

# RAW EXPERT

Nutritional training package



Natures Menu: Veterinary Division

# 4. Nutrition and Health

## The role of nutrition in maintaining good health

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Nutrition plays a key role in good health and can also be used to help manage a wide variety of health complaints. In this module we will discuss the impact of nutrition on general health and look at specific recommendations for some common conditions. Where necessary we will refer to published literature to support the science behind the advice and a full list of references with some further reading can be found at the end of the module. It is important to note that raw diets are not currently offered as prescription diets, this module simply acts to highlight the potential of raw nutrition within a variety of common conditions. We would also like to stress that the information in this module should never be used as a substitute for veterinary advice. If a pet is unwell we would always recommend the owner seek veterinary attention in a timely manner.

Topics covered are as follows:

- Early development and growth
- Senior health
- Obesity
- Dietary sensitivities (allergy and intolerance)
- Dental health
- Anal glands
- Skin complaints
- Arthritis
- Strictly under veterinary advice: can help diabetes, pancreatic disease, epilepsy, some forms of diarrhoea, urinary disease, cognitive dysfunction and hormonal imbalances.

## Early development and growth

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Objectives when feeding a young animal are:

- ✓ Healthy growth
- ✓ Good immune function
- ✓ Minimise obesity
- ✓ Prevent developmental orthopaedic disease
- ✓ Optimal trainability

Growth rates of young dogs are affected by breed, nutrient density of food and the amount of food fed. Feeding for maximal rather than optimal growth increases the risk of skeletal deformities and obesity whilst decreasing longevity. The common perception that ‘big is beautiful’ when it comes to puppies in particular is very dangerous, as the larger puppies with the most rapid growth rates will be more prone to debilitating joint problems later in life.

The requirements for all nutrients are increased during growth compared with adults. Most nutrients supplied in excess cause little to no harm, with some exceptions such as energy, which can lead to obesity, and calcium which can lead to skeletal abnormalities. During the first weeks after weaning, growing puppies use about 50% of their total energy intake for maintenance and the remainder for growth. The recommended minimum protein content in foods intended for growth is 25% on a dry matter basis (DM); there is no maximum as high levels have not been shown to be detrimental. Most commercial foods for puppy growth contain more protein than is needed. Minimum protein content for kittens is recommended to be higher, at least 30% DM.

Dietary fat provides essential fatty acids (EFAs), a carrier for fat-soluble vitamins and a concentrated source of energy. EFAs are essential for neural, retinal and auditory development as well as being shown to improve trainability in puppies (Kelley, et al., 2004). As there is no dietary need for carbohydrates in a dog or cats diet there is no recommended amount for growth.

## Senior health

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### Definition of senior

Generally, companion animals are classed as senior when they enter the final third of their expected lifespan. Because of the huge variation between our pet cats and dogs, it is not accurate to class every animal over eight years old as 'senior' for example a St Bernard at the age of seven could be classed as senior due to their average life expectancy of nine years of age. In contrast, a miniature Dachshund at eight years old would not be classed as senior due to their average lifespan of twelve years. When it comes to cats, many cats begin to demonstrate signs of ageing as early as eight years old but many will continue into their late teens and sometimes even early twenties. The aim of feeding senior animals is to slow or prevent the progression of metabolic changes associated with ageing however, care should be taken as many pets will have the additional complication of clinical disease associated with old age. Both older cats and dogs can suffer a number of age-related issues such as dental disease, loss of teeth, arthritis, obesity, inappetance and general lack of energy. All of these common problems may be eased or sometimes even prevented when fed a nutritionally balanced, species-appropriate diet.

### Dogs

Dogs generally require 15-20% less energy than that of a younger dog of similar body weight when they are approaching old age. There is normally notable reductions in physical activity and lean body mass due to a lower metabolic rate. Some older dogs will have reduced digestive activity accompanied by a reduced appetite, whereas others may start to become obese due to their natural energy levels decreasing. Importantly, nutrient requirements remain the same into the senior years and a reduction of food must not compromise on nutritional value. There is also no evidence that healthy older dogs require different levels of vitamins and minerals to that of young, healthy dogs.

### Cats

As cats reach their senior years, their energy requirements also decline. Obesity however, is comparatively rare in older cats and they are usually found to be significantly underweight due to a decline in digestive function, especially of protein and fats which provide the younger cat with energy. Most cats can compensate well with an attentive owner and will self-increase their intake of food but increasing the food intake is not always the best option, as a more energy dense diet may be more appropriate.

Cats require high levels of protein within their diets when leading a normal, healthy lifestyle but when entering into old age, some cats may suffer from digestive issues where protein metabolism is impaired. Restricting protein is not the answer as this will lead to many other problems, such as muscle wastage, so it is important to use a diet where the protein is of high quality, easily digestible and of high biological value. Hyperthyroidism is a typical disease seen in senior cats; typified by a ravenous

appetite alongside rapid weight loss (much to some owners confusion!), however, long periods of inappetance can also occur in senior cats (especially those with dental disease) and as a consequence they can suffer severe liver problems (eg hepatic lipidosis). Therefore the dietary needs can be very varied amongst seniors, and optimal nutrition must always be targeted towards the needs of the individual.

## Obesity

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An animal is classed as obese when the bodyweight is 15% or more than is recommended and it is the most common form of malnutrition within the UK. There are many animals who compensate well when they are obese but clinical issues can occur, some of which may not be noticeable to the average pet owner, such as;

- > Osteoarthritis
- > Respiratory disease
- > Exercise intolerance
- > Diabetes mellitus
- > Circulatory problems
- > Lowered immune response
- > Liver disease
- > Dermatological problems, especially in cats when self-grooming becomes an issue
- > Feline lower urinary tract disease
- > General anaesthetic and surgery risk

Obesity is the result of energy intake exceeding energy output and leads to the deposition of fat in adipose tissue throughout the body. Increase in fat cell size is referred to as hypertrophy while an increase in fat cell numbers is referred to as hyperplasia, which occurs in young growing animals. It is therefore vitally important that growing animals do not have an excess intake of energy if they are not expending it, as puppies and kittens who suffer from hyperplasia have a lifelong predisposition for excessive weight gain. The initial dynamic phase of fat deposition is followed by a static phase in which the animal remains fat but its bodyweight remains fairly stable.

A normal weight for an animal will depend on the breed, species and sex. Breed standards can be referred to for purebred dogs and cats, although this is not helpful for crossbreeds. A healthy sized average animal should not have clearly visible ribs but they should be easily palpable when placing your hands on the rib cage under a thin layer of fat i.e. you should not have to press your fingertips into the animal's side to be able to feel ribs. A waistline should also be visible just behind the ribcage where the body should 'nip-in' to form a normal, healthy body shape from above. Dogs tend to accumulate fat

around their tail base and can sometimes develop a fat roll over this area which can lead to dermatological issues and/or anal gland problems. Cats tend to gain an ‘apron’ of fat around their groin area which can be seen swinging from side to side in some obese cases when the cat walks. Body condition scoring is a vital measurement for management of obesity. The 9 score system recommended by the WSAVA (World Small Animal Veterinary Association) is shown in the tables below:

## DOG

Score	Description	Feature			Estimated body fat %	% BW below/above score 5
		Ribs & bony prominences	Abdomen	Tail base		
1	Emaciated	Visible from a distance and easily palpable with no overlaying fat	Severe abdominal tuck when viewed from the side, exaggerated hourglass shape when viewed from above	Prominent, raised bone structures with no tissue between the skin and bone. Obvious loss of muscle mass and no discernible body fat	< 4%	- > 40%
2	Very thin	Visible and easily palpable with no fat layer under the skin	Strong abdominal tuck when viewed from the side, accentuated hourglass shape when viewed from above	Prominent, raised bone structures with no tissue between the skin and bone. Minimal loss of muscle mass	4-10%	-30-40%
3	Thin	Discernible and easily palpable with minimal fat cover	Pronounced abdominal tuck when viewed from the side, marked hourglass shape when viewed from above	Raised bony structures with little tissue between skin and bone	5-15%	-20-30%
4	Slightly underweight	Easily palpable with minimal fat cover	Abdominal tuck when viewed from the side, slightly marked hourglass shape when viewed from above	Raised bony structures with little subcutaneous tissue	10-20%	-10-15%
5	Ideal	Ribs not visible but easily palpable with thin layer of fat. Other prominences are palpable with slight amount of overlying fat	Abdominal tuck when viewed from the side and well- proportioned lumbar waist when viewed from above	Smooth contour or some thickening, bony structures palpable under a thin layer of subcutaneous fat	15-25%	0%
6	Slightly overweight	Palpable with moderate fat cover	Less obvious abdominal tuck when viewed from the side, hourglass shape less pronounced when viewed from above	Smooth contour or some thickening, bony structures remain palpable under	20-30%	+10-15%

				moderate layer of subcutaneous fat		
7	Overweight	Difficult to palpate ribs, thick fat cover	Little abdominal tuck when viewed from the side or waist and back slightly broadened when viewed from above	Smooth contour or some thickening, body structures remain palpable under subcutaneous fat	25-35%	+20-30%
8	Obese	Ribs difficult to palpate with thick layer of fat, other prominences are distended with extensive fat deposit	Ventral bulge under abdomen, no waist and back markedly broadened. Fat deposits over lumbar area and neck	Appears thickened, difficult to palpate bony structures	30-40%	+30-45%
9	Grossly obese	Ribs very difficult to palpate with thick layer of fat, other prominences distended with extensive fat deposit	Pendulous ventral bulge, no waist, back markedly broadened. Fat deposits over lumbar area, neck, face, limbs and in groin. A dip may form on the back when lumbar and thoracic fat bulges dorsally	Appears thickened, bony structures almost impossible to palpate	>40%	+ >45%

## CAT

Score	Description	Feature		Estimated body fat %	% BW below/above score 5
		Ribs & bony prominences	Abdomen		
1	Emaciated	Visible and easily palpable with no fat cover	Severe abdominal tuck when viewed from the side and an exaggerated hourglass shape when viewed from above	<10%	- >40%
2	Very thin	Visible on shorthaired cats, easy to palpate and no fat cover	Severe abdominal tuck when viewed from the side and a marked hourglass shape when viewed from above	5-15%	- 30-40%
3	Thin	Easily palpable with minimal fat cover	Marked abdominal tuck when viewed from the side and an obvious waist when viewed from above	10-20%	- 20-30%
4	Slightly underweight	Easily palpable with minimal fat cover	Abdominal tuck when viewed from the side and a well-proportioned waist when viewed from above	15-25%	- 10-15%
5	Ideal	Palpable with a slight fat cover	Abdominal tuck present when viewed from the side, well-proportioned waist when viewed from above	20-30%	0%

6	Slightly overweight	Palpable under moderate fat cover	Abdominal tuck and waist less pronounced. Mild abdominal fat pad may be palpable	25-35%	+ 10-15%
7	Overweight	Palpable under a moderate fat cover	No abdominal tuck but moderate abdominal fat pad is visible when viewed from side and no waist when viewed from above	30-40%	+ 20-30%
8	Obese	Difficult to palpate under a thick fat cover	Pendulous ventral bulge with some abdominal fat deposits when viewed from the side. Broadened back when viewed from above	35-45%	+ 30-40%
9	Grossly obese	Very difficult to palpate under a thick fat cover	Large pendulous ventral bulge with extensive abdominal fat deposits when viewed from the side. Markedly broadened back when viewed from above. Fat deposits around face, neck and limbs	>45%	+ >40%

Recent data from the Pet Food Manufacturers Association (PFMA) suggests that as many as one in three pets in the UK are obese. Mirroring the human obesity epidemic in the developed world, pets are not far behind. In multiple studies higher protein and lower carbohydrate diets have been shown to be more effective in pet weight loss. In one study, cats fed a higher-protein diet lost more body fat while reducing their loss of lean body mass by 50% (Laflamme, 2005). A further study confirmed that increased protein intake favours the maintenance of lean body mass during weight loss in obese cats (Vasconcellos, 2009). The results also suggest that protein may reduce the calorie restriction needed for weight loss. In addition, protein intake appears to act on a long-term basis, resulting in greater calorie requirements during the subsequent phase of weight maintenance. These aspects are important for successful weight loss and maintenance in cats.

A higher protein: carbohydrate ratio is also known to provide a more stable energy release resulting in less hyperactivity and a more stable blood glucose level. Reduced hyperactivity can also be attributed to foods with less additives, artificial colours and flavours, which are generally not present in raw food diets due to their natural ingredient base.

A recent study (Raubenheimer, 2015) looked at the evolution of nutrition for humans and correlated the reduction in the consumption of protein-sourced energy with the rise in obesity throughout the developed world seen in humans and companion animals alike. This ‘protein leverage hypothesis’ suggests that humans and companion animals are better able to naturally regulate their intake of energy from protein sources compared to non-protein sources (ie fats and carbohydrates). As a result of the rising costs of protein, our diets have included more non-protein sources which has contributed to the current obesity epidemic.



Care needs to be taken when encouraging weight loss at a rapid speed, as this can lead to severe metabolic problems. Slow weight loss towards an achievable target should be aimed for by feeding for the desired weight, rather than the current weight to help achieve some loss. The amount of food should be decreased gradually to help prevent animals feeling overly hungry. For example, if a dog weighs 30kg and should ideally weigh 20kg, we would advise first feeding for a 28kg dog. Once achieved, then decrease to a 26kg daily amount until achieved and continue to decrease every few weeks until the weight is deemed healthy. Increase in exercise is also key but care should be taken when dealing with excessively overweight animals due to compromised respiratory and heart function. Dogs can be increasingly walked and are easily given extra energy releasing activities such as feeding from a toy or by scattering the food to prevent gobbling. Cats can be more difficult to increase energy expenditure but 'chase-it toys' are always popular and can be combined with running up and down stairs. A diet with a reduced calorie level should be fed to animals wishing to lose weight as reducing a normal, balanced diet can lead to nutritional compromise due to components or levels being removed or decreased. L-carnitine (synthesized from the amino acids lysine and methionine) plays a vital role in fat metabolism and energy production, it is key to weight loss and aids in the retention of lean body mass.

## Dietary sensitivities

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Dietary sensitivities can be separated into two main clinical problems. **Food intolerance** is a clinically abnormal response to a dietary component which may occur from an impaired ability to digest the specific food type. This could be due to the lack of the digestive enzyme needed to break down this food type or could be a more in-depth problem associated with pharmacological, metabolic or toxic reactions. The other clinical problem seen is a **food allergy or hypersensitivity** which is an immune-mediated phenomenon. Both food allergies and food intolerances are very difficult to distinguish due to their similarity in visible symptoms and the treatment approach to both is the same.

Symptoms may include:

- > pruritus (itchy skin) which can lead to self-trauma and sores
- > otitis externa (ear disease)
- > miliary dermatitis (red itchy skin - especially cats)
- > eosinophilic plaque in cats (raised, ulcerated lesions, often found on the abdomen)
- > diarrhoea
- > irritable bowel disease
- > idiopathic chronic colitis
- > many other uncomfortable problems may be seen within individual animals

The dietary sensitivity can be associated with any ingredient or even additive, but most are caused by protein intolerance (Paterson, 1995). Firstly, the allergen must be identified and eliminated from the animal’s diet. If the specific protein source is unidentifiable at this stage, then a diet should be fed containing a protein source which the animal has not been exposed to in the last month. The trial period for elimination diets is usually around sixty days. If symptoms subside within this time, other single source proteins can be gradually introduced to assess if a reaction is noticeable. This will then enable the owner to decipher which source the pet is intolerant to. A diet which does not contain the allergen is said to be ‘hypoallergenic’ for that particular individual.

Available research has highlighted that the most common proven allergens for cats and dogs include beef, chicken and dairy products. In one literature review, 278 dogs with food allergy were evaluated and the problem ingredient was clearly identified for each dog. Beef was the most common allergen, being responsible for 95 of the cases reported. Dairy was responsible for 55 cases, making it the second most frequent cause. Corn was identified as the offender in only 7 cases. In cats, the situation is similar. Fifty-six cats were evaluated in this study. Forty-five of the food allergies resulted from eating beef, dairy, and/or fish. Corn, meanwhile, was responsible for only 4 cases.

## Dental Health

Many pet owners often associate dry pet foods with improved dental health and wet foods with poorer dental health, but this is often a misconception. Food texture is very important but the majority of dry kibbles are actually far too soft to have any positive ‘teeth cleaning’ effect. As the pet bites on a typical kibble it will shatter and crumble providing no mechanical cleaning function (Logan, et al., 2010).

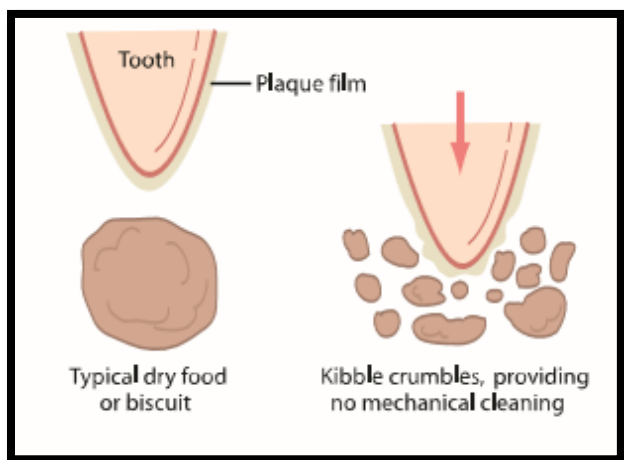


Figure 1: Reproduced from Logan, et al., 2010

Cats and dogs have developed a range of differently shaped and sized teeth for cutting, shearing and grinding actions; providing only a uniform food does not enable full use of their specially designed dentition and can lead to the build-up of dental calculus. Raw meaty bones and chews can provide both a behavioural stimulation to cats and dogs but they also require the use of all teeth as they were designed, which can maintain better oral health. Natures Menu bone guides emphasize the use of a variety of appropriate bones and chews, in terms of their size and density, to avoid dental damage and potential gastro-intestinal issues, as well as always ensuring suitable training and supervision. Cooked bones should never be fed. Many veterinarians and pet owners often notice the superior dental health of those cats who hunt and consume their prey on a regular basis, compared to those indoor cats raised solely on processed foods.

Throughout life we are frequently taught that dental disease and tooth decay occurs as a result of a sugary diet, and it is no different for our pets. Both wet and dry foods can be very high in carbohydrates and sugars compared to raw foods, and these sugars can have the same negative impact on dental health as they would in our own diets. Typical wet foods also differ to raw in their texture; there is often a very sticky quality to the jelly or gravy used in canned and pouch varieties which can frequently lead to plaque formation. In contrast, raw foods often possess a more gritty and abrasive texture due to the ground bone content.

## Flatulence and Anal sacs ('anal glands')

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### Flatulence

Flatulence is excessive formation of gases in the stomach or intestine and can be a common cause for concern amongst pet owners. It is usually associated with the following three findings:

- Flatus - gas expelled through the anus
- Eructation - noisy voiding of gas from the stomach through the mouth
- Borborygmus - rumbling noise caused by the propulsion of gas through the intestines

While flatus, eructation and borborygmus occur in normal pets, they can often develop as a consequence of digestive disorders. Excessive swallowing of air (aerophagia) is a risk factor for flatulence and is seen with brachycephalic (short-nosed) breeds, working and sporting canine breeds and pets with aggressive and competitive eating behaviours.

Gas in the gastro-intestinal tract is normal and may arise from swallowed air, gases produced by gut bacteria or may diffuse from the blood. Using highly digestible foods is key in the management of flatulence as it reduces the residues available for colonic bacterial fermentation, which is responsible

for many of the malodorous gases expelled. Studies in dogs have shown that using rice as a carbohydrate source results in less intestinal gas formation than foods containing more complex, harder to digest carbohydrates, such as wheat or corn (Washabau RJ, et al., 1986). Leguminous protein sources such as soybean meal should be avoided in pets with excessive flatulence (Roudebush, et al., 2010). Protein sources with higher digestibility should be selected, such as those found in raw foods (Crissey, et al., 1999; Murray, et al., 1997). Soluble or fermentable fibre-enhanced foods may contribute to excessive flatulence in some patients, therefore the amount of fibre should probably be limited to no more than 5% DM (Roudebush, et al., 2010).

Carminatives are preparations to relieve flatulence and can be of medical, herbal or botanical origin. Two examples are yucca extract which is thought to decrease faecal aroma, and grape seed extract which alters the gastrointestinal microbiome (bacterial population) and decreases faecal release of volatile sulphur compounds.

## Anal sacs

Disease of the anal sacs is a common reason for presentation of dogs to a veterinary surgeon. It is less common in the cat but does occur. Little is known of the aetiology or pathogenesis of anal sac disease so treatment is often symptomatic. Predisposing factors to anal sac disease are soft stools and obesity (Scarff, 2010).

If simple anal sac impaction is present, action is often taken to try to firm up the stool and allow more natural emptying of the anal sac secretions during normal defecation. Increasing the dietary fibre may help (Scarff, 2010), but raw foods, including ground bone and raw meaty bones, are also well known to produce much firmer stools and also aid in the management and prevention of simple anal gland impactions.

Obesity management is also key to prevent deposition of fat around the external anal sphincter interfering with normal anal sac expression. As discussed earlier, a high protein raw food can also offer a great way to manage weight loss and thereby prevent future anal sac issues.

## Skin complaints

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Disorders of the skin and hair are known to be a very common occurrence amongst dogs and cats. Surveys indicate that 15 to 25% of all small animal veterinary activity is involved with the diagnosis and treatment of problems with the skin and coat (Scott, et al., 1995). There are multiple skin and hair complaints that can arise as a result of a nutrient deficiency, there is also an element of breed predilection. Ensuring an appropriately balanced diet is the simplest way to help prevent such diseases.

Providing sufficient quantities of good quality protein is paramount in maintaining healthy skin and haircoats.

Essential fatty acids are commonly used in the management of inflammatory skin conditions. They exhibit multiple anti-inflammatory and immune-modulating properties with the potential to affect allergic skin disease as well as any other inflammatory forms. Dietary sensitivities can often manifest with symptoms of the skin and haircoat. Diet trials with both novel protein sources and novel carbohydrates are easily achieved with raw diets and are still very palatable and easy to stick to. Novel ingredients are vital as the pet has not been exposed to them before and so is unlikely to have been able to develop a sensitivity.

## Arthritis

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Osteoarthritis is the most commonly observed non-traumatic orthopaedic condition of dogs (Clements, et al., 2006). The most common risk factors in dogs are developmental orthopaedic disease, previous trauma and obesity. The extent to which the general population of cats is affected by osteoarthritis remains unknown, but it is thought to be common. One study concluded that 90% of cats over the age of 12 years had radiographic evidence of osteoarthritis (Hardie, 1997). Obesity can both cause and exacerbate osteoarthritis and so obesity management is key to nutritional recommendations.

Omega-3 fatty acid supplementation reduces the body's capacity to produce pro-inflammatory mediators, instead favouring production of mediators with minimal or no inflammatory effect. One study (Hielm-Bjorkman & Virtanen, 2014) found mobility improved in a number of older dogs after starting a raw diet and many have been able to discontinue the use of joint supplements as the diet can offer glucosamine and chondroitin in its natural form.

## Under veterinary guidance

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**Strictly under veterinary guidance**, raw food has the potential to help in the management of a wide range of other diseases:

- Some causes of **diarrhoea**, E.g.
  - **Exocrine pancreatic insufficiency (EPI)** - raw offers a very high digestibility
  - **Small intestinal bacterial overgrowth (SIBO)** - raw can positively impact the natural balance of gut bacteria (microbiome)
  - **Colitis** - hypoallergenic options and bone content helps with firmer faeces
  - **Inflammatory bowel disease (IBD)** - highly palatable grain/gluten free options with novel protein and carbohydrate sources
- **Pancreatitis** - Very palatable, highly digestible - must choose lower fat options

- **Diabetes mellitus** - Restricted carbohydrate and sugar content for dietary manage of blood glucose levels
- Some cases of **urinary disease** - High moisture content helps flush urinary tract
- **Cognitive dysfunction** (canine dementia) - Omega-3 fatty acid content well preserved in frozen format and high in antioxidants
- Some cases of **epilepsy** - Completely natural food, often calmer behaviour and can sometimes metabolise drugs more efficiently so lower doses required.

## Summary

While the flexibility of raw feeding can prove invaluable in achieving tailored nutritional management for a host of disease processes, we do not intend for it to replace prescription diets and would always recommend dietary changes should be made under the supervision of your veterinary surgeon. Here we summarise appropriate recommendations within the Natures Menu range for specific circumstances.

Disease Process	Nutritional Requirements	Product Recommendations	
		DOG	CAT
<b>Early development and growth</b>	<ul style="list-style-type: none"> <li>✓ Increased energy</li> <li>✓ Essential fatty acids</li> <li>✓ Appropriate calcium/phosphorus</li> </ul>	<ul style="list-style-type: none"> <li>➤ Puppy ranges</li> <li>➤ Country Hunter Puppy nuggets</li> </ul>	<ul style="list-style-type: none"> <li>➤ Kitten pouches</li> <li>➤ True Instinct cat nuggets</li> </ul>
<b>Senior</b>	<ul style="list-style-type: none"> <li>✓ Less energy</li> <li>✓ High digestibility</li> <li>✓ Balanced micronutrients</li> </ul>	<ul style="list-style-type: none"> <li>➤ Senior nuggets</li> <li>➤ Senior pouches</li> </ul>	<ul style="list-style-type: none"> <li>➤ Senior pouch</li> <li>➤ Beef &amp; Chicken pouch</li> </ul>
<b>Obesity</b>	<ul style="list-style-type: none"> <li>✓ Less energy</li> <li>✓ High protein/low carbohydrate</li> <li>✓ L-carnitine</li> </ul>	<ul style="list-style-type: none"> <li>➤ Light or Senior pouches</li> <li>➤ Country Hunter Rabbit nuggets</li> <li>➤ NM Senior complete nuggets</li> <li>➤ NM Chicken complete nuggets</li> </ul>	<ul style="list-style-type: none"> <li>➤ Senior pouch</li> <li>➤ Beef &amp; Chicken pouch</li> </ul>
<b>Dietary sensitivities</b>	<ul style="list-style-type: none"> <li>✓ Single source, novel protein</li> <li>✓ Novel carbohydrates</li> <li>✓ Grain and gluten free</li> </ul>	<ul style="list-style-type: none"> <li>➤ Country Hunter nuggets (except Chicken &amp; Salmon, Turkey and Goose, or Beef)</li> <li>➤ Country Hunter pouches (duck and turkey)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Country hunter pouches (duck/pheasant and turkey/rabbit)</li> </ul>
<b>Dental health</b>	<ul style="list-style-type: none"> <li>✓ Low sugar</li> <li>✓ Abrasive, non-sticky texture</li> </ul>	<ul style="list-style-type: none"> <li>➤ Complete nuggets</li> <li>➤ Raw meaty bones (1-3 times per week)</li> </ul>	<ul style="list-style-type: none"> <li>➤ True Instinct Complete nuggets</li> <li>➤ Raw meaty bones (1-3 times per week)</li> </ul>
<b>Flatulence and anal sacs</b>	<ul style="list-style-type: none"> <li>✓ High digestibility</li> <li>✓ Reduce aerophagia</li> <li>✓ Obesity management</li> <li>✓ Higher bone content</li> </ul>	<ul style="list-style-type: none"> <li>➤ Raw meaty bones (1-3 times per week)</li> <li>➤ Avoid beef, tripe and banquet nuggets as little or zero bone content</li> </ul>	<ul style="list-style-type: none"> <li>➤ Raw meaty bones (1-3 times per week)</li> </ul>
<b>Skin complaints</b>	<ul style="list-style-type: none"> <li>✓ High quality protein</li> <li>✓ Omega-3 fatty acids</li> <li>✓ Balanced micronutrients</li> </ul>	<ul style="list-style-type: none"> <li>➤ Complete nuggets</li> </ul>	<ul style="list-style-type: none"> <li>➤ Complete nuggets</li> </ul>

<b>Arthritis</b>	<ul style="list-style-type: none"> <li>✓ Obesity management</li> <li>✓ Omega-3 fatty acids</li> <li>✓ Glucosamine and chondroitin</li> </ul>	<ul style="list-style-type: none"> <li>✓ Light or Senior pouches</li> <li>✓ Country Hunter Rabbit nuggets</li> <li>✓ NM Senior complete nuggets</li> <li>✓ NM Chicken complete nuggets (lower fat options)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Senior pouch</li> <li>✓ Beef &amp; Chicken pouch (lower fat options)</li> </ul>
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## References and Further reading

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- Bennett, Greco & Peterson, 2001. Comparison of a low carbohydrate vsus high fibre diet in cats with diabetes mellitus. *Journal of Veterinary Internal Medicine*, Volume 15, p. 297.
- Bennett, Greco, Peterson & al, e., 2006. Comparison of a low carbohydrate-low fiber diet and a moderate carbohydrate-high fiber diet in the management of feline diabetes mellitus. *Journal of Feline Medicine and Surgery*, Volume 8, pp. 73-84.
- Bonnet, Egenvall, Hedhammar & al, e., 2005. Mortality in ovr 350,000 insured Swdish dogs from 1995-2000: Breed-, gender-, age- and cause-specific rates. *Acta Veterinaria Scandinavica*, 46(3), pp. 105-120.
- Cameron, Casey, Bradshaw & al, e., 2004. A study of environmental and behavioural factors that may be associated with feline idiopathic cystitis. *Journal of Small Animal Practice*, Volume 45, pp. 144-147.
- Clements, Carter, Innes & Ollier, 2006. Genetic basis of secondary osteoarthritis in dogs with joint dysplasia. *American Journal of Veterinary Research*, 67(5), pp. 909-918.
- Crissey, et al., 1999. Use of a raw meat-based diet or a dry kibble diet for sand cats (*Felis margarita*). *Journal of Animal Science*, 75(8), pp. 2154-2160.
- Dodd, Zicker, Jewell & al, e., 2003. Can a fortified food affect behavioural manifestations of age-related cognitive decline in dogs?. *Veterinary Medicine*, Volume 98, pp. 396-408.
- Fettman, KuKanich & Phillips, 2010. Effects of food on pharmacokinetics. In: *Small Animal Clinical Nutrition*. Topeko, Kansas: Mark Morris Institute, pp. 1196-1207.
- Frank, Anderson, Pazak & al, e., 2001. Use of a high-protein diet in the management of feline diabetes mellitus. *Veterinary therapeutics*, Volume 2, pp. 238-246.
- German, 2006. The Growing Problem of Obesity in Dogs and Cats. *Journal of Nutrition*, 136(7), pp. 19405-19465.
- Guengerich, 1995. Influence of nutrients and other dietary materials on cytochrome P-450 enzymes. *American Journal of Clinical Nutrition*, 61(Suppl.), pp. 651-658.
- Hamper, et al., 2012. The unique nutritional requirements of the cat: a strict carnivore. In: Little, ed. *The cat: clinical medicine and management*. St Louis: Elsevier Saunders, pp. 236-242.
- Hardie, 1997. Management of osteoarthritis in cats. *Veterinary Clinics of North America: Small Animal Practice*, 27(4), pp. 945-953.
- Hjelm-Bjorkman & Virtanen, 2014. Exploratory study: 632 shared experiences from dog owners changing their dogs' food to a raw food (BARF) diet.
- Hoening, Alexander & Pazak, 2000. *Effect of a high- and low- protein diet on glucose metabolism and lipids in the cat*. s.l., Purina Nutritional Forum, pp. 98-99.
- Kelley, Lepine, Burr & al, e., 2004. *Effect of dietary fish oil on puppy trainability*. s.l., s.n.
- Kossoff, 2004. More fat and fewer seizures: dietary therapies for epilepsy. *The Lancet Neurology*, 3(7), pp. 415-420.
- Laflamme, 2005. Increased dietary protein promotes fat loss and reduces lean body mass during weight loss in cats. *International Journal of Applied Research in Veterinary Medicine*.

- Logan, Wiggs, Schert & Cleland, 2010. Periodontal Disease. In: Thatcher, Remillard, Roudebush & Novotny, eds. *Small Animal Clinical Nutrition*. Kansas: Mark Morris Institute, pp. 989-1001.
- Maguire, Fettman, Smith & al, e., 2000. Effects of diet on pharmacokinetics of phenobarbital in healthy dogs. *Journal of the American Veterinary Medical Association*, Volume 217, pp. 847-852.
- Murray, Patil & Fahey, 1997. Raw and rendered animal by-products as ingredients in dog diets. *Journal of Animal Science*, Volume 75, pp. 2497-2505.
- Neal, et al., 2008. The ketogenic diet for the treatment of childhood epilepsy: a randomised controlled trial. *The Lancet - Neurology*, 7(6), pp. 500-506.
- Paterson, 1995. Food hypersensitivity in 20 dogs with skin and gastrointestinal signs. *Journal of Small Animal Practice*, 36(12), pp. 529-534.
- Raubenheimer, e. a., 2015. Nutritional Ecology of Obesity: From Humans to Companion Animals. *British Journal of Nutrition*, Volume 113, pp. 526-539.
- Roudebush, Davenport & Remillard, 2010. Flatulence. In: *Small Animal Clinical Nutrition*. Topeka, Kansas: Mark Morris Institute, pp. 1127-1132.
- Scarff, D., 2010. An approach to anal sac disease. *Veterinary Nursing Journal*, 25(4), pp. 39-44.
- Scott, Greaves & Scott, 1961. Nutrition of the cat. 4. Calcium and iodine deficiency on a meat diet. *British Journal of Nutrition*, Volume 15, pp. 35-51.
- Scott, Miller & Griffin, 1995. *Small Animal Dermatology*. 5th ed. Philadelphia: WB Saunders.
- Vasconcellos, 2009. Protein intake during weight loss influences the energy required for weight loss and maintenance in cats. *Journal of Nutrition*, 139(5), pp. 855-860.
- Washabau RJ, Springfield DR & Buffington CA, e. a., 1986. Evaluation of intestinal carbohydrate malabsorption in the dog by pulmonary hydrogen gas excretion. *American Journal of Veterinary Research*, Volume 47, pp. 1402-1406.