# Hygiene Protocols for the Prevention and Control of Diseases (Particularly Beak and Feather Disease) in Australian Birds

## Design of a Captive Breeding Facility for a Recovery Program

Australian Government

Department of the Environment and Heritage

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# Disclaimer

**Note**

This document describes the *Design of a Captive Breeding Facility for a Recovery Program*. The document has been developed with the involvement and cooperation of a broad range of stakeholders, but the making of this document does not necessarily indicate the commitment of individual stakeholders to undertaking any specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the document due to changes in knowledge.

## *Office Complex*

A suggested layout for an office complex is presented in Figure 1. It can be seen that the office complex comprises an entry that is always locked and access is only by authorised personnel. The complex comprises an office, toilets, staff amenities, a workshop, a food storage area and a food preparation area. The office complex should be air-conditioned, and windows should not be opened in normal circumstances (windows are needed for the office - to see people leaving and returning to the complex from the facility, and the food storage and the workshop room - to see people arriving with deliveries at the food and workshop delivery ramps.

Drainage from the Office Complex must be contained and not enter the facility proper.

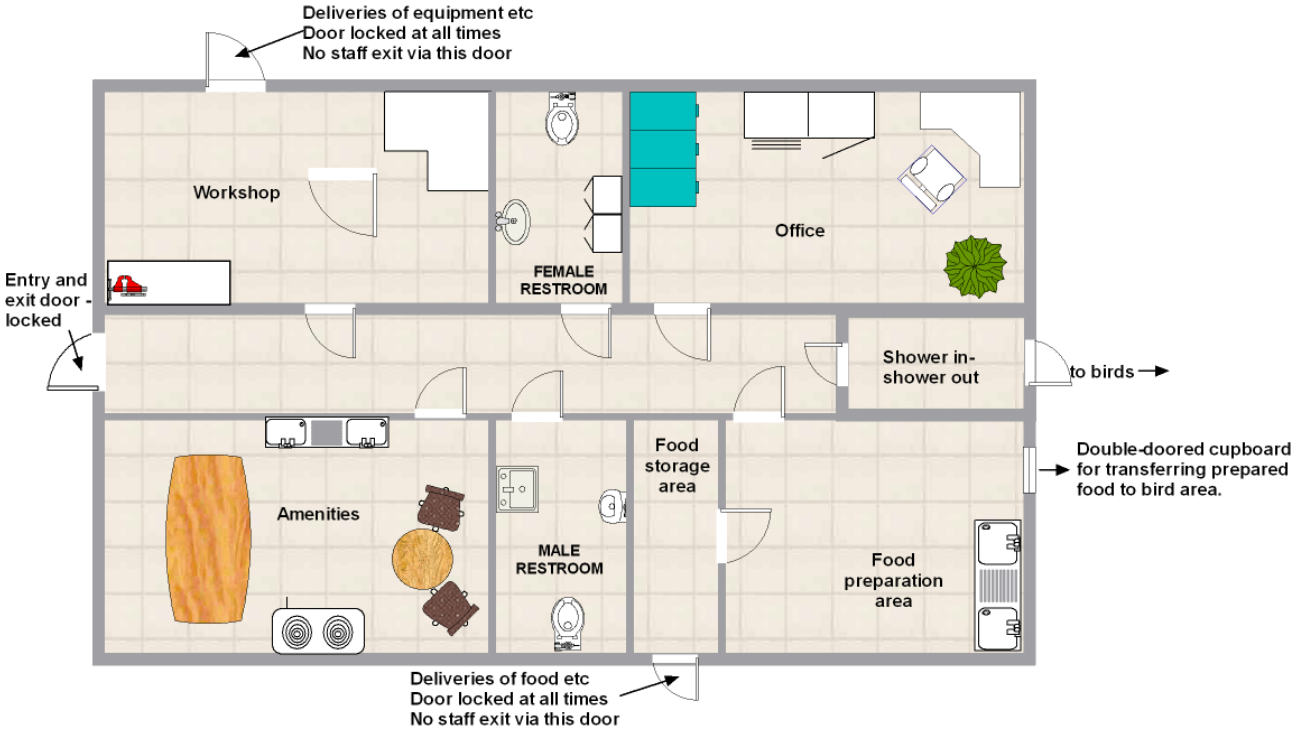



**Figure 1: Suggested layout for an office complex**

Delivery docks are placed at the workshop and the food storage area. These docks are enclosed, are accessed by a sliding door, and have an impervious floor that can be disinfected with 2% Virkon S prior to deliveries (allowing 10 minutes' contact time). Food deliveries should be in containers that have had no contact with birds. If there is any possibility that deliveries to the workshop dock have had contact with birds, then they should be disinfected with 2% Virkon S for 10 minutes prior to being placed on the dock. The external door is opened, materials delivered, the door closed and then the workshop or food delivery internal door opened to gain access.

There is no exit from the office complex from either the food delivery or equipment delivery doors.

Personnel going from the office complex to other modules (Breeder, Juvenile, Hatchery or Nursery) need to shower and change their clothing and footwear. When entering modules, disposable plastic overshoes, disposable gloves and head covering are donned. On departure from the module, the footwear is left in the module and the disposable gear placed in a disposal bin. Personnel going from breeders to juveniles and vice versa do the same.

It is preferable for any service personnel, such as electricians or plumbers, not to have had contact with birds for the previous 36 hours. Any equipment they need should be disinfected with 2% Virkon S for 10 minutes' contact time on visibly clean equipment.

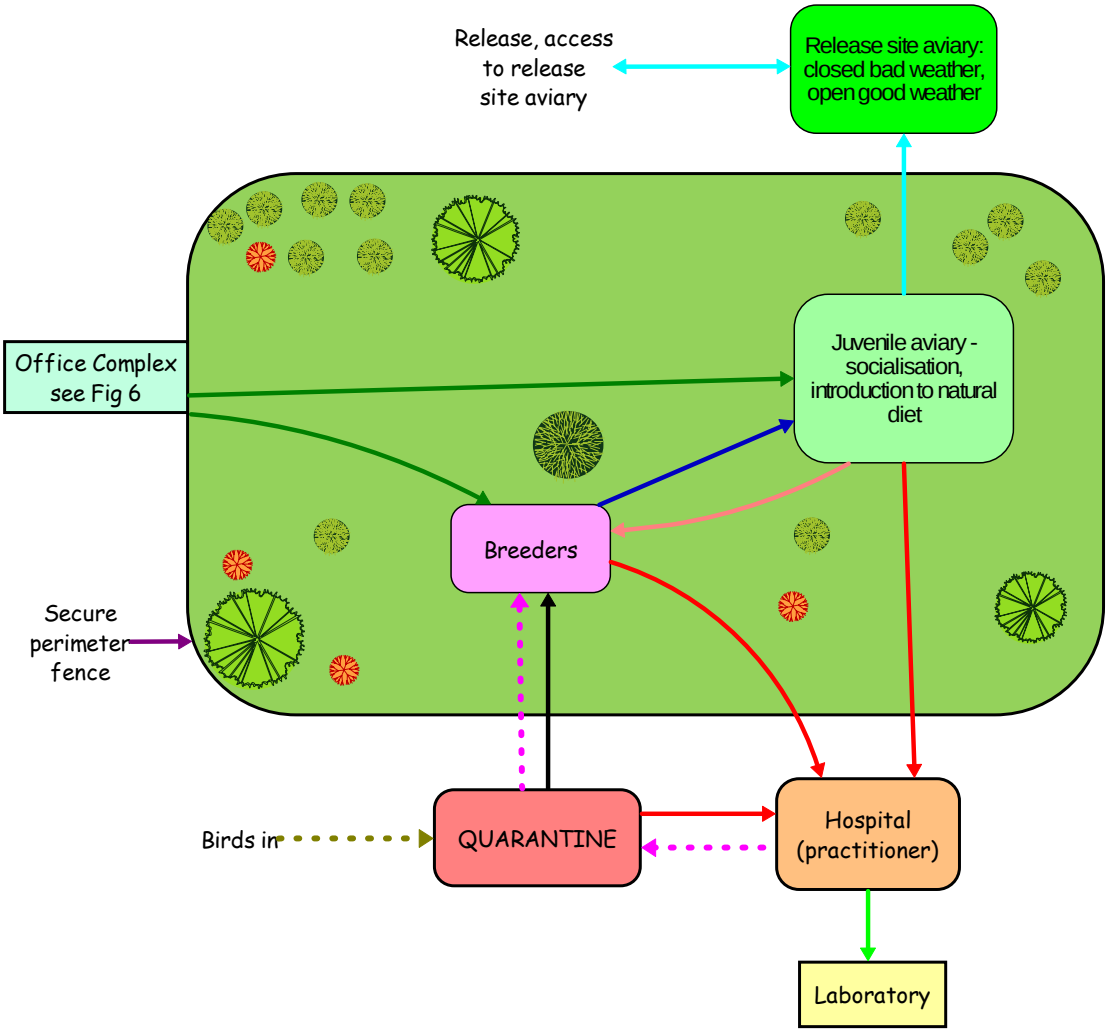
There should be a separate spray pack of disinfectant in each module. This is to stay within the module and should always be visibly clean and the exterior disinfected with 2% Virkon S after use.

The Food Preparation Area should be constructed as follows:

- Drainage is from centre of the room to walls (see later - construction of modules).
- The floor should be constructed of effectively sealed concrete, or consist of large tiles with minimum grout.
- Stainless steel and tiles with a concrete floor are desirable.
- All benches are to be mounted from the walls.
- There should be a dish washer - dishes, bowls and bottles that come out of a dishwasher are virtually sterile.
- Utensils can be either stainless steel or ceramic.

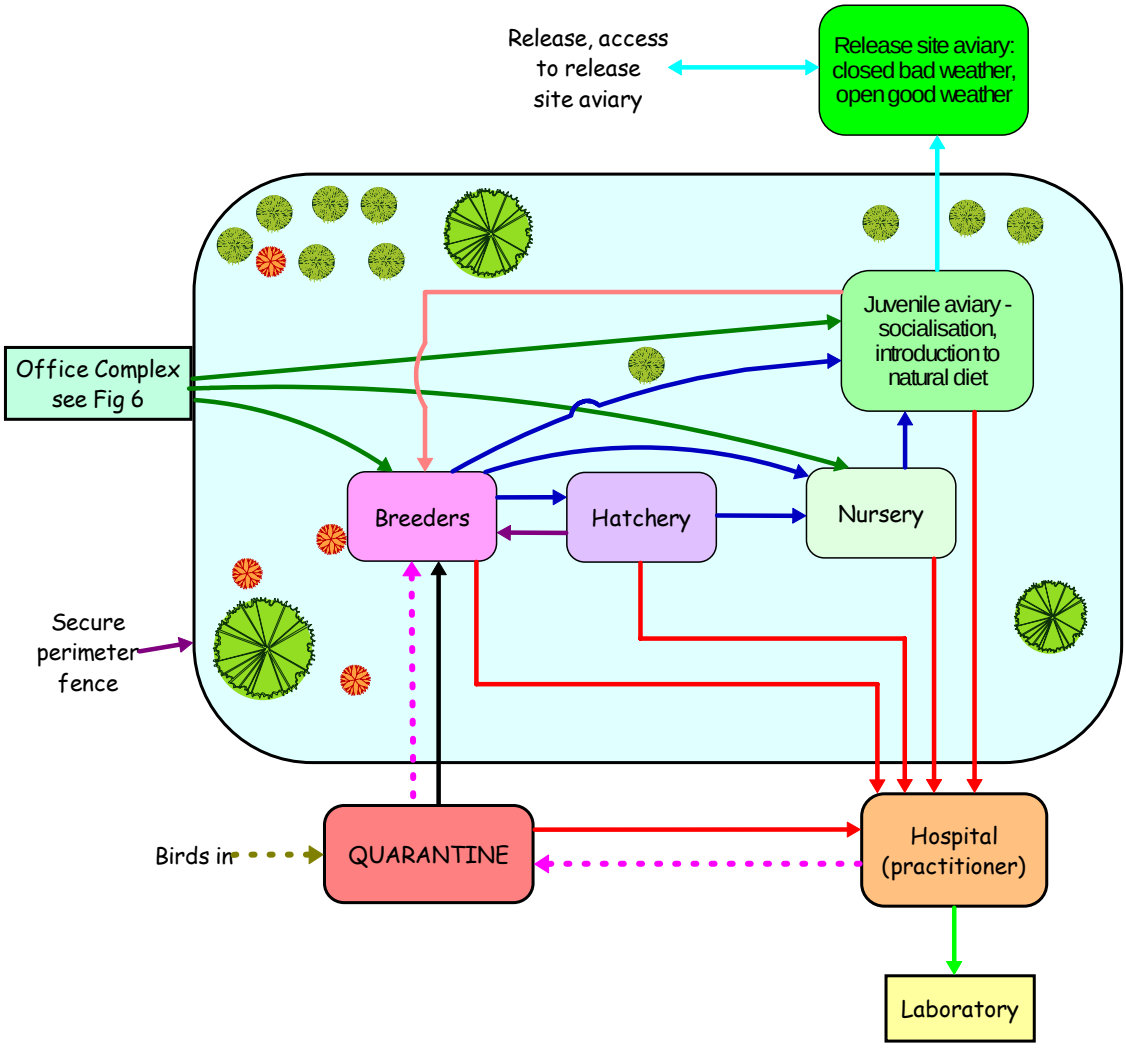
Food must be free of *Salmonella* and fungi (*Aspergillus*). Any food that falls to the floor is to be rejected. Food (and water, if necessary) is delivered directly from the kitchen to the various modules via a double-doored cupboard.

Suggested designs for a facility with breeder and juvenile modules (Figure 2), and one with breeder, hatchery, nursery and juvenile modules (Figure 3), follow.




**Key**:
- food to breeders and juveniles
- birds from quarantine to breeders
- birds from breeders to juveniles
- morbidity/mortality
- juveniles selected for breeding juveniles to breeders
- specimens from hospital to laboratory
- juveniles to release site and release
- recovered birds from hospitals to quarantine and then to breeders

**Figure 2: Proposed design for breeding (without hatchery or nursery), showing bird movement between modules**




Key:
- food to breeders and juveniles
- birds from quarantine to breeders
- birds from breeders to juveniles, from either hatchery or nursery, from hatchery to nursery, from nursery to juveniles
- morbidity/mortality
- juveniles selected for breeding juveniles to breeders
- specimens from hospital to laboratory
- juveniles to release site and release
- recovered birds from hospitals to quarantine and then to breeders

**Figure 3: Proposed design for facility with hatchery and nursery, showing bird movements between modules**

### *Construction of modules*

All modules must provide protection from environmental extremes. The modules should be separate, with the quarantine and hospital modules off-site. Modules should be placed in the facility with a mind to bird flow patterns (Figures 2 and 3).

Effectively sealed concrete floors are essential for vermin control and biosecurity. Sand, various gravels or dirt accumulate pathogens and transmit diseases via the faecal-oral route, and cannot be disinfected. Clipsham (1996) recommended that concrete be poured to extend at least 15 cm beyond the external walls to discourage rodent entry, and to drop from the centre to the edges 2.5 cm for every 1.2 metres. By having floor drains at the edges of the module, drains are placed away from traffic patterns.

Any benches are to be mounted from the walls.

Clipsham (1996) stated that concrete cinder block was the material of choice for walls, since it was insulative and reduced noise substantially. Metal is preferable to wood, but transmits heat and cold. Divisions between aviaries should be solid or double wired to prevent contact between neighbouring birds.

The roof should be impervious and drain adequately. Water run-off should be carried away from the module. Water from the roof may contain faecal material from wild birds, so care should be taken to exclude it from entering the aviary. Aviaries should be totally covered by solid roofing to prevent faeces from wild birds entering the aviary. Lazerlite or other clear material may be used to provide light into the aviary. If there is a high risk of contact with wild birds, wired parts of the module should be double-wired, either by incorporating a walkway at the front, or a space of 0.5 metres between the wires. There should always be two doors between the birds and the outside of the module, to prevent escapes.

Wire should be of stainless steel or nylon mesh (neophemas). Galvanised wire is not recommended.

All-stainless steel suspended cages allow droppings and uneaten food to fall to the ground below, avoiding the faecal-oral route of transmission of pathogens. However, the OBP needs access to solid ground, for example, impervious concrete with non-pathogen-containing sand or similar material spread over the concrete. OBPs need natural "ground foraging", an important habit for birds that are to be released. A tray of soil with growing grasses that they would access in the wild could also be provided. These would need to be removed and replaced every 7 days, before *Ascaris* spp eggs become infective (see here).

### ***Quarantine Module*** (figures 2 and 3)

The facility should be fully enclosed with one entrance and locked at all times. With this proposal, the quarantine module is external to the breeding and rearing facility. If the quarantine module is placed within the facility it raises the problem of containment of possibly sick birds that is avoided by having it at a remote location. For similar reasons, the hospital is also external to the facility. The quarantine module can be either nearby or remote. It is important that the hospital is nearby.

- Birds enter the quarantine module after undergoing pre-quarantine testing.
- The quarantine period starts with the arrival of the last bird.
- If any new birds are added to the quarantine module after quarantine has commenced, the quarantine period must be re-commenced.
- If a bird has a positive antigen test at either the second or third tests, then the quarantine period must be re-commenced.
- Birds are delivered securely from quarantine via the office complex to the breeder module. Birds enter the breeder module only after they have passed a minimum quarantine period in the quarantine area, passing all testing criteria and having received

all required treatments.

- Any birds leaving the facility to the hospital that have recovered, must go through quarantine before re-entering the facility. If birds are in quarantine and any birds are added, then all birds in quarantine must re-commence their quarantine period.

***Breeding Module*** (Figures 2 and 3)

- Birds are received from either the quarantine or juvenile modules. All nest boxes used by breeding birds in a year's breeding should be disposed of and replaced by new nest boxes.
- The new boxes should be sprayed with a pyrethrum spray and allowed to dry before installation. All porous equipment, such as perches, should be replaced monthly.

***Hatchery*** (Figure 3)

- This module is totally enclosed and separately serviced.
- There should be a minimum of three incubators, one to incubate, one to hatch and a spare.
- Eggs are received only from the breeder module.
- Eggs that are pipping may be returned to the hen of origin in the breeder module.
- Eggs that hatch in the hatchery and cannot be placed with a hen are transferred to the nursery for hand raising.
- There should be a back-up generator to cover power failure.
- One way to maximise the number of fledgling birds produced is to implement practices used by aviculturists in Australia. Eggs can be "pulled" from the hens, replaced with false eggs, the eggs artificially incubated and replaced under the hen at pip. The parents then feed the nestlings for the first 10-14 days, at which stage they are removed and hand-fed, allowing the parents to second-clutch. Indeed, some *Neophema* hens may return to lay at 14-18 days and can attack their clutch at this time. See Closed Aviary Concept - this practice applies to a situation where birds will remain in captivity and there is ample genetic base. In an endangered species program, there is a very limited genetic base, and problems of inferior stock may be encountered if numbers are maximised for introduction to the wild.

***Nursery*** (Figure 3)

Hand-rearing of OBP nestlings may not be an option in the short term, since there is a risk of imprinting. Cross-fostering may result in the chicks being imprinted on the call of the foster parent (e.g, a blue-winged parrot), and not that of the OBP.

The nursery module is the most sensitive area of the facility (Clipsham 1996) - contamination with microorganisms is a particular concern. Personnel entering the nursery should change shoes (or don disposable overshoes), and put on disposable gloves and headwear. The nursery should:

- be totally enclosed
- receive birds from the breeder module and hatchery, and never from outside the facility.
- have separate personnel
- have impervious and easily cleanable and disinfected surfaces
- have sufficient power outlets to allow for brooders - birds should be housed in separate brooders

Records are vital to the success of nursery operation

- Identification
- Date.
- Age
- Complete physical examination
- Parents
- Weight in grams on entry
- Daily weight, just prior to first morning feed
- Diet (amount taken each feed)
- Behavioural notes

### *Juvenile Module* (Figs 2 and 3)

- The juvenile module receives birds from the breeder module (Figures 2 and 3), or the nursery (Figure 3).
- Fledged birds are allowed to socialise in this module.
- Some of these birds may be used for breeding. These birds can be transferred to the breeder complex and do not need to enter quarantine.
- This module may qualify as a "soft release" module, provided the birds are given access to the foods they will eat after release.

### *Morbidity/mortality*

- Any dead bird or bird with clinical signs of illness is securely transferred to the hospital.

- Such birds may come from the breeder or juvenile modules (Figure 2) or from the breeder, hatchery, nursery or juvenile modules (Figure 3). Specimens from the hospital go to a laboratory.
- No problems will arise from the veterinary hospital performing, and collecting specimens from necropsies.
- However, for sick birds, the veterinary hospital should have a separate room or facility within the hospital that does not receive other client's birds for consulting. This room could even be a demountable. There should be minimal possibility of transfer of pathogens, with the clinician changing clothes, and wearing disposable gloves**.**

If an avian veterinarian must visit the facility, whatever module, it is preferable they come directly from home first thing in the morning after a shower and change of clothes at home and shower in to the facility. The clinician is to wear shoes that are not worn to the clinic, and hire a taxi to get to the facility, in order to avoid bringing pathogens that might be present in a clinic vehicle. Veterinary equipment would be a major problem in this instance, and this is why it is better to transport sick birds to the clinic, and when recovered, such sick birds would enter quarantine.

### *Environmental Cultures*

Environmental cultures of specific areas should be undertaken whenever a building is cleaned and disinfected to assess if the cleaning process is effective and if resistance is developing to Virkon-S.

### *Release Site*

Socialised, physically fit juveniles that have been exposed to foods they will encounter at the release site, may be taken to an aviary at the release site. The birds may be released immediately or later, depending on the weather. If the weather is inclement, the birds are maintained in the aviary until the weather improves. After one end of the aviary is opened, the birds can enter and leave at will. Feeding stations are also provided at the site. At the current site, such birds mix with wild birds and have been seen to immediately eat wild foods in the area.

*Managing Bird Feeding Stations*:

- If crowding at the station occurs, another station should be provided. Crowding is a key factor in spreading disease.
- Keep feeding stations clean, using daily 2% Virkon S on a visibly clean surface for at least 10 minutes contact time.
- Stations should be safe, with no sharp edges or points.
- Some pathogens that might be transferred at feeding stations include *Salmonella* spp, *Trichomonas* spp, *Aspergillus* spp.

### *Nest boxes provided for released and wild birds*

Each year, prior to disinfection of the nest boxes, samples of the nest material are to be assessed for BFDV, APV and *Chlamydophila psittaci* antigen, ensuring that cross-contamination of samples does not occur, and that samples are labeled according to nest box of origin. Nest boxes shall be cleaned and disinfected annually six months before re-occupation by wild and/or released birds.

In summary, a facility should be designed so that:

wild mammals and birds cannot gain access to captive birds;
it has a floor that is impervious and does not degrade;
drainage is from the centre to the edges; and
waste does not contaminate the environment.

Consequently, if personnel understand the concepts of hygiene, how pathogens are transmitted and the epidemiology of the diseases that are to be excluded from the captive birds, then management will contribute the great part of disease control in a captive bird facility.

### *Reference*

1. Clipsham R. 1996. Aviculture Medical Management, in *Diseases of Cage and Aviary Birds*,3rd Ed. Eds WJ Rosskopf and RW Woerpel, Williams and Wilkins Maryland USA. pp 880-903.