

A guide to

Avoiding Nutritional Disease in Pet Parrots



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Note from the author:

The nutritional concepts discussed in this booklet are based on information acquired from a large and diverse array of scientific papers, text books and over 30 years' experience as an avian clinician. The facts are not in dispute, however, the interpretation of these facts may vary between experts, and those views expressed here are mine.

The general concepts outlined are made with the larger pet parrots in mind. This approach is taken because these species of birds tend to represent the group most commonly kept as pets and presented to vets for advice and treatment. They are, in theory, longer lived thus being subject to, and more commonly exhibit, the cumulative effect of long term suboptimal nutrition.

Examples of malnutrition can also be found in other groups of birds, (raptors, waterfowl, passerines, columbiformes (pigeons and doves) etc.) and the principles of correction are equally valid.

As will be explained in this booklet nutritional disease is multifactorial in its expression and the text and photographs included are not intended as either a comprehensive review of all the manifestations of avian nutritional disease nor as a 'diagnostic guide' to the presenting signs. Owners who believe they have birds presenting symptoms of avian malnutrition should not assume that that is all that is wrong and are strongly encouraged to seek experienced professional veterinary advice for a complete health check, and assistance in addressing the problems and their concerns.

I hope you find this booklet useful.

Dr Brian Stockdale



About the author:

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Introduction

The general consensus among experienced avian practitioners worldwide is that:

Nutrition is the single most important aspect of bird welfare.

Malnutrition still underlies most of the clinical cases presented to vets and is the biggest cause of death in pet parrots. Whether you are a professional in the avian healthcare sector, an aviculturist, breeder or simply a dedicated and caring owner, this is alarming.

Malnutrition is, or should be, a preventable disease.

This booklet will help clarify some of the issues that surround avian malnutrition:

- Why do so many of our pet parrots suffer from malnutrition?
- What are the clinical signs and consequences of this malnutrition?
- What can we do to try to resolve the problem?

What is nutrition?

When discussing malnutrition it is important to clarify some simple definitions:

- Feeding should not be confused with diet.
- Feeding is what is put in the feeding bowl.
- Diet is what the bird actually eats from the foods that are fed.
- Nutrition is not another word for feeding.
- Nutrition comes from the assimilation of the nutrients from the foods that the bird actually eats. Food selection and quality obviously have a strong bearing on the levels of nutrients as does nutrient interaction within the body.

Basic nutritional requirements

The nutrients in a bird's diet supply the energy to fuel metabolism and provide the building blocks for the synthesis of structural and metabolic elements. These nutrients are generally categorised as:

- Macro-nutrients - fats, proteins and carbohydrates with dietary levels that are measured in grams.
- Micro-nutrients - vitamins and minerals. These are measured in micrograms.

Nutrient requirements are not static and a bird's physiological state is a major factor in determining the required levels. The demands of growth, breeding, incubation, moulting and thermoregulation increase nutritional needs above those for maintenance and the pathological states of stress, disease and injury also modify nutritional requirements.

The theory of good nutrition is therefore to provide captive birds with a diet that will deliver adequate levels of both macro- and micro-nutrients, appropriate to the individual bird's requirements.

What do we mean by malnutrition?

If good nutrition is: 'the provision, through the intake of food, of appropriate levels of essential nutrients necessary to maintain healthy cellular function', then malnutrition is: 'a failure to provide these appropriate levels, predisposing to suboptimal cellular function'.

Suboptimal cellular function leads to organ and system dysfunction and subsequently to disease.

What, therefore, is nutritional disease?

Nutritional diseases are a range of conditions arising from this lack of optimal cellular function. Depending on which tissues are affected and the severity, nutritional disease can express itself as a wide range of clinical examples.

These may present as an acute clinical emergency, for example hypocalcaemic fits, or they may be chronic, taking many years for the symptoms to manifest themselves, for example fatty liver disease. Some symptoms, such as the sudden onset of destructive feather behaviour, may even be acute manifestations of chronic disease.

Whilst numerous conditions are overt, many are not and exist unperceived. Subclinical disease occurs under the surface predisposing to secondary conditions, bacterial sinusitis - a snotty nose - being a common example. Similarly, metabolic systems and most importantly the immune system may be compromised. With these subclinical diseases the bird may survive but it will not thrive either physically or mentally.



Above: An example of an apparently normal African Grey that was actually suffering from subclinical hypocalcaemia - low blood calcium.



Left: An Amazon parrot showing overt signs of malnutrition: flaking beak; poor feather quality lacking a sheen; dull thickened cornea (due to a lack of tear production from glandular dysfunction, metaplastic change and secondary bacterial infection). Although not apparent from this picture, this bird also had multiple oral and lingual abscesses, and blood samples showed liver and kidney disease, raised blood cholesterol and hypocalcaemia. Its lifetime diet had been 100% sunflower seeds.

The current causes of avian malnutrition

The need to eat

In order to fulfill its nutritional requirements a bird needs to eat. A bird's energy needs are considerably more variable than other nutrient requirements and a bird will eat to meet this primary demand. Activity levels, ambient temperature, and the energy concentration of the diet all influence a bird's feeding rate.

In captivity there will generally be a reduced intake of food due to the bird's lower energy requirement and/or through eating more energy dense foods when compared with those eaten in the wild.

The requirement for macro-nutrients of wild birds should not be compared with that of captive birds.

As the need for other (micro) nutrients remains reasonably constant, however, the food consumed by captive parrots should have a higher proportional percentage of these nutrients to compensate for the lower consumption rates.

This simple concept has a fundamental part to play in the pathogenesis of avian nutritional disease.

Common feeding practices

The majority of pet parrot owners still feed their birds commercially constructed 'parrot mixes' which contain a variable range of grains, seeds and nuts, most of which would be foreign to their 'free-living' relatives. The seeds included vary from mix to mix, generally depending on their size and the target species at which the food is aimed. When offered these 'parrot mixes' the bird rarely consumes many of the different kinds of seeds often selecting only those with a high fat content.

Seed and nut quality is often variable. This may be due to the source, with many being second-grade leftovers from the human food market, or the way in which the seeds have been handled, stored and preserved.



Irrespective of their type, size or quality, it is well established that seeds are a deficient source of essential nutrients. Whilst the nutrients available from each individual type of seed or nut may vary, **no seeds come close to fulfilling the dietary requirements of birds.**

The role of seeds in avian malnutrition

Seeds provide a rich source of calories. This can be in the form of carbohydrates eg. corn, canary seed; fats eg. sunflower, hemp, rape, nuts; or protein eg. legumes.

Seeds are, however, considered to be missing 32 essential nutritional ingredients from 8 groups:

Vitamins	Vit A, Vit E, Choline, Niacin, Pantothenic Acid, Riboflavin (B2), Cyanocobalamin (B12), Biotin (H), Vit D ₃ , Vit K, Folic Acid
Vitamin Precursors	Beta-carotenes (converted to vitamin A in the liver)
Minerals	Calcium, Phosphorus (70% tied up as non-digestible phytates in plant products), Sodium
Trace Minerals	Selenium, Iron, Copper, Zinc, Manganese, Tin, Iodine, Chromium, Vanadium, Bismuth, Boron
Essential Amino Acids	Lysine, Methionine
Fibre	Mucopolysaccharides - soluble and insoluble
Fatty Acids	Omega-3
Pigments	Chlorophyll, Canthaxanthin

Some key nutritional deficiencies of seeds

Protein: Proteins are constructed of smaller units called amino acids. Some of these amino acids can be synthesised within the body, however some, known as essential amino acids, cannot and must be obtained from the diet.

Ten of the twenty or so amino acids that make up proteins are recognised as essential in birds. The proteins found in seeds are deficient in a number of these essential amino acids.

A lack of these essential amino acids will lead to a number of structural and metabolic problems in birds. For example high levels of lysine are required for growth and development and feather quality is dependent on the availability of adequate levels of the sulphur containing amino acid methionine.

Calcium, Phosphorus and Vitamin D: To function properly a bird requires a diet that contains around 0.1% calcium. Diets will also contain phosphorus and to be most effective calcium needs to exceed the phosphorus in a ratio of approximately 2 to 1. **A failure to meet these criteria will lead to both skeletal, metabolic and neurological issues.**

Seeds are generally low in calcium (0.03%) and high in phosphorus leading to a Ca:P ratio nearer to 1:4 or even worse (1:7 in sunflower seeds).

The dietary uptake of calcium also requires active vitamin D. This needs to be produced from inactive vitamin D from the diet and exposure to UV light. Seeds are deficient in vitamin D.

Vitamin A: Vitamin A is an essential vitamin utilised by the body in many metabolic functions. The health and integrity of the skin and mucous membranes, and the immune system being important examples. Vitamin A is not found in plants, what plants do have are carotenoids which the body converts. Seeds are generally short of these vitamin A precursors and can in essence be considered to be short of vitamin A.

It is readily apparent from this small number of examples the pivotal role that seeds play in the establishment of nutritional disease. The same nutritional limitations apply equally to nuts.

Parrots eat seed in the wild so what is the problem?

We know from observations of wild parrots that, for the majority of species, seeds represent a high percentage of their dietary intake. So where does the problem lie?

- Birds, both wild and captive, eat to satisfy an energy need. Wild birds, however, have a higher energy requirement than captive birds so consume a greater amount of food. Whilst the micro-nutrient levels of these foods may be low, the higher volume consumed results in the uptake of adequate levels of essential micro-nutrients.
- Wild parrots also have access to, and eat, a much wider range of food types. They tend to eat semi-ripe seeds which have a much higher level of nutrients than the dried seeds which are typically found in most parrot mixes. Their diet is also augmented with fruits and invertebrates which provide them with a richer level of nutrition than caged birds on a standard seed diet.
- Whilst the energy expenditure of captive birds is much lower than wild birds their need for trace elements for vital body functions is not. In fact, one might suggest that it may be higher as controlling stress (often captivity induced) necessitates high levels of some micro-nutrients.
- For captive parrots, easy 'fixes' such as high fat seeds and nuts, which are provided in most seed mixes, are a readily accessible source of energy and satiation is generally reached quite quickly. Therefore less food is eaten and that consumed is generally of lower (micro)nutritional quality. Thus pet parrots run into a micro-nutrient deficit.



Diets for captive birds need to be lower in energy to stimulate appetite and higher in trace elements than those of wild birds.

The role of the bird in avian malnutrition

Dietary habits are based on a number of issues. Food availability is an obvious one, and palatability and digestive capabilities are also important. Taste (although parrots have only around 350 taste buds compared with around 9000 for humans!), shape and colour have also been implicated in food selection. However, the most fundamental principle in formulating the eating habits of birds is learning.

Learning: A pet parrot is taught its dietary practices by both its owner and its peers. By subjecting birds, particularly at the time of weaning, to a limited range of foods (in most instances seeds) we are effectively creating the principles for their dietary habits for the rest of their lives. In later life the introduction of new foods can often not be perceived as food and ignored in preference for the bird's accepted diet. Previous dietary experience has a considerable bearing on the eating habits in older captive parrots and is perhaps the biggest obstacle to dietary change.

The role of the owner

Owners, regrettably, must also take some of the responsibility for the existence and persistence of avian malnutrition and the prevalence of 'sunflower seed junkies'. Nutritional misconceptions and inappropriate feeding regimes, perpetuate the problem.

Many owners believe the bird will select what is right for them, but with very few exceptions (increased calcium intake by certain species of birds prior to egg-laying being an example) the 'Mother Nature knows best' philosophy does not apply. Whilst pet parrots do selectively eat foods high in fats (a quick energy fix), they do not choose foods based on their micro-nutrient content.

Preferential self-selection of favoured, but nutritionally unbalanced foods, results in an unbalanced, deficient diet.

Some owners offer a seed mix as a form of entertainment for the bird as it rummage and select its food. Many birds still preferentially select the same seed (often a sunflower seed) over and over again, because birds eat to fulfil a need



for energy. But the presentation of a seed mix and the selection of the same seeds results in a limited diet and can lead to malnutrition. Feeding and food should not be used as a substitute for additional mental and physical stimulation (toys, games, 'playtime', baths etc), and whilst the end result, of say a foraging toy, can be an edible reward it is the journey not the arrival that is important.

By feeding a nutritionally complete diet, and providing a stimulating environment, both the bird's nutritional and mental needs can be satisfied.

The diagnosis and clinical manifestations of avian malnutrition

Is there a test for malnutrition?

The ways in which the body stores and processes nutrients mean that there are limited simple diagnostic procedures that can be used to highlight the presence of malnutrition.

X-rays can be taken to clarify the extent or severity of certain nutritionally related conditions, such as metabolic bone disease or an enlarged liver. Blood tests for some specific nutrients can be carried out, but both these procedures are essentially used as additional confirmation of what an avian clinician already suspects from their physical examination and observation of the bird.



Clinical examples of avian nutritional disease

It is worth emphasising that when considering the challenge of identifying the effects and underlying pathogenesis of avian malnutrition that:

- Nutritional disease is invariably: multi-factorial in its cause
multi-systemic in its effects
multi-presentational in its appearance
- Very rarely can malnutrition be isolated to a deficiency of one or two specific nutrients, causing specifically identifiable problems.
- Malnutrition affects the body in an all-inclusive manner.

The following sections highlight some of the commonly encountered and more directly attributable, nutritionally related conditions associated with a particular body system. Identifying lesions in one part of the body, however, does not preclude equally diagnostic signs occurring in other systems. Most birds suffering from malnutrition exhibit multi-systemic problems and multiple observable symptoms. The key to sound diagnostic appraisal is an appreciation of the presenting signs and good clinical observation.

The following overviews may help.

Skin and feathers

The skin and feathers are perhaps the easiest areas in which to identify cellular dysfunction because as cell turnover is high the consequences are more readily observable. The production of the wide range of keratin proteins is complex and heavily dependent on vitamin A for their accurate biosynthesis. Low dietary levels of vitamin A, or their carotenoid precursors, and a lack of the appropriate essential amino acids, will lead to suboptimal protein construction resulting in poor quality feathers and epithelium.

Signs of nutritional conditions affecting the integument and feathers



Stress lines and retained feather shafts



Poor feather durability

- Dry, flaky skin (itch)
- Bleeding blood feathers
- Stress bars
- Overgrown/flaky beak
- Overgrown/misshapen claws
- Failure to shed shafts
- Slow to moult
- Feather colour breaks
- 'Bumble foot'
- Poor feather durability (melanin shows through)
- Preen gland dysfunction: abscessation/impaction
- Change in feather lustre
- Lack of skin elasticity (especially the proptagium and tail)
- Feather plucking and self-mutilation
- Secondary bacterial and fungal infections



A slow moult with retained 'pin feathers'



Feather colour breaks



Lack of tissue elasticity resulting in skin cracks, irritation and self mutilation

Metabolic disease

These conditions are not always as easy to appreciate or interpret as those affecting the integument as they influence the biochemical processes of the body.

One metabolic condition that is readily apparent, however, is obesity. High levels of fat intake, caused by inappropriate foods and feeding behaviour, and exacerbated by a lack of exercise, are obvious causes of this problem. Because of the thin skin of birds, fat can often be seen as yellow deposits in the sub-cutis, but fat deposition also occurs around and within organs of the body. Here it can disrupt both normal mechanical function, atherosclerosis for example, and metabolic function, especially where fatty-liver disease is implicated. Whilst all birds are susceptible to obesity, some species, such as Amazons, galahs, cockatiels and budgies, would seem to have a greater disposition towards it.

Another observable metabolic dysfunction is hypocalcaemia – a lack of usable calcium within the blood stream. As well as being responsible for good bones and egg shell, calcium is needed for the smooth working of the muscles and nervous system. Low circulating blood calcium levels may result in cutaneous irritation leading to feather chewing and general irritability, or acute seizures which, if unattended, can often be fatal. A combination of low calcium intake and inadequate levels of vitamin D (seeds, as mentioned, are generally deficient in both) and non-exposure to UV light, will predispose to this life-threatening problem.

Signs of nutritional conditions affecting the metabolism

- Obesity - Atherosclerosis
- Iron Storage disease (ISD)
- Cardiomyopathy
- Hypocalcaemia
- Pancreatitis
- Gout
- Diabetes
- Hypervitaminosis toxicity
- Hypothyroidism
- Vitamin competition
- Hernias
- Xanthomas, Lipomas and Fibrolipomas
- Fatty liver disease



Abdominal hernia



Visceral gout



Wing xanthoma
(cholesterol deposits)

The Reproductive system

The nutritional requirements for a hen bird to breed can be divided into three general categories: nutrients required for egg production; nutrients needed to maximise hatchability; and adequate and appropriate foods to raise chicks. Parrots are designated as income-breeders ie. they form eggs from the nutrition that they receive at the time of laying. A diet specifically designed for egg-laying in parrots should not be necessary. Providing that a female bird has been on a good diet that will have already optimised her body condition, her nutritional requirements for breeding will be being met and her regular diet will provide the daily replenishment of transiently depleted stores.

A malnourished hen bird will, however, when given an up-lift in her nutrition, put her own house in order first by replenishing depleted reserves and repairing and renewing damaged cells. She will not use these extra nutrients to breed, or if she does she will not fund the egg as well as she might.

Inappropriate nutrition (high fat/calorie intake) can also stimulate egg-laying in non-breeding birds. The consequences of this, often coupled with low dietary calcium, can lead to a range of potentially serious conditions.

Right: X-ray of an egg-bound African grey. Egg-binding is typically associated with low blood calcium levels. Low blood calcium prevents the natural contraction of the uterus inhibiting the expulsion of the egg. Of equal importance, however, in failing to pass an egg is inadequate dilation of the cloaca. This inability to stretch can be due to a loss of elasticity in the tissue around the cloaca, a consequence of poor tissue composition which is a direct result of low dietary vitamin A. A nutritional holistic approach should be given to these birds rather than solely addressing the calcium levels.



A chick is only as good as the egg from which it has hatched. An egg produced by a hen which has been fed on a nutrient-replete diet is normally a rich source of essential amino acids, essential fatty acids, energy, and all the vitamins, minerals and antioxidants required for normal cell division, growth and maturation of an embryo. If a hen is fed on a nutrient-deficient diet, albeit one that may still allow egg production, then embryo development may occur but not proceed normally. Early embryonic death, dead in shell, malformation or problems with subsequent growth and development, and neonatal infections due to a poor immune status can all be consequences of a poor female diet.

For a male bird to produce good levels of quality sperm (high count and viability) there has to be good levels of essential vitamins and antioxidants to protect the sperm from being denatured.

Signs of nutritional conditions affecting the reproductive system

- Poor parenting
- Egg binding -
 - Egg peritonitis
 - Cloacal prolapse
 - Prolapsed oviduct
- Unwelcome sexual activity -
 - Bonding
 - Aggression/screaming
 - Feather plucking
 - Masturbation (leading to cloacal abrasions or cloacal prolapse)
 - Regurgitation
 - Chronic egg-laying
- Infertility -
 - Lack of libido
 - Low sperm count and viability
 - Failure to ovulate
 - Failure to incubate; multiple nesting attempts

The Paediatric bird

Inappropriate nutrition during hand-rearing or parent rearing can predispose to a variety of issues during a chick's growth. Gross deficiencies (or excesses) will lead to identifiable problems. Of equal importance as the direct physical issues, is the effect that suboptimal nutrition has on the baby bird's immune system, depressing it and potentially predisposing the chick to a wide range of infections.

Signs of paediatric nutritional conditions

- Failure to grow - 'stunting'
- Slow crop emptying - primary or secondary to candida infection
- Skeletal -
 - Osteodystrophy (Metabolic bone disease)
 - Splay leg or tibiotarsal rotation
 - Angel wing
- Inappropriate food intake - obstruction
- Dead in shell



Splay leg



Osteodystrophy
(Metabolic Bone Disease)



Dead in shell

The Respiratory system

Pet parrots are commonly presented to their vets with sneezing, chronic nasal discharge, sinusitis, respiratory noise and occasionally more severe respiratory distress. The lining of the nares and sinuses are designed to inhibit the inhalation of foreign particles and to act as an active barrier to micro-organisms. To function properly the cellular lining must have the ability to secrete mucous and generate normal healthy epithelium. Malnutrition has a profound effect on the lining of the sinuses and its ability to do this. Often designated as vitamin A deficiency due to the role of this vitamin in cell division (although as pointed out, malnutrition is never confined to a single nutrient), there is a progressive change in the nature of the cellular lining of the sinuses from mucous-producing epithelial cells to dry, metaplastic cells. These die, flake off within the sinuses and nares, initially causing an inflammation, irritation, and then accumulate as swellings.

Signs of nutritional conditions affecting the upper respiratory system

- URT infections
- Nasal discharge
- Sinus 'abscesses'
- Rhinoliths and destruction of the nares
- Oral 'abscesses'



Top left: A Cockatiel with classical upper respiratory infection exhibiting conjunctivitis, rhinitis, sinusitis and respiratory effort. Many of these symptoms are secondary to a poor quality nasal mucosal lining.

Top right: An African Grey showing a classic example of a rhinolith with enlarged nasal openings.

Bottom right: A Conure exhibiting a large sublingual 'abscess' arising from metaplastic change to the salivary glands.

Bottom left: An African Grey with a sinus 'abscess'.

Behaviour

Why should nutrition have an effect on behaviour?

A lack of essential nutrients means that normal organ functions are not carried out. This may influence the production of enzymes, hormones and other biochemicals that regulate normal metabolic activities, and in such cases atypical, often undesirable, behaviour may arise. Should this metabolic dysfunction result in the production or non-breakdown of toxins and metabolites, these too can have an adverse effect on normal function. Behavioural changes can manifest themselves in subtle ways which the owner perhaps thought was normal for their bird – to more discernible changes such as self-mutilation, screaming or aggression. In breeding birds poor parenting is often attributed to the individual birds themselves or aspects of husbandry unrelated to diet which may not be the case.



Above: An African Grey exhibiting extensive feather destructive behaviour.

The Immune system

The most subtle, but arguably one of the most significant issues of avian malnutrition, is suppression of the immune system. The immune system is the firewall that protects the body against attack from potential disease-causing organisms (viruses, bacteria, fungi and parasites) and toxins, both internal as well as external. The immune system comprises of a wide range of cells, biological structures and processes that depend on essential nutrients to maintain their function. Failure of the immune system, by the very nature of its function, predisposes the body to attack. Whilst a lot of the structures and chemical responses that constitute the immune system are complex others are not. As has already been highlighted, simply by having poor quality cells lining the sinuses and the surface of the skin affords reduced protection and allows colonisation of opportunistic pathogens.



Above: A Healthy Faecal Grams Stain: Psittacine birds unlike passerines, have a healthy bacterial gut population that functions as part of their immune system. Malnutrition reduces both the numbers and types of these beneficial micro-organisms. Faecal Grams stains can identify abnormal bacterial patterns in the gut flora and can thus act as a warning signal that all is not well. Increasing levels of 'healthy flora' can also be a good (and reasonably rapid) indicator that the body is responding to a healthier diet.

Treatment of the malnourished bird

The approach to resolving the issues of a bird presenting a nutritionally derived disease will invariably involve treating the presenting symptoms. Whilst treating the condition without addressing the underlying cause may achieve a short-term alleviation of the problem, it is unlikely to effect a long-term cure. Correcting nutrient deficiencies may initially include a 'quick-fix' of injectable vitamins or minerals or oral nutrients but inevitably resolving the problem will require a complete reassessment of both diet and feeding protocols.

Treating malnutrition needs to be an all-embracing nutritional and lifestyle reappraisal for both bird and owner

Attempted dietary correction using supplements

Those who recognise the deficiencies and imbalances of a seed-based diet may try to rectify the problem through the additional supply of vitamin and mineral supplements. Unfortunately, the effective provision of supplements can be challenging. The fortification of nutrients through the bird's water is problematic as aqueous solutions of vitamins and minerals are very unstable and water consumption can be variable. Powder application to the surface of seeds is also a very hit-and-miss method of medication with most ending up in the bottom of the bowl or remaining on the discarded shell of the seed post-husking. Whilst the use of supplements may halt a temporary decline in micro-nutrient reserves, it is generally ineffective at 'balancing' a deficient diet and has been shown, in many cases, to be unsuccessful at preventing deficiency diseases; and certainly has no effect on the excessive intake of fats.

Dietary correction should not be, and indeed cannot be, a top-up of presumed deficient nutrients within a bird's diet.

Correcting the diet

If we recognise, from both nutritional analysis and veterinary observation, that seeds and nuts are both deficient in many of the essential macro and micro nutrients and in general oversupplied with fats, it is clear that a seed-based diet is nutritionally unsuitable for long-term health. And if we accept that the use of vitamin and mineral supplements doesn't redress these shortages, then another method of dietary correction needs to be adopted.

Most parrots, whilst having an evolutionary preference for certain foods are generally diverse, flexible and opportunistic in their eating habits. Therefore within the constraints of the bird's digestive capabilities, food-types and forms other than whole seeds and nuts can be fed and accepted by parrots. By doing so we can provide the levels of nutrients needed for a healthy life.

Dietary augmentation with fruit and vegetables

Fruit and vegetables are fed in varying amounts to pet parrots and although their acceptance and consumption by individuals varies considerably they are an important ingredient of a parrot's diet. Fruit is a valuable source of bowel-regulating fibre and rich in sugars (calories) but is deficient in many macro-nutrients (protein) as well as the majority of micro-nutrients.



Vegetables are generally higher in minerals than both fruit and seeds, and dark coloured vegetables such as peppers, carrots, spinach and broccoli provide good levels of carotenoids. However, in common with fruits, they are fundamentally short of many of the essential nutrients needed to prevent malnutrition.

Both fruit and vegetables are good adjuncts to a nutritionally complete diet but, like supplements, should not be seen as a way of correcting a deficient seed-mix diet.

Feeding of table-foods

Some table-foods do no nutritional harm to pet parrots; rice, pasta, potato, bread and cooked chicken, all in limited amounts, will provide carbohydrate and protein to the diet, but in general little more. Some human food items should, however, be avoided; those that have been cooked in fats or contain high levels of fat (chips and crisps for example) have the potential not only to do harm but to create undesirable eating patterns.

The main issue with feeding table-foods is that, whilst most may not do any harm, the energy levels of the birds are being met with foods that do not contain adequate levels of micro-nutrients.

In general, feeding table-food is more likely to exacerbate dietary problems than to correct them.

Prevention is better than cure

Fortunately, many conditions can be greatly improved by dietary improvement; some may even be 'cured' in that the observed effects are no longer present. It would be optimistic, however, given the subtle, insidious and permanent nature of some nutritional diseases to suggest that all problems will be resolved by treatment - hence the necessity for preventative action.

Prevention of nutritional disease

The prevention of malnutrition revolves around two considerations: being aware of the potential for nutritional disease; and providing a suitable diet through all life-stages from juvenile to geriatric. Nutrition is not a static process, it is dynamic and influenced by life-stage and lifestyle.

Metabolically demanding periods such as growth, moulting, reproduction and stress increase nutritional demands. As discussed, for most birds the provision of seed-mix diets, with or without additional supplements, will not achieve these needs and it is internationally recognised that the best way to provide a nutritionally complete diet is through the feeding of a formulated diet.

The role of formulated diets in the correction and prevention of avian malnutrition

Due to the variable nutrient content of individual food items and the vagaries of pet parrot eating patterns, it is rarely possible for the parrot owner to create an accurate nutritionally balanced diet by simply feeding a range of specific food items. This difficulty has been overcome by the development of formulated diets specifically designed for pet parrots. Avian veterinarians would generally agree that the development and feeding of formulated diets represents the biggest advance in captive avian health and welfare over the last 40 years or so.

- The principal of formulated diets is to provide a balanced level of essential nutrients in an acceptable and palatable form.
- The formulas are based on food-types that form the birds' natural diet.
- They have been constructed to ensure that the required levels of all essential nutrients are met.
- Energy levels in the foods are kept reasonably low to ensure that eating is encouraged and micro-nutrients intake levels are maintained.
- Using a formulated diet means that dietary nutritional deficiencies and excesses are avoided and 'buffet feeding' is eliminated.

All formulated diets are not the same

Feeding a formulated diet as the main part of a pet parrot's nutrition is considered by avian veterinarians and nutritionists as the most appropriate way of providing your birds with the essential nutrients for a healthy life. As with other foods, however, all formulated diets are not the same and vary considerably in composition, palatability and quality. It is therefore worth considering these key points when choosing your formulated diet. UK's leading avian vets recommend Harrison's Bird Foods as these are at the forefront of this nutritional know-how.

- Harrison's Bird Foods are manufactured using human-grade ingredients.
- They are certified organic and non-GMO, so remove any risk of the bird ingesting harmful agro-chemicals.
- Harrison's Bird Foods are manufactured using an extrusion process which enhances the digestibility of the ingredients, whilst preserving the nutritional content. It also breaks down many of the naturally occurring digestion inhibitors and reduces potentially harmful myco-toxins levels.
- For more information on Harrison's Bird Foods see pages 21-23.

Importance of a formulated diet from a young age

It is important to use a nutritionally complete Harrison's formulated diet from as early an age as possible because it is rarely possible to play 'nutritional catch-up'. The effects of juvenile metabolic bone disease, for example, will not be corrected by a change to a nutritionally replete diet; even minimal deficiencies or excesses have a cumulative effect on the bird's body that can result in unresolvable conditions. For fully weaned or older birds, the process of conversion should begin as soon as possible. Nutritional disease is generally the collective result of low level deficiencies, so prompt restoration of normal nutrient levels will prevent both clinical and subclinical disease progressing into 'malnutrition'.



Even when presented with birds that do not, as yet, show any signs of deficiencies, it is inevitable that any bird fed on a predominately all-seed diet will eventually succumb to malnutrition. Dietary change should be implemented at the earliest opportunity so as to reduce the impact of the previous deficient diet.

The positive way forward

The consequences of avian malnutrition can be debilitating for the bird and distressing for the owner. Fortunately with Harrison's at the forefront, formulated diets are improving the welfare and longevity of captive parrots. Embracing the use of formulated diets with our pet birds is the healthiest and most practical option available. Malnutrition is a preventable disease. Correction may take many months to achieve, but the improved health of your pet and the pets in your care repays the effort and, cliché or not, prevention is always better than cure because sometimes, for some conditions, there is no cure. Our aim as carers should be to provide an environment for our pets where they will thrive not just survive.

The positive effects of dietary correction

Just as the presenting signs of avian malnutrition may be dramatic or subtle, the visual results of dietary correction can also be varied. The two pictures below emphasise the subtle nature of dietary correction seen by improved feather quality. What can't be seen or measured is the improvement in the general overall health of the bird and the increased pleasure gained by the owner in having a happier and healthier pet.



Left: A conure exhibiting signs of malnutrition whilst on a seed based diet (see descriptions of annotations below)

Below: The same conure after a change of diet to Harrison's High Potency Fine



1: Inflamed nares with mild discharge. Nasal discharge from birds is almost invariably abnormal.

2: Lack of feather lustre due to poor production of oils. The production of both body and preen gland oils require healthy cellular function. One of the effects of oil application to the feathers is to create an optical colour effect – that of lustre – by altering the refractive light patterns of the feathers. Non-lustre is therefore symptomatic of poor cellular function.

3: Scruffy feathering due to failure of barbs to fully interlock. Poor feather growth results in defects in the nanostructure of the interlocking barbs and barbules resulting in an 'unzipped' appearance.

4: Blackish tinge to the normal green feathers. Failure to moult results in longer feather retention and thus a greater degree of abrasion; and/or poor structural quality as a consequence of feather follicle dysplasia resulting in poor quality keratin, causing the black melanin base layer of the feather pigmentation to become visible.



Harrison's Bird Foods

Premium, certified organic, nutritionally complete diets for pet birds

Recommended by the UK's leading avian vets

Having read the preceding part of this booklet, I hope that you are convinced that feeding a formulated diet is the nutritionally optimal way to ensure that pet parrots receive the best diet we can provide. There are a number of formulated diets on the market, so why choose Harrison's? What makes Harrison's Foods stand out from the others?

By drawing on the combined expertise of veterinarians, nutritionists and aviculturists, Harrison's have produced a premium range of scientifically formulated diets that provide pet birds with the levels of macro- and micro-nutrients they require for good health. Manufactured using a low-temperature extrusion process, the foods' natural qualities are preserved and digestibility is improved.

Harrison's Bird Foods are made with premium-quality, human-grade cereals and are certified organic and non-GMO verified*. By using organically sourced ingredients, Harrison's have eliminated the risk of pet parrots ingesting exogenous toxins often associated with the growing, storage and manufacturing processes. As they are organic, potentially harmful herbicides, pesticides, preservatives and synthetic colourings are eliminated from the Harrison's Bird Food range.



As Harrison's Bird foods are nutritionally complete they eliminate the need for supplementation and avoid the problems that result from 'buffet feeding'.

Harrison's Bird Foods are used and recommended by leading avian vets both UK and worldwide, as they believe they are the best diets for pet birds.



For more information please see www.hbf-uk.co.uk

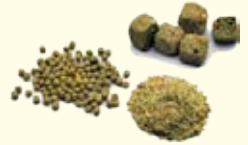
* Certified organic in the USA by the Department of Agriculture and in the UK and Europe by the Organic Food Federation. Verified non-GMO in the USA through the Non-GMO project.

Which Harrison's food to choose




All Harrison's Bird Foods are formulated to provide pet birds with the nutrition needed for good health. The necessary levels of energy, protein, vitamins and minerals are all provided and there is no need for the use of additional supplements.




There are two main types of diet: High Potency and Adult Lifetime. The formulations differ slightly in nutritional content – mainly the fat and protein levels (influencing the calorific value) - making them appropriate for use in a variety of different nutritional and clinical situations. These are outlined below.

Thereafter the main difference between the Harrison's foods is the size of the food nugget. Which size you choose is down to the preference of your bird and how they usually eat their food. The foods most commonly fed to each type of bird are shown opposite, but this is just a guide – if a bird prefers a different size of piece to 'the norm' then feed them this as they will still receive the same balanced nutritional benefit.



The Harrison's range also includes treats and hand-feeding foods for all pet birds. For a full analysis of composition please visit our website: www.hbf-uk.co.uk




HIGH POTENCY DIETS		
 High Potency Coarse	 High Potency Fine & High Potency Superfine	 High Potency Mash
<p>High Potency diets provide the correct balance of essential vitamins and minerals, whilst having a slightly higher calorific value, making them most suitable for birds:</p> <ul style="list-style-type: none"> - which are converting from a seed based diet - which are still young and developing - which have higher metabolic rates and benefit from higher energy diets, e.g. African Grey, large macaws, or palm/moluccan cockatoos - which are moulting or have poor feathers - which are recovering from illness - you wish to bring into breeding condition 		

ADULT LIFETIME DIETS		
 Adult Lifetime Coarse	 Adult Lifetime Fine & Adult Lifetime Superfine	 Adult Lifetime Mash
<p>Adult Lifetime diets provide the correct balance of essential vitamins and minerals, whilst having a slightly lower calorific value, making them most suitable for birds:</p> <ul style="list-style-type: none"> - which have been eating High Potency for 6 months since conversion as this is a more appropriate long-term diet (excluding species benefitting from High Potency - see above) - needing help preventing chronic egg laying (typically cockatiels), or which are showing signs of undesired breeding behaviour - which may be diabetic - which have problems controlling their weight (e.g. Amazons, galahs). 		




SIZE OF PIECE

Coarse	Larger pieces that bigger parrots can pick up and eat from their feet	e.g. Cockatoos African Greys	Macaws Amazons	Eclectus Pionus...
Fine	Smaller pieces for smaller parrots who pick them up in their beak directly from the bowl	e.g. Senegals Quakers	Parakeets Cockatiels	Conures Lories...
Superfine	The smallest pieces, for small birds which peck directly from the bowl	e.g. Canaries Budgies	Finches Doves...	
Mash	A 'coarse' powder. Suitable for all birds, it can be moistened, or sprinkled onto fruit or vegetables, or served dry to birds which peck directly from the bowl.			

OTHER FLAVOURS AND TREATS

 Pepper Lifetime Coarse	Pepper Lifetime Coarse: The Adult Lifetime Formula with added chili peppers. Some birds love the spicy flavour and it can be served as a staple diet, as a healthy treat or as a conversion food.
 Power Treats	Power Treats: A tasty, toasted treat with a sweeter, nuttier flavour, which acts as a good conversion tool, or can be served as a healthy treat. It contains sustainable organic Palm Fruit Oil which benefits the skin, feathers and immune system.
 Harrison's Bird Bread Mix	Bird Bread: A mix based on Harrison's Bird Foods which you can use to bake your birds 'a cake'/'bread'. Available in three flavours (Original, Millet & Flax and Hot Pepper), it is ideal as a conversion food, a healthy treat, for birds that enjoy human food, or as a way of introducing fruit and vegetables to your bird's diet as these can be baked into the bread.

Which food should I use for hand-feeding?

	Composition	Suggested uses			
 Recovery Formula	Protein 35% (min) Fat 19% (min) Fibre 1% (max) Moisture 10% (max)	For debilitated or injured birds. The high protein content aids the recovery in 'critical care' situations.	For medical and surgical patients recovering from pansystemic failure and as a dietary transition for recovering patients.		
		A hand rearing food for small insectivorous birds with apparent inability to digest cornstarch.	In instances of anorexia with slowed gastrointestinal emptying time.		
	Composition	0-7 days	7-14 days	14-21 days	21 days -weaning
 Neonate Formula	Protein 26% (min) Fat 14% (min) Fibre 1% (max) Moisture 10% (max)	Passerines			
		Chicks with adult weight <150g eg. cockatiels			
		Chicks with adult weight <350g			
		Chicks with adult weight >350g	Chicks with adult weight >350g eg. macaws, cockatoos, African greys, Amazons		
 Juvenile Formula	Protein 18% (min) Fat 11% (min) Fibre 4% (max) Moisture 10% (max)	Introduce Juvenile Formula gradually when transitioning from Neonate Formula.		Other parrots to weaning	
				Chicks with adult weight <150g eg. cockatiels	

MAH

Meadow's Animal Healthcare

**For more information about Harrison's Bird Foods
please contact us or visit our websites:**

www.hbf-uk.co.uk

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