Aviary Birds:
Housing, Transport and Biosecurity

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Learning Outcomes

At the end of this learning activity you should be able to:

- Illustrate the concepts surrounding cage and aviary setup and design.
- Describe the requirements for housing and transporting caged and aviary birds
- Explain the principles of biosecurity and quarantine for captive birds.

LECTURE NOTES

Provision of correct and adequate housing for caged and aviary birds is central to animal welfare for the species being kept. Broadly, housing must enable the Five(5) Freedoms:

- Freedom from pain, injury and disease
- Freedom from fear and distress
- Freedom from discomfort
- Freedom to express normal behaviour
- Freedom from hunger and thirst.

Caged and aviary birds can be considered as any indigenous or exotic bird kept legally in captivity (this absolutely encompasses backyard chickens). Species that can be kept legally (with or without permits or licences) will vary across jurisdictions. Minimum conditions for the housing and transport of caged birds is underpinned by several pieces of legislation – both State and Federal. In Victoria, these include:

- The Prevention of Cruelty to Animals (POCTA) Act 1986
- POCTA Regulations 2019
- POCTA (Domestic Fowl) Regulations 2016
- Victorian Code of Practice for the Housing of Caged Birds

It is advised that you familiarise yourself with the relevant legislation in the State/Territory or Country where you practice. This lecture will address more general concepts pertaining to housing, transport and biosecurity of caged birds rather than being specific to any legislation.

Generalisations for housing birds

Before purchasing birds, one should have prepared housing that is appropriate for the species and intended stocking density; Codes of practice are particularly useful for the latter. Some aspects to consider when designing an aviary or cage bird set up are discussed below. Nutrition and how to provide food and water for caged birds has its own lecture within this series.

Size and Architectural Features

- Legislation relevant to the jurisdictional zone will state minimum standards for cage and aviary size, dependent on the species size (and mixture) and stocking density.
- Cages and aviaries should always be as big as the space available permits. The length should be at a minimum, at least twice the wingspan of the largest bird to be caged.

- For flighted birds, they should favour length over height; birds fly more like planes than helicopters.
- Is the bar spacing or mesh size suitable for the species? Generally, as cages get bigger, this spacing also gets bigger. This poses problems for smaller birds housed in larger cages if they can fit through the spaces. Spacing should be small enough to prevent them being able to get their head through or risk injury, potentially death.
- Protection from the environment in the case of outdoor aviaries. A portion of roof and one end of the aviary (three sides) should be solidly enclosed to provide basic shelter and protection from the elements (wind, rain, sun).
- Indoor cages rarely have any solid sides. Whilst being indoors protects from weather conditions, it does not necessarily remove a perception of exposure by the bird. Supplying a sheet/blanket/towel over part of the cage can be a simple measure to provide this security.

Location

- Orient outdoor aviaries to maximise warmth retention in winter and cooling in summer. Though, additional mechanisms for supplying both can be necessary in extreme climatic conditions.
- Indoor cages:
    - Keep away from windows. Being beside a window allows for predator visualisation/perception, increased temperatures from radiant sunlight, or cold air and drafts with open windows.
    - Be placed in an area with low human traffic to avoid constant interruption and arousal. This is especially important at night, when birds should be in darkness for 10-12hours. Disruption to dark/light cycles has physiological implications, often resulting in inappropriate egg production for which female pet birds present to veterinary clinics.
    - Not be housed near or in food preparation areas. This is both for human health (in biosecurity discussed below) and bird health. Many materials used in the kitchen can cause injury (ie, hot pans, boiling water, etc) or deadly toxicities (ie, Teflon fumes, pyrolytic/self-cleaning ovens)

Cage Material

- Metal basis? If so, which kind of metal is most suitable?
    - Galvanised zinc is commonly encountered for outdoor aviary set ups. This has the potential to cause zinc toxicosis in the birds, from any small metal particles that persist wherever two pieces of metal cross (ie, corners). Weathering, either naturally in the outdoor environment, or with acidic chemicals (such as vinegar) reduces this risk.
    - Powder-coated metals are a much safer option than galvanised zinc. They are often used for indoor companion bird cages.
    - Stainless steel – this is the safest option. The trade-off comes with cost and weight of the physical cage, making this an uncommon option without custom manufacture.
    - Metal cages are typically easiest to keep clean.
- Timber frames are suitable for some species of birds, notably chickens. Birds with chewing tendencies (ie, parrots), should not be housed in cages with timber frames, as they will easily chew through it and escape. Timber also comes in many different forms; some are toxic naturally (ie, cherry tree timber), whereas others have toxins added in the curing process (ie, treated pine). Being an organic substrate does somewhat limit the ability to keep these cages optimally clean.
- Plastic cages are rarely encountered for housing pet birds. Plastic cages are very useful in the veterinary setting as a hospital cage, providing an easy option for sanitation.

Flooring/Substrate

- Indoor cages usually have a catcher tray made of plastic or the same material as the cage, plus/minus a metal grate that overlays the catcher. The grate allows for a more hygienic cage environment, as food and waste falls below; though this should not be viewed as a substitute for frequent cleaning. It does, however, subtract from potential foraging behaviour that may otherwise be exhibited if food fell to an accessible level on the cage floor. The cage floor should be lined with a substrate that facilitates easy cleaning, for example, a layer of newspaper/paper towel or newspaper based cat litter pellets.
- Outdoor aviaries can have various types of flooring.
    - Dirt/gravel – organic material, unable to be cleaned. Risks sustaining parasite lifecycles and foreign body ingestion and obstruction. Does allow for foraging and natural plants to be grown within the aviary.
    - Grit – as per dirt/gravel. Requires shovelling in and out as part of hygiene/cleaning routine. Can add nutritional component.
    - Cement – easiest to clean as can be hosed or pressure cleaned. With frequent aviary cleaning, parasite lifecycles are less likely to be sustained.
    - Straw – commonly used in chicken coops or as nesting material. Susceptible to soiling, ammonia build up and microorganism growth without frequent turnover.
    - Woodchips/sawdust/etc – Not recommended. Larger particles have sharp edges which can cause injury to soft tissue. Ingestion can lead to obstructive disorders. High dust levels or aromatic woodchips can see respiratory illness.
    - Suspended aviaries are those which have a wire flooring suspended above the ground. This is potentially the most hygienic option, providing the area underlying can be suitably serviced and maintained.

Other animal access

- Ground dwelling predators (ie, foxes, cats, dogs) – can something dig into the coop/aviary from the outside? Prevented by burying mesh deep into the ground at the enclosure borders or using cement flooring. Ensure the cage wire is secured to the frame well to prevent predators from pushing through.
- Flighted predators – hawks and other birds of prey will rarely approach an aviary, though covering any exposed areas of the aviary with shade cloth helps prevent this without totally limiting sunlight. Butcher birds are a risk in many parts of Australia and preventing them access to an outdoor enclosure often proves challenging.
- Wild birds (ie, pigeons, sparrows, mynahs, etc) – risk from these birds is typically from overhead, with them perching on the tops of outdoor aviaries and passing droppings into the cage bird environment. Provision of roofing (solid or otherwise) is a simple method for minimising this contamination.
- Rats and mice – where there is bird food, there are typically rodents. Cement aviary floors, with mesh cemented to the floor helps keep these species out of aviaries. Avoid the use of traps, which can trap the housed birds accidentally. Rodenticide toxicity is a risk if baits are used within aviaries.
- Indoor cage set ups have considerably less risk from the above. Other household pets do potentially pose hazards. Keeping birds separately from other companion animals is advised to minimise stress for the bird being exposed to its predator frequently, and physical injury, should an undesirable encounter occur between the two.
- Children should not be provided access to pet birds without strict supervision. Despite well intentioned, they can accidentally release the bird/s or receive an injury or illness from said pet birds or their cage.

Enclosure furnishings

- Perches:
    - The best perches for all bird species are natural branches. Using branches sourced from outdoor environments does have an element of risk; some trees can be toxic (ie, cherry tree) while others may be heavily contaminated in wild bird excrement.
    - Commercial perches (ie, dowel, potentially plastic) provide no benefit for pet birds, and their smooth and homogenous surface can result in foot-related health issues.
    - Rope perches, whilst very common and aesthetically pleasing, pose entrapment, entanglement, and gastrointestinal foreign body risk. Their use is not advised except for in a very few veterinary contexts (ie, obese birds with severe bumblefoot requiring softer surfaces).
    - Grit covered or sandpaper based perches will be purchased by an owner with an intent of it having a positive effect on nail length. This should be considered no more than a marketing myth, as there is no substitute for natural substrates for abrading nail tips. Plus, it unlikely is very comfortable to stand on such a rough surface all day – a liken it to standing on a shell covered beach bare foot for hours and hours!
    - Calcium perches – in most cases, yet another marketing myth. This one has been covered in your nutrition lecture.
- Enrichment opportunities
    - Commercial toys – rarely are these designed with the bird in mind, especially the very economical ones. They are usually plastics, metals, and ropes. Some pose foreign body and toxicity risks, others can set up for inappropriate behaviours (ie, mirrors provided to budgies). There are some of the more premium commercial toys which have been manufactured to provide foraging opportunity – these should be encouraged over others.
    - Recyclable materials (ie, empty toilet rolls, cereal boxes, paper bags, etc) are a very cheap, sustainable enrichment option for birds, where the only limitation is the bird owners' imagination and creativity.
    - Fibre based products, be they natural or not, should be used with caution. Birds' natural instinct would be to preen, peck and chew anything in their cage environment. This results in small fibre particles being ingested, and over time, accumulating in the gastrointestinal tract and causing obstructive disorders.
    - Natural browse, such as branches with leaves and flowers, fresh grasses, etc can provide considerable enrichment potential for all bird species. Risk with these is in the form of disease introduction; selecting from minimally contaminated sources, and/or doing some basic washing of these reduces these risks. As per perches, non-toxic options should be selected.
- Breeding materials
    - This will be discussed in more detail in the aviculture lecture. The basics include provision of nesting material appropriate to the species being housed. It can be in the form of purpose-built nest boxes made of various timber products, hollowed out logs, provision of grasses from which birds construct their own nests, etc.
    - Breeding material should only be supplied if the intent is to breed the birds. Otherwise, it encourages reproductive hormone activity, which can be expressed inappropriately and can manifest into illness.
    - One to avoid – "Happy Huts". These are a commercial product, available at most pet shops, under various names, marketed as a place for a bird to sleep and feel secure. They are usually a fabric material presented in a triangular tube that hangs within the cage. Entanglement and entrapment of limbs as well as gastrointestinal obstruction from gradual ingestion of the fabric pieces is a common occurrence for companion birds. Inappropriate hormonal activity is also not uncommonly linked to the placement of a happy hut within a birds' caged environment.

Co-housing considerations

Where multiple bird species, or even large flocks of the same species are to be maintained in the one aviary, there should be provision of areas for individuals to elude other birds. Size requirement should align with minimum standards set out in legislation. There are many species incompatibilities that need to be considered if multi-species aviaries are desired. For example; zebra finch are exceptional breeders and will outcompete other finch species for nesting space; lovebirds are particularly aggressive to other birds and can cause physical injury when kept in mixed species aviaries. Lovebirds are also known for being carriers of certain contagious viral diseases and co-housing puts other species at risk. In some instances, there can also be detrimental effects if trying to co-house males with females of a particular species; Eclectus parrots are one such species. They have quite solitary lifestyles in the wild, coming together for breeding purposes only. When co-housed year-round, it is not uncommon for injury (potentially fatal injury) to be sustained to one; usually the female injures the male. A novice bird fancier should be encouraged to source this type of information from experienced bird keepers by contacting local breeding associations or bird clubs.

Species Specifics

Many of the housing decisions to be made can be ascertained by considering the species anatomy and physiology. In other cases, the intended function of the bird will have housing implications. The following table links these properties to housing considerations; though it should not be considered an exhaustive list.

Bird Order	Anatomical (or other) feature	Housing consideration
Galliformes	Ground dwelling, poor flyers **Smaller species can be very efficient at jumping	Outdoors appropriate, usually purpose built coops. All housing materials provided at ground level or with suitable ramps to allow elevation. Can have open tops or be free ranging though need protected areas (unless good at jumping heights). Should be securely enclosed overnight to avoid predation risk.
	Roost elevated	Perches free of sharp edges (avoid square/rectangular timber), at a suitable height, with soft landing area beneath.
	Daily egg production	Require secure nesting site and substrate.
Anseriformes	Ground dwelling	Outdoors appropriate. Securely enclosed overnight to avoid predation risk.
	Webbed feet	Pond or water source for swimming Avoid cement as causes chronic foot injury.
	Roost on the ground	No elevated perches necessary, though secure and enclosed roosting site with appropriate substrate should be provided.
Psittaciformes (The most commonly kept companion bird species)	Flighted	Need large aviary (indoors or outdoors) or time outside of indoor cage environment to exhibit flight. If outdoor aviary, a safety area or barrier is recommended for all human access points to minimise escape potential.
	Curved beak, primary defensive function	High destructive potential – no timber for cage exterior.

		Cage furnishings (including perches) should provide suitable materials for chewing and foraging behaviour.
	Inquisitive/intelligent	Can attempt escape from cage confines. Ensure doors are not a risk if this attempted (ie, avoid spring loaded and guillotine type doors). Draw bridge style doors recommended. Consider locks and complex latches on cage doors.
	Zygodactyl feet	Perch diameter should allow for feet to curl approximately 2/3rd around the perch. This will optimise nail length. Some size variability ensures optimised foot health.
Passeriformes (Commonly kept as aviary birds)	Flighted	Typically, in large outdoor aviaries. If outdoor aviary, a safety area or barrier is recommended for all human access points to minimise escape potential.
	Straight beak	Considerably less destructive than parrots so cage exterior can include untreated timber
	Syndactyl or anisodactyl feet	Perch diameter should allow for feet to curl approximately 2/3rd around the perch. This will optimise nail length. Some size variability ensures optimised foot muscular strength.
Columbiformes (Either racing pigeons or fancy pigeons, rarely companions)	Flighted and athletic	Large outdoor aviaries (called lofts) Some have homing potential so free flight encouraged with adaptations to the aviary to allow voluntary re-entry of birds – food reward common. Often housed as teams, breeders, stock birds.
	Heavy bodied	Flooring considerations to enable gentle landing.
	Anisodactyl feet	Perch diameter should allow for feet to curl approximately 2/3rd around the perch. Some size variability ensures optimised foot muscular strength.

Bird Transportation

There are many reasons one may need to transport birds; from pet shop/breeder to home environment, home to vet clinic, to race meetings for pigeon owners, to name a few. The most important aspect of transporting birds is to ensure they are restrained. Unrestrained birds within any vehicle has the potential to result in a road traffic accident. As such, in Australia, there are legal penalties associated with driving with an unrestrained animal.

Restraint for birds being moved typically occurs in some sort of boxed or cage-based device, ensuring adequate ventilation is preserved. Size permitting, companion birds can be transported in their regular cage. If this is for a trip to the veterinary clinic, this is useful as it allows for the veterinarian to assess the state of the birds' cage set up. When regular home cages are too large, small travel cages, equipped with a perch and food and water bowls can be all that is needed. They should be covered in some way, to enable the bird to feel secure. Cat and dog carriers are great options as an alternative. They have the added benefit of being easily cleaned, as they are typically constructed from plastic materials. Larger carriers are equally suitable for transporting bigger birds, such as chickens and ducks.

In the case of companion parrots, it is now possible to purchase bird transport backpacks. These are great if people are looking to include their companion birds in regular outings, but ensure they are safely restrained. An alternative is to train companion parrots to wear a harness and lead. This does take considerable positive reinforcement training to ensure compliance and a stress-free bird; it should not be assumed that parrots are immediately receptive to this as this is unlikely to be true. The do have risk of injury and escape if used inappropriately. Bird breeders and pigeon fanciers will typically have custom built transport boxes made of a timber-based material.

Birds presenting to vet clinics will often do so in cardboard boxes. Whilst these are not unreasonable for all bird species, they do have an increased likelihood of enabling escape. Parrots can easily chew through cardboard. Soiling of the bottom with droppings or water can see the bottom of boxes fall out under the birds' weight. Inadequate closure of the tops of boxes permits escape as does displacement of lids on shoeboxes. As such, cardboard boxes should be discouraged as a suitable means for bird transportation.

Next is to consider the duration of time encompassed in transporting a bird. Is water and food provision indicated? Supplemental heating or cooling? If the vehicle is to be disengaged for a time, what is the implication for the birds being transported (they too should not be left unattended in a locked car). The Code of practice, along with other legislation, is a good place to seek information specific to the transportation event at hand.

Biosecurity

Biosecurity can be considered any procedure or measure that aims to protect against harmful biological substances. Put into the context of caged birds, it encompasses everything from basic hygiene and cleaning practices, preventing access of other animals, through to quarantine procedures.

Hygiene and Cleaning Routine

Each circumstance under which captive birds are housed will have a unique hygiene and cleaning routine applicable. These are largely dependent on the way said housing has been established and individual traits of the birds and flock kept in the captive environment.

In the case of a single pet bird, confined to a cage, the daily cleaning routine may involve merely washing food and water bowls with warm soapy water, and removing waste foodstuffs from the bottom of the cage. Every other day, the catcher tray may require its substrate be changed. Once weekly the perches and cage furnishings may be cleaned and/or rotated; once monthly the cage may require a deep clean.

An outdoor aviary will require a slightly different routine. The daily process may be similar, with fresh food and water containers being cleaned with warm soapy water, though dry food hoppers may undergo a complete clean once weekly. The flooring type will dictate both the frequency of aviary floor cleaning and how this is performed; cement can be pressure cleaned weekly, dirt floors may require trowelling daily or every other day to remove prominent excrement, with a deep layer of top soil removed and replenished every few weeks to months.

Cleaning routines should always be performed by an adult, with suitable personal protective equipment in place. Chemicals used in cleaning processes can be basic dish detergents or household disinfectants, although there are some bird specific products (ie, Avicare) that can be sourced. For some infectious organisms, veterinary hospital grade disinfectants may be required (ie, F10). All cleaning products should be thoroughly rinsed before coming in to contact with the birds, food or water (unless there is a labelled stipulation that indicates otherwise).

As part of biosecurity processes, one must consider waste material disposal. Bulk faecal material or water waste contaminated with faeces, should be disposed of into appropriate wastewater channels; a toilet works well for flushing small water volumes. Other materials contaminated with faeces that cannot be flushed, should be placed into general rubbish. Please note, any recyclable materials contaminated with faeces should not be recycled. Washing of bowls, perches, etc, should occur in designated sinks, that are not concurrently used for human food preparation or sanitation. For larger scale set ups, where considerable biological materials are requiring disposal, waste management companies should be engaged.

Interspecies Factors

Within the biosecurity banner falls the potential for transmission of biological agents from any animal (including humans) external to the enclosure to the bird or flock within. Humans can easily bring disperse biological material into aviaries from footwear and clothing. Companion birds are most susceptible when owners have visited other locations where biological material could deposit on their skin or clothing (for example, a trip to the local bird pet shop). Practicing good personal hygiene, and being aware of these risks, will enable bird owners to amend their action and reduce this risk.

Other animals are more likely to contaminate outdoor aviaries than indoor pet bird cages. Wild birds perching on top of aviaries and the ability for rodents to access the inside of an aviary are both commonly encountered with outdoor set ups. Prevention occurs through provision of aviary roofing and rodent proofing respectively.

Quarantine

One of the most pertinent components to biosecurity is quarantine. Bird enthusiasts have a tendency to collect birds, and as such, their quarantine protocols should be optimised to minimise introduction of pathogens to a naïve flock or individual. Rarely will a true “closed flock” situation be encountered outside the poultry industry. All and any new birds should be housed in a designated quarantine area. Ideally, this should be separate to an isolation area; isolation areas should be reserved for sick birds from within the existing flock.

The designated quarantine area should be as far as possible from the main bird housing. In the case of individual indoor pet birds, the aim should be to avoid a sharing of air space by the resident and newly acquired bird. The quarantine area (and isolation area alike) should be completely self-sufficient, with its own cages, cage furnishings, food supply, bowls, and utensils. Foot baths are advised at entry/exit points as are clothing changes or the use of coveralls. Quarantine areas should be tended to in the daily routine after the main aviary routines have been completed.

Any newly acquired bird should undergo a six week quarantine period, as a minimum. This is based around the incubation time for Chlamydia psittaci; a zoonotic pathogen that has the potential to cause severe disease in birds. There are now known to be several other pathogens, with longer or poorly defined incubation periods, which is an argument for maintaining closed flocks rather than relying upon quarantine procedures. Prophylactic medication use for quarantined birds is not advised. In the case of antibiotics, this can easily select for resistant bacteria. All birds in quarantine should receive a veterinary health check, which includes a microscopic droppings assessment at the start and end of their quarantine period; the droppings assessment allows for parasitic burdens to be assessed and treated on a need basis, versus prophylactically. Additional caution surrounding medication usage should be exercised when quarantining poultry; they are recognised as food producing species, and have additional legislated requirements surrounding medication use.

Once quarantine protocols have been fulfilled, the bird can be transitioned to its permanent housing. For aviary birds, short periods of exposure to a new aviary environment, whilst being contained in a

smaller cage will help prevent any flock hierarchy disruption and associated maladjustment. After several days, the smaller cage can be opened to allow the new-comer the option to join the flock. All quarantine materials should be thoroughly cleaned and disinfected, and kept empty for at least a week prior to re-use.