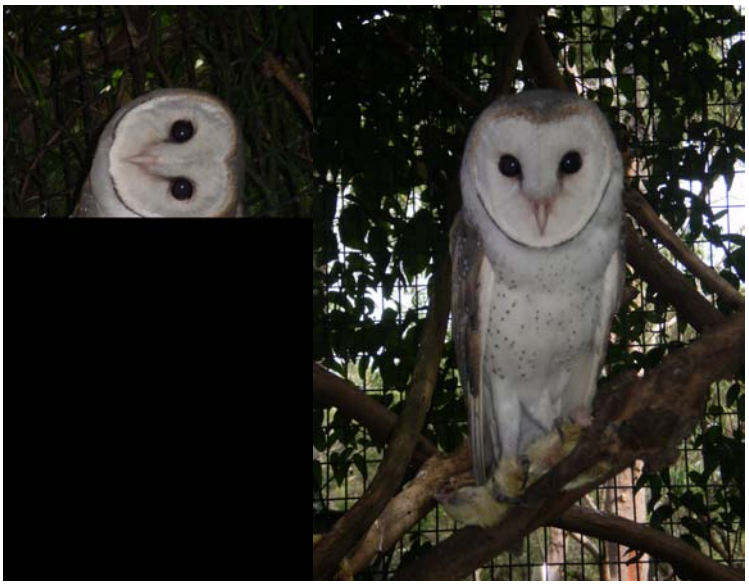
Husbandry Guidelines for

Barn Owl

Tyto alba

Aves: Tytonidae



Figures 1 and 2 – Owls holding their prey

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TABLE OF CONTENTS

OH&S

OH&S is a necessary precaution when ever working in any industry as it is essential in providing a safe and effective environment for yourself and others around you, including the animals held in captivity.

(australia.gov)

The following table is to show the basic OH&S requirements for a Barn Owl.

Causes	**Examples**	**Risk level**	**Treatment and Prevention**
Animal itself			
	Bites, scratches	5	Wearing correct PPE, use first aid kit to treat any injury
	Zoonoses	4	Daily maintenance of enclosure and basic hygiene, if problem occurs medical attention would be needed
Procedures			
	Bending and lifting certain objects	3	Use of correct procedures like bending with your knees, could lead to a few days off work and need of medical attention
	Food preparation – use of knives	4	Keepers being signed off with the knowledge of how to use a knife correctly, first aid kit required if cut occurs
	Hygiene – lice, illness	4	Washing of hands after every time in enclosure or handling the animal, may need a few days off work if become sick
	Use of certain tools – rake, scarifier	4	Sign off sheets and information (MSDS) how to correctly use each tool, mostly first aid required
Enclosure			
	Branches at head height	3	Clear path ways throughout enclosure, could lead to first aid needed
	Wire holding certain branches, plants, nesting boxes in place	5	Proper construction and maintenance of enclosure, first aid would be necessary
	Maintenance of enclosure – watering plants, lifting furnishings, re mulching	3	Following correct procedures and ensuring you are not pushing your self to far, lead to injury of your back causing days of work and medical attention

1 Introduction

The Barn Owl is unique but also one of the most common Owls found all over the world. It is a pale, long-winged, long-legged owl with a short squarish tail. As there are 36 subspecies of this Owl, its average measurements are about 25–45 cm in overall length, with a wingspan of some 75–110 cm. A way of distinguishing the Barn Owl from true owls when seen in flight is by its tail shape, wavering motions and the open dangling feathered legs.

Its head and upper parts are a mixture of colours depending on the subspecies ranging from buff to grey (especially on the forehead and back) feathers. The heart-shaped facial disc is usually bright white, but in some it is browner or an off white colouring. The under parts of the Barn Owl vary from white to reddish buff and are either mostly unpatented or bear a varying amount of tiny blackish-brown speckles depending on the sex.

Unlike most Owls the *Tyto alba* species does not hoot. It instead produces the characteristic shree scream. Males in courtship give a shrill twitter. It can hiss like a snake to scare away intruders, and when captured or cornered, it throws itself on its back and flails with sharp-taloned feet, making for an effective defense. Also given in such situations is a rasp and a clicking snap, produced by the bill or possibly the tongue usually by the Owlets when still in the nest.

(Wikipedia)

1.2 ASMP Category

The Barn Owl is classified Secure in every State of Australia. This meaning that it is not actually listed in the Federal Government's Environment Protection and Biodiversity Conservation Act 1999.

(Birds in Backyards)

1.3 IUCN Category

Red list.
Least Concern. (IUCN)

1.4 EA Category

N/A

1.5 NZ and PNG Categories and Legislation

N/A

1.6 Wild Population Management

N/A

1.7 Species Coordinator

N/A

1.8 Studbook Holder

N/A

2 Taxonomy

2.1 Nomenclature

Class: Aves
Order: Strigiformes
Family: Tytonidae
Genus: *Tyto*
Species: *alba*

2.2 Subspecies

Tyto alba alba
Tyto alba guttata
Tyto alba ernesti
Tyto alba erlangeri
Tyto alba schmitzi
Tyto alba gracilirostris
Tyto alba detorta
Tyto alba affinis
Tyto alba poensis
Tyto alba thomensis
Tyto alba stertens
Tyto alba deroepstorffi
Tyto alba javanica
Tyto alba sumbaensis
Tyto alba meeki
Tyto alba delicatula
Tyto alba crassirostris
Tyto alba interposita
Tyto alba pratincola
Tyto alba guatemalae
Tyto alba bondi
Tyto alba niveicauda
Tyto alba furcata
Tyto alba bargei
Tyto alba punctatissima
Tyto alba contempta
Tyto alba hellmayri
Tyto alba tuidara

“Handbook of the Birds of the World Vol. 5”

2.3 Recent Synonyms

Strix alba
Strix pratincola
Tyto delicatula

2.4 Other Common Names

Lesser Masked-owl
Monkey-faced Owl
Cave Owl
Death Owl
Delicate Owl
Demon Owl
Ghost Owl
Golden Owl
Hissing Owl
Night Owl
Screech Owl
Silver Owl
White Owl

“Handbook of the Birds of the World Vol.6”

3 Natural History

The scientific name of the Barn Owl was established by G.A. Scopoli in 1769. When translated from the onomatopoetic Ancient Greek it literally means "white owl", *tyto* (τυτο) for an owl—compare English "hooter"—and Latin *alba*, "white".

(Wikipedia, Owl Pages)

Though out time Barn Owls have been mentioned and seen in letters, books, movies, folk lore, myths and superstition from all over the world. This is one of reason why the Barn Owl is one of the most commonly known Owl species and has at least 18 different names. In many ways, Barn Owls have been associated with death and misfortune. This is likely due to their nocturnal activity and high screeching call. However, they have also been associated with wisdom and prosperity.

Henry David Thoreau summarized one perception of owls when he wrote in 1854's *Walden*, "I rejoice that there are owls. Let them do the idiotic and maniacal hooting for men. It is a sound admirably suited to swamps and twilight woods which no day illustrates, suggesting a vast and underdeveloped nature which men have not recognized. They represent the stark twilight and unsatisfied thoughts which all [men] have."

The following table is of some of the few mentions of Barn Owls in our Histories by The Owl Pages, the Animals Kingdom and Wikipedia.

Country	Symbolism	Meaning
Japan	Good luck	The Japanese word for "owl" is "fukurou". The Japanese word for "hardship" is "kurou" and the Japanese for "not" is "fu" thus meaning "fukurou" implies a life without hardship. Therefore owl symbols are often given to Japanese couples when due for marriage, because of the bird's auspicious association.
Africa	Death	Among the Kikuyu of Kenya it was believed that owls were harbingers of death. If one saw an owl or heard its hoot, someone was going to die. In general, owls are viewed as omen of bad luck, ill health, or death.
America	Sorcery, Art and rituals	The Aztecs and Maya, along with other Natives of Mesoamerica, considered the owl a symbol of death and destruction. The Aztec god of death, Mictlantecuhtli, was often illistrated with owls.
Mexico		There is an ancient saying in Mexico that is still in use today: *Cuando el tecolote canta, el indio muere* meaning "When the owl cries/sings, the Indian dies"
India	Companion of Goddesses	Considered to be the vehicle of Goddess Lakshmi and so it is considered lucky if an owl lives near your house.
Finland	Wisdom and imbecility	Paradoxically viewed as both because of its "dumb stare".
Egypt	Letter M	Representation of an owl for their hieroglyph. They would often draw this hieroglyph with its legs broken to keep this bird of prey from coming to life
Greek	Wisdom	The Greek goddess Athena was commonly shown accompanied by Owls. This symbolism is used in the

		numerous logos of institutions such as universities.

3.1 Morphometrics

Barn Owls have evolved in such an astounding sense when concerning of both sight and hearing. These senses have been enhanced by several factors, some of which are directly observable in the skeletal system. The orbits of an Owl's eye are rotated forwards so that they sit anteriorly. Anteriorly facing orbits permit the visual field of each eye to partly cover the other, creating an area of binocular vision. The large bony sclerotic rings which sit within the sclera of the eye prevent rotation of the eye itself; with this owls must rotate their entire heads to see to either side of them.

Barn Owls especially, also have a remarkable ability to capture prey in the absence of any light, using primarily their sense of hearing to guide them. They use soft-tissue compositions called facial discs (heart-shaped) to amplify the sounds traveling to their ears. Another unique variation of Barn Owls is the asymmetry of their external auditory meatus (external ear openings). This unevenness causes sound to reach each ear at different times which offers a three-dimensional hearing space.

(Digital Morphology)

The Barn Owl's flight is silent, both at frequencies audible to the human ear and ultrasonic levels. This form of flying can be explained by the development of the Barn Owl's feathers. Along the main edges of the flight feathers, outer primaries, there is a stiff comb like fringe which promotes laminar air flow which cuts out noise creation. The primary and secondary feathers also have a soft hair like fringe which can minimize the turbulence where air flowing over the top and bottom of the wing meet. Also the downy upper surfaces of each feather, eliminates the noise of most other birds when wings are beating.

(Taylor, 2004)

Figure3. Talon, egg and skull

3.1.1 Mass And Basic Body Measurements

Average	Female	Male
Wing span (cm)	75-110	70-105
Tail (cm)	16	15
Length (cm)	30-42	28-39
Weight (grams)	500-580	470- 522

3.1.2 Sexual Dimorphism

On average, females are also larger, as it is common for most owls. A mature female Barn Owl of a large subspecies may weigh over 550 g, while males are typically about 10% lighter. They also have a darker coat on their underside and are more densely spotted on their wings, back and underbelly.

(Owl Pages)

3.1.3 Distinguishing Features

Barn Owls are different and can be identified from other Owls by their:

-Tail shape, which is short squarish
-Heart shaped disc (face), which reflects sound towards its ears.
-Vocal sounds because they don't make the hooting sounds as most owls do but they produce a shree scream
-Flight pattern, they fly against the wind and appear headless when in flight but also when flying their wavering motions and their open dangling feathered legs
-Buff markings on their wings and back
-Brown collar outlining their facial disc
-Much higher metabolic rate, seeing as they eat a lot more than most owls
-Choice of nests

(Wikipedia)

3.2 Distribution and Habitat

Barn Owls are found all over the World and on every continent, except Antarctica, because they are one of the most wide-spread of all land birds and can adapt to most climates. In the old world Barn owls were most common in England, Canada, USA and Africa but more so now in Australia and New Guinea as they were introduced to most oceanic islands, Hawaii in 1958, to control rodent species.

They mostly live in mild climates that shun the severe cold and can be found near grasslands, open fields, woodlands, heaths and moors. Over the years Barn Owls have moved closer to rural and urban areas as this is where most of their prey can be found in high quantities.

(Owl Pages)

Like most Birds, Barn Owls lay their eggs in nests but are unique in the way that they do not collect material for this nest. The parent birds will use high out of reach cavities for their location and a nest will form from the pellets and faeces the adult female desecrates.

(Animal Diversity)

They will find nests in a range of natural or man-made structures within a suitable foraging habitat.
-Barn lofts
-Tree hollows
-Church steeples
-Wells
-Thick foliage
-Warehouses
-Cliff faces
-River banks
-Nest boxes
-Caves

Figure4. Green areas are where Barn Owls can be found

3.3 Conservation Status

In the old world Barn Owls were most common in England and USA but over the years since the middle of the 19th Century these numbers have dropped. This is because poor winter weather, agricultural intensification, traffic deaths, pesticide use but mainly due to introduced pests, such as foxes, feral cats and dog, which have been consuming their prey.

(ARKive)

Seven states in America have actually classified Barn owls as an endangered species but in most other places they are still common. Places like Australia and Papua New Guinea have only just hand these Owls introduced over the past 50-100 years and are still expanding in numbers. With these birds becoming a native species they are being used as flying pest control systems for farmers and factories.

“This species has an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence <20,000 km2 combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The population trend appears to be stable, and hence the species does not approach the thresholds for Vulnerable under the population trend criterion (>30% decline over ten years or three generations). The population size is extremely large, and hence does not approach the thresholds for Vulnerable under the population size criterion (<10,000 mature individuals with a continuing decline estimated to be >10% in ten years or three generations, or with a specified population structure). For these reasons the species is evaluated as Least Concern.” (IUCN)

3.4 Longevity

3.4.1 In the Wild

This species of bird has a very short-lived life and an average life expectancy of 1-2 years. Most don’t survive their first year of life. In North America the oldest known and recorded Barn Owl to have survived in the wild lived to 11 years, 6 months and in Holland, a wild Barn Owl lived to be 17 years, 10 months old.

(Owl Pages)

In Captivity

On average it is around 17 years of age, though in England, a captive female Barn Owl was retired from breeding at 25 years old but at the Australian Reptile Park our eldest bird lived to 15 years of age in captivity and currently we have 5 birds that have been in our care for over 10 years.

(Owl Pages)

3.4.2 Techniques Used to Determine Age in Adults

For a Barn Owl, there is no real way to tell their exact age unless you have had them or been documenting them from hatching. As mentioned before most don’t live over the age of 1 so if brought into captivity (and the age is unknown) it is best to say they aren’t that much older than 1 year of age. The basic way to tell a birds age is by its feathers and moulting stage.

Juvenile - it will have fresh feathers and without a moult limit.
2-3 years of age – some outer primary feathers and inner secondary feathers moulted, as well as the center pair of tail feathers.
3-4 years of age – 3 generations of feathers, outer and innermost juveniles and two more generations of moulted adult pattern feathers.
Full Adult - three generation of feathers, but all with adult pattern.

(Javier Blasco-Zumeta)

4 Housing Requirements

4.1 Exhibit/Enclosure Design

When first designing a Barn Owl enclosure you need to make sure you have the space to provide a large enough aviary for the Owl. This needs to include enough flight room for it to move freely and enough space for a suitable shelter. Also you need to consider the longevity of the enclosure you are about to build as Barn Owls can live up to 20 years in captivity.

(Barn Owl Trust)

To buy, sell or publicly display a Barn Owl you need to acquire an Article 10 license issued by DEFRA and meet the EAPA standards for exhibiting that animal. As Barn Owls are classified as a bird of prey and according to the EAPA standards each enclosure containing a Barn Owl must have:

- Covered shelter and a waterproof wall protecting the bird from wind, rain, direct sunlight and extreme heat.
- A water mist spray
- Mesh netting surfaces
- A double door safety access
- Visual barriers if both sexes are contained in the same exhibit
- Provision of nesting boxes, perches and other climbing equipment that outnumber the amount of birds in the enclosure and at all different heights
- Access to a bathing area either a water bowl or manmade pool of a non slip surface no deeper than 15cm
- A minimum size of 3m wide by 6m long and 3m high

Keepers from the Birds Of Prey Foundation believe for each Barn Owl the enclosure should also provide:

- Protection from predators, meaning the enclosure going at least 2 feet into the ground and at an L-shaped pattern to prevent digging predators from entering
- Environmental enrichment, vegetation, such as grasses, shrubs and trees

All materials used in the design of a Barn Owl enclosure should be safe for the bird to live within and amongst. The use of wire, such as chain link, vinyl-coated chain link, or similar material is unsuitable for raptors as it can cause damage to the bird's feet, and feathers. Recommended materials are Red Cedar, preserved timbers, galvanized nails, plastic coated wire or galvanized weld mesh.

(Barn Owl Trust)

When concerning weather conditions, any exhibit should be positioned that the main covered or sheltered area is facing the most south west direction. This has been proven in Australia to be the most common direction for severe weather to approach from. It is recommend by the Barn Owl Trust and is used in the design of the Australian Reptile Parks exhibit, that one third of the roof be completely covered in corrugated plastic sheet or similar.

The floor of a Barn Owl exhibit should either be concrete or wire mesh to prevent rodent infestations. It should then have a deposit of dirt/soil and finish with a layer of grass or mulch. This presents a more natural effect for animal, keeper and public. Areas under nesting boxes and main perching areas can be either sand or gravel pits, for easier cleaning as these birds tend to produce many droppings and pellets daily.

The enclosure at the Australian Reptile Park has been designed for not only 7 Barn Owls but also 2 Black-shouldered Kites, 5 Boobook Owls and 3 Tawny Frog Mouths. This enclosure has used the double door entrance and is utilizing it not only for security and safety but also as a night enclosure for 2 of the 3 Tawny Frog Mouths.

This enclosure has been designed for the public to enter and once through the second door there is a railing preventing the public from getting any closer to the birds. The exhibit is made of wire mesh and the entire roof is covered with corrugated plastic sheeting. Water mist sprays have been installed so that when in extreme temperatures they can be turned on for a certain amount of time in certain perched areas for the birds to cool down.

(Brendan Cook, pers.com)

The entire floor has been mulched and is re-mulched every three months. Through this substrate grows many native plants but also a variety of perches which have been held in place by it. Each perch has a number of branches at different heights and widths and is from native trees within the local area.

With the Australian Reptile Park's enclosure the improvements needed for it to beat and better the EAPA standards would be to:
-eliminate the access of the public into the exhibit to give better protection to the animals and public.
-add complete coverage to one of the existing walls to stop wind and excessive rain from entering at the most SW point of exhibit.

Figure5. Bird of Prey Exhibit at the Australian Reptile Park, Gosford

4.2 Holding Area Design

Holding facilities should have low lighting, warm temperatures and be for single birds according to the EAPA standards. It should also be easily accessible and maintained to keep up maximum hygiene levels.

Figure6. shows the type of wooden holding enclosure we use at the Australian Reptile Park. There are 4 holding areas each large enough to hold a single Barn Owl for several days. A perch and substrate can easily be placed inside each for the Barn Owl to sit on. There is also enough room for a water bowl and if needed a heat lamp.

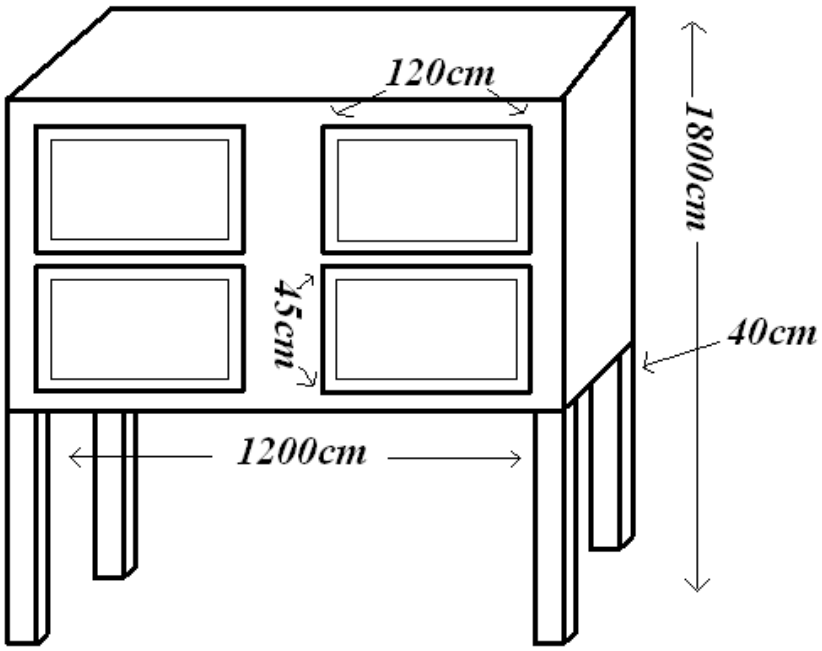


Figure6. Australian Reptile Park's holding facility

4.3 Spatial Requirements

The Spatial Requirements for the Barn Owl is:
Width = 3m
Length = 6m
Height = 3m

This is also the same requirements for the other birds of prey located in the exhibit at the Australian Reptile Park except for the Black-shouldered Kite which needs a height of 4m. The enclosure at the Australian Reptile Park is currently 4mX8mX4m. In the case of Raptor species any bird of the same size or hunting ability can be held together in the same enclosure.

(EAPA, 1995)

4.4 Position of Enclosures

Animal enclosures should be designed so that the most protected area is facing in the most South Westerly direction. This is due to, in Australia, most extreme weather conditions come from this path and the animals within the enclosure will need as much cover as possible.

(Brad Walker, pers.com)

At the Australian Reptile Park the Birds of Prey enclosure is located on a slight slope so the water runs away from it and is protected most sides by a 1m high retainer wall. The enclosure is facing north-east to prevent most rain and wind penetrating it. The substrate all around the enclosure is also made up of leave litter and mulch which absorbs most of the rain.

4.5 Weather Protection

With the enclosure facing north-east and the roof fully enclosed it protects the exhibit from extreme weathers. It prevents direct sunlight, rain, wind and the extreme heat. All of these weather conditions if needed can be provided for the Barn Owl mechanically and monitored by keepers. To improve the aviary at the Australian Reptile Park we could also enclose an entire wall which would provide further protection.

(EAPA, 1995)

4.6 Temperature Requirements

As Barn Owls are found all over the world they have adapted to most climates but seem to prefer areas with quite an average temperature year round or areas with mild winters. Barn Owls in Australia live in habitats that range in temperature from 10’C to 38’C. Temperatures bellow 10‘C can actually cause higher mortality rates in this Owl species as they are unable to store body fat and during these months become too weak to hunt.

(Animal Diversity)

Keepers from Australian Reptile Park have mist sprays that we control to wet aviary and birds down during extreme heat and provide extra nesting boxes and browse during the colder months.

4.7 Substrate

Mulch/ leaf litter substrate is highly recommended when furnishing a bird exhibit. It can easily be removed, cleaned and is cheap to buy. Under this mulch substrate is soil which is used for planting live plants and securing perches into an aviary. Sand or sawdust is not recommended as much more cleaning is required and can hold a lot more diseases and parasites.

(Brendan Cook, pers.com)

4.8 Nest boxes and/or Bedding Material

The Barn Owl is one of the few birds that do not make a nest. They don't gather materials but nest in cavities in tree hollows or old buildings like ware houses and churches. This is one of the reasons for this Owl's many names.

During the breeding season, female Barn Owls will form a nest with the pellets they have regurgitated. These pellets are the remains of their prey which the birds could not digest, usually consisting of fur or feathers. This in itself, once the female has been sitting on the eggs for a number of days, creates a nest like area and increases the warmth within the roosting cavity.

(World Owl Trust)

In captivity the access to nesting boxes and hollow tree trunks, which have an area inside with little or no light and a security roost, will suffice them.

(EAPA, 1995)

Provision of actual nesting material like grasses, ferns or leaf litter is not required but can be placed within each nest box or tree hollow during colder months as it will provide extra heating.

(Brendan Cook, pers.com)

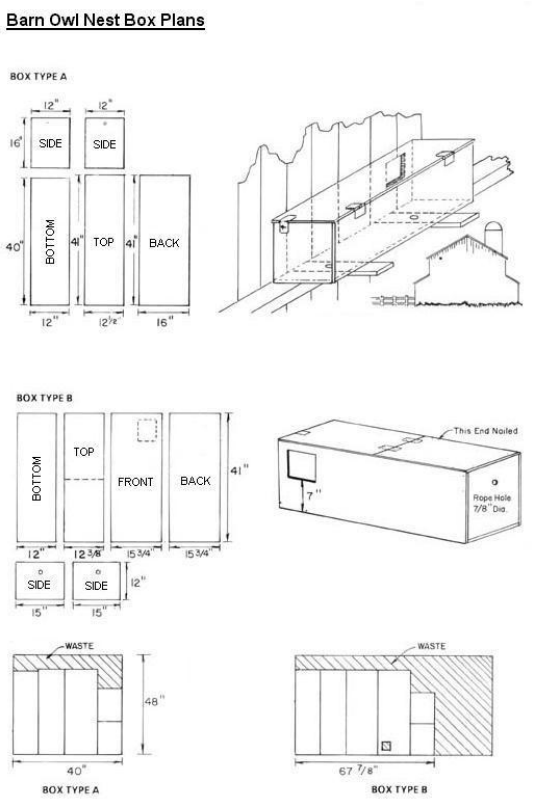


Figure7. Design of a man made nest box

4.9 Enclosure Furnishings

The minimum standards for a Bird of Prey aviary are:
- The total number of perches must outnumber the amount of birds in the enclosure
- At least one perch should be no less than 2m from the ground. This is to increase maximum flight abilities
- Many branches are situated at the maximum height
- A number of stumps
- Perches are to be well away from walls and other fixtures to allow clear passage
- Perches must vary in diameter
- hollow logs and nesting boxes provided
- Sight barriers
- A water bowl or bath no deeper than 15cm

(EAPA, 1995)

Most if not all furnishings within this exhibit should be from this bird's natural environment as in any animal enclosure. Use of all natural perches and tree hollows as well as live plants is also recommended as Birds of Prey are the least likely bird to destroy their captive furnishings.

At the Australian Reptile Park we have also provided the Birds rocks to sharpen their bills on as well as a fence like railing. This was recommended not only for keeping the public at a distance from the birds but to encourage the Barn Owls natural foraging behaviour as most are seen perched on a fence post in the wild

(Brendan Cook, pers.com)

Figure8. Inside Bird of Prey exhibit at Australian Reptile Park

5 General Husbandry

5.1 Hygiene and Cleaning

Hygiene is a major factor when considering a captive animal's health. Birds in particular attract disease and illness more than most other animals. Barn Owls are a host to several parasites both internal and external. If the environment surrounding them is contaminated it is to be expected that these birds will become quite ill.

(Animal Diversity)

Daily maintenance is important especially to remove the faeces specifically in small enclosures. Lack of removal of faeces may contribute to a high worm burden. It is important that clean water and feed containers be provided. As these are the main contributors to disease.

Each week a head keeper will walk through each aviary and decide what and if anything needs to be updated, replaced or something else needs to be added. In the Owl aviary these changes happen daily, weekly, monthly or quarterly.

(Michael Craig, pers.com)

The following table is of the maintenance conducted at the Australian Reptile Park.

Daily	**Weekly**	**Monthly**	**Quarterly**
-Watering of plants -Cleaning and refilling of water bowl -Feeding and removing old uneaten food -Raking substrate (mulch) -Distal examination of birds -Hosing / scrubbing perches, railings and wire of aviary to remove any faeces	-Weeding aviary -Pest control	-Re mulching -Move furnishings around enclosure to enhance enrichment -Bleaching the water bowl	-Replace old or dying plants -Clean out nesting boxes and hollows -Physical examination of birds -Replace rotting or old furnishings

5.2 Record Keeping

There are many stages and categories of information needed to be recorded about an animal in captivity. Most if not all this information can also be recorded of wild animals as well. Basic information of each animal is required for breeding plans, transportation to wild or other institutions, treatments, conditioning or further research. All information can be recorded in daily diaries, keeper diaries, specific data sheets, computer records and ISIS records.

Identification	**Development**	**Diet**	**Behaviour**
-parents -sex -birth/age -colouring	-size -weight -height -wingspan -moult -feathers	-how much -how often -what type -when feed -fecal/pellet count	-social/playful -imprinting -aggressive -abnormal -sexual

5.3 Methods of Identification

Identifying a wild Barn Owl is fairly difficult. As there are 36 subspecies the colouring and size can vary dramatically. Depending on what country you are in you can eliminate certain subspecies. Usually though the larger more densely spotted Owls are female.

For captive Owls you can look for:
-distinctive facial features
-colours
-injuries
-scars or markings
-size and shape
-behavior and the way each bird acts towards keepers and other birds
-leg bands

Having each bird conditioned to a name, spray painting a area of each bird with a different colour or photos of each individual bird as also other forms of identification used around the world.
(Owl Pages)

5.4 Routine Data Collection

Routine Data Collection is vital in ensure your Barn Owls are health and displaying their natural behaviours. Distal and physical examinations occurring as often as once a week to once every month can be conducted to make certain each bird is eating right, have no new injuries or illnesses. Faecal floats and pellet examinations can also occur to determine pests and disease control.

This information gets recorded into keeper diaries and computer records. It is then used to determine whether the enclosure and environment are providing the right physical and behavioral requirements for the individuals and if any improvements need to be made.

The amount of information and how many times data is collected can vary depending on the birds age (younger an Owlet is the more information is recorded if being artificially raised), institution (if used for shows birds are usually examined daily – once a week) and many other factors.

(Ravi, pers.com)

6 Feeding Requirements

6.1 Diet in the Wild

Barn Owls, all over the world, are most known for their beauty but most importantly by the way they hunt. The heart-shaped structure of their facial disc, which is unique to the *Tyto* species, can reflect the slightest sound wave towards a Barn Owls inner ear. Even though a Barn Owls eyes are 100 times better than ours at night when absorbing light, the way the facial disc has adapted it gives the owl the ability to hunt in total darkness if necessary.

(Digital Morphology)

Another feature of the way a Barn Owl hunts is that of its silent flight. Soft feathering and oversized wings gives the Barn Owl the ability to fly slowly and giving the owl the effect of a silent flight. It also allows the Barn Owl to perform a surprise attack on its prey.

(Taylor, 2004)

Barn Owls have been described as a lesser nocturnal owl. Hunting in the late evenings, all though out the night and sometimes during the early morning. They are usually seen sitting on fence post on the sides of roads, near hay stacks and open fields waiting to hear their prey moving around nearby.

(Owl Pages)

Their most common prey in Australia is the introduced Long-haired Rat and the House mouse (*Mus musculus*). This is due to the rapid plagues that occur with these rodents. A Barn Owls diet does not change from season to season but changes from which food is availably at that time. They also have been recorded in Australia and overseas eating:

-Small mammals
-Bats
-Baby rabbits
-Caterpillars
-Frogs
-Lizards
-Gophers
-Shrews
-Voles

(Hollands, 1991)

The main problem with the Barn Owls diet is that almost all of its prey is made entirely of bone. The Owls however has adapted to this in a way of regurgitating pellets. Barn Owls have an avian stomach which means it has two parts. The first, the glandular stomach, is used for digesting and the second, the muscular stomach, as a filter. While food is in the second stomach soluble parts are aloud to pass though while others like bone, teeth, fur, feathers and insect skeletons are compressed into a cylinder shape and coated in mucus. The mucus is applied to allow easy access when pellets are regurgitated. Pellets can be in a range of sizes as large as 8cm and as small as 2.5cm. Barn Owls will usually regurgitate one pellet a day.

(Taylor, 2004)

6.2 Captive Diet

In captivity Barn Owls can be fed a range of food including rabbit, rats, mice, day old chicks and quail. The amount of which you feed a captive Barn Owl depends on the Owls age, sex, health, if breeding/mating, how well it is handled, wealth conditions and much more.

The average amount of food a day for each individual bird is either one of the following:
-Rabbit – 1 hind leg
-Rats - 1 half
-Mouse - 2 or 3
-Day old chicks – 2 or 3
-Quail – 1 medium sized

(Arent, 2007)

Each aviary containing a Barn Owl should also contain a water bowl, no deeper than 15cm, so that the Owl can drink from and bath in.

(EAPA, 1995)

A Barn Owls diet will only need changing if mating or breeding which means the amount will need to be increased so each Owl receives enough energy from its food. There is no need for season feeding or browse for Barn Owls in captivity or the wild.

Food should always be given to a Barn Owl in the evening and not frozen or live. Live feeding could actually cause more damage to the Owl than the prey itself. All uneaten food should be removed the next day and water bowl cleaned out and refilled. Feeding the Owls in the evening gives the keep a chance the next day to check each Owl's pellets and to make sure they are physically eating because the featherings of a Barn Owl can hind an undernourished Owl.

(Arent, 2007)

Figure9. Day old chickens

6.3 Supplements

When fed whole mammals or animals in a varied diet and housed outside, supplements for Barn Owls are not needed. However, if housed inside and fed only one type of food in their diet, Vitamin D is needed. One or two drops of cod liver oil added to the Barn Owls food once per work should be enough. The Vitamin D deficiency is due to lack of sunlight, so allowing an inside housed Barn Owl a few hours each day in an outside aviary will prevent this.

(Parry-Jones, 2002 and Taylor, 2004)

6.4 Presentation of Food

Food for a Barn Owl or any Raptor can be placed on a fed tray or all around the aviary. It should never be placed on the ground because the substrate can get attached to the food and it may be hard for the owl to digest. It is also best to place food in the same place each time because Birds of Prey are creatures of habit. By placing food in the same place each time it reinforces that this is their prey and if the food type needs to be changed, placing it in the same place will reassure the bird.

Figure10. Barn Owl holding prey

When feeding two or more birds in one aviary it is best to feed them at the same time and place food in separated piles. Visual barriers are always a great help if some birds become aggressive when around their food. Wearing gloves is also recommended when feed Birds of Prey.

(Arent, 2007)

The Australian Reptile Parks keepers place the food all around the aviary on stumps, in ferns, inside hollows, on logs and on perches. This enhances the animal's senses on having to retrieve the chicks from hard to reach places. When live food is not recommended not much enrichment can be provided for Barn Owls when it comes to their diet. The only main enrichment which we at the Australian Reptile Park could also improve on is a varied diet.

7 Handling and Transport

7.1 Timing of Capture and Handling

The best time to transport, catch or handle any Bird is the early morning. In doing this it gives the bird the rest of the day to recover and is usually the coolest time of day, so the bird doesn't over heat too easily.

(Arent, 2007)

7.2 Catching Bags

The best tool used when catching and handling a Barn Owl is a thick towel. Nets, (long or short handled) can also be used but without proper training feather damage can occur or the bird could actually get caught in the net and cause even further damage.

(Arent, 2007)

7.3 Capture and Restraint Techniques

The best way to catch a Barn Owl or any Raptor is to corner it. If in a large aviary, like the Australian Reptile Park, use two or more people so you can guide it to a corner and then hopefully to the ground. Whenever trying to capture a bird you must do it as quick as possible because birds can get stressed easily causing severe damage to them self. Once on the ground place a towel or net over the Barn Owl. Once secure, locate the head and restrain this region so when restraining the rest of the body it cannot harm you.

The best technique for restraining a Barn Owl is the Raptor grip. This technique allows you to restrain the Owls feet (talons), wings and tail the strongest parts of an Owl in one hand or two if need be. Also with this grip it keeps your hands well away from the bird's beak so there should be no chance of getting bitten.

(Arent, 2007)

Chemical restraint can also occur with the use of sedation and/or anaesthesia. This method of restraint enables keepers to facilitate a safe and thorough approach to physical examination and sample collection. It also provides immobilization and analgesia for surgical procedures. Anaesthetic difficulties can occur especially during induction and recovery. Possible complications can be minimized by first-class planning and detailed monitoring during anaesthesia.

Anaesthesia can be induced and sustained with a range of parenteral and inhalation agents. The agent used depends on a variety of factors including the age, ease of handling, physical condition of the bird and available facilities. For lengthy procedures, birds should be intubated and maintained with an inhalation agent.

Areas that need to be monitored during this form of restraint are temperature, blood loss/count, heart rate, respiratory rate, and any other salient observations.

(Australasian zoo keeping)

7.4 Weighing and Examination

When examining a Barn Owl, the best position is for the bird to be restrained in its normal upright position. When in its upright position you can examine the Barn Owl's feathers, beak, talons, feet and wings.

Always make sure examinations occur inside and with the minimal amount of people present as possible. Try and use the same equipment or same time of day to perform your examination because this will give the keeper the most accurate result.

To weigh a Barn Owl it is best to place the bird inside a catching bag or cardboard box. In doing this the keeper must release his grip on the bird so an accurate ready can be conducted. If rapping the bird in towel beforehand remember to get the total weight then minus all the equipment used weights. Once the bird has been weighed the keeper then must regain his grip on the bird. Take your time because fast movements will cause the bird to stress and try and get away.

(Arent, 2007)

7.5 Release

After an examination the Barn Owl should be directly released into its enclosure. The owl should be placed on its back on the floor of the enclosure. Once the keeper releases the bird from a restraining grip, the keeper should slowly role the Owl away from him/her. This will help the bird right itself and gain composure before taking flight to its preferred perch (not the same if was under anesthesia).

Once released keep an eye on the Barn Owl and if still panting or fluttering it is best to spray the bird slightly with water to cool it down. So having a spray bottle handy is usually required.

(Arent, 2007)

7.6 Transport Requirements

7.6.1 Box Design

For Barn Owls and really any Bird of Prey, cardboard of plastic sky kennels are not recommended. Traveling boxes should not let in too much light and should definitely not have a wire front door. Boxes should be made of wood, like plywood, and should have no windows but only drill holes for plenty of air. This means that once inside the Barn Owl should be in complete darkness. It should have an upwards sliding door for easy access in and out of the box and also have handles on the box for easy keeper handling. The box should not be large enough for the bird to open its wings but the bird should not be able to touch any part of the box when sitting with its wings tucked in.

(Arent, 2007)

The IATA recommended box size for transporting a Barn Owl is:
Length 20cm
Width 12cm
Height 14cm

IATA transport box for Birds of Prey in Appendix viii

7.6.2 Furnishings

The floor and or roof of each transport box should be carpeted or have some kind of non slip surface lining it as the birds will need a surface to grip too. Perches are not recommended for Owls because most will travel on the floor and actually cause damage to themselves on the perch itself if not a trained Owl.

However if the Barn Owl is traveling for a number of days a perch is recommended because no Barn Owl naturally perches on flat ground for long periods of time. This then means the box itself will have to be larger due to the head to tail length needing to be longer and higher once a bird is on a perch.

(IATA,)

7.6.3 Water and Food

During transport no food or water is needed in the box but once released it is necessary that it is available for them in their new enclosure.

(IATA,)

7.6.4 Animals per Box

Only one Barn Owl can be transported in each box. Unless it is new born chicks under the age of 3 weeks because any older than this the stress of moving larger/older chicks could kill the runt of the group.

(IATA,)

7.6.5 Timing of Transportation

Owls and most Birds of Prey can only be transported for a limited amount and during early morning. It is unadvised to transport any birds in cars with no air conditioning.

(Animal Transportation Act, 2006)

7.6.6 Release from Box

If releasing more than one bird into a new aviary make sure it is done during daylight so you can see how the birds are behaving towards each other. However, if it is only one Owl then you can release them at any time even at night. Once released best thing to do is to leave them alone. You can check on them a few times a day but leave handling them to a bare minimum. When first released most will not eat but after a day or to the appetite will soon recover and make sure you are, for the first 2 or 3 weeks, feeding the Owl what the previous person was feeding them.

(Arent, 2007)

8 Health Requirements

8.1 Daily Health Checks

When caring for Barn Owls in captivity daily health checks are required to monitor that animal's health. They can be conducted from a distance and during rounds so minimal contact is needed or under anesthesia by a trained veterinarian. Barn Owls and most other birds like routines or repetition but also have the ability and defense to look completely healthy when in fact they could be quite ill. Performing a morning round/check at the same time of each day but also an afternoon round/check at different times enables you to observe the Owls unnoticed.

(www.pgaa.com)

At the Australian Reptile Park during the morning and afternoon rounds each animal is examined on the following:

Body Condition	**Eyes**	**Discharges**	**Behavior**	**Faecal Material**
-making sure all feathers are in place and appropriately groomed -wings are in the right position, not sagging or bent at an awkward angle -no missing nails -both legs being used for supporting animal (most only will use one leg while resting but usual swap after a few minutes) -posture (back not arched)	-open fully, no swelling (if awake) -clear -shape (more round than oval) -no discharges or mucus on or around surface	-no fluids near or on nasal area (beak) -cloacae clear of faeces -no sign of blood on any part of body or in faeces	-change in FFF distance (Fright, Flight, Fight) -if sitting in same position -towards other animals and keepers -more aggressive or submissive -if awake or asleep at the right times -if grooming/preening -no tail bobing	-correct colour (bright dark green is bad) -correct number of pellets (pellets being the regurgitated food the Barn Owls could not digest) -all in one area (Barn Owls usually excrete faeces in same place each day)

8.2 Detailed Physical Examination

8.2.1 Chemical Restraint

Chemical restraint can occur with the use of sedation and/or anaesthesia. This method of restraint enables keepers to facilitate a safe and thorough approach to physical examination and sample collection. It also provides immobilization and analgesia for surgical procedures. Anaesthetic difficulties can occur especially during induction and recovery.

Anaesthesia can be induced and sustained with a range of parenteral and inhalation agents. The agent used depends on a variety of factors including the age, ease of handling, physical condition of the bird and available facilities. For lengthy procedures, birds should be intubated and maintained with an inhalation agent.

Areas that need to be monitored during this form of restraint are temperature, blood loss/count, heart rate, respiratory rate, and any other salient observations.

(Australasian zoo keeping)

Using Isoflurane gas at 3% during induction and then decreasing to 1.5-2% while procedures are occurring. A face mask is the best way to begin the restraint them moving to incubation.

(Jackie Salkeld, pers.com)

8.2.2 Physical Examination

A physical examination is when you have actually caught the bird itself and you or a vet performs a full body check and examines the bird more in depth. Physical examinations are best preformed during the early mornings when the weather is coolest due to birds becoming stressed quite easily.

All examinations that need to be performed on a Barn Owl can be preformed when conscious only few exams need to be conducted under anesthesia. It is a two keeper job with one restraining the bird while the other performs the examination. Examinations can be as frequent as once a week, fortnightly or monthly.

The best technique for restraining a Barn Owl is the Raptor grip mentioned above in the Handling and Restraint section of this manual. This technique allows you to restrain the Owls feet (talons), wings and tail the strongest parts of an Owl. Also with this grip it keeps your hands well away from the bird's beak so there should be no chance of getting bitten. This grip also allows the examiner easy access to all body parts.

A physical examination can involve the following procedures:
-weighing
-worming
-blood testing
-X-rays
-beak, wing, nail clipping
-pectoral/keel muscle examination
-wing expansion
-feather/skin condition

(Dr. Marshall, Bird Health)

8.3 Routine Treatments

As Barn Owls are hosts to several parasites external and internal frequent worming is recommended to prevent excessive amounts occurring. Endo and ecto parasites are found mainly on hatchlings and in nest areas but are also found on adult Barn Owls. Parasites like mites, lice, fleas and worms.

(Animal Diversity)

Worming a Barn Owl can be as simple as adding a solution to its water bowl and that being its only source of water for several days. You can also inject the worming solution into its food. At the Australian Reptile Park we use a product called Wormout Gel and administer 1ml per 80ml of water and leave in each aviary for 2 day periods. We conduct this treatment 4 times a year.

8.4 Known Health Problems

Ectoparasites – mosquitoes, lice, fleas, mites

Ectoparasites are an organism that live on the outer surface of another organism, its host, and does not contribute to the survival of the host (*Carnus hemapterus*).
Causes- overcrowding of birds, interaction with infected bird, low immunity of young birds

Signs- skin irritations, physically seeing parasites, scaly or crusty appearance on the legs and feet, and around the beak or eyelids, lumps, excessive bathing, lethargic

Treatment- orally, a solution in water bowl, spays, spot ons, injections or otherwise vet treatment (Wormout Gel).

Prevention- thoroughly clean and disinfect the cage and furnishings, double wire around enclosure.

Endoparasites – round worm, tape worm, flukes, coccidians

An Endoparasite is an organism that lives within the tissues or bloodstream of its host. It feeds off its host and physical harms the Birds (*Kirodaia subpachygaster*).
Causes- contact with infected bird faeces, digestion of certain ectoparasites (lice & mites)

Signs-weight loss, gasping for air, discharge from the nose, coughing, bloating, diarrhea, vomiting, agitated

Treatment- a faecal test will be conducted then worming in water bowl, orally, spot ons, injections (Wormout Gel).

Prevention-thorough hygiene of animals, enclosures, keepers

(Animal Diversity and Wikipedia)

Bumblefoot

Found on the bottom of a bird's feet where it has formed an abscess
Causes- plastic perches, sharp-cornered perches, injury or has an infection

Signs- small reddened area, or sometimes a small shiny patch on the leg/foot

Treatment- soaking legs and feet in warm water, antibiotics usually a penicillin injection, applying hemorrhoid cream to the affected foot

Prevention- Provide a bird with natural perches with different circumferences and textures

(Avian Web)

Poisonings

Over populations of rat and mice are due to plagues and many farmers place rat poisons around their farms to keep the number down.
Causes- preyed food having digested the poison

Signs-fluffed up, discharges, dis-coloured faeces, weakness, vomiting, diarrhea

Treatment-immediate vet or medical attention

Prevention-using rat traps instead of poisons, enclosed feed sheds

(Animal Diversity)

Psittacosis

Psittacosis also known as parrot fever is a disease caused by an organism called *Chlamydia psittaci*. It is not easily transmitted to Barn Owls but there are still sensitive to this disease.
Causes- contact with infected young stressed birds and there faeces

Signs- respiratory problems, conjunctivitis, diarrhea, weight loss

Treatment-A faecal test would be conducted then the bird will be placed on antibiotics. Chlortetracycline, doxycycline and oxytetracycline are the most common drugs used for treatment. Further infection can occur even after treatment usually leading to the animal's death.

Prevention- Cage hygiene is essential. Clean out bird cages regularly to prevent faecal build-up.

(Bird Health)

8.5 Quarantine Requirements

Any animal going into Quarantine stays for a duration of around 30 days. This is to ensure all test conducted are clear as well as some illnesses don't show signs of infection for at least 2 weeks. Examinations occur to o determine whether it is safe for that animal to be transported to a new place. The reasons for Quarantine are mainly for transporting animals from one institution to another but can also be for transporting animals around the same institute.

Quarantine can also be used for singling out certain birds from within a flock if injured, ill or needing a routine examination.

Areas of which you will need to cover when considering quarantining a Barn Owl are:

- PPE required
    - Gloves
    - Boots
    - Full body uniform
    - Face mask
    - Goggles
- Record keeping
- Hygiene considerations
    - Disinfection, sanitation
    - Footbaths
    - Food preparation
- Waste disposal
- Entering and exiting quarantine areas
- Feeding and monitoring of food
- Provision of appropriate bedding
- Physical exams
    - Weights
    - Blood test
    - Faecal Float
    - Pellet extractions
- Environmental enrichment

(ARAZPA, 1990)

9 Behaviour

9.1 Activity

Like most Owls, Barn Owls are nocturnal but they are first and foremost the greatest hunters of small mammals. The studies of this bird's dietary behaviour are extensive in the wild and in captivity even though they are most active between the times of dusk and dawn.

(Taylor, 2004 and Owl Pages)

Usually Barn Owls will hunt from above, either being perched on a road side fence or tree branch over an open field. They bob and weave their heads until they locate their prey by listening to it scurrying about. When retrieving their prey Barn Owls will fly down low and seize it in their outstretched claws.

(www.raptor.org)

They achieve this with adaptation of their flight pattern; they fly against the wind and appear headless when in flight but also they conduct wavering motions and have their feathered legs, open and dangling. Barn Owls are also known for their excessive amount of grooming to keep each and every one of their feathers clean and intact, thus giving them another ability to fly silently.

Figure12. Owl roosting on fence post

Barn Owls will then return to their roosts at dawn, often calling as they do. Constant vocalizing is another common behaviour of the Barn Owl with at least 15 different calls being identified. While sleeping during the day, usually perched on or in a man-made structure, they generally balancing on one leg with the wings closed and hunched forward to hide their pale belly.

They are not typically shy creatures and have been known to become quite acquainted to people, in particular in European Countries where many man-made nest boxes have been created for them specifically.

(Animal Diversity)

9.2 Social Behaviour

Barn Owls are social animals for most of the year while they are breeding or caring for their young but for the few months in between they become solitary or territorial. The study of this particular behaviour is rather scarce in literature due to their natural wild behaviour, so most of the mentioned bellow studies have been conducted in captivity.

In recent times it has been observed that more Barn Owls are living in colonies rather than singularly. This is believed to occur due to the increase in rat and mouse plagues but also with farmers building more man-made nesting boxes.

(Animal Diversity)

The most active time for social interaction is just before dawn, when all adult Owls return to the roosting area. This is when they reform the social structure and ranks. It is performed in ways of head bobbing, bill to bill rubbing, nipping, vocalizing and in rare circumstances one owl grasping another with its foot. When living in these colonies in captivity and the wild they have formed set territories which have been observed in the studies of D.Csermely and N.Agostini.

9.3 Reproductive Behaviour

The Studies of a Barn Owls reproductive behaviour is just like the research conducted on their dietary behaviour somewhat widespread. The main behaviour observed while reproduction occurs within the Barn Owl life cycle is the courting of the owls.

"Courtship behaviour could hardly be described as spectacular it has a subtle beauty and more than a hint of mystery."

(Taylor, 2004)

The first sign of courtship is the male Barn Owl spending more time at the nest site and the increasing tendency of him to create a long drawn out screech. This call varies as the breeding season approaches with it being both a distinct vibrato (to advertise ownership of that site) and also a hoarse weak cry (to attract a mate). The call is used most during the laying of both the first and second eggs to ensure ownership is known to all other birds.

(Taylor, 2004)

Figure13. Courtship of Barn Owls

Courting or the Mating ritual is performed by the male and it begins with him hovering in one spot over the female, emitting a sort of breathless choking sound. He then waits for the female to accept and if so he will repeatedly clap his wings beneath him before flying off to return with some kind of food offering. The male then needs to show he can provide for her and their offspring during the entire breeding period by offering the female food daily. Most Barn Owls will use the same nesting area for 20 or 30 years and will usually be the same pair of Owls.

(Oregon Zoo)

Mate Guarding is also a known trait of the Barn Owl with male birds being found sitting beside their mate constantly during the last 2 weeks before laying and while laying. The males will then decrease their presence from the nest site after the clutch completion returning to their preferred roosting site.

(Taylor, 2004)

9.4 Bathing

Though it is not a common occurrence, Barn Owls have been observed bathing in shallow creeks and rivers. This is conducted to cool down the bird but also to clean the feathers and down and is conducted usually during the hot, dry weather of summer and just after fledging of the young.

(Trek Nature)

Bathing can be a lethal experience for Owls as their feathers aren't water proof but even more dangerous for the female owl if conducted right after her chicks have fledged due to these Owls being quiet over weight and not being able to remove themselves after soaking, thus ending in drowning.

Figure14. Female Barn Owl bathing

9.5 Behavioural Problems

One of the natural behavioural problems for a Barn Owl is its adaptation for living near and in human structures but also feeding near road sides. Cars and humans are one of the major causes in Barn Owl deaths this century. Due to Barn Owls not being shy to humans and our activity it is allowing them to be hit by cars or crushed when old buildings are demolished.

If there are any other behavioural problems with Barn Owls they are rarely noticed by humans due to keepers and visitors never truly seeing these birds when they are truly active so further studies on this can and should be conducted.

The most common captive behavioural problem though would only occur with hand raised Barn Owls and this could be excessive aggression, boredom and not knowing its natural reproductive or dietary behaviour.

(Animal Diversity)

9.6 Signs of Stress

For most if not all Birds the typical signs of stress are:

- loss of feathers or poor condition
- sitting on the ground
- fluffed up
- arched back
- abnormal faeces, or pellet
- droopy wings
- discharges at the eyes, beak, vent
- preening or tail bobbing
- eye shape

When a Barn Owl is stressed or believes it is threatened it will spread its wings and sway its head back and forth. This is used as a warning sign to any predators that may be approaching but they can also fall on their backs and strike out at the predator with its feet if needed.

(Animal Diversity)

9.7 Behavioural Enrichment

There are many ways to enrich a Barn Owls life to help fulfill its natural behaviour and habitat. The following graph is a monthly calendar that I have constructed to show just a few examples of what enrichment you could give a captive held Barn Owl. Each of the follow enrichment can be used for a various reasons such as toys, items to hide behind, increase natural habitat and to begin reproductive season/changes.

1	2	3	4	5	6	7	8	9	10
New substrate	Hanging rope	New nest boxes		New browse	Sprinklers on for 1hr		Hanging hessian bags	Scatter feeds	Fake plants
11	12	13	14	15	16	17	18	19	20
Increase amount of live plants in enclosure			Play recording of bird calls	Hanging perches		Change in diet	Add shallow pound	Shredded phone book pages	
21	22	23	24	25	26	27	28	29	30
Hanging plastic snake	Increase diet amount		New perches		New browse	Sprinklers on for 1hr		Soft toys	New browse

9.8 Introductions and Removals

All introductions and removals of enrichment items should be conducted with the least amount of interruption, commotion and stress to the birds. It is best if only one keeper makes the change but to also rotate the person who is making the changes so the Barn Owls do not fear that person or get into a routine.

Most if not all the mentioned above enrichments, can be used more than once a month as shown with the use of new browse. Certain pieces of enrichment like new plants and perches can cause a bit of disruption to the animals and their behaviour so it is recommended that you give them a day of rest before adding anything else or new items.

Once the new enrichment is placed in the enclosure or again removed from it, observations from a distance should be made to see if the item is a success for future use. If the animal is stressed the new item should be removed immediately as Barn Owls and all birds in particular can become ill rapidly.

(Brad Walker, pers.com)

9.9 Intraspecific Compatibility

Barn Owls can be housed and live with one another in many different sized groups. From being just one pair of mating Barn Owls to colonies of up to 15 pairs of breeding Owls and their chicks. Studies of this have been conducted in many Zoos' and private owned institutions such as the observations of D.Csermely and N.Agostini.

Naturally in the wild when rat or mice plagues are on the rise colonies of over 20 Barn Owls can be seen. For example in Utah an abandoned steel mill was housing over 30 Barn Owls and in Florida 10 pairs of breeding owls and their chicks were located in one barn. It was estimated that those 10 pairs of Barn Owls consumed over 15,000 cotton rats from the surrounding fields that year.

(Taylor, 2004)

For these Owls to be housed at a minimum standard the enclosure must be of 3m wide, 6m long and 3m high. Within that enclosure multiple visual barriers and nesting boxes are need to provide these animals access to their natural behaviours. Excessive amount of food is also required to maintain enough for all members of the social structure.

(EAPA, 1995)

9.10 Interspecific Compatibility

At the Australian Reptile Park in particular, our 7 Barn Owls are in an enclosure with 2 Black Shouldered Kites and 5 Boobook Owls. With conducting my observations I have found that the Barn Owls natural behaviours can still be conducted as if they were housed in a same species enclosure.

The birds tend to stick to their own species and territory of the aviary so to house these birds in an inter-specific enclosure I would recommend:
- Enclosure is double the minimum EAPA standards
- Excessive amounts of visual barriers
- Plenty of food provided
- 4 or 5 perches per animal
- 1 or 2 nesting boxes per breeding pair

9.11 Suitability to Captivity

Any institute, private or public, holding a Barn Owl requires a Bird License and an extensive understanding of the bird itself. They can be used for training, research or just simply as an exhibited bird. Because of their unique beauty and features they are a good attraction for visitor even though they are such wide spread Owl.

They are easy to maintain and require minimal human contact or handling if need be and can be housed with other Bird of Prey species. The only down fall of having these birds in captivity is the enclosure size and how easily they can reproduce, all of which can be monitored and changed.

Barn Owls are not an endangered species so keeping them to help their population numbers is not needed. But in saying this having a Barn Owl in captivity can assist in raising the awareness of human intervention and recklessness but all so of other endangered night jars (birds of prey).

(World Bird Sanctuary)

10 Breeding

10.1 Mating System

The pair-bonding of Barn Owls is mostly monogamous, meaning they will mate for life but some males are occasionally bigamous, where they will take on a second mate if food is plentiful.

(World Owl Trust)

Copulation occurs every few minutes during the nest site search. Both sexes crouch down in front of each other to seek copulation. The male mounts the female, grasps her neck, and balances with spread wings. Copulation continues with decreasing frequency throughout incubation and chick rearing period.

(Taylor, 2004)

For Barn Owls it's not just a matter of food and copulation. Most pairs also engage in mutual preening and cheek rubbing both being shows of affection. They "talk" to each other in the nest, making a wide variety of soft chattering and hissing calls.

(Animal Diversity)

10.2 Ease of Breeding

Once over their first year of breeding most Barn Owl pairs will stay together in the same territory or live as "neighbors". Even though the whole reproduction cycle can take months it is a simple enough act if adequate food is available.

It is not usually hard for a Barn Owl to find a mate. They live in colonies or close enough to one another that once the vocalizing (of the mating ritual has began) you can hear the males from 1-5km away.

(Raptor Center and Barn Owl Trust)

10.3 Reproductive Condition

10.3.1 Females

As the reproductive stages of a Barn Owl occurs when their prey numbers are high, the female Owl spends progressively less time hunting, as her mate will begin feeding her at the nesting site. Her weight will increase from around 350g to 425g and she comes into what's called the "breeding condition". Copulation generally occurs each time food is presented and this, combined with her healthy condition, helps to ensure all the eggs are fertile.

10.3.2 Males

During the beginning of any breeding season it is when male Barn Owls are the most vocal and active. They are constantly on the alert and vocalizing to defend their nest and female from other males.

The male, during this period, will hunt more by daylight in order to present food to his mate to prove he can provide for her. Each male Owl is different with some being surprisingly lethargic or hardly ever present.

(Taylor, 2004)

10.4 Techniques Used to Control Breeding

Humans can easily control the amount and time of when they want Barn Owls to breed simply by the provision of food and nesting boxes/sites. Without a several amounts these items reproduction cannot be successful or commence.

In recent studies in European Countries, farmers have been observing the increasing numbers of Owls in their fields, when providing those Barn Owls with nesting boxes within the farmer's barns and sheds but also by not poisoning the cotton rat and mice populations and letting nature take its course.

(Owl Pages)

The same occurs in captivity with the availability of sufficient amounts of nesting boxes or hollows and food. I have observed this in particular at the Australian Reptile Park, when we increase the amount of day old chickens and provide the Owls within the enclosure more access to other hollows that breeding takes place almost instantly.

Figure15. Wild Barn Owl using man-made nest box

10.5 Occurrence of Hybrids

It is a rare event but can occur when a breeding pair's female in deceased and one of their chicks may take the place of its mother but is very unlikely as the numbers of wild Barn Owls is still high. Interspecies breeding is also uncommon but breeding amongst subspecies can occur if living within the same region.

I have observed in our own enclosure at the Australian Reptile Park that Barn Owls will only breed within their own species and rarely even communicate with the other birds.

10.6 Timing of Breeding

The reproductive cycle begins when a Barn Owl is around 1 year old and the courtship of the male will occur during late February till early June. The mating ritual can last for 3-4 days over even 2 weeks depending on how long the pair has been together or previously.

Most breeding or egg laying occurs in April, May and June when small mammal numbers are at their highest. Reproduction can take place at any time of the year with Barn Owls though, with the introduction or increase of rat and mice plagues.

(Barn Owl Trust and Taylor, 2004)

10.7 Age at First Breeding and Last Breeding

Once fully fledged and dispersed from their parents Barn Owls are able to reproduce as young as 10 to 12 months of age. This is mainly due to their quick growth rate but also a Barn Owls high mortality rate at the age of 1 or 2 years.

If Barn Owls survive their first year or two of life and become adequate hunters and have a plentiful habitat of food and shelter, they can live up to at least 8 years of age and reproduce every year until they die but further studies needs to be conducted on the specifics in the wild. In England, a captive female Barn Owl was retired from breeding at 25 years old.

(Owl Pages)

10.8 Ability to Breed Every Year

Food availability is the major reason for reproduction within a Barn Owl life cycle. As long as food is always available Barn Owls will constantly breed. But also because mortality rates for Barn Owls are highest when Owls are 1 year or younger, the need for younger breeding and constant reproduction is required to keep their numbers high.

(Taylor, 2004)

10.9 Ability to Breed More than Once Per Year

As long as the food is abundant and their habitat provides enough nesting hollows or boxes Barn Owls are capable to breed at least once even twice a year, producing 2 or 3 broods.

(Owl Pages)

In captivity double clutching can be encouraged with the removal of the first clutch and artificially raised but only recommended if you have the facilities to complete the entire rearing of the chicks.

10.10 Nesting, Hollow or Other Requirements

A natural nest site of a Barn Owl would include hollows in high trees, rock crevices and holes in cliffs but for centuries now the preferred site for Barn Owls seems to be rural areas consisting of man-made buildings and nest boxes; for example church steeples, abandoned steel mills and factories.

In both cases, natural or man-made, the prime requirements are shelter from the rain; due largely to the Barn Owl's lightly oiled plumage, which makes them more prone to soaking than other species and to be located at least 3-5m from the ground. Nests have been found over 20m above the ground.

(Barn Owl Trust)

Figure16. Barn Owl nest site

The Barn Owl is one of the few birds that do not make a nest. They don't gather materials but nest in cavities in tree hollows or old buildings like ware houses and churches. This is one of the reasons for this Owl's many names.

During the breeding season, female Barn Owls will form a nest with the pellets they have regurgitated. These pellets are the remains of their prey which the birds could not digest, usually consisting of fur or feathers. This in itself, once the female has been sitting on the eggs for a number of days, creates a nest like area and increases the warmth within the roosting cavity.

(World Owl Trust)

10.11 Breeding Diet

Most Barn Owl breeding transpires during a period of small mammal population increase or breeding therefore they become the main diet for the Barn Owls. Mammals such as rabbits, rats, mice, shrew and hare are all consumed as well as bats and other small birds if necessary during the mating season.

Depending on the clutch size or brood size of the Barn Owl chicks determines the food intake of mother and young. The more food the adults have the more young they can produce so while the female is on the nest food supply realise on the male Owls. Food supply is also affected by habitat quality, prey density, the weather and the experience and behaviour of the individual adult owls.

(Taylor, 2004)

10.12 Incubation Period

Most bird species don't start to incubate (warm) their eggs, until the clutch is complete so the eggs hatch at more or less the same time. Barn Owls on the other hand begin incubation as soon as the first egg is laid and additional eggs are added every two to three days. Incubation is completed almost entirely by the female, with the male feeding her daily for around 30-34 days.

Figure17. Parent Barn Owls with chicks and nest

10.13 Clutch Size

Compared to other Owl species, Barn Owls clutch size and eggs themselves are quite unique. The eggs are small, in relation to the bird's actual body size and will lay an average of 4-6 eggs but it has been recorded that up to 12 can be laid at a time. The largest clutch size at the Australian Reptile Park and that I have observed is 5 chicks one of which passed away at 3 days old.

Once laid, the eggs will hatch after 30 to 34 days at two or three day intervals. With this the chicks can have an age cap of 10 to 15 days from oldest to youngest. This kind of hatching is called asynchronous hatching.

(Barn Owl Trust)

Figure18. Barn Owl Chicks

10.14 Age at Fledging

On average the female Barn Owl will sit on the chicks until the eldest is around 3 weeks of age which means she has been sitting continuously on the nest for around 8 weeks. This is when the chicks are at the stage of fledging. Add on another 3 or 5 weeks before they are no longer dependent on their parents.

The number of surviving chicks from the original number depends on the food and according to the studies of The Barn Owl Trust; “In times of hardship the younger chicks often do not survive as they are unable to compete for food. However, during times of plenty, the older chicks have been known to feed their younger brothers and sisters.”

By the age of 5 weeks the chicks are usually heavier than a fully grown adults and by the 9 week mark they are making their first flights and near the 10 weeks they are outside, "play-hunting" and perfecting their flight patterns’. This involves the chicks pouncing on anything that moves especially leaves and each other.

(Barn Owl Trust)

10.15 Age of Removal from Parents

Dispersal can start as early as 10 weeks of age and they can stay on with their parents for months after fledging if food is abundant but the average time is 11-14 weeks of age. There are many reasons why the young leave their parents; being chased away, attacked, not enough habitat or food etc.

(Barn Owl Trust)

At the Australian Reptile Park Barn Owl chicks are removed within a week of hatching and are then on hand raised but our Bird Keepers. This occurs usually once a year and once at the age of 4-6 months they are transported to other institutions across Australia.

10.16 Growth and Development

While growing in the early stages of life Barn Owlets are nothing like the normal bird chicks. Yes they still beg for food, eat and defecate but they also 'play'. From 3 weeks old they are increasingly mobile and by 5 weeks they run, jump, pounce, hiss, click their tongues, and move their heads in the most comical manner side to side, round and round, even turning their heads upside down.

In the later half of the growth period, when Owlets are 5-8 weeks old, it is not uncommon for individual chicks to accidentally fall from the nest. This is often fatal even if they are uninjured. If there are still other chicks in the nest, individuals on the ground below are usually ignored and starve to death.

(Barn Owl Trust)

Once fledging has occurred the young owlets generally locate their own roosting area within a 1km radius of their parents nest. They can travel up to 200km away is pursuing food or another Barn Owl of the opposite sex.

A major problem affecting Barn Owl numbers is the mortality rate of those young owlets right after dispersing from their parents. Most die of starvation from not finding an adequate habitat with large amounts of food present. Once and if they make it past their first year of age Barn Owls are then fully grown, can perfect the hunting and flying abilities and also begin reproducing.

(Animal Diversity)

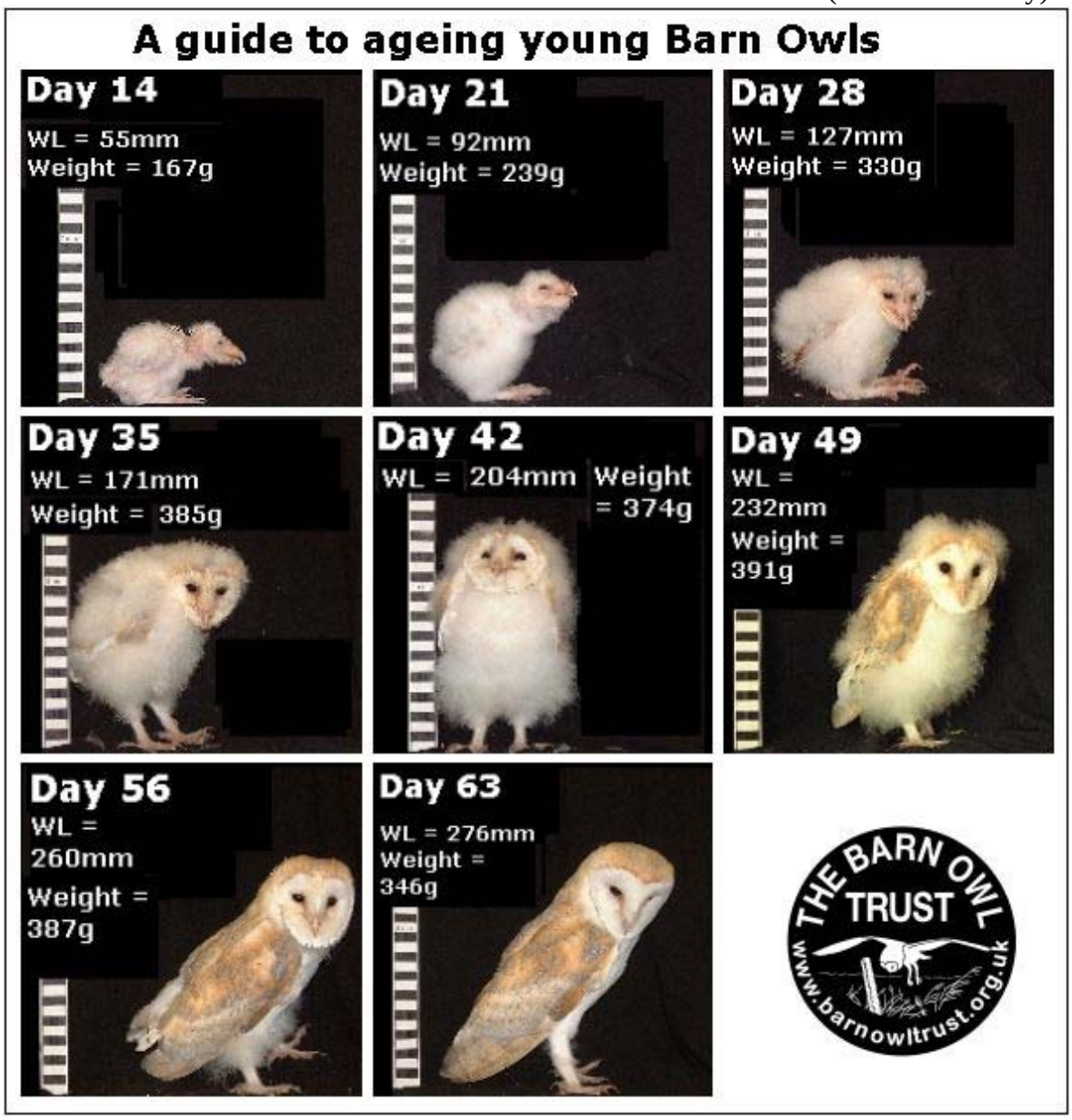


Figure19. Growth and development of a Barn Owl chick

11 Artificial Rearing

11.1 Incubator Type

There are many designs of incubators all over the world and most are created for fowl but the following mentioned bellow is also recommended for Parrots, Birds of Prey and Exotic Species.

Each incubator is unlike from another and can differ by one of the following:
- size and weight of actual incubator
-temperature control
-automatic turning ability
-size and thickness of viewing area/window
-materials used in the design of incubator
-egg capacity
-humidity control

Depending on the quality and technology of each incubator, the average price range is $400-$700. You can however pay up to $1000 on a newly released or a minimum of $200 on a second hand or homemade incubator.

Moving air incubators are highly recommended for Bird of Prey species. Research has shown that eggs from these birds require a different form of turning methods compared to other species. Brinsea-incubators and A.B incubators are two major developers of this type of product.

“By placing the eggs on their sides and turning them through 1800 on rollers for the first 10-15 days of the incubation period, a good membrane development can be obtained. Once the embryo is secured to the pointed end of the egg, it can then be placed into a plastic insert in the same machine. The eggs can then be turned in the traditional vertical position through 9Q0, until the eggs are ready to hatch having observed the internal pipping.” According to the developers of A.B Incubators.

Figure20. Different sized eggs inside a New Life 75 Mk 4 (A.B Incubators)

A.B incubators have designed the following two for small and large bird species including birds of prey:

- ## Newlife 75 Mk 4 Moving Air Incubator

-With automatic turning, close temperature control
-Latest dial-up %RH humidity control
-Specially designed for rare and difficult avian species
-Improved proportional solid state thermostat with accuracy of +1- 0.50C, with fine and coarse control facility.
-Automatic egg turning, the egg passes through 900 and back in a two hour period
-Three turning trays as standard. The central one may be substituted with a set of rollers.
-High accuracy digital thermometer to monitor air temperature the wandering probe can be located in any point above the eggs
-High precision humidity control, gives required humidity at the turn of a dial. Pumps water from an external supply to limit bacterial infection.
-Large double glazed viewing window for minimum heat loss
-Tough, thermally efficient cabinet, with hard epoxy coat to give an easy surface to sterilize..
Egg Capacity: 138 Mountain Quail, Dusky Lory, Jap. Quail, 75 Barn Owl, Golden' Pheasant, Macaws. 54 Peregrine Falcon, Capercailee, Teal, 12 Golden Eagle, 9 Crane.
Supply: 220/240v or 110/11 5v 50Hz 1 ph AC
Consumption: Max. 115 watts.
Size Actual: H 300mm W 620mm D 530mm
Size Packed: H 430mm W 740mm D 660mm
Weight: Nett: 9kg Gross: 14kg

- ## Moving Air Incubator

-With automatic turning
-Close temperature control
-Latest dial—up % RH humidity system
-Latest solid-state thermostat accurate to ± 0.50C with coarse and fine controls.
-Automatic egg turning once every two hours.
-Three egg turning trays as standard, or remove the centre tray and substitute for rollers.
-Digital thermometer to monitor dry-bulb temperature accurate to ± O.10C, with a probe which can be positioned over any egg on the turning trays or rollers.
-Electronic humidity control using the latest dial-up % RH Humidity
-External water supply to limit contamination and bacteria build up.
-Large see-through double glazed lid.
-Thermally efficient cabinet sprayed with special hard wearing epoxy paint.
-Easy to clean to prevent contamination.
Egg Capacity: 60 Parakeet, 56 Quail, 24 Macaw, 24 Barn Owl, 20 Partridge
Supply: 220/240v 50/60Hz 1ph AC Consumption:
Consumption: 38 watts
Size actual: H 255mm W 490mm D 305mm
Size packed: H 370mm W 670mm D 400mm
Weight: Nett: 7kgs Gross: 8.7kgs

11.2 Incubation Temperatures and Humidity

Temperature is a major factor when incubating an egg naturally or artificially. This is why one parent bird, the female in the Barn Owl species, will always be found sitting on the nest to regulate the nests temperature. Having the correct temperature is the basic reason why a chick will hatch healthy.

"Developing embryos are fairly tolerant of short term temperature drops and the user need not be concerned about cooling that occurs when inspecting eggs. Temperatures above ideal can quickly have a serious detrimental effect on hatch rates and must be avoided."

(Brinsea Incubators)

The best temperature for artificially incubating a Barn Owl is:
36.8 C – 37.0 C
98.3 F – 98.6 F

Barn Owl eggs should remain in the incubator for around 30-34 days. The incubator should be at a constant temperature and check 2-4times daily to insure no faulty equipment. When concerning the humidity of an Incubator there are two factors that affect this: water evaporation within the incubator (from eggs as well as from additional water) and levels of ventilation.

The three methods, presented by Brinsea Incubators, to reach accurate humidity levels:
- Follow the manufacturer's guidelines for water and ventilation levels.
- Measure humidity levels and alter to equal published guidelines for each species.
-Monitor egg weight loss which differs as a direct result of humidity and correct against published weight loss figures for the species.

For a Bird of Prey Species, such as a Barn Owl, the average incubation RH level is 35-45% RH. This can varying depending on what type of incubator is in use and further studies need to be conducted for a specific result of a Barn Owl.

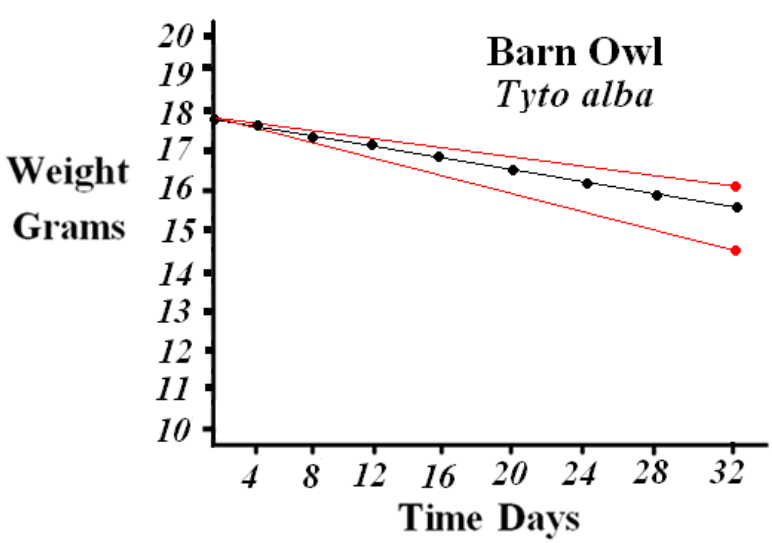
11.3 Desired % Egg Mass Loss

Throughout incubation eggs need to lose a predetermined amount of water which matches to a loss in weight of around 13-16%. This is because "eggs lose moisture through their shells and the rate of evaporation depends on the humidity levels around the eggs and the shell porosity" according to Keepers at the Australian Reptile Park.

(Brendan Cook, pers.com)

By measuring average weights every couple of days, the actual weight loss can be plotted and contrasted to the ideal weight loss line so corrections can be made. If the actual weight loss was greater than ideal loss then the air has been too dry and humidity levels need to be increased to compensate. An average ideal weight loss for Bird of Prey species is 16%. This is displayed bellow in figure 23.

(J. Marshall, C. Hager and G. McKee)



Egg weight loss graph

Average weight is 17.9

4 days = 17.7
8 days =17.3
12 days =17.1
16 days =16.9
20 days =16.6
24 days =16.4
28 days =15.8
32 days =15.4

Figure21. Graph of desired weight loss

11.4 Hatching Temperature and Humidity

For all bird species higher humidity levels are needed for the last few days of incubation and hatching to prevent membranes drying too quickly. An average of 65% RH or more is required for all bird species including the Barn Owl. Water and weight losses will not be significantly affected as hatching occurs in such a short period of time. High humidity levels however, will drop dramatically if the incubator lid is opened to often and will take awhile for the humidity to build back up. To prevent this from occurring leave a 2-3hour interval between all checks and removals of chicks.

Within the brooder each bird should be placed in an artificial nest like a plastic container, ice cream container, with a minimum of 5cm of sand or shredded paper. Form a hollow in the centre of each container and line with kitchen paper. Place the chick in this hollow with its legs tucked underneath itself to prevent splaying legs occurring.

(J. Marshall, C. Hager and G. McKee)

11.5 Normal Pip to Hatch Interval

As these birds are unlike most and begin incubating from when the first egg is layed, the pip to hatch interval is usually between 1-4 days. Other factors affecting this interval could be:

-the temperature and humidity of artificial incubator
-poorly developed chick, without an egg tooth

(J. Marshall, C. Hager and G. McKee)

Parameter	N	$\bar{x}$	SD	min/max
Length (l) (mm)	75	43.07	1.24	39.95-47.95
Breadth (B) (mm)	75	33.67	0.70	32.50-35.40
Fresh Weight (W_0) (g)	75	26.6	1.4	24.6 -29.9
Lay to Pip (LP) Interval (days)	50	28.2	1.4	25-33
Pip to Hatch (PH) Interval (Days)	50	2.1	0.5	1-4
Incubation Period (days)	50	30.3	1.5	27-35

Figure22. Table showing Egg development

11.6 Brooder Types/Design

Bird brooders are extremely easy to use and keep clean. They are of a simple design and come in many shapes and sizes. The basic use of a brooder is to keep a required temperature at a constant level while chicks are being artificially reared.

The average size of a brooder is 40-65cm wide by30- 60cm long and 40-60cm high. This is so you can hold a number of birds within the area till old enough that they have most of their down/feathers and can keep their own body heat.

The advanced “Octagon Thermal Life Support Cabinet Brooder” created by Brinsea and “Harvey’s Parrot” small and large brooders are used all over the world, also by Priam, to raise larger bird chicks and recommended for birds of Prey.

(www.robharvey.com/**incubators**.htm)

With the use of 3 brooders it increases the accuracy of the temperature within the enclosure but also as the Owlet grows so does the surrounding environment. Each brooder is set to a certain humidity and temperature and changes when required.

11.7 Brooder Temperatures

Humidity and Temperature control play a major part in the first stage of raising Owlets. For the first few days after hatching the temperature required is quite high but can be reduced several degrees each day.

Use behaviour cues to determine whether the room temperature is correct; cold chicks will huddle together and cry, hot chicks pant, mover away from one another and cry another different sound.

(Debra Bourne)

By the age of 20 days most chicks can sustain their own body temperature and are better off if housed with more than one other chick as this increases the probability of the chicks keeping their own temperatures.

11.8 Diet and Feeding Routine

As Barn Owls are known for asynchronous hatching, their chicks will be of all different ages and sizes. So designing a feeding routine can be quite difficult compared to most birds. Depending on the size of the Owlet you should generally feed for the first time between 4, 6, or 8 hours after hatching. The basic food to begin feeding an Owlet with is finely chopped pinkie mice.

Once the food has been swallowed you must check to see if the chick's digestive system is working correctly, meaning to wait for feces to appear. When this does occur you may then feed the chick an average of 2-4 pieces of pinkie mice every 2-3 hours.

Given that Barn Owls don't have a crop like most bird species it is difficult to tell when a chick requires food, so checking for healthy feces and the stomach region before next feed is recommended. Do not over feed your Owlet as this can kill them.

(Barn Owl Trust)

Food which can be fed to a Barn Owl Chick at different stages of rearing:
-pinkie mice
-pinkie rat
-adult mouse
-adult rat
-day old chicken
-week old chicken

The mentioned bellow feeding routine is used by Debra Bourne and her bird of prey species.

Day 1-6 - Once the chick has hatched it does not require food immediately but will within the first 4-6 hours. Muscle meat from a day old chicken or finely chopped pieces of pinkie mice.

Day 7-13 - As weight is starting to increase you can provide the Owlet with more variety from the day old chicken including bones and skin but still not the yoke sake.

Day 14-27 – Larger pieces of day old chickens can be provided as well as vitamin and mineral supplements added.

Day 28-42 – whole day old chickens or chopped quail and week old chickens as well as the provision of vitamins and minerals

Day 43-63- Close to fledging so should be eating whole carcasses of week old chickens

If feeding bones, fur and all parts of the mice pinkies and later on whole mice, no supplements will be required to be fed to a Barn Owl chick as the captive diet reflects what most adult Owls would feed their young naturally.

11.9 Specific Requirements

As Barn Owls and most Birds of Prey young are relatively active they are quite common to Spraddle-leg. A common condition affecting hand reared birds which can easily be prevented with the correct bedding inside a brooder. Towels or old clothing can be used so the birds have a good footing when moving around the brooder.

"Spraddle-leg or splay leg is a condition of immature birds in which abnormal lateral forces on the legs causes the long bones (femurs) and sockets of the upper leg (acetabula) to distort and bend outward or sideways. Both legs are usually affected. The cause of this condition is a nesting area or container, which is too slick for the bird to grasp well. Lack of adequate or appropriate bedding in the nest box also causes this condition, as will too rapid a growth rate in overfed, hand-reared birds."

(Dr Hines, http://www.2ndchance.info/)

If a problem does you can, recommended by the Birds of Prey Foundation "gently hobbled the feet together in a normal position using Vet rap, which is comfortable, soft and flexible. The birds are not unbalanced by this treatment because they are usually not standing yet. By the time they wanted and needed to stand, the problem was resolved."

11.10 Pinioning Requirements

Pinioning or wing clipping is not recommended for any Owl species. It involves surgically removing the pinion joint, the joint of a bird's wing farthest from the body, to prevent it from flight. This can be however a recommendation by some of birds held in captivity where public has constant access to the enclosure like at the Australian Reptile Park.

We have not actually preformed this procedure on one of our Barn Owl s but as our Bird of Prey exhibit is a walk through some of our birds have their wings clipped. This is to reduce the risk of injury to animal and public as it keeps the birds from over flying and away for the public's reach.

(Brendan Cook, pers.com)

11.11 Data Recording

There are many stages and categories throughout artificially rearing a Barn Owl chick, where records are needed. These areas are shown in the following table.

Incubation	**Identification**	**Development**	**Diet**	**Behaviour**
-egg length -egg breadth -egg weight loss -lay to pip -pip to hatch -incubation period	-parents -sex -birth/age -colouring	-size -weight -height -wingspan	-how much -how often -what type -when feed -fecal/pellet count	-social/playful -imprinting -aggressive -abnormal -sexual

All of the mentioned above and more can be recorded in daily diaries, keeper diaries, specific data sheets, computer records, ISI records and many more. The reasons for recording this information could be for future reference, breeding facilities, person knowledge, conditioning, and so on.

11.12Identification Methods

Barn Owls lay white, spotless eggs around 43mm long and 33mm wide with an average weight of 21g. They should be in a clutch of around 3-5 eggs and all at different stages of incubation.

(Taylor,2004)

Figure23. Different types of Prey Bird eggs from left to right.
Golden Eagle, Buzzard, Red Kite, Osprey, Marsh Harrier, Montagues Harrier, Hen Harrier, Sparrow Hawk, Peregrine, Merlin, Kestrel, Hobby, Tawny Owl, Barn Owl, Long Eared Owl, Short Eared Owl, Little Owl.

Once hatched, Barn Owl chicks are not like any other hatchlings. They are not cute! Barn Owls can usually be identified by their obvious facial disc but also the edges of their eyelids are always brown, as said by the Barn Owl Trust. When hatched they are covered with a soft, fluffy down. Once 10-12 weeks of age they are fully feathered and look exactly as adult Barn Owls except with more brown spots on chest.

11.13Hygiene

Poor hygiene is the easiest way to kill a Barn Owlet. When young they have poor immune systems and any infection usually leads to death. To prevent this basic hygiene is needed to be kept at a high standard as well as extra cleaning of certain utensils. All areas where the Owlets are housed should be cleaned daily, as these places are the highest causes of bacteria and infections from the fecal and pellet matter.

Sanitizing and sterilizing of all surfaces and equipment before and after use is need. Sterilization should last for a minimum of 10min or to a maximum of an entire day and many different chemicals can be used.

(Tim Folkner, pers.com)

The following equipment should always be cleaned before artificially rearing a Barn Owl:
-incubator
-brooder
-tongs
-gloves
-Scales
- Tongs
-stainless steel feeding bowls
-feeding spoons
-measuring cups
-measuring spoons
-thermometer
-chopping board
-blender
-kettle

11.14 Behavioural Considerations

When considering to artificially rear a Barn Owl you need to take into account that these birds are normally in the nest right up until they are ready to fly, at around nine weeks of age, so caring for them is a long term event as mentioned by the Barn Owl Trust.

Barn Owls are known for the unique playful behaviour they display when at a young age. This is needed to be encouraged if being reared by itself so the use of toys, extra keeper interactions or another bird of prey species should be housed with them. If being reared in a group make observations of when this behaviour is present for further studies as this information is not covered in detail.

These birds are also known for their ability to hunt without sight. Persuading the chicks to find their food in that manor will help if the birds are to be released in the future as the parent Barn Owls are the usual teachers of this event. Even if the chicks are not to be released teaching each and every Owlet to find its food themselves is required.

(Debra Bourne)

11.15 Use of Foster Species

Most other Birds of Prey species will not adopt other chicks as their own if they have not experienced the reproduction period themselves. In saying this there has been events where foster parents of the same species has occurred (AdoptaBird.Org) where an adult Barn Owl took on a couple of chicks and raised them as her own. This usually occurs when chicks have been handed in from the wild.

(World Bird Sanctuary)

11.16Weaning

Being unique with asynchronous hatching, keepers can begin weaning Barn Owl chicks from 3-6 weeks of age depending on when hatched as this is usually the fledging age of the birds. Once at this age the birds should be able to find and consume their prey on their own.

Throughout the rearing period the types of food fed to the Owlets will constantly be changing but at the age of fledging the chicks should be getting fed 1-2 day old chickens daily. When changing from one food species to another use the follow method which is conducted by keepers at the Australian Reptile Park with pinkie mice and day old chickens. Inter-grade one piece of day old chick to the amount of pinkie mice fed. Then increase the amount of day old chickens fed daily while reduce the amount of pinkie mice until no mice pieces are left and they are consuming only day old chickens.

To ensure the chicks are feeding on their own and know how, start reducing the amount of food you actually feed them and place the excess food around the enclosure they are in. if the food is not there the next time you check it should mean they have found and consumed it. Repeat the process until you are no longer hand feeding the birds and only placing it around the enclosure.

(Brendan Cook, pers.com)

11.17Rehabilitation Procedures

To rehabilitate an Owl can mean to care for after an injury but is usually when an animal is to be released. To release a captive bred or housed Barn Owl is not highly recommended unless it is part of a special breeding and release program. Many wild Barn Owls on the other hand are constantly being handed in with injury or being impounded from illegal owners/sellers.

The procedures used to rehabilitate an injured Owl are to:
-Recording and identification the bird – According to the Barn Owl Trust "the exact finding place and circumstances must be recorded. The lack of this information will almost certainly affect the final choice of release place/method and this decision will have a strong influence on the bird's chances of survival." Next the age is determined of the bird so comparisons of weight and conditions can be made.
-Initial Assessment – Immediate judgment of whether to put down or care for the Owl is required. This is not an easy task as it is usually difficult to tell if the Owl will survive. After the decision to care for the bird is made, the need for or for not any veterinary involvement is to be looked at.
-First aid and treatment - often involves treatment by vet or keeper of one of the following:
-shock
-de-hydration
-open wounds
-fractured wing
- leg fracture
-need for antibiotics
-infected eyes

Release- depending on the extent of the injury the Owl could be in your care for 1-60days. Appropriate housing and care is required until release can occur. Some release method are:

-Returned to nest or fostered in – chicks which have fallen from the nest usually obtain no injury so after the once over the chicks can be placed back into their original nest. If the nest is empty some can be fostered-in to a different nest with young of a similar age but this does not always work so artificially rearing will occur till old enough to be released.

- Young brood release- As study shows by the Barn Owl Trust this method involves "placing one or (usually) more nestling Barn Owls in a nestbox in an area of suitable habitat and placing food in the box every evening. The birds are not shut in and are only restrained by their own underdevelopment. As they grow and become more mobile the natural pace of their own development governs the speed of their release."

-Cold (unsupported) release- this method is to be only used on adult birds of complete health and have only been held in care for less than a day. It involves taking the Owl back to where it was found and slowly releasing it, from a keepers grip, so it can take flight. No other interaction is made once the bird has left.

-Slow release- the enclosure door of where the bird is being housed is left open for a certain period so the bird can leave whenever it is healthy enough to do so. Door will remain open for around a 2 week period after the Owl has left and food will be placed within the enclosure daily. Some nights the door will be shut so the Owl does not depend on the artificial feeding and after a certain period not opened again.

(The Barn Owl Trust)

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Societies

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ISIS
Animal Transportation Act
Encyclopedia of Life
EUNIS
Fauna Europaea
Global Biodiversity Information Facility
DPI

Nature Serve
Species 2000
UNEP World Conservation Monitoring Centre
World Wildlife Fund
ARAZPA

Personal Comments

Graeme Phipps
Jackie Salkeld
Brad Walker
Tafe teachers
Richmond TAFE

Brendan Cook
Keeper of Mammals and Birds
Australian Reptile Park

Images

Figure 1- Alana Sieders

Figure 2- Alana Sieders

Figure 3- http://www.boneclones.com/images/bc-153-set_web-lg.jpg
Last viewed: 7/6/10

Figure 4- http://en.wikipedia.org/wiki/File:Tyto_alba_dis.png
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Figure 5- Alana Sieders

Figure 6- Alana Sieders

Figure 7- http://www.barnowltrust.org.uk
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Figure 8- Alana Sieders

Figure 9- Alana Sieders

Figure 10- Alana Sieders

Figure 11- IATA
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Figure 12- http://www.allposters.com.au/-sp/Barn-Owl-on-Fence-Post-UK-posters_i4014009_.htm
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Figure 13- Raptors in Captivity by Lori R. Arent 2007
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Figure 14-
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Figure 15- http://www.911wildlife.com/images/barn-owl-nest-box-photo-by-.jpg
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Figure 16 - http://www.wildaboutbritain.co.uk/gallery/files/1/0/6/6/5/chicks.jpg
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Figure 18- http://www.wildwingsrehab.org/photos/2007-10-30_03.jpg
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Figure 19-
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Figure 20- http://www.brinsea.com/
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Figure 21- Alana Sieders

Figure 22- Raptor Research Vol. 20 (3/4); 108-112
Last viewed: 7/6/10

Figure 23- www.replica-eggs.co.uk/
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14 Glossary

Adaptation- evolutionary process whereby a population becomes better suited to its habitat
Anteriorly- forward facing
Asymmetry- out of line or not equal
Asynchronous hatching- occurring at different times
Chemical restraint- the use of sedatives or anesthetics to control an animal's activity and thereby allow certain procedures to be done with minimal stress to the animal.
Clutch- a number of birds hatched at the same time
Conditioning- training of an animal
Copulation- sexual intercourse
Courtship- the way two animals attract each other to mate
Enrichment- act of making fuller or more meaningful or rewarding
Facial disc- the concave collection of feathers on the face of some birds
Fledging- A young bird which has just developed its flight feathers and is learning to fly
Furnishing- the objects that occupy an interior space
Identification- process of assigning a pre-existing individual or class name to an individual organism
Incubation- sitting on eggs so as to hatch them by the warmth of the body
Juvenile- young newly hatched bird
Mate Guarding- an individual remaining near its mate to prevent others from copulating with the mate
Metabolic rate-The rate at which an organism transforms food into energy and body tissue
Monogamous- having only one sexual partner at any one time
Mortality- death rate
Nocturnal- active during the night
Nomenclature- A set of names or terms
Owlet- A young owl
Pellets- mass of undigested parts of a bird's food that some bird species occasionally regurgitate
Physical restraint- restrict movement of an animal's body by the use of physical force
Preening- grooming
Roost- perch, sit or sleep on a surface
Sight barriers- a visual item that blocks other areas out
Spatial Requirements- a certain amount of area required for an animal to be housed within
Solitary- by one’s self
Substrate- ground cover of an area
Territorial- any sociographical area that an animal of a particular species consistently defends against conspecifics
Ultrasonic levels- having frequencies above those of audible sound
Zoonoses- infectious disease that can be transmitted from animals, both wild and domestic, to humans or from humans to animals

15 Appendix

i) MSDS (www.solopak.com.au/)

BLEACH

MSDS:	Rev 2 Date: 06 August 2003
Domestic Trade Name:	Bleach
Other Names:	Hypochlorite Solution, Bleach Solution, Hypo.
Manufacturers Product Code:	None Allocated
UN Number:	1791
Dangerous Goods Class:	8
HAZCHEM Code:	2X
Poison Schedule Number:	None Allocated
Use:	Bleaching Agent, Disinfectant

2.2.1 Section 2 Physical Description / Properties

Appearance:	Clear, green-yellow liquid having a chlorine odour. Bleach is strongly corrosive and a moderate oxidising agent.
Boiling Point or Melting Point:	110^{o}C (15% available Chlorine)
Vapour Pressure:	Not Available
Specific Gravity:	1.1
Flash Point:	Not Available
Flammability Limits:	Not Available
Solubility in Water:	Aqueous Solution

2.2.2 Section 3 Other Properties

pH of Concentrate:	12 (approximately)

2.2.3 Section 4 Ingredients

Chemical Name:	**CAS Number:**	**Proportion:**
Sodium Hypochlorite [NaOCl]	7681-52-9	10% weight / volume
Sodium Hydroxide [NaOH]	1310-73-2	0.8%
Water	-	Remainder

2.2.4 Section 5 Health Effects

Acute:	Corrosive and irritating if swallowed or ingested. Dangerous when in contact with the eyes.

Swallowed:	Severe internal irritation due to corrosive effect.
Eye:	Severe irritation and burns.
Skin:	Irritation and burns.
Inhaled:	Irritation of respiratory tract, resulting in coughing and breathing difficulty caused by chlorine fumes.
Chronic:	If condition persists, seek further attention.

2.2.5 Section 6 First Aid

Swallowed:	Wash out mouth with water and give water to drink. Do not induce vomiting.
Eye:	Irrigate immediately with water for 15 minutes and seek medical attention.
Skin:	Wash with large amounts of water. Remove affected clothing and wash underlying skin.
Inhaled:	Remove from exposure. Keep warm and at rest.

2.2.5.1 Section 6B First Aid Facilities:

Advice to Doctor:	Treat symptomatically.

2.2.6 Section 7 Precautions for Use

Exposure Standard:	There are no exposure limits available.
Engineering Controls:	Use in open or well ventilated areas.
Personal Protection:	Wear PVC gloves and chemical goggles. An acid resistant respirator to AS 1716 is recommended if spray mists are produced during use. It is recommended that a shirt with long sleeves and long trousers be worn. Always wash skin and clothing after using this product.
Flammabity:	Non-flamable.

2.2.7 Section 8 Safe Handling Information

Storage and Transport:	This product is classified as non dangerous according to the ACTDG. Store in plastic containers in a clean, dry, cool, well ventilated place away from foodstuffs, other oxidising agents and acids. Store and transport in an upright container. Containers must be carefully vented to release any pressure build-up.
Spills and Disposal:	Minimise leak and or contain spills. Collect as much of the spillage as possible. Keep pH of the remaining spilled solution above 7.0 and dilute it with large amounts of water. Avoid contact with acids. Add soda ash to the cleanup liquid to minimise release of chlorine gas during cleanup.

Fire / Explosion Hazard	This product is not flammable under the conditions of use and does not support combustion. The product is stable and will not polymerise. It is incompatible with strong acids, metals, metal salts, peroxides and other oxidising agents and with reducing agents. It decomposes on exposure to heat or light. Upon heating or upon contact with acids, this product may emit toxic fumes, including chlorine gas which has a TLV of 1 ppm; 3 mg/m^3 – peak exposure. Source: NOHSC (under review). If the product is involved in a fire, fire fighters should wear self-contained breathing apparatus as well as PVC gloves and chemical goggles. Fire fighters should fight any fires with dry chemical, carbon dioxide, vaporising liquid or foam extinguishers or water delivered in a fine spray or fog if available.

2.2.8 Section 9 Other Information

Sodium hydroxide solution is chemically sensitive to:	Acids, Temperature, Metals and Aging

ii) Barn Owl distribution (Taylor, 2004)

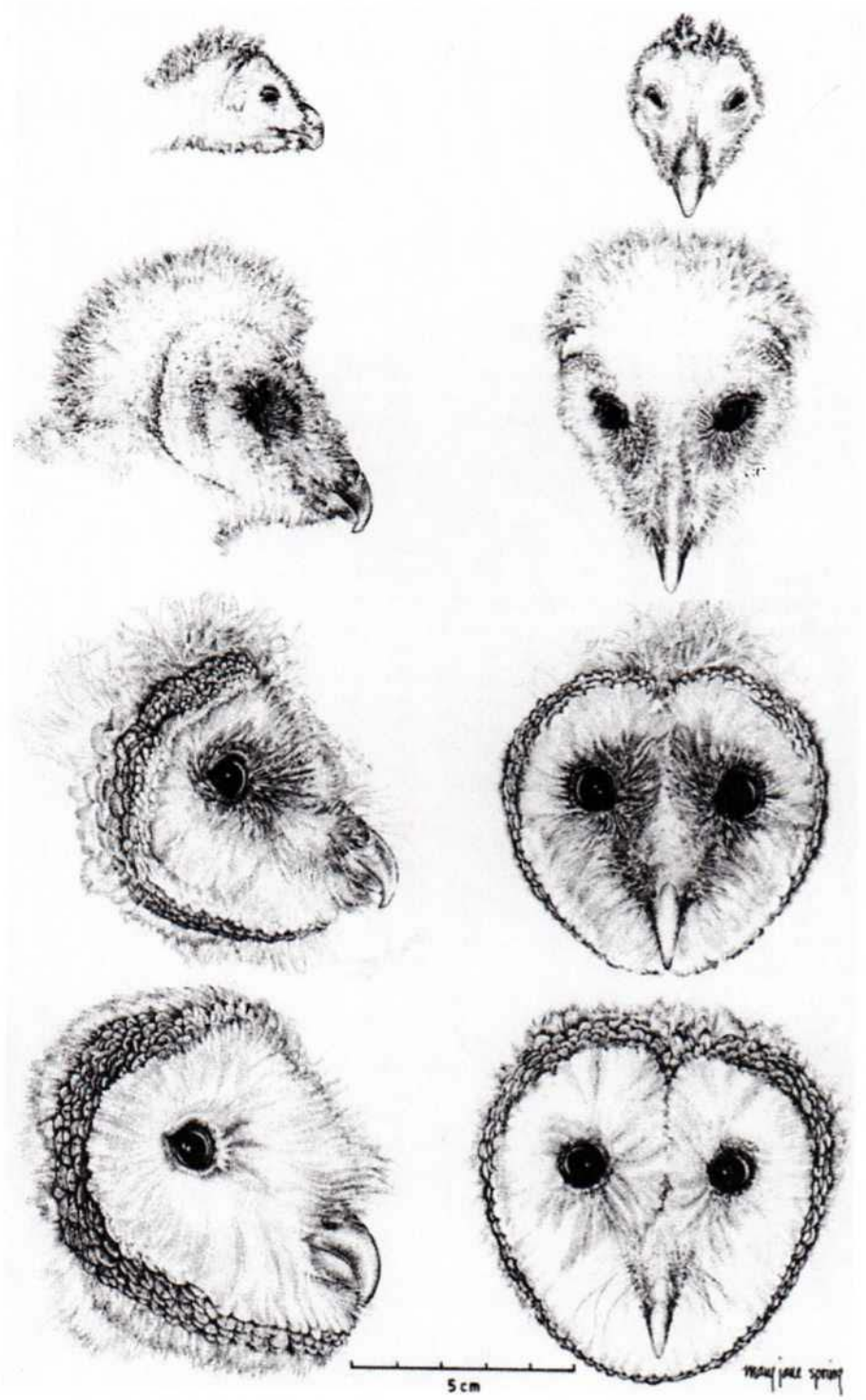
Fig. 2.1. Distribution of barn owl subspecies. 36 subspecies have been described, although some confusion exists over the status of some. Precise details of distribution are uncertain for many and the map is intended as a general guide. **1.** *T. a. alba* (Scopoli): UK, Ireland, Channel Is., Spain, Portugal, west and south France, Italy, Yugoslavia, Greece, N. Africa. **2.** *T. a. guttata* (Brehm): Denmark, Netherlands, Belgium, Germany, eastern Europe. Hybrid zone with *alba* in eastern France/western Germany. **3.** *T. a. schmitzi* (Hartert): Madeira. **4.** *T. a. gracilirostris* (Hartert): Canary Is. **5.** *T. a cinesti* (Kleinschmidt): Corsica, Sardinia. **6.** *T. a. detorta* (Hartert): Cape Verde Is. **7.** *T. a. affinis* (Blyth): Africa, south of Sahara. **8.** *T. a. thomensis* (Hartlaub): Sao Thome'. **9.** *T. a. hypermetra* (Grote): Comoros Is., Malagasi. **10.** *T. a. erlangeri* (Sclater): Saudi Arabia, Oman, Gulf states north to Lebanon, Syria, Iraq, Iran. **11.** *T. a. stertens* (Hartert): India, Pakistan, Bangladesh, Sri Lanka, Assam, Sikkim, Nepal, Bhutan, Burma. **12.** *T. a. javanica* (Gmelin): Thailand, Burma, Indo-China, Malaysia, Indonesia, Java, Flores, Timor. **13.** *T. a. deseopstorfii* (Hume): Andaman Is. **14.** *T. a. sumbaensis* (Hartert): Sumbe Is. **15.** *T. a. everetti* (Hartert): Savu Is. **16.** *T. a. kuehni* (Hartert): Lesser Sunda Is., Flores to Timor; confusion possible with distribution of *javanica* and *everetti*. **17.** *T. a. meeki* (Rothschild and Hartert): south east New Guinea, Vulcan and Dampier Is. **18.** *T. a. delicatula* (Gould): Australia, Solomon Is. **19.** *T. a. crassirostris* (Mayr): Boang Is., Tanga Group, Bismark Archipelago. **20.** *T. a. interposita* (Mayr): Santa Cruz Is., Banks Is., northern New Hebrides. **21.** *T. a. lulu* (Peale): New Caledonia, south New Hebrides, Fiji, Loyalty, Tonga, Samoa, Society Is. **22.** *T. a. pratincola* (Bonaparte): North and Central America. **23.** *T. a. guatemalae* (Ridgeway): Panama to Guatemala. **24.** *T. a. lucayana* (Riley): Bahama Is. **25.** *T. a. furcata* (Temminck): Cuba. **26.** *T. a. niveicauda* (Parkes and Phillips): Is. of Pines, Cuba. **27.** *T. a. bondi* (Parkes and Phillips): Bay Is. (off Honduras). **28.** *T. a. glaucops* (Kaup): Tortuga and Hispaniola, West Indies. **29.** *T. a. nigrescens* (Lawrence): Dominica, West Indies. **30.** *T. a. insularis* (Pelzeln): Lesser Antilles. **31.** *T. a. bargeri* (Hartert): Curacao Is. (off Venezuela). **32.** *T. a. contempta* (Hartert): Columbia, Ecuador, Peru, Venezuela. **33.** *T. a. subandea* (Kelso): parts of Columbia, Ecuador. **34.** *T. a. hellmayri* (Griscom and Greenway): Guianas to Amazon. **35.** *T. a. tuidara* (Gray): Brazil (south of Amazon), Chile, Argentina. **36.** *T. a. punctatissima* (Gray): Galapagos Is.

iii) Table showing development of chicks (The Condor 104;885-890)

Age (weeks)	No. of individuals	Mass (g)	Body length (cm)	Bill length (cm)	Bill width (cm)	Wingspan (cm)	Wing length (cm)	Tail length (cm)	Tarsus length (cm)	Middle claw length (cm)
0[a]	4	14.8 ± 2.4	8.6 ± 0.1	0.5 ± 0.0	0.5 ± 0.1	8.2 ± 0.3	0.9 ± 0.1	0.1 ± 0.1	1.9 ± 0.5	0.2 ± 0.1
1	79	38.9 ± 2.1	10.7 ± 0.3	0.8 ± 0.0	0.6 ± 0.0	10.9 ± 0.5	2.2 ± 0.1	0.4 ± 0.1	2.2 ± 0.1	0.4 ± 0.1
2	64	112.9 ± 4.7	15.7 ± 0.4	1.3 ± 0.0	0.8 ± 0.0	21.5 ± 1.2	5.2 ± 0.5	0.9 ± 0.1	3.1 ± 0.2	0.8 ± 0.1
3	52	224.9 ± 8.9	20.2 ± 0.5	1.7 ± 0.1	1.0 ± 0.0	33.3 ± 1.6	7.7 ± 0.7	1.9 ± 1.1	4.4 ± 0.2	1.2 ± 0.1
4	40	318.2 ± 12.7	22.9 ± 0.6	1.9 ± 0.1	1.1 ± 0.2	44.0 ± 2.1	10.8 ± 1.0	3.1 ± 0.3	5.2 ± 0.3	1.4 ± 0.1
5	50	410.9 ± 11.6	26.1 ± 0.6	2.2 ± 0.1	1.1 ± 0.2	57.4 ± 2.4	15.3 ± 0.8	5.4 ± 0.4	6.3 ± 0.2	1.9 ± 0.1
6	49	435.8 ± 10.2	30.2 ± 0.7	2.5 ± 0.1	1.2 ± 0.0	69.9 ± 2.6	21.4 ± 1.0	7.9 ± 0.4	7.4 ± 0.2	2.1 ± 0.1
7	33	447.0 ± 6.8	31.6 ± 0.6	2.5 ± 0.1	1.3 ± 0.0	77.4 ± 2.0	21.9 ± 1.0	8.7 ± 0.5	7.6 ± 0.3	2.2 ± 0.1
8	19	434.5 ± 8.1	33.2 ± 0.6	2.7 ± 0.1	1.4 ± 0.0	78.7 ± 5.1	22.1 ± 1.2	10.1 ± 0.5	7.7 ± 0.3	2.3 ± 0.1
9	9	437.0 ± 10.9	34.2 ± 0.6	2.7 ± 0.1	1.4 ± 0.0	86.2 ± 10.2	22.8 ± 0.8	11.2 ± 2.1	8.0 ± 0.4	2.4 ± 0.2
Adult	20	406.9 ± 8.5	36.7 ± 0.5	3.4 ± 0.3	1.5 ± 0.1	90.0 ± 1.0	29.4 ± 0.6	12.7 ± 0.2	8.2 ± 0.1	3.1 ± 0.1

[a] Immediately after hatching.

iv) Facial Ruff (The Auk 105;699-705)



v) Worming Material

WORM OUT GEL for birds - 50ml (1.7 floz)

Active Constituents: 20g/L Praziquantel, 20g/L Oxfendazole

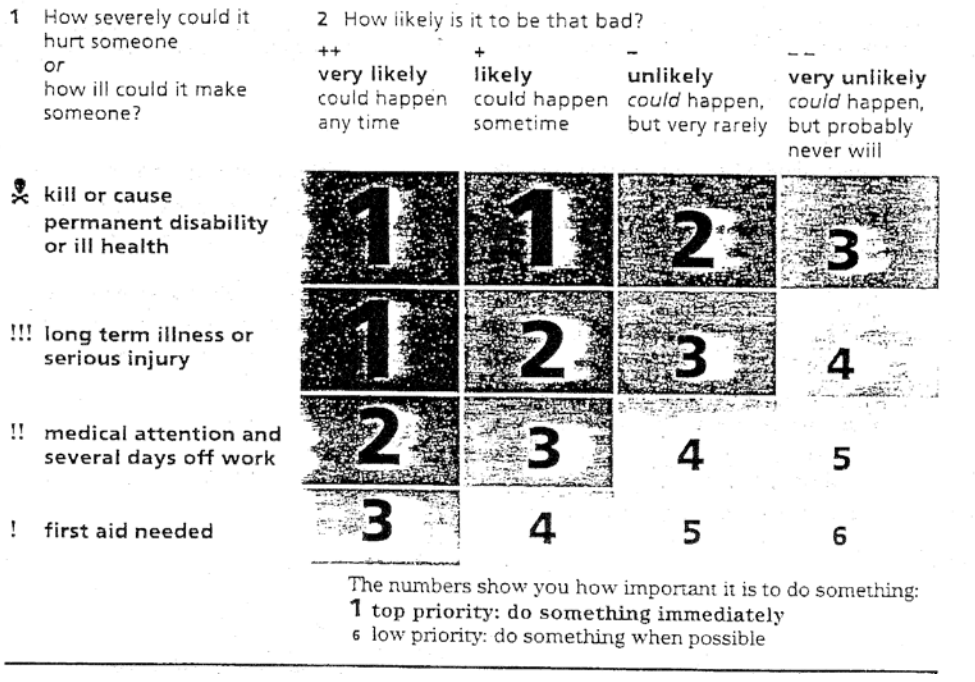
A soluble bird wormer, Wormout Gel for birds contains Oxfendazole and Praziquantel two of the safest wormers available and their combination covers all the major worm species found in birds including thread worm, tapeworm, roundworm, caecal worm, and hookworm.

Directions:
All Aviary Birds - add 1ml (0.034 floz) to 80ml (2.72 floz) of water. Supply medicated water for 2 days. Remove other sources of water during treatment. Aviaries should be treated at least four times a year.

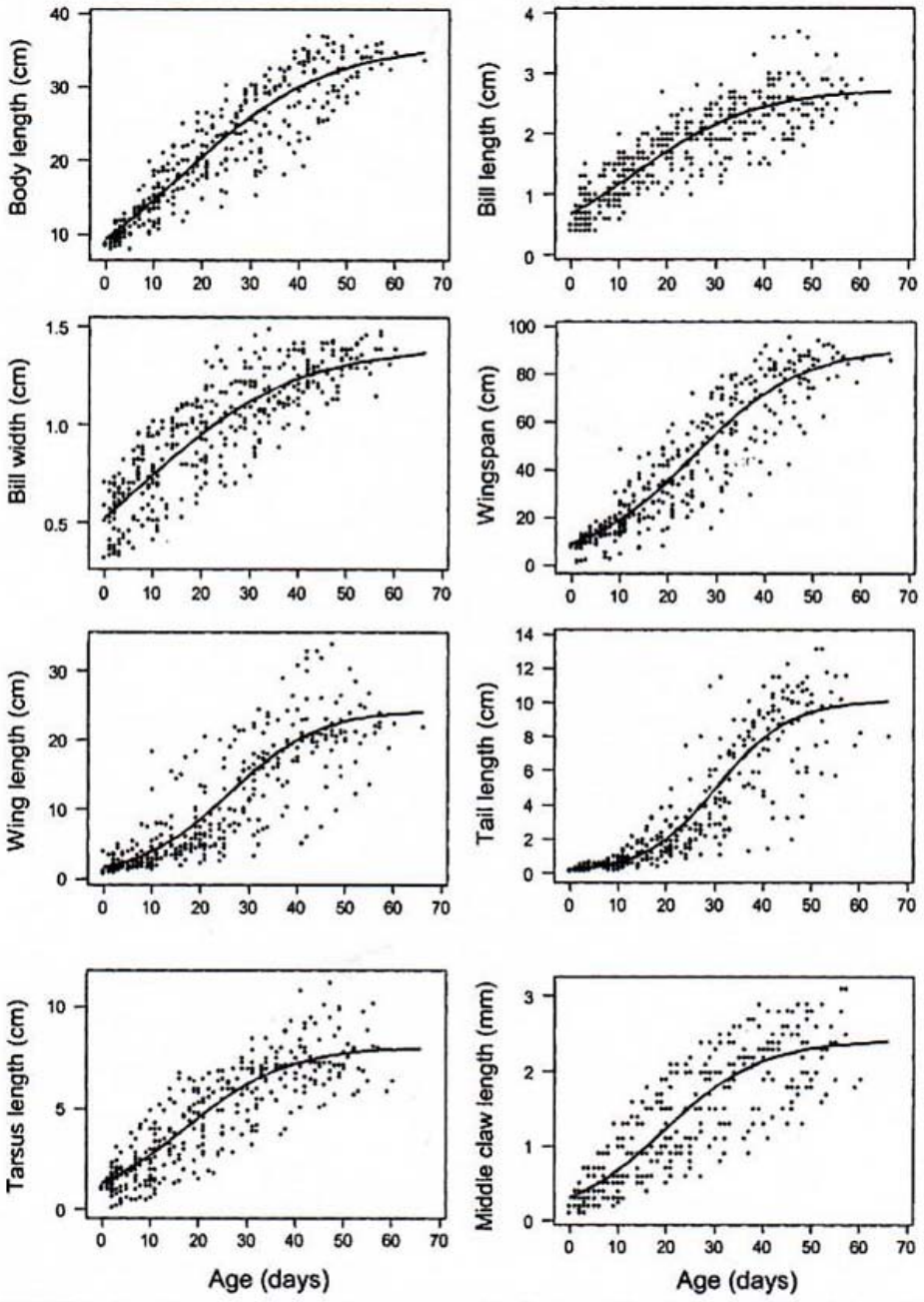
Packaged in a convenient pump action bottle

Storage:
Store below 30°C (room temperature)

vi) HAZPAK graph



vii) Development of Owl chicks from hatching to fledging (The Condor 104;885-890)



viii) IATA container requirements

CONTAINER REQUIREMENT 20

The illustrations shown in this Container Requirement are examples only. Containers that conform to the principle of written guidelines for the species but look slightly different will still meet the IATA standards.

Applicable to birds of prey (including other birds of prey, n.o.s.):

Buzzard species	Hawk species
Caracara	Kestrel species
Condor species	Kite species
Eagle species	Osprey
Falcon species	Owl species
Gyrfalcon	Vulture species
Harrier	

STATE VARIATIONS: AEG-01, AEG-02, CAG-01, GBG-01/02/04/06, USG-01

△ OPERATOR VARIATIONS: CO-03/04/05/09, DL-07, DL-08, EK-02, EK-03, EK-06, EK-08, GF-02, IR-01, IR-02, NW-02, QF-01, SK-01

8

20

1. CONTAINER CONSTRUCTION

Materials

Wood, hardboard (masonite), non–toxic plastic, fibreglass and synthetics, weld mesh and strong plastic mesh.

Principles of Design

The following principles of design must be met in addition to the General Container Requirements outlined at the beginning of this chapter.

Size

The normal habits and necessary freedom of movement of the bird species involved will determine the size.

The height of the container must be sufficient to allow the bird to just be able to stand in a normal position. No head clearance is required for these species because they tend to jump up forcefully if permitted to do so.

The container or compartment of a container must be wide enough so that the bird can turn round without stretching its wings to their full extent.

Multiple–compartment containers can be used provided there is sufficient ventilation.

Frame

A solid wood frame, either screwed or nailed and glued with a non–toxic glue, located on the outside.

Sides

The sides must be either of wood or hardboard. The front must be double with the outer layer made of weld mesh and the inner layer of a strong plastic mesh with a distance of 4–5 cm (1½–2 in) between them.

The interior of the container must not have sharp edges or protuberances on which the birds can injure themselves.

Handling Spacer Bars/Handles

Must be provided as shown in the illustration on four sides of the container.

Floor

Solid and leak–proof, it can be covered with carpeting in order to allow the bird to get a firm foothold.

Perches

These species can travel safely standing on their feet but small raptors prefer to be off the ground and a wooden block, firmly fixed to the bottom of the container will allow it to feel secure.

Stocking Density

One bird per container or compartment of a container.

Roof

Must be padded with a soft non–destructible padding.

Door

A vertical or horizontal sliding or hinged door must be constructed to cover the front plastic mesh of the container and it must have at least two observation openings of approximately 5 cm (2 in) in the upper third.

Ventilation

Meshed ventilation openings, approximately 2.5 cm (1 in) in diameter must be provided at approximately 5 cm (2 in) distance apart along all four sides of the container. There must be a line of openings near the base large enough to allow some light into the container in order that the bird can see well enough to eat while remaining in semi–darkness. The openings must be covered by external wiremesh but care must be taken that there are no sharp edges present within the container, all edges must be covered with a smooth material.

Feed and Water Containers

Water containers must be provided, they must be accessible for refilling.

These birds feed from the floor so do not require food troughs.

Soldered tin must never be used.

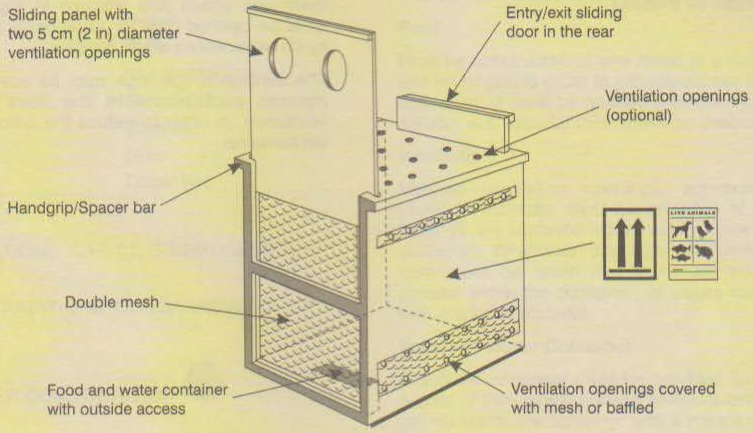
Continued..

Rigid Plastic Pet Containers
(see Container Requirement 1)

A modified rigid plastic pet containers is suitable for use. The following modifications must be made:

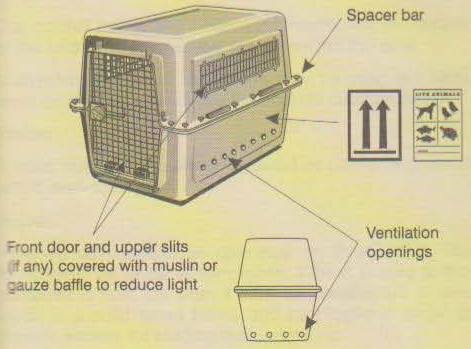
- a fixed foothold blocks or non–slip floor lining must be fixed appropriately to the floor of the container;
- non–destructible padding must be fixed to the roof;
- the doors and ventilation openings must be baffled with a suitable material to permit air to enter but keep the container in semi–darkness;
- an observation opening/flap into the container must be present;
- a suitable water container must be fixed inside the container with a means of refilling;
- labelling must conform to IATA standards for Live Animals;
- if a container has wheels, they must be removed or rendered inoperable.

EXAMPLE:



Note:
Food and water troughs must be provided.

TYPICAL RIGID PLASTIC CONTAINER



2. PREPARATIONS BEFORE DISPATCH (see Chapter 5)

It is advisable that shippers must ensure that wild birds have been held after capture for approximately thirty days before dispatch to overcome the stress of capture and allow them to become accustomed to confinement and their new diet. It is of the utmost importance that all birds be given, under close supervision, an opportunity to drink an ample supply of water before departure.

These species are shipped one per compartment of a multiple container or one per container. The only exception to this rule is when nestlings are being moved for a specific reason which must be cleared with the relevant authorities at the time of reservation.

Falcons and hawks — the bird must be given its normal food prior to dispatch which must be sufficient up to 24 hours. The tail feathers of these birds damage easily. Adhesive brown paper strips (not plastic tape) bound around the tail feathers for protection, which can be soaked off at the end of the journey, have been used successfully.