

Obesity in the Dog



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Obesity is considered to be the most common form of malnutrition encountered in small animal practice, and as such, represents a significant challenge to the veterinarian. Studies in Europe have indicated that up to 44% of dogs seen in veterinary practice are overweight or obese. This figure implies that nearly half of the dogs seen in veterinary practice are likely to be obese; however, it should not be assumed that this is a true representation of the overall dog population. Obesity has been linked with a number of serious conditions, and it has been suggested that obese dogs are far more often presented to a veterinarian than pets with normal body weight.

Incidence of Obesity in Dogs

<i>Species</i>	<i>Incidence</i>	<i>Study</i>
Dog	11.6%	Krook et al. 1960
	28%	Mason 1970
	34%	Anderson 1973
	44%	Steininger 1981
	23.4%	Edney and Smith 1986

Definition

"Obesity is pathological condition characterised by an accumulation of fat much in excess of that required for optimal body function" (Mayer, 1973)

A number of definitions have been proposed for obesity. Firstly there is a "mathematical" definition, which in humans defines obesity as the body weight being 10% to 20% above normal. Secondly, obesity can be defined as a physiological impairment associated with excessive fat accumulation.

Obesity Assessments

<i>Objective Assessments in Humans</i>	<i>Objective Assessments in Dogs</i>	<i>Subjective Assessments in Dogs</i>
<ul style="list-style-type: none"> • Weight and height measurements (Body Mass Index) • Skin fold thickness • Ultrasound - measurement of subcutaneous fat • Densitometry - assessment of body composition • Potassium content • Computed tomography • Fat soluble gases • Dual energy x-ray absorptiometry (DXA) 	<ul style="list-style-type: none"> • Breed data • Densitometry - assessment of body composition • Ultrasound - measurement of subcutaneous fat 	<ul style="list-style-type: none"> • Based on observation and palpation • Based on body score system

The mathematical definition is more appropriate in humans, where extensive data exist on optimal height-weight standards, than in pets, where data on optimal) are restricted to purebred dogs.

Body Score System

The assessment of the dog can be done by observation and palpation using the following criteria:	
Thin	Underweight; no obvious body fat
Lean	Skeletal structure visible Little body fat
Optimum	Rib cage easily palpable but not showing Moderate amount of body fat
Overweight	Rib cage barely palpable Bodyweight more than normal
Obese	Rib cage not palpable; large amount of body fat; physical impairment due to excess body fat

Causes of Obesity

Obesity is a consequence of energy intake exceeding the dog's energy requirement at some stage in its life, resulting in formation of excess adipose tissue.

Obesity is a common familial disorder, and there may be a genetic component in some individuals that results in a defect to regulate energy intake or energy expenditure. In a few cases obesity may be secondary to other conditions, such as endocrine disorders or drug-induced polyphagia.

Imposed on the genetic base of the pet are environmental and social factors, and the key component in terms of feeding is the pet's owner. Clearly, no owner deliberately sets out to create an obese pet; however, feeding mistakes and behavioral problems play a crucial role in the development of obesity. Understanding and addressing these issues form the cornerstone for the successful management of canine obesity.

A further owner-related factor associated with obesity in dogs is obesity in the owner. A number of reasons may explain this, including lack of exercise by the owner (and hence the dog), the consumption of high calorie foods with table scraps going to the dog, and a possible failure to recognize the problem and regard the overweight dog as normal.

Feeding Mistakes and "Bad Habits"

Pet owners play a key role in feeding their pets and are therefore directly responsible for their nutrient and calorie intake. The main problem is providing pets with too much food. There are a number of reasons why owners overfeed their pets:

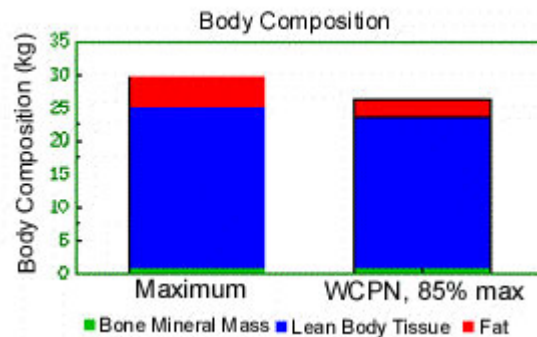
- A tendency to feed the same amount daily
- Opinion that a good appetite is a sign of health
- Leaving food as a palliative when leaving the dog on its own.
- Feeding snacks and treats without adding the calories to the basic diet.
- Providing food instead of exercise
- Indulging begging behavior because it is regarded as "cute"

Overfeeding Growing Puppies

Overfeeding growing puppies is particularly detrimental as it can lead to a number of problems, both during growth, as well as later on in adult life. Overweight puppies may show problems in their skeletal development. Large and giant breeds are particularly at risk, as their skeletal system is more prone to abnormalities.

The number of fat cells is determined in the growth phase of the animal's life. An energy intake above requirements during growth will lead to the development of excess fat cells. Once a fat cell is created it will remain within the body forever. Thus, adolescent body weight has a direct influence on the number of fat cells in the body. In adult animals, a calorie intake above requirements is more likely to lead to excess fat deposit and thus obesity if there are a high number of fat cells to be filled.

Studies by WALTHAM have shown that a controlled food intake of 85% of maximal (ad libitum) intake can help to minimize the level of body fat tissue during growth.



Feeding the Same Amount Daily

A commonly observed mistake is to feed the same amount of food (e.g., 1 cup dry or 2 cans) regardless of the pet's energy requirements or the food's energy density. Energy requirements depend on a variety of factors, including environmental temperature (seasonal changes), the dog's lifestage (growth, adult maintenance, pregnancy), and level of activity. It may therefore be necessary to adjust the type of food as well as the amount of calories according to these factors. A further risk is presented when owners change to a different type of food without adjusting the feeding quantity. This is particularly dangerous when changing to a more energy-dense food or a high quality, very highly digestible food, and professional advice from the veterinary practice may be necessary to adjust the level of calorie intake.

Predisposing Factors for Obesity

There is evidence that certain breeds of dogs are more (or less) prone to obesity than others. The reasons for this are not known, although in one breed (Cavalier King Charles Spaniel) a poor food selection ability has been observed (Waltham Centre for Pet Nutrition, unpublished observations). The intake of large quantities of highly palatable foods has been reported in obese humans, and it may be this overriding of food intake regulation that makes certain breeds more predisposed.

Breed Susceptibility to Obesity

<i>Breeds Most Prone to Obesity</i>	<i>Breeds Less Prone to Obesity</i>
Labrador Retriever	German Shepherd Dog
Cairn Terrier	Greyhound
Shetland Sheepdog	Yorkshire Terrier
Basset Hound	Doberman
Cavalier King Charles Spaniel	Staffordshire Bull Terrier
Beagle	Lurcher
	Whippet

Medical Implications of Obesity

Obesity in humans has been described as one of the most important medical hazards in the United States, shortening the life span and increasing the incidence of certain related diseases, such as cardiovascular problems and diabetes mellitus. Similar parallels have been observed in dogs, and there are a number of diseases that are more commonly observed in overweight dogs, including:

- Cardiovascular problems
- Respiratory problems
- Joint and locomotor problems
- Exercise intolerance
- Increased risk of diabetes mellitus
- Lowered resistance to infection
- Increased surgical risk

Links to other problems have been suggested as well, including:

- Heat intolerance
- Skin problems
- Constipation and flatulence
- Urinary incontinence in spayed bitches

Cardiovascular Problems

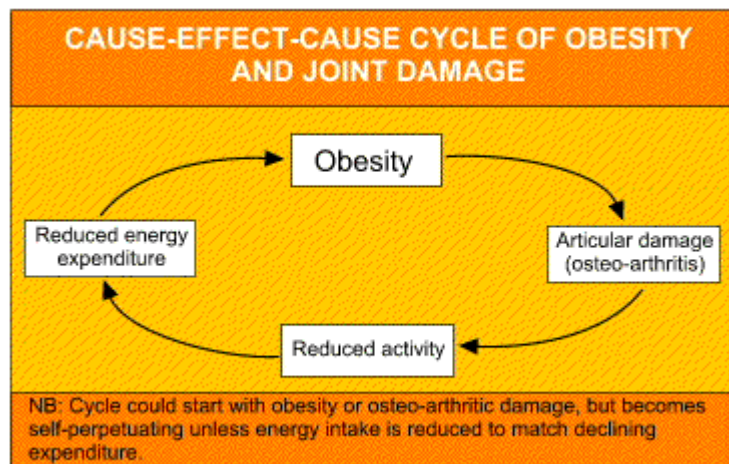
The perfusion of excess adipose tissue requires an increase in circulating blood volume and cardiac output, with the effect of reducing cardiovascular reserves. This increased workload, imposed on a heart weakened by fatty infiltration, may considerably contribute to congestive heart problems. Clinical problems associated with the cardiovascular system may, however, only become apparent in severely obese dogs.

Respiratory Problems

Respiratory difficulties have been noted as a frequent problem in obese dogs. Fat deposits surrounding airways in laryngeal and pharyngeal areas may exert pressure and lead to a narrowing of the airways. This complication may be partly responsible for exercise intolerance in obese pets.

Joint and Locomotor Problems

It has been suggested that osteoarthritis may be the most important pathologic effect of obesity in dogs. Joint injury, which leads to reduced mobility and energy expenditure, could then lead to a cause-effect-cause cycle, thus progressively worsening both obesity and joint damage (and adding to exercise intolerance). The abnormal stress imposed on the joints by excess weight is likely to be an important factor in the etiology of osteoarthritis in dogs.



Increased Risk of Diabetes Mellitus

A very close association between obesity and diabetes mellitus has been recognized for many years in humans, and a similar link has been established in dogs. It has been suggested that it appears to be a heterogeneous phenomenon, in that in some patients it arises from decreased numbers of insulin receptors, and in others from a combination of this with a postreceptor defect.

Lowered Resistance to Infection

Obese dogs may be more at risk from infectious diseases than animals of normal body weight. Studies of experimental infections with canine distemper virus or *Salmonella typhimurium* both resulted in more severe effects in obese dogs than in normal control dogs.

Increased Surgical Risk

An increased surgical risk may occur due to a number of factors:

- Altered drug kinetics, particularly anesthetics
- Prolonged recovery
- Predisposition to cardiac failure
- Wound infection and wound breakdown

Diagnosis of Obesity

Obesity is generally a simple condition to recognize in the dog and is unlikely to be confused with other conditions that can cause abdominal distension, such as ascites or pregnancy. In a few cases obesity may be secondary to other conditions, such as endocrine disorders or drug-induced polyphagia. However, endocrine disorders represent less than 5% of the causes of obesity in humans, and it is likely that the prevalence is similar in dogs. Drug-induced polyphagia can be diagnosed from the dog's history. Drugs that stimulate the animal's appetite include steroids, megestrol acetate, and some anticonvulsants, especially primidone.

Endocrine disorders that can result in complicated obesity include diabetes mellitus, hypothyroidism, and hyperadrenocorticism. History and physical examination may allow differentiation, but it may be necessary to confirm the diagnosis through thyroid and adrenal function testing.

Management of Obesity

The first stage in the management of obesity is a thorough clinical evaluation with appropriate hematologic and biochemical testing to rule out underlying causes of the condition. The presence of coexisting diseases, such as heart or osteoarthritic problems, should also be evaluated and addressed.

In rare cases, endocrine disorders may be the primary cause of obesity; however, in the majority of cases, genetic plus environmental and social factors will be responsible for the problem. Limited data exist on the use of drugs in the management of canine obesity. A number of drugs including fenfluramine, thyroid and growth hormone, and yohimbine have been evaluated with varying success. Perhaps the most promising pharmacologic approach seems to lie in the use of DHEA, a 17-ketosteroid of adrenal and gonadal origin (Kurzman et al. 1990).

Dietary Management of Obesity

The cornerstone of the dietary therapy of obesity is to create a situation of negative energy balance by controlled calorie intake, which will then mobilize body tissue and lead to weight loss.

Once the dog has reached its normal body weight, its further development should be closely monitored. Depending on the dog's environmental and social factors, the diet can then be changed to a normal maintenance food for adult dogs or a "light" diet with a slightly restricted energy level for animals prone to gain weight.

Controlled Calorie Reduction

There are a number of ways in which a controlled calorie reduction can be implemented. The underlying principle is to feed 40% to 50% of the maintenance energy requirements at target weight. This can be achieved by feeding less of the pet's normal food or by feeding a diet specifically designed for weight loss. Specific dietary considerations may include protein, essential fatty acids, vitamins and minerals, and the inclusion of fiber.

Protein, Essential Fatty Acids, Vitamins and Minerals

Some lean body tissue is lost with all effective dieting. However, excessive protein loss during weight reduction is not desirable, because functional tissue losses will need to be replaced. Dietary protein level may be one factor that can influence the composition of weight loss, and it has been suggested that protein levels should be kept at optimum requirements for a beneficial effect on sparing lean body tissue.

A number of adverse health problems during weight loss in humans have been attributed to possible deficiencies in minerals and/or vitamins. To avoid deficiencies, it is crucial to feed essential fatty acids, vitamins, and minerals at maintenance levels, even though the energy content of the diet is restricted.

The Role of Fiber in Weight Loss

In human and small animal medicine, dietary fiber has been included in foods as a bulking agent in an attempt to overcome hunger and increase compliance during weight loss programs. In humans some support for this view has been provided by a number of short-term studies; other studies, however, have provided conflicting results.

Two recent controlled studies in dogs show that the addition of moderate or even high levels of either soluble or insoluble fiber to a commercial low calorie diet had no beneficial effects on

satiety when fed to dogs at an energy intake level compatible with weight reduction (Butterwick et al. 1994, Butterwick and Markwell 1997).

Target Weight

When an overweight dog is first seen and weighed, its normal weight is estimated (e.g., using breed charts) and set as a final target weight. If this final target weight is below 15% of the current weight (and in most cases it will be), it is crucial to take a step-by-step approach in reaching it.

The pet's caloric allowance is calculated on the target weight, and it is therefore important not to set it too low. A very low target weight will provide a very low calorie intake and a very rapid weight loss, which is characterized by an undesirable increased loss of lean body mass. Feeding very little amounts of food also encourages begging behavior and may jeopardize owner compliance.

To ensure a good, healthy, and successful weight loss, a target weight is set a maximum of 15% below the current body weight. If further weight loss is then required, another target weight is set, until the final one has been reached.

Feed the Pet's Normal Food or a Diet Specifically Designed for Weight Loss?

Feeding the pet's normal food is often suggested by pet owners, as it is perceived to be the easiest and most cost effective method. It is, however, associated with several risks:

- **The original food may be inappropriate** since it has contributed to the problem in the first place.
- In commercial foods, **all essential nutrients** (protein, vitamins, minerals) **are balanced on the estimated caloric intake of a specific food** (e.g., an intake of 620 kcal for a 10 kg dog). If the intake is suddenly reduced by 50%, the dog will not only receive 50% less calories but also 50% less protein, vitamins, and minerals, which long-term may lead to deficiencies
- **Owner compliance is more at risk**, as owners are more likely to increase the amount to what they and the pet are used to.
- **Pets are more likely to show extreme begging behavior** if their bowl is suddenly only half full

Feeding a diet specifically designed for weight loss has several clear benefits:

- **The diet has been balanced on a lower calorie intake** and is therefore balanced.
- **The volume of the diet has been increased** to ensure good owner and pet compliance.

- The diet is available through the veterinary practice, which ensures **regular client contact and good monitoring of the pet's progress.**

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