DETERMINING FACT FROM FICTION: DIET AND CANINE OBESITY ISSUES

Author: Tim Watson

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TIM WATSON calls for veterinary staff to take a proactive role in tailoring healthy diets for individual patients, and issues a stark warning about providing pets with snacks and food-based treats.

WHAT role does diet play in the development of canine obesity?

Is it true that, with the widespread feeding of very palatable, energy-rich pet foods, dogs are simply consuming too many calories? Or does such a sweeping generalisation fail to take into account the contribution of feeding practices and eating behaviours, as well as owner attitudes to nutrition and exercise, to the prevalence of obesity? These questions are examined in this article, which reviews the extent to which pet foods, feeding practices and other owner-related behaviours contribute to canine obesity. Since nutritional modifications are a cornerstone of weight-loss programmes, the importance of dietary characteristics in obesity management are also discussed.

Canine obesity – an epidemic?

Few in the veterinary profession need reminding just how common obesity is in dogs (Figure 1). Estimates of its prevalence range from 22 to 40 per cent, depending on the geographical location and defining criteria (German, 2006).

One set of data comes from a survey of Australian veterinary practices, using a silhouette-based guide to body condition, which indicated that 34 per cent of clients' dogs were overweight and eight
per cent were obese (McGreevy et al, 2005).

Canine obesity’s aetiology is undoubtedly complex, with factors such as breed, age, female gender, neutering, bodyweight at an early age, sedentary lifestyle, drug therapy and concurrent endocrine diseases all playing roles (Table 1).

These risk factors aside, the essential cause is a mismatch between calories consumed and energy expended and, in this respect, the biggest contribution comes from the relationship between dog and owner. This was borne out in a survey of veterinary practices in Australia, in which 97 per cent of responders believed canine obesity was directly attributable to owners’attitudes and behaviours, and specifically the manner in which they influence diet, feeding and exercise (Bland et al, 2010).

How is canine obesity linked to diet?

A number of authors have speculated that the high prevalence of canine obesity is linked to feeding highly palatable, calorie-rich dry foods that override normal appetite-control mechanisms, resulting in excessive energy consumption (Diez and Nguyen, 2006; Stuart, 2008; LaVigne, 2008). In support of this, experimental evidence suggests high dietary carbohydrate-to-protein ratios – which are typical of dry foods – contribute to obesity in a number of species (Simpson and Raubenheimer, 2005).

It is with respect to energy density – the number of calories per unit weight – that dry foods differ most markedly from natural canine diets and canned foods. A dry dog food generally contains between 350kcal and 450kcal of metabolisable energy (ME) per 100g as it is fed, compared with 80kcal/100g to 100kcal/100g for canned food.

To put these values into a more familiar context, the energy density of dry dog foods falls somewhere between that of sweet biscuits and hard cheeses such as Cheddar, Gruyère and Parmesan, whereas the energy density of canned foods is equivalent to foods like bananas, potatoes and chicken breast (Figure 2). The energy content of foods consumed by wild dogs, which include newborn calves, rabbits and chickens, ranges from 76kcal/100g to 112kcal/100g (Dierenfeld et al, 2002).

The differences between food types are most noticeable when these energy densities are translated into daily food allowances. Current guidelines suggest moderately active pet dogs require 130kcal of ME per kg of metabolic bodyweight (BW0.75) per day (National Research Council, 2006), which for a cocker spaniel weighing 15kg, equates to 991kcal per day. This would be met by feeding 250g of a typical dry food or 1,100g of a canned food (Figure 3).

In the wild, dogs eat a minimum of 0.07kg of prey meat per kilogram of their bodyweight a day (Fuller and Kat, 2008), meaning that a 15kg dog consumes at least 1,050g of food each day. If this
amount is taken as a measure of a dog’s natural appetite, then it is clear that our spaniel might well consume more than 250g of dry food – assuming it is available – or seek other food sources, simply to satisfy its appetite. The net result is the potential continued consumption of food, even though energy requirements have been met – consequently, excess calories are stored as body fat.

The role of diet type in canine obesity development has not yet been thoroughly investigated. In the only epidemiological study of the subject, food type (wet versus dry) had no apparent effect on obesity incidence (Robertson, 2003). However, in cats – where more studies have been reported – both observational and physiological data link obesity with feeding premium-type dry foods that are rich in fat and have a high energy density (Scarlett et al, 1994; Lund et al, 2005; Backus et al, 2007).

Evidence that obesity prevalence is lower in dogs fed homemade diets, as opposed to canned or dry petfoods, is lacking (Kienzle et al, 1998). The absence of any kind of feeding guide on home-prepared diets makes it difficult to judge just how much to feed and, therefore, increases the risk of overfeeding.

How do feeding practices influence calorie consumption?

While it could be that dry foods, per se, are not a risk factor for canine obesity development, it is likely the way they are fed is important. The practice of ad-libitum feeding undoubtedly delivers potential for overconsumption, as most dogs appear unable to self-regulate their energy intake (German, 2006).

Problems can still arise when portion sizes are controlled, because feeding guides are based on averages and cannot accommodate an individual dog’s circumstances. Recommended allowances are calculated using estimates of mean energy requirements, but average pet dog ME requirements vary from 95kcal/kg\(^{0.75}\) to 133kcal/kg\(^{0.75}\). For each of these estimates, the population spread (taken as standard deviations) can be as much as plus or minus 52kcal/ kg\(^{0.75}\) (National Research Council, 2006). Therefore, taking it to the extremes, the daily energy requirements for a 15kg dog could be as low as 328kcal, or one-third of the predicted value of 991kcal, or as high as 1,425kcal.

The picture becomes even more complex when variations in activity are considered. Taking just a single breed – the border collie – as an example: reported mean daily energy requirements range nearly two-fold, from 97kcal/kg\(^{0.75}\) for inactive animals to 175 kcal/kg\(^{0.75}\) for highly active pets (Burger, 1994). The energy costs of exercise can be considerably more substantial for working dogs, with sled dogs that race in Arctic conditions consuming a massive 980 kcal/kg\(^{0.75}\) (Hinchcliff et al, 1997). Assuming that a dog is active when, in fact, it leads a relative sedentary lifestyle can lead to a substantial overestimation of daily food rations.
Another reason for errors is some owners fail to accurately measure food portions, especially dry diets, and this leads to overfeeding. This may be because they literally misinterpret the meaning of the term “cup” on feeding guides, which is a standard North American measure of 8oz (227g), and instead use a large mug.

Problems are also posed by the fact that cups, jugs and other such utensils measure pet food by volume and not weight, so the amount of food – and, therefore, the number of calories – can vary according to the density of that food.

**What other dietary factors contribute to obesity development?**

These factors include the number of meals fed (with a greater risk when either a single meal or three or more meals are fed a day), frequently feeding table scraps and snacks, and the dog’s presence when owners prepare or eat their own food (Kienzle et al, 1998; Robertson, 2003; Bland et al, 2009).

A single sausage (24g) contains 73kcal (Figure 4), whereas a rasher of bacon has 64kcal, meaning that offering a cocker spaniel either of these as a “treat” would increase daily calorie consumption by around seven per cent. If this is an excess to energy expenditure, the sausage alone would result in a net gain in bodyweight of nearly 9g. While this may not sound a great deal, feeding just one small sausage a week would have the potential of increasing the spaniel’s bodyweight by around 450g (or three per cent) in a single year.

The calorie content of snacks and treats, including chews and other dental-health products, should not be ignored. Boneshaped milk or gravy biscuits contain between 20kcal and 120kcal each, chewing strips 20kcal to 60kcal, and marrow bone biscuits around 40kcal. Dental sticks designed for daily use can add another 50kcal to 70kcal to daily energy intake, whereas larger chews, which are recommended for weekly use, contain as much as 560kcal. Giving a cocker spaniel a mediumsized gravy biscuit each day and a dental hygiene product once a week, without reducing the main diet, will increase weekly calorie intake by more than 300kcal and could lead to an annual weight gain in excess of 1.5kg. Therefore, it is imperative that owners are shown how to adjust the main diet accordingly.

**Diet’s role in managing obesity**

Therapeutic foods for the management of canine obesity have been in use for more than 50 years. They are designed with a lower energy density, so that calorie intake can be reduced while maintaining satiety and continuing to provide adequate essential nutrient intakes (Roudebush et al, 2008).

The diet’s energy density can be lowered in several ways – the simplest is to increase its moisture content. The volume of canned food required to meet daily energy requirements is four times
greater than that of dry food. Replacing some of the dry meal with canned food offers an ideal way of reducing calorie intake, as well as providing appetite-satisfying portions and retaining some of the oral health benefits associated with dry foods. Adding water to dry foods is not recommended, since the oral health benefits associated with dry textures are lost.

Other features of weightcontrol products include reducing fat content – since fat contains almost 2.5 times as many calories per gram as protein or carbohydrate – and incorporating calorie-neutral dietary fibre. The effects of dietary fibre on satiety are, however, complex and poorly understood and remain controversial. Research failed to show that moderate amounts of soluble or insoluble dietary fibres had any effect on satiety in dogs (Butterwick and Hawthorne, 1998). Although benefits have been reported with higher amounts of fibre (Jackson et al, 1997), concerns remain that such levels of inclusion greatly increase faecal volume and compromise essential nutrient digestion (Roudebush et al, 2008).

Evidence has emerged of an interaction between dietary fibre and protein in promoting satiety in dogs. Consuming a diet that is high in protein (41.2g/400kcal) and fibre (24g/400kcal) was associated with significant reductions in short and medium-term food intake – as well as voluntary food intake – when compared with diets simply enriched with protein or fibre (Weber et al, 2007). This diet has been shown to promote higher levels of weight loss, and a faster weight loss rate, in obese dogs when compared with a high-protein diet with medium fibre levels (German et al, 2010).

Effective weight control is not, however, as simple as selecting a therapeutic diet and following the manufacturer’s instructions.

A review of 44 diets with directions for weight loss or management in dogs identified worrying variations in the feeding guidelines (Linder and Freeman, 2010). Recommended calorie intakes corresponded to between 0.73 and 1.47 times the resting energy requirements, meaning that feeding those products with values of one or more would actually result in weight gain.

The highest probability of successful weight loss can, therefore, only be guaranteed by working with clients to gain an accurate estimate of their dog’s current calorie intake, and then guiding them on exactly what and how much food to feed on a daily basis. Calorie requirements for weight loss can be based on current bodyweight (such as offering 40 to 60 per cent of ME requirements, where ME = 130 × BW^{0.75}), current calorie intake (such as reducing by 20 per cent), or target/optimal bodyweight (providing 50 to 75 per cent of ME requirements for this weight).

Much of the “brain ache” involved in planning a weightloss diet can be alleviated by using web-based applications that determine the energy content of foods and compute daily energy requirements based on the patient’s current and ideal bodyweight, age, gender and activity. Working with clients to tailor feeding according to the individual dog’s requirements is an essential component of success in enabling weight loss.
Changing attitudes and behaviour

Helping owners modify behaviours that contribute to their dog’s obesity, as well as establishing valuable exercise programmes, are also key to effective weight control.

The family should be counselled on the need to comply with the diet, limit snacks, treats and access to other food sources, and participate in monitoring of the weight-loss programme (Table 2).

Keeping a food diary and attending regular “weigh-ins” can help owner compliance and enhance success. Realistic targets should be set – aiming to lose between one per cent and two per cent of bodyweight per week. Moderate, regular exercise is also indispensable, starting with daily walks of 15 to 30 minutes, depending on the animal’s health and present activity levels.

Dietary non-compliance is common – evident in as many as 95 per cent of cases – and is usually attributed to the owner treating the dog, or the dog stealing food (German et al, 2007). Even small snacks and table scraps can contribute an additional 10 per cent to the daily energy intake, with doughnuts, crisps and portions of chips adding 25 per cent or more (Figure 5). Helping owners appreciate the calorie content of a slice of bread or a biscuit, for example, can make them think twice before offering their dog that treat.

If further incentives are required, then presenting the whole family with evidence that dogs on calorie-controlled diets live longer, healthier and, arguably, happier lives, might just do the trick (Kealy et al, 2002; Lawler et al, 2005).

Summary

• It has been suggested that more than 40 per cent of dogs in developed countries are overweight or obese. Predisposing factors include genetic (breed) factors, age, female gender, neutering, sedentary lifestyle, drug therapy and endocrine disease.

• The essential cause of obesity is a mismatch between calorie consumption and energy expenditure. This, in turn, is influenced by diet, feeding behaviour and owner attitudes to pet nutrition and lifestyle.

• Diet type influences calorie intake, but the contribution of different foods to energy intake is poorly understood. Canned foods are relatively light in calories, dry foods are energy-dense and human foods offered as treats vary widely in calorie content.

• Ad-libitum feeding, or failure to control meal sizes, is a clear risk factor for excessive calorie intake. Other dietary factors that contribute to obesity include meal frequency and feeding table scraps and treats, which can increase daily calorie consumption by 10 per cent or more.
• Products for canine weight management are designed with a reduced energy density to promote satiety while maintaining essential nutrient intakes. The most effective way of diluting calorie intake is to increase the moisture content of food, ideally by substituting some dry food with canned. Simply adding water to dry food is not recommended, since it reduces the oral health benefits associated with kibble textures.

• Although conflicting evidence exists regarding whether dietary fibre helps promote satiety in dogs, a high-protein, high-fibre diet has been shown to reduce food intake and promote weight loss.

• Veterinarians and veterinary nurses have a responsibility to develop a realistic weight-loss programme for each obese dog, carefully calculate food allowances and help owners understand the benefits of behavioural and lifestyle changes. It is not sufficient to rely on on-pack feeding guides, which cannot take into account individual lifestyle factors and, therefore, provide only an average estimate as guidance.

References

• Burger I H (1994). Energy needs of companion animals: matching food intakes to requirements through the life cycle, Journal of Nutrition 124: 2,584S-2,593S.
Metabolizable energy intake and sustained energy expenditure of Alaskan sled dogs during heavy exertion in the cold, *American Journal of Veterinary Research* **58**: 1,457-1,462.
