



Everything You Need to Know about Birds (Not Chickens!) Mini Series

Session One: Husbandry, Nutrition, Clinical Examination and Grooming Procedures

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Session one

Husbandry, captive care, species identification, grooming procedures, nutrition and behaviour of psittacines

The order Psittaciformes consists of parrots, macaws, cockatoos, parakeets and lorries. Parrots have powerful hooked beaks, short necks and zygodactyl (digits 1 and 4 face caudally, digits 2 and 3 cranially) prehensile feet. Psittacine birds vary considerably in size with typical species seen ranging from budgerigars (30g) to green winged macaws (1400g). Budgerigars, cockatiels and parakeets have shorter lifespans of 10 - 20 years where as larger parrots can survive for over 50 years in captivity. Parrots originate from tropical and sub-tropical regions of the world in a variety of habitats including tropical rainforest, savannah and semi-desert. The group is essentially vegetarian and some species are specialised feeders, for example lorries only eat pollen and nectar, requiring specialised care. The majority of parrots are "hole" nesters and lay clutches of white eggs. Parrot chicks remain in the nest for a long period after hatching and hatch covered in feather down. Parrots are very popular birds mainly kept for their intelligence and potential for training. Many species are excellent mimics.

Parrots seen in veterinary practice are either kept as individual birds in indoor cages or as part of a collection in aviaries (either private or zoological). Aviary birds are typically kept as individual pairs, although smaller species such as lovebirds, cockatiels or budgerigars are kept in colonies. Some species are kept as exhibition birds and are highly prized for their colour and shape. A large variety of captive mutations are available for the more commonly bred species.

Aviary design is important for the long term welfare of the occupants. It is essential to leave a space between each aviary to prevent parrots biting toes of their neighbours.

The aviary would normally consist of a building providing shelter and sleeping quarters (traditionally a wooden shed) combined with an outdoor wire mesh flight. Building materials need to be parrot proof from their potentially destructive chewing, stainless steel is the most suitable structural material. It is advisable to buy the best wire available as cheaper imported galvanised mesh has been associated with zinc toxicity in parrots. Care should be taken to ensure the provision of adequate perches, nest boxes, feed and water containers to prevent territorial aggression. Outdoor aviaries need to be easily accessible for cleaning and feeding. A double door system is advisable to help prevent birds from escaping.

The substrate of an aviary should preferably be constructed from a hard material (paving, concrete or stone) to reduce the risk of vermin, aspergillus, endoparasitism or avian tuberculosis. Many breeders of larger parrots suspend the aviary to enable droppings to fall through the mesh floor base and prevent the birds foraging on the ground. The majority of the roof area should be left open to allow natural exposure to ultraviolet radiation but a small section can be covered to permit protection from predators and severe weather conditions.

Pet birds can be housed in a wide array of cage types, which vary in size and price. These are unfortunately normally devised to appeal to the owner rather than to suit the needs of the bird. Any caged bird should be able to extend its wings in all directions as a minimum. It is best to permit the parrot considerable opportunity to get outside the cage into a secure and safe environment, using the cage as a resting place. Many cages are galvanised with zinc and made cheaply in Europe. Higher quality zinc free cages are more costly and the owner will remember paying a lot for the cage.

Commercial cages are normally supplied with unsuitable perches for parrots both in terms of size (unsuitable diameter) and material (plastic or smooth wood). Perches should be replaced as soon as possible with natural branches which provide an irregular surface of varying diameter. This allows for increased blood flow to the feet and avoids the development of pressure sores on the feet. Hard wood or fruit tree branches can be used so long as they have been thoroughly disinfected and provide excellent environmental enrichment by encouraging chewing behaviour, in addition to keeping feet and nails in good condition. These should be from 'non stoned fruit' and free of pesticides. They should be cleaned before use using a disinfectant such as F10. Suitable perches are commercially available and are made from Manzanita wood (which is very hard). Some have coated surfaces or are made of solid material to assist with keeping the nails filed down and are called 'sandy perches', 'therapeutic perches' or 'concrete perches'. These are suitable for use, but are indestructible and can lead to pressure sores on the feet of the bird. It is best to supply a single perch only which is not used for roosting (keep it lower in the cage). Sanded perch covers are still available and are often used but are not recommended as they too lead to sores on the feet.

Newspaper is an ideal floor covering, cages should be cleaned out daily and old food stuffs and faeces removed to help reduce spread of any infection.

Soaking the paper with a disinfectant prior to removal reduces air borne particles and is of particular importance to reduce the likelihood of transmission of zoonotic diseases such as chlamydia. Hygiene is important for successful captive care.

Many owners provide a play stand on which the parrot can spend most of its day. A popular design is the 'Java Tree' products which provide variable diameter perching. These are also available to be placed in cages.

Parrots are highly intelligent creatures so the provision of toys is recommended. Heavy metal toxicity is a fairly common problem and can be caused by lead or zinc found in chrome and galvanised metals which can be found in things like zippers, curtain weights, old paintwork and household keys. It is also commonly found in the clips attaching toys to the cage. It is preferable to allow limited access to an individual toy to prevent boredom by employing a rota system.

Owners need to make sure that the parrot does not have access to any potential dangers such as electric cables, pets or toxic plants if allowed free access around the house. Potential toxins include avocado, bacon, chocolate, lead, mycotoxins (mouldy nuts such as peanuts can contain aflatoxins), polytetrafluoroethylene PTFE (from overheated Teflon cookware), rodenticides, caffeine, tobacco, salt, zinc, lead, plug ins, deodorants and opioids.

Housing birds permanently indoors is responsible for many problems. The lack of natural exposure to ultraviolet light can affect the efficiency of vitamin D metabolism (particularly in Grey parrots) and preening behaviour. Access to UV-b should be considered for all species and this is essentially available from two sources. Exposure to sunlight, either in a 'day aviary' or wheeling the cage outside onto the patio on sunny days is to be encouraged. Providing shelter from the heat of the day is important and draping a towel over part of the cage is suitable. Artificial UV-b sources are available and have been shown to have a positive benefit on vitamin D metabolism as well as stimulating normal behaviour. These should be placed on the exterior of the cage and used for a minimum of four hours daily.

Indoor pollutants including air fresheners (especially plug in varieties), deodorant aerosols and cigarette smoke can lead to dry, brittle feathers and ultimately plucking behaviour. They can also lead to irritation of the air sacs and lungs as their unique respiratory system makes them highly susceptible to airborne toxins. Teflon coated pans used for cooking are a hazard to parrots as overheated pans produce toxic fumes that cause acute respiratory distress and even death. This is all compounded by the dry warm environments encouraged by central heating in modern homes.

There is now a European ban on importation of wild birds which means that most birds being presented are captive bred birds. A captive bred parrot is more acclimated to humans than the wild counterpart but the degree of taming can vary from an aviary bird used for breeding, an aviary bred juvenile caught and caged for the pet market to a hand reared bird (often sold as EBHR – English Bred Hand Reared). Other descriptions of hand reared parrots include 'silly tame'.

However many breeders give little thought to biosecurity and many parrot chicks from different breeders are hand reared in one unit with no quarantine. This has led to viruses becoming endemic in the UK population especially psittacine beak and feather disease (PBFD) and psittacine proventricular dilatation disease (PPDD). The young are also imprinted on humans in many cases creating numerous behaviour problems in later life.

Identification of species, sex and age

Correct identification of the species and sex of individual birds is useful both for breeding and clinical reasons and instils confidence in the owner. Many diseases are age related (such as polyoma virus in young birds) and others are typically seen in particular species (for example persistent egg laying in cockatiels). Many owners have no idea what species they possess or will tell you the wrong one. It is worth getting reception to ask owners on the phone what species they have and to identify is problem prior to the bird being presented. It is worthwhile noting that many avian presentations our emergency cases that should be seen promptly.

The majority of parrots are sexually monomorphic but can be sexed by DNA analysis. Endoscopic sexing is considered an unnecessary mutilation by the RCVS as a result of the widespread availability of the genetic tests. However visual assessment of the gonads can be extremely useful for birds intended for breeding as it can give an indication of sexual maturity, reproductive activity and to rule out pathology. Many owners will tell you the sex of their bird when actually they have no idea. Egg laying is obviously a good indication as to the sex of the bird.

Parrots are difficult to age although there are some useful clues. Grey parrots and many macaws possess a dark grey iris at birth. The colour gradually lightens over the first year finally becoming yellow at maturity. Thus 'black eyed babies' is another frequent term used within the trade. Small psittacines become sexually mature after 6 – 12 months and larger parakeets and parrots maturing at 2 – 3 years of age.

Commonly seen species

Family	Important groups and sexing	Lifespan	Species weight range
Budgerigars <i>Melopsittacus undulatus</i>	Males have a blue or flesh coloured cere. Females have a brown or white coloured cere. It is possible to sex juveniles with careful examination of the cere around the nares.	7 – 10 years.	40 – 60 grams
Cockatiels <i>Nymphicus hollandicus</i>	Males have no wing or tail bars when sexually mature. Females and juveniles have bars. In the grey variety (wild type) sexually mature males have yellow heads. Females and juveniles have grey heads.	10 – 15 years.	90 – 110 grams
Parakeets	Most are not dimorphic. Important to identify commonly seen groups such as the Lovebirds <i>Agapornis sp.</i> and Conures <i>Aratinga sp.</i>	10 - 15 years.	40 – 250 grams
Ecelectus parrot	Males are green and females are red.	25 – 50 years	450 – 500 grams
Grey Parrot <i>Psittacus erithacus sp</i>	Not dimorphic although some experienced breeders get a high percentage correct based on head morphology. Two sub species the silver and the timneh (smaller and maroon tail)	25 – 50 years	450 – 550 grams
Amazon parrots <i>Amazona sp.</i>	A large variety of species possible. Important to identify commonly presented species such as Orange Winged and Blue Fronted.	25 – 50 years	360 – 560 grams
Cockatoos <i>Cacatua, Eolophus and Probosciger sp.</i>	Variety of species. Commonly seen species include Sulphur Crested, Galahs and Umbrella cockatoos. Males have a black iris and females a red iris when sexually mature.	25 - 50 years	450 - 750 grams
Macaws <i>Ara sp.</i>	Largest of parrots but there is a dwarf family. Commonly seen species include the Blue and Gold and the Greenwinged.	25 – 50 years	550 – 1200 grams

Parrots may be identified by microchip or rings. Rings can either be 'closed' which require placement as a juvenile confirming they are captive bred and will have the year of birth on them with a sequence number and identifying letters. However these are not under any form of control and many can not be used to identify the original breeder.

'Split' rings can be applied at any time and are used to identify older birds in a collection, may be 'sexing' rings and can be used to fool a purchaser into believing they are captive bred or hand reared. Many parrots fiddle with their rings and can easily crush split rings leading to trauma, or they can catch them in wire and lead to fractures as the bird panics. 'Ring bind' is a common term used by breeders and trauma can be severe by the time the owner has noticed. Anaesthesia is likely to be required to remove the ring as fractures are a possible complication of removal. Dremmel tools and bolt croppers can be used to cautiously remove the rings. Analgesia, antibiotics and dressings may be required if there is significant soft tissue trauma.

Typically one are is cut through (or already performed in split rings) and a second area is scored. Haemostats can be placed in the gap and gently opened out to elevate the ring from the birds leg. These wounds surprisingly heal well and the ring should be returned to the owner. Rings may be required for legal identification of specimens and a microchip should be placed in these cases. Where birds have been out on loan for breeding the return of an intact ring is often used as confirmation the bird has died (as opposed to being sold or hidden out of view from the original owner). It is worthwhile considering the removal of rings from birds which have reached their final pet home, before problems occur.

Birds should be scanned for a microchip. Placement sites may vary. Microchips should be introduced into the caudal third of left pectoral muscle mass, anaesthesia though not absolutely necessary, is preferable for smaller birds. The feathers should be parted and the area disinfected. The bird should be secured well and stretched. The approach can be proximal or distal. There is no requirement for suturing, though digital pressure over the injection site will reduce the possibility of the microchip being withdrawn with the needle and control excessive haemorrhage. Proper restraint is vital to minimise complications.

Grooming procedures

Wing clipping is frequently requested by clients or may have been performed by the breeder, trader or pet shop. The intention is to prevent escape or to provide help, albeit short-term, with training, but the procedure is controversial. Birds are designed to fly and this is vital. Clipping prevents this and can lead to psychological problems, particularly in young greys. Taming is possible as the bird is unable to escape (fight or flight behaviour) leading to 'enforced' exposure to the owner and is highly stressful. In these situations the bird may launch itself from the high perch it has climbed up to only to land heavily on the ground leading to pain and damage to the keel. The skin in this area is tightly adherent to the keel bone and can easily become split. Osteomyelitis of the keel bone can also occur if infection set in. Pain and self mutilation of the site is possible and it can take at least a month to heal lesions. Feather plucking the area is a possible sequel. The procedure also appears to lead to poor moulting behaviour (probably because the weight of a feather is a trigger factor for the moult) and feather picking owing to the presence of old, splintered feathers. My recommendation is that this should not be performed on welfare and ethical grounds.

There are a variety of views relating to the technique and if it is performed should be bilateral. Single wing clips unbalance the bird. No wing clip is 100% effective the bird should always be flight tested in the surgery and clear warnings given to the client. It is vital to use a sterile pair of sharp scissors for the procedure to avoid frayed feather ends.

The feathers should be cut short so they are protected by the covert feathers. Typically the last 2 – 3 distal primary feathers are left (to disguise the fact the bird has been wing clipped). **Do not clip blood feathers.** These appear as feathers with a darker rachis because it is full of blood. A feather sheath may also surround growing feathers. Leave one feather unclipped either side of a blood feather to stabilize it. Other individuals clip the distal primaries as this limits the bird's main ability for lift.

An alternative to wing clipping is to harness train the bird. If the owner requires wing clipping 'for the safety of the bird' then they should review their husbandry practices and consider if they are suitable owners of such a pet.

If problems are encountered following a wing clip the feathers can be replaced by the traditional falconry technique of imping and it is useful to keep a store of feathers frozen for this eventuality. In most cases the feather rachis is so damaged that imping is impossible and removal under anaesthesia is required. Primary feathers attach to the periosteum of the bone and removal is painful anaesthesia and analgesia is therefore required.

Claw trimming should be unnecessary in most birds if attention is paid to perch design and nutrition. Perches should be of variable diameter along their length with a rough surface, if these are provided the claws naturally keep in good condition. Malnutrition, high protein diets and in particular liver disease should be suspected in any bird with over grown claws, as they lead to abnormal keratin metabolism. The author does not recommend concrete perches as, although they keep nails trim, they are associated with the development of bumblefoot type lesions on the sole of the foot. In small psittacine birds a sharp pair of canine nail clippers is appropriate but in the larger parrots burring the nails with a dremel is recommended. This is typically performed conscious, although anaesthesia can facilitate the procedure. This has the bonus of providing heat to cauterise any blood vessels nicked by the device. It is preferable to be cautious as if haemorrhage occurs it can be difficult to control (using silver nitrate or potassium permanganate) due to the birds knocking any clot formed from their claws. If the owners try at home corn flour can be advocated to stem the bleeding as an emergency procedure. Chemical cautery is painful.

Beaks should never need reshaping unless there is a underlying problem with the bird. This can include congenital malocclusion in young birds or damage occurring during the hand rearing process from over zealous feeders. This can be seen where syringe feeding or spoon feeding in hand reared parrots is performed from one side only leading to distortion of the malleable beak during the growing phase. In adult birds trauma (e.g. being bitten by a mate), disease (e.g. scaly face in Budgerigars or neoplasia) and most importantly malnutrition are the only reasons for beak reshaping. Dietary correction can lead to an increase in the interval between reshapes but it can take many years.

The beak is well innervated and highly sensitive and therefore beaks should always be reshaped under general anaesthesia unless overgrowth is mild. Nail clippers should never be used as poor clipping leads to further problems with the beak, although in cases where malocclusion is severe the bulk of the beak can be removed with the dremel used for final shaping. The dremel does generate heat and damp cotton buds or gauze will be required to cool the beak. If overgrowth is severe it is preferable to use several procedures under anaesthesia, in an attempt to reshape it rather than one aggressive one. The vascular supply to an overly long beak can extend beyond that of normal anatomy and caution is to be exercised. Beak trauma can be intensely painful and the use of analgesics is critical.

Avian nutrition

Avian beaks are modified according to dietary requirements and in parrots they are also important for prehension and locomotion. The oesophagus in birds is quite distensible. The crop (ingluvium) is an outpocketing of the oesophagus and functions to store food. Pigeons, parrots, falcons and eagles have crops but owls do not. The shape of the ventriculus (gizzard) varies in birds from a simple fusiform continuation of the proventriculus (most carnivorous and piscivorous species) to a hard muscular chamber in psittacines. In psittacines it is usually palpable on the left side just caudal to the sternum. The proventriculus is analogous to the secretory stomach of mammals and the ventriculus acts as a mechanical crush to grind food, as birds do not have teeth.

Parrot nutrition

Chronic malnutrition is a common clinical presentation in captive psittacines. It is therefore of paramount concern to both aviculturists and veterinary surgeons to provide a nutritionally adequate diet. Most pet parrots have multiple nutrient deficiencies or excesses rather than problems with a single dietary component. Recent published research indicates that the optimal diet for pet parrots is one based on a complete, balanced formulated product with limited seed and human food supplementation. It has been shown that parrots fed diets consisting of less than 50% balanced formulated food risk deficiency of several vitamins and minerals, particularly vitamin A, vitamin E and calcium. However, the majority of psittacine birds are still fed "parrot seed" mixes promoted by the pet trade which are usually nutritionally inadequate and are of poor quality. This is also encouraged by the perception that pelleted diets are cost prohibitive. Nutritional problems are common in all psittacine birds, grey parrots, cockatoos, budgerigars and cockatiels are the most frequently represented. This is probably because they are the parrots most likely to resist changes to their diet. Birds learn to feed at an early age based on mimicking the foods taken by other members of their flock. Thus they learn how to feed and what to feed on prior to arriving at the pet home. They may also become fixated on individual food components within the diet and selectively take these items. Given birds can survive on a small amount of seed (due to its low moisture content, high fat and high protein and hence energy levels) and that a large quantity is frequently offered, there is a huge difference between what is offered as food and what is actually taken.

A good exercise is to evaluate the food offered by tipping it onto a sheet of paper; then evaluate the food left by the parrot in the same manner. It soon becomes apparent to the owner the bird is selectively feeding on certain components only. Many owners also falsely provide variety by offering millet sprays, honey bars or other 'seed' based products.

Dietary recommendations

Species	Wild Diet	Recommended captive diet
Budgerigars, cockatiels and small psittacines	Granivore - native grass and seeds.	Formulated diet or good quality fresh seed mix, with sprouted seeds, fruit and vegetables as supplements. Do not feed ad lib due to problems with obesity. Avoid larger fatty seeds, such as sunflower.
Grey Parrot	Florivore - seeds, fruit, flowers and nuts.	Formulated diet with limited vegetable supplementation. Provide UV-b light for adequate vitamin D3 metabolism or calcium supplement.
Amazon parrots	Frugivore.	Formulated diet or pulse mixture supplemented with fruit. Avoid seed as very prone to obesity and fatty liver.
Cockatoos	Omnivore - seeds, plant roots and insects.	Formulated diet. Avoid high fat seed diets.
Macaws	Frugivore & granivore - seeds, fruit, nuts, leaves, shoots and bark.	Formulated diets with 10% vegetable supplementation. Avoid excessive use of nuts as treats

A full dietary history is therefore a vital part of the routine consultation for any psittacine bird presenting for clinical examination. Evaluation of the type of food fed, the amount fed, plus any supplementation is essential. It is also vital to analyse what the parrot actually eats rather than just what it is offered as parrots in captivity can be very selective feeders, often becoming fixated on individual dietary components.

Dietary components

The basal metabolic rate of parrots depends on the climate of their country of origin with temperate species having a rate higher than those from the tropics. Energy requirements vary with age, environment, activity, physiological processes, reproductive behaviour and species. Obesity is common in parrots fed on high fat seed based diets and fatty liver disease is commonly seen in such individuals.

Water should be freely available at all times. The daily water requirement varies with environmental temperature, species and diet. The provision of fruit in the diet has been shown to significantly decrease water consumption whereas the feeding of formulated diets increases water consumption. This variability in water intake makes it impossible to standardise intake of vitamin supplements through the water supply and many psittacines will reduce voluntary water intake when either supplements or drugs are added. Conversely intake is increased when breeding and toxic levels can be achieved at this time. Water bowls should be kept clean and disinfected regularly as contaminated water is a common source of infections. It is common for pet parrot owners to offer drinks such as tea, coffee or soft drinks as an alternative to water. This should be discouraged, as parrots are very susceptible to caffeine toxicity and crop burns can occur with hot drinks.

Vitamin and mineral supplementation

Psittacine birds are unable to synthesise most of the vitamins they require so these have to be supplied in the diet. Unfortunately, over-supplementation with multi vitamin mixtures is an increasingly common occurrence in aviculture that can lead to either hypervitaminosis or secondary hypovitaminosis. This is particularly true for vitamins A and D. Fat soluble vitamins (A, D, E and K) can be stored for long periods of time so parrots can withstand long periods of depletion before deficiency signs manifest. This can also lead to problems with toxicity, especially of vitamins A and D in over-supplemented birds. Water soluble vitamins (B complex and C) cannot be stored and must be supplied constantly in the diet. There are a number of minerals essential for optimum health but, with the exception of calcium, research is lacking.

Diets commonly fed in captivity

Commercially available parrot diets can be divided into either seed based mixes or modern formulated diets. Both diet groups are frequently supplemented with a combination of soaked pulse mixtures, vegetables and fruit. In addition commercial vitamin and mineral supplements are often added. Cuttlefish bone and iodine blocks are frequently offered to small psittacines.

Seed based diets can lead to deficiencies in vitamin A, B12, D3, E, calcium and iodine and imbalances in amino acids. They also contain excessive fat and can be contaminated by fungal or bacterial agents. The addition of fruit and vegetables to these diets can help to correct deficiencies in vitamin A for example (if highly coloured fruits and vegetables are given) but they do lead to high levels of sugars and fibre. Contamination of these sources is also common. However they do provide a useful vehicle for supplementation. This is probably the most common diet used by breeders but intake is variable and problems seen may still be identical to all seed diets. Hypervitaminosis is possible if the owners are over zealous and birds selectively take supplemented food. In many cases this is a compromise achieved where owners will not or are unable to convert their bird onto a more suitable diet.

Seed based diets are the foundation of most aviculturist diets and the resistance of owners to change can be extremely challenging. The trade continues to recommend and sell seed mixes, usually based on sunflower seed, as “complete” parrot diets. The seed mixes are normally balanced using a biscuit supplement containing both vitamins and minerals to create a ‘complete diet’ if the parrot eats the whole ration. Unfortunately selective feeding is common so the majority of birds will be fed a nutritionally inadequate diet. Although parrots will survive on seed mixes, they are chronically malnourished and unhealthy with poor reproductive performance. Studies have indicated that seed diets are deficient in many nutritional components, especially essential amino acids (chiefly methionine and lysine), calcium, vitamin A, vitamin D and iodine. Seeds are also high in fat and most also have an inappropriately low calcium to phosphorus ratio. Although it is possible to fortify seeds with minerals, vitamins and essential amino acid coatings, it is difficult to create a balanced diet as seeds are rapidly dehusked when eaten.

Seed quality in the pet trade is generally poor and is usually classified as unfit for human consumption. This means that the nutritional content of seeds in the mix is also poor. In addition, the seed may be contaminated with bacteria and fungal spores which are potential pathogens, especially when fed to malnourished birds. Aspergillus is a potential consequence of feeding a poor quality seed based diet. Mycotoxins are also a common problem in poorly stored seed mixes. Seeds should really only be considered as a complementary diet; they should be stored in airtight bins and, if seeds are fed, they should always be of human food grade quality. Such seeds, however, have usually been dehusked which can further reduce their nutrient composition, but at least the kernels can be assessed for quality. Many aviculturists use a pulse based diet for larger psittacines or a homemade diet as an alternative, with vitamin and mineral supplementation.

The optimal maintenance diet for pet parrots is a complete formulated diet (at least 80% of total food consumed) with some additional fruit and vegetables. It should be noted that not all commercial products are of comparable quality so care should be taken before recommending particular products. A maximum of two tablespoons per day of pelleted diet is required for many parrots. Obesity is still possible if fed ad lib. Formulated diets are manufactured either by a pelleting process or extrusion procedure. The extrusion process binds components at high temperature, pasteurising ingredients to reduce both bacterial contamination and dust. In addition the process increases both the palatability and digestibility of many dietary components. Pellet diets are produced at lower temperatures and are considered inferior due, firstly, to the increased risk of bacterial contamination and, secondly, to only moderate palatability. Formulated diets use the extrusion process to combine dietary ingredients, providing a nutritionally complete nugget. This means that parrots cannot select individual components, thereby preventing imbalances.

Aviculturists generally supplement diets with a combination of fruit and vegetables to add variety and interest. It is also generally believed that this will supply essential vitamins or minerals, although frequently this is not the case. Fruits produced in temperate conditions are nutritionally poor should only be considered as a sugary drink. Tropical fruits have a better protein and fibre content so their incorporation in diets is more rational.

With formulated diets thought to be nutritionally complete, the addition of fruit and vegetables dilutes the important nutritional components, thereby unbalancing the diet. Vegetables, especially pigmented varieties are nutritionally useful. High grade products should always be used in order to avoid feeding material contaminated with potential pathogens such as aspergillus moulds. The use of organic fruit and vegetables is to be recommended wherever feasible. Avocado should not be fed to captive parrots as some strains contain toxins that cause death within several hours.

Grit is a good source of minerals, especially calcium. In the smaller granivores, such as budgerigars, grit helps digestion by enhancing the grinding action of the gizzard. The lack of grit in budgerigars has been implicated in cases of *Macrorhabdus* infection. Grit should be supplied regularly in small amounts as either mineralised grit or oyster shell. One common nutritional problem in budgerigars is iodine deficiency, which can be easily prevented by the supply of commercial "pink" iodine blocks. The provision of grit is recommended for the large psittacine birds although no requirement has been demonstrated.

Dietary conversion

Conversion to formulated diets or encouraging birds to take a variety of foods can be difficult to achieve as parrots frequently become fixated on individual food items and are resistant to change. The bird may have to learn different feeding methods and indeed may not even recognise the new food source as food. Such birds may starve to death even though food is available.

Owner education is of paramount importance as only a convinced and dedicated owner will successfully convert their birds. Many are totally unaware that parrots in the wild eat a variety of foods, not just seeds. There is also resistance amongst aviculturists against formulated diets as they are felt to be both uninteresting for the birds to eat and expensive. Many birds require treatment of primary diseases before dietary changes can be implemented but improved nutrition should always be considered once normal appetite has returned. It should be explained that many deficiencies will take a long time to recover. There are a number of strategies that can help the clinician achieve a successful dietary conversion.

Top tips for dietary conversion

- 1 Weigh bird and monitor weight gains or losses during conversion period.
- 2 Introduce new diet dispersed through previous mix, gradually increasing the percentage of new diet fed.
- 3 Do not feed ad lib but 2-3 times daily for 60 minutes. In the case of small birds two teaspoons of seed a day is sufficient for maintenance.
- 4 Add the new diet to favourite foods.
- 5 Encourage the owner to eat the new diet in front of the bird. Place the bird in sight of other parrots that are already eating the formulated diet. Diets such as Harrisons are human grade.
- 6 Conversion is easier if there are several birds involved especially for the smaller parrots. A mirror can be used to trick birds. This should be placed on the floor with the new diet scattered over the surface. The bird is encouraged to feed by its own reflection. This works particularly well with cockatiels and budgerigars.
- 7 Soak formulated foods in sweet juices (e.g. fresh orange juice), increasing the water contents and warming the mixture can all help to encourage consumption.
- 8 Hide food in favourite toys or in the substrate used on the cage floor.
- 9 Feed the new diet outside the cage.
Feed the new diet on alternate days, gradually increasing the number of days fed.
- 10 Hospitalise bird for dietary conversion if the owner is adamant that the bird will not change. These birds can be converted in a 'cold turkey' fashion with careful monitoring of bodyweight. Birds resistant to formulated diets can be stomach tubed for several days so that they acquire a taste for the food. Typically many convert within 5 days.
- 11 Advise owners that complete dietary conversion may take up to 6 months.
- 12 Advise breeders to wean their progeny onto formulated diets as these will be willingly accepted at this point.
- 13 Advise owners that visible improvements in their bird's plumage and general condition may take up to 18 months.

Manufacturer information and suppliers for formulated diets and vitamin and mineral mixes are available at:

- Harrisons Bird foods www.harrisonsbirdfoods.ee
- Kaytee Products Incorporated www.kaytee.com
- Mazuri Diets www.mazuri.com
- Pretty Bird International www.prettybird.com
- Rolf C. Hagen Corporation www.hagen.com

- Roudybush foods www.roudybush.com
- ZuPreem Diets www.ZuPreem.com
- Bird Care Company www.birdcareco.com
- Vetark Products www.vetark.co.uk

Consequences of malnutrition

Chronic malnutrition commonly presents as deterioration in the integument and plumage when malnutrition has reached severe levels. Lysine, methionine and cysteine are essential amino acids necessary for feather quality, growth and pigmentation. They are deficient in all seed diets. Severe deficiencies are required before feathers are affected. All changes are potentially reversible but owners should always be advised that improvements will take up to 18 months as new feathers will need to be produced.

Obesity and lipomas are commonly presented in seed fed overweight birds.

Fatty liver disease is common in seed fed captive parrots. Affected birds present with abdominal enlargement, and diarrhoea is a common symptom due to chronic malabsorption. There is usually also evidence of increased respiratory effort due to enlarged hepatic size. Radiography will indicate enlarged livers and abdominal fat. Lactulose and hemicellulose may aid in treatment of hepatopathies.

Atherosclerosis can develop with fatty diets. The intimal lining of large blood vessels can become replaced by fibrous tissue with fatty infiltration underneath the vessels luminal surface. Vessels can become calcified which is evident radiographically. Atherosclerotic vessels are sometimes radiopaque due to calcification. But many birds present as sudden deaths due to vessel rupture.

Vitamin A deficiency is widely regarded as the most common vitamin deficiency suffered by captive parrots being fed a seed based diet. Toxicity may also be a problem as the signs are very similar to a deficiency and many formulated diets and supplements contain high levels of vitamin A. The maintenance requirement for cockatiels has been reported to be 2000 IU/kg. Deficiency causes squamous metaplasia of epithelial cells lining the respiratory, gastrointestinal and urogenital tract leading to hyperkeratosis, poor feathering, poor colouration, reproduction and chronic respiratory infections. Renal disease is also a possible long term sign of deficiency. Respiratory disease, renal disease, diarrhoea and gout can all be associated with hypovitaminosis A.

Loss of papillae around the choanal slit can be used as a presumptive diagnosis. Loss of papillae on the feet and rhinolith formation are also commonly seen. Low hatchability, poor growth rates in young birds, increased susceptibility to opportunistic infections and, if the deficiency is severe, vision loss may also be encountered.

Diagnosis is by clinical signs, examination of the vitamin A composition of the diet (including supplements), and liver biopsy (liver biopsy is more reliable than blood sampling) but 1 gram of tissue is required and this is impractical in the clinical situation. Treatment of deficiency is by oral supplementation. Caution should be exercised as excess dietary vitamin A can cause secondary deficiencies of other fat soluble vitamins. Parenteral injections are best avoided due to concerns regarding the toxic effects of vitamin A. Natural sources of vitamin A include fish liver oil, alfalfa, carrots, sweet potato, green vegetables, capsicum (bell peppers) and corn.

Deficiencies in calcium, vitamin D3 or improper calcium to phosphorous ratios can lead to nutritional secondary hyperparathyroidism, osteodystrophy and pathological fractures in young parrots, hypocalcaemic seizures, egg binding, poor egg shell quality and poor reproductive performance. Grey parrots have been shown to have an increased incidence of clinically significant hypocalcaemia and osteodystrophy compared with other psittacine species. It is generally considered more useful to measure serum ionised calcium levels in parrots rather than total calcium levels when investigating disorders of calcium metabolism. In grey parrots normal ionised calcium levels are between 0.96-1.22 mmol/L with clinical signs apparent at levels less than 0.6mmol/L. Changes in pH can affect ionised calcium levels. Adult grey parrots suffering from chronic hypocalcaemia present with neurological changes ranging from twitching to convulsions (seizures). The condition usually responds to injections of vitamin D and calcium supplementation in the short term. In cases of chronic hypocalcaemia, it may take several days for the clinical symptoms to resolve and for blood levels of ionised calcium to return to normal. Recurrence can be prevented by the supply of a formulated diet containing adequate calcium and vitamin D.

Indoor parrots with inadequate dietary intake of vitamin D3 (all seed diets) and without access to unfiltered sunlight are at risk of deficiency. Consideration towards providing increased UV-B radiation above the birds would also be useful, particularly where dietary conversion is not possible. Calcium toxicity is rare but manifests as soft tissue mineralization and renal disease.

Iodine deficiency is relatively common in budgerigars and presents as hypothyroidism and goitre, but can be seen in pigeons. The cause is usually a poor quality seed diet. Affected birds develop "goitre" (thyroid hyperplasia) and become obese due to a low metabolic rate. Thyroid testing is not generally available for psittacines and diagnosis is presumptive based on clinical signs. Treatment is 0.3% Lugol's iodine, 1 drop in 20ml water, daily for 1 week, three times in the second week and then once weekly. Most available thyroid tests are designed for humans or dogs. These tests are not usually able to detect the relatively low concentrations of T₄ in the avian patient. To measure T₄ activity more accurately, a TSH stimulation test is required. Recently, a stimulation test in several genera of birds has been developed in the USA using synthetic human thyroid stimulating hormone. Reference ranges for most species are currently limited.

Vitamin E is a lipid soluble antioxidant that when deficient is mainly associated with necrosis due to oxidative change. Steatitis is seen when deficient in fish eating birds. Myopathies associated with encephalomalacia can be seen in growing chicks of psittacine species.

Poor reproductive performance has been recorded in macaws. Cockatiels can show weakness, crop distension and wing/leg paralysis.

Iron functions in oxygen delivery, oxidative metabolism and enzymatic processes and is essential for all living things. Hemosiderosis is when iron accumulates in reticuloendothelial cells/ parenchymal cells leading to overload without toxicity. Hemochromatosis is when iron accumulates in reticuloendothelial cells/ parenchymal cells leading to functional and morphological change (toxicity). Parrots generally have a low susceptibility to hemochromatosis but lorikeets and fruit eaters can be affected. Avian species that appear more susceptible are starlings, mynahs, hornbills, birds of paradise, fruit doves, lorikeets and toucans. Diagnosis is usually by liver biopsy (histopathology + measure liver iron concentrations). Avian serum iron levels vary widely and are not always an accurate indicator of hepatic iron stores. Treatment can involve dietary modification to decrease iron uptake (add tannins to the diet e.g. tea leaves) or limit dietary items high in ascorbic acid and citrate that increase iron absorption. This is mediated by the oxidation of ferrous ions (Fe^{2+}) to Ferric ions (Fe^{3+}). Phlebotomy removes iron from the body via haemoglobin in the red cells, but treatment may have to be prolonged to establish an effect. Deferoxamine and deferiprone are iron chelating agents that have been used successfully in birds.

Anorexia is a common symptom in diseased birds. The nutritional requirements of ill parrots differ in that they need increased energy, fat, protein, vitamin and minerals in their diet. Commercially prepared juvenile hand rearing formulae can be used to supply these additional nutrients to diseased adult birds and, as anorexia is common, these foods have the advantage that they can be tube fed. Small psittacines have a high metabolic rate and anorexia is a genuine emergency. Fat storage is usually minimal in birds as the extra weight impairs flight. Thus any increase in metabolic demands leads to body condition loss.

Parrot behaviour

In the wild parrots are loud, bold, aggressive, colourful, impressive birds. They form variable sized flocks made up of pairs and family groups. Their intelligence, combined with dexterous feet and powerful beaks, allows them access to food and other resources. One of the greatest challenges of living wild is simply finding food. Most wild animals spend most of their waking hours foraging for food. Many leaves, nuts, buds, flowers, fruits and seeds are ripped open, dug up, stripped off and plucked to supply needed calories. Less desirable foods are sometimes eaten, supplying other nutrients to the hungry wild hoard.

Compare this to captive pet birds that have no opportunity to explore the world, are supplied with high calorie foods, and receiving little exercise, either physical or mental.

A hand reared baby parrot, kept as a pet will be very interactive with humans, and their owners tend to be very bonded. In these cases the bird may see the owners as parental figures. Many birds reach their final home as young as sixteen weeks of age.

Some owners will have more than one parrot in the house, which if carefully managed can result in a contented household, after all these are flock species that enjoy company. Time and space available may limit many owners to be “single” parrot households. These birds can be very tame and easy to handle if they have been well managed.

Poor management as a juvenile can, however, lead to an overconfident or aggressive bird that rules the roost or one that has an inappropriate bond with a human and see them as a potential mate. Indoor parrots also need routine, training and discipline if they are to be healthy and content.

The human criterion for intelligence is the ability to learn. Those species that have a long training period and continue to develop their behaviour over a relatively long period are typically considered intelligent. Precocial birds, such as chickens are hatched with the ability to forage, hatch with all the skills needed to survive. They exhibit little ability to change or adjust their behaviour or to be trained, so are considered less intelligent. Parrots, on the other hand, are hatched naked or downy (altricial), are fed by the parents and remain in the family group for several months, learning to find food and protect themselves. They have a long development stage and develop some complex behaviour. This pattern is similar to that found in both human and nonhuman primates. By this standard parrots might be considered highly intelligent.

Basic training of house birds is therefore important; it creates a positive bond between owner and bird. Parrots enjoy the interactive nature of ongoing training while “flock” hierarchy is maintained. Again it is often a neglected area. A bite from a parrot can be very nasty; a large macaw can do some serious damage. A well behaved parrot that respects its human friends will have a much richer life than one that is left stuck in its cage because every one is scared to touch it.

Parrots learn by mimicking. In the wild, role models would include the parents and other birds in the flock. If the intent is to have the bird mimic its human companions, it is best not to house it near or with another bird. Birds learn more easily from other birds than they do from humans.

Reinforcement of a particular behaviour comes in the form of a response to the behaviour. If the response is favourable (in the birds opinion), the behaviour will be repeated. Behaviours that are reinforced will continue. The bird that screams for attention is reinforced by having its human companion scream back. The bird considers that a favourable response. Learning how to control your responses so that they send the appropriate message is an important part of training both the owner and the bird!

The term “pecking order” originated from studies conducted on flock hierarchy. The bird that dominated “pecked” the other birds and was considered the leader. Flock order is necessary to establish which birds have access to prime resources: the best nesting spots, the ripest fruits, the top branch in the tree. Pecking order allows conflicts to be resolved with ritualised interactions. It is only when the social order is challenged that combat is likely to occur, even then, conflicts are usually brief.

Parrots always consider themselves candidates for the top of the social order, and may continually challenge their human companions to see if the position is available. A large percentage of these birds eventually become dominant when their owners become intimidated and back down. To prevent this “mutiny”, owners must continually give dominant signals.

Cages should be positioned so as to provide a secure shelter for the bird, as well as a social aspect, a corner of a room or against a wall is good. An appropriate environment is as important as good training. Birds spend many hours in their cage, so they must be comfortable. The cage should be as large as possible for the available space. The general rule is that the cage be wider than it is tall. Height is an important factor in establishing leadership over a bird. If the cage goes to the ceiling and the bird can look down at its human companion, the bird considers itself dominant. The size of the bird is also a factor in selecting a cage. A macaw should have a cage sufficiently tall so that its tail does not drag. The cage should allow adequate exercise and space for climbing and wing flapping.

Birds become territorial about their cages. If the bird has the whole house as its ‘cage’ it is not as aggressively territorial as it is with a true cage. This is not to say that giving a bird free reign in the house is necessary as there are many dangers in the average home, but more time out of the cage is certainly a benefit. All birds that are not under immediate supervision should be returned to their own cage.

Perches should be placed so that human eye level is higher than that of the birds, this will quietly enforce the humans senior rank in the household. An assortment of perch sizes and shapes should be available, as well as swinging or moving perches, natural tree branches, and rope perches. Rope perches should be knotted to reduce the risk of limb trauma.

Toys such as hard plastic items (that cannot be chewed up), rawhide, cardboard, leaves, flowers, leather pieces, soda straws, twigs, paper cups, bottle tops, or any natural items that the bird can use to chew, eat or tear up are appropriate. Avoid toys with lead pieces, spring clips, split-ring connectors, sawdust stuffing or breakable plastic or glass parts.

Aiming to copy natural day length times is important for parrots. They need to have twelve to fourteen hours of daytime which should include exposure to both UV-a and UV-b lighting. A room temperature around 16-20°C is suitable for most parrots but extremes of temperatures should be avoided as should drafts. Parrots need ten to twelve hours of darkness in which to rest. A blackout cover over the cage can facilitate a good night’s sleep. The cages should be in a quiet place or a second “sleeping” cage may be a solution. All birds need their own space, and time alone during the day as well.

Most parrots are intelligent, sociable creatures that need company and stimulation. A parrot that stays alone for many hours may appreciate a radio or TV to provide background noise or activity. An answering machine near the birds’ cage will enable you to call and “talk” to the bird several times during the day. The owner may bring the bird to work and it will probably enjoy the adventure and look forward to time at “work”.

A bored parrot is likely to become unpleasant to have and may develop behavioural and health problems. Parrots that live in multiple bird households are usually fairly content with their avian companions, but they all like to interact, so owners can expect some noisy times, often first thing in the morning and early in the evening. When parrots communicate it may be a charming exchange of whistles and phrases or a rather boisterous outburst of shrieks and squawks, especially if a bird is desperate for attention.

Teaching birds to talk and training exercises (owner handout).

One of the reasons parrots are so popular is their ability to mimic human speech. Most birds imprint their vocal patterns at a young age. Parrots and some other species, such as mynahs and starlings, have a longer and more flexible learning period and can develop a wider range of verbal associations. Some parrots begin talking right away, and some may not talk for two to three years, but most will talk eventually.

Some parrots have shown signs that they may understand some word meanings, speech patterns and understand the concepts of shape, colour, material and size. Some birds, while appearing to understand when to use words, are merely remembering instances when words are used, and fill them in appropriately. For instance, if an owner says 'oops' every time he/she drops something, the bird may associate dropping something with saying the word and may say 'oops' whenever something is dropped. It's appropriate, but still learned.

The key to teaching your bird to talk is talking to your bird, a lot. Greet the bird. Teach the bird to say hello, using your name, when you enter the room. Name food items and other objects when you give them to the bird. Sing songs. Call to the bird as you move about the house and out of sight. Let it know where you are and call its name softly to maintain contact and discourage screaming. When close, whisper to the bird to pique its interest. Avoid talking loudly or in a falsetto voice. Use your normal voice, and speak softly. When the bird speaks softly to you, answer it or walk to the cage to reinforce a soft tone.

Many birds have a 'social time' in the early morning and early evening, when they would normally gather with the flock and call to each other. This has little to do with speech training, and may be so ingrained in some birds that they continue to do it even though there is no flock. Sometimes a distraction such as a new toy will put a stop to the vocal display. If you can tolerate it, let the bird vocalise. Parrots will find this a great deal of fun and it does no harm, unless it drives the owner crazy.

Tapes that claim to teach speech may be as boring to birds as they are to humans. Birds may not learn from them, or you may grow tired of the phrases that someone else thinks are cute.

Some birds just do not talk. If this is the case, enjoy the bird for what it is but don't give up.

Talk to the bird during training exercises. Say what you are doing. If you want the bird to step up, say, "step up" as you offer your hand. You can say, "go back on the perch" as you invite the bird to do just that.

Training your bird is an important way of maintaining your status in the pecking order and provides stimulation for your bird. These are some simple commands that you bird can learn.

- Step up: Begin by placing your hand up against the birds' breast. Coax the bird to step up onto your hand.
- Step down: Place the bird up to the perch so it can step forward or backward onto the perch. It will step forward more readily than back, but it will learn to step back.
- Stay: Place the bird on the perch and, using the command "stay", block it from leaving the perch, or continually replace the bird on the perch until it stays in place.
- Hooding: Cup your hand over the bird's head and eyes and talk softly so it will be calm.
- Carrier: With your hand in the carrier, have the bird step off your hand and close the door. Wait a minute or so and open the door. Have the bird step up on your hand and remove it from the carrier.
- Towel: Place a towel near the bird and jiggle the towel so that it is a game and not a fright. Each day, increase the familiarity with the towel, placing it over the bird's back and shoulders and over the bird, letting the bird find its way out, until you are gradually able to wrap the bird in the towel and hold it.

Repeat each of these exercises every day until the goals are achieved. If it fails one day, try it again the next day. Take care not to make any one exercise a point of contention, be insistent but not aggressive. If one exercise is done easily, spend more time on any that remain problematic.

Perching birds

These are passerine birds with anisodactyl feet (three digits forward and one back). The basal metabolic rate of these small birds is 50-60% greater than non passerines and their body temperature 2°C higher. They are typically small in size with a large surface area. This has important implications when prescribing medications. Doses extrapolated from domestic mammals and non passerine birds may be too low to have a therapeutic effect. They generally live for 7 – 15 years. They can be kept as pets, for breeding birds or for exhibition. They are housed in cages or aviaries and generally require supplemental heating and lighting during the winter months if housed outside.

Many are of low economic value but if in the pet situation strong bonds can be created with their owners. The ban on importation of wild birds since 2006 has lead to a marked increase in value of these species (some up to 20 fold increases) and this has lead to increased captive breeding attempts and resale value. It is possible more passerines may be presented in practice as a result of this changed economic situation. Many birds are bred in large numbers in Belgium and Holland and are frequently brought into the United Kingdom.

Passerine bird nutrition

Seed quality in the pet trade is generally poor and, in addition, the seed may be contaminated with bacteria and fungal spores which are potential pathogens, especially when fed to malnourished birds. Aspergillus is a potential consequence of feeding a poor quality seed based diet, but is seen more commonly in frugivorous birds that have been exposed to mouldy fruit. Mycotoxins are also a common problem in poorly stored seed mixes and can be seen as a problem in wild passerines due to contaminated peanuts. Seeds should really only be considered as a complementary diet and they should be stored in airtight bins. Many aviculturists use a seed based diet with the addition of soft food for granivorous passerines, with vitamin and mineral supplementation. Many species take livefood and this correlates with breeding activity and is therefore used to 'condition' birds. Livefood offered includes mealworms, waxworms, crickets and locusts. Maggots should be avoided due to the risk of them carrying botulism. Nutritional secondary hyperparathyroidism is a common problem in frugivorous and insectivorous species in particular and appropriate supplementation with calcium and vitamin D should be performed. The same principles apply when feeding livefood to birds in that gut loading with a high calcium supplement and dusting them with a calcium balancer. The livefood should be fed immediately to ensure the supplement is not groomed off. Many fanciers feed crickets in large plastic tubs or cool them first to reduce the likelihood of escape. Many insectivores are also offered insectivorous mixes to supplement the diet. Some families have an absolute requirement for vitamin C as they lack the capacity to produce it. It is variably manufactured via the liver or kidney depending on species.

Although much less popular the same reasoning for providing a pelleted diet follows. However in particular note is the incidence of iron storage disease and some pelleted diets have a guaranteed analysis of less than 100 ppm (mg/kg). Many texts stipulate feeding levels up to 70 ppm (mg/kg).

Iron functions in oxygen delivery, oxidative metabolism and enzymatic processes and is essential for all living things. Hemosiderosis is when iron accumulates in reticuloendothelial cells/ parenchymal cells leading to overload without toxicity. Hemochromatosis is when iron accumulates in reticuloendothelial cells/ parenchymal cells leading to functional and morphological change (toxicity). Avian species that are more susceptible are starlings, mynahs, hornbills, birds of paradise, fruit doves and toucans. Diagnosis is usually by liver biopsy (histopathology + measure liver iron concentrations). Avian serum iron levels vary widely and are not always an accurate indicator of hepatic iron stores. Treatment can involve dietary modification to decrease iron uptake (add tannins to the diet e.g. tea leaves) or limit dietary items high in ascorbic acid and citrate that increase iron absorption. This is mediated by the oxidation of ferrous ions (Fe^{2+}) to Ferric ions (Fe^{3+}). Phlebotomy removes iron from the body via haemoglobin in the red cells, but treatment may have to be prolonged to establish an effect. Deferoxamine and deferiprone are iron chelating agents that have been used successfully in birds.

Anorexia is of urgent concern in passerines due to their high metabolic rate (Hainsworth energy constant = 129). Anorexia can be rapidly fatal in these species and supportive nutrition of these species is important. Post mortem findings can include haemorrhagic diathesis in the bowels.

Pigeons and doves

These birds lack a lateral cervical apertium (featherless tract) so it may be challenging to perform jugular venipuncture on a pigeon. They have well developed powder down feathers as most lack a uropygial gland and their contour feathers are easily shed when handled. They tend to take off vertically when startled and this can lead to “scalping” injuries. When transporting it helps to line the top of the transport crate or any new aviary they are unfamiliar with. They have a large plexus venosus intracutaneous collaris (cervical vascular plexus) to aid thermoregulation. Their crop is bilobed and very large. Both sexes produce “crop milk” for approximately two weeks after young are hatched. It is composed of desquamated crop epithelial cells.

Husbandry and captive care of raptors

Raptors consist of Falconiformes (eagles, hawks, falcons) & Strigiformes (owls). Most birds of prey molt their feathers annually. Owls have asymmetrical external and middle ears to increase auditory acuity to aid in prey detection at night. Most birds of prey have little delineation between the proventriculus and ventriculus forming a simple glandular stomach with a pH of 1 in falconiformes and 3 in owls. Both form casts. Casts are compacted, indigestible, pelleted portions of food such as feathers and fur (falconiformes digest bone, owls cast bone) that are egested by synchronised contractions of the oesophagus, proventriculus and ventriculus. Owls cast more quickly after eating than falconiformes since they lack a crop. Falconiformes usually cast once a day.

The birds which are most commonly presented in practice are hawks, falcons and owls. The most common species presented will be the Harris Hawk. The females are much larger than the males and they originate from the Southern United States. Many falconers will keep British birds as species such as the peregrine falcon will be presented. Typical owls commonly seen include Barn Owls and Eagle Owls.

Many birds will be used in the sport of falconry, for pest bird control, captive breeding or for falconry displays, belonging to falconry centres and zoos. Falconry is the taking of wild quarry in its natural state using a trained bird of prey. A license is not required to keep raptors, though some species are subject to CITES restrictions, and paperwork should be held. Private owners may train and fly their birds at quarry (prey). This bird is then flown on private land or at arranged field meetings. For certain species of quarry a license is required. Also, when hunting game one has to observe the dates of hunting season (i.e. September 1st – January 31st for flying grey partridge).

Training a raptor

The training regime for raptors follows a basic four step pattern, the length of time that one has to spend on each step will vary greatly depending on the species. Manning is the first step which involves taming the bird and making it familiar with everyday occurrences, akin to socialisation in other species. This is a very important stage of training as the more stimuli that a young bird is introduced to the steadier it will be as an adult.

Most birds are collected from breeders at around 8 weeks of age, and manning should begin once the bird has settled from the stress of moving. If a hood is to be used (typically falcons more than hawks) then this is the time to introduce it. This step of training generally involves having the bird sat on the fist for extended periods of time and builds an association between the falconer and food. Once the bird has realised the gloved hand provides food then training can begin. In the initial stages this will be simply stepping from the perch to the glove for a piece of food. The distance between perch and glove can then be extended. For security purposes a creance should be used once the bird is flying to the length of her leash. A creance is a strong, light weight line that is attached to the swivel in place of the leash and will afford the bird more freedom. This stage of the training reinforces the bond by encouraging the bird to return to the falconer for a food reward. Fitness training is important and a lure can be introduced. This is a leather pad that mimics the quarry to which the falconer wants the bird to hunt. For hawks/eagles this may be a 'legless' rabbit i.e. a weighty leather pad with fur on it and for falcons a leather pad with the wings of the prey species attached. Food is placed onto it and it can then be used to attract or 'lure' the bird. This is used not only to encourage the bird to start to think about quarry, but also gives the falconer something to use to call the bird back from further afar. The bird can be encouraged to range a little wider once the lure has been introduced and the creance can eventually be dispensed with. As the training progresses the bird can be allowed to go further away before being called in or flown for longer as the levels of fitness start to increase. Many falconers use a kite or balloon and encourage the bird to mount to a great pitch (800-1000 feet eventually). The lure is attached to the line of the kite or balloon, the bird then flies up to it, grabs the lure and then brings it to the ground. This has proved a very good method of increasing fitness levels and has been used successfully in rehabilitating injured wild birds prior to release. Hunting is the final stage which is when the bird is entered at quarry. During the previous stages of training a weight record should have been kept allowing the falconer to establish what the bird's flying weight is, this is the weight at which the bird performs at an optimum. The falconer should also have created an association between themselves and food, which will result in the bird staying reasonably close to the falconer and waiting to be served by them. The time spent on this stage of training will vary greatly depending on bird, falconer and the set up available for hunting. As a general rule the quarry that falcons are flown at is feathered and for hawks and eagles furred. Owls are rarely used for hunting as they are very difficult to train to do so. Others may be imprinted for AI (those used for breeding hybrids for example). The bird sees the person as first a parent and then a mate. Such birds retain all natural instincts, such as protection of food, mate and territory, these will be directed at humans that unless managed carefully will lead to behavioural problems.

Housing

Housing requirements are similar for diurnal and nocturnal raptors, they will vary only when the birds are being flown. As a general rule when not flying birds should be kept in an aviary. Dimensions for aviaries will obviously vary depending on what species is being housed and whether one or two birds are being put together. It needs to be big enough to allow for each bird to have its own space, but not too large that it makes catching up the birds difficult.

The most common design is three solid sides with a mesh front. The roof is often 1/3 solid and 2/3 mesh, though many people advocate a solid roof with skylights of mesh to provide a stronger structure and better protection from the elements. Four solid sided aviaries with the sky light roof (a seclusion aviary) are recommended for breeding pairs and nervous birds as they offer the best security and protection from weather and potential predators alike.

Within the aviary there should be plenty of perching surfaces in open and secluded areas, these perches should be appropriate for the species. Ideally all perches should be covered with longleaf Astroturf® as this helps prevent foot problems by dispersing the pressure on the feet. The aviary should have a bath that can be easily cleaned and filled from the outside, there should be a feeding hatch or chute, to allow the remote provision of food. The floor should be well drained and easy to clean. The provision of natural cover, i.e. real shrubs, can be beneficial as long as they do not overcrowd the aviary. A double door system should be used and the appropriate security devices incorporated. The location of the aviary is also important, it would not be desirable to have it anywhere too public or near a road. Also one should avoid sites with a lot of potential predators or in proximity of a compost heap or muck/straw piles (due to the risk of aspergillus infection). A south facing direction is preferable to allow optimal sun exposure.

During the flying season or for demonstration a different set up will be required. The birds will usually have a weathering area and separate night quarters. During the daytime the birds are kept tethered, i.e. with their leash attached to the perch. As a general rule the block perches are used for falcons are bow perches for most other species. If a permanent weathering is used, for example a pre-demonstration area at a centre, then it should provide protection from extreme conditions. This is usually achieved by having an open fronted cubicle that allows the bird to be under cover or exposed. The floor of which should be easy to maintain. A bath should be provided and the area should be predator proof. After flying the bird is then put away into its night quarters. This is usually a closed unit (such as a mews) with perches in which the bird is either turned loose or kept tethered. The important difference in this area is that the perches are kept higher from the ground and kept in darkness. This affords more protection from frostbite and will make the bird feel more secure. Diurnal raptors have poor night-vision; therefore it is vital that the night quarters are made rodent/predator proof.

Raptor Nutrition

This is perhaps the most vital aspect of raptor husbandry as birds are kept within a specific weight range. This means a tightly managed feeding regime. The experienced falconer will know how many grams of what type of food needs to be fed to the bird to maintain its weight. With larger birds there is a greater range in their flying weight but with small birds it is tiny. Environmental temperature will have a huge influence on feeding requirements and some falconers get caught out during a cold snap. Raptors are carnivorous and they consume all of their prey including fur, feather, skin, muscle, bone and organs. This food is taken into the crop in diurnal raptors and down the oesophagus into the proventriculus (first part of the stomach) in owls. The crop is not a digestive organ and the crop must be 'turned over' into the proventriculus. Digestion then takes place, the bird's body will form a pellet or casting of the indigestible portion, this is then regurgitated approximately 8-12 hours after feeding. Gorging or any cause of gastrointestinal slowdown (dehydration, illness, poor body condition) can lead to a failure of the crop to turn over leading to 'sour crop' this is when food material decomposes at body temperature without digestion. Birds can die of sepsis if the rotting food is not evacuated from their crop.

Dietary options in captivity include day old chicks or turkey poults, with quail, rats, mice and rabbit also available commercially. It should always be recommended that the commercial food be bought from a reputable supplier as this should guarantee the quality, i.e. the method of killing, freezing and storage. Some quarry will be fed, but it is important that the quality of the food item be checked carefully before feeding as infections can be transmitted to the raptor. These include trichomonas and herpes viruses. A thorough inspection, including internal organs, should be carried out before feeding, if there is any doubt then the food should be discarded. The same goes for road-kill as in both these cases the prey may well have been ill predisposing it to injury or capture. Freezing a carcass for 7 days can be used to prevent the risk of trichomonas transmission. The amount of food required will vary depending on climatic conditions and the physiological status of the bird. As a general rule the darker the muscle (e.g. pigeon breast meat) and the higher the blood content (i.e. liver and heart) the more energy dense the food is.

When not flying the weight is of less importance, however over feeding can lead to obesity and atherosclerosis, particularly prone are birds fed on laboratory rats. Also if a bird is heavy then more pressure will be put on the feet which can lead to problems such as bumblefoot. Feeding is therefore critically linked to bodyweight and this should be measured at least daily. A good falconer is one who manages weight properly and should be able to tell you exactly what the bird weighs at any given time. Even if the bird is kept in an aviary the weight should be monitored. Feed whole adult prey at least twice weekly, this will ensure a good balance of calcium, vitamins and other minerals. Monitor castings and faecal output (mutes). Remove any uneaten foodstuffs from aviaries promptly. Water should be provided free access. Dietary deficiencies and excesses are rare if feeding whole prey items. However supplementation may be indicated for breeding females.

GLOSSARY OF FALCONRY TERMS

Aylmeri	Leather anklets with an eyelet for a jesse
Bate, to	To jump from the fist/perch whilst being tethered
Bewits	Strips of soft leather fastening on the leg bells
Bells	Bells can be attached to the leg(s) or tail to assist the falconer in locating the bird when in the field
Bind to, to	To catch and hold the quarry in the air
Block	Perch for falcons
Bolt, to fly at	To fly straight from the fist at quarry (accipiters)
Bow Perch	Perch for accipiters/buzzards/hawks
Braces	Leather or gortex® straps used to open and close the hood
Broad-wing	A buteo or other soaring bird (eg harris hawk/buzzard/eagle)
Cast, to	To hold a hawk around the body
Cast, to	To regurgitate a casting/pellet
Casting	The pellet containing the undigested portion of a meal
Check, to fly at	To leave one quarry and pursue another
Cope, to	To cut/file/burr the beak and or talons
Crab, crabbing	The act of one bird seizing another
Creance	A long line that the bird is kept attached to during early training
Deck feathers	The central two feathers of the tail
Enter, to	To introduce the bird to it's quarry/hood for the first time
Foot, to	Strike or clutch with the foot
Flying weight	The weight at which the bird is eager to hunt whilst being in optimum physical and mental condition
Fret marks	Lines across the webs of feathers indicating a stress at the time that the feather was developing
Hood	Close fitting leather cap, often tooled and decorated, used to blindfold and therefore 'hoodwink' the bird into thinking that it is night time and thus relax
Imprinting	A complex behaviour pattern that develops when an eyass is hand reared
Jesses	Leather leg straps that run from anklet and attach to the swivel
Leash	Braided thong that runs through the swivel and is tied to the perch
Lure	An imitation quarry swung on a line used to tempt the bird back to the falconer
Man, to	To tame the bird through positive reinforcement
Mews	A place where raptors are kept at night or during bad weather
Mutes	Raptor droppings, having a faecal, urate and urine portion
Quarry	The game flown at

Swivel	Two metal rings held together but allowed to pivot, the jesses connect to one ring and the leash to the other. It helps prevent the bird from becoming tangled
Wait on, to	To circle around in the air (preferably above the falconer) at a good height until the quarry is flushed below
Weather, to	To put a bird out in the open air and allow it to bathe and bask in the sun

Telephone triage and advice to owners

Many birds owners seek the opinion of the local pet shop, bird keeping friend, the internet or their supplement supplier prior to seeking veterinary advice. This may unnecessarily delay veterinary attention. However you may be required to offer some telephone advice. In many cases this is 'bring the bird in now, today or tomorrow for evaluation'. If a bird has sustained trauma, such as an orthopaedic injury, then the possibility for soft tissue damage is huge. The bird should be restricted to a small darkened area such as a box until it is presented. For raptors they should be confined to their box or cast and placed in a restraint jacket/towel and NOT fed up.

Falconers have an overwhelming urge to feed their birds up after a traumatic incident and it should be explained to them that this is almost always of detriment, as when in a state of shock a bird will channel all its energy to maintaining those systems vital to life i.e. brain and kidney, they will shutdown the gastro-intestinal system. If fed a full crop at this time the bird will be unable process it and could develop a sour crop (see later), it also increases the risk of problems during general anaesthetic.

If the owner is capable of crop feeding then some critical care formula would not go amiss. Banadaging injures is possible but may lead to further trauma.

Birds subjected to intraspecific competition should be removed from the group and kept warm and quiet, these may have been ill and subsequently attacked. In raptors crabbing injuries are common but even in the injury appears small a thorough evaluation under anaesthesia with radiography and endoscopy is required as the talon can penetrate deeply.

If a bird is potentially exposed to a respiratory toxin it should be taken outside inot fresh air and brought to the practice immediately. Birds with a possible inhaled foreign body are also in need of urgent attention but rarely make it to the clinic alive.

Many falconers will have a first aid kit and good basic first aid knowledge, but often are in a state of shock themselves. If they have the equipment you can advise them how and what to use if they feel they can. A first aid kit usually comprises; Crop tube/syringe, various dressing materials, iodine based scrub, calcium and critical care powders.

Being familiar with how to use these items is of great value, it can make a real difference to the survival of birds in the field as they can sometimes be hours away from a veterinary practice.

History taking, handling, clinical examination and hospitalisation

It is preferable to bring parrots in a front opening cat carrier, into which a perch can be placed. If their normal cage is being used advise the clients to remove all toys and have only one perch in. This will facilitate capture and reduce the chance of injury on the journey. Many parrot owners think it creates a good impression if they bring their bird in on their shoulder. This should be discouraged. Equally many owners rush to take the bird out of its cage as soon as they enter the consulting room. This should be discouraged and the owner asked to replace the bird in the cage while a clinical history is taken.

Passerines are typically transported in a carry cage or box. Wildlife casualties can be presented in a variety of receptacles. Swans are usually brought in swan a bag which facilitates examination and restraint.

Raptors will be used to travelling and therefore the falconer should have an appropriate set-up for this, usually a box or cadge in the car (open box with a perch used for transport). Some owners travel with a friend and have the bird gloved throughout the journey. It is good practice to ask falconers who do not have a box to keep their birds in their vehicle until ready to see them.

A full clinical history is hugely relevant prior to physically examining a bird that has been presented at the clinic. A thorough history will take 20 minutes to complete. Asking the relevant questions covering the husbandry already detailed is important. Infectious disease can be commonly seen and identifying the source of the bird, its companions and quarantine protocols are important. Psittacine beak and feather disease, polyoma virus and chlamydia PCR tests are available commercially and the bird may have been tested prior to purchase. However as these agents are transmitted by feather dust, it is possible for young bird to be exposed to infections after they were tested and the unsuspecting owner has difficulty when you wish to test for a disease the bird is already 'negative' for. The best sources of pet parrots are those where all the stock have been tested negative and there are good quarantine protocols in place. It is uneconomic for pet suppliers to test low value birds and these should be housed in a separate air space as should any dry stock so it is not contaminated with feather dust. Smaller pet shops will have everything in the one room. Infectious disease is much less of a problem in raptors.

Having taken the history, further questions need to be asked about the specific reason for the bird being presented to the clinic. Generally most birds present as fluffed up and anorexic which leaves little to go on. But this may throw light onto possible differentials and lead to more detailed questioning or enable you to formulate a diagnostic plan to rule out likely conditions.

How long has the bird been ill? What signs have been seen? Has there been any previous treatment? You may not be the first vet to see the bird and they may well have obtained pet shop supplements, products under the small animal exemption scheme, borrowed drugs from a friend or obtained them illegally from abroad (most likely via the internet). Some of these drugs when used inappropriately can lead to toxicity – most notably fenbendazole and nitroimidazoles.

Next observe the bird in its carrier. Birds regulate their temperature both by behavioural and physiological means. Sick birds aim to conserve energy and will fluff out their feathers to conserve heat. Most pet psittacines will tolerate fairly close observation without becoming fractious. Raptors can be observed on the fist of their owner. The bird respiratory rate and effort should be noted. Dyspnoeic birds may be tail bobbing as they exert themselves and some may have a change in voice. This can indicate an infection and obstruction of the syrinx, typically found in goshawks, gyrfalcons and seed fed parrots. Usually aspergillus is the causal organism. These are an emergency and require urgent placement of an air sac tube. Birds are experts at hiding illness so subtle changes in behaviour or weight are important observations. It was once said 'by the time an owner notices their bird is sick it is 70% dead' and 'by the time they take it to the vets it is 90% dead'. While this is not strictly true it does reinforce the need for urgent medical attention if a bird is showing any signs of illness. Many birds presented may have been 'looking well' and 'eating/drinking normally' in the eyes of the owner but can in fact be quite critically ill by the time they are presented.

Correct handling of birds is critical to prevent injury. Parrots and other perching birds need to be observed in their cages for their initial assessment. Cage birds vary in size from the fairly harmless Canary to the rather intimidating Hyacinth macaw. The largest passerines are ravens and birds of paradise. If they need to be caught up the method is much the same, however the beak can lead to painful bites in psittaciformes and passerines can shed feathers in large numbers with poor handling due to an evolutionary adaptation. Feathers in areas likely to be grasped by predators require much less traction prior to loosening. Before attempting to catch up a caged bird, make sure that all doors and windows are closed, any curtains or blinds drawn and if there is a fan that it is turned off. Dimming the lighting can help for diurnal birds. A suitably sized towel should be selected; a tea towel will be adequate for a little bird whereas a large parrot will need something more like a bath towel. It is advisable to put a fold along the top of the towel and have this thicker area in the palm of your hand. This will give greater protection to the hand and offer good support to the birds head. The aim here is to restrain the bird without getting bitten, and avoid causing trauma to the bird. Hopefully the bird has been presented in a front opening carrier. If not, and the cage is full of clutter it is advisable to remove as much as possible. Toys and spare perches will just get in the way and be potential hazards for the bird as it tries to avoid capture. The door to the cage can be used or it can be separated from its base to provide a suitable opening. The towel covered hand should be placed inside the carrier or cage and the birds' response observed. It is common for them to flap about initially but it is worth waiting for a short time to see if they settle. The bird should then be grasped quickly, but gently, from behind with the thumb and fingers supporting the neck or lower beak and towel engulfing wings and body. The bird needs to be fully immobilised before removing it from the cage or carrier since thrashing wings and legs could easily be caught and damaged in cage bars.

For larger birds a second hand may be required to restrain the birds' wings and legs within the towel. Feet and beak may also be hanging onto the side of the cage and require an assistant to remove them. This needs to be considered before putting one hand through a small cage door and then finding there is not enough space for two hands, a towel and the bird to come back out. If the cage door opening is too small a second person must first lift the wire part of the cage up, separating it from its solid base, so that the bird can be approached without restriction. When the bird is ready to be released it is important for it not to be dropped but lowered gently back into its carrier or cage. The bird should be allowed to get a foot hold and, even better, a beak hold before the towel is gently removed, again to avoid flapping. In the event of an unwanted escape, towels may be inappropriate for catching a loose bird so it is helpful to have net handy just in case. Reduced light levels will discourage birds from flying around. Passerines and pigeons can be captured in a similar manner. Many are prey species and feather loss can easily occur with poor capture technique.

Waterfowl should be captured by grasping the neck close to the head and quickly controlling the wings. Some species can give a nasty peck or stabbing wound if the beak is left uncontrolled. Swans can cause painful injuries by flapping their wings and scrabbling with their claws when poorly carried.

All raptors have the potential to bite but the main danger to a handler from a bird of prey is from its talons. All birds of prey possess a digital flexor tendon talon locking mechanism. Once locked, their digits have to be ratcheted open if the bird continues flexing (be very careful when handling). These can cause a very nasty injury if handled incorrectly. Feet should be controlled throughout any handling procedure and caution taken during anaesthesia.

Generally speaking, initial examination of a non collapsed bird would begin by observing it as it stands, hopefully fairly relaxed, on a glove or perch. Further examination however will involve wrapping the bird in a towel, known as casting it, and securing the feet and talons. If a bird of prey is presented in a travel box and it is not wearing jesses it will need to be cast from there. This might be the case if it is a wild bird or, if it is a captive bird that has been taken straight from the aviary, maybe out of the falconry season when many birds are free lofted without furniture. Hopefully your patient will be fully equipped with anklets, jesses and a leash and will be presented either already on the glove or will go onto a glove from its box. Most falconers are competent at handling their own birds and it is a good idea for the initial exam on the glove to take place with them as the handler. This will allow the bird to relax, as much as it is possible in the surroundings, and more likely to show itself in its true light. When it is time to restrain the bird it is advisable to remove it from its owner. This not only makes your life easier, it will also help to prevent a loss of trust between bird and falconer, especially if it is a young bird new to training.

To get a bird up onto the fist, the handler needs to grasp the jesses between thumb and finger, with a gloved hand and then lift the hand up in front of the birds' legs. It should step forward willingly up onto the raised glove. The leash can then be secured by passing it between the third and fourth fingers, and then wrapping it around the bottom two.

To cast the bird allow it, if possible, to settle and stand at ease with its wings resting against its body. This is relatively easy if the bird can be hooded but a non hooded bird may be suspicious and it may be difficult to get it to keep its wings down. The person to cast the bird needs to approach it from behind, holding out a suitably sized towel, in both hands with them held apart. This then needs to be wrapped quickly but gently around the birds' wings and body with the handler ending up with one of the birds legs securely in each hand and the birds back cradled into the handlers chest. With the birds feet and wings restrained and contained the bird can now be safely examined. When it is time to release the bird it should be held over the glove or perch and allowed to get a foot hold before the towel is gently unwrapped. This will help to prevent unwanted flapping that could damage feathers. If the bird is resistant to casting and bates off the glove then the handler can grasp the tarsometatarsals of the bird (one in each hand) and the bird suspended upside down. The wings are folded in and the bird wrapped in the towel as before prior to examination or manipulation. Dimming the lighting can help to steady a diurnal bird but provides an advantage for nocturnal species!

The birds weight should be determined either through the falconers weight records (which will be in pounds and ounces so you need to convert it to grams) or by weighing the bird. As a general rule, weigh to the nearest 1g for birds under 500g and to the nearest 5 – 10 grams over this. This is critical for therapeutics and comparing this to species specific ranges and for assessing the response to therapy. **NO EXOTIC ANIMAL SHOULD EVER HAVE ITS WEIGHT GUESSED** (although you may have to occasionally or base it on previous history).

Also check what the bird has come in. Is the cage or box of good design and is it clean? The droppings should be examined and be of normal consistency. Seed fed birds will have a darker central faecal component with small amounts of urates with minimal urine. Birds on extruded diets will have more voluminous faeces and they will have higher moisture content. Many passerines are frugivorous and their droppings have a high fluid content.

Guide to abnormal droppings

- Diarrhoea- unformed "runny" faecal portion- multiple causes
- Undigested food in faeces- pancreatitis, ventriculitis, PDS (proventricular dilatation syndrome), liver cirrhosis
- Large mass of droppings- maldigestion, malabsorption, reproductively active hens, abdominal growth, pelleted diet
- Melena- enteritis, GIT neoplasia or trauma, tapeworms, TB, lead, zinc, renal disease
- Fresh blood- cloacal pathology, papillomatosis
- Smelly droppings- bacterial (clostridial/other bacteria), fungal overgrowth
- Green urates- may indicate liver disease and biliverdinuria
- Yellow urates- anorexia
- Pink/red urates- blood, hemoglobin- possible renal disease; lead poisoning in some species
- Orange urates- recent vitamin B injection or artificial colours in the diet

- Thick, pasty urates- dehydration
- Aerated droppings- seen most commonly in cockatiels with giardiasis
- Polyuria- heavy metal toxicity, renal disease, sarcocystosis, diabetes mellitus, pituitary disorders
- Anuria - faecoliths or uroliths, egg-binding, cloacal prolapse, papillomatosis, renal disease, severe dehydration, intestinal or gizzard impactions

Raptors may have cast up on the journey in and this should be noted. It is important that this has occurred prior to an anaesthetic.

Clinical examination

Annual health checks should be performed, where possible for healthy birds and should include a full clinical examination. Clinical examination involves a systematic evaluation of the patient and mirrors that used in other species. Birds can be highly fractious or may be suffering from respiratory compromise and examinations may need to be thorough, but brief, or after a period of stabilisation and in some cases undertaken under anaesthesia. Start at the head and work backwards. Check the following:

- Eyes- swellings, discharge
- Nostrils-clear and symmetrical
- Beak- symmetry and condition
- Oral cavity- tongue, mucose, choanae and papillae
- Ears
- Feathers- presence/absence of and pattern of loss, condition, stress lines, molt, ectoparasites. Check for normal growth and blood feathers.
- Pectoral muscle mass palpation for condition score (must consider bird's lifestyle to interpret e.g. wild, cagebird etc)
- Auscultate heart (over sternum), lungs (over dorsum) and caudal airsacs (ventrum caudal to sternum)- need paediatric stethoscope usually
- Feet- pododermatitis, nail length and quality, excessive faecal build up
- Check feet can grip by using a pen or finger and manipulate the legs
- Coelomic cavity ventrocaudal to sternum- check for enlargement- egg binding, mass, fluid retention, hepatomegaly
- Uropygial gland (not present in amazons or hyacinth macaws)
- Pericloacal region- faecal build up on feathers- diarrhoea
- Cloacal mucosae- CRT, pettechiation, papilloma, FB
- Examine the wings and extend them fully checking for feather damage and range of movement
- The basilic vein should be checked for volume and refill

SICK BIRDS PRESENTING TO THE CLINIC SHOULD BE HOSPITALISED AND PROVIDED WITH SUPPORTIVE CARE AND DIAGNOSTIC INVESTIGATIONS WHENEVER POSSIBLE.

Differentials based on clinical signs

Examination	Abnormality	Common Clinical Condition
Head	Periocular swelling	Ocular or sinus disorder
Eyes	Epiphora, conjunctivitis Scabs, scars, pustules	Ocular or sinus disorder Pox virus
Cere	Brown hypertrophy Hyperkeratosis, crusting	Endocrinopathy (budgerigars) Cnemidocoptes spp. mites
Nares	Discharge (rhinitis) Rhinoliths Enlarged orifice	Sinusitis, air sacculitis Hypovitaminosis A Severe rhinitis (bacterial, fungal), atrophic rhinitis (African greys)
Oral cavity	Excessive moisture Blunting choanal papillae White/yellow fixed plaques	Inflammation Hypovitaminosis A Pox, bacterial ulceration
Feathers	Dystrophic Broken, matted, chewed, Plucked, missing	PBFD, polyoma virus Self trauma (discomfort, psychological), small cage, seizures, bullying, endocrinopathy
Beak	Overgrowth, malocclusion	Cnemidocoptic mange, PBFD, hypovitaminosis A
Crop	Dilatation Thickening	Thyroid hyperplasia (budgerigars) Inflammation, infection
Pectoral muscles	Body condition scoring 0-4	Emaciation/obesity, superficial tumours
Abdomen	Enlargement	Liver enlargement, egg retention, excess fluid or solid mass
Wings	Abnormal position	Neoplasm, fracture, soft tissue trauma
Legs	Distortion	Distortion may be due to incorrect diet, fracture, neoplasia, arthritis, articular gout
Cloaca	Soiled or swelling	GIT disease; differentiate between prolapse, impaction, papillomatosis, cloacoliths
Uropygeal gland	Increased size	Squamous cell carcinoma, adenoma, abscess (note; gland absent in some birds)
Feet	Overgrown, deformed nails Digital necrosis Abnormal shape	Hypovitaminosis A Constriction by wire etc., frostbite Cnemidocoptic mange, bumblefoot

Hospitalisation

Hospitalising birds can be challenging, but by no means impossible for most practices. Unless a bird is collapsed it will want to perch, this is also essential to keep tail feathers from dragging on the floor and becoming soiled or damaged. Indeed many falconiformes will require tail guards to be placed to prevent damage to the deck feathers during their stay. Birds of prey will require either a block or bow perch, while parrots and other cage birds will require dowelling type perches. Waterfowl will not require perches but should be housed on a padded floor. If possible, birds should be kept away from other birds, or at least not directly share the same air space, to reduce the risk of disease transmission. Predator and prey species should be separated. Ideally, it is useful to be able to observe them remotely in order to assess their actual demeanour, as by nature they will always attempt to appear well.

If a bird of prey has been presented in a falconry box this may be used for short term hospitalisation. The smaller species can also be housed in the sky kennel type pet carrier and larger birds of prey can be housed in cat or dog kennels. Their mutes can tarnish stainless steel so it is advisable to tape newspaper onto all cages or kennel surfaces that may get soiled. The front of the cage will need to be covered with a towel to reduce escape attempts.

Falconers are very concerned that you do not cause any damage to their birds' flying feathers. They can be obsessive about this as a broken flight feather can compromise performance or put them out of action for a season. These birds aren't just kept to look impressive, they are active hunting birds. (The most heroic life saving surgery in the world can get completely overlooked if a vital flight feather has been damaged.) Tail guards are recommended for any hospitalised bird of prey and can easily be made from strong cardboard or x-ray film.

Psittacines and passerines require only simple cage facilities. One perch, one feed bowl and one water bowl is ample in their cage, and newspaper makes an ideal substrate. Cat and dog kennels are not recommended due to the high risk of escape from large door openings. In the absence of a bird cage a front opening cat carrier will be more suitable. Positioning of the cage needs careful consideration, somewhere warm that offers a feeling of security is important.

If the patients are voluntarily feeding then the usual diet should be fed. This may mean the practice has stocks of suitable food or for more specialised feeders the owner is requested to bring some of the more usual diet along for their pet.

Many exotic animals requiring hospitalisation may be anorexic or become anorexic. Birds have a very fast metabolic rate and as such should not be allowed to go without food for any length of time. For some patients it may be difficult to gauge what quantity of food they may, or may not have eaten. Measuring and recording a patients' weight is therefore a vital part of monitoring their health status and feeding requirements. It may be necessary to record a patients weight two or three times a day to assess the requirement for assisted feeding.

The time of weighing and any assisted feeding should be recorded, so that true comparisons of weight status can be made. An accurate weight is also required to calculate drug volumes. In birds weight gain may be minimal but should stabilise quickly.

Enclosures must be of a design that can easily be dismantled and cleaned between patients. Fogging the environment with a disinfectant such as F10 should be considered. Separate air spaces are required for birds and barrier nursing will be required for animals suffering from infectious disease. Gloves, aprons, footbaths and masks may all be required when handling patients.

The most significant zoonotic disease risk is Chlamydophila, caused by the bacterium *Chlamydophila psittaci*. It is best known for affecting parrots and parrotlike birds but can affect other avian species as well as being passed to mammals and humans. It can be shed in body secretions – for example, faecal, nasal and ocular fluids. Chlamydophila organisms survive in the environment for several weeks and may be distributed by dust. The infection is mainly airborne; with the pathogen first reproducing in the respiratory tract.

Once psittacosis (known as chlamydophilosis / ornithosis in humans) is passed to humans it cannot be passed from human to human, nor human back to birds. It is a chronic disease posing a particular risk to children, the elderly and immunosuppressed individuals.

In humans the common signs are headaches, neck pain and fever progressing to respiratory infections. It can also cause fatal heart disease. Signs you may see in birds include conjunctivitis, nasal discharge, sneezing, depression, ruffled feathers, weight loss, inappetence, bright green diarrhoea, feather colouration changes, occasionally nervous signs, or even sudden death.

Psittacosis can be a difficult disease to definitively diagnose, but may be suspected on a blood profile, endoscopy or on radiographic findings. The best way to identify the Chlamydophila organism is by sending off a faecal sample collected over a 3 day period for a PCR, but this may not pick up all cases as the organism is only shed intermittently. In other case antibody testing should be performed, particularly if the bird has been treated with antibiotics as this can stop the faecal shedding of the organism.

Treatment of birds generally involves doxycycline for 6 weeks and follow-up testing to confirm no reactivation of the disease. Even a bird that tests negative for chlamydophila after treatment, this cannot be considered clear of infection as a negative test can only indicate there is no organisms shed at the point of testing. Once the infection is over many birds are susceptible to re-infection or re-activation of the organism. Therefore due to these issues and the human health risk, euthanasia may be considered in some situations.