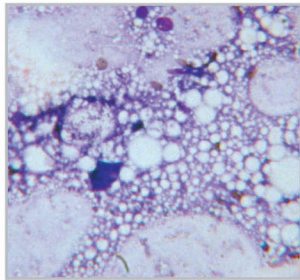


# **f**VETERINARY **focus**

Special edition

The worldwide journal for the companion animal veterinarian



## Tackling obesity in cats



Laurence Yaguiyan-Colliard  
Marianne Diez  
Alex German  
Albert Lloret

**Tackling  
obesity  
in cats**

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## The authors



From left to right: Albert Lloret, Laurence Yaguiyan-Colliard, Marianne Diez and Alex German.

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Marianne Diez graduated from the University of Liège (Belgium), in 1989. She joined the Animal Nutrition Unit in 1991, after a period in a small animal private practice. She obtained her PhD in 1998 and became a founding Diplomate of ECVCN (European College of Veterinary and Comparative Nutrition) in 2000. Since 1998 Marianne Diez has been developing a practice in clinical nutrition at the Faculty of Veterinary Medicine in Liège and she has been an associate lecturer of general animal nutrition and clinical nutrition of companion animals since 2000.

She has authored and co-authored many papers in national and international journals and gives lectures on obesity topics.

Her research interests include dietary fibres, pre-biotics, insulin resistance and obesity in companion animals.

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### Alex German

Alex German qualified, with honours, from the University of Bristol (UK) in 1994.

After two years in mixed practice he returned to Bristol to undertake a PhD in canine mucosal immunology, and then a residency in small animal internal medicine.

In October 2002, he moved to the University of Liverpool where he currently holds the position of Royal Canin Senior Lecturer in Small Animal Medicine.

Alex German attained the RCVS certificate in small animal medicine in August 2001, became a Diplomate of the European College of Veterinary Internal Medicine in September 2004, and a Royal College of Veterinary Surgeons Recognised Specialist in Internal Medicine in 2006.

His clinical and research interests include all aspects of small animal internal medicine, gastroenterology, and comparative obesity biology.

He is also director of the Royal Canin Weight Management Clinic ([www.pet-slimmers.com](http://www.pet-slimmers.com)), the first referral service in Europe, specifically devoted to treatment of obesity and associated diseases in companion animals.

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### Albert Lloret

Albert Lloret was born on April, 19 1968 in Barcelona (Spain). He qualified as a Veterinarian at the Veterinary Faculty of Universitat Autònoma de Barcelona in 1990. After seven years in small animal private practice he gained a full position of clinical instructor in the Internal Medicine Service at the Veterinary Teaching Hospital. He currently heads the Spanish Feline Study Group (GEMFE) and is a member of the European Society of Feline Medicine (ESFM) Executive Committee and of the European Advisory Board in Cat Diseases (ABCD).

Albert Lloret has authored and co-authored several papers published in national and international journals and is a speaker on internal medicine topics. His areas of interests are feline medicine and oncology. Since 2006 he has been resident of the ECVIM-CA in order to obtain board certification in internal medicine.

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### Laurence Yaguiyan-Colliard

After graduating from the National Veterinary School at Alfort (France) in 1998, Laurence worked in private veterinary practice until 2004.

Since 2004, she has been a Resident in Clinical Nutrition at Maisons-Alfort, working towards the European College Diploma in Veterinary Comparative Nutrition.

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She is currently specialising in Food and Nutrition for captive exotic species in zoological parks.

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# Introduction

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## Cats are more difficult than dogs...



In a recent study(\*) of 600 veterinarians, 87% of them expressed the opinion that "Managing a weight loss regime in cats is much more difficult than in dogs".

The reasons for this are many and varied, and one clear factor is that owners do not consider obesity to be an illness or even a cause of death; to take it one step further, if their veterinarian doesn't consider obesity a major problem why should they?!

This research has backed up our belief that we must offer a practical solution: we have therefore asked four European experts – nutritionists and experts in internal medicine – to come up with a more pragmatic and up to date approach to feline obesity and its' prevention.

Our approach is based not only on their personal experience but also on information from the "Weight Management Clinic" at Liverpool University in the UK, which is run by Dr. Alex German ([www.pet-slimmers.com](http://www.pet-slimmers.com)).

This special edition of Focus is designed to offer you the flexibility of using different dietetic foods – dry, moist or home-made, or in combination. It is full of ideas and methods to enable you to adopt a truly strategic approach to this problem, so that on-going management can be made much more effective.

We are very grateful to our contributors who have shared their knowledge in this field with us, and we are delighted to be able to offer you our contribution, not only because of the benefits in terms of improved feline health, but also because of the knowledge and expertise shared here.

**Jean-Christophe Flatin**  
CEO  
Royal Canin

(\*) Telephone poll carried out in England, Germany, Spain, France, Italy and Poland, October 2007.



# 1. What is feline obesity?

## > Summary

Obesity is a disease that threatens all cats, but especially those that are male, neutered, live indoors and are under 10 years. This disease can predispose to other disorders such as diabetes mellitus and orthopaedic disease. In addition, hepatic lipidosis is a potential concern in obese cats who do not tolerate the change of diet at the beginning of the weight loss programme.

## 1/ An overview of obesity

### A) Definition of obesity

Obesity is defined as an accumulation of excessive amounts of adipose tissue in the body. Unlike in human medicine, where very strict criteria are used to classify overweight and obesity, there is limited information in the case of pets. However, in one study, overweight was defined as a weight more than 15% above ideal, whilst obese was defined as a weight more than 30% above ideal (Burkholder, 2000). However, in practice it can be difficult to apply such definitions, and it is preferable to use a body condition score to classify our patients (see **Chapter 2**).

It is important to remember that daily energy requirement for a cat is lower than for a dog of same bodyweight! As an example, a 4 kg cat needs 31% less energy than a 4 kg dog.

### B) Obesity in cats

Obesity is currently one of the most common medical disorders in cats and, in countries where studies have been conducted, it ranges from 25 to 40% of the total cat population (Scarlett, 1994; Armstrong, 1996). Overall, data from these studies suggest that approximately 35% of cats are overweight, whilst 5% are obese. Many veterinary surgeons believe the incidence of obesity to be increasing, especially in urban areas, although there are no epidemiological studies to date that demonstrate this.

*Daily Energy Requirement for Maintenance (NRC 2006)*





### C) Causes of obesity in cats

The most frequent cause of obesity in cats is an imbalance between energy intake and energy expenditure, resulting in a positive energy balance and an accumulation of adipose tissue.

This imbalance may be caused by excessive food intake or by feeding an unbalanced diet, such as one that has excessive carbohydrates or fat compared with protein content. Since cats are strict carnivores, their metabolism is adapted to a high-protein, low-carbohydrate diet. Excessive carbohydrates are stored as fat because the metabolism is adapted to use proteins as the principal source of energy, and to produce glucose from protein metabolism (gluconeogenesis), even though there is a plentiful supply of carbohydrates.

Lack of activity is another cause of weight gain, even when food intake is not excessive. This is due to insufficient energy expenditure. Many cats live in flats in cities and do not go outside. They also spend a lot of time alone, and receive little environmental stimulation during the day.

### D) Diseases that can cause obesity in cats

There are some differences in the disease associations of obesity between dogs and cats. Endocrine diseases, such as hypothyroidism and hyperadrenocorticism, are common in dogs and both can cause weight gain. However, these diseases are rare in adult cats; for example, there is only one case report on naturally-occurring hypothyroidism in the literature (Rand, 1993). Hence, we should only consider the presence of these two diseases as the cause of obesity if there are other clinical signs that suggest such a diagnosis. However, both of these diseases can occur with an iatrogenic cause in cats. For instance, some cats can develop hypothyroidism as a result of medical or surgical treatment for hyperthyroidism.

During the first evaluation of an obese patient, the veterinarian should examine the previous medical history to determine whether drugs have been administered which might either stimulate the appetite or favour adipose tissue formation (glucocorticoids, phenobarbital, cyproheptadine, benzodiazepines and progestagens).

### Risk factors for feline obesity



Acromegaly (excess growth hormone) is an endocrine disorder that is increasingly diagnosed in cats. Cats with acromegaly suffer from diabetes mellitus that is hard to control, unusual growth of certain parts of their body, especially flat bones and abdominal viscera, and these cats may have gained weight recently. Acromegaly should therefore be included in the differential diagnosis of weight gain in cats. Nonetheless, since many soft tissues enlarge in size (not just adipose tissue), this is not a true predisposition to obesity.

### E) Risk factors in feline obesity

Many risk factors have been determined in feline obesity:

- Gonadectomy or neutering (greater predisposition in male and female neutered cats alike).
- Age: higher risk in adult cats when physical activity starts to diminish but after 10 years, the risk decreases (Scarlett, 1994).
- Indoor living: greater predisposition amongst cats that live indoors, confined to flats and unable to go outside (Scarlett, 1998; Lund, 1999; Robertson, 1999).
- Gender: greater predisposition in male cats, unlike in dogs where a greater predisposition is observed in bitches.
- Type of food: greater predisposition in high-calorie diets and when food is offered *ad libitum* (Harper, 2001).
- Behavioural factors: it seems that there is a greater predisposition in cats that suffer anxiety, depression or frustration, which can lead to eating disorders and lack of control of satiety. The only source of pleasure seems to be eating (Heath, 2005).

### Comparison of obesity between cats and dogs

Item	Cat	Dog
<b>Incidence</b>	Similar	Similar
<b>Feeding behaviour</b>	Small frequent meals, not a social behaviour, hunting not linked to appetite. Cat can refuse eating completely	Big meals Social behaviour
<b>Feeding requirements</b>	Strict carnivore, lower energy requirement than a small dog for the same bodyweight. Indoor cat means very low requirements	Not strict carnivore
<b>Owner's expectations</b>	Increase of activity after weight loss is less perceived as an advantage. Some owners prefer fat cats where exercise is more difficult. Risk of excess feeding high because small animal	Increased activity is a motivational reward after weight loss. Dogs seems to be younger, overweight body condition is deemed normal in the breed standard for some dogs.
<b>Consequences</b>	Type II diabetes (that can reverse after weight loss), hepatic lipidosis	Joint problems
<b>Consequences of neutering</b>	Lower energy requirement for both cats and dogs but food intake dysregulation in cats?	

- Breed predisposition: greater predisposition amongst short-haired domestic cats in comparison with pure breeds, e.g. Siamese (Lund, 2005).

## F) Feline obesity and neutering

Neutering is one of the biggest risk factors, and many studies have investigated this subject. Some have demonstrated reduced basal metabolism after castration, and therefore reduced energy requirements (Root, 1996; Harper, 2001). However, if energy expenditure is expressed according to lean mass, no differences are observed in the metabolic rate between castrated and non-castrated cats (Hoenig, 2002). Other studies have demonstrated that weight gain is mainly attributable to increased food intake, brought about by changes in food intake behaviour or habits (Fettman, 1997; Kanchuk, 2003) and reduced physical activity, both of which obviously lead to a positive energy balance (Nguyen, 2002). Finally, there are suggestions that the closer the emotional relationship between cat and owner, the higher the risk (Heath, 2005).

In summary, information on predisposing factors is useful for veterinary surgeons, because it enables cats which are at particular risk to be identified e.g. a neutered adult domestic cat that lives in a flat, cannot go outdoors, and is fed *ad libitum* (Kienzle, 2000).

## G) Neutering and hormonal changes

Currently, a number of groups of researchers are investigating the hormonal changes that occur following gonadectomy. One of these studies demonstrates that a rapid increase in plasma IGF-1 (insulin growth factor 1) and prolactin concentrations occur after

neutering, bringing about adipose tissue formation, weight increase, and glucose intolerance (Martin, 2006). Adipose tissue secretes excessive leptin, which causes an inadequate regulation of glucose metabolism, resistance to insulin, and a greater tendency to adipose tissue formation.

## 2/ Diseases caused by or associated with obesity

Like obesity in dogs and humans, obesity in cats is a predisposing factor in the development of certain diseases such as osteoarthritis and other musculoskeletal problems, diabetes mellitus type II, hyperlipidaemia, urinary disorders, non-allergic dermatological diseases, and some cancers. Cats, in particular, show a marked predisposition to developing severe hepatic lipidosis, which often leads to liver failure and death in many cases. A study of diseases associated with obesity in cats demonstrated that approximately 30% of cases of diabetes mellitus and lameness could be prevented by maintaining an ideal body condition (Scarlett, 1998).

Not only can obesity cause greater incidence of the aforementioned diseases, but it can also shorten life expectancy. Studies conducted on humans and dogs have demonstrated the effects of obesity on longevity and it seems likely that the case of cats is very similar.

For the vet, many techniques are more difficult to perform in obese cats.



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## A) Obese cats are difficult patients

Obesity creates problems in clinical practice. It is difficult to examine obese cats and less information can be obtained from a physical examination, abdominal palpation, or heart and lung auscultation because of the presence of a great quantity of adipose tissue. Some techniques, such as blood sampling, cystocentesis, and ultrasonography are also more difficult and thus take longer to perform. Furthermore, anaesthetic risk is increased, because venous catheterisation takes longer, it is harder to calculate the dose for anaesthesia, and surgery may take longer.

## B) Obesity and diabetes mellitus

It has been demonstrated that the majority of diabetic cats (80 to 90%) suffer from diabetes mellitus (DM), similar to type II in humans. The clinical characteristics of diabetes mellitus type II are presented in obese, adult cats. This diabetes is often transient or reversible.

Obesity is a determinant factor in the pathophysiology of diabetes mellitus type II. This type of diabetes mellitus is characterised by the presence of chronic hyperinsulinaemia – caused by obesity and insulin resistance (O'Brien TD 2002) –, and the deposit of amyloid material or amylin in beta cells. Hyper-insulinaemia may be caused by obesity or chronic excess carbohydrate intake, and leads to beta

cell apoptosis or programmed cell death. Amylin is secreted together with insulin, and therefore, more insulin secretion means more amylin secretion, and amylin deposits in the pancreas. In hyperinsulinaemia less fat is used and therefore there is a greater tendency to weight gain. In some cases beta cells become exhausted and stop secreting insulin. All these toxic phenomena in the pancreatic beta cells are often reversible if persistent hyperglycaemia is controlled and less insulin is secreted.

The combination of insulin and high-protein, low-carbohydrate diets will reverse diabetes in many cases, especially if the diabetes has not been uncontrolled for a long time. In these cases cats will no longer require insulin even after only a few weeks or months. This is referred to as transient diabetes. These cats will need to continue their high-protein diet and an attempt should be made for them to lose weight.

(See FAQ “How to manage two diseases at the same time” on page 54).

## C) Obesity and hepatic lipidosis

Hepatic lipidosis is a potential concern in obese cats when a weight management programme is implemented. This can lead to cholestasis and severe liver failure, leading to death in many cases. Although this disease was initially described as an idiopathic disease, it is increasingly clear that, in the majority of cases, it is associated with a concomitant disease



© Diego Esteban, Tor cat, Barcelona

Diabetes mellitus in cats is frequently a consequence of obesity. The picture shows a cat with advanced diabetes, and a plantigrade stance.

## > Diagnosis and management of feline hepatic lipidosis (FHL)

Feline hepatic lipidosis (FHL) is characterised by massive triglyceride infiltration in the cytoplasm of hepatocytes, causing cellular dysfunction that can sometimes be extremely severe.

The typical clinical presentation is that of a previously obese or overweight cat that has become anorexic in recent weeks and lost more than 25% of its normal body weight. Often, there is also a recent history of concurrent illness, hospitalisation, surgery or a change in environment or diet. The disease has a higher incidence in male cats than females.

### Clinical signs

The most common clinical signs are apathy, dehydration and jaundice.

Vomiting and diarrhoea can occasionally be present and, in some cases, there may be neurological signs caused by hepatic encephalopathy (HE). It is important to note that ptalism may be the only sign of HE in cats.

Clinico-pathological alterations cannot confirm a diagnosis of HL, but can provide a helpful guide.

### Laboratory features

On serum biochemical analysis, liver enzymes are elevated; alkaline phosphatase (ALP) is markedly elevated (often 5 times above the reference range), usually to a greater extent than alanine aminotransferase (ALT). Unlike in other cholestatic liver diseases, gamma-glutamyl transferase concentration (GGT) is normal or marginally elevated; this contrasts with other feline hepatopathies, where ALP and GGT are usually elevated to a similar extent. Other common alterations can include hyperbiliru-

binaemia, hypercholesterolaemia, hypoalbuminaemia and hyperglycaemia. Further, hypokalaemia is present in approximately one third of cats with HL, and may suggest a poor prognosis. On haematological analysis, anaemia is often present, which may be regenerative or non-regenerative, but white blood cell counts are often not suggestive of an inflammatory process. The diagnosis of FHL can only be definitively confirmed by a histopathological assessment of liver tissue, but the other diagnostic tests may provide guidance.

### Ultrasonography

Abdominal ultrasonography is useful because the presence of diffuse hyperechogenicity of the hepatic parenchyma is typical in this disease and less common in other liver diseases. An ultrasound may also identify changes consistent with other diseases that may present with similar clinical signs such as inflammatory bowel disease (IBD), pancreatitis, or hepatic and/or biliary inflammatory diseases (feline cholangitis complex).

### Pathology

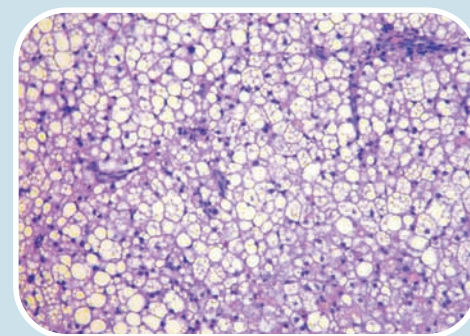
Ultrasound-guided fine-needle aspiration cytology of the liver is a minimally invasive test that may be useful in some cases to diagnose FHL. However, the specificity of cytology is not perfect and, although the result may be compatible with lipidosis, there may be an underlying inflammatory liver disease, or intestinal or pancreatic disease.

Therefore, in cases where the clinical signs or diagnostic test results are not typical of FHL, or clinical response is



Diffuse hyperechogenicity of the hepatic parenchyma is typical in hepatic lipidosis.

not satisfactory, a liver biopsy and histology study should be performed to confirm the diagnosis. Coagulopathies may be present in some cases of FHL, and therefore tests of haemostatic function should be undertaken prior to performing fine-needle aspiration or liver biopsy.



Liver histology can confirm a diagnosis of HL, whilst at the same time ruling out inflammatory or neoplastic causes. Massive lipid infiltration of the hepatocytes is shown in this picture.



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The gross appearance of the liver, during coeliotomy, in two cats suffering from hepatic lipidosis.

### Treatment

There are 2 main therapeutic strategies:

- First, supportive therapy is required, as well as correcting clinical and haemodynamic alterations derived from liver dysfunction (fluid therapy, potassium chloride supplements, antiemetics and/or gastric protectors, vitamin K, fresh frozen plasma or whole blood transfusions and antibiotics).

- Second, aggressive nutritional support is required e.g. enteral nutrition through a gastrostomy or oesophagostomy tube, depending on the preference of the veterinary surgeon.

### Prognosis

The prognosis for cats with HL is highly variable because it depends on many factors, such as the severity of liver impairment and the aggressiveness of supportive and

nutritional therapies. In general, the majority of cats with severe lipidosis do not recover without adequate nutritional support. The attitudes of the cat owner is also important, because 4 to 8 weeks of enteral nutrition may be required, and some owners may not commit to this.

Oesophagostomy (left) or gastrostomy tubes (right) are good options for enteral nutrition in cats suffering from hepatic lipidosis.



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© Diego Esreban, Tot cat, Barcelona

or environmental factor that causes a catabolic state, generally preceded by lack of appetite, poor digestion or malassimilation. Cats with lipidosis typically present with clinical signs of obesity, stress and partial or total anorexia; most typically such individuals eat less than 20% of their daily requirement.

Recent studies suggest that hepatic lipidosis is a combination of different factors:

- Excess peripheral lipid mobilisation (due to catecholamine release) and subsequent development of nutritional deficiencies that affect lipoprotein formation
- Hepatic use of fatty acids for energy
- Mobilisation of hepatic triglycerides

Cats with hepatic lipidosis usually have low glutathione levels and, as a result, are at greater risk of oxidative hepatocyte damage.

#### D) Obesity and FLUTD

Obese cats may present with lower urinary tract signs. The majority develop idiopathic cystitis whilst, in the remainder, calculi or urethral plugs, bacterial infection, congenital malformations, neurological problems or neoplasia may develop. Epidemiological studies have demonstrated that

urinary tract diseases have a higher prevalence in obese, sedentary, indoor cats (Willeberg, 1984; Jones, 1997).

#### E) Obesity and orthopaedic disorders

Osteoarthritis is a disease that was under-diagnosed in cats in the past. However, increased awareness of this disease now exists, and it is included in the differential diagnosis of cats with locomotor problems, those with behavioural changes, cats that show apathy, and those that "seem to be ageing". A study has shown that overweight cats are more likely to suffer from lameness (Scarlett, 1998).

#### F) Obesity and other problems

Non-allergic skin disease may also be associated with obesity in cats, and these often result from inability to or difficulty in grooming.

Examples include:

- Diffuse desquamation
- Dry skin
- Feline acne

Obesity can have dermatological consequences, like faecal soiling of the perineum due to inability to groom.



© Alex German



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Other potential disease associations include cardio-respiratory disease and a tendency to constipation.

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### G) What are adipokines?

Apart from diseases that can be associated with the physical or mechanical excess of adipose tissue, it has been demonstrated that adipocytes have a major endocrine secreting function, with effects on a number of body systems. Many of these factors, or 'adipokines', have inflammatory actions, and obesity is now thought to be characterised by a chronic inflammatory state. In humans, these adipokines have been related to the development of metabolic syndrome, insulin resistance, hypertension and thrombosis. An association between leptin secretion and insulin resistance has also been noted in cats (Appleton, 2002).

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### H) Feline obesity and hypertension?

The association between obesity and hypertension is well-documented and studied in human medicine, with regard to hormonal and metabolic changes known as the metabolic syndrome. Some canine studies demonstrate that obese dogs have higher blood pressure than dogs with a normal body condition, although marked hypertension is uncommon (Bodey, 1996; Bloomfield, 2000, Montoya et al, 2006). Given that, to date, there have been no equivalent studies in cats, it is not clear as to whether an association between obesity and hypertension exists. However, subjective clinical experience suggests that the majority of hypertensive cats present with renal impairment and/or hyperthyroidism, rather than with obesity. More work is therefore required in this area. ■





## 2. Defining a cat's optimal weight

### > Summary

When treating obesity, a specific weight-loss diet should be used. When calculating the amount to feed, a restriction is applied to the energy requirements for maintenance at optimal weight; this ensures that the cat uses its adipose tissue reserves as a source of energy, leading to weight loss. Therefore, in order to determine starting energy requirement, it is essential to calculate the optimal weight. Unfortunately, there are no tables or objective measurements available in practice to give this information. However, there is a simple and scientifically-validated method of estimating this weight: the body condition score.

### 1/ Why is it so important to determine the cat's optimal weight with such precision?

In the calculations of energy requirements that are presented in this *Veterinary Focus Special Edition*, the weight used is the lean mass of the animal (organs, muscles, bones, connective tissue, etc.), which normally contains around 25% fat in the cat (Laflamme, 1997). Adipose tissue consumes a negligible amount of energy for maintenance. Thus, feeding fat in the same way as muscle would be to overestimate the energy requirements of the animal and is a major reason for failure in weight loss programmes.

For example, the maintenance energy requirement of a 4 kg entire male adult cat is 240 kcal (60 kcal per kg of bodyweight). This cat currently weighs 11 kg and you choose an optimal weight of 6.5 kg. The energy intake applied for weight loss is 60% of that required for maintenance at this weight (see **Chapter 3**), equivalent to around 234 kcal in this case ( $60 \times 6.5 \times 0.6$ ). The cat will not lose any weight since you are giving

him the energy he needs to maintain his 4 kg of lean mass! And if you had chosen 7 or 8 kg as most owners usually do, the cat may even gain weight.

### 2/ Tools available in everyday practice

#### A) The animal's weight

There is not one normal weight: a domestic shorthair weighs between 3.5 and 4.5 kg on average. However, this is highly variable as a function of their morphology and does not apply to purebred cats. Thus, 4 kg may be too thin, optimal, or excessive! There are also disparities within breeds.

This parameter is nevertheless of interest when monitoring the animal. Indeed, the weight of an adult cat should remain stable over the years. It is therefore strongly recommended to weigh the cat regularly and systematically (at least 3 to 4 times a year) and to monitor any changes in weight once they have reached adulthood.

In human medicine, any deviation of more than 2% in one week, 5% over one month, or 10% over six months should prompt the instigation of nutritional measures (ANAES, 2003). It is probably a good idea to apply these guidelines to veterinary medicine, at least until more specific studies have been undertaken (Chan, 2006).

## B) The animal's body condition score

The only method available to us to determine the optimal weight of the cat is to assess its body condition score using a validated scoring system. Although it is subjective and requires some experience, it is very effective. The animal's weight and body condition score should, therefore, be recorded on the annual vaccination certificate and in the medical records.

The original scale used 9 categories (Laflamme, 1997), but many people find that a 5-point adaptation is easier to use. With experience, the scale can be further divided into half points, thus returning to the original scoring system. The body condition scoring in the cat (see page 21) gives a detailed explanation of how to assess the body condition score.

This scale is calculated by observing the animal's figure and palpating certain specific anatomical zones. To assess the figure, the standing animal is viewed both from the side and from above. This may not always be practical in a consultation because nervous cats may lie flat or tucked up (in a ball) on the examination table; nonetheless, an impression can often be gained, and it is important to do this with the owners.

Indeed, several studies have demonstrated that owners underestimate the body condition score of their pet, especially if the latter is overweight (Allan, 2000; Colliard, 2008). Studies have also shown that the use of illustrations of different body condition scores can help to produce an improved appreciation of the shape of their animal compared with simple oral descriptions (thin, slim, normal, over-

weight, or obese). If possible, take lateral and more importantly "sky-view" photos of the cat to demonstrate current condition to the owners. If the cat will not cooperate, ask the owners to take the photos at home and send them to you... they are often surprised by the appearance of their cat! Making the owners aware of the problem is important for the success of the obesity treatment.

The score will enable you to calculate the optimal weight for cats that are reasonably overweight. With the 5-point scale, each half unit approximately corresponds to a variation of 10 to 15% in comparison with the optimal condition score of 3.

A body condition score of 4 therefore corresponds to an excess of 20% to 30%. However, for extreme scores (1 and 5), the figure of 40% only represents a minimum. Cats that have an excess weight of more than 100% are unfortunately not that uncommon. If you are in any doubt, base your calculations on an optimal weight of 4 kg for a cat of average size. This estimated optimal weight will be written on the prescription, below the current weight.

Kittens naturally have a body condition score of 2 to 2.5.

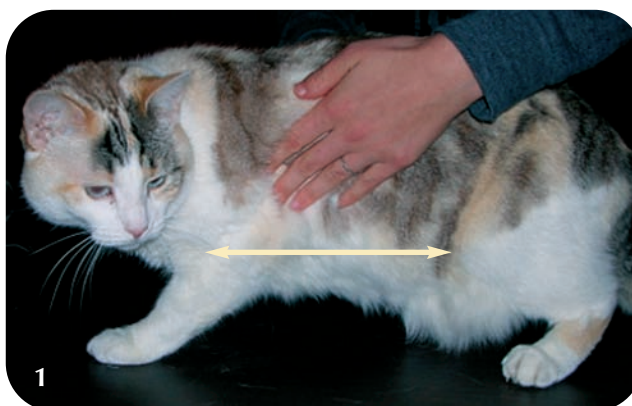


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## How to palpate the cat in order to calculate the body condition score

### 1. Palpation of the ribs

Place the hands flat on each side of the cat's thorax and move them back and forwards. This is used to assess the thickness of the adipose layer over the ribs. For an optimal body condition score, you should be able to count the ribs with the fingertips without having to apply pressure.



### 2. Palpation of the spinous processes, lumbar muscles, and the points of the ilium

Move a hand over the spine, palpate the lumbar muscle masses and the bones of the pelvis. For an optimal body condition score you should be able to feel all of the bony prominences, and feel sufficient muscle mass (back flat and muscular).

### 3. Palpation of the ventral fat pouch

Pass a hand under the cat's belly (if possible!) and palpate the inguinal fat pouch. For a normal body condition score, this fat pouch may be present but should be small.



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### C) The limits of Body Condition Scoring (BCS)

Body Condition Scoring principally evaluates subcutaneous fat. However, a cat can have a normal (3/5) or slightly increased (3.5/5) BCS, despite having a distended abdomen which is difficult to palpate (and appears pear-shaped when viewed from above). This would suggest a substantial amount of visceral fat, in which case the cat would be considered to be obese and that it should lose weight.

In humans, excessive abdominal adiposity, with the characteristic android (or “apple”) body shape, is a key feature of the metabolic syndrome.

A diagnosis of metabolic syndrome can be made if 3 out of 5 of the following criteria are present:

- Hyperglycaemia
- Hypertriglyceridaemia
- Excessive concentrations of HDL-cholesterol
- Waist circumference >88 cm (women) and 102 cm (men)
- Hypertension

This syndrome predisposes to diabetes mellitus, cardiovascular disease, hepatic disease and reproductive problems. In France, 1 adult in 6, both male and female, are affected by this syndrome, and the Hôpital Pitié-Salpêtrière in Paris has a special unit devoted to it. Although metabolic syndrome is most commonly seen in patients with increased body mass index ( $BMI = \text{weight}/[\text{height}]^2$ ; normal = 19-24), excess visceral adiposity can occasionally be present and cause metabolic syndrome (including insulin resistance), despite the individual having a normal BMI. The situation of the ‘pear-shaped’ cat, as described above, may well be similar.

There has been no specific study into metabolic syndrome in the cat. However, as a general precaution, it is sensible to identify cats which may have excessive abdominal fat, which might be causing metabolic changes and predispose to serious diseases. ■

## Body condition scoring in the cat

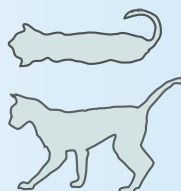
- Observe the animal from the side and from above, and compare with the photographs below.
- Palpate the animal with the hands flat (without applying any pressure) over the ribs, spinal column, lumbar muscle masses, and hips, and compare with the descriptions below.
- In long-haired animals or those with a thick coat, palpation is the only way of assessing the body condition.



- The bones are visible from a distance (ribs, spinous processes, wings of ilia).



- All of the bones are lying just under the skin.
- Little or no muscle mass (severe amyotrophy).
- No detectable fat deposits.



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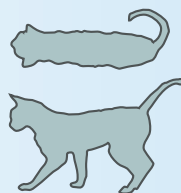
### 1/5 : EMACIATED = weight at least 40% below the optimal weight



- The bones can be made out, but are barely visible from a distance.



- Pronounced dip in the flank (waist and abdominal tuck).
- Bones are easily palpable.
- Poorly developed muscle masses (moderate amyotrophy).
- Little fat palpable.



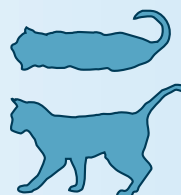
### 2/5 : THIN = weight 20 to 30% below the optimal weight



- Waist (from above) and abdominal tuck (from the side) clearly visible.



- Bones cannot be seen from a distance.
- Bones palpable with minimal fat covering ribs.
- Even muscle mass.
- Minimal ventral fat pad.



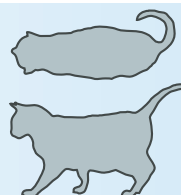
### 3/5 : IDEAL = optimal weight



- Waist (from above) and abdominal tuck (from the side) hard to make out.



- Obvious ventral fat pad.
- Bones hard to palpate, impossible to count the ribs.



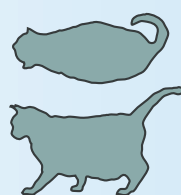
### 4/5 : OVERWEIGHT = weight 20 to 30% over the optimal weight



- Waist (from above) and abdominal tuck (from the side) absent.



- Marked ventral fat pad.
- Bones cannot be palpated, abundant fat.



### 5/5 : OBESE = weight at least 40% over the optimal weight



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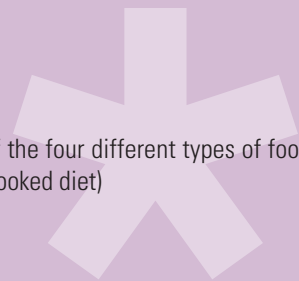


## 3. Treatment of feline obesity

### > Summary

Treatment of feline obesity should follow 6 steps:

1. Motivating the owner
2. Setting a goal for the programme
3. Rationing the energy intake
4. Choosing the weight-loss diet: advantages and disadvantages of the four different types of food (dry or moist commercial diet, mixed commercial ration or home-cooked diet)
5. Prescribing
6. Follow-up



### Introduction

The nutritional treatment of obesity requires energy intake to be restricted. However, it is important to continue to provide an adequate volume of food so as not to induce frustration, which may cause behavioural problems. Furthermore, only energy should be restricted and not the supply of essential nutrients (proteins, fatty acids, minerals, vitamins), which could lead to development of deficiency states. Therefore, it is essential to use specific weight loss diets, in which energy concentration (in kcal per 100 g of food) is low but the supply of nutrients is guaranteed.

From a practical perspective, treatment is instigated following an in-depth clinical examination to exclude other diseases and identify any associated clinical disease; a “step-by-step” approach should be applied.

### 1/ Motivating the owner

#### A) The difficulties

There’s no use hiding from reality, cat owners are often less motivated than dog owners when it comes to instigating a weight management regime. Indeed, in dogs, the inactivity that results from obesity may be a major disadvantage for owners who enjoy walks. The same argument – the inactivity caused by excess weight – is clearly not valid in sedentary and neutered cats, which are perceived, or even chosen, as calm and relatively inactive pets. Thus, from the outset, there is an enormous error in the perception of the normal behaviour of a cat. A point that should not be overlooked!

As a general rule, the differences between obese dogs and cats should all be taken into account when developing a set of arguments that are targeted and adapted to the cat (refer to **Table** on page 9).



## B) The solutions

### 1. A healthy cat is an active cat!

The owner must be made to understand that it is not normal for a cat to be inactive / sedentary, living on a cushion 2 metres from its litter tray and food bowl (full of course!). The older the animal (and the more obese), the more the owners have forgotten what this kitten, young adult, used to be like before!! It may be useful to remind them, by asking questions that enable them to understand the behavioural changes that have developed due to the excess weight e.g. jumping, playing, interactions with other animals and members of the family.

### 2. An obese cat is a cat that will become diabetic!

This statement is somewhat exaggerated, but is not that far from reality. Diabetes is a disease that is known and feared by the majority of people, especially because of the need for daily insulin injections. It is currently the most effective argument for motivating owners of obese cats.

### 3. A diet is not synonymous with "deprivation" when a specific weight-loss diet is used

The words "restriction and deprivation" are negative and incite refusal; obese cats are generally cats that are particularly pampered in terms of feeding, or even perceived as "difficult" by the majority of their owners. As we will discover later on, several solutions may be proposed and adapted to individual

needs. Currently, using a combination of dry and wet diets is an excellent solution for maintaining an adequate volume of food and preventing unwanted behaviours (constant meowing, hyperactivity, etc.). Using feeding toys with a kibbled ration may help in a similar way.

### 4. As a veterinarian, you know what's good for the cat

A diet should not be brought up as a mid- to long-term possibility, but as the only treatment for a pathological condition. This approach implies an immediate and precise treatment strategy, in addition to close monitoring by regular check-up consultations. These various points are developed in more detail below.

## 2/ Setting a goal for the programme

The goal of weight loss is for the patient to reach an "ideal" weight. This notion is fairly subjective as it depends on the practitioner. Nevertheless, fixing a target weight is absolutely essential for determining the amount of food to feed. A useful guideline is to estimate the desired weight loss, which is then subtracted from the current weight; alternatively, if a previous adult body weight was known (when the cat was in ideal condition), this could be used.

In order to remain healthy and lean, a cat needs a lot of play and stimulation.



© C. Renner

Since there is a too high variation in quantity obtained with measuring cups (20%), the use of kitchen scales is recommended.

### 3/ Rationing the energy intake

Before we get on to the practical aspects, we will discuss a few key points about energy requirements in the cat.



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#### A) The different forms of energy

This overview aims to specify the type of energy that we are talking about when calculating energy requirements. When discussing dietary energy, there are four different forms (see **Figure** below):

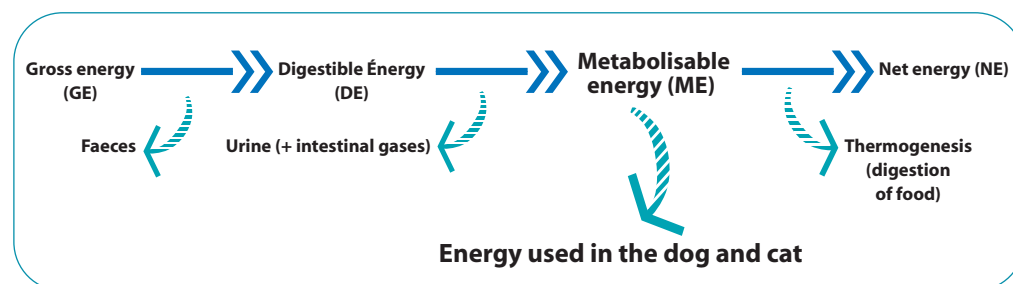
- **Gross Energy (GE)** is determined in a bomb calorimeter (direct calorimetry).
- **Digestible Energy (DE)** is determined by subtracting the quantity of raw energy (RE) in the faecal matter from the RE of the food.
- **Metabolisable Energy (ME)** is the reference used for dog and cat diets. It is defined as the DE from which we subtract the energy lost in urine and digestive gases. In the species considered here, energy loss in the form of gas is negligible. Each energy nutrient supplies specific metabolisable energy.

- **Net Energy (NE)** is the portion of energy that is actually available to the body. It corresponds to the ME from which we subtract the energy used for thermogenesis. Thermogenesis is the energy created and dissipated in the form of heat during the digestion of food and the absorption of nutrients in the gastrointestinal tract.

In the second part of this work, all energy use (kcal) will refer to the ME.

#### B) Energy concentrations of nutrients

The veterinary surgeon shall explain to the owner that fat is the highest source of energy in a diet (see **Table 1** on page 26).



### C) The maintenance energy requirements of healthy cats (MER)

In entire adult cats with a normal level of activity, MER (in kcalME/d) is calculated as follows:  $MER = 100 W^{0.67}$ , where W = optimal weight of the cat in kg (NRC, 2006). MER is not linear with respect to body weight, and can instead vary, from 80 kcal/kg body weight (BW) in a 2 kg cat, to 55 kcal/kg BW in a 6 kg cat (see **Figure 1** on page 27).

You have now estimated the cat's ideal weight and calculated its MER for this weight. You now need to impose an energy restriction to induce weight loss. It is important to remember that this calculation is only a starting point, and that it will need to be adjusted over the course of subsequent consultations and according to the speed of weight loss.

intake of approximately 25% x MER for ideal weight) weight loss may progress too rapidly (4% of the initial weight per week), which may predispose to the development of hepatic lipidosis (Szabo, 2000) (see **Figure 2** on page 27).

Thus, a "safety margin" should be built in and, in practice, energy intake in the range of 50 to 60% of the MER is acceptable (Markwell, 1994; Butterwick, 1996; Nguyen, 2002). The rate of weight loss is a function of the degree to which energy is restricted; for example, weight loss of approximately 1% of starting weight per week typically limits lean tissue loss to ~10%. If, however, energy intake is restricted to 45% of MER, the rate of weight loss is faster, but with a higher loss of lean mass (20%) (Butterwick, 1995).

In practice, an intake of 60% MER (for the optimal weight) gives good results, and ensures a certain safety margin with respect to the risk of hepatic lipidosis.

### D) Choosing the degree of energy restriction with respect to maintenance

If energy intake has not been restricted sufficiently, there is a risk that no weight will be lost. However, if the energy restriction is too severe (e.g. energy

Table 1. Energy concentrations of energy supplying nutrients in dogs and cats (RE: raw energy; ME: metabolisable energy)

	RE (kcal/g)	ME (kcal/g) Home-made food	ME (kcal/g) Other food
<b>Proteins</b>	4.4	4	3.5
<b>Lipids</b>	9.4	9	8.5
<b>Carbohydrates</b>	4.15	4	3.5

Figure 1. Maintenance energy requirements of an entire adult cat (kcal/d)

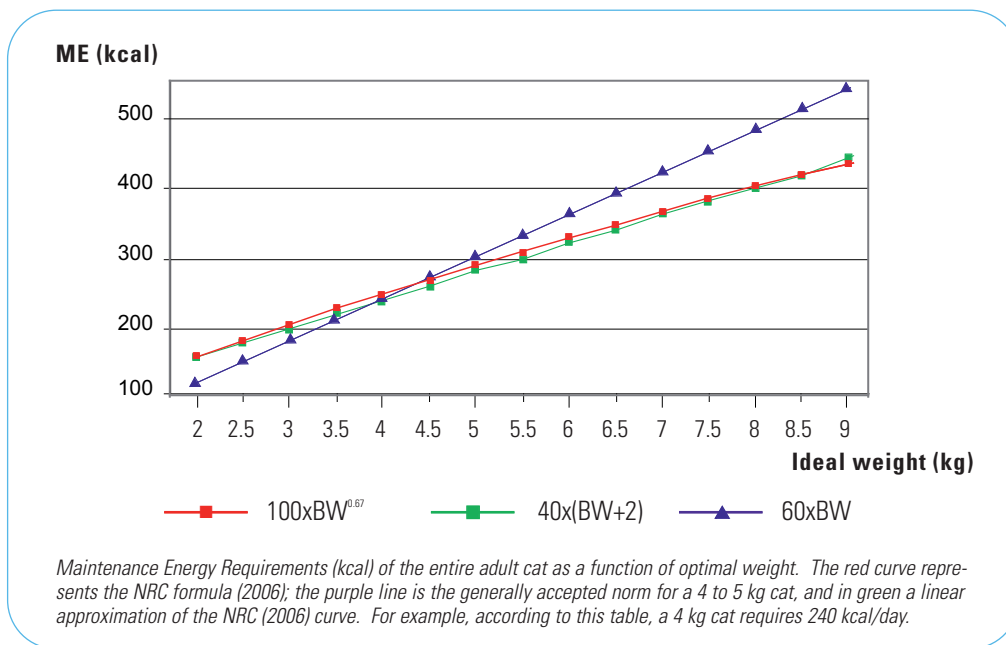
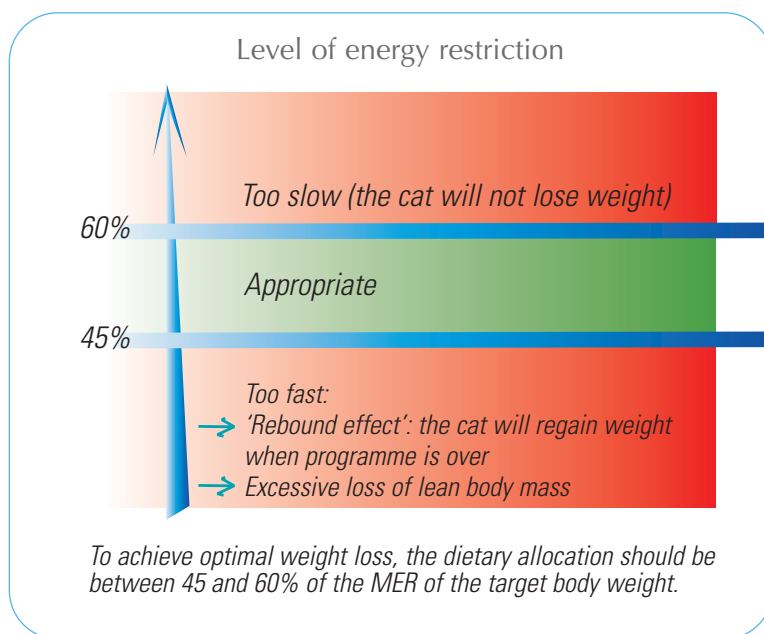


Figure 2. Maintenance Energy Requirements (MER) of the target bodyweight



## > The diabetic cat

In diabetic cats, mobilisation of adipose tissue should be balanced against the risk of triggering an attack of ketoacidosis. However, weight loss is important in diabetic animals, since obesity causes insulin resistance. Initially, and outside of any situation of medical emergency, it is wise to apply a coefficient of 0.8 to the cat's MER, but using their current weight. If during subsequent consultations, the cat has not lost any weight, the energy intake can then be further reduced by 10%. The energy restriction will therefore be progressive, as a function of the clinical status of the animal and the speed of weight loss.

## 4/ Choosing the weight-loss diet: advantages and disadvantages

It is the energy concentration of the diet that determines the exact quantity offered to the animal. This is generally expressed in kilocalories (kcal), and sometimes in kilojoules (kJ), per gram, 100 grams, or per kilogram of food (1 kcal = 4.184 kJ).

There are two possible solutions: use a purpose-formulated commercial food, or prepare a home-cooked diet from fresh ingredients.

Commercial diets are available in two forms, dry (kibble) or moist (pouch or can). Below is a description of each type of food, with its advantages and disadvantages. The quantities are rounded up for ease of use: by increments of 5 g for kibble and by an easily measurable quantity for moist diets. To ease acclimatisation to the new regime, a dietary transition of at least one week should be undertaken, when the existing diet is progressively replaced by the new food. This allows for gastrointestinal adaptation and reduces the risk of refusal by the cat.

It is also desirable, to facilitate weight loss, to increase the cat's level of activity. Play sessions should be prescribed, obviously adapting the exact protocol to the circumstances of the individual cat and its ow-

ners. If instigated correctly, the ultimate aim is that everyone enjoys themselves!

### A) Dry commercial diets

A daily ration of kibble is proposed, calculated from the defined energy intake and the energy concentration of the diet.

For example, for a cat with an ideal weight of 4 kg: the energy intake to induce weight loss will be 152 kcal. The proposed dietetic food has an energy concentration of 3.5 kcal/g of food (Royal Canin Obesity Management, dry), 40 g of kibble will be prescribed per day (152/3.5).

#### **Important points for consideration when using dry food:**

1. The quantity of kibble should be weighed precisely by the owner (to the nearest gram). Measuring cups are not reliable for such small quantities, are not inter-changeable between brands and, most importantly, are imprecise. This can easily be demonstrated by getting different people to weigh out the same ration: a difference of up to 20% is not unusual!
2. It is strongly recommended to use strategies to increase the time taken to eat the ration. Distributors

(balls or cylinders) are available: the daily ration of kibble can be distributed over a number of smaller meals. Trials should be made to calculate the actual time that the cat takes to consume the ration. The owners should be warned that some cats are not interested in these kinds of devices (and do not therefore eat anything at all), whilst others work out how to open them! You can also suggest placing the kibble in 2 or 3 different places (on shelves, on the top of a cupboard, etc.) two or three times a day (10 hiding places, using 5 each time). A simple solution is to place kibbles in a container with an opening that is smaller than the size of the cat's head (e.g.: a large beaker); this is fixed to a table (using double-sided adhesive tape): the cat must then remove kibbles with a paw, which will take significantly longer. Getting the owner involved in such solutions may take some imagination, but it will improve compliance.

The main advantage of this type of ration is its ease of use. Its biggest disadvantage is the comparatively modest volume of food offered, which will not be tolerated by all cats. The advantages and disadvantages of this ration are summarised in **Table 1** on page 31.

Commercial dry foods may not be advisable for cats suffering from chronic urolithiasis, when a moist diet can increase water intake and provide urinary dilution.

---

## B) Moist commercial diet

In many circumstances, a daily ration of moist food can be used, calculated from the defined energy intake and the energy concentration of the diet.

In our example, with a cat whose ideal weight is 4 kg, the energy intake to induce weight loss will be 152 kcal. The proposed dietetic food has an energy concentration of 57 kcal/100 g of food (Royal Canin Obesity Management, 100 g pouch): 2 pouches and  $\frac{2}{3}$  will be prescribed per day (152/57).

It is preferable to divide the daily ration into 4 meals:

- The first is given in the morning.
- The second meal is given by the first person to get home.
- A third meal is provided during the course of the evening.
- The final meal is given just before bedtime. This late-evening meal can reduce the chances of the cat disturbing the owners by meowing in the early hours!

The main advantage of this ration is the large volume of food given to the cat. Its biggest disadvantage is its cost. The advantages and disadvantages of this ration are summarised in **Table 2** on page 31.

Commercial moist foods are preferable in cats suffering from recurrent urolithiasis.

An intermediate solution involves dividing the ration into dry and moist commercial diets. This makes it possible to combine the various respective advantages and reduce the disadvantages.

---

## C) Mixed commercial ration

The calculated energy intake is divided between dry and moist foods. For practical reasons, it is advisable firstly to subtract the energy provided by the wet food, taking care to choose an easily divisible quantity without the need to weigh.

Taking the same cat with an ideal weight of 4 kg: its energy intake to induce weight loss will be 152 kcal. The moist food (Royal Canin Obesity Management pouch of 100 g) provides 57 kcal/100 g pouch. One pouch will be offered and the rest of the energy (152-57 = 95 kcal) is provided by kibble (Royal Canin Obesity Management, energy density = 3.5 kcal/g), equivalent to 25 g. The volume of the ration will be 125 g compared with 40 g for a commercial dry food.

The dry food can be given in one meal, provided that the guidelines for dry food are applied. The moist food should be offered in two meals, one during the course of the evening, and a late-evening meal just before bedtime. In many respects, this mixed ration combines the advantages of each diet type, whilst reducing the disadvantages (see **Table 3** on page 31).

---

## D) Home-cooked diet

Some owners routinely feed home-cooked food to their pets, and will want to continue even whilst on a weight management regime. A home-cooked diet involves mixing food that is normally intended for human consumption. Five ingredients are essential for supplying the forty-odd essential nutrients:

- Proteins: the supply of meat should cover the requirements for essential amino acids and arachidonic acid in the cat.
- Essential fatty acids, which are supplied by rapeseed oil or a specific veterinary product.
- Minerals and vitamins, supplied in the form of specific veterinary products.
- Fibres (vegetables): although these are not essential, they ensure good gastrointestinal health and increase the volume of the ration.
- and finally carbohydrates are provided primarily in the form of starch. However, this component is not essential to the cat.

The quality of the raw materials should be correct, both from a nutritional and food safety point of view. Although starchy foods should be well-cooked in order for the starch to be utilisable (rice or pasta should be well cooked and not rinsed), this is not the case for meat and, in fact, cooking can decrease its nutritional value (e.g. in the supply of taurine).

The simplest method is to calculate a ration from a home-cooked type ration. The examples given contain 200 kcal (refer to **Table 4** on page 32).

The home-cooked diet should be offered in three meals, with one in the late-evening just before bedtime. This diet has few advantages in comparison with the numerous disadvantages (refer to **Table 5** on page 32), and should be reserved for highly dedicated owners!

Complete home-cooked diets are relatively rare, however, in some cases such rations are used alongside a commercial dry food, e.g. where half of the energy intake is supplied by each component.

The dry food can be given in one meal if the guidelines for dry food are applied. The home-cooked diet should be offered in at least two meals, with one in the late-evening just before bedtime.

---

## 5/ Prescribing

It is important to be as precise as possible on the prescription. The owner should find all of the required information that you have discussed together, without ambiguity. An example of a prescription is given on page 36.

---

## 6/ Follow-up

Monitoring is particularly important for the success of the diet, and should be started immediately. The prescription might have been personalised, but that's not enough! Throughout the duration of the weight loss programme the owners will need to be supported and encouraged.

## Advantages and disadvantages of the different types of commercial food

Table 1. Dry food

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Precise quantity</li> <li>• Quantity easy to adjust</li> <li>• Longer shelf-life after opening</li> <li>• Ability to increase the time taken to eat the ration (hiding places, distributors, etc.)</li> <li>• Daily cost</li> </ul>	<ul style="list-style-type: none"> <li>• Precise weighing needed (on the scales to the nearest gram)</li> <li>• Monitoring of water intake</li> <li>• Small volume of the ration</li> </ul>



Table 2. Moist food

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• High volume of the ration</li> <li>• Water intake</li> </ul>	<ul style="list-style-type: none"> <li>• Volume may be excessive for some cats</li> <li>• Quantity difficult to adjust</li> <li>• Limited shelf-life after opening</li> <li>• Difficult to increase the time taken to eat the ration</li> <li>• Numerous meals required to maintain satiety</li> <li>• Daily cost</li> <li>• Some owners will refuse to use this type of food</li> </ul>



Table 3. Mixed ration (dry + moist food)

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Precise quantity (completed with dry food)</li> <li>• Quantity easy to adjust by adjusting the amount of kibble</li> <li>• Possibility of increasing the time taken to eat the ration with the dry food</li> <li>• Satisfying volume of the ration</li> </ul>	<ul style="list-style-type: none"> <li>• The dry food must be weighed out precisely (on the scales to the nearest gram)</li> <li>• Limited shelf-life of the moist food after opening</li> </ul>





Table 4. Home-cooked weight-loss diets for healthy cats (200 kcal ME)

Ingredients	Meat ration	Fish ration	Ration without starch
Lean meat (1)	125 g	-	125 g
Cod (2)	-	150 g	-
Rapeseed oil or soybean oil (3)	2 g	4 g	2 g
Cooked green vegetables (4)	30 g	75 g	90 g
Cooked white rice	15 g	15 g	-
(pre-cooked dry-weight)	(5 g)	(5 g)	(-)
MVS (5) Ca/P = 2 (15.5% Ca)	3 g	4 g	3 g

(1) Lean meat = minced beef 5% fat content, skinless chicken breast, lean pork.

(2) Tuna fish (in brine) and salmon can be considered as lean meat.

(3) 1 teaspoon of oil = 4 g of oil; 1 tablespoon = 3 teaspoons = 12 g of oil.

(4) Green vegetables = green beans, carrots... If they are fresh or frozen vegetables add a pinch of salt to the cooking water.

(5) MVS: Mineral and vitamin supplement (veterinary prescription)

Table 5. Advantages and disadvantages of the home-cooked diet

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Volume of the ration</li> <li>• Water intake</li> <li>• Easy to adapt and personalise the diet</li> </ul>	<ul style="list-style-type: none"> <li>• Delicate nutritional balance</li> <li>• The cat may selectively eat some components making the diet unbalanced</li> <li>• Nutritional food safety aspects need to be monitored</li> <li>• Shelf-life is limited after preparation</li> <li>• Preparation time</li> <li>• Cost of the meat</li> <li>• No possibility of increasing the time taken to eat the ration</li> <li>• Numerous meals</li> </ul>

## A) Ensure that your patient continues to eat

Given the risk of hepatic lipidosis, it is advisable to ensure that the cat eats their daily ration correctly (as a guide, the veterinarian should ensure that ~75% of the ration is consumed each day). We systematically ask owners to call us after a few days to check that there has not been a drastic reduction in food intake following the prescription. Alternatively, a member of the practice staff (e.g. nurse) could call the owner 24-48 hours after starting the diet.

## B) Monitoring body weight

The cat's body weight should be checked regularly, once a week for the first month. It can be performed at home (if the owners have a precise set of scales) or at the clinic. The cat should be weighed at similar times, for example in the morning after the first meal. Regular weight checks are the only way of objectively assessing the efficacy of the diet. Subsequently, two routine weight checks per month are enough.

We strongly recommend the use of weight record cards (a table with the date/weight/comments), ask the owners to bring it with them at each visit to the clinic. This will enable you to draw up a weight loss curve. Any decrease or increase in the speed of weight loss indicates a problem with the prescribed diet. You can easily confer this task to your vet nurse, who will alert you in the event of an anomaly. The aim is to listen to the owner and answer any questions or doubts that they may have.

## C) Planning check-ups

It is advisable to examine the cat a fortnight after the end of the dietary transition period, i.e. 3 weeks to 1 month after the start of the diet. Subsequently, once-monthly check-ups should suffice. At these check-ups, a clinical examination should be performed and the rate of weight loss checked; the latter should not exceed 2% per week. If weight loss is

too rapid, it is advisable to readjust the quantities of food so that the rate of weight loss slows. Most typically, the ration is altered by increments of 10%. The cost of a weight loss programme, it is at the discretion of the veterinary practice; one option is to offer a weight-loss "package"; such a scheme may help with motivation, since the owners have already paid and are already committed to the programme!

If the cat does not lose weight, one should always reassess the diet completely and its application. You should aim to discover whether the owners are following your instructions or whether the cat is eating additional food (often a problem when there are several cats in the household). The relationship of trust and confidence between owner and veterinarian is crucial at this stage. They should feel able to admit that they have not followed your guidelines, without fear of reprisal. You should be sympathetic, whilst remaining firm on the medical aspect of the treatment. You should also call yourself into question (the hardest part) if the owner has indeed respected your prescription: did you make a mistake when calculating the ideal weight? Have you set the ration appropriately for this cat?

## D) Get help from the rest of the team

Get the maximum number of people at the clinic involved (nurses and receptionists) in the monitoring of the diet, at all stages! At the very least set aside a specific area, equipped with scales, and accessible whenever the clinic is open.

Follow-up can be monitored thanks to special software such as the Slim Fit programme from Royal Canin.



### E) Once the objective has been attained... one must stabilise the weight!

First and foremost, congratulate the owner: a cat that was 50% overweight took one year to lose weight! Then instigate a low energy maintenance diet. This diet should also be diversified and individualised and a dietary transition period respected.

One effect of dietary energy restriction is that basal metabolism is decreased. This creates resistance to slimming and favours weight gain. If the energy intake given to the cat corresponds to its ideal weight, there may be a risk of a 'rebound' weight gain. The only method of preventing this risk is to increase activity levels, which will increase the lean mass of the animal, the latter being the only one to consume energy.

To stabilise body weight, it is best to apply a coefficient of 0.8 to the MER calculated for the ideal weight. Monitoring body weight is still essential, as the animal could rapidly gain weight again. In practice, during the first month, following the calculation of the quantity of the new diet, you will actually be supplying half of this quantity with a weight-loss diet. One month later, there are three possible situations:

- The cat continues to lose weight, although at a slower rate. Once it has changed over completely to the new diet, there is little risk that the cat will gain weight.
- The cat's weight is stable: well done, you have found its energy requirements straight off! You will then need to either decrease the volume of the ration by passing over completely to the new food, or increase the wet part of the diet.
- The cat regains weight. In which case, call the owner into question, and yourself! It is also advisable to offer the weight-loss diet again until the cat has lost the regained weight. You can then decrease the energy intake for stabilisation by 10% and start again.

Following 6 months of weight stabilisation, you can lower your guard, the owners should hold fast! ■



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Clinic staff members should also be involved in the monitoring of the diet, at all stages.

## > Clinical case: Poppy

Before weight loss – 23/1/07



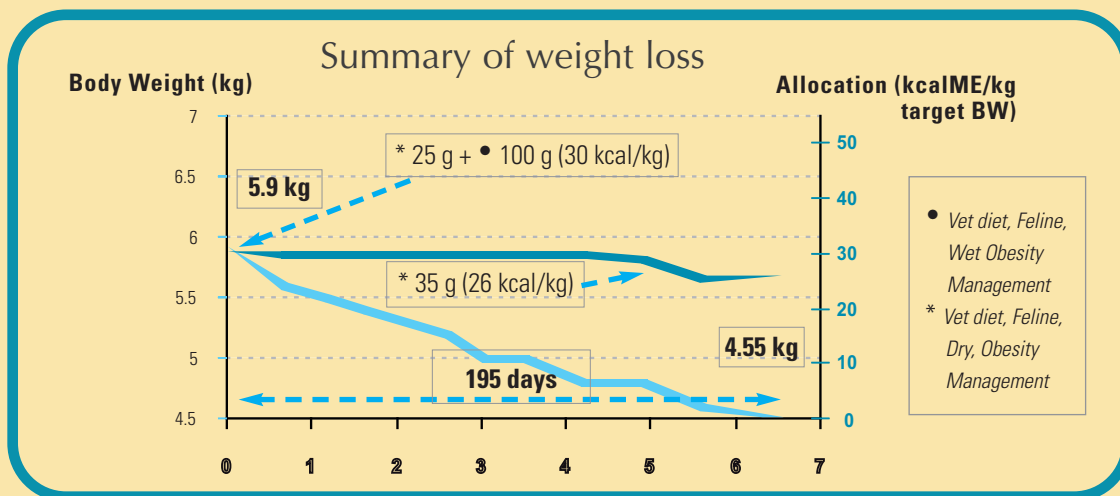
5.90 kg



31.6% of body fat

- **Breed:** DSH
- **Age:** 11 yrs
- **Sexual status:** NEUTERED female
- **Fat tissue:** 31.6%
- **Body Condition Score (BCS):** 5/5
- **Lifestyle:** indoor cat

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After weight loss – 6/8/07



4.55 kg

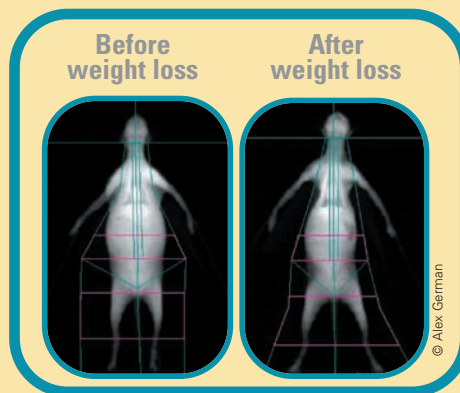
- **Weight loss duration:** 195 days
- **Mean rate of weight loss:** 0.82%/week
- **Maintenance requirement after weight loss:** 47 kcal/kg/d TBW\*\*
- **Fat tissue:** 15.3%
- **BCS:** 3/5

\*\* Target Body Weight



15.3% of body fat

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© Alex German

Dr A. German and S. Holden, VN, Weight Management Clinic, University of Liverpool.

## Fax prescription for use of commercial diet for weight loss

**Dr Weit Loss**  
Quicker way  
50 549 Fat City  
Tel: 01908495  
Email: sofat@slimfit.com



*Loukoun*

Current weight = *6.7 kg*  
Estimated ideal weight = *4 kg*  
Excess weight: *67.5%*

### 1. Diet

Feed the following food per day:

**Royal Canin Obesity Management, 100 g pouch: please give 1 per day**  
and  
**Royal Canin Satiety Support, kibble: 20 g per day**

The pouch should be divided into two or three meals per day, and the kibbles can be used as treats or divided into two daily meals.

**Dietary transition:** gradually introduce the new foods over a period of **10 days** until they completely replace the previous food.

Make sure Loukoun eats every day.

### 2. Exercise

Initiate two 2-minute play sessions with *Loukoun* every day.

### 3. Follow-up

Weigh him every week at the clinic (his basket weighs *1.4 kg*) and return for a repeat consultation in one month's time.

*Dr Weight Loss*





## 4. Prevention of feline obesity

### > Summary

Prevention of obesity is definitely easier and better than cure! Our advice is based on the six recommendations detailed (from A to F) below, but particularly on three key strategies:

1. Control of food intake
2. Promotion of physical activity and play behaviour
3. Monitoring body weight and body composition.



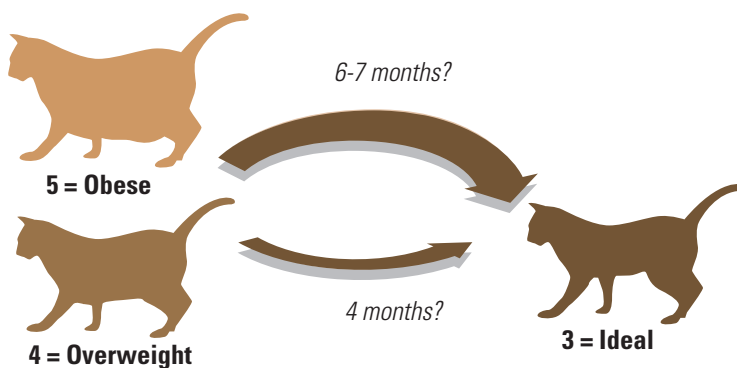
### Introduction

As with most medical diseases, prevention is better than cure. Obesity has a number of health and welfare implications, most notably a decrease in both quality and quantity of life. Lifelong feeding trials in dogs have demonstrated that an ideal body weight can be maintained, throughout life, by controlling energy intake. The consequences of such a strategy are dramatic, e.g. ~18% increase in lifespan and a reduced risk of developing obesity-associated diseases. Thus, both quality and quantity of life are improved. Although similar studies do not exist in cats, it is likely that the

same recommendations will hold true. Furthermore, since the consequence of any weight management programme is a loss of lean tissue as well as body fat mass, it is unlikely that an obese cat which becomes ideal weight through weight loss will have as ideal a body composition as a cat that has maintained ideal weight throughout life.

Finally, preventing obesity is always the best option and, what is worth bearing in mind when confronted with an obese cat is, the longer a cat is overweight then the more reduced the benefits of weight loss in terms of improved lifestyle and longevity.

In terms of obesity, it is easier and quicker to go from stage 4 to stage 3, than from stage 5 to stage 3.





## > Key principles for obesity prevention

- Prevention is better than cure
- The sooner you intervene the better
  - It prevents a developing problem from becoming severe
  - The sooner the cat starts losing weight the longer it will enjoy the benefits
  - It minimises the time spent in the obese state and hence the risk of developing associated diseases
  - The problem is only half as bad to solve e.g. if you intervene as BCS 6/9 [3.5/5], returning to 5/9 [3/5] is quicker and easier than going from 9/9 to 5/9
  - The habits of the obese cat are less pronounced
    - ▶ Inactivity
    - ▶ Begging behaviour
- Intervene in early adulthood if possible
  - The major population at risk is between five and ten years of age
  - The sooner the cat loses weight, the longer it can enjoy the benefits
  - The cat spends as little time as possible in the obese state
- Target neutered animals to prevent weight gain. Monitor these cases proactively
- Target new pet owners who may not be aware of the concerns over obesity
- Promote the healthy cat lifestyle
  - Natural feeding behaviour of the cat
  - The need for regular play activity

Thus, health and welfare of all dogs and cats is likely to be improved more dramatically, by preventing the development of obesity, rather than by treating the disease after it has arisen. With this in mind, veterinarians need to be pro-active in their approach to excess body weight prevention, and should provide adequate client education about the dangers of obesity in their pets.

## 1/ Recommendations for obesity prevention

### A) Veterinarians should weigh and estimate BCS for every cat at each consultation

Both the measurement of body weight and estimation of body condition score should form part of a

standard physical examination. They enable changes in body composition to be noted, meaning that unwanted increases in body weight (suggesting over feeding) can be identified early on and rectified. However, these assessments also have wider health implications, because subtle weight loss might be recognised as the first component of another significant medical disease.

## B) Communicate the message of obesity prevention early on and continually reinforce this message throughout life

Advice on healthy eating and regular physical activity should be included in all kitten consultations and continued for all cats whenever they are seen at the practice. As a general rule, it helps to build in discussion of body weight and body condition at every routine check up e.g. annual vaccination.

## C) Be alert to weight gain in young and middle-aged cats

Previous studies have shown that the cat population most at risk of obesity are middle-aged e.g. between the ages of 5 and 10 years. Cats should be closely monitored throughout this period (e.g. 6-monthly) allowing weight gain to be recognised early.

However, weight gain in middle-aged cats is often secondary to bad habits (in both owners and cats) acquired earlier in life. Therefore, it is preferable to target these cats (and their owners) even if there is no evidence of weight gain.

Further, aggressively targeting young adult cats in for obesity prevention means that the intervention comes at a time when any derived benefits will be maximal. In this regard, preventing obesity in this population will have maximal beneficial effect on longevity and in reducing disease risks. For the same reasons, any young cat that has become overweight or obese should have a weight management strategy implemented as soon as possible.

## D) Be aware of weight gain that can occur as a consequence of neutering

Like age, neutering is a major predisposing factor for overweight and obesity. Therefore, education about prevention of weight gain should be an integral part of the discussions regarding neutering, prior to and immediately after castration or ovario-hysterectomy, and during follow-up. It is advisable to schedule 2-3 weight-checks in the first 6-12 months after neutering to identify those cats at risk of weight gain and correct it before it becomes a problem.

When the cat is given back after neutering, the owner is usually worried and may not pay attention to the advice given. It can be worth providing written information and offering a free weight-check appointment, where nutritional advice can be given.



## E) Promote the benefits of a healthy lifestyle for all cats

This includes weighing and recording food intake, avoiding feeding extra food (treats and table-scrap), and promoting regular physical activity through exercise and play sessions. The main components of a 'healthy lifestyle' are discussed later in this chapter.

Encourage responsible feeding behaviours. This includes:

- Control of food intake
- Avoiding the feeding of extras

It is also important to encourage regular physical activity through:

- Exercise
- Regular play sessions
- The use of indoor environmental enrichment
- Encouraging activity at meal times

Ideally, all practice staff should be encouraged to promote these concepts, and waiting room literature and other forms of education and support should be available to all owners.

## F) Target new cat owners

People who have only recently taken on a new cat, may well have had limited experience with pet ownership; in addition they may have received bad advice from a variety of sources (friends, the Internet). Hence, it is important to make sure all new owners are provided with the education and support necessary to prevent obesity problems from developing. A useful first stage is to teach new cat owners about responsible pet ownership, and about the benefits of maintaining a healthy lifestyle (see above).

## 2/ Factors promoting a healthy lifestyle for cats

Owners should be encouraged to adopt pet-ownership strategies which will ensure that their cats remain in ideal body weight and condition throughout their life. Those strategies which encourage normal feline behaviour are most appropriate.

### A) Control of food intake

#### 1. Weigh out and record food intake

There are some circumstances where it may be necessary to be precise about the exact food intake of a particular cat. Examples of such situations include:

- Cats where unexpected weight gain has occurred between veterinary visits (see intervention points below)
- Problem cats in multi-cat households
- Previously obese cats in the maintenance phase of their weight management programme

In these cases, the daily intake can be precisely controlled by adopting strategies similar to those described for treatment of obesity (**Chapter 3**) e.g.:

- Weigh out food using scales
- Record amount fed and eaten

#### 2. A feeding guide is ONLY A GUIDE!

Feeding guides are commonly displayed upon the side of commercial pet foods, and can help owners to decide upon the correct amount that should be fed to their pet. Such information is usually derived from recommended energy requirements from organisations such as the National Research Council (see NRC 2006 for more details). However, it should be remembered that the recommended amount usually represents the average intake for a particular body weight, and there can be marked individual varia-

tion. Therefore, although the feeding guide recommendation can be the starting point, when introducing a new diet, body weight and condition should be monitored regularly (see below) and, if weight gain or loss occurs, adjustments should be made to food intake.

### 3. Always balance energy intake to energy expenditure

Owners should be made aware of the fact that, if the energy expenditure of their cat changes, so too should the amount fed. Likewise, anything that alters diet intake may also lead to energy imbalance. Common situations where energy intake does not equal expenditure are as follows:

**Changing the brand of cat food.** Different foods contain different energy levels so if you do not adapt the intake to the new diet, problems arise (see **Table 1** below).

**Additional illnesses or injuries.** If a cat develops a medical disease, activity level may be affected. If the amount fed does not change, then weight gain is likely.

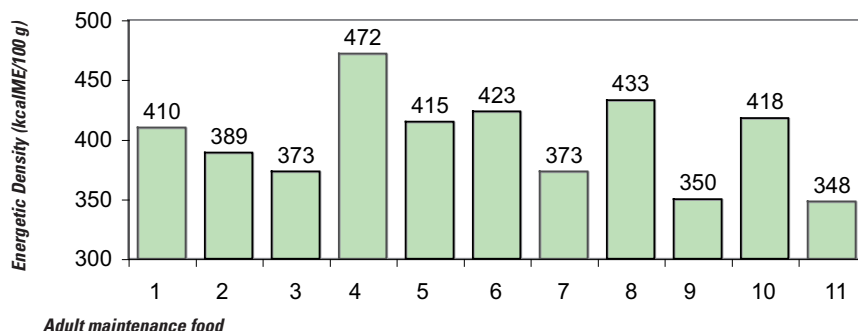
**Irregular activity pattern.** Many cats are dependent upon their owners for exercise. These cats may be prone to periods of fluctuation in their activity e.g.:

- Household without a cat-flap, outside access may be limited to when the owner is at home
- An indoor-only cat where activity depends upon the owner availability e.g. play activity
- Seasonal fluctuations e.g. amount of outdoor activity may be dependent upon daylight length, weather conditions

**Cats accommodated in boarding kennels during owner vacation.** In these circumstances, normal activity patterns are disrupted markedly, but energy intake is not restricted. Further, many boarding establishments increase portion size to make certain that pets do not lose during their stay.

**Moving house.** Moving house is at least as stressful for cats as it is for the owners!! This may affect energy intake. Further, the level of physical activity is likely to change because it can take time for the cat to adjust to the new surroundings, establish territory, and get into a routine.

Table 1. Comparison of the Energetic Density in various commercial complete foods for adult cats



Comparison of maintenance diets for adult cats. The reported energy densities (in kcalME/100 g) are those displayed by the manufacturer. The various digits (from 1 to 11) represent adult maintenance diets from different manufacturers. The figure demonstrates that variation in energy content amongst diets can be up to 35%.

#### 4. Control supplemental feeding

- Avoid feeding treats or table scraps. Although this may be a less common problem for cats than dogs, the concerns over such extras are similar:
  - Supplemental food makes an already balanced diet unbalanced. Such extras are often high in fat and sugar, whilst being unbalanced in micronutrients.
  - Owners under-estimate the caloric contribution from small extras. Given the difference in body weight between owner and pet, what seems like a negligible quantity of food to an owner, may be a significant amount of food to a cat (refer to **Table** on page 58).

However, giving occasional treats may be acceptable, but must be factored into the feeding strategy. In some cases, treats can be beneficial to the cat, in promoting health (e.g. dental snacks) and activity (see physical activity section below). Ideally, such should be nutritionally-balanced.

- Educate all family members and friends. To ensure that a cat is fed responsibly, it is essential to make sure that all family members (and friends) are committed to avoiding supplemental feeding.
- The 'liquid' lunch! Owners should also be made aware that liquids are part of the diet and so the caloric value of drinks must be included as part of the overall plan. The use of food to facilitate oral administration of medications can also be a source of significant caloric intake.

#### 5. Understand normal feline feeding behaviour

Many owners misread signals about the behaviour of their cat with regard to eating.

It is important to remember that:

- Cats in the wild are designed to be trickle feeders and would typically consume numerous small meals (10-15 meals per day). Despite this, most owners choose to feed their cats in 2-3 large meals per day.

- Cats do not have any inherent need for social interaction during feeding times. When the cat initiates contact, owners often assume that they are hungry and are asking for food when they are not. Nevertheless, if food is provided at such times, the cat soon learns that initiating contact results in a food reward. If larger amounts or energy-dense foods are offered, it has the potential of leading to excessive food intake and obesity.

Unfortunately, this misinterpretation of normal feline behaviour is so common that pet cats have already learned two 'unnatural' behaviours:

1. They learn to eat large quantities of food during a meal
2. They learn to 'beg' for food by demonstrating affection when they are hungry

In these circumstances, regulated feeding is necessary e.g. weighing out the daily ration; however, this food should ideally be offered in as many portions as possible during the day.

Further, pre-learnt begging behaviour can be reversed, to some extent, by interacting in a different way with the cat. For instance, do not offer a food reward but encourage another form of positive owner-pet interaction e.g. petting, initiating play activity, grooming. This will distract the dog or cat from the behaviour at the same time as increasing energy expenditure.

#### 6. Adopt strategies that help to prevent over-eating

Consider methods of slowing food intake at meal times.

This can include:

- The use of feeding toys
- Diets with a larger kibble size (that require more chewing before swallowing)
- Relocating the feed bowl before or during meal times, and activity related rewards e.g. food ration only given after an activity has been performed

## B) Physical activity and play behaviour

Increasing energy expenditure helps to prevent the development of obesity, and strategies include increasing the level of physical activity and introducing regular play sessions. Additional benefits of exercise include:

- Building muscle mass and thus increasing the resting metabolic rate
- Improving mobility
- Benefits to the cardiovascular system
- Enhanced pet/owner bond by developing a relationship based on play rather than on food
- Providing mental stimulation
- Improving welfare and quality of life

### Methods of increasing physical activity

The exact exercise programme must be tailored to the individual, and take account of any concurrent medical concerns. It should also take account of existing capabilities, as well as the age, health and other conditions of the owner.

The aim should be to increase the level of activity in gradual steps and to make it a regular feature of the cat's life. The type of physical activity recommended will vary depending upon the individual.

### Methods to increase physical activity in cats include

- Increasing play activity
- Encouraging the cat to exercise itself
- Increasing movement by using food rewards (providing it is part of the daily ration)

In terms of activity, regular play sessions are advised. Short, frequent play sessions are better than a single long period. It is preferable for a cat to play for a few minutes each day, than to play half an hour during the week end.

### **Understanding normal feline behaviour and the need for play activity**

In domestic cats, hunting and eating behaviours are independently motivated. Thus, cats have a physiological need to hunt (or perform some alternative to this such as play activity) even when their daily energy requirements are already fulfilled. Although play behaviour may be more pronounced in juvenile cats, most owners do not realise that it is necessary throughout life.

Further, activity in the wild usually consists of many short high-intensity bursts each day (corresponding to hunting excursions). Therefore, when implementing play sessions, remember a number of short periods are preferable to one long session.

When implementing regular play activity for the first time, it is best to start with two to three short (~2-3 minutes) sessions each day. This will not overburden the owners, and allow the cat to become accustomed to the activity. Indeed, it can be a real pleasure for owners to interact with their cat in this way. Once a regular level of activity has been attained, the frequency and intensity of the exercise or play sessions can be increased.

### **Encourage voluntary exercise e.g. through access to the outside**

Many cats like exercise outdoors, and this can be encouraged, as long as it is safe to do so (e.g. quiet neighbourhood with no major roads). However, nervous cats may be reluctant to venture far, and other methods of exercise are thus necessary.



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**Use of toys**

Toys are the best way of stimulating play activity, and these sessions are designed to mimic the hunting behaviour of the wild. A number of toys designed specifically for cats are now available; some features of good cat toys include:

- Ability to produce rapid and unpredictable movement
- Emission of a high-pitched sound
- Small 'prey' size
- Ability to supply a food reward

Examples of good cat toys include fishing rod toys although some home-made objects can work equally well (e.g. rolled up paper, tin foil etc). Whilst laser pens can be used to stimulate activity, they can lead to frustration. This is because play activity should mimic hunting behaviour, and there is a need for the 'prey' to be caught on some occasions. Hence, if laser pens are used, it is important to finish each movement by focusing on another object, which itself can act as the 'prey' object and be caught.

**Use feline activity centres**

Feline activity centres are another means by which cats can both exercise and fulfil their natural behaviours. The best-designed stations are those that provide many and varied levels and climbing options (thus making full use of 3-dimensional space), include dangling toys and scratch posts. Scratching is an additional means by which cats can expend energy; posts which allow the cat to stretch at full stretch are best.

**Encourage activity at feeding times**

Food can also be a useful motivator for physical activity. Hollow toys can be purchased or constructed,



© Shelley Holden

which contain small amounts of kibbles. The cat must then play with the toy (thereby expending energy) to receive the reward. This solution diverts the cat, decreases its boredom when living exclusively indoors, and helps to reduce overall food consumption.

For some cats, encouraging walking activity prior to meal times by moving the feeding bowl can also help.

## C) Monitoring of body weight and body composition

**Body weight**

- Use the same weigh scales on each occasion. Electronic scales are recommended, and these should be regularly calibrated for precision and accuracy. Weight measurements must be recorded on the clinical records of the patient.
- Aim to monitor body-weight on a regular basis:
  - Young and growing cats should be monitored, at least once a month
  - Young adult cats (6 months to 2 years) are best monitored every 3-4 months since, if obesity can be prevented at this stage, the good habits will hopefully be initiated
  - Adult cats, older than two years of age, should be weighed every six months throughout life
- Pay particular attention to cats recently neutered. It is advisable to schedule 3-4 weight checks in the first 12 months after neutering. This coincides with the period of early adulthood. One approach would be to organise free weigh-in sessions (included in the overall cost of neutering) at:
  - 1 month
  - 3 months
  - 6 months
  - 12 months

It is worth having a spot in the house where your cat can fulfill its behavioural needs.

- Consider intervention points for excessive weight gain or loss. Not only should body weight be regularly recorded, but alterations to feeding and lifestyle should be made if changes have been noted between veterinary visits. It is the responsibility of the individual clinician to determine whether (and when) to intervene in a particular patient.

However, the following guidelines have been adopted from similar recommendations in adult human patients:

- 2% change in 7 days
- 5% change in one month
- 10% change in 6 months

### Body composition

Body condition scores are the most widely-available methods of assessing body composition in first-opinion practice. Studies have shown that the most commonly-used systems correlate well with adipose tissue mass determined by other means (e.g. dual-energy X-ray absorptiometry; DEXA).

Other methods include zoometry, bioimpedance and DEXA. Whilst the latter is most precise, its availability is limited. Although zoometry and bioimpedance methods have been validated, they have not been shown to be any more precise than a body condition score. ■

## > Prevention of obesity - dietary strategies

Altering dietary composition is another strategy that can be used to prevent over-feeding in cats. Broadly speaking, the characteristics of a diet designed for weight loss will also be those which can help to prevent development of obesity in cats. Broadly speaking, characteristics are as follows:

- Reduced energy density, usually through a reduction in fat content.
- Increased micronutrient (vitamin and mineral) content relative to energy content. For some inactive cats, energy expenditure is low, and the diet has to be reduced accordingly. This ensures that malnutrition does not occur even at low levels of maintenance energy intake.
- Increased protein content relative to energy content. As with micronutrients, this ensures that protein malnutrition does not occur when energy intake is restricted. However, given that the level of protein consumption can determine voluntary food intake, over-supplementation of protein in cats should be avoided.
- Supplemented with L-carnitine. Incorporating L-carnitine can help to maintain lean mass in cats.
- Fibre supplementation. Higher dietary fibre content increases the bulk of the diet and improves satiety.
- Increased water content. High dietary water content has been shown to reduce energy intake even on a high fat diet. The amount of food offered with a moist food (about 20% of dry matter) is about three to six times higher than the amount offered with a dry food (90% dry matter) for an equal daily energy allowance. Thus, feeding a moist diet can be a useful method of reducing energy intake, if cats will tolerate this.





## 5. FAQ's

### 1/ FAQ'S from owners

#### A) My cat refuses to eat the prescription diet, what should I do?

It is impossible to impose a particular food on cats, because if they deem a food unpalatable they are capable of starving themselves for long periods. So, if your cat refuses to eat for more than 24 hours, you should offer him his usual food again. This kind of refusal is usually the result of trying to change the diet too rapidly.

Cats are by nature unaccustomed to a varied diet because, in the wild, the number of different prey animals they consume is relatively limited (rodents, birds). The smell, the size of the mouthfuls, the consistency, and the way in which the food breaks down in their mouths, can all play a role in food choice.

The new diet should therefore be introduced very gradually. On the first day, you should introduce a few new kibbles and (in extreme cases only ONE kibble) or a pea-sized amount of canned food into the old ration, and then progressively replace the existing food with the new one.

The changeover to the new diet will take at least a week. For some cats, the transition should be even slower, in which case you need to find the smallest possible quantity of the new diet that is accepted by the cat and increase it (double it at most) every two or three days. When the cat refuses, go back to the previously-accepted mixture. The quantity of the new diet is then increased very slowly. As a result, the transition can take a month, but this is an effective way of doing it.

#### B) My cat is very fussy, he knows exactly what he does or doesn't like

Cats are naturally "gourmet" e.g. if they have not been accustomed to dietary changes from an early age they can be very fussy, even going so far as to refuse everything except one particular type of food. It should be remembered that cats are quite capable of starving themselves if they take exception to a particular food!

However, the prescription of a dietetic feed is vital for the nutritional management of your cat's disease. This difficulty is not insurmountable, and simply requires a little patience. Your veterinary surgeon will start by adapting the choice of diet to your cat's feeding habits (wet or dry food, or a mixture of the two). These feeds have been purpose-formulated to be easily accepted by the cat. The changeover to the new diet will involve a period of dietary transition between the existing and new diets, which can last over 2 weeks, the aim being to get your cat used to the new diet gently. The vast majority of "difficult" cats accept these dietary changes when they are undertaken over a period of one month.

#### C) My cat is happy the way he is, why should I worry about obesity?

A cat is not "happy the way he is"; his feeling of "happiness" can only be assessed using his own criteria. An overweight cat is either a sick animal, or at risk of becoming ill (risk of diabetes or hepatic lipidosis). Their behaviour is affected, as well as their mobility and activity in general. Moreover, their life expectancy is reduced in comparison with a healthy cat. Treating their obesity will be a kindness rather than a punishment.

## D) I have already tried to get my cat to lose weight and failed. Why was I unsuccessful?

The principle of a weight-loss diet is to restrict the amount of energy based on the animal's daily requirements at its optimal weight. This requires a purpose-formulated diet to prevent the occurrence of dietary deficiencies. "Light" diets are not formulated to produce weight loss.

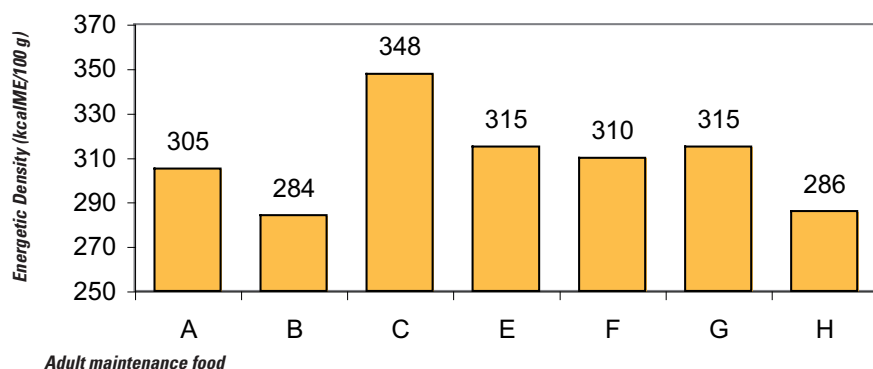
In the body, fatty tissue (known as "adipose" tissue) requires very little energy to maintain itself. Therefore if a cat weighs 8 kg – and its optimal weight is 4 kg – and it consumes the amount of feed required by a 4 kg cat, it will maintain its weight of 8 kg! The average standard domestic shorthair weighs between 3.5 and 4 kg, so a slim cat that weighs 5 kg is already a big cat! Overestimating the ideal weight is one of the major reasons for the failure of weight loss diets.

The volume of diet prescribed depends on the energy density of the food (the amount of energy per 100 g of food); the higher this density, the lower the volume of the ration. Weight-loss diets have a low

energy density, and this maintains a satisfactory volume of ration. However, each brand of "low calorie" food has its own characteristics and there can be a difference of up to 20% between the least and most calorific; as a result, your vet will therefore prescribe a specific food (brand and quantity), which is not interchangeable with other diets unless the prescription of the quantity of food is also changed! These uncontrolled changes in foods are one of the reasons for failures of weight loss diets.

Finally, the volume of the food given to the cat is restricted because it is a small mammal. It is therefore vital to weigh the food accurately on the kitchen scales, which should ideally be exact to the nearest gram; 10 g of kibble may not look like much but can represent up to 25% of the ration! Using approximate measures to this degree may compromise the success of the nutritional treatment of obesity (see **Table 1** below).

Table 1. Comparison of the Energetic Density in various dietary foods for obese cats



Comparison of dietary dry foods designed for nutritional management of obese cats. The reported energy densities (in kcalME/100 g) are those displayed by the manufacturer. Different letters (from A to H) represent weight management diets from different manufacturers. The figure demonstrates that variation in energy content amongst diets can be up to 20%.

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### E) I don't feed my cat very much

True or false? It is important to define "he doesn't eat much" ... not much is a very relative notion ... a "small bowl of kibble" can provide a lot of energy. If this statement is correct (and if the cat does not receive any other uncounted supplements), energy expenditure (principally through activity) must be compared with supply. A cat that is relatively inactive has very low energy requirements, in which case, it is possible to calculate a ration that provides a relatively high volume, using specific diets.

desirable, even though it may be a little surprising, and shows the improved quality of life of the cat. You just need to provide him with an environment that is rich in stimulation and games, so that he can exercise his natural predator behaviours. This normal behaviour should be distinguished from that which could be classed as aggressive: the animal plays violently, attacks, bites, or scratches, and becomes much less tolerant to being handled and stroked. In cats, the sensation of hunger may occasionally lead to severe aggression towards their owners. If this is the case, don't hesitate to talk to your veterinarian, so that they can adjust the diet and environment accordingly to prevent this aggressive behaviour.

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### F) Since my cat is undergoing his weight loss programme, he has become overactive!

Overweight or obese cats are usually not very active and described as being calm; they usually only get up to eat or visit the litter tray, do not play much, and demand little attention from their owners. However, a healthy cat at its optimal weight, even those that sleep a lot (up to 16 hours a day), is an animal that plays, demands attention, and usually prefers to go to sleep on the book that you are reading, or the sheet of paper that you are trying to write on! It is difficult to forget their presence.

As it loses weight, the cat will progressively return to a normal level of activity and therefore become more noticeable. This change is perfectly normal and

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### G) My cat is fed by the neighbour, what should I do?

Initially, you should also find out whether the neighbour feeds all of the cats in the neighbourhood or whether they simply feed their own pets outside. In the latter case, it may be possible to change their feeding regime; in the first case, such people cannot be insensitive to the consequences of feline obesity. To convince them, you will need to explain exactly why they should not be feeding your cat. For instance you can tell them that your cat is on a specific diet for healthy reasons. If they remain unconvinced, it may help to equate obesity to other medical diseases such as diabetes or bladder stones. In extreme cases, the cat may need to be kept in to avoid the risk of additional food elsewhere.

## 2/ FAQs from vets

### A) Why should I bother with obese cats?

As stressed previously, obesity should be considered as a disease, and the diet is a form of preventive medicine. The investment in terms of time is certainly substantial, especially at the first visit, but the result is gratifying for both the owner and the vet. Furthermore, offering the best service should be the objective of all vets. We are often surprised to see cases referred with owners who say that their vet never told them that their cat was overweight or the risks involved. Although such statements are most likely poor excuses, they should not be ignored.

### B) How to deal with an obese owner?

Although confronted with an owner-cat "couple", as a vet we are only responsible for caring for the ani-

mal. We cannot ourselves put up barriers to a discussion about the excess weight of the animal because their owners themselves are obese. The simplest method is to speak only about the animal: "your cat is obese and here are the exact risks which face him." At this stage of the discussion, some obese owners may look perturbed, and might compare their cat to themselves ... "he's a bit like me...". Although there are certain similarities between animal and human obesity, it is important to bring the discussion back to the animal alone.

### C) How to deal with a multi-cat owner (especially new kitten)

Whilst it is difficult enough to instigate an effective weight reduction plan in a cat living alone, multi-cat households represent a particular challenge. One option would be to feed all cats the same (e.g. weight reduction) diet. However, it is likely that group-feeding was one of the factors that allowed the obese cat(s) to become overweight in the first place; in this respect, if food is left out for all cats to share, then tendency is that greedy cats over-eat at the expense of cats with better appetite control. Therefore, in order for an owner to guarantee that

Some vets are afraid to lose a client by offending them with the obesity issue. However, vets should avoid anthropomorphism wherever possible. In this scenario, don't consider the aesthetic aspects but focus on obesity as a disease. You would not fear of talking about alopecia with a bald owner, or of lameness with an owner who uses a walking stick. Instead, we simply modify our approach to discuss such matters in these circumstances.



all cats maintain their body weight excess food must be left out allowing some of the cats to over-eat.

Thus, the only solution is to instigate individual feeding plans for each cat. This can be done in the following ways:

- Feed the cats in separate rooms or locations
- Feed the cats in the same locality but supervise them at all times and pick up feed bowls as soon as each cat stops eating
- Feed cats at different times
- Put the food for the cat(s) in normal body condition in a location where the obese cat(s) cannot reach. For instance, food could be placed in an elevated position if the obese cat is unable to climb; alternatively, the food could be placed in a box with an opening that only the normal weight cats can fit through.

Food intake for new kittens must be carefully, and individually, monitored. Body weight should be assessed regularly, and body condition followed to ensure that weight gain occurs at an appropriate rate. Purpose-formulated diets for growth are recommended, and it is advisable to monitor the kitten's intake to ensure that the growth diet (and not the diet of other household pets!) is consumed.

## D) How do I increase the cat's physical activity?

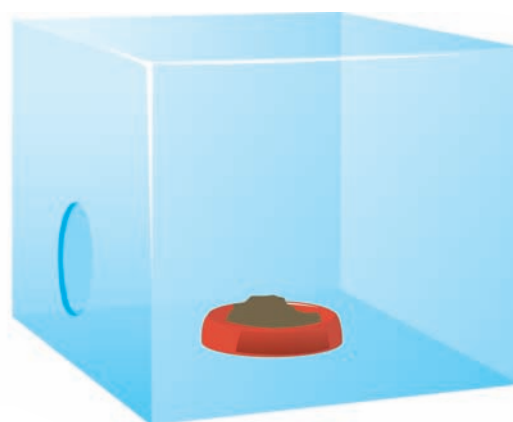
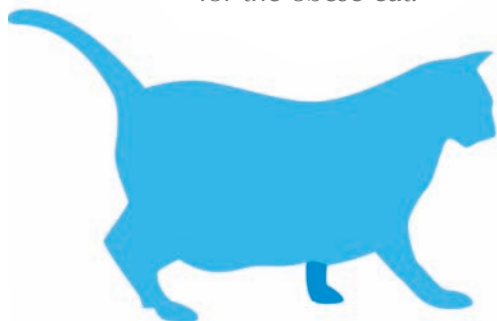
The exact exercise programme must be tailored to the individual, and take account of any concurrent medical concerns. It should also take account of existing capabilities, as well as the age, health and other conditions of the owner. The aim should be to increase the level of activity in gradual steps and to make it a regular feature of the cat's life. The type of physical activity recommended will vary depending upon the individual. Methods to increase physical activity in cats include:

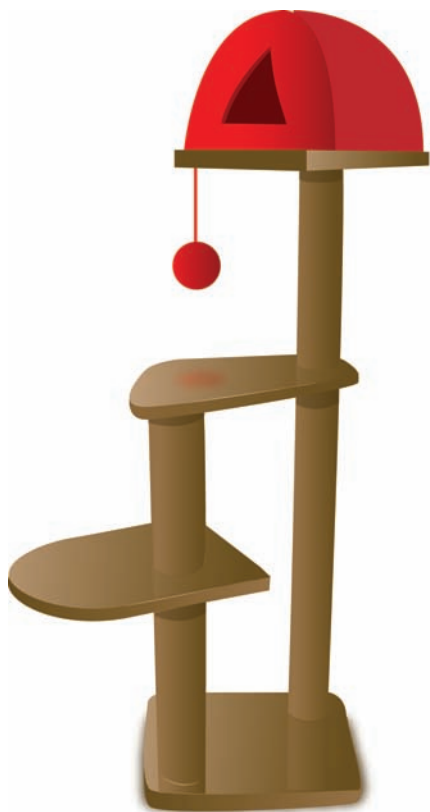
- Increasing play activity
- Encouraging the cat to exercise itself
- Increasing movement through the use of food treats

When implementing regular play activity for the first time, it is best to start with two to three short (~2-3 minutes) sessions each day. This will not overburden the owners, and allows the cat to become accustomed to the activity. Once a regular level of activity has been attained, the frequency and intensity of the exercise or play sessions can be increased.

Toys are a good way of stimulating play activity. Examples of good cat toys include fishing rod toys

In a multi-cat household, greedy overweight cats can steal the food of other cats. One solution is to put the food of the normal weight cat in a restricted area, such as in a box with an opening too narrow for the obese cat.





A cat tree can help your cat both exercise and fulfill its behavioural needs (scratch, hide, etc.).

although some home-made objects can work equally well (e.g. rolled up paper, tin foil etc.).

Feline activity centres are another means by which cats can both exercise and fulfil their natural behaviours.

Food can also be a useful motivator for physical activity. Hollow toys can be purchased or constructed, which contain small amounts of kibbles (see advice given in **Chapter 4** on pages 45 and 46).

## E) What should I do when the cat becomes annoying or even aggressive?

In the cat, hunting behaviour is distinct from hunger. An abundance of food does not therefore decrease its predatory behaviour; the domestic cat should be able to find replacement activities for this activity. However, a sensation of hunger may lead to an exacerbation of predatory behaviour: the animal will hunt in its territory, occasionally leading to severe aggression towards one or several members of the family. It will also decrease the cat's tolerance levels, leading to aggression due to irritation.

It is important to look out for this phenomenon when energy restriction is first imposed. In order to minimise the risk of such behaviour developing, the degree of restriction should not be too intense, so a sufficient quantity of feed must be provided. Owners who have been made aware of this risk will contact you as soon as their cat becomes aggressive.

Two solutions are possible:

1. If the rate of weight loss is too rapid, increase the food intake by 10%
2. If the speed is satisfactory, increase the wet part of the diet that you prescribe, to increase the volume of the diet.

In addition, explore ways of prolonging the time that the cat spends eating e.g.:

- Use an automatic food dispenser
- Divide the ration into several smaller meals
- Increase the number of play sessions etc.

## F) How to manage two diseases at the same time, i.e. urinary disease and obesity

Some cats, particularly when they reach a geriatric age, can present with two diseases that both require a special diet. In this case, it may be difficult to decide which prescription diet would be best and which treatment is the priority one.

### 1. FLUTD and obesity

An initial example could be a cat with feline lower urinary tract disease (FLUTD) which is also overweight, obese or has risk factors for increased weight (it is sedentary, has been neutered, etc.). The first step is to determine exactly which specific FLUTD the cat has. The majority of cats suffer from idiopathic cystitis, whilst a smaller percentage present with calculi. Frequently, cats with idiopathic cystitis present with triple phosphate (struvite) crystalluria, and are misdiagnosed as having calculi. It is normal for many cats to have a certain amount of struvite crystals in their urine, and these crystals commonly form when urine is allowed to stand. Calculi can only be diagnosed if the presence of solid macroscopic material is confirmed in urine either by eye or by imaging tests. Struvite stones can be dissolved by prescribing an appropriate diet inducing acidic urine.

The main concern with using a diet for dissolution of struvite calculi, is that such rations are commonly high in fat and can contribute to weight gain. This type of dissolving diet should be prescribed for a few weeks (4-8 weeks) together with antibacterials (if struvite stones have been caused by bacterial infection). The daily ration of food should be adjusted carefully in order to stop the cat suddenly gaining weight. When the calculi have dissolved, the cat can be moved on to a maintenance diet that has a less severe protein restriction.

Cats with idiopathic cystitis that do not present with calculi do not need to be treated with a low-protein acidifying diet. However, it has been demonstrated that these cats benefit from a higher proportion of wet food and increased urine volume. Idiopathic cystitis is more common in obese cats (see **Chapter 1**), and therefore a suitable weight-reducing diet also helps to reduce cystitis episodes.

### 2. Chronic kidney disease and obesity

This is an uncommon occurrence in clinical practice. Cats with chronic kidney disease start to show clinical signs and clinical-pathological alterations (isosthenuria, azotaemia) when  $\frac{2}{3}$  to  $\frac{3}{4}$  of the total renal mass is no longer functional; hence, diagnosis is

made late in the course of disease, and the majority of cats are already losing weight. Therefore, tendency to weight gain will not be a problem. Protein restriction in chronic kidney disease is beneficial in reducing the accumulation of uraemic toxins, and is indicated at certain levels of azotaemia to reduce clinical signs resulting from uraemia. Given that no benefits of protein restriction have been demonstrated, prescribing such diets to cats that are at an early stage of the disease is not warranted.

### 3. Corticosteroids and obesity

A significant number of cats require long-term corticosteroid therapy due to allergic or immune-mediated disease, principally feline chronic gingivostomatitis, feline asthma, inflammatory bowel disease, allergic dermatitis, or eosinophilic granuloma complex, amongst others. Corticosteroids increase the appetite and lead to increased adipose tissue deposits in certain parts of the body. These cats have a greater disposition towards diabetes mellitus, because they are overweight or obese, and because excessive use of corticosteroids antagonises the effect of insulin. As a result, cats that are on chronic corticosteroid therapy need a special preventive diet to avoid excessive weight gain from the start. Excessive use of corticosteroids should also be avoided, and other alternatives should be considered to treat these diseases, such as inhaled corticoids in the case of asthma or ciclosporin in the case of atopic dermatitis, thus avoiding the risk of obesity and diabetes mellitus.

### 4. Diabetes mellitus and obesity

The majority of diabetic cats present with a form resembling human type II diabetes mellitus, characterised by its association with obesity, insulin resistance, chronic hyperinsulinaemia and amyloid deposits in beta cells in the pancreas that cause major damage in these cells.

The first step is to stabilise the diabetes: these cats require insulin therapy to maintain good glycaemia control and a specific diet. Once the diabetes is stabilised, consider starting the weight management programme... however, diabetic foods are nutritionally adapted for this purpose.



In recent years it has been demonstrated that high-protein, low-carbohydrate diets are beneficial in the treatment of diabetes mellitus, and often lead to a reduction in the insulin dose required, at the same time as increasing the probability of diabetic remissions (transient diabetes), due to the reversibility of the toxicity phenomena in the pancreatic beta cells (Rand, 2005).

### 5. Neutering and obesity

Neutering an overweight or obese cat adds an extra problem, because it increases the likelihood of the cat becoming more overweight, and makes it harder to succeed with a weight-reducing treatment. High-protein, low-carbohydrate diets are a suitable option in these cases, because they come closest to a cat's natural diet. Monitoring weight is crucial. Quantities of food must be calculated extremely precisely, taking the individual cat's basic needs into account. Enriching the cat's environment is just as important as the diet, stimulating play and physical activity in order to increase energy expenditure.

### G) I don't want this diet because it is too high in protein

In theory, weight loss can be achieved in two ways:

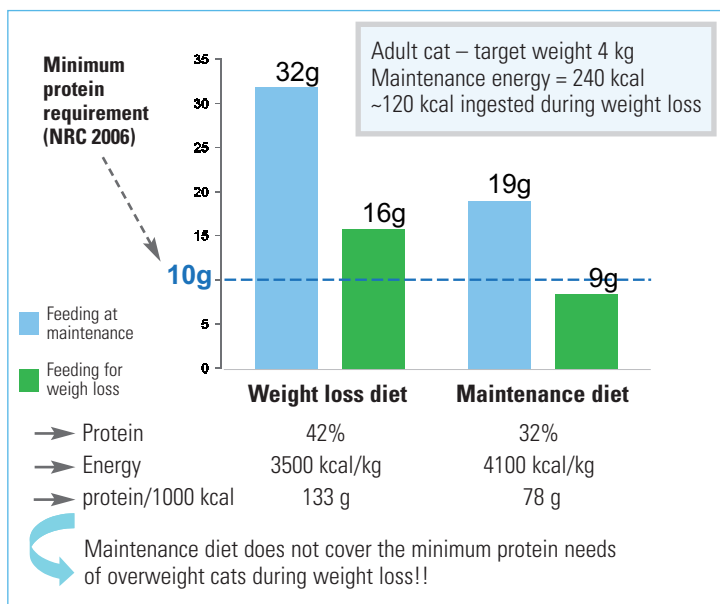
- Using a standard maintenance diet, but reducing the amount of food offered daily
- Using a diet which has a lower energy density

It is inadvisable to use a standard maintenance ration and simply restrict the amount of food given. Most nutrients are balanced to the energy content of the ration and, when this is restricted, malnutrition states may develop. Therefore, using diets with a reduced energy density is the key strategy during dietary intervention. These diets are supplemented in protein and micronutrients relative to energy content.

A common concern (and in fact misconception) with feeding a 'high protein' weight loss diet is that the protein level may be damaging to health, especially in older animals. In this respect, some clinicians are concerned with a possible negative impact on pre-existing chronic kidney disease (CKD). However, there is no evidence that supports a link between high protein intake and the development of CKD in dogs and cats.

Further, clinicians should remember that protein content is only increased RELATIVE TO CALORIC CONTENT. Thus, when energy intake is restricted, an appropriate (and NOT excessive) level of protein is then fed. ■

Comparison of protein intake during weight loss on maintenance and weight loss diet



## > Routine blood work and urinalysis prior to starting a diet

Obese cats are predisposed to different diseases, as described in earlier chapters. Some of these diseases, such as hepatic lipidosis or diabetes mellitus may not show clinical signs in the early stages. Many obese cats that are started on a weight-reducing diet are adult or geriatric cats. It is therefore necessary to carry out a thorough physical examination and a basic blood analysis (blood count, basic biochemistry) and urine analysis in order to ascertain the patient's internal condition. Slight or moderate elevation of ALT or ALP in asymptomatic cats could suggest the presence of hepatic lipidosis (or another liver disease that is unrelated to obesity), and in this case we should seriously consider weight reduction in order to prevent the disease from worsening, using a high-protein, low-carbohydrate diet. In this example particular care should be taken to introduce the new diet gradually, so that the cat does not refuse it, as this could aggravate the lipidosis.

It is sometimes hard to diagnose diabetes mellitus due to the stress hyperglycaemia that occurs in cats when blood is taken. Glycaemia levels in stressed cats can easily increase to similar levels as those seen in diabetic cats (14-22 mmol/l; 250-400 mg/dl). This is caused by the release of catecholamines in the event of stress. Stress hyperglycaemia even lasts long enough to cause glucosuria, even when the cat is not truly diabetic. In these cases it can be useful to determine fructosamine concentration; the degree of elevation of fructosamine is proportional to the magnitude of hyperglycaemia over the past 2-3 weeks.

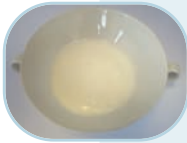


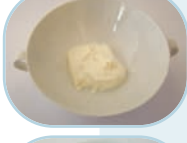



These analyses are not considered as essential for all overweight cats that are to be put on a weight-reducing diet, especially if the cat does not present with any clinical signs of disease. However, information obtained from these analyses may be a great help, if there are no financial concerns and/or the cat is geriatric. If the cat has problems with its health when it is on the weight-reducing programme, then there will be baseline values to use as a reference.

### Pros & cons for blood sampling before obesity diet

Pros	Cons
<ul style="list-style-type: none"> <li>• Identify subclinical disease like diabetes mellitus and renal and liver disease</li> <li>• Obesity is a disease: this may be a way to engage the owner</li> <li>• Defensive: if you start obesity programme and the cat becomes sick, or if a more important disease was behind</li> <li>• If results are normal, it's positive information for the owner</li> </ul>	<ul style="list-style-type: none"> <li>• Handling issues</li> <li>• Financial issues?</li> <li>• May not be necessary in young cats with recent weight gain</li> </ul>

## Contribution of titbits to daily energy intake

- When an owner gives titbits on top of the daily food ration, this drastically increases the overall daily energy intake\*. This has the potential to cause weight gain in cats fed at maintenance levels, and slow/stop/reverse weight loss in cats on a weight management programme. Below are few examples illustrating the potential effect of titbits on food intake.

	Quantity	Energy intake (in kcal)	Excess daily energy intake (in %)
	2 spoons of low-fat cheese	54	21
	2 spoons of yoghurt	41	16
	100 mL of full fat milk	58	23
	25 g of cream	96	38
	25 g of tuna (in brine)	28	11
	43 g of liver pâté	154	61
	25 g of liver	30	12
	30 g of ham rind	255	101
	60 g of high-fat cream cheese	62	25

\* for a 4 kg cat



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## Personal notes

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# Personal notes

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*This book has been prepared with the greatest care, taking into account the latest research and scientific discoveries. It is recommended that you refer to drug and food prescriptions and instructions, since they are likely to change. In view of the diversity and complexity of clinical cases for dogs and cats, it is imperative to realise that any supplementary tests and therapeutic treatment described in this book are non-exhaustive. The treatments and solutions proposed can under no circumstances replace examination by a qualified veterinarian. The publisher and authors can in no way be held responsible for any failure of the suggested treatments and solutions.*

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