

# EAZA Best Practice Guidelines

## Black-winged Myna - complex – *Acridotheres melanopterus*

(*Acridotheres m. melanopterus*,

*Acridotheres m. tricolor* and

*Acridotheres m. tertius*)



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**Mandai**  
WILDLIFE GROUP



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### Preamble

Right from the very beginning it has been the concern of EAZA and the EEPs to encourage and promote the highest possible standards for husbandry of zoo and aquarium animals. For this reason, quite early on, EAZA developed the “Minimum Standards for the Accommodation and Care of Animals in Zoos and Aquaria”. These standards lay down general principles of animal keeping, to which the members of EAZA feel themselves committed. Above and beyond this, some countries have defined regulatory minimum standards for the keeping of individual species regarding the size and furnishings of enclosures etc., which, according to the opinion of authors, should definitely be fulfilled before allowing such animals to be kept within the area of the jurisdiction of those countries. These minimum standards are intended to determine the borderline of acceptable animal welfare. It is not permitted to fall short of these standards. How difficult it is to determine the standards, however, can be seen in the fact that minimum standards vary from country to country. Above and beyond this, specialists of the EEPs and TAGs have undertaken the considerable task of laying down guidelines for keeping individual animal species. Whilst some aspects of husbandry reported in the guidelines will define minimum standards, in general, these guidelines are not to be understood as minimum requirements; they represent best practice. As such the EAZA Best Practice Guidelines for keeping animals intend rather to describe the desirable design of enclosures and prerequisites for animal keeping that are, according to the present state of knowledge, considered as being optimal for each species. They intend above all to indicate how enclosures should be designed and what conditions should be fulfilled for the optimal care of individual species.

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## Summary

This Best Practice Guideline aims to provide guidance on the husbandry of the Black-winged Myna *Acridotheres melanopterus* Complex.

Black-winged Myna is a complex on the radar of the IUCN SSC Asian Songbird Trade Specialist Group due to the high level of trade in the species within the South-East Asian region and the small and localised wild populations. Previously identified as three separate species, these have now been lumped as a single species, the complex therefore comprises three Conservation units, Black-winged Myna *A.m. melanopterus*, Grey-backed Myna *A. m. tricolor* and Grey-rumped Myna *A.m. tertius*. This lumping has led to a downgrade of the IUCN status from Critically Endangered to Endangered. However, the level of threat remains high and there is an urgent need to safeguard the species and ensure a viable *ex-situ* population, both demographically and genetically.

The following Best Practice Guidelines provide valuable information on the husbandry of the species including breeding and veterinary considerations. As the species is mostly found in captivity in the South-East Asia region, the guidelines are based on the husbandry in a few conservation centres and bird parks in a tropical climate. Despite the additional considerations for wintering the birds, the husbandry in temperate climate does not differ much. Additionally, there is few relevant literature available for this species and this guideline will be updated should more publications become available.

As the EEP is currently working on the transfer of birds from in-country conservation centres to EAZA zoos, these Best Practice Guidelines provide a good framework for future holders.

## Acknowledgment

My thanks go to the Cikananga Conservation Breeding Centre Team who have worked intensively with the Black-winged Myna. They have gathered valuable data over the years, both in relation to captive breeding and releases. A special thanks to Bertie Ferns, from Cikananga Conservation Breeding Centre, David Jeggo from Cologne Zoo and Harriet Whitford from Durrell Wildlife Conservation Trust for proofreading the document.

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# Section 1: Biology and Field Data

## A. Biology

### 1.1. Taxonomy

Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Passeriformes
Family:	Sturnidae
Genus:	<i>Acridotheres</i>
Species:	<i>melanopterus</i> - Black-winged Myna

*Synonyms:* *Acridotheres (m.) tricolor* (previously Grey-backed Myna)  
*Acridotheres (m.) tertius* (previously Grey-rumped Myna)

*Acridotheres tricolor* and *A. tertius* were previously recognized as conspecific of *A. melanopterus* until they were separated into individual species and distinguished by the extent of grey and black coloration on their mantle, rump and flanks. However, recent genetic analyses have suggested that the difference of coloration is due to introgression from the Javan Myna *A. javanicus* and the three species have again been accepted into one complex (Sadanandan et al. 2020).

To promote clarity, these Best Practice Guidelines will use the three previous names (Black-winged Myna, Grey-backed Myna and Grey-rumped Myna) to distinguish the three subspecies.

Common name(s): Black-winged Myna, Black-winged Starling, Jalak putih (Indonesia)

### 1.2. Morphology

Birds within the Black-winged Myna complex present similar characteristics: the beak and legs are yellow and the skin around the eye is bare with yellow coloration that extends on the triangle shape behind the eyes. The wing feathers (remiges) and tail are black with white feather tips and the rest of the plumage is white.

Formerly recognised as only one species, briefly separated into three and consolidated once again, the morphological differences between the Black-winged Myna, the Grey-backed Myna and the Grey-rumped Myna lie in the different coloration of the scapulars, back, rump and flanks.

The Black-winged Myna is fully white on the scapulars, back, rump and flanks. The Grey-backed Myna has grey coloration on the scapulars and rump, while the Grey-rumped Myna has dark grey coloration on the scapulars and back and paler grey coloration on the rump and flanks.

A study done on Black-winged Myna in Cikananga Wildlife Centre suggests that the males are slightly bigger than the females (see next section). At fledging time, the juveniles are grey on the head, back and shoulders that changes to white at around 6 months old in captivity (4 months in the wild).



Figure 1: Black-winged Myna. © Anaïs Tritto



Figure 2: Grey backed Myna. © Boas Emmanuel



**Figure 3:** Grey-rumped Myna. © Pierre de Chabannes

## Biometric

Biometric data from 37 Black-winged Mynas (20 males and 17 females) has shown males to have consistently greater measurements in relation to body characteristics.

Data in mm	Beak length	Beak height	Beak width	Head height	Head width	Head length	Length tibia	Length tarsus	Diameter Tibiotarsus	Length wing	Body length	Tail length	Weight
<b>Male (N=20)</b>	22.1 ± 1.2	8.0 ± 0.5	8.2 ± 0.5	23.4 ± 0.9	21.9 ± 0.6	34.2 ± 1.4	43.7 ± 3.2	35.2 ± 2.8	5.1 ± 0.7	133.4 ± 3.2	245.8 ± 8.3	82 ± 4.6	93.3 ± 9.9
<b>Female (N=17)</b>	20.9 ± 1.1	7.8 ± 0.5	7.6 ± 0.5	22.7 ± 0.8	21.3 ± 0.4	33.2 ± 1.0	42.7 ± 2.9	32.9 ± 1.7	4.5 ± 0.3	127.0 ± 3.8	238.2 ± 4.8	79.2 ± 3.7	83.0 ± 7.7
<b>Statistical difference</b> (S: significant, NS: non significant)	S	NS	S	S	S	S	NS	S	S	S	S	S	S

**Table 1:** Biometric results of 37 Black-winged Mynas and the statistical difference between males and females

## 1.3. Vocalisation

The Black-winged Myna is a vocal bird, both when paired and when in larger social gatherings. Based on observation from released Black-winged Myna, they are mostly vocal in the early morning and late afternoon when they gather in their roosting area. Vocalisations emitted at social gatherings are made of high-pitched whistles or a harsh alarm call if there is a threat.

Vocalisation also plays a major role in the courtship display of the birds where both males and females stand next to each other and make a repeated “krr krr krr” with the crest erected and head bobbing.

## 1.4. Longevity

There is no information on the longevity of the species in the wild. Based on the data from the International Studbook, the oldest Black-winged Myna in captivity was 24 years old and the oldest breeding bird was 16 years old.

The generation time (average time between two consecutive generation) is 2.2 years, according to studbook data.

# B. Field Data

## 1.5 Conservation status / Zoogeography / Ecology

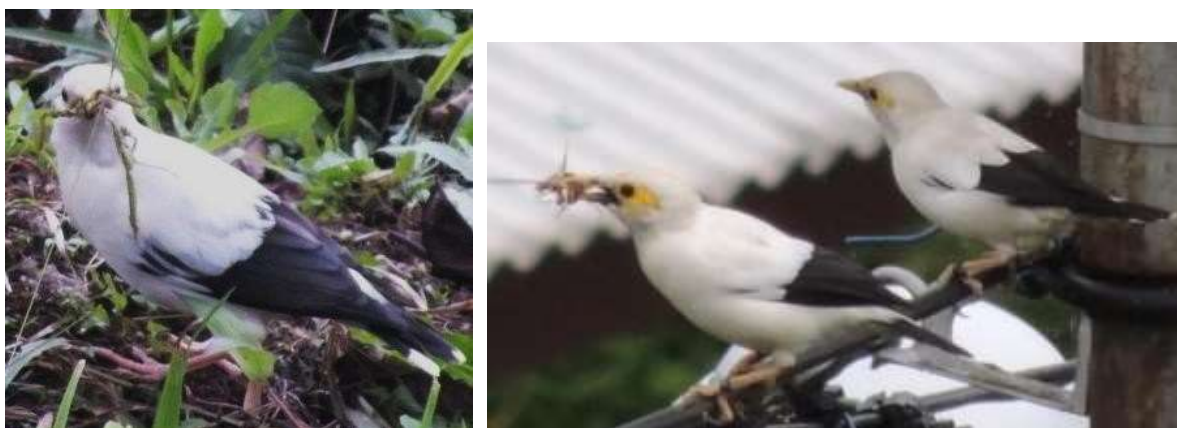
The Black-winged Myna complex is endemic to Java and Bali. Although the population size varies between the Black-winged Myna, Grey-backed Myna and Grey-rumped Myna, populations remain small and isolated from each other. This led to the complex being classified as Critically Endangered until 2021 and then as Endangered when the three species were merged into the Black-winged Myna Complex (BirdLife International 2021). The following describes the geographical range of each sub- species:

- The Black-winged Myna is endemic to West Java and formerly in Madura Island. Although this complex was once widespread, it survives in only 2 locations in West Java: Muara Angke Nature Reserve and Pulau Dua. Some sightings have been reported in Singapore although this must have been from previous escapes, and none have been seen recently (Eaton et al. 2015).
- The Grey-backed Myna is found in East Java, only sighted in two National Parks: Alas Purwo and Baluran. Like the Black-winged Myna, the sub-species was widely represented in the past in the plains, from the east of Gunung Bromo to the far east of Java (Eaton et al. 2015). Recent survey showed that the population might be increasing in Baluran National Park with some individuals living outside the savannah areas (Marsden 2017).
- The Grey-rumped Myna is endemic to Bali and some past records highlight its presence in Nusa Penida and Lombok Island, although this may have been from previous escapees. The range is now restricted to Bali Barat National Park and a single site in southern Bali (Eaton et al. 2015).



## 1.6. Diet and Feeding Behaviour

The three sub-species have a fruit-based omnivorous diet. The Black-winged Myna has been observed eating fruits of Tembusu (*Fagrea fragrans*), *Eugenia longifolia*, Mulberry tree (*Morus indica*), Caqui (*Manilkara kauki*), Stinking passionflower (*Passiflora foetida*) and *Strychnos lingustrina*. (Craig et al. 2018). In addition to this frugivorous diet, they have also been recorded regularly consuming small invertebrates such as beetles, cockroaches and mantids. The consumption of insects significantly increases during breeding season. The Black-winged Myna usually forages in trees and on the ground (grassland), in pairs or small flocks. There is no evidence of this species joining mixed-species flocks to forage. Although little information is available for the Grey-backed Myna and Grey-rumped Myna, it is believed their feeding behaviour is similar to the Black-winged Myna, although the species of fruits and insects may depend on the availability at the location. Grey-rumped Mynas are observed foraging for ectoparasites on the backs of cattle during the dry season when food is scarce (Squires & Marsden 2021).



**Figure 4:** Released Black-winged Myna catching a Praying Mantis and a Moth. ©Anaïs Tritto

## 1.7. Reproduction

Black-winged Mynas are monogamous, and their breeding season lasts from January to May in Java. They usually nest in holes high up in trees or rocks. Similar to other *Sturdinae* species, the Black-winged Myna is believed to build the exterior of the nest with twigs. They line the nest chamber with soft materials such as plant fibre and feathers. The clutch comprises 3-4 eggs which are plain sky-blue in colour. (Craig et al. 2018). Information from released birds show that chicks fledge at around 28 days and follow the parents for up to three months until they are fully independent. They then join or create juvenile social groups.



**Figure 5:** Juvenile Black-winged Myna about to fledge from one of the nestboxes provided at the release site in Java. ©Anaïs Tritto

## 1.8. Behaviour

There is not much data available on the behaviour of this species in the wild.

They are highly social, with large groups gathering to roost at night, while splitting into smaller numbers or pairs when foraging during the day. They are known to be sedentary but disperse seasonally depending on the fruiting season and food availability. This pattern was also observed for released Black-winged Mynas that moved to different foraging habitats depending on the tree fruiting seasons.

There is no evidence of Black-winged Mynas forming mixed-species flocks although they have been observed foraging on the same trees as Sooty-headed Bulbuls (*Pycnonotus aurigaster*) without disturbance. There is also evidence of released birds breeding next to the nest of Ashy Drongo (*Dicrurus leucophaeus*) and gaining benefit from the aggressive behaviour of this species towards potential predators, such as Black Eagle (*Ictinaetus malaiensis*). No information on mixed-species flocks is found for the Grey-backed Myna and Grey-rumped Myna in East Java and Bali.

# Section 2: Management in Zoos and Aquariums

## 2.1. Enclosure

### 2.1.1. Boundary

The aviary should be made of galvanised wire (ferrule or woven) mesh with a grid of 1cm x 1cm to avoid the entry of pests and predators such as rats, mice or snakes. The mesh can be painted in black to allow better visibility for the visitors. Knitted mesh should be avoided as the species likes to grab onto the mesh and can easily get caught. If several pairs are housed next to each other, a visual barrier between the two aviaries (black netting, plain wall) must be placed to avoid aggression between the pair. Dense planting to create such a barrier has proved ineffective as the Black-winged Mynas investigate the plants to gain visual access to each other. This also applies to single-sex groups housed in adjacent aviaries (if they are of different sexes) as some aggression is likely to occur within the group. Indoor aviaries can be used in countries with harsher weather and a plain concrete wall must be used to insulate the aviary. However, good ventilation must also be provided.

Additional protection against predators can be implemented with electric wires on the top and lower part of the aviary to prevent predators or pest species climbing up.

The perimeter of the aviary must have a concrete foundation to prevent digging mammals entering. The foundation should have an L shape going 50cm down into the ground and 30cm horizontally (outwards) from the aviary.

There is no need for an additional public barrier as this species is not aggressive.

It is deemed acceptable to have a glass-sided aviary as the birds quickly learn not to crash into it. To ease the introduction and learning, the glass can be striped with tape first so the birds can visualise the glass barrier when first introduced.





**Figure 6:** Breeding aviary for the Black-winged Myna in Cikananga Conservation Breeding Centre, Java, Indonesia (left) and Jurong Bird Park, Singapore (right). ©Anaïs Tritto (Left) and Mandai Wildlife Group (right)



**Figure 7:** Display aviary at Bird Paradise, Singapore: walkthrough aviary of 0.27ha. The species is mixed with 54 other species, with a total of 290 individuals. ©Mandai Wildlife Group

### 2.1.2. Substrate

The substrate can be natural ground with short grass where the Black-winged Mynas can forage for small insects. Leaf litter also allows the presence of small insects and provides natural enrichment for the birds. A shallow water stream is beneficial for the birds to bathe in, but the stream must be switched off or the level lowered during the breeding season to avoid fledglings drowning. Adding a concrete slab below the feeding station is recommended for easier husbandry and cleaning. If adjacent to an outdoor aviary, the indoor aviary must have a concrete floor for easy cleaning and disinfection. Indoor aviaries in tropical greenhouses can have the same substrate as the outdoor aviaries.

### 2.1.3. Furnishings and Maintenance

The aviaries should be planted well enough to provide perches, shelter against the rain and wind, but not too heavily as the species likes to fly around in the aviary. Vegetation should be planted in a way that facilitates flight along the full length of the aviary and trimmed at the top for a high flight corridor. Evergreen trees are preferred as they provide foliage all year. In tropical countries, the following plant species have been offered to the birds: Rasamala (*Altingia excels*), Ambarella (*Spondias dulcis*), Yucca trees (*Asparagaceae*), Neanthe Bella palm (*Chamaedorea elegans*), palm trees (*Arecaceae* spp.), camwood (*Baphia* spp.), golden eye-grass (*Curculigo* spp.) and Cogon grass (*Imperata cylindrica*). In temperate countries, bamboo (*Sasa palmate*, *Fargesia rufa*), yews (*Taxus baccata*), spruce from the Pinaceae family and perennial shrubs (*Lonicera nitida*) are a few examples of plant species that can be used.

In addition, horizontal perches should be provided at a minimum height of 1.5m (depending on the height of the aviary). Leaning perches from the ground to higher levels can also be provided when there are fledglings so they can easily get off the ground by hopping up to a comfortable height.

The usual diameter should be around 2-3cm so the birds can grip it comfortably. The perches should not be placed above food or water trays as the birds can contaminate them with faeces. One or several perches must be placed under a shelter, so the birds can escape from rain.

Indoor exhibits (winter areas) must be provided with adequate perches and some potted plants to offer more tranquillity for the birds.

A large log can also be provided on the ground as it provides a natural form of enrichment, particularly when it is rotten, and birds can forage for insects.

Nest boxes are provided during the breeding season and will be detailed in the breeding section.

The maintenance of the aviary must be done on a regular basis and can follow the proposed frequency:

- daily clean of the area around the food trays (raking or washing depending on the substrate),

- weekly scrub of the leaves, perches, rocks, etc for faeces and raking of the aviary.
- at least yearly change of perches, substrate and disinfection of the aviary, before the breeding season.

However, during the breeding season, disturbance inside and around the aviary must be kept to a minimum to avoid disturbance.

The aviary must be regularly checked for the presence of pests (rats, snakes, wild birds) that could injure/kill the birds or bring pathogens inside the aviary. Pests must be removed, and a control plan must be implemented to avoid recurrences.

The species is prone to atoxoplasmosis so regular disinfection and changing of substrate is recommended, as well as the deterrence of wild birds perching on the top of the mesh especially near feeding stations.

#### **2.1.4. Environment**

Black-winged Mynas are tropical birds that can live outside for most of the year. However, during wintertime, access to an indoor aviary with heat is suggested, so they can protect themselves against cold and wind. A room temperature set up at 20°C is adequate and good ventilation is important. In case this temperature cannot be reached, additional heat lamps must be provided above a perch to offer the possibility to reach a higher temperature. Lighting can follow the tropical circadian cycle.

#### **2.1.5. Dimensions**

Pairs of Black-winged Mynas successfully bred in aviaries measuring 2.4m (L) x 2.4m (W) x 2m (H) and 4m (L) x 3.5m (W) x 2.5m (H) at the Cikananga Conservation Breeding Centre and in aviaries of 4m (L) x 3m (W) x 2.5m (L) in Jurong Bird Park. To maximise the welfare of the birds and allow the possibility of flight, aviaries of a minimum dimension of 4m (L) x 3.5m (W) x 2.5m (H) are recommended.

For a single-sexed group or juvenile group, the size of the aviary depends on the group size. The Cikananga Conservation Breeding Centre successfully housed groups of up to 12 females or juveniles in aviaries of 6m (L) x 3.5m (W) x 2.5m (H). In Jurong bird park, a mix-sexed group of 11 adult Grey-backed Mynas were successfully housed in an aviary of 8m (L) x 4m (W) x 4m (H).

If indoor aviaries are used, 2m (L) x 2m (W) x 2m (H) is sufficient for a pair for the winter months. Groups must be housed in larger aviaries.

The aviaries do not need to be fully sheltered but at least one third of the aviary should be covered so the birds can find protection from the rain. Ideally, two shelters at the front and back of the aviary should be provided so the birds can have different choices.

## 2.2. Feeding

### 2.2.1. Basic diet

As a fruit-based omnivorous species, the maintenance diet is composed of different types of fruits (papaya, apple, pear, banana) either diced or in large pieces to be spiked in the aviary. Commercial softbill pellets provide all the necessary nutrients for a balanced diet. The brand used at Jurong Bird Park is Nutribird® Beo-komplet pellets (Versele-laga) and the Cikananga Conservation Breeding Centre offers locally produced pellets. Although iron storage disease has never been detected so far for this species, it is preferable to offer low-iron pellets (below 150 parts per million) as evidence shows that other Mynas, such as Bali Mynas (*Leucopsar rothschildi*), are susceptible to iron storage disease.

Insects, such as crickets, mealworms, buffalo worms, cockroaches, grasshoppers or katydids can be offered in low quantities outside the breeding season.

Mealworms should be given sparingly due to their unbalanced nutrient content.

All insects must be gut-loaded 2 hours prior to feeding with a commercial gut-load powder such as Wombaroo Insect Booster®.

Items	Quantity for 1 bird
Fruits (a mix of papaya, apple, pear, banana)	35g
Nutibird® Beo-komplet pellets	10g
Insects	10g

During the maintenance regime, feeding should be done twice a day – early morning and mid-afternoon. Fruit and pellets must be placed in different trays to avoid losing the consistency of the pellets from the fruit juice. Fruit from the first feed must be cleared at the second feed as it can spoil fast.



**Figure 8:** food provided in Cikananga Conservation Breeding centre (pellets in a bowl and fruit spiked on a branch). ©Anaïs Tritto





**Figure 9:** Food preparation at Jurong Bird Park for fruit-based omnivorous starlings. ©Mandai Wildlife Group

Nutritional supplements are offered at Cikananga Conservation Breeding Centre, Jurong Bird Park and Bird Paradise.

Outside the breeding season, Calci-lux® and Omni-vit® are offered twice a week in food and drinking water respectively.

A month before the breeding season, Fert-vit® is given daily to the birds until the first egg is laid. After the first hatching, Probi-zyme® is provided daily on the insects that are fed to the chicks and stopped at fledgling. From egg laying to fledgling, Calci-lux® and Omni-vit® are given daily.

Maintenance / non breeding							
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
For all birds			OMNI-VIT CALCI-LUX			OMNI-VIT CALCI-LUX	
Breeding birds							
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1 month before breeding season starts + nesting + incubation period	FERTI-VIT CALCI-LUX	FERTI-VIT CALCI-LUX	FERTI-VIT OMNI-VIT CALCI-LUX	FERTI-VIT CALCI-LUX	FERTI-VIT CALCI-LUX	FERTI-VIT OMNI-VIT CALCI-LUX	FERTI-VIT CALCI-LUX
Addition for chicks: from hatching to independence	PROBI-ZYME CALCI-LUX	PROBI-ZYME CALCI-LUX	PROBI-ZYME CALCI-LUX	PROBI-ZYME CALCI-LUX	PROBI-ZYME CALCI-LUX	PROBI-ZYME CALCI-LUX	PROBI-ZYME CALCI-LUX

**Figure 10:** Nutritional supplement schedule given at Bird Paradise.

### 2.2.2. Special Dietary Requirements

During the breeding season, Black-winged Mynas become highly insectivorous. To sate this, a regular supply of different types of insects can be given throughout the day. The insects can



be scattered throughout the aviary to increase the foraging behaviour or inside a tall plastic bucket to avoid escapees.

When the first egg is laid, it is important to significantly decrease the quantity of insects to avoid having the male disturbing the female during incubation. One day before the expected hatching, the quantity of insects is increased. Soft-bodied and small insects are then provided such as white mealworms or pin-head crickets. In both the Cikananga Conservation Breeding Centre and Jurong Bird Park, ant eggs were given as a main source of protein during the first week after hatching and the birds were more interested in them than in mealworms or in crickets.

When chicks are in the nest, the first feed must be done as early as possible after sunrise and the last feeding as late as possible. For the first week, insects or ant eggs should be given to the parents every 2 hours. From the second week, the number of feeds can be slightly decreased (down to 4-5 times a day) with bigger insects provided to the birds such as adult-sized crickets.

As a general rule, newly moulted mealworms when they are still white should be avoided as the exo-skeleton can be too hard for the chick to digest and can cause impaction of the digestive system.

The large provision of insects can decrease when the juveniles are observed self-feeding and taking fruits.

Crickets can also be used to orally medicate birds and negate the need to catch them. Medicine is injected directly into the insect's body and it is offered solely to the bird in the morning, to increase the chances of ingestion. While successful, it has been noted that birds may not be keen to continue eating the medicated insects if the drug is not very palatable.



**Figure 11:** Food for chicks with the additional water protection against ant infestation. ©Anaïs Tritto

### 2.2.3. Method of feeding

Food is delivered in bowls or trays under a shelter to avoid being spoiled by rain or contaminated by wild bird faeces. Feeding the birds at the entrance of the aviaries is recommended so as to avoid disturbing the birds, especially during the breeding season. A minimum of two troughs should be provided, one for dry food (pellets) and one for the fruits. Fruit can be offered either cut in small pieces in a food bowl or spiked on a branch. If spiked on a branch, the branch must be cleaned every day to avoid having any leftover food that could encourage the growth of fungus or bacteria.

Insects can be either scattered on the ground or placed inside a large plastic bucket. Leaves inside the bucket provide additional enrichment for the birds who need to dig into it to reach the insects.

The number of feeding stations depends on the number of birds inside the aviary. To avoid competition for the food that could lead to aggression, several feeding stations must be provided in aviaries housing more than 2 birds.

The aviary must be rat proofed to avoid rats eating the food. Ants can also be a problem and placing the food tray inside a second tray, larger than the first one with shallow water, deters the ants from accessing the food. The distance from the side of the water tray and the food bowl should be at least 5cm. This is particularly important when ant eggs are provided during breeding season.

For a large group, standing or hanging feeders can also be offered to the birds but must also be sheltered to avoid rain spoiling the food.



**Figure 12:** Food provided in Bird Paradise on elevated feeders with water cup system to prevent ants accessing the food. ©Mandai Wildlife Group

#### **2.2.4. Water**

Water must be provided fresh and clean on a daily basis.

Water can be either offered in large trays on the ground or in small water bowls near the food. The Black-winged Mynas like to bath in the water trays so the water must be changed twice a day. The number of watering points depends on the group size.

If a stream is present in the aviary, the birds can drink from it if the flow is slow and there is an easy access to the stream via a landing beach. If the stream is the only source of water, the quality of the water must be assessed, and a filtration system must be in place. As a general rule, it is encouraged to provide water points that can be changed daily even if there is a stream inside the aviary, to ensure freshness and cleanliness.

### **2.3. Social structure**

The Black-winged Myna is a social species that can live in large groups in the wild. However, captivity set ups can sometimes create some challenges in housing the species.

Black-winged Myna can be kept either in pairs or groups, pairs being ideal to control the breeding and the genetics.

Single-sex groups can be formed, the size depending on the dimensions of the aviary. However, a group of females should not be housed in proximity (visually and vocally) of a group of males as aggression can occur in each group, especially during the breeding season. A single-sex group should also not be housed near a breeding pair as aggression has been observed in the pair on multiple occasions.

The stability of juvenile groups is easier to maintain. However, close monitoring should be done once the birds come close to sexual maturity (around 1 year old) as aggression is likely to occur.

#### **2.3.1. Changing Group Structure**

Introducing a pair is relatively easy for Black-winged Myna although some aggression in incompatible pairs has been observed, so introduction must always be carefully monitored.

For this species, there is no need to make a soft introduction with a howdy cage and the male and female can be introduced directly to each other. As a general rule, the two birds should be released in a neutral aviary to ease the introduction process. If a neutral aviary cannot be provided, the male must be released into the female's aviary.

For the introduction of new birds into an established group, it is encouraged to release at least two at the same time to dilute potential aggression. If it is not possible, a howdy cage can be used for soft introduction. Experience shows that introducing birds into a female group is easier than introducing into a male group where aggression occurs more frequently. Ideally, it is better not to disturb a stable male group by introducing others.

At Cikananga Conservation Breeding Centre, a mix-sexed group were housed in a large aviary to allow the possibility of natural pairing. This can only be achieved with strong monitoring for as soon as the pair is formed, they tend to become aggressive to the others by trying to establish a micro territory in the aviary.

As the species is very social, for welfare reasons it is better to avoid housing a Black-winged Myna alone if possible. To avoid this, a single bird can be housed with other starlings / mynas and this has proved successful in Jurong Bird Park where a single Black-winged Myna male was housed with a male grey-backed Myna.

### **2.3.2. Sharing enclosure with other species**

When kept in a non-breeding group, Black-winged Mynas can be successfully housed with other species, especially ground birds such as Galliformes. In Jurong Bird Park, a non-breeding group of Grey-backed Mynas was housed with a non-breeding pair of Common Green Magpie (*Cissa chinensis*), a non-breeding pair of Spotted Imperial Pigeon (*Ducula carola*) and a non-breeding pair of Mountain Peacock Pheasant (*Polyplectron inopinatum*).

A single male in Jurong Bird Park was successfully housed with a male Grey-backed Myna (*Acridotheres m. tricolor*), a pair of Collared Partridge (*Arborophila gingica*), a pair of Pacific Imperial Pigeon (*Ducula pacifica*) and a pair of White-rumped Shama (*Copsychus malabaricus*).

A breeding pair has also been kept with a pair of Silver Pheasant (*Lophura nycthemera*) in Jurong Bird Park where both species successfully raised chicks, although at different times of the year. No interaction was observed with the new fledgling and the Galliformes. The Black-winged Mynas were observed using Silver Pheasant feathers to line up their nest.

## **2.4. Breeding**

Breeding Black-winged Mynas is fairly easy compared to other songbirds; however, it is important to not disturb the nest too often (no more than once a day when both parents are voluntarily out of the nest) to avoid abandonment.

### **2.4.1. Mating**

Courtship behaviour is performed by both male and female, who perch next to each other and do the typical vocalization “krr-krr-krr” with the crest erected and head bobbing. If they are in a mixed group, they stay separated from the other group members. If the pair has

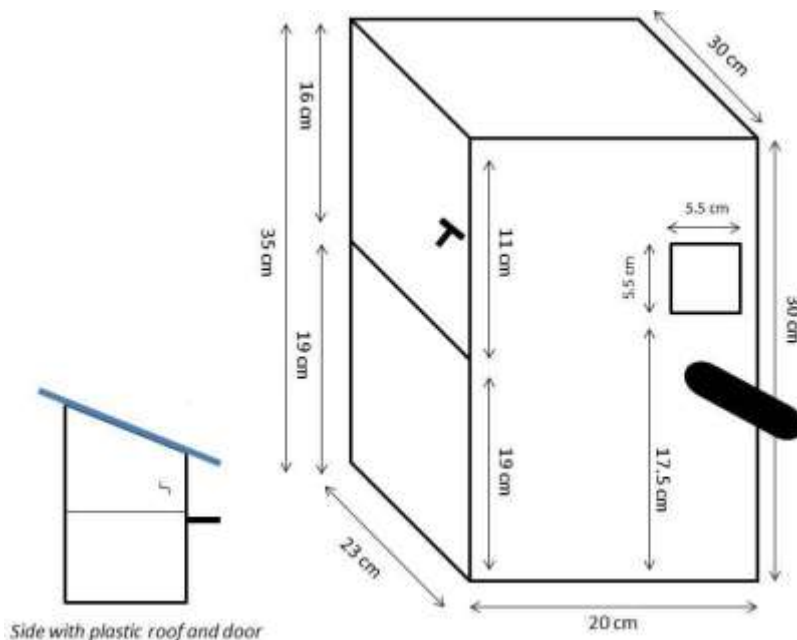
offspring and are kept in a middle size aviary (breeding type), they can be aggressive to them, so it is better to remove any juveniles from the aviary.

Mating has never been observed for this species, but it is believed to be similar to other passerines.

#### 2.4.2. Nesting/egg laying/incubation

Black-winged Myna nest in boxes as a recreation of the rock or tree cavities they would use in the wild.

The box must be deep enough so the birds can feel confident to sit inside and be out of sight. The entrance must also be small for them to feel more secure.



**Figure 13:** Nest box design for Black-winged Myna.

A back or side door allows the keeper to check the nest. In Cikananga Conservation Breeding Centre, a system is used to safely check the box without disturbing the parents. The box is placed outside the aviary and a wooden panel inside the aviary recreates the design of the front of the box with the perch (see figure 14). The box has the entrance square hole to fit exactly with the square hole of the wooden panel. With this design, when the box is taken out for cleaning, checking the chick or potentially swapping boxes for foster-rearing, there is no change in what the parents perceive as the facade of their nest box. They still see the wooden panel with the entrance square hole that has been closed to prevent escape.



Figure 14: Nest boxes situated outside the breeding aviary, additional wooden panel inside the aviary and closing system. ©Anaïs Tritto

Different nesting substrate is provided to the birds such as coconut fibre, long grass, small twigs, etc. When the box is offered, the keepers can fill it with nest materials to encourage the birds to start building. Some pairs may remove the nest material first, others can use it as a base. Additional nest materials must be provided inside the aviary in different locations (on the ground, hanging from trees) and must be regularly topped up or changed if spoilt.

The birds take several days to build the nest with the first egg being laid within a week of the nest being completed.

Up to 4 eggs are laid, of bright blue colour. The size is an average of 2.74 x 1.89 cm (based on 80 eggs; Cikananga Conservation Breeding Centre, unpubl. data). The eggs are laid one day apart, and the birds start incubating at the second egg.

The incubation period is 14 days and both parents participate in the incubation process.

In case of infertile eggs or completion of the chick rearing, the female may lay again. In tropical countries, the female can lay eggs all year long. It is then important to rest the female to avoid exhaustion and calcium deficiency after the second successful clutch or the 3<sup>rd</sup> unsuccessful clutch. Rest can be offered by removing the nest box or moving the female to a female group.

### 2.4.3. Hatching

If fertile, all the eggs hatch within 2 days. Usually, 2 to 3 chicks hatch although 4 chicks have been observed on several occasions at the Cikananga Conservation Breeding Centre. There are a few experiences of rejected chicks by the parents, even from established pairs.



Both parents immediately start feeding the chicks with ant eggs (provided throughout the day, see Special Dietary Requirement Section).

#### 2.4.4. Development and Care of young

The species is altricial, the chicks hatching naked and blind. Pin feathers start to appear at 7 days old and the eye lids open at around 10 days old. Both parents take part in the feeding and brooding process.



Day 6



Day 8



Day 9



**Day 10**

Figure 15: Development of parent-reared chicks. ©Anais Tritto

The parents also collect the faecal sac after each feed and tend to discard it at the other side of the aviary.

To avoid disturbance to the parents, it is important to not check the box too often. Once a day is the maximum frequency of checking and it must be done when both parents are out of the nest. Another alternative is to listen to the chicks when the parents are out, instead of opening the box. For example, if 2 chicks are in the nest, keepers can first try to listen for the chicks before opening the box. If 2 chicks are heard, it means they are healthy, and keepers can wait for one more day before opening the box.

The chicks can be close-ringed at 8 days old, and it is also encouraged to give them orally the first preventive treatment with Toltrazuril against *Atoxoplasmosis* (0.01mL per 10g of body weight of diluted Toltrazuril 1:1).

Chicks fledge at around 21-22 days old. Before they fledge, it is important to provide leaning perches in the aviary, from the ground to bushes or trees so the fledgling can easily reach higher levels of the aviary. Also, the box should not be checked close to the fledging date as it can scare the chicks and force them to leave the nest earlier than expected. For the first 3-4 days after fledging, the chicks cannot properly fly and try to hide in the bushes or a corner of the aviary.

After fledging, juveniles are still fed by the parents but will become independent after a minimum of two weeks. If the parents are laying again, it is better to remove the chicks from the enclosure as there is no form of cooperative breeding for this species and the parents will become aggressive. Once removed, the juveniles can be housed in a juvenile group without any problem until they are sexually mature (about 1 year old).

Juveniles are easily recognized by the grey back and crown coloration that they progressively lose over time to be replaced with white. It has been noted that captive-bred birds lose the coloration at almost 1 year old while wild-hatched birds lose it at about 4 months old. The yellow mask also appears later, usually after few months of access to natural sunlight.





Figure 16: Morphology of juveniles in captivity (left) and wild (right). The grey coloration on the head and back is replaced by white feathers earlier in wild birds. ©Anaïs Tritto

#### **2.4.5. Hand-rearing**

Cikananga Conservation Breeding Centre, the most prolific Black-winged Myna breeding facility, has never hand-reared due to a lack of infrastructure. Consequently, there are very few experiences of hand-rearing Black-winged Mynas and only Jurong Bird Park hand-reared a few birds in 2015/2016. However, hand-rearing Black-winged Myna is no different from any other omnivorous Mynas and the following protocol can be used as general guidelines.

As the species is fairly easy to breed and adult Black-winged Mynas can raise chicks successfully without abandonment (as long as the adequate food is provided to the chicks), it is not necessary to actively pull eggs or chicks out of the nest for artificial incubation and hand-rearing. However, holders should be familiar with the hand-rearing protocol in case of unexpected chick rescue. If hand-rearing is done without excessive human contact, the process should not negatively impact the birds' behaviour.

Day	Temp (°C)	Diet	Frequency	Comment
0	38	<b>DO NOT FEED solids for 24hrs</b> Saline 0.02mls every 2 hours, Probiotics 0.02mls BID Multi vitamin 0.1mls SID	Every 2 hrs from hatching	<b>Brooder:</b> small nest cup w/ tissue & spongy mat. w/ water cup for humidity: ~80%RH Betadine seal on umbilicus 2x/day for 2 days <b>Hydration is most important.</b>
1	37.5	60% Pinkie (small pieces) No limbs & tail 40% Papaya Mix until mashed  Saline 0.02mls before <b>every</b> feeding Probiotics 0.02mls BID before <b>every</b> feeding Multi vitamin 0.1mls SID before <b>first</b> feeding	Every 2 hrs (7x) 0600 to 1800hrs	Number of feedings dependant on hatching time and yolk absorption. Chick should be passing out faecal sac after each feeding.
2	37			
3	36.5			
4	36			
5	35.5	60% Pinkie (small pieces) No limbs & tail 30% Papaya 10% Soaked Nutribird Beo-Komplet Pellets Mix until mashed  Saline 0.02mls before <b>every</b> feeding Probiotics 0.02mls BID before <b>every</b> feeding Multi vitamin 0.1mls SID before <b>first</b> feeding		
6	35			
7	34.5	45% Pinkie (small pieces) No limbs & tail 35% Papaya 10% Soaked Nutribird Beo-Komplet Pellets 10% Crickets Abdomen Mix until mashed  Saline 0.02mls before <b>every</b> feeding Probiotics 0.02mls BID before <b>every</b> feeding Multi vitamin 0.1mls SID before <b>first</b> feeding		
8	34		Every 3 hrs (5x)	
9	33.5	40% Pinkies 30% Papaya 15% Soaked Nutribird Beo-Komplet Pellets 15% Crickets Abdomen Mix until mashed  Saline 0.02mls before <b>every</b> feeding Probiotics 0.02mls BID before <b>first</b> feeding Multi vitamin 0.1mls SID before <b>first</b> feeding		
10	33			
11	32.5	35% Pinkies 25% Papaya 15% Soaked Nutribird Beo-Komplet Pellets 15% Crickets Abdomen 10% Ant Eggs Mix until mashed  Saline 0.02mls before <b>every</b> feeding Probiotics 0.02mls BID before <b>first</b> feeding Multi vitamin 0.1mls SID before <b>first</b> feeding	Every 4 hrs (4x)	
12	32			Expect jumping out of nestcup/Branching/ Perching Day 12-14 Expect to be prompting for 1-2 weeks before completely independent.  Prompt to eat from food bowl each time prior to feeding. Offer soaked pellets from forceps if necessary. Drop pellet and/or bugs in water dish to stimulate chicks to drink/eat.

Figure 17: Hand-rearing protocol used in Jurong Bird Park for Black-winged Myna.

#### 2.4.6. Population management

The new Regional Collection Plan (RCP) developed by the EAZA Songbird TAG states that there is a need to develop an *ex-situ* management programme to create a viable long-term population. In 2020, a new EEP was approved for the Black-winged Myna complex, including the Black-winged Myna, Grey-backed Myna and Grey-rumped Myna. The EEP aims to set up

a pure captive population for future restoration. In addition, the EEP liaises with *in-situ* projects (wild survey, reintroduction) and genetic research (for taxonomy determination).

Of the three sub-species, the Black-winged Myna is the most represented in the EEP. As of March 2024, 60 Black-winged Mynas from one institution are included in the EEP (data from ZIMS). One institution holds 9 Grey-backed Mynas, although they are considered hybrids. No zoological institution nor conservation breeding centre holds Grey-rumped Myna.

At the time of writing, a Long-Term Management Plan (LTMP) is being developed and will be made available when finalised, including the target population and strategic plan for the *ex-situ* programme.

An International Studbook was created in 2015 for the Black-winged Myna and includes zoological institutions and conservation centres.

There is a necessity to build up the population in zoological institutions and, as the species is slowly acquired and transfer to captive settings, it is important to start breeding the birds according to the recommendations of the EEP. At the time of writing, there is no necessity to control the population but, in the event a holder has reached its carrying capacity, breeding can be controlled by creating single-sex groups. Since the species is highly social, it is not recommended to isolate birds for the purpose of breeding control. As mentioned in the previous section, hand-rearing is not recommended on a regular basis and should be kept for rescue operation of eggs and chicks.

## 2.5. Behavioural enrichment

Black-winged Mynas are very curious birds and food-driven, especially with insects. Several food-based enrichments can increase their foraging times:

- A log can be placed in the aviary and, as it rots, the Mynas can pick larvae from it.
- A box/deep tray can be filled with leaves and insects where the Mynas need to dig for the insects.
- A dispenser can be placed to slowly release live insects throughout the day.



Figure 18: insect feeder at Bird Paradise for a regular release of live crickets or mealworms.  
©Mandai Wildlife Group

The Black-winged Mynas were also observed in Cikananga Conservation Breeding Centre catching geckos and lizards coming into their aviaries, so some bigger live prey can be intermittently offered.

Finally, by maintaining short grasses in the aviary, it may attract different types of insects allowing the birds to spend more time foraging.

Whenever providing enrichment to the birds, it is better to avoid hanging devices with small ropes/strings as the bird's legs can easily get tangled in it.

## **2.6. Handling**

### **2.6.1. Individual identification and sexing**

The Black-winged Myna is a monomorphic species so males and females look alike and also use the same vocalisation patterns. Consequently, DNA sexing should be used, using a small drop of blood or feathers. Scoping can also be performed but, considering the size of the bird, DNA sexing is preferred.

Some private breeders believe that the males and females have different cloaca (vent) colours, with male cloacas being grey and female cloacas being pink. This sexing method has not proven to be 100% accurate and must be used with caution as young birds often have pink cloacas.

The identification of the birds can be done using two methods:

- Identification ring: a ring of 4.5mm diameter is used. Closed rings can be used on chicks and they must be ringed at 8 days old. An additional colour ring (metal or flat band) can be added to the other leg to differentiate the birds in a group (male/female, siblings, etc). Ringing must be done by experienced staff to avoid tight rings, improperly closed rings or overlap.
- Microchipping: microchipping birds can be done either into the pectoral muscles or subcutaneously (on the left side below the pectoral muscles). In Cikananga Conservation Breeding Centre, a microchip of 1.4 x 8mm was used, subcutaneously. As microchipping is an invasive procedure, it must only be performed by trained staff or vets.

### 2.6.2. General handling

Handling of passerines must be done by experienced staff to avoid mishap during manipulation. As a general rule for a passerine, the bird is constrained using one hand. The neck is maintained between the index and middle finger so the head is secured. The pressure must be gentle to avoid the bird suffocating but enough to avoid the bird escaping. The back of the body lays on the palm of the handler while the wings are secured along the bird's body by the thumb on one side, and the ring finger and little finger on the other side. The other hand is used to secure to leg to avoid the bird moving and scratching its body and eyes. The legs are restrained at the tibiotarsus and maintained in a rest position.

A bird should not be held by the wings or only the head or legs.



**Figure 19:** Correct handling of a Black-winged Myna. ©Anaïs Tritto

### 2.6.3. Catching/Restraining

There are different methods to catch a Black-winged Myna, depending on the size of the aviary:

- Capture with a net: this method can be used for small aviaries and must be done by experienced staff only. To make the catching efficient, the staff should know the flight pattern of the bird in the aviary and use it to catch the bird when it is flying through this path. Using a net can lead to serious trauma if done inappropriately and the head or body is severely hit by the net. To limit potential catching trauma, the net rim must be padded with soft materials (foam) to absorb any potential impact. The size of the net should be 25cm diameter to allow the bird to be restrained into it by doing a 90 degree turn of the net ring.
- Trapped/conditioned into trap cages: conditioning or luring the bird to enter a small trap cage or a pet carrier eases the catching of the bird as their movements are already restricted in the cage. Catching is consequently done faster but still needs to be performed by experienced staff to ensure the catching is as fast as possible and does not cause injury to the bird. These techniques remain the most preferable methods and provide a hands-off experience for the bird if it does not require a medical check-up but only internal transfer.



**Figure 20:** Large trap cages in Jurong Bird Park with the sliding door to allow the bird to enter the cage. ©Mandai Wildlife Group

Finally, it is important to mention that restraint in the form of feather clipping is not recommended for Passeriformes. If a bird is showing aggression towards aviary mates, it is better to place it into a howdy cage for a few days than clipping the feathers, as this will greatly impair the welfare of the bird.



#### 2.6.4. Transportation

Two types of transportation can be considered: internal/local transport within the organization or locally if the transport does not exceed 2 hours; and international transport.

##### 2.6.4.1. Internal / local transportation

Internal or local transportation that does not exceed 2 hours can be done within a pet carrier. However, changes to the pet carrier must be done and a perch must be installed and secured inside the carrier to allow the bird to perch during transport. A bird staying in a pet carrier without a perch can injure itself as it cannot find a suitable or non-slippery place to perch. The perch is secured by being screwed to the plastic box around 10cm above the bottom. The perch is disinfected after each use and must be changed regularly.

During transportation, it is recommended to cover the carrier with a towel to limit the stress of the bird.



Figure 21: Modified pet carrier providing a perch for the birds. ©Mandai Wildlife Group

##### 2.6.4.2. International transfer

Crates for international transfer must follow the IATA requirements (IATA 2024 Live Animal Regulations) if the transport is done by air. When the transport is done by other means of transportation, it is left to the owner to decide on the size and material of the crate, however, it is strongly recommended to follow the IATA recommendations too. This is because they provide good guidelines on size and ventilation to ensure maximum bird welfare during the transfer.

Crating of Black-winged Myna must be done individually, and a crate can contain up to 5 compartments. Ideally, each compartment should be 30cm long, 18cm high and 18cm wide with a perch fixed at a height of 4cm and 15cm from the back of the box. Ventilation holes (no bigger than 1cm diameter) are located on both sides of the compartment. Food and water bowls must be attached firmly in the front of the box to avoid moving during the transport and injuring the bird. The water bowl is lined with sponge to prevent spillage.

The front of the crate is mesh-covered, ideally with 1.2 cm ( $\frac{1}{2}$ " ) mesh to allow a regular check-up of the bird and potential refill of the water and food in case of a long transport. A burlap cloth should be attached to the external top of the crate to cover the mesh thus limiting stress to the bird between checking or feeding.

At the time of writing, the Black-winged Myna does not require CITES permits, but international transport must follow the regulations of the sending and receiving country/regions. Provision of a health certificate for the bird that follows the health regulations of the receiving country is necessary and the bird must undergo a quarantine period after arrival at the destination.

#### **2.6.5. Safety**

Safety risk for the staff is limited as the species is not known to be aggressive. However, a more aggressive behaviour can be observed during the breeding season or if a bird is hand-reared so keepers must be mindful of their eyes since the birds can try to peck at them.

The safety and welfare of birds must always be ensured especially during the introduction of an individual to a group, introduction of a new species to an aviary or during any aviary maintenance work while birds are still present. Safety also includes preventing their potential escape, so keepers must always ensure doors are kept closed at all times. The use of an airlock mechanism to shut doors is preferred to avoid any escape.

## **2.7. Veterinary considerations for health and welfare**

Like every other bird species, good indicators of health are food intake, body weight and individual activity levels. When catching the bird for a routine medical check-up, it is good to then assess the general condition of the bird in more detail. It is vital to record morphological details to help determine the condition of the bird when it is being caught. Body weight, pectoral muscle score and the subcutaneous fat score are good parameters and should not be discounted as they all represent the general condition of the bird. Recording these scores with consistency between check-ups and different assessors is very important.

Capillaria and cestode species have been noted sporadically in low numbers in captive specimens at Jurong Bird Park. Incidence of intestinal parasitism may increase with



reproductive stress. Faecal samples are collected for regular screening (two to three times a year) and treatment is based on positive results. Preventive deworming is not performed.

Black-winged Mynas appear to be more susceptible to atoxoplasmosis (systemic isosporiasis) than other passerine species and juvenile birds are even more susceptible so closer attention should be paid. Preventive treatment is advised for this parasite, particularly when birds are breeding, rearing and fledgling young. Treatment is started when the first egg is laid, using toltrazuril (Baycox®, Bayer, Germany) at a dose of 75mg per litre of drinking water. The treatment regime is 2 days treatment, 5 days off, 2 days treatment. During the days of treatment, no other source of water must be given. At the recommended dosage, the medicine is unlikely to have adverse effects on other avian species that could be mixed in the aviary. The same protocol should be used at the time the chick fledges, or via a direct oral dose. When the juveniles are removed, the liver size should be assessed (visually, by examining the coelomic cavity) and potentially blood can be taken to screen for isospora via a buffy coat smear (light microscopy) or polymerase chain reaction (PCR). If positive, toltrazuril treatment can be repeated as previously. Additional treatment can be implemented upon veterinary advice.

Hyper-keratinisation of the legs (“scaly leg”) is a common problem for captive birds and develops when they stay for a prolonged period in captivity. Scaly leg is never observed in wild birds or captive birds of less than 1 year old. Birds presenting with scaly leg have been sampled for parasites and none have been found. The scales are made of keratin that can be gently peeled by applying pressure.

It is likely that the issue starts to develop due to a dry environment, since the aviaries are usually partially sheltered. Several experiments have been made to prevent the hyper-keratinization from occurring, such as providing multiple water stations and showering the birds regularly; applying Vaseline and a bandage to soften the skin. However, these methods did not prevent the appearance of scaly leg.

Although the situation is not life-threatening, attention should be kept when the bird has a ring as it can become restricted in movement, and the skin can start developing above it. Should scaly leg occur, it is advisable to remove the ring.



**Figure 22:** Hyper-keratinization of the legs (“scaly leg”). ©Anaïs Tritto

## **2.8. Specific problems**

As the species is fairly easy to keep in captivity, there are no species-related challenges that need to be highlighted in this section.

## **2.9. Recommended research**

To better understand the ecology and management of the species, some research topics are recommended by the author and EEP:

- Extent of toxoplasmosis within the captive population and effect of prophylactic treatment to decrease the morbidity and mortality, especially for young birds.
- Scaly legs and how to prevent it in captivity.

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- **Nutribird Beo-Komplet.** Versele-Laga, Kapellestraat 70 - 9800 Deinze – Belgium. [www.versele-laga.com](http://www.versele-laga.com)
- **Insect Booster.** Wombaroo® PO Box 151, Glen Osmond, South Australia 5064 – Australia. [www.wombaroo.com.au](http://www.wombaroo.com.au).
- **Calci-Lux Oropharma.** Versele-Laga, Kapellestraat 70 - 9800 Deinze – Belgium. [www.versele-laga.com](http://www.versele-laga.com)
- **Omni-Vit Oropharma.** Versele-Laga, Kapellestraat 70 - 9800 Deinze – Belgium. [www.versele-laga.com](http://www.versele-laga.com)
- **Ferti-vit Oropharma.** Versele-Laga, Kapellestraat 70 - 9800 Deinze – Belgium. [www.versele-laga.com](http://www.versele-laga.com)

- **Probi-zyme Oropharma.** Versele-Laga, Kapellestraat 70 - 9800 Deinze – Belgium.  
[www.versele-laga.com](http://www.versele-laga.com)

*For hand-rearing protocol:*

- **Probiotic.** Vetafarm, 3 Bye Street, Wagga Wagga - NSW Australia. [www.vetafarm.com](http://www.vetafarm.com)
- **Multivet.** Vetafarm, 3 Bye Street, Wagga Wagga - NSW Australia. [www.vetafarm.com](http://www.vetafarm.com)