified wire can be used as a second barrier or to prevent animals from climbing or digging along the primary fence line. Voltage on the wires should not exceed 4.5kV for jackals and 6kV for wild dogs.

Furniture

Jackals and wild dogs are both very active species that move around a lot. It is therefore important that the furniture provides sufficient variation and stimulates the animals to make use of the whole enclosure. Logs, rocks, bushes and trees can be used to provide appropriate infrastructure. Bushes and trees are also essential for providing shade and shelter. Natural or artificial shelters and barriers should be provided to give the animals the opportunity to be out of each other's sight, and to allow them to rest and be protected from inclement weather conditions. Examples of appropriate shelters include: hollow logs, rock overhangs, artificial shelters, logs, rock, trees and bushes. In a country such as Malawi shallow water pools are strongly recommended to regulate body temperature. As canids like elevated areas (e.g., hills tops of den boxes, elevated platforms) for resting and to oversee the surrounding area, it is recommended to include these elements in the landscape.

Ground surface

The ground surface of the outdoor enclosure and shift yards should consist mainly of natural substrates which allow the animals to dig. Bare, sandy ground alternated with grass areas is ideal. Additional patches with leaf litter, bark mulch or just leaves can be provided to make the environment more interesting. The substrate should allow water drainage, especially in the rainy season.

Climate control

Jackals and wild dogs are adapted to the general weather conditions in Malawi. It is, however, essential that both species have the option to hide from inclement and extreme weather conditions.

The enclosure therefore needs to have sufficient shelters for animals to hide from the hot sun, heavy rains and wind. For both species it is important that a big enough shelter is provided to give access to all individuals. It is critical that indoor enclosures provide sufficient ventilation, especially when animals are temporarily locked inside.

15.2 Husbandry requirements

Care standards

Jackals and wild dogs are highly intelligent, social animals which require high standards of care. Animals kept in undersized enclosures or social groups of the wrong composition may show diminished wellbeing which can lead to pacing, aggression, nervousness, poor reproduction, and poor care of offspring. In order to meet their physical, social, and behavioural needs, careful consideration should therefore be given to enclosure design as well as group composition.

Social organisation

Jackals

In the wild, side-striped jackals live alone as well as in monogamous pairs. In captivity these species can be kept alone when in a well-enriched environment. It is, however, recommended to keep them in compatible couples (male/female) or small family groups to provide the animals with social stimuli. In some situations more than two adults can be kept together, but in these cases extensive group monitoring is required to make sure all individuals get along. Enclosure size and complexity are important factors which can contribute to the success of keeping multiple jackals in one enclosure.

Wild dogs

African wild dogs are highly social animals. Keeping this species solitary has serious welfare implications and should only be allowed on a temporary basis and with good reason.

Wild dogs can be kept in family groups as well as in single-sex groups. In family groups the number of the pack can, in theory, go up to 15-20 individuals as long as sufficiently sized enclosures, appropriate infrastructure and knowledge of this species are in place. It is strongly recommended to initially keep smaller groups in which all individuals are compatible with each other. The basis for a family group is the alpha pair with their offspring. With wild dogs, males remain in the natal group even after reaching adulthood. Females need to be taken out when reaching adulthood after around 1.5 years. Packs

will therefore naturally have more adult males than females.

In single-sex groups the number of animals kept together should ideally not exceed 7-8 for males and 4-5 for females. This is due to the fact the females bond less easily and packs need relatively more space to remain stable.

Due to the complex social structure of wild dogs, groups need to be closely monitored to make sure all individuals get along. In case individual animals are not accepted by the pack, serious consideration should be given to removing them from the group.

Animal monitoring

Jackals as well as wild dogs are intelligent and social animals which require close observation to ensure their physical and psychological wellbeing. Well-trained caretakers will need to conduct daily observations and keep records with regard to body condition, food consumption, faeces as well as social interactions. Signs of stress and aggression need to be taken seriously and appropriate action taken.

Catching/Handling

Direct physical interaction with jackals and wild dogs should be limited to the protected contact method and only conducted by trained caretakers which are familiar with the individuals. Whenever possible and appropriate, positive reinforcement training should be used to minimise the need for chemical immobilisation and to reduce stress during procedures. Positive reinforcement training should, in these cases, be part of the daily husbandry routine as much as possible. Animals should not be caught and restrained within visual contact of other members from the group. When positive reinforcement training to enter a box or cage is not possible or appropriate, animals should be separated for chemical immobilisation.

Enclosure hygiene

Indoor enclosures and holding pens should be cleaned on a regular basis, with the main focus on removing food leftovers, dirty substrate and faeces. Drinking facilities and pools should be cleaned and disinfected on a daily basis and filled with fresh potable water.

15.3 Nutritional requirements

Diet

Jackals

In the wild, side-striped jackals are omnivorous

scavengers which generally adapt their diet to the availability of certain food items within the area. They generally feed on insects, fruits, small vertebrae, carrion and plant material. In captivity this species is known to eat a variety of insects, mice, poultry, fruit and vegetables. As little is known about long-term complete diets for jackals in captivity, the composition of the diet provided should always be determined in consultation with a veterinarian.

Wild dogs

Recommended diets for captive wild dogs vary and therefore diet composition should always be determined in consultation with a veterinarian. Generally wild dogs are provided with a varied commercial or homemade raw meat-based diet, meat on the bone (beef, goat, horse), whole prey (rabbit, chickens, rodents) and a supplement of vitamins and minerals. The diet needs to be evaluated based on feeding observations, body condition and general health.

Food presentation

Jackals

Jackals are strictly nocturnal animals and food in captivity should be provided at the beginning of the evening.

Wild dogs

In the wild, wild dogs hunt together with the whole pack during the day time. The hunt is a species-specific social behaviour and strengthens the bond between individuals. It is therefore recommended to feed the group on a regular basis by providing them with just a few bigger prey items which the dogs need to share. Feeding an animal separately can lead to division from the group, and should only be conducted in cases when this is specifically required. Smaller food items should be scattered in the same area of the enclosure. Wild dogs should be fed 6-7 days a week. To prevent boredom daily food should be provided at different times and at different places in the enclosure.

Food handling

Unless the food is provided fresh, meat should always be stored deep frozen. Items frozen for later use should be dated and labelled. Food should be fed within 24 hours of thawing. Diets should be prepared in a safe and hygienic manner to reduce the possibility of contamination or spoilage. Meat should be prepared using separate cutting boards, utensils and food preparation surfaces. It should always come from a reliable source and be guaranteed free of diseases.

15.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include: ear tags, microchips, ear notches.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation

- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is being examined.

Vaccinations

- Rabies
- Canine distemper virus (killed only)
- +/- Parvovirus, leptospirosis, Canine Adenovirus, Canine Parainfluenza (all killed) depending on disease risk

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Rabies and distemper are two diseases of concern in carnivores and should be on the list of differentials for any animals showing neurological signs or unexplained lethargy or depression. Since canine distemper is prevalent in companion animals in Malawi, vaccination of captive canids against this disease could be of benefit. Echinococcus sp is a zoonotic tapeworm that can be shed in the faeces of carnivores.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. If an animal showing neurologic signs dies, the head should be immediately sent for rabies testing. The carcass should be disposed of appropriately (incineration).

15.5 Health and safety requirements

Potential risks

Jackals have historically been known to cause outbreaks of rabies as well as distemper. They represent reservoirs for both of these diseases.

Preventative healthcare

All personnel in direct contact with carnivores should be rabies vaccinated. PPE (gloves) should also be worn when working with carnivores.

Safety measures

Wild dogs should, as much as possible, be cared for by the protective contact method. If keepers need to enter enclosures with African wild dogs, they should do so as a group and with deliberation and caution.

16. MUSTELIDAE (MUSTELIDS)

Species and classification

Common name	Scientific name	Classification
African Striped weasel	<i>Poecilogale albinucha</i>	B
Honey badger	<i>Mellivora capensis</i>	C
African Speckle-throated otter	<i>Lutra maculicollis</i>	C
Clawless otter	<i>Aonyx capensis</i>	C

16.1 Enclosure requirements

Careful consideration should be given to enclosure design for mustelids so that all areas meet their physical, social, behavioural and psychological needs. Ideally the enclosure environment should resemble the natural living conditions for the species as much as possible. The quality of space is very important for these active animals and should be made up of a combination of the right minimum enclosure size in combination with appropriate furniture.

Size and dimensions

Enclosure sizes are based on the species size, behavioural repertoire, home range size, activity pattern, daily movements, and professional experience with *ex situ* populations of these species. The following sizes and dimensions are minimum standards:

Weasels

20m² for one or two animals. For each additional animal 4m² is required. The enclosure height should be no less than 2.1m. Each shift yard should be no less than 4m² in addition to the main enclosure.

Honey badgers

120m² for one or two animals. The enclosure height should be no less than 2.1m.

Speckle-throated otters

A minimum of 150m² to be provided for two animals with 50m² for each additional animal. An additional holding pen should be no less than 40m².

Clawless otters

A minimum of 225m² should be provided for two animals with 75m² for each additional animal. An additional holding pen should be no less than 60m².

Infrastructure

Most mustelids can be housed in a single room enclosure as long as the animals are compatible with each other. Generally, however, it is

recommended to have one additional holding area for introduction and management purposes.

For otters the recommended land/water ratio is 4:1 to 5:1.

Barriers

Mesh wire or solid walls are generally used to contain mustelids. As most mustelids are good climbers, walls should be non-climbable. If containment barriers consist of mesh, they should be topped with an un-climbable, inward-facing overhang of 80cm at a height of 1.80cm.

Electrical wire can be used as a secondary fence line or straight on the primary barrier to prevent the animals from climbing up. The voltage for speckle-throated otters should not exceed 3KV and the voltage for clawless otters should not exceed 6KV.

Trees, bushes, and other enclosure furniture should be placed away from the perimeter so they cannot be used as a means of escape.

Mustelids are good diggers and therefore it is important to sink the perimeter fence or wall into the ground to at least 80cm. For weasels, mesh wire should be no less than 12 gauge and no more than 1.5cm wide. For honey badgers and otter species, wire should be no less than 9 gauge and no more than 5cm wide.

Furniture

Enclosure complexity is very important for these species. Successful enclosures will take into account the species' and individuals' needs using natural and artificial materials to encourage normal behaviour patterns, minimise any abnormal behaviour and avoid confrontation and aggression.

Striped-weasels

The enclosure should be provided with complex climbing structures (a combination of thin and thick branches), bushes, scrubs and large logs on the floor to encourage exploration and provide the animal with places to hide and rest. Natural or

manmade shelters should be provided to protect individuals from inclement weather and provide a hiding place for nervous or stressed animals. There should be at least one nest box for each adult. The size of nest boxes should be appropriate to each species (allowing enough room for the animal to stand up and turn around).

Honey badgers

The enclosure should provide a variety of scrub, bushes, big logs, pipes and rocks. Natural or manmade shelters should be provided to protect individuals from inclement weather. Although honey badgers are mainly terrestrial, they are able to climb if they want to. Burrows or artificial caves should be provided as denning areas.

Honey badgers are good swimmers and a pool within the enclosure is therefore highly recommended.

Otters

Otters are semi-aquatic animals and therefore require an appropriate sized pool for foraging, mating, cleaning, and play behaviour. All pool shorelines should be provided with lounging logs, shaded rest areas, and sandy banks to be used as latrine sites. Large flat/sloping rocks and logs can be used along the shoreline to hold back the substrate as well as provide good sunning areas. The pool should have varying depths, offering opportunities for animals to forage in the shallow water and swim/dive in deeper water. Shorelines should be complex and curving, as opposed to straight, uninterrupted lines.

On land a diverse habitat should be created by using a variety of live plants (trees, bushes, grasses) as well as log piles, large tree stumps or root systems, hollow logs, hills, etc. All of which can provide visual complexity to the enclosure and offer otters excellent opportunities for foraging, playing and sheltering.

Socially housed otters should be provided with several nest boxes; at least one for each individual animal and one which allows all individuals in the enclosure together. Nest boxes should be big enough for each species to stand up and turn around in.

Ground surface

For all mustelids a substantial part of the enclosure needs to consist of a natural substrate which allows the animals to dig and make burrows. Suitable substrates include soil, soft sand, grass, mulch, leaves, straw and hay. Digging pits and grooming areas with soft, loose substrates should always be included in otter

enclosures. Enclosures should offer bedding material like grasses, leaves, hay, straw, wood wool, sedges, pine needles, towels, hessian or wood shavings.

Climate control

Under normal Malawian weather conditions all mustelids species should be able to be kept outside throughout the year and no additional heating is required. All species, however, require constant access to burrows or denning areas to hide from inclement weather. The enclosure should also provide sufficient shade and shelter spots which provide cover and give the opportunity to rest.

16.2 Husbandry requirements

Care standards

Mustelids are intelligent animals and require thoughtful design and husbandry to ensure a good quality of life. As they are good diggers and climbers, the enclosure needs to be constructed in such a way that the animals are properly enclosed and daily care procedures don't give the animals the opportunity to escape. As carnivores, mustelids are capable of inflicting serious wounds to conspecifics and keeper staff. The introduction of new individuals should be undertaken carefully to prevent fighting, injury, or death. Caretakers should be careful when working hands-on with these species. Generally it is paramount for caretakers to be familiar with the behaviour and general biology of these species, as well as the individual history and character of the animals.

Social organisation

The social organisation of mustelids depends on the specific species. Many species live alone or in (seasonal) pairs. Differences amongst species do, however, occur. The combination of animals will depend on the space and complexity of the enclosure.

Striped-weasels

Can be kept alone or in pairs (male/female or female/female). Adult males generally don't get along well unless they have been raised together. All introductions need to be performed with great care, as past experience has shown that this has led to some individuals killing each other.

Honey badgers

Can be kept alone or in pairs (male/female).

Clawless otters

Can be housed alone, in small groups of females with their offspring or as a single male with one or two females. Pairs should be separated during

parturition and early pup rearing.

Speckle-throated otters

This species is best housed in single-sex pairs (female/female or male/male) or family groups (multiple females and potentially their offspring). Introductions of adult members should always be performed with great care as individuals can fight and injure each other. Adult males can sometimes be kept together when introduced to each other at a young age (< 4 months).

Animal monitoring

It is important that daily observations and records are kept of feeding behaviour, physical condition and faeces as well as the social stability and relations within the group. Many mustelids are escape artists so the enclosure should be properly checked on a daily basis for holes or other potential escape routes.

Catching/Handling

All mustelid species are good candidates for crate training with the use of positive reinforcement techniques. As mustelids are susceptible to stress and injury by improper handling, this is the recommended method for otters and honey badgers. Striped-weasels can also be caught by net or hand, as long as appropriate protective clothes are worn.

Enclosure hygiene

Enclosure furniture, including perches and nest boxes, should not be included in the daily cleaning regime as these species scent mark their territory and a thorough cleaning of their home space may be a source of stress. One quarter of the enclosure furniture should be cleaned at a time, leaving scent marks on the rest. Old, soiled furnishings may be replaced 25% at a time.

Food leftovers should be removed on a daily basis or more often when temperatures are very warm. Food and water containers should be cleaned on a daily basis and water containers filled with fresh potable water.

Pool water for otters needs to be kept clear and clean. It is highly recommended to use appropriate water filter systems. If this is not an option, the pool needs to be drained and refreshed on a daily basis.

16.3 Nutritional requirements

Diet

There is great variation in food requirements

within the mustelid family and an appropriate diet always needs to be established by a veterinarian or nutritionist, based on the animals' needs as well as local availability. Striped-weasels are carnivores that eat rats, mice, birds and chicks. Honey badgers eat a wide variety of invertebrates and vertebrae ranging from insects, spiders, tortoises, turtles, frogs, fish, rodents and termites. In captivity a selection of whole prey in combination with commercially produced whole cat food will generally fulfil their requirements. Otters are obligate carnivores but they will eat some vegetative matter such as berries and/or consume vegetation or other foreign material out of boredom or while exploring their environment. The diet of clawless otters can, for instance, consist of high quality whole cat food, and a combination of fish, crayfish and dry dog food. It is important that a variety of fish is provided to get the animal used to eating different types. Hard dietary items should also be routinely incorporated for dental health. These can include: hard kibble, crayfish, crabs, chicken necks, ox/horse tails, partially frozen fish, bony fish, day-old chicks, mice, rib bones, canine dental bones, or similar items.

Food presentation

Mustelids should be offered food during the period of the day when they would typically be expected to forage. This will not only discourage pest species, but will encourage typical foraging behaviour.

Due to a high metabolic rate and rapid digestive passage rate, it is recommended that mustelids be fed at least twice a day. Due to their very active nature weasels should be fed 3-4 times a day. At least 2-3 of these feedings should be provided in a different fashion, by varying the feeding times and delivery methods. Otters should ideally be fed three times a day.

For all mustelid species, enrichment is an important aspect of their care. Food should therefore be presented in a variety of challenging ways to prevent boredom. On top of normal feeds, so called 'enrichment feeds' can be provided on a daily basis to keep the animal active.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration or for a short period of time in vermin-proof containers. Meat products should come from a reliable source and be kept refrigerated/frozen.

16.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination under anaesthesia. It may be possible to do an exam on a young animal under manual restraint, but examinations of adult mustelids should be done under anaesthesia.
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites
- Faecal endoparasites – microscopic exam using direct and flotation methods
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. These may include microchips or ear notches, depending on the species.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Blood smear for parasites

- Faecal endoparasites – microscopic exam using direct and flotation methods
- Tuberculosis test

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under anaesthesia.

Vaccinations

- Rabies
- Canine distemper (killed only)
- +/- Leptospirosis, Feline Panleukopenia, Canine Adenovirus (all killed) depending on disease risk

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Mustelids may show signs of anaphylaxis after vaccination; animals should be observed for 30 minutes post-injection. Rabies and distemper are two diseases of concern in carnivores and should be on the list of differentials for any animals showing neurological signs or unexplained lethargy or depression. Echinococcus sp is a zoonotic tapeworm that can be shed in the faeces of carnivores.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. If an animal showing neurologic signs dies, the head should be immediately sent for rabies testing. The carcass should be disposed of appropriately (incineration).

16.5 Health and safety requirements

Potential risks

Mustelids are carnivores and can therefore inflict serious bite wounds.

Preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals. In addition caretakers should also be provided with personal protective equipment. Due to the potential susceptibility

of some mustelid species to Influenza viruses, keepers with symptoms of respiratory disease should refrain from working with these animals while ill.

Safety measures

Mustelids are good diggers and climbers. The enclosure therefore needs to be constructed in such a way that the animals are properly enclosed and daily care procedures don't give the animals the opportunity to escape. Ideally a double-door system should be in place.

For the health and safety of the caretakers, but also to ensure the wellbeing of the animals it is recommended to work according to the protective contact method. Ideally all facilities should have holding areas in order to shift animals into/out of their primary enclosure. When this is not the case, caretakers should be provided with appropriate personal protective equipment when entering the enclosures. For catching, especially for otters and honey badgers, it is strongly recommended that the animals are trained to enter crates or catching cages.

17. HYSTRICIDAE (OLD WORLD PORCUPINE)

Species and classification

Common name	Scientific name	Classification
Crested porcupine	<i>Hystrix africaeaustralis</i>	B

17.1 Enclosure requirements

Size and dimensions

The enclosure should not measure less than 120m² for up to two individuals with a minimum height of 1.8m. For each additional individual another 15m² is required. When a shift yard is made available, the space should be no less than 20m² in addition to the main enclosure.

Infrastructure

Generally porcupines can be housed in a single room enclosure, as long as the animals have sufficient and appropriate hides and sleeping sites. For the introduction of new individuals a shift yard is recommended in addition to the main enclosure.

Barriers

Porcupines are powerful diggers and have strong teeth with which they can easily chew through mesh wire. A mesh wire or chain link fence is therefore not suitable to use as a primary barrier. To contain porcupines concrete or brick walls are recommended to be used. The wall should reach at least 80cm underneath the ground and 120cm above ground. Southern crested porcupines are poor climbers and can therefore easily be kept in an open top enclosure, unless predators are present in the area.

Furniture

The enclosure furniture should provide varied surroundings with sufficient opportunities to hide. Typical structures which can be used are big wooden logs, branches and rocks. Hollow logs or artificial pipes are good places for porcupines to rest and sleep. An artificial burrow can also be provided. Natural or artificial structures (shelters) should be provided to give protection against inclement weather conditions, especially the sun. Natural vegetation like trees and bushes are good places to hide and provide shelter. It has, however, to be kept in mind that porcupines will gnaw on natural vegetation and therefore in small enclosures vegetation needs to be protected.

Ground surface

Most of the ground of the enclosure should be

made up of natural substrate consistent with the site. The substrate may be supplemented with materials like wood shavings, sand, gravel and boulder. Grass areas are also recommended.

Climate control

Under normal Malawian weather conditions porcupines are able to be kept outside throughout the year.

17.2 Husbandry requirements

Care standards

Porcupines are generally not difficult to keep in captivity. It is important that the enclosure size and furniture provide the animal with a varied environment and sufficient places to hide and rest.

Social organisation

The southern crested porcupine can be kept as a solitary animal, but does better in pairs or in small mixed groups containing one male. Females do not need to be removed for parturition. Male porcupines are normally not aggressive towards their offspring and play an active role in raising and protecting their young. Introducing same sex animals to each other can potentially lead to aggression, although it is often accomplished successfully if the animals are given the opportunity to get familiar with each other through a mesh wire barrier or door.

Animal monitoring

Daily observation is required to quantify and measure the welfare of individual animals through monitoring of nutritional, physical and social conditions. Qualified personnel should conduct daily observations to monitor for signs of physical or behavioural abnormalities. Any unusual activities must be recorded in designated reports.

Catching/Handling

Porcupine species respond well to positive reinforcement, and they can be well trained for veterinary and management procedures to come into a catching/squeeze cage. For more extended procedures it is necessary to anaesthetise the animal. With these animals it is very possible to build up a positive relationship between caretaker and animal.

Enclosure hygiene

Porcupine enclosures need to be cleaned daily. Natural substrate can be spot cleaned while artificial substrate should be scrubbed with water and soap or disinfectant. Food and water bowls should be cleaned and disinfected daily. When food is being scattered, leftovers should be removed on a daily basis.

17.3 Nutritional requirements

Diet

Unless commercial food is available (monkey/rodent/herbivore chow, leafeater biscuits), porcupines should be given a variety of 60% hard vegetables (carrot, sweet potato, broccoli), 25% leafy vegetables (cabbage, green beans) and 15% fruit (apple, pear, banana). Besides this, a combination of bark, roots, tubers and wild fruits should be provided to complement the diet. Fresh, clean water should be available at all times.

Food presentation

Porcupines are naturally nocturnal, but are known in captivity to become more active during the day. Food should be provided according to the animals' activity patterns and offered at least once, preferably twice, a day. Food is best be scattered throughout the enclosure to stimulate activity. Alternatively it can be offered on trays throughout the enclosure.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration or for short periods of time in vermin-proof containers.

17.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint (squeeze cage)
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. Microchips are an option.

Routine/Preventative health checks

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including spine integrity, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint (squeeze cage) or anaesthesia.

Required tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods

Recommended tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- +/- Rabies

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

While porcupines are well protected by their spines, their skin is very thin and prone to tearing. Injections should be given carefully as sloughing of skin through inappropriate injections and handling has been known to occur.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. The carcass should be disposed of appropriately (incineration).

17.5 Health and safety requirements

Potential risks

Animals should be handled with care by wearing protective clothing (gloves).

Preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals.

Safety measures

Capture and restraint of porcupines should be undertaken with caution due to their defence capabilities. Crested porcupines have large, smooth quills which are held erect when the animal is excited or threatened. The quills make hand restraint difficult, if not impossible. Entering an enclosure with porcupines should only be done when the animal is not aggressive and the enclosure provides enough space and opportunities for the animal to hide. A broom or a wooden shield should be carried to keep the animals at a safe distance. Whenever required, the animal should be moved to a neighbouring shift yard for enclosure maintenance or cleaning. Caretakers need to be provided with appropriate personal protective equipment while entering the enclosure.

18. SCIURIDAE (SQUIRRELS)

Species and classification

Common name	Scientific name	Classification
Mutable sun squirrel	<i>Heliosciurus mutabilis</i>	B
Smith's bush squirrel	<i>Paraxerus cepapi</i>	B
Striped bush squirrel	<i>Paraxerus flavovittis</i>	B
Black and red bush squirrel	<i>Paraxerus lucifer</i>	B
Red bush squirrel	<i>Paraxerus palliates</i>	B

Despite the fact that there are differences in the behaviour and ecology of the Malawian squirrel species, the husbandry standards required to keep these animals in captivity remain reasonably similar. Therefore the standards provided here cover all species of Malawian squirrel.

18.1 Enclosure requirements

Size and dimensions

The enclosure size for one or two compatible squirrels should be no less than 15m² with a minimum height of 2.5m. Each separation pen should measure no less than 2m².

Infrastructure

Most endemic squirrels are solitary but can, under the right circumstances, be kept in compatible couples. The latter can, however, lead to aggression during certain times of the year or when having young. Therefore when squirrels are kept in couples or family groups, a separation pen is required to split animals up in case this required.

Barriers

Enclosure barriers can be made of solids material (concrete, brick, glass) or mesh. Being rodents, squirrels can chew heavily on enclosure materials causing severe damage. To prevent escapes materials used for barriers should be chew resistant. The advantage of mesh wire as opposed to solid materials is that mesh gives the animals the opportunity to climb. When being used, mesh wire should not be wider than 16mm to prevent animals from squeezing through.

As all Malawian squirrels are highly arboreal it is strongly recommended to make the enclosure closed-top. Side barriers should reach up to 30cm underneath the ground to prevent escapes.

Furniture

Squirrels are very active animals which require sufficient opportunities to move around. It is therefore important to provide these opportunities in captivity. To achieve this, enclosure complexity is very important and should be provided through

the use of various natural and artificial materials (branches, ropes, platforms) to encourage normal behaviour patterns, minimise any abnormal behaviour and avoid confrontation and aggression. To prevent boredom furniture should be changed on a regular basis. As all species of Malawian squirrels are arboreal the infrastructure provided should fully cover all dimensions of the enclosure.

To provide the animals with the opportunity to hide and rest, nest boxes need to be provided. As a general rule there should always be one more nest box available than there are adult animals in the enclosure.

The barriers of the enclosure should be strong enough to resist gnawing activity, but the enclosure itself should provide sufficient opportunities to accommodate this behaviour.

Ground surface

The ground surface should be made up of a natural substrate consistent with the site, which allows caretakers to easily clean the enclosure.

Climate control

Under normal Malawian weather conditions all squirrel species should be able to be kept outside throughout the year. Shelter and shade should, however, be provided to protect animals from inclement weather conditions like sun, wind or rain.

18.2 Husbandry requirements

Care standards

Squirrels are active and intelligent animals which require thoughtful enclosure design and husbandry to provide them with a good quality of life. Small enclosures with insufficient opportunities to exercise and explore generally

lead to boredom and abnormal behaviours. It is therefore paramount for caretakers to be familiar with the behaviour and general biology of these species.

Social organisation

All species except the Smith's bush squirrel are generally solitary animals. The Smith's bush squirrel generally lives in breeding pairs or family groups. Despite this fact all species can be kept alone or in breeding pairs, the latter based on the condition that a separation pen is available to split up individuals when required.

Animal monitoring

It is important that daily observations and records are kept of feeding behaviour, physical condition and social interactions (when relevant).

Catching/Handling

Catching and handling can lead to high stress levels and apathy amongst squirrels. In some cases the stress can even result in death of the animal. Catching and handling should therefore only be conducted by experienced and well-trained caretakers.

To minimise stress the catching of squirrels should be best performed by using a catching cage or compartmented tunnel. Entering the catching cage or use of the tunnel should be part of the daily husbandry to habituate animals to the device.

Enclosure hygiene

Food and water containers should be cleaned on a daily basis. Faeces and uneaten perishable food should be removed within an appropriate timeframe and prior to moulding or contamination.

18.3 Nutritional requirements

Diet

The Smith's bush squirrel, striped bush squirrel, black and red bush squirrel as well as the red bush squirrel are generally fruit and seed eaters. Their diet in captivity should consist of a variation of fresh fruits and a mixture of equal parts of wild bird seed, parrot mix, hamster mix and mixed nuts. Commercial nuts should be avoided as they limit the squirrels' uptake of calcium. In addition the animals should be provided on a daily basis with fresh leaves, buds and bark. As squirrels teeth grow constantly throughout their lives they should be provided with chewing material like hard bark, roots and large bones. The latter are also required to provide the animals with

sufficient calcium.

The mutable sun squirrel is more omnivorous. In addition to fruit (see diet as above), these species require extra protein in the form of insects (crickets, meal worms) and eggs.

Food presentation

Squirrels should be fed in accordance with their species-typical activity pattern. The species that occur within Malawi are diurnal and are most active in the early morning and late afternoon. Dry food can be offered in a bowl or feeding platter at one or two locations within the enclosure. To stimulate exploration behaviour the fruit can be offered throughout the enclosures at different heights.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods must be kept refrigerated or for a short periods of time in vermin-proof containers. Meat products should come from a reliable source and kept refrigerated/frozen.

18.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Complete Blood Count (CBC), serum chemistry analysis
- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. Microchips are one possibility for squirrels.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes,

all appendages/digits, tail/tail pelage, etc.

- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Complete Blood Count (CBC), serum chemistry analysis
- Faecal exam via centrifugation
- Urinalysis

Deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

None.

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Rodents may be vectors for Salmonella, Plague, and Leptospirosis.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. The carcass should be disposed of appropriately (incineration).

18.5 Health and safety requirements

Potential risks

Squirrels have sharp teeth and claws and can inflict serious injuries during physical restraint.

Safety measures

Animals should only be handled by experienced staff. Catching is best done using catching cages or tunnels. When handling animals staff need to wear appropriate leather gloves.

19. PROCAVIIDAE (HYRAXES)

Species and classification

Common name	Scientific name	Classification
Rock hyrax	<i>Cavia capensis</i>	B
Yellow-spotted rock hyrax	<i>Heterohyrax brucei</i>	B
Southern tree hyrax	<i>Dendrohyrax arboreus</i>	B

19.1 Enclosure requirements

Size and dimensions

The enclosure size should measure no less than 45m² for 2-5 individuals with a height of 2.5m. For each additional individual another 4m² is required. When a shift yard is made available for introductions, the space should be no less than 9m² in addition to the main enclosure.

Infrastructure

Generally hyraxes can be housed in a single room enclosure, as long as the animals have sufficient and appropriate hides and sleeping sites. For the introduction of new individuals a shift yard, in addition to the main enclosure, is essential.

Barriers

Solid walls or wire mesh can be used to contain hyraxes. Moats are not recommended.

The mesh size should be no less than 6x6cm with a thickness of no less than 12 gauge. The barrier should go at least 50cm deep into the ground to prevent the animal from digging out.

All hyraxes are good climbers and are best kept in a closed top enclosure. When kept in an open top enclosure part of the wall should be made from a non-grip surface. In these cases it should also be kept in mind that these animals move easily from branch to branch and vegetation should not allow them to escape.

Furniture

Appropriate complexity should be provided through the use of various natural and artificial materials in the enclosure. For hyraxes this means one or more rock formations for climbing, sun bathing and hiding. The enclosure should provide additional structures for hiding and/or providing shelter, such as tree trunks, pipes, dust baths as well as bushes and trees. At least one appropriate shaped rock or wooden nest box should be available to be used as a den. The denning area should be no smaller than 50x30x35cm with an entrance of 30x30cm. For tree hyraxes dens

should be made off the ground.

In general the enclosure should provide sufficient barriers for animals to hide from each other or the public.

Ground surface

Most of the ground of the enclosure should be made up of natural substrate consistent with the site. The substrate may be supplemented with materials like wood shavings, sand, gravel and boulders. Grass areas are also recommended.

Climate control

Under normal Malawian weather conditions all hyrax species are able to be kept outside throughout the year. Hyraxes have a relatively poor ability to regulate body temperature and a low metabolic rate. It is therefore essential that appropriate shelter is provided to protect animals from inclement weather conditions like sun, wind or rain. It is also important for hyraxes to be able to sunbathe and the enclosure should provide sufficient sunny spots to do so.

19.2 Husbandry requirements

Care standards

Housing hyraxes in inadequately sized enclosures can result in social stress and/or stress to individual animals which are unable to express natural behaviours, including the ability to retreat from disturbance. Behavioural indicators of stress can include heightened aggression, pacing and other repetitive behaviours. Therefore all caretakers should have decent knowledge of the biology, behaviour and husbandry needs of these species.

Social organisation

Hyraxes are gregarious species and usually live in colonies with one dominant territorial male and several related females and their offspring. Animals should be kept in pairs or larger groups. Possible combinations are one male with one or more females or just females. Keeping two males together can easily lead to aggression and should be avoided. Male offspring should be

removed from the enclosure before reaching (sub) adulthood. Integration of new animals should be done with care and by using a satellite enclosure to provide the opportunity for the animals to get used to each other. In case of aggression, the satellite enclosure can also be used to separate individuals.

Animal monitoring

Daily observation is required to quantify and measure the welfare of individual animals through monitoring of nutritional, physical and social conditions. Qualified personnel should conduct daily observations to monitor for signs of physical or behavioural abnormalities. Any unusual activities should be recorded in designated reports.

Catching/Handling

It is very possible to build up a positive relationship between the caretaker and animal. Catching or handling of all these species should ideally be done by habituating or training the animal to come into a kennel or catching cage to prevent stress.

Enclosure hygiene

Animal waste should be removed from the habitat as often as necessary to prevent contamination of the animals, to minimise disease hazards and to reduce odours. Generally for hyraxes this means that enclosures should be cleaned at least three times a week.

All water reservoirs should be cleaned on a daily basis and provided with fresh potable water.

19.3 Nutritional requirements

Diet

The diet should consist of a combination of about 35% vegetables/starch (e.g. carrot, sweet potato, squash, broccoli), 15% fruit (e.g. apple, pear, bananas), 25% of leafy vegetables (cabbage, lettuce, collared greens) and 10% fresh grass, browse or fine hay.

Food presentation

Food should be presented in bowls or on feeding platforms at different locations in the enclosure. Animals should be fed a minimum of once, but ideally twice during the period of the day they are active.

Food handling

Dry goods should be stored in clean, dry storage

areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration or for a short period of time in vermin-proof containers.

19.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. Microchips are the best option for these animals.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Complete Blood Count (CBC), serum chemistry analysis
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Faecal exam via centrifugation
- Urinalysis

Vaccinations, deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

- Rabies
- +/- Tetanus

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Conspecific fighting is frequent in captive, stressed hyraxes. Due to their sharp teeth and fluffy haircoat, it may be difficult to detect injuries. Hyraxes with hair that is matted together, wet, or otherwise unkempt should be examined closely for injury.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. The carcass should be disposed of appropriately (incineration).

19.5 Health and safety requirements

Potential risks

Animals should be handled with care wearing protective clothing, although hyraxes can easily bite through leather gloves.

Preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals.

Safety measures

In case capture or restraint is required, this is best done through training or habituating animals to come into catching boxes or kennels. Net catching is possible, but generally only recommended in emergency situations or with animals that have not been trained to come into a kennel or box. Caretakers need to be provided with appropriate personal protective equipment while entering the enclosure.

20. ERINACEIDAE (HEDGEHOGS)

Species and classification

Common name	Scientific name	Classification
African pygmy hedgehog	<i>Atelerix albiventris</i>	B

20.1 Enclosure requirements

Size and dimensions

The enclosure size should measure no less than 2.25m² for one or two hedgehogs. For each additional animal 0.5m² should be added.

Infrastructure

Hedgehogs can be kept in a single room enclosure. Physical barriers and hides should be used to provide infrastructure to the enclosure.

Barriers

Hedgehogs are excellent climbers and to prevent escapes the walls of the enclosure should be made of a smooth non-climbable surface. The floor and walls should be free from sharp edges to prevent the animals from injuring themselves. It is not recommended to use mesh for floors and walls as animals will easily get stuck. Mesh can be used to close the top to prevent escapes or to protect animals from potential predators outside the enclosure.

Furniture

The enclosure furniture should provide a varied environment with sufficient opportunities to hide. Typical structures which can be used are wooden logs, branches and rocks. Bushes, scrubs, hollow logs or artificial structures should be provided at different locations to provide shade and opportunities to rest and hide. Whenever required artificial hides should be added to the enclosure.

Ground surface

The ground surface should consist of natural substrate. At least half of the enclosure should be covered with dead/fresh leaves or grass.

Climate control

Sufficient natural and/or artificial hides should be present to protect the animal from inclement weather conditions, including the sun. Appropriate measures should be taken to prevent the enclosure from flooding during the rainy season.

20.2 Husbandry requirements

Care standards

To minimise stress it is important that hedgehogs are provided with sufficient opportunities to

hide and rest. The enclosure should also provide sufficient protection against inclement weather and flooding.

Social organisation

Hedgehogs are primarily solitary animals and this is the best way to keep them. If necessary, hedgehogs can be kept together or in small groups as long as the animals are compatible and don't show aggression towards each other. Best options for social housing are one male with one or more females, or two or more females. Females should be kept separated from the male during courtship or when having young.

Animal monitoring

Daily monitoring is required to determine the welfare of individual animals. Important aspects to monitor are food intake, physical condition and social interaction. Infants should be weighed on a daily basis to monitor their condition.

Catching/Handling

Hedgehogs need to be handled with care due to their quills. If they are handled on a regular basis they will stop curling up to defend themselves, which makes it easier to hold them. Animals which feel threatened or discomforted might bite. For animals which are kept according to the hands-off method it is best to provide them with a nest box/shelter which can be taken out of the enclosure for transport or medical treatment.

Enclosure hygiene

Food leftovers should be taken out on a daily basis to prevent contamination. Water containers should be cleaned daily and filled with fresh water. Wet spots in the bedding should be taken out on a daily basis. Walls and bedding in general should be cleaned/refreshed at least twice a week.

20.3 Nutritional requirements

Diet

Captive hedgehogs do well on a diet of commercial dog or cat food in combination with mealworms, crickets and small amounts of fruits and vegetables. Insects are an essential part of the diet; depriving insectivores of insects can lead to malnutrition.

Food presentation

Hedgehogs are naturally nocturnal animals. Food

is therefore best presented at the beginning of the night. The food should be presented on multiple plates throughout the enclosure.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers. Perishable foods should be kept under refrigeration or for a short period of time in vermin-proof containers.

20.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Complete Blood Count (CBC), serum chemistry analysis
- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. Microchips are one option.

Routine/Preventative healthcare

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including spines/skin, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

- Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Complete Blood Count (CBC), serum chemistry analysis
- Faecal exam via centrifugation
- Urinalysis

Deworming and identification may also all take place whilst the animal is under examination.

Vaccinations

None recommended.

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Pygmy hedgehogs are highly susceptible to dermatitis from urine or faecal contamination, which can be common in captive conditions. Hedgehogs can also carry internal and external parasites including fleas and ticks, as well as intestinal helminthes and tapeworms. Hedgehogs are susceptible to both obesity and malnutrition (particularly calcium deficiencies) and may suffer from dental disease and neoplasia. Hedgehogs display a self-anointing behaviour called “anting” which should not be confused with a disease process. Under cold conditions, hedgehogs go into a reduced activity state called torpor, which may be confused with a disease process.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. The carcass should be disposed of appropriately (incineration).

20.5 Health and safety requirements

Potential risks

The primary threat is if the handler drops a hedgehog accidentally if the hedgehog accidentally pricks them.

Preventative healthcare

Caretakers should be screened for TB and vaccinated for rabies prior to having direct contact with the animals.

Safety measures

Handling hedgehogs should be done with protective gloves (gardening gloves are fine). Hedgehogs can be held bare-handed by experienced handlers.

21. LEPORIDAE (RABBITS, HARES)

Species and classification

Common name	Scientific name	Classification
Smith's red rock hare	<i>Pronolagus rupestris</i>	B
Scrub hare	<i>Lepus saxatilis</i>	B

21.1 Enclosure requirements

Size and dimensions

The enclosure size should measure no less than 30m² for up to two individuals.

Infrastructure

Hares can be kept alone or in a compatible pair.

Barriers

Solid walls (glass, bricks, concrete, wood) or mesh wire can be used to contain hares. Mesh wires should be no wider than 7cm.

Furniture

The enclosure should provide sufficient cover through natural vegetation like grass, bushes and trees. In addition manmade structures can provide opportunities to hide.

Ground surface

The ground surface should consist of a natural substrate with grassy and sandy areas.

Climate control

Under normal Malawian weather conditions hares are able to be kept outside throughout the year as long as sufficient shelter is provided to hide from inclement weather.

21.2 Husbandry requirements

Care standards

Hares are generally not difficult to keep in captivity. It is important that the enclosure size and furniture provide the animal with sufficient space and places to hide and rest.

Social organisation

Hares are solitary animals but in captivity can be kept in compatible pairs.

Animal monitoring

Regular monitoring of food intake, body condition and faeces is required.

Catching/Handling

Hares which are habituated to humans can easily be handled. However, for rehabilitation purposes, handling should be kept to a minimum.

Enclosure hygiene

Food and water containers should be cleaned on a daily basis. Faeces and uneaten perishable food should be removed within an appropriate timeframe and prior to moulding or contamination.

21.3 Nutritional requirements

Diet

Hares are plant eaters and should be fed with hay with in addition to fresh grass, twigs, vegetables and pellets.

Food presentation

Food should be provided at several locations throughout the enclosure to stimulate locomotion.

Food handling

Dry goods should be stored in clean, dry storage areas in sealed containers or on pallets. Perishable foods should be kept under refrigeration or for a short periods of time in vermin-proof containers.

21.4 Veterinary requirements

Quarantine

Quarantine time

Minimum quarantine time should be 30 days.

Recommended tests

- Full physical examination either under anaesthesia or under manual restraint
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Complete Blood Count (CBC), serum chemistry analysis
- Faecal exam via centrifugation
- Urinalysis

Identification

Upon completion of the quarantine period, all animals should be able to be individually identified through some semi-permanent or permanent process. Microchips are one option for lagomorphs.

Routine/Preventative health requirements

Visual examinations

Each animal should be visualised on a daily basis, but should be more critically examined every six months. This visual examination should include:

- Body condition score, including haircoat, eyes, all appendages/digits, etc.
- Locomotion/activity
- Observation of eating
- Social interactions (where appropriate)

When possible, each animal should be photographed from the front, back, right, and left sides at the time of the biannual visual examinations. These photographs should be identified and dated and stored for future reference/comparison.

Physical examinations

Hands-on physical examinations should be performed on each animal every two years under manual restraint or anaesthesia.

Recommended tests

- Full physical examination
- Faecal endoparasites – microscopic exam using direct and flotation methods

Other tests

- Complete Blood Count (CBC), serum chemistry analysis
- Faecal exam via centrifugation
- Urinalysis

Deworming, contraception and identification may also all take place whilst the animal is under examination.

Vaccinations

None

Deworming/Ectoparasite control

Faecal examinations (direct/float/centrifugation) should be performed on all animals twice a year. Appropriate anthelmintic administration should be instituted based on results.

Special concerns

Lagamorphs may be carriers of the zoonotic disease tularemia. Rabbits and hares should be held properly in order to ensure that they do not fracture their spine while kicking. Pasturella/

related bacterial infections should be considered in any lagomorph with an upper respiratory disease. Lagamorphs have continuously growing teeth; animals on an inappropriate diet may develop dental problems. Lagamorphs are hind-gut fermenters and can suffer an antimicrobial dysbiosis. The following antibiotics should not be given orally: clindamycin, lincomycin, penicillin, ampicillin, amoxicillin, amoxicillin-clavulanic acid, cephalosporins, erythromycin. Fatal enteritis may result.

Post-mortem

All animals that have died of natural causes or have been euthanised should undergo a post-mortem examination by a veterinarian or a similarly experienced, qualified person. The carcass should be disposed of appropriately (incineration).

21.5 Health and safety requirements

Potential risks

Animals should be handled with care and while wearing protective clothing (gloves).

22. MANIDAE (PANGOLINS)

Species and classification

Common name	Scientific name	Classification
Cape pangolin	<i>Manis temmincki</i>	D

Pangolins in general are very difficult to successfully keep in captivity due to their specialised behaviour and dependence on natural living circumstances. Despite several institutions in Asia and Africa working on captive care guidelines, a lot more research is required to successfully keep and breed these species in captivity. Currently, no published captive care standards exist for Cape pangolins and only a few institutions have experience with keeping this species. In cases where there is any emergency need to keep Cape pangolins in temporary captivity, it is recommended that all relevant staff contact those institutions which have experience with keeping this species.

These Standards highlight some important aspects on how to keep this species in captivity. Pangolins are categorised as a Category III species, and are generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

22.1 Enclosure requirements

Stress is one of the major causes of fatality among captive pangolins and is thought to be created by the combined results of inappropriate environmental factors. An environment that is as natural as possible is therefore key to reducing stress levels. Appropriate burrows, natural ground substrate and enclosure furniture are important factors. A stable climate with appropriate temperature and humidity is another key factor given that pangolins have slow metabolism and lack fur. Pangolins kept under low temperature conditions are known to die very easily.

22.2 Husbandry requirements

Human interference and handling are serious stress factors and should be minimised as much as possible. Capture and handling should only be performed when absolutely necessary and the animals should be kept in an environment free from disturbance.

22.3 Nutritional requirements

In the wild pangolins live on a diet of ants, termites, and various other invertebrates including bee larvae, flies, worms, earthworms and crickets. These are not easy to acquire and provide in captivity in sufficient quantities. An appropriate artificial diet is therefore another key factor for the captive breeding of pangolins. According to their natural food composition a number of artificial diets for captive pangolins had been developed. Ingredients include eggs, meat (minced beef, horse meat, fish), milk, milk powders, canned feline diet, orchid leaves, commercial chows, psyllium seeds, carrots, yeasts, multivitamins, and insects. Although lots of diet formulas have been developed, some more

successful than others, more work is needed to improve the artificial diet for pangolins in the future.

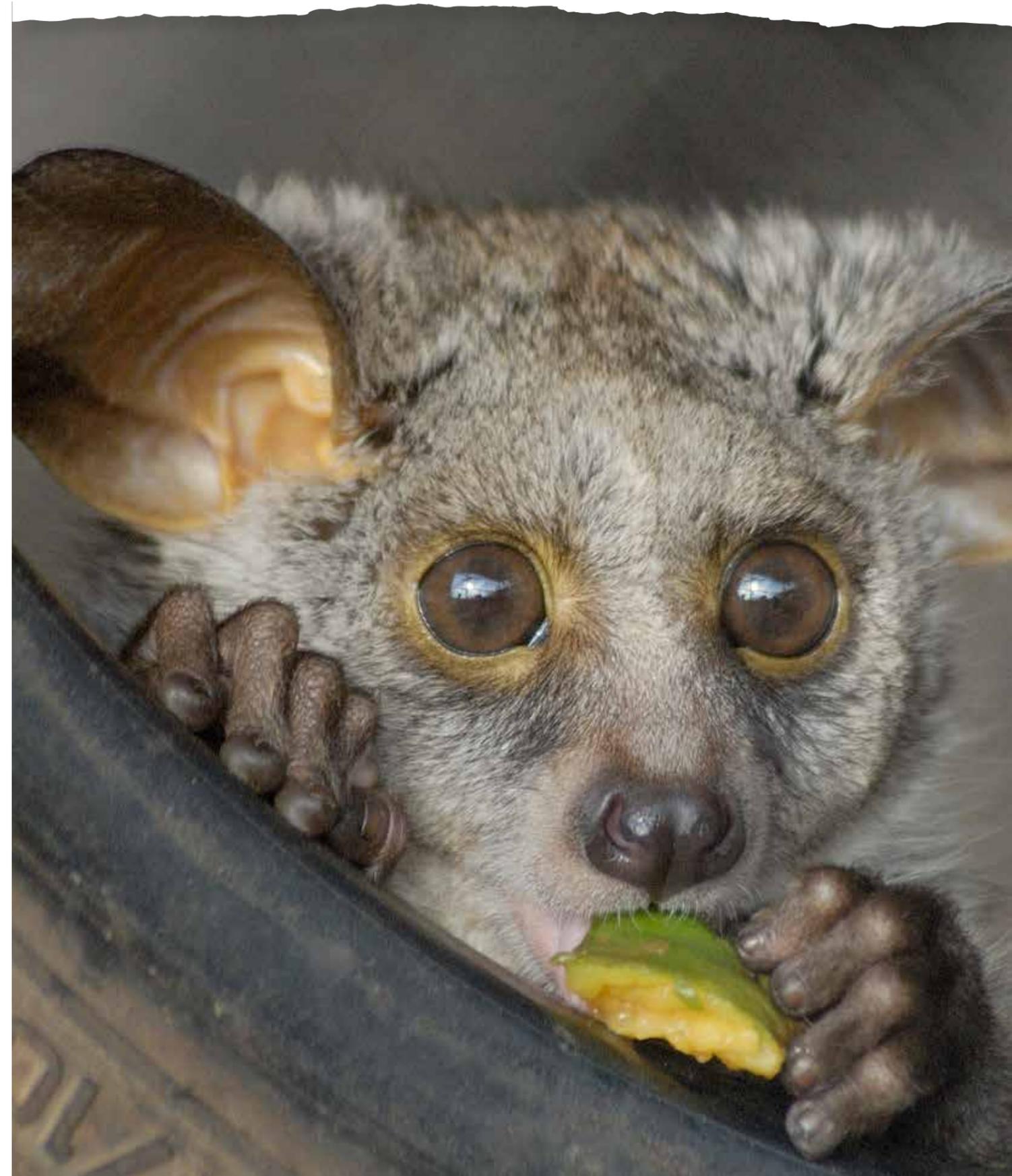
22.4 Veterinary requirements

Due to poor adaptability to a captive environment and a weak immune system, pangolins easily get sick. Some of the more common veterinary problems of captive pangolins are:

- Moist dermatitis, especially in stressed pangolins that are housed inappropriately
- Ticks between the scales
- Intestinal helminthes
- Clinical coccidiosis, especially in stressed pangolins that are malnourished and housed inappropriately (in crowded, unsanitary conditions)
- Gastric ulceration

SECTION IV

CATEGORISATION OF SPECIES



As outlined in Section I, article 9, this Section provides an overview of the categorisation of the species covered by the Standards.

Category I

Generally allowed to be kept by private persons and institutions without a captivity licence.

Category II

Generally allowed to be kept by private persons and institutions under the condition that a captivity licence is provided based on the Standards as being set.

Category III

Generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

Category I species

Common name	Scientific name
African pygmy hedgehog	<i>Atelerix albiventris</i>

Category II species

Common name	Scientific name
Vervet monkey	<i>Chlorocebus pygerythrus</i>
Yellow baboon	<i>Papio cynocephalus</i>
Blue monkey	<i>Cercopithecus mitis</i>
Greater galago	<i>Otolemur crassicaudatus</i>
Southern lesser galago	<i>Galago moholi</i>
Burchell's zebra	<i>Equus burchellii</i>
Hippopotamus	<i>Hippopotamus amphibious</i>
Bushpig	<i>Potamochoerus larvatus</i>
Common warthog	<i>Phacochoerus africanus</i>
Common duiker	<i>Sylvicapra grimmia</i>
Red forest duiker	<i>Cephalophus natalensis</i>
Bushbuck	<i>Tragelaphus scriptus</i>
Sharpe's grysbok	<i>Raphicerus sharpie</i>
Suni	<i>Neotragus moschatus</i>
Oribi	<i>Ourebia ourebi</i>
Klipspringer	<i>Oreotragus oreotragus</i>
Impala	<i>Aepyceros melampus</i>
Puku	<i>Kobus vardonii</i>
Southern reedbuck	<i>Redunca arundinum</i>
Nyala	<i>Tragelaphus angasii</i>
Waterbuck	<i>Kobus ellipsiprymnus</i>
Roan antelope	<i>Hippotragus equinus</i>
Sable antelope	<i>Hippotragus niger</i>
Lichtenstein's hartebeest	<i>Alcelaphus lichtensteinii</i>
Blue wildebeest	<i>Connochaetes taurinus</i>
Common eland	<i>Tragelaphus oryx</i>

Category II species (continued)

Common name	Scientific name
Greater kudu	<i>Tragelaphus strepsiceros</i>
African buffalo	<i>Syncerus caffer</i>
Caracal	<i>Caracal caracal</i>
Wildcat	<i>Felis silvestris</i>
Serval	<i>Leptailurus serval</i>
Side-striped jackal	<i>Canis adustus</i>
African civet	<i>Civettictis civetta</i>
Common genet	<i>genetta genetta</i>
African palm civet	<i>Nandinia binotata</i>
African striped weasel	<i>Poecilogale albinucha</i>
African speckle-throated otter	<i>Lutra maculicollis</i>
Clawless otter	<i>Aonyx capensis</i>
Honey badger	<i>Mellivora capensis</i>
Slender mongoose	<i>Galerella sanguinea</i>
Common dwarf mongoose	<i>Helogale parvula</i>
Egyptian mongoose	<i>Herpestes ichneumon</i>
Banded mongoose	<i>Mungos mungo</i>
White-tailed mongoose	<i>Ichneumia albicauda</i>
Rock hyrax	<i>Cavia capensis</i>
Yellow-spotted rock hyrax	<i>Heterohyrax brucei</i>
Southern tree hyrax	<i>Dendrohyrax arboreus</i>
Mutable sun squirrel	<i>Heliosciurus mutabilis</i>
Smith's bush squirrel	<i>Paraxerus cepapi</i>
Striped bush squirrel	<i>Paraxerus flavovittis</i>
Black and red bush squirrel	<i>Paraxerus Lucifer</i>
Red bush squirrel	<i>Paraxerus palliates</i>
Crested porcupine	<i>Hystrix africaeaustralis</i>
Smith's red rock hare	<i>Pronolagus rupestris</i>
Scrub hare	<i>Lepus saxatilis</i>
Aardvark	<i>Orycteropus afer</i>

Category III species

Common name	Scientific name
Black rhinoceros	<i>Diceros bicornis</i>
Southern giraffe	<i>Giraffa giraffe</i>
Masai/Rhodesian giraffe	<i>Giraffa tippelskirchi</i>
Reticulated giraffe	<i>Giraffa reticulate</i>
Northern giraffe	<i>Giraffa camelopardis</i>
African bush elephant	<i>Loxodonta africana</i>
Lion	<i>Hippopotamus amphibious</i>
Panthera leo	<i>Potamochoerus larvatus</i>
Leopard	<i>Phacochoerus africanus</i>
Panthera pardus	<i>Sylvicapra grimmia</i>
Spotted hyena	<i>Crocuta crocuta</i>
African wild dog	<i>Lycan pictus</i>
Cape pangolin	<i>Manis temmincki</i>



APPENDIX I

Taxonomic List of Species for Captive Care Standards

KEY	Order
	Family • Species common name (<i>scientific name</i>)

Artiodactyla (even-toed ungulates)

Suidae (pigs)

- Bushpig (*Potamochoerus larvatus*)
- Common warthog (*Phacochoerus africanus*)

Hippopotamidae (hippopotamuses)

- Hippopotamus (*Hippopotamus amphibius*)

Bovidae (antelope)

- Nyala (*Tragelaphus angasii*)
- Common eland (*Tragelaphus oryx*)
- Bushbuck (*Tragelaphus scriptus*)
- Greater kudu (*Tragelaphus strepsiceros*)
- Sharpe's grysbok (*Raphicerus sharpei*)
- Red forest duiker (*Cephalophus natalensis*)
- Common duiker (*Sylvicapra grimmia*)
- Waterbuck (*Kobus ellipsiprymnus*)
- Puku (*Kobus vardonii*)
- Southern reedbuck (*Redunca arundinum*)
- Roan antelope (*Hippotragus equinus*)
- Sable antelope (*Hippotragus niger*)
- Impala (*Aepyceros melampus*)
- Lichtenstein's hartebeest (*Alcelaphus lichtensteinii*)
- Blue wildebeest (*Connochaetes taurinus*)
- African buffalo (*Syncerus caffer*)
- Suni (*Neotragus moschatus*)
- Klipspringer (*Oreotragus oreotragus*)
- Oribi (*Ourebia ourebi*)

Giraffidae (giraffe)

- Giraffe (*camelopardalis*)

Perissodactyla (odd-toed ungulates)

Equidae (horses)

- Burchell's zebra (*Equus burchellii*)

Rhinocerotidae

- Black rhinoceros (*Diceros bicornis*)

Hyracoidea (hyraxes)

Procaviidae

- Rock hyrax

Tubulidentata (armadillos)

Orycteropodidae

- Armadillo (*Orycteropus afer*)

Proboscidea (elephants)

Elephantidae (elephants)

- African bush elephant (*Loxodonta africana*)

Primates

Galagonidae (galagos)

- Greater galago (*Otolemur crassicaudatus*)
- Bushbaby (*Galago moholi*)

Cercopithecoidea (Old World monkeys)

- Vervet monkey (*Chlorocebus pygerythrus*)
- Yellow baboon (*Papio cynocephalus*)
- Blue monkey (*Cercopithecus mitis*)

Carnivora (carnivorans)

Felidae (cats)

- Caracal (*Caracal caracal*)
- Wildcat (*Felis silvestris*)
- Serval (*Leptailurus serval*)
- Lion (*Panthera leo*)
- Leopard (*Panthera pardus*)

Viverridae (civets, genets)

- African civet (*Civettictis civetta*)
- Common genet (*Genetta genetta*)

Nandiniidae

- African palm civet (*Nandinia binotata*)

Herpestidae (mongooses)

- Slender mongoose (*Galerella sanguinea*)
- Common dwarf mongoose (*Helogale parvula*)
- Egyptian mongoose (*Herpestes ichneumon*)
- Banded mongoose (*Mungos mungo*)

Hyaenidae (hyaenas)

- Spotted hyena (*Crocuta crocuta*)

Canidae (dogs, foxes)

- Side-striped jackal (*Canis adustus*)
- African wild dog (*Lycan pictus*)

Mustelidae (mustelids)

- African striped weasel (*Poecilogale albinucha*)
- African speckle-throated otter (*Lutra maculicollis*)
- Clawless otter (*Aonyx capensis*)
- Honey badger (*Mellivora capensis*)

Rodentia

Hystricidae (old world porcupine)

- Crested porcupine (*Hystrix africaeaustralis*)

Sciuridae (squirrels)

- Mutable sun squirrel (*Heliosciurus mutabilis*)
- Smith's bush squirrel (*Paraxerus cepapi*)
- Striped bush squirrel (*Paraxerus flavovittis*)
- Black and red bush squirrel (*Paraxerus lucifer*)
- Red bush squirrel (*Paraxerus palliatus*)

Erinaceomorpha (hedgehogs and gymnures)

Erinaceidae

- African pygmy hedgehog (*Atelerix albiventris*)

Lagomorpha (lagomorphs)

Leporidae (rabbits, hares)

- Smith's red rock hare (*Pronolagus rupestris*)
- Scrub hare (*Lepus saxatilis*)

Pholidota (pangolins)

Manidae

- Cape pangolin (*Manis temminckii*)

APPENDIX II

Captive Care Standards Scoring Tool

Rationale

The Standards for Keeping Wild Animal in Captivity (the ‘Standards’) provide standards to keep wild animals in captivity in such a way that the minimum needs in terms of welfare and health and safety are covered. Nevertheless, this does not mean that all species covered in the Standards are suitable for being kept in captivity. Where some wild animals are easier to keep in captivity, others have much more complex needs in terms of required space, complexity of enclosure, enclosure design, social structure and safety requirements. It must also be noted that the requirements of certain species can be so high that animal welfare or human health and safety will still be seriously compromised even if all the minimum standards are met.

To address this issue, the Standards provides both minimum standards as well as a categorization structure that classifies species according to their requirements and feasibility to be kept in captivity. Based on the classification, the Standards provide advice with regard to the likely legal requirements of keeping wild animals in captivity without causing undue or unnecessary suffering or risks to humans or the environment. To be able to classify and categorise the animals it is important that a well-informed and considered judgement is made to determine the feasibility of a certain species to be kept in captivity. To support this process the working group developed a scoring tool which takes both welfare and health and safety aspects into account.

Methodology

The scoring tool helps make an assessment of the suitability of keeping a wild animal in a captive care setting. The tool takes the following two aspects into consideration:

1. The **WELFARE REQUIREMENTS** of the animal in a captive care setting.

Welfare is defined as the requirements to meet the animal’s physical and psychological needs.

2. The **HEALTH AND SAFETY RISKS** involved in keeping the animal in a captive care setting.

Health and safety risks are expressed as the potential risk for the holder or general public in terms of physical injuries and/or disease transmission (zoonotic diseases).

The potential to keep a certain species in captivity initially depends on what the impact is on an animal if the welfare requirements are not being met or, from a human perspective, if the health and safety risks are not all eliminated. Besides the impact, there is also a need to look at how feasible it is for someone to meet the set requirements for an animal(s). Feasibility is the possibility or likelihood that the welfare requirements will be fully met when any potential health and safety risks are eliminated. Feasibility depends on the required knowledge and expertise needed to keep an animal in captivity and applicability of both of these for each particular species. For certain species the required knowledge and expertise is generally available. For other species such knowledge might be only available amongst restricted professionals or specialists. And even if such knowledge is available, this does not always mean that it is easily applicable in practice i.e. in some cases the knowledge can only be properly applied by specialist species experts. In other cases the required resources may be so specific that they are not easily available within a country such as Malawi.

The potential to keep a certain species in captivity is therefore a product of the impact on, as well as the feasibility of keeping that species in captivity (see [Figure 1](#)).

Figure 1

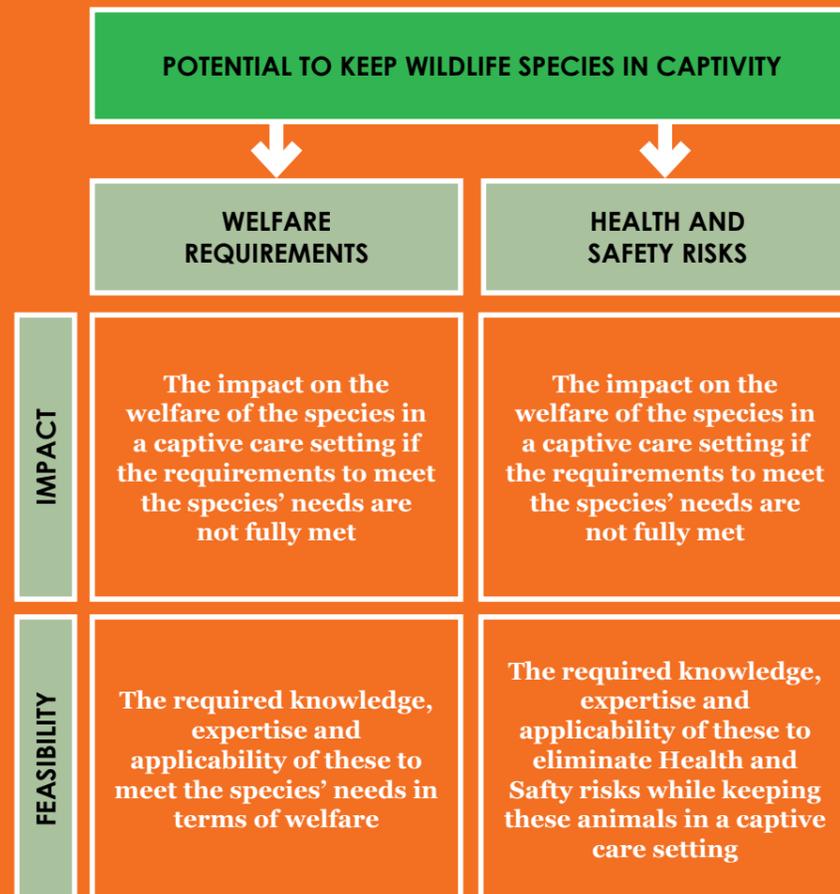


Table II.1

Criterion	Animal needs	Interpretation
Enclosure space and structures	<i>The animal's physical and psychological needs in terms of locomotion</i>	The enclosure provides sufficient space and structures to not restrict the animal in its species-specific locomotion needs. The space and structures help to reduce stress and keep the animal in a good physical condition.
Resting, hiding and shelter	<i>The animal's needs in terms of hiding, resting and shelter</i>	The enclosure provides the required structures and facilities for take animal to rest, hide and shelter from inclement weather conditions.
Behavioural stimuli	<i>The animal's psychological needs in terms of behavioural stimuli and challenge</i>	The animal is provided with an appropriately complex and varied living environment and care system to stimulate and challenge its natural species-specific behavioural patterns with regard to environmental exploration and foraging.
Social environment	<i>The animal's social and biosocial needs</i>	Animals are kept in social settings appropriate to their species, whereby group structures are managed in such a way that they sustainably meet the animals' social and biosocial needs.
Animal handling	<i>Capture, restraint and handling with least possible stress and discomfort</i>	Whenever required, capture, handling and restraint of the animal can be done safely and appropriately, with minimal stress and discomfort.
Diet	<i>The animal's nutritional needs</i>	The animal is provided with a diet with the quality, quantity and variety to match the physiological and psychological state of the individual as it changes over time, with consideration for its age, life stage, condition and size.
Healthcare	<i>The need to have access to appropriate veterinary care</i>	The ability to provide the animal with appropriate veterinary healthcare such that physical pain, injury or disease is prevented or rapidly diagnosed and treated.

Table II.2

Criterion	Animal needs	Interpretation
Physical injury	<i>The risk of the animal causing any physical trauma</i>	The animal causes physical trauma as a result of poor care procedures or poor design, construction or maintenance of the enclosure.
Zoonotic risks	<i>The risk of the animal transferring any zoonotic diseases</i>	The animal transfers a zoonotic disease as a result of poor preventative healthcare.

To determine the impact and feasibility a set of criteria has been established to reach appropriate standards in animal welfare and to eliminate health and safety risks. An overview of these criteria is given in the [Tables II.1](#) and [II.2](#).

For each criteria, the impact and feasibility is scored on a scale from one to four. With regards to the impact, a score of 'one' indicates that the impact on the welfare of an animal is likely to be low, even if recommended welfare criteria are not met. A 'four' indicates that the impact is very high when criteria are not fully met. With regards to feasibility, a score of 'one' indicates that the knowledge required to keep a certain species is generally available and well applicable in practice, whereas a score of 'four' indicates that the required knowledge is not available in Malawi or is, at best, scarcely available. For a complete overview of the scoring tool see [Table II.3](#) (scoring of the feasibility) and [Table II.4](#) (scoring of the impact) below.

Application of the scoring tool

To apply the scoring tool for the species covered by the Standards, a technical committee of captive care specialists from DNPW, DAHLD and specialist NGOs should be formed. The committee determines in accordance with the set criteria the feasibility and impact of keeping wild animals in captivity. The scores are assigned based on publications and existing knowledge of the committee members. Based on the individual scores, the committee will place the species in the classification system outlined below.

Class A species

Those species for which there is a relatively small risk that their welfare will be affected by captivity and/or they form a risk for human health and safety. For these species, it is generally easier to meet the conditions required to minimise any existing risks and usually no specialised knowledge or expertise is required to do so.

Class B species

Those species for which there is a modest risk that their welfare will be affected by captivity and/or they form a risk for human health and safety. For these species, it is possible to minimise these risks to an acceptable level when existing knowledge and expertise is applied by holders who have sufficient knowledge, expertise and resources.

Class C species

Those species for which there is a high risk that their welfare will be affected by captivity and/or they form a serious risk for human health and safety. In theory it may be possible to minimise

these high risks if the right expertise is fully applied and all resources are available. However, even under these conditions it can remain challenging to meet the welfare criteria and/or fully eliminate all associated health and safety risks. Species within this class should usually only be kept by professionals who have the proven knowledge and skills to provide these animals with the best possible care standards.

Class D species

Those species for which there is a very high risk that their welfare will be seriously affected by captivity and/or they form a very serious risk for human health and safety, even when all existing knowledge on how to keep these wild animals in captivity is applied. Species within this class should never be kept in captivity, unless for emergency rescue or conservation purposes. In case of the latter, captive care should only be allowed by specialists.

Based on the classification, the Standards provide direction with regard to the legal requirements to keep a wild animal in captivity. All species of the Standards are hereby categorised by the technical committee in one of the following categories:

Category I

Generally should be allowed to be kept by private persons and institutions in captivity without a captivity licence.

Category II

Generally should be allowed to be kept by private persons and institutions under the condition that a captivity licence is provided based on the Standards as being set.

Category III

Generally never allowed to be kept in captivity, with the exception of professional institutions which have been provided with an exemption from the DNPW to keep this species for rescue and/or conservation purposes.

A complete overview of the species per category is provided in Section IV.

Wherever appropriate, the committee will cluster certain species for the scoring tool based on similarities in their biology and associated health and safety risks. Clustering is mainly applied for species within certain families whereby social structure, food specialisation and use of enclosure are relatively similar. One of the advantages of clustering species is that existing knowledge of well-known species can be applied to other species about which relatively little is known.

Table II.3: Scoring tool with regard to impact of keeping wild animals in captivity

IMPACT: The impact on the health and welfare of the animal in a captive care setting if the following requirements are not met		CRITERIA	REQUIREMENTS	Low. The impact on the health and welfare of the animal is low in case the criterion is not fully met, which shows itself through abnormal or stress related behaviours and/or health problems which can easily be resolved and have no - or to a very low extent - detrimental effect on the health and welfare of the animal.	Modest. The impact on the health and welfare of the animal is modest in case the criterion is not fully met, which shows itself through abnormal or stress related behaviours and/or health problems which are difficult to resolve but have only a temporary or limited detrimental effect on the health and welfare of the animal.	High. The impact on the health and welfare of the animal is high in case the criterion is not fully met, which shows itself through abnormal or stress related behaviours and/or health problems which are difficult to resolve and have long term and/or extensive detrimental impact on the health and welfare of the animal.	Very high. The impact on the health and welfare of the animal is very high in case the criterion is not fully met, which shows itself through abnormal or stress related behaviours and/or health problems which are very difficult to resolve and have long / life-long / potentially life-threatening / extensive detrimental impact on the health and welfare of the animal.
CRITERIA	REQUIREMENTS						
Enclosure space and structures	The animal's physical and psychological needs in terms of enclosure space and design						
Resting, hiding and shelter	The animal's needs in terms of resting, hiding and shelter						
Behavioural stimuli	The animal's psychological needs in terms of behavioural stimuli						
Social environment	The animal's social and biosocial needs						
Animal handling	Capture, restraint, and handling with least possible stress						
Diet	The animal's nutritional needs						
Healthcare	The need to have access to appropriate veterinary care						
IMPACT: The potential impact on public health and safety if the risks are not fully eliminated				Low. The chance of any physical injury or disease transmission remains low. In case of any incident, impact remains small and brief. There is no impact on the normal day-to-day functioning and no medical intervention is required.	Modest. The chance of any physical injury or disease transmission remains low. In case of any incident, impact could require short-term medical treatment. An incident is unlikely to have long-term impact on the day-to-day functioning or health.	High. The chance of any physical injury or disease transmission is significant. In case of any incident, it is likely that medical treatment is required. An incident is likely to have impact on the day-to-day functioning or health up to several weeks.	Very high. The chance of any physical injury or disease transmission is large. In case of any incident, it is likely that medical treatment is required. An incident is likely to have long-term or life-long impact on the day-to-day functioning or health.
CRITERIA	HEALTH & SAFETY RISKS						
Physical injury	The animal causes physical injury as a result of inappropriate care / housing						
Zoonotic risks	The animal transfers any zoonotic diseases						

Table II.4: Scoring tool with regard to feasibility to keep wild animals in captivity

FEASIBILITY BASED ON WELFARE CRITERIA: The chance that the welfare criteria will not be fully met, based on required knowledge and expertise, and applicability of these in action		CRITERIA	REQUIREMENTS	Low. The required knowledge to meet the criterion is generally known or available to everyone and is generally sufficient to meet the animal's needs.	Modest. The required knowledge to meet the criterion is available but requires access to specialised sources of information. Applying the available knowledge is possible and considered sufficient to meet the animal's needs.	High. The required knowledge to meet the criterion is only considered available to well-trained and educated holders. Successfully applying the knowledge / expertise often remains challenging and the welfare criterion cannot always be fully met.	Very high. The required knowledge to meet the criterion is not available or exclusive to a small group of specialists who have long term experience of working with the species to meet the specific needs. Successfully applying the knowledge / expertise remains challenging and the welfare criterion is often not fully met.
CRITERIA	REQUIREMENTS						
Enclosure space and structures	The animal's physical and psychological needs in terms of enclosure space and design						
Resting, hiding and shelter	The animal's needs in terms of resting, hiding and shelter						
Behavioural stimuli	The animal's psychological needs in terms of behavioural stimuli						
Social environment	The animal's social and biosocial needs						
Animal handling	Capture, restraint, and handling with least possible stress						
Diet	The animal's nutritional needs						
Healthcare	The need to have access to appropriate veterinary care						
FEASIBILITY: Chance that the health and safety risks will not be fully eliminated based on the required knowledge and expertise, and applicability of these in practice				Low. The required knowledge to eliminate the risks is generally known or available and easy to implement.	Modest. The required knowledge to eliminate the risks is available but requires access to specialised sources of information. The available information is easy to implement.	High. The required knowledge to eliminate the risks is only considered available and/or applicable to well-trained and educated holders. Successfully applying the knowledge / expertise often remains challenging and health and safety risks cannot always be fully eliminated.	Very high. The required knowledge to meet the criterion is only considered available to well-trained or educated holders. Successfully applying the knowledge / expertise remains challenging and the health and safety risks often cannot be fully eliminated.
CRITERIA	HEALTH & SAFETY RISKS						
Physical injury	The animal causes physical injury as a result of inappropriate care / housing						
Zoonotic risks	The animal transfers any zoonotic diseases						

