Avian Nutrition

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Learning Outcomes

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

- Describe the general nutritional requirements of common aviary bird species
- Explain the different forms of feed available for captive caged and aviary birds.
- Portray the principles of biosecurity surrounding avian nutrition.

LECTURE NOTES

Nutrition is the process of consuming food for use by the body towards growth, tissue repair and maintenance of life. It is linked to overall health and wellbeing of all animal species, with birds being no exception. Provision of adequate nutrition to pet birds is essential for enabling them to develop and grow into healthy adults who can reproduce, have competent immune systems, capable of preventing disease and allowing for healing. In general, we consider nutrition to encompass water and the five(5) major food groups; carbohydrates, fat, protein, vitamins and minerals.

Water

Provision of water to pets, including birds, fulfills a basic welfare requirement. It should be provided in such a way that it is easily accessible to the bird. Consideration needs to be given to the placement in a cage or aviary, such that it does not incur contamination from droppings, food, or other materials. The natural behaviours of the species will dictate suitable placement of water sources and design of the water delivery method. For example, ground dwellers need to be able to access their water from ground level, whereas flighted birds can have their water source elevated. Many birds will also like to bathe in their water bowls.

Use of open topped water bowls have increased risk of spillage and contamination with food, faeces, and even feathers if the birds use the water bowl as a bathing location. Bowls should not be placed under perches, in direct sunlight or anywhere where contamination from wild birds could occur. Commercial drinkers will limit contamination from food and faeces, though enable higher bacterial/fungal levels if the holding tank is infrequently washed and replenished. The water bowl material should be carefully selected, as some have the potential to cause toxicity (ie, galvanised zinc containers). Water bowls are typically made of stainless steel, plastic or ceramic, though other metal bowls can still be readily sourced.

The life history of a bird species will ultimately determine how much water it is likely to require. For example, desert dwelling species (budgies) have physiological mechanisms for tolerating drought, and thus can potentially sustain days without drinking; juvenile atricial birds require considerably more water than adults. A good rule of thumb is to consider maintenance fluid requirement to be 50ml/kg/day, adapting based on life stage. For birds to drink the water on offer, it must also be palatable. The addition of supplements or medications can drastically alter palatability, limiting a birds' intake.

Feeding strategy

As with water provision, how one supplies and provides food to a pet bird will be impacted by the natural behaviours of the bird species. Factoring in contamination potential is also of high importance. Thus, when setting up a cage or aviary, the following questions should be answered with the needs of the species in mind:

- Is the number of feeding stations appropriate for the number of birds?
- Where is the food provision apparatus being positioned?
    - Indoors or outdoors?
    - On the ground or elevated?
    - Is overhead faecal contamination possible (from perching birds, wild birds flying over an aviary)?
    - Is it likely to be in direct sunlight?
    - Is it able to be secured to avoid tipping or spillage?
- What type of feeding apparatus is appropriate for the species?
    - Open topped bowl? Material (plastic, metal, ceramic)?
    - Hopper style? Material (plastic, galvanised, other)?
    - Does this allow for any natural behaviours such as foraging? If not, how could practices be amended to allow for this?
- Can this type of feeding apparatus cause injury or entrapment?
- Is it possible to easily clean and maintain the feeding apparatus with how it is positioned?
- Is there potential for:
    - toxicities (ie, Zinc from galvanised equipment)?
    - contamination by rodents (Salmonella, Yersinia, Pasteurella to name a few)?

An essential part of nutrition provision is the consideration of hygiene. Good hygiene practice involves daily cleaning of all fresh food and water containers with warm soapy water and thorough rinsing. Frequency may need to be increased if wet foods are provided or contamination occurs. Feeding apparatus containing dry foods can have less frequent cleaning, aligning cleaning to soiling or other contamination events. Failing to practice good hygiene can result in the introduction of food-borne pathogens and/or maintenance of parasitic lifecycles.

Biosecurity is equally as important as hygiene. Failure to observe strict biosecurity measures when preparing and providing food can result in the introduction of pathogens. For the individually housed pet bird, good biosecurity typically involves purchasing fresh foods from a reputable source and washing it before use. Aviary set ups should have a designated set of food and water bowls and utensils for the main aviaries, and completely separate sets for quarantine/isolation areas. The quarantine/isolation areas should be tended to last in the daily feeding routine.

Food groups and types

Avian nutrition (excepting commercial poultry) is an area of relative infancy compared to mammalian nutrition. The general concepts of ensuring the five(5) food groups are balanced for each species of bird is ideal, however, it is limited by the diversity of bird species kept as

pets with varying, and often inadequately researched, nutritional requirements. It is an ever evolving and expanding field, so continue to watch this space in the literature.

An alternative method for considering avian nutrition is to take a food type approach. Generally speaking, there are five(5) food types that are fed to birds. It must be noted that regardless of the food type offered, of paramount importance is what the bird actually consumes within the offered diet; the two are rarely the same.

1. Seeds
   This has historically been considered a "natural" diet for all birds. It is easily acquired by owners and is inexpensive. Whilst a vast majority of birds will consume seed in the wild to some degree, the seeds encountered fresh in the wild, across all geographical locations where birds exist, are hardly likely to be represented by those found in a box or bag at the supermarket or pet store. In addition, pet birds confined to a cage/aviary/household, do not encounter the same requirements for energy provision as their wild counterparts. Pet birds are also known for being selective in the seeds they will consume when offered an excess with frequent replenishment, resulting in a diet being further restricted to potentially even a single seed type (ie, sunflower seeds).
   Seeds, fed as a sole diet, are nutritionally incomplete. They are typically very high in fat and deficient in protein, fibre, most vitamins and minerals. Over time and generations, this type of diet is likely to manifest as disease for the individual and produce congenital malformations in future generations.

2. Supplemented seeds
   The addition of supplements to seeds is a way in which pet food companies attempt to overcome some of the deficiencies of a seed-only diet. Supplements can be incorporated into the seed mix by the producer or by the owner (with a secondary product). Supplements can be powdered, pelleted, dried fruits or vegetables, or nuts.
   Powdered supplements (minerals and vitamins) are typically of little benefit, as they rely on the powder somewhat adhering to the hull of the seed, being taken up by saliva (of which birds have very little) or the hull being swallowed (not likely for those species that dehusk seeds, like parrots do). Powdered supplements can be added to moistened food, though this increases the potential for bacterial and fungal proliferation in the food. They can also be added to water, though as discussed, this can affect water palatability and consumption.
   All other types of supplements essentially dilute out the available seed in the diet and add variety for the bird. However, this relies on the bird eating all components of the provided diet. Most birds are very selective with their food, and will purposefully avoid the supplements, rendering their use redundant.
   Dried fruits (less so vegetables) can be considered condensed sugars thanks to the dehydrating process. Nuts are also high in fat. If these are consumed by the bird as part of a supplemented diet, they are likely to have excessive sugar and fat intake, which would ultimately be stored in the body as fat.

3. Seeds with fresh vegetables and fruits
   Similar to the aforementioned supplemented diets, the addition of fresh fruit and vegetables to a seed diet is based on the principle of diluting the seeds. Again, it relies on

the bird actually consuming the vegetables and fruits. A method of maximising this is to cut all veggies and fruit very small, if not blend the components, to make "chop"; a term well known among bird enthusiasts. Adding fresh materials directly into a seed mix does come with risk of contributing to food spoilage. It can be offered separately, though, doing so removes the dilution effect. Ensuring food is provided fresh daily, with bowls cleaned in warm soapy water and rinsed, is essential for preventing bacterial and fungal overgrowth. A majority of the fruits and vegetables available for human consumption are safe to provide to pet birds. Choosing leafy vegetables over energy dense vegetables (eg, corn) and fruits is preferred, as any excess energy intake from energy rich foods would be converted to fat. Green leafy vegetables (eg, silver beat, bok choy, kale, etc) are a rich source of vitamins and minerals. Red and orange coloured fruits and vegetables (eg, oranges, chillies, pawpaw, etc) are typically an excellent source of vitamin A and essential in some species' diets (ie, Eclectus parrots).
Toxic: avocado, onion and rhubarb are all considered toxic to birds and should not be fed.

4. Table/human foods
   Human food is not recommended as a suitable diet for a pet bird. It is unlikely to ever be balanced from a nutrient perspective. It also has the potential to over supplement some nutrients (ie, salt – which we find tasty), resulting in illness for the animal. The only time these foods could be considered for use is as an incentive for positive reinforcement training, though portion size must be strictly controlled.
   There is also a tendency for pets consuming human foods to eat at the dinner table or off of peoples' plates – this poses anthropozoonotic disease risk.

5. Manufactured or formulated diets
   These include extruded and pelleted diets; both are a mash of various foodstuffs that are pelletised – the difference being the first is treated at high temperature in the formulation process. These diets prevent "picky eaters" from selectively choosing certain foodstuffs over others. It is often a less messy way of providing food for parrots, as hulls are not present, and thus, not removed and dropped.
   This type of diet is more likely to be nutritionally balanced, although limitations do exist because of the diversity of bird species kept as pets and an inability to cater individually for all (as yet!). Many manufactured diets will make claims on the labelling about it being "complete and balanced". This should be interpreted with caution, as no commercial diet for pet birds is likely to be sufficiently tailored to any given species. To compensate for species' variations, fresh vegetables, fruits, grasses, nuts, etc, should be provided daily, in separate containers. The percentage of fresh to manufactured diet should be altered based on consideration of the likely natural diet the species would encounter in its wild counterparts' geographical niche.

Miscellaneous supplements
The supplements noted earlier are typically those that provide a nutritional value to a pet bird. However, people will present birds with other supplements being offered. Some examples include:

- *Grits*
  These are commonly found within many commercial bird feeds, or recommended by pet shops/breeders/etc, to be added to a birds' diet. Grit comes in two forms; soluble (ie,

crushed sea shells) and insoluble (ie, small stones and rocks). Both are provided for the purpose of aiding the breakdown of foodstuffs when in the muscular ventriculus. Insoluble grits are passed in faeces or are retained in the ventriculus indefinitely. Soluble grits will eventually be broken down and either absorbed or passed in faeces. Soluble grits should not be used for the purpose of supplementing calcium.

- *Cuttlebone*
  From the marine mollusc, Cuttlefish, the cuttlebone is often found washed up on beaches. It is classically used as a source of calcium for pet birds or with the intent of "keeping their beaks short". The cuttlebone is too soft to have any effect on the shape of a birds' beak, and whilst some provision of calcium is possible, it should not be considered a substitute for a balanced diet. There have been instances of birds engorging on this causing life-threatening gastrointestinal obstructions. If it is not thoroughly rinsed, it also holds the potential to cause severe electrolyte imbalances from the salt residue of sea water.
- *Red factor*
  This is a pigment supplement specifically for canaries. When added to the diet, at the subsequent moult, yellow canaries will take on a red colouration.

<u>Maintenance nutrition for different bird Orders</u>

A birds' upper digestive tract anatomy underpins the types of foods that can be prehended and digested, ensuring maximised nutrient absorption. Diet will also be impacted by evolutionary history surrounding food types and availability in the geographical niche of origin. The list below summarises dietary recommendations for commonly kept pet bird species and notes any pertinent anatomical features.

Galliformes *(eg. Chickens, quail)*

- Feed commercial poultry diet, appropriate to the life stage.
- See poultry nutrition lectures.

Anseriformes *(eg. Ducks, geese)*

- Several commercial diets that have been formulated with Anseriformes in mind.
- Supplementation should occur with fresh green leafy vegetables, plants and grasses.
- Avoid feeding breads and pastas, as can result in musculoskeletal deformities.

Psittaciformes *(eg. Parrots and parakeets)*

- Anatomical considerations: curved beak capable of dehusking seed, muscular ventriculus.
  - Variation for lorikeets and lories which have a brush like tip to their tongue, less developed musculature of the ventriculus compared to other psittacines.
- Seed based diets commonly fed with varying degrees of supplementation.
- Preferred: Formulated diets with fresh vegetables and fruit provided daily. Note, the percentage of formulated diet to fresh foods is highly variable depending on species. A 50:50 ratio of formulated to fresh is considered an adequate starting point.
  - Lorikeets and lories should be fed a formulated nectar mix. There are wet and dry preparations available, in a range of qualities. Wombaroo or Passwell Lorikeet food is considered a high-quality nectar for these species in Australia.

- Natural browse from tree species endemic to the species' geographical niche can provide nutrition and enrichment. Note; toxicities are possible, so check before offering.

Passeriformes *(eg. Canaries, finch, magpie, wattlebirds, etc)*

- Anatomical considerations: straight bill type. Further subdivided depending on shape and density of the beak, as well as tongue anatomy.
    - Nectivores, insectivores, omnivores, granivores all within Passeriforme order.
- Diets for the species commonly kept in captivity are typically seed based.
- They may have vegetables, fruit or insects supplemented.
- Certain species are nectivorous and thus require powdered nectar formulations.
- Grit can be offered.
- Fresh native grasses and browse has both nutritional and enrichment value for many species. Note; toxicities are possible, so check before offering.

Columbiformes *(eg. Pigeons, doves)*

- Anatomical considerations: have the potential to be very athletic.
- Usually provided a grain/seed based diet with added legumes for increased protein.
- Grits required to grind ingested seed within the ventriculus.
- Many mineral supplements often supplied.
- Are some formulated diets available on the consumer market.
- Often complex diet, with unique modifications based on owner (anecdotal) experience.

Feeding for Life Stage

Birds should always be fed in line with the life stage of the individual. In some cases, there are formulated diets with specific life stage claims (ie, chicken starter, parrot hand rearing formula). At other times, such as prior to breeding, during egg production for non-poultry species, during a moulting process, etc, tailored and specific diets are rarely available. To cater for these circumstances, general maintenance dietary recommendations should be followed and optimised, with the addition of supplements on an as needed basis. For example, additional calcium should be provided during times of egg production. It should be noted that additional supplementation of an optimised diet during a maintenance life stage, is not recommended, as oversupply can be just as detrimental to health as deficiency.

Dietary Conversion

Birds are creatures of habit and routine. If provided a new type of food they do not recognise, they will be wary and reluctant to even go near it, let alone consume it. This poses problems for converting birds on unsuitable diets to more appropriate diets. Any diet conversion attempt should occur very slowly, potentially over weeks to months. Clients should be made aware of the need to be patient and do this process slowly. Birds should be frequently weighed (once daily ideally) during the conversion process to ensure weight remains static, or any desired weight loss is occurring in a controlled manner.

The process of conversion can involve mixing the new food type in with the seed mix and slowly weaning out the seed. Pelleted formulas can be moistened to allow them to stick to the seeds, allowing for pellets to be tasted at the time of seed prehension. High reward seed

types (ie, sunflowers) can be stuck into the flesh of vegetables and fruits to entice birds to take the seed and taste the vegetable matter accordingly. Creativity can be key to a successful conversion attempt.