

A guide to

Identifying and Avoiding Nutritional Disease in Pet Parrots



Produced by:

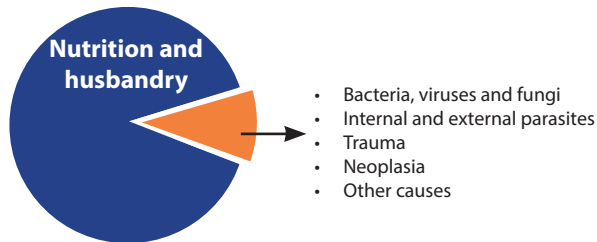
MAH
Meadow's Animal Healthcare

Introduction

Since the first edition of this booklet was written there have been great strides forward in the care of pet birds. One significant change is that teaching of exotics medicine at veterinary colleges is now part of the mainstream syllabus, rather than an afterthought. Along with exotics-related CPD, many vets are now armed with a foundational knowledge on which they can build.

So, the wellbeing of pet birds has never been better...? I believe this is probably true, but that is not to say that everything is under control. Pet birds still become ill and suffer from preventable disease.

With the banning of avian imports in 2005, the incidence of infectious diseases in pet birds, especially parrots, has dropped dramatically. There has therefore been - in relative terms - a rise in husbandry-related illnesses, and particularly those related to nutrition. I believe that around 90% of cases presented to vets have this underlying cause.



The believed underlying causes of avian ailments

The nutrition, and appreciation of the effects of inappropriate nutrition, of pet birds has lagged behind that of other domestic pets. I am pleased to say, however, that recent years have seen a general improvement in the feeding of pet birds. Both owners and vets appreciate the role of nutrition as a major factor in the health of pet birds, and there have been significant improvements in avian diets.

This improvement has, in no small part, been brought about by both the availability and use of formulated diets, especially those based around organic ingredients. Their use is accepted by veterinarians and professional aviculturists worldwide as being the greatest step toward improved captive bird health in recent times.

A fundamental issue to the correction of nutritional disease is fully appreciating and diagnosing the effects of inappropriate nutrition. This requires a knowledge of the appearance of a 'normal'/'healthy' bird in order to identify abnormalities. The owner of an unhealthy bird may perceive their bird as 'normal' as they have no experience of what a 'healthy' bird really looks like or how it acts.

There is no classic tell-tale sign for malnutrition, or a simple diagnostic test. Symptoms, and the severity of those symptoms, depend greatly as to the level of nutritional disease, the system that is affected, the duration of the problem, and many other factors.

The clinician or owner should not forget the following:

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

Given the multifactorial way that malnutrition can be presented, the text and photographs in this booklet are not intended as a comprehensive review of all the manifestations of avian nutritional disease nor as a complete 'diagnostic guide' to the presenting signs. They will, however, hopefully provide guidelines of things to consider when making a clinical assessment of a bird.

The general concepts outlined in this booklet 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 and thus are subject to, and more commonly exhibit, the cumulative effect of long-term suboptimal nutrition.

The nutritional concepts discussed in this booklet are based on information acquired from a large and diverse array of scientific papers and textbooks, and my experience as an avian clinician for over 30 years. Whilst the facts are not in dispute, the interpretation of the facts, and the views expressed here, are mine.

Whilst the internet is a rich source of useful information on avian matters, as for many areas there is also an abundance of misinformation. Veterinarians therefore need to be conscious of the owner who prefers 'amateur advice' over an informed opinion from a qualified source as, even if well-intentioned, this can cause, or exacerbate, husbandry-related problems.

I hope you find this booklet useful.

Brian Stockdale

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Nutrition

The consensus among experienced avian practitioners worldwide is that...

Nutrition is the single most important aspect of bird welfare

Nonetheless, 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 cause for concern.

Malnutrition is - or should be - a preventable disease

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

- What are the clinical signs and consequences of malnutrition?
- Why do so many pet parrots present with signs of 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 bird's **DIET** - the foods that it actually eats

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, carbohydrates and proteins with dietary levels that are measured in grams
- Micro-nutrients - vitamins and minerals 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. The pathological states of stress, disease and injury, and captivity* has a strong bearing on nutritional requirements.



* - The requirements of captive birds differing from wild birds is considered later in this booklet

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

It goes without saying that these foods need to be in an accessible, palatable and digestible form for the species of birds being considered.

What do we mean by malnutrition?

GOOD NUTRITION IS...

The provision, through the intake of food, of appropriate levels of essential nutrients necessary to maintain healthy cellular function

SO MALNUTRITION IS...

a failure to provide these appropriate levels, predisposing to suboptimal cellular function

And...



So, what is nutritional disease?

Nutritional diseases are conditions arising from this suboptimal cellular function.

Depending on which tissues are affected, and the severity, nutritional disease can express itself as a wide range of clinical cases.

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.



An apparently normal African Grey that was actually suffering from subclinical hypocalcaemia

With subclinical diseases a bird may survive but it **will not thrive either physically or mentally**



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 diagnosis and clinical manifestations of avian malnutrition

Is there a test for malnutrition?

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

It is worth emphasizing, that when considering the challenge of identifying and diagnosing 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

Also consider that:

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

Nutritional disease will affect different birds, in different ways, at different times

But that does not mean that malnutrition cannot be identified. The sharpest tools in a veterinary practitioner's kit are:

Observation

Clinical examination

History taking

As most conditions in pet birds attending a veterinary clinic are likely to have a basis in malnutrition, an appreciation of the identifiable presenting signs, along with good clinical observation, and history taking (a bird on a predominantly seed-based diet can be assumed to be malnourished, for example) is key.

Clinical examples of avian nutritional disease

The following sections highlight some of the nutritionally-related conditions which are commonly encountered, and are more directly attributed to malnutrition.

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 these presenting signs through good clinical observation.

Visible lesions are manifest as a direct consequence of cellular dysfunction - the criterium by which we defined malnutrition. Dysfunction will be greater in some systems with higher cellular turnover or where a specific range of nutrients are required in greater amounts.

Skin and feathers

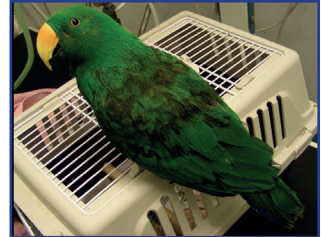
The skin and feathers are perhaps the easiest areas to identify cellular dysfunction. As cell turnover is high, and the process of skin and feather replacement is continuous, the demand for nutrients is high and therefore the consequences are more readily observable.

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. Reduced calcium levels also can result in poor feather construction.



Stress lines and retained feather shafts



Poor feather durability

Signs of nutritional conditions affecting the integument/feathers

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



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. It should be considered that primary metabolic dysfunction is the root cause of all system issues.

Obesity is, however, readily apparent. An obvious cause is high fat intake - through inappropriate foods and feeding behaviour - exacerbated by a lack of exercise.

Because birds have thin skin (compared to mammals) 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, where the function of the heart and great vessels is impeded and the normal flow of blood obstructed - and metabolic function, especially where fatty-liver disease is implicated. Whilst all pet birds are susceptible to obesity, some species, such as Amazons, galahs, cockatiels and budgies, seem to have a greater disposition towards it.

Another observable metabolic dysfunction is hypocalcaemia. As well as being essential for good bones and eggshell, 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
- acute seizures which, if unattended, can often be fatal

A combination of low calcium intake and inadequate levels of vitamin D, and a lack of exposure to UV light, will predispose to this life-threatening problem.

Signs of nutritional conditions affecting metabolism

- Obesity
 - ◇ Atherosclerosis
 - ◇ Cardiomyopathy
 - ◇ Hypothyroidism
 - ◇ Xanthomas, lipomas and fibrolipomas
 - ◇ Pancreatitis
 - ◇ Diabetes
 - ◇ Hernias
 - ◇ Fatty liver disease
- Iron storage disease (ISD)
- Hypocalcaemia
- Gout



Abdominal hernia



Visceral gout



Wing xanthoma
(cholesterol deposits)

The reproductive system

There is an obvious dichotomy facing the avian veterinarian when dealing with reproductive issues in birds. On the one hand there is the aviculturist or conservationist who want their birds to breed, and they are failing to do so, and on the other, the pet bird owner for whom unwanted sexual activity in their bird is both unwelcomed and not without potential health risks.

Nutrition plays a fundamental role in both challenges, although the majority of vets are more likely to encounter issues with pet parrots rather than breeding collections.

Reproduction in birds can be divided into two parts:

- the physiological intrinsic factors - the hormonal cascade that induces reproductive behaviour and egg-laying
- the physical extrinsic factors that trigger that cascade

The two are very much interlinked. For many pet parrots, extrinsic factors such as excessive periods of light, inappropriate social interaction between owner and bird resulting in 'pair-bonding', and the (generally inadvertent) provision of nesting substrate, for example, can all lead to misdirected reproductive behaviour.

Triggering the hormonal cascade when nutrition is suboptimal can result in reproductive complications, the most dramatic being egg-binding. Here, primary low dietary calcium/vitamin D levels or secondary parathyroid dysfunction (organ dysfunction), coupled with inadequate cloacal dilation (poor elastin and collagen quality) resulting in an inability to respond to both prostaglandin and oxytocin stimulation - production of which may in themselves be inadequate - all combine to create the life-threatening problem.



An X-ray of an egg-bound African grey

Long-term corrective measures must not be to simply add more calcium to the diet but to appraise the whole of the diet and the underlying triggers.

Diet itself can provide an extrinsic factor. Inappropriate nutrition (high fat/calorie intake) can also stimulate egg-laying in non-breeding birds, especially when coupled with other stimuli.

The male bird is not immune to misplaced breeding activity, aggression and territory defence - often manifesting as biting, reluctance to leave their cage (nest site) and screaming, for example - behaviour which the owner may not perceive as abnormal or sexually related. Some, such as attempting to copulate with their carer's hand or head, and presenting regurgitated food, are more obvious.

For both sexes of birds, the induced abnormal mix of reproductive hormones may also lead to destructive feather behaviour, a consequence of misdirected pair-bond allopreening and brooding behaviour. This can very quickly lead to self-mutilation.

Signs of nutritional conditions affecting reproductive systems

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

The paediatric bird

Inappropriate nutrition during both 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 to 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
- Inappropriate food intake - obstruction
- Dead in shell
- Skeletal
 - ◇ Osteodystrophy (Metabolic bone disease)
 - ◇ Splay leg or tibiotarsal rotation
 - ◇ Angel wing



Splay leg



Osteodystrophy
(Metabolic bone disease)



Dead in shell

The immune system

The most subtle, but arguably one of the most significant issues of avian malnutrition, is suppression of the immune system. Failure of the immune system, by the very nature of its function, predisposes the body to attack.

The immune system is comprised of a wide range of cells, biological structures, and processes that depend on essential nutrients to maintain their function. Whilst a lot of the structures and chemical responses that constitute the immune system are complex, others are less so.

Simply having poor quality cells lining the sinuses and the surface of the skin and bowel affords reduced protection and allows colonisation of opportunistic pathogens. Many gut pathogens are kept in check by a high level of the beneficial gut microflora. Sound nutrition is paramount in maintaining a healthy bowel ecosystem. High fat (and, effectively, low fibre) diets produce a 'toxic' environment for gut flora resulting in what is commonly referred to as 'stagnant gut syndrome'.

Poor levels of gut flora can be easily demonstrated on a faecal smear. Sloughed keratotic mucosal cells are also identifiable, indicative of poor epithelialisation. Due to the high reproductive rate of the gut microflora, rapid improvement of bacterial numbers can be readily appreciated on subsequent smears, once nutritional correction has been made.

The immune system's role in the wellbeing of an individual extends beyond that of just physical and humeral barriers to the insults of the external and internal world. It is well accepted that the gut microbiome affects cognitive function and, as such, behaviour. A healthy gut will lead to a healthy mind as well as a healthy digestive system.

Many of the toxic insults to the body arise from normal cellular metabolism. These potentially harmful metabolites - known collectively as 'free radicals' - are neutralised by an array of biochemical compounds and pathways. Their role is primarily to prevent damage to cell membranes due to oxidative stress, protecting the cell and the organ. A lack of vitamins and minerals, whilst playing a role in a multitude of other biochemical pathways, are essential for the efficient functioning of this antioxidation (redox) mechanism.

Diets low in these micro-nutrients and high in fat - which by its very nature increases the levels of oxidative stress - limits the ability of the body to detoxify, increasing levels of toxic metabolites. Whilst these toxins affect the functioning of all cells, the brain with its high lipid content is a prime target.



Behaviour

The aetiologies of behavioural problems in pet birds are extensive and complex. That pet parrots suffer from behavioural issues is hardly surprising as we are keeping a wild bird – however tame – in an unnatural environment. Parrots are not a domesticated species and they maintain many of their natural habits and social patterns. It is the duty of their carers to ensure that pet parrots are allowed to express as many of their natural behaviours as possible and to provide a diet that provides for their wellbeing.

We have already remarked on the profound effect that nutritional deficiencies or excesses can have on behaviour (see *Reproductive system* and *Immune system*). Many birds, however, exhibit atypical activities that go unnoticed, or unchallenged, by their owners as they are often accepted as 'the norm'. A reluctance to play or socialise may be subtle, but often the signs can be more overt such as aggression, screaming and feather plucking - a problem that will generally prompt a visit to the vet.

As seen in reproductive issues, the link between nutrition and the observed problem can often be readily understood. Feather plucking, whilst generally multi-faceted in its aetiology, can often be attributed to borderline hypocalcaemia resulting in cutaneous neuropathies, or to irritation caused by poor moult or excessive dander. These in turn may be the consequence of malfunctioning glands – the thyroid, preen gland, or feather follicles for example – due to suboptimal nutrition.

For a lot of behavioural issues, however, the link between nutrition and the problem are less well defined. A lack of essential dietary nutrients, as has been pointed out, results in suboptimal cellular function. This influences the production of enzymes, hormones, and other compounds that regulate normal metabolic and homeostatic activities. An imbalance, and the potential accumulation of toxins and metabolites, can result in atypical, often undesirable, traits.

The visible physical results of dietary correction are generally slow to be observed, however, the effects on the general wellbeing of a pet bird are often quickly appreciated by the owner, commenting that their pet is more sociable and interactive, and generally happier.

UV light

The provision of adequate levels of UV light, whilst not a nutrient per se, is important. It has a direct influence on calcium metabolism via vitamin D activation, and on maintaining the balance between the brain hormones melatonin and serotonin - levels of which are known to affect mood and behaviour (particularly in people). This is easy to appreciate when one considers that a parrot's natural environment is one where UV levels are particularly high.



An African Grey which has been feather plucking

The respiratory system

Pet parrots are presented to vets with:

- sneezing
- chronic nasal discharge
- sinusitis
- respiratory noise
- 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 their ability to do this.

Often attributed as resulting from a 'vitamin A deficiency', due to the role of this vitamin in cell division (although, as mentioned, 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 cells die, flake off within the sinuses and nares - initially causing an inflammation and irritation - and then potentially accumulate as swellings. This loss of mucosal integrity allows for the easy access of opportunistic bacteria, resulting in bacterial rhinitis or sinusitis.

Signs of nutritional conditions affecting the respiratory system

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



African Grey with a sinus 'abscess'



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



African Grey with a classic example of a rhinolith with enlarged nasal openings



Conure exhibiting a large sublingual 'abscess' arising from metaplastic change to the salivary glands

Diagnostic tests for avian malnutrition

Whilst initial appraisal will likely have been based on a clinical examination and observation of the patient, and knowledge of the bird's history, there are diagnostic procedures which can be used to back-up a clinician's assessment.

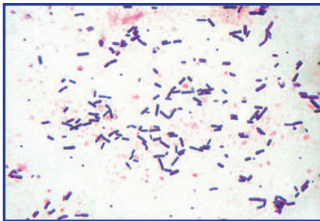
These can show the extent or severity of certain nutritionally related conditions, help to provide a prognosis and, if it is needed, offer 'proof' to the owner of the need for dietary change. Owners often have difficulty in making a subjective assessment of their pet's physical wellbeing, but an objective test result can help.

Bacteriology - Faecal Gram stains

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.

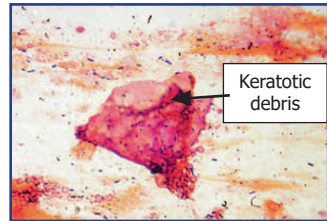
Gram stains can identify abnormal bacterial patterns in the gut flora, acting as a warning signal that all is not well. Owners are generally familiar with the concept of 'healthy gut bacteria' and demonstrating a lack of gut flora is often useful as a first step to highlighting the need for dietary correction.

Increasing levels of 'healthy flora' can also be a good (and reasonably rapid) indicator that the body is responding to a healthier diet.



Left: a 'normal'/'healthy' Faecal Gram stain with 160 micro-organisms per field

Right: an 'unhealthy' stain, with only 50 micro-organisms per field, indicative of 'stagnant gut syndrome'



Blood biochemistry and haematology

These should be standard protocol for any thorough avian work-up. Blood tests for some specific nutrients - ionized calcium, for example - are generally part of the profile, as well as organ metabolites such as bile acids and uric acid. The results are essentially used as confirmation of what the clinician suspects from their examination and observation.

Leucopaenia, whilst not a specific indication of nutritional disease (circovirus is a non-nutritionally-related cause, for example) is, in the author's opinion, indicative of nutritional disease as he is yet to see a malnourished bird with a normal leucogram. Lipidaemia is another frequent finding in many malnourished birds.

Imaging

This can clarify the extent or severity of certain nutritionally related conditions, such as metabolic bone disease or an enlarged liver, as well as more obvious cases such as egg-binding.

The causes of avian malnutrition

Knowledge of avian care has undoubtedly improved in recent years, and most pet parrot owners are now aware of the dangers to their bird from malnutrition.

Sadly, however, avian malnutrition has not been eliminated, as whilst the owners may be well-intentioned, some approaches to providing a suitable diet are flawed.

Seed-based diets...

Whilst there are few owners who now feed only seeds, there are many for whom seeds are still the main part of their bird's diet, whether due to 'tradition', or a belief that it is the most natural approach. A seed-based diet can lead to a number of nutritional problems, and it is worth noting a few key points...

Most seeds are considered to be 'missing' **30+** essential nutritional elements

This includes...

- **Vitamins:** Vit A, Vit E, Vit D₃, Vit K, Choline, Niacin, Pantothenic Acid, Riboflavin (B2), Cyanocobalamine (B12), Folic Acid, Biotin (H)
- **Vitamin Precursors:** Beta-carotenes (converted to vitamin A in the liver)
- **Minerals:** Calcium, Phosphorus (and *the ratio of phosphorous to calcium that is present is significantly imbalanced*), Sodium
- **Trace Minerals:** Selenium, Iron, Zinc, Copper, Manganese, Iodine, Chromium, Tin, Vanadium, Bismuth, Boron
- **Fibre:** Mucopolysaccharides - soluble and insoluble
- **Essential Amino Acids:** e.g. Lysine, Methionine
- **Fatty Acids:** Omega-3

As seeds are high in energy most pet birds do not eat sufficient volume to avoid further micro-nutrient deficiencies

When compared to wild birds, birds in captivity generally have:

- a much lower energy requirement (they are more sedentary; there is a more constant ambient temperature)
- a similar need for other essential micro-nutrients (and in some cases a higher need due to the stresses of a captive life)

Birds eat to satisfy energy needs above any other nutrient requirements. Eating a high energy (seed) diet will satisfy a captive bird very quickly, so they are likely to eat less than their wild counterparts.

Pet birds fed on a primarily-seed diet can therefore develop further micro-nutrient deficiencies as they fail to eat sufficient volume of food to obtain enough of any of the essential nutrients that seeds *do* contain.

...with vitamin and mineral supplements

Some owners recognise the deficiencies and imbalances of a seed-based diet and try to rectify the problem by providing vitamin and mineral supplements.

Unfortunately, the effective provision of these supplements is problematic. Whether in the water, or added to food, there can be little certainty how much of the supplement has been consumed and, in addition, aqueous solutions of vitamins and minerals are very unstable.

The use of supplements may halt a temporary decline in micro-nutrient reserves, but is generally ineffective at 'balancing' a deficient diet and often unsuccessful at preventing deficiency diseases.

Vitamin and mineral supplements also have no effect on the excessive intake of fats which can result from a diet which is predominantly seeds.

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

...with fruit, vegetables, sprouted pulses, and more

The feeding of items such as fruit and vegetables is not without benefit. Fruit is a valuable source of bowel-regulating fibre, for example, and vegetables, such as peppers, carrots, spinach and broccoli, provide good levels of carotenoids.

But they also individually lack many of the essential nutrients which are also missing from seeds.

And, as addressed on the facing page, a bird which satisfies its hunger (its energy requirement) by eating energy-rich seeds, is unlikely to eat sufficient 'other foods' to meet its requirements for macro- and micro-nutrients.

Fruit, vegetables, sprouted pulses and certain 'human foods' can be good additions to a nutritionally complete diet, but cannot compensate for deficiencies in a predominantly seed-based diet

Feeding a 'balance' of all the above

It would be wrong not to recognise that there are some owners who have well-nourished birds through the provision of a veritable *smorgasbord* of foods, including seeds, nuts, fruits, vegetables and more. But this is a rarer occurrence than might be realised, due to a key factor - the bird itself.

Birds are creatures of habit, with 'routines' and 'favourite' items. They do not select foods to achieve a well-balanced diet, rich in a variety of essential nutrients, instead satisfying their energy needs by eating foods they are most familiar with.

It is therefore important for owners to appreciate that good nutrition comes from nutrients in the foods the bird actually eats, and not what they are served.

Whilst there are owners who manage to get their pets to eat all the assorted elements in the bowl, in the correct proportions, more often the bird adopts a buffet-style feeding practice, eating some items to excess, and insufficient of others. So even if what is served is ideal, what is eaten may be far from optimal.

Even if the owner provides a nutritious range of foods, selective eating patterns can still put the bird at risk from nutritional disease

Avoiding nutritional disease in pet birds

Treatment of the malnourished bird

Resolving the issues of birds with nutritionally derived diseases may involve treating the presenting symptoms and attempting to achieve short-term alleviation of problems through oral nutrients or injectable vitamins or minerals.

Any 'quick-fix' solution, however, will not prevent reoccurrence. This can only be achieved through a complete assessment of both the bird's diet and the feeding protocols, leading to meaningful changes which address the underlying issues.

Treatment of malnutrition needs to incorporate an all-embracing reappraisal of the bird's nutrition with the owner taking necessary action

Prevention is better than cure

Fortunately, many conditions can be greatly improved by dietary adjustment; some may even be 'cured' in that the observed effects are no longer present.

Given the subtle, insidious, and permanent nature of some nutritional diseases, however, it is optimistic to suggest that all problems will be resolved this way.

Even when presented with birds that do not, as yet, show any signs of deficiencies, it is inevitable that any bird fed on a diet recognised to be deficient will eventually succumb to the effects of malnutrition.

Preventative action is therefore of fundamental importance with all pet birds.

A nutritionally complete diet should be provided 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'.

Dietary change should be implemented at the earliest opportunity to reduce the impact of the previous deficient diet

The role of formulated diets in correction and prevention

Due to the variable nutrient content of individual food items and the vagaries of pet parrots' eating patterns, it is rarely possible for owners to ensure an accurate, nutritionally balanced diet by simply feeding a range of specific food items.

The answer to this problem has been 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 the required levels of essential nutrients, in the correct proportions
- Energy levels in the foods are kept reasonably low to ensure that eating is encouraged, and intake levels of micro-nutrients are maintained
- The formulas are based on food-types that form the birds' natural diet, and provide the nutrients in a palatable and digestible form
- Using a formulated diet means 'buffet feeding' is eliminated, so dietary nutritional deficiencies and excesses are avoided

Some owners see formulated diets as 'not natural', but for the pragmatic owner - who recognises that keeping a parrot captive in a house in the UK is, in itself, 'not natural' - they provide an ideal, 'real world' solution to combatting malnutrition.

The vast majority of avian veterinary experts worldwide advocate using a formulated diet as the basis for sound nutrition in pet parrots

Feeding formulated diets

Although formulated diets should constitute the majority of a bird's diet, they are not usually intended to be 100% of the diet.

Fruit, vegetables, and certain other foods can also be served, so long as the owner ensures the bird consumes sufficient of the formulated diet to gain the required levels of essential micro-nutrients. These additions can provide some nutrients, such as fibre, whilst adding nutritional variety (though 'eating' should not be seen as a substitute for environmental enrichment and mental stimulation).

Not all formulated diets are the same

Although based on the fundamental principles above, all formulated diets are not the same and vary considerably in composition, palatability and quality. When choosing a formulated diet you should therefore consider these key points.

- Are they manufactured using high quality (human-grade) ingredients?
- Are they certified organic and GMO-free? Agrochemicals and artificial additives can adversely affect a bird's physical and mental wellbeing.
- How are they manufactured? Using an *extrusion process* in their production enhances the digestibility of the ingredients, whilst preserving their nutritional content. It also breaks down many of the naturally occurring digestion inhibitors and reduces levels of potentially harmful myco-toxins.
- Are they developed and endorsed by avian experts?

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. This can be seen by the improved feather quality, for example, but 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.

Below: a conure exhibiting signs of malnutrition whilst on a seed-based diet (see descriptions of annotations)



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.

An effect of oil application to the feathers is the creation of 'lustre' by altering the refractive light patterns of the

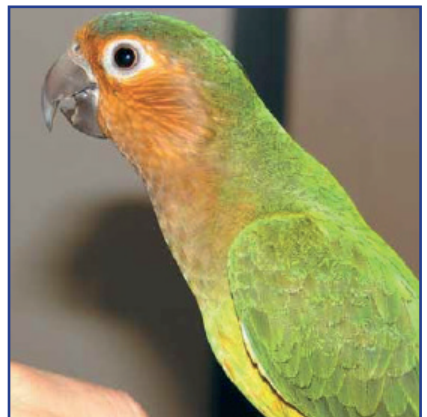
feathers. A lack of this 'lustre' is therefore symptomatic of poor cellular function.

3: Scruffy feathering due to failure of barbs to fully interlock

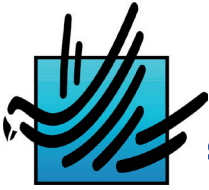
Poor feather growth results in defects in the nanostructure of the interlocking barbs and barbules resulting in an 'unzipped' appearance.

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.



Above: The same conure after improving the bird's nutrition through a change of diet to Harrison's Bird Foods High Potency Fine



Harrison's Bird Foods

**Premium, certified organic,
scientifically formulated diets for pet birds**

Having read the preceding part of this booklet, I hope you agree that feeding a formulated diet is the best way to ensure pet parrots receive optimal nutrition.

There are a number of formulated diets on the market, so why choose Harrison's?

- **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 growing, storage and manufacturing processes. Potentially harmful herbicides, pesticides, preservatives, and synthetic colourings are eliminated from the Harrison's Bird Food range.

This organic approach is also beneficial to the environment and protects vital insect populations.



- **Manufactured using a low-temperature extrusion process**

Harrison's manufacturing processes ensure the natural qualities of the ingredients are preserved. The process reduces the levels of potentially harmful myco-toxins, and digestibility is improved, with naturally occurring digestion inhibitors broken down.

- **Developed by leading veterinarians, nutritionists and aviculturists**

Decades of expertise, research and hands-on experience has been used to create formulas that provide the essential levels of macro- and micro-nutrients, in foods that are readily enjoyed.

- **The choice of veterinary experts in the UK and worldwide**



For more information visit
www.hbf-uk.co.uk

* Certified organic in the USA by the Department of Agriculture and in the UK by the Organic Food Federation.

Verified non-GMO in the USA through the Non-GMO Project.

The Harrison's Bird Foods range

Types of diet

There are two main types of diet: **High Potency** and **Adult Lifetime**.

These both contain a balance of essential nutrients for optimal avian health, but differ slightly in nutritional content – mainly the fat and protein levels (influencing the calorific value) - to make them appropriate for use with different species, in a variety of life-stages, or in specific situations.

There are also foods with extra ingredients to give an additional source of natural flavours (see opposite), and three hand-feeding foods for all ages of psittacine and passerine chicks, and for rehabilitating birds of all ages - **Neonate**, **Juvenile** and **Recovery** Formulas.

Size of piece

Each of the main diets is available in four sizes of nugget - Coarse, Fine, Superfine and Mash.

The size fed can be down to the preference of the bird. The Coarse pieces can be picked up by birds which eat from their feet, whereas the smaller pieces are ideal for birds which peck from their bowl.

The foods most commonly fed to each type of bird are shown, but this is 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.



High Potency diets

High Potency diets provide a balance of essential nutrients, but have a slightly higher calorific value than the Adult Lifetime diets, which make them most suitable for...

- all birds converting to Harrison's
Except species listed opposite, all birds should eat High Potency for 6 months before changing to Adult Lifetime
- breeding birds until chicks are weaned
- young birds after weaning
- birds which are underweight, or recovering from illness
- birds which are moulting
- geriatric birds
- birds housed in a cold climate
- African greys, palm/Moluccan cockatoos, and large macaws as a year-round formula
These species have higher metabolic rates than other birds so benefit from relatively higher energy diets



High Potency Coarse

African greys
Palm & Moluccan cockatoos
Large macaws
Amazons*
Pionus*
Eclectus*

High Potency Fine

Budgies*
Cockatiels*
Lovebirds*
Quakers*
Conures*
Doves* & pigeons*

High Potency Superfine

Canaries*
Finches*
Parakeets*
Parrotlets*

High Potency Mash

Canaries*
Finches*
Parakeets*
Parrotlets*
Doves* & pigeons*

* before conversion to an Adult Lifetime diet if appropriate

Adult Lifetime diets

Adult Lifetime diets provide a balance of essential nutrients, but have a slightly lower calorific value than the High Potency diets, which make them most suitable for...

- all birds after eating High Potency for six months
Except species which benefit from staying on High Potency, or birds which would specifically benefit from a higher energy diet - see the opposite page
- birds which may be diabetic
- birds displaying unwanted breeding behaviours or suffering from chronic egg-laying (especially cockatiels)
- birds which have problems controlling their weight (e.g. Amazons, galahs)



Adult Lifetime Coarse

Amazons
Small cockatoos
Small macaws
Pionus
Eclectus

Adult Lifetime Fine

Budgies
Cockatiels
Lovebirds
Quakers
Conures
Doves & pigeons

Adult Lifetime Superfine

Canaries
Finches
Parakeets
Parrotlets

Adult Lifetime Mash

Canaries
Finches
Parakeets
Parrotlets
Doves & pigeons

Other products in the Harrison's range

The Harrison's range includes foods which can be part of the regular diet, or fed as a treat alongside one of the other diets. These are **High Potency Pepper Fine** and **Pepper Lifetime Coarse**, for birds which enjoy a spicy flavour, **Power Treats**, which contain organic, sustainable palm fruit oil, and **Bird Bread** which the owner can bake at home.

There is also **Neonate** and **Juvenile Formulas**, and **Recovery Formula** for the rehabilitation of debilitated birds. For more details visit www.hbf-uk.co.uk/handfeeding.

Feeding Harrison's

Birds may eat as much Harrison's as they want, but guideline amounts are below. It is recommended to feed fresh Harrison's every day, and as distinct meals to reduce waste.

It is recommended that Harrison's products make up 70% by volume of the bird's diet, with 20% being good quality, organic, vegetables and fruits, and 10% being good quality, organic items which provide a rich source of omega-3s (such as chia, hemp or flax seeds, or certain nuts).

	Harrison's	Additional items
Macaws	20-60g	2-4 tsp
Amazons	15-50g	1-2 tsp
Cockatoos	15-50g	2-3 tsp
Eclectus	15-30g	1-2 tsp
African greys	15-30g	1½-2 tsp

	Harrison's	Additional items
Pionus	10-15g	½-1 tsp
Doves	5-15g	1-2 tsp
Conures	5-9g	1½-2 tsp
Quakers	3-7g	1-1½ tsp
Lovebirds	2-5g	½-1 tsp

	Harrison's	Additional items
Cockatiels	2-5g	½ -1 tsp
Budgies	1½-3g	½ -1 tsp
Parakeets	1½-3g	½ -1 tsp
Canaries	1-1¾g	½ tsp
Finches	1-1¾g	½ tsp

MAH

Meadow's Animal Healthcare

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

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