Weight management in dogs

How to check that your dog is overweight

* Define the right stage of obesity

Ill effects of overweight

Medication for weight loss? Slentrol

Check all the medical conditions - before or after?

Current benchmarking

* Diet and treats
* Exercise level
* Hydration
* Medical conditions
* Routine
* Basic info - breed, age, gender, spayed?, weight, ideal body weight
* Capture fat different parts of the dog body - graphics to do it

Full weight loss plan and monitoring

* Diet plan
  + What to eat - give options to make plans for home made and
  + What NOT to eat and give
  + Capture full current diet - food and treats
  + When to eat
  + How much to eat
  + Nutritional value
  + Common issue faced
  + Good practices
  + How to introduce the diet food - if advised
  + Value add - suggest diet plan - based on activity, breed, weight, gender, spayed, age, medical conditions, ideal body weight, current diet,
  + Part of solution - day cares with few friendly dogs together - playing all day
  + Issue from customer side for restrictive diet
* Exercise plan
  + What to do
  + How to do
  + How much to do
  + Tracking progress
  + When to do
  + Common issue faced
  + Value add -
  + Medical issues or other issues which
  + Motivation for more exercise - day cares or exercise houses,
* One page reports for vets
* Keep publishing reports - what dog foods are performing good, what dog breeds are doing well etc
* How to maintain accuracy of readings - calories, weight, exercise etc.
* Time to feed?

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5590893/>

Insights:

* Results:
  + 97% dogs lost weight
  + Mean weight loss range (5.6% - 17.2%)
  + Sexually active lost more weight than neutered
  + Female dogs lost more weight than male dogs
  + Colony dogs - 1-2% per week
  + Other studies - <1% per week
  + Female should not be pregnant
* Options to reduce weight
  + Only food no additional exercise
  + Food + additional exercise
* Suggest food based on
* concurrent therapy with drugs that might feasibly influence the weight loss process (e.g. glucocorticoid therapy, anticonvulsants, appetite stimulants, antibacterials, insulin) was not allowed
* all dogs had to be used to consuming either a commercial dry or wet food exclusively or a mix of wet and dry food
* Diets used - high protein high fiber weight loss diets
* Less than maintenance requirements were fed
* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5590893/table/pone.0184199.t002/?report=objectonly>
* Program
  + Dogs weight taken, BCS assessed, subjective assessment about activity, QOL, and food seeking behaviour
  + A 2-stage method used for daily food ration
    - Estimate of target bodyweight was determined by dividing the current body weight by a factor that took into account the estimated percentage of excess weight - assumed to be 10% per unit of BCS between 5 and 9
    - Therefore, the estimated TBW for dogs with BCS 7, 8, and 9, were calculated by dividing the current body weight by 1.2, 1.3 and 1.4, respectively
  + The initial daily energy allocations ranged from 251 to 335 kJ per kg0.75 of TBW (60 to 80 kcal per kg0.75 of TBW) per day, depending upon sex and neuter status (sexually intact males 251 kJ/kg0.75 TBW [80 kcal /kg0.75 TBW]; neutered males 293 kJ/kg0.75 TBW [70 kcal/kg0.75 TBW]; sexually intact females 293 kJ/kg0.75 TBW [70 kcal/kg0.75 TBW]; neutered females 251 kJ/kg0.75 TBW 60 kcal/kg0.75 TBW)
  + Study investigators entered details of sex, neuter status, current body weight, and BCS, and the programme then automatically calculated TBW and starting food allocation, as well as converting the starting allocation to a daily ration (in grams or tins of food), based on the food type selected (e.g. dry or mix of wet and dry food). For dry food, in all countries apart from the USA, portion size was accurately determined using electronic gram scales wherever possible. If owners refused to use electronic gram scales, a calibrated measuring cup was instead used: here, the cup was individually calibrated by first weighing a portion of food on gram scales at the practice, and marking portion size on the cup using an indelible marker pen. For the USA, owners were provided with an 8 US fl oz cup (237 mL) with marked graduations corresponding to one quarter, one third, one half, three-quarters and one cup. All food portions were provided in ounces, and a conversion provided for the corresponding number of cups. The owners were instructed to divide the daily ration into at least two daily meals, with food given in the morning and evening. All owners were counselled about not giving extra food (e.g. table scraps and treats), but formal guidelines were not provided.
  + The study investigator entered the body weight at the visit, and the software automatically calculated the rate of weight loss based upon the percentage of initial body weight lost per week. The software then suggested adjustments to the feeding plan to aim for a weekly weight loss of between 1% and 3% per week. For example, if the rate of weight loss had been <1% per week, a 10% reduction in energy allocation was suggested, whilst a 10% increase in energy allocation was recommended if weight loss had been faster than 3% per week. However, the attending veterinary professional could use their judgement on adjusting the ration, based upon the individual circumstances of the case. Examples of reasons for overriding the recommended adjustment included evidence of non-compliance (which could be corrected by owner counselling) and an owner being reluctant to change the food allocation.
  + The internet-based software (VET FOLLOW UP, Royal Canin) used by study investigators to determine food allocations, was also used for data recording. Data included age, sex, neuter status, breed, body weight, BCS, size, and owner-reported behaviour (activity, QOL and food-seeking). For size, dogs were assigned to one of three categories based upon TBW data (small <10 kg; medium 10–25 kg; large >25 kg). Continuous data are reported as mean ±SD, median and interquartile range (IQR), or median and range, as indicated. The restricted maximum likelihood (RML) method was applied to linear mixed models to deal with missing data. Age data were missing for 3 dogs, information on QOL was missing from 1 dog (visit 5), and information on food-seeking behaviour was missing from 1 dog (visits 1, 2, 3 and 5). Energy allocation data were not reported for a total of 80 instances in 31 dogs, whilst body weight measurements of 16 dogs were missing (7 at Visit 2, 5 at Visit 3 and 6 at Visit 4). Data were analysed with SAS v9.3 (SAS Institute Inc., Cary, NC, USA), and the level of statistical significance was set at *P*<0.05, for two-sided analyses. Datasets containing all study data are available in the supporting information ([S1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5590893/#pone.0184199.s002) and [S2](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5590893/#pone.0184199.s003) Datasets).

Analysis:

* + Stepwise linear regression analyses were then performed to assess the impact of various fixed effects (age, sex, neuter status, dog size [small {<10 kg} vs. medium {≥10 to <25 kg} vs. large categories {≥25kg}], initial BCS, average energy intake during the study, and continent [Americas vs. Europe]) on percentage body weight loss in the subpopulation of 437 dogs
  + Contingency tables were used to assess the independence of each factor vis-à-vis all other factors. Stepwise regressions were set in such a way that each forward selection step could be followed by a backward elimination step if necessary using the Schwarz Bayesian Information Criterion (SBC)
  + In this model, if removal of any effect yields a model with a lower SBC statistic than the current model, then the effect producing the smallest SBC statistic is removed. When the removal of any effect increases the SBC statistic then, provided that adding some effect lowers the SBC statistic, the effect producing the model with the lowest SBC is added (SAS v9.3; SAS Institute Inc.). The cut-off value (*P* value) to enter or remove a variable at each step was set at 0.05. Complementary analysis of baseline data was performed on the subpopulation (n = 437) using either a classic general linear model (GLM) to assess the effect of the most relevant factors identified in the stepwise regression (e.g. continent, sex and neuter status) and their interactions (e.g. sex\*neuter, sex\*continent, neuter\*continent, and sex\*neuter\*continent). For the GLM analysis, residual distributions were checked for normality and were subsequently rank transformed if not normal.
  + Statistical analyses of subjective scores of activity, QOL and food-seeking behaviour (rank transformed to be treated as ordinal data) were conducted using linear mixed models with visit number, initial body condition (BCS 7/9 vs BCS 8-9/9) and their related interaction as fixed effects, and dog as a random term. Given that several visits were considered, post-hoc analyses were adjusted with Scheffé’s method to avoid alpha-risk inflation

Results

* Of the 578 dogs that did not complete the trial, 474 dogs (82.0%) failed to return for revisits and were lost to follow up, 40 (6.9%) stopped due to owner non-compliance, 11 (1.9%) stopped because of a concurrent medical condition, 7 (1.2%) stopped because the dog refused to eat the food, and 2 (0.2%) owners found the programme too tough to follow. The reasons why the remaining 44 dogs (7.6%) stopped were not recorded.
* Of the 926 study dogs, 750 (81%) were fed dry food exclusively (median weight 25.5 kg, range 2.1–80.0 kg), 170 (18%) were fed a mix of wet and dry food (median weight 16.5 kg, range 2.6–72.9 kg), and the remaining 6 (1%) were fed wet food exclusively (median weight 40.7 kg, range 3.5–54.2 kg). Of the 750 dogs that were fed dry food exclusively, 601 (65% of total) were given dry diet 1 (median weight 31.8 kg, range 3.5–80.0 kg) and the remaining 149 (16% of total) were given dry diet 2 (median weight 9.0 kg, range 2.1–25.4 kg). Of the 170 dogs that were fed a mix of wet and dry food, dry food 1 and dry food 2 were used in 110 dogs (12% of total, median weight 10.2 kg, range 2.6–41.0 kg) and 60 dogs (6% of total, median weight 30.3 kg, range 4.8–72.9 kg), respectively.
* The mean ±SD starting allocation for the study dogs was 276 ±35.6 kJ/kg0.75/day TBW (66 ±8.5 kcal/kg0.75/day TBW), whilst the mean energy allocation for the whole of the 12 weeks was 264 ±43.5 kJ/kg0.75/day TBW (63 ±10.2 kcal/kg0.75/day TBW).
* Although the planned schedule for follow up was 4 visits over 12 weeks (visits 2 to 5), there was considerable deviation from this, with median (IQR) time from starting the programme (visit 1) being 15 days (14–19 days), 32 days (28–41 days), 61 days (56–70 days), and 91 days (82–102 days) for visits 2, 3, 4 and 5, respectively. The mean (±SD) initial body weight lost was 3.2 ±3.20% (by visit 2), 5.7 ±3.96% (by visit 3), 8.7 ±4.85% (by visit 4) and 11.4 ±5.85% (by visit 5). The mean ±SD rate of weight loss for the whole of the study was 0.9 ±0.45% of initial body weight per week, whilst rates of weight loss for the periods between visits were as follows: visit 1 to 2: 1.3% per week (0.6–1.9% per week); visit 2 to 3: 1.0% per week (IQR: 0.4–1.5% per week); visit 3 to 4: 0.9% per week (IQR: 0.4–1.2% per week); and visit 4 to 5: 0.8% per week (IQR: 0.3–1.1% per week). The number of dogs losing weight at >2% per week was 221 (23.9%) between visits 1 and 2, 105 (11.3%) between visits 2–3, 32 (3.4%) between visits 3–4, and 9 (1.0%) between visits 4–5. Only 6 dogs (0.6%) maintained a rate of weight loss of >2% per week throughout the whole study. In the 437 dogs (47.2%) that complied closely with the visit schedule, mean (±SD) rate of weight loss decreased sequentially over the 5 visits (visit 1 to 2: 1.4±1.35% per week; visit 2 to 3: 1.1 ±1.26% per week; visit 3 to 4: 0.9 ±0.84% per week; visit 4 to 5: 0.7 ±0.96% per week; *P*<0.001)
* This is not surprising since the median duration of a complete weight loss cycle (e.g. returning dogs to ideal body weight) is 9 months, and some dogs require >12 months to reach target
* The rate of weight loss decreased significantly during the study, which is consistent with findings observed in other studies

Links

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/>

For cats, feeding a diet containing 40 % of crude protein (on an as fed basis) during weight loss results in greater loss of fat mass and greater retention of lean body tissue than feeding a diet containing 30 % crude protein

The most effective diets also aim to minimise signs of hunger, in order to reduce begging behaviour and improve compliance, and this is usually achieved by altering macronutrient content [[30](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR30), [31](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR31)]

Suggest them food on content, availability, their usage, etc.

The protein and fibre content of a feline weight loss diet, must be carefully controlled, so as to inhibit hunger whilst ensuring palatability and, at the same time, preserving lean body mass. Although supplementing dietary fibre decreases voluntary food intake in cats, diets become less palatable if too much fibre diets is added [[33](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR33)]

Further, increasing protein intake generally increases, rather than decreases voluntary food intake

Therefore, diets that minimise signs of hunger, whilst preserving lean tissue and not compromising palatability, have modestly increased dietary fibre (e.g. 23 % total dietary fibre as fed) and protein (e.g. 34 % as fed) [[34](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR34)].

Most studies that have assessed weight loss in obese dogs and cats have used colony animals, and protocols are invariably highly successful [[19](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR19), [23](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR23), [27](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR27)]. Typically, young, healthy dogs and cats are used that are often only modestly (e.g. ≤20 %) overweight. In such a setting, weight loss is predictable, usually progressing at 1–2 %/week, when energy intake is restricted to 50–75 % of maintenance energy requirements [[23](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR23), [27](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR27), [29](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR29), [38](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR38)]. Given such results, the vast majority of weight loss studies in colony was completed in 3–6 months. Whilst there are many advantages to undertaking colony research, the main disadvantage is that the findings cannot easily be generalised to weight loss in obese pets, where weight programmes rely on compliance from owners. It is only by examining the weight loss in clinical studies involving pet animals, that the outcomes of weight loss can be appropriately judged

n light of this, recent studies have examined a period of weight loss in pet dogs and cats that are overweight. In both species, more marked energy restriction is usually required than in a colony and, despite this, rates of weight loss [0.5–1.0 % of starting bodyweight (SBW) per week in both species] are slower [[24](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR24)–[26](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR26), [32](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR32), [34](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR34)]. A number of factors account for the differences, such as the fact that most obese pet dogs and cats are neutered, have a variable age range, are more overweight, and commonly have concurrent disease

Most of them will leave the program before the dog reaches the right weight

With regard to degree of obesity, the fatter the dog, the less likely it was to complete, with a 15 % increase in the odds of failure for every additional percentage of excess body fat

In addition to the effect of the type of diet used during weight loss, feeding practices before weight loss could also be considered. In another study, possible effects of main meal feeding (type of food, how measured, meal frequency) and the feeding of extras (table scraps or treats) on the success of weight loss programme was assessed [[40](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR40)]. Most feeding practices had no significant effect; however, dietary energy intake during weight loss was less for dogs that were fed purchased snacks before weight loss, most likely because they continued to use these during the weight loss period.

What should be the maintenance diet after the dog got to the target body weight

In the first 28 days of a weight loss protocol, the median rate of weight loss was 1.2 % body weight per week (BW/wk) in dogs [[37](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR37)] and 0.8 % BW/wk in cats [[42](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR42)]. Thereafter, weight loss rapidly slows in both species such that, after 12 months, median rate is <0.3 %/week in both species [[37](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR37), [42](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5073926/#CR42)]. This slowing down of the rate of weight loss occurs despite the energy intake being gradually reduced during the weight programme, by 10–20 % in both species.

food composition improved energy metabolism

Prior to starting a weight loss programme, target weight (TW) is often estimated, using starting body condition score (BCS). The current study assessed how well such estimates perform in clinical practice. Information on body weight, BCS and body composition was assessed before and after weight loss in 28 obese, client-owned dogs. Median decrease in starting weight per BCS unit was 10% (5-15%), with no significant difference between dogs losing moderate (1-2 BCS points) or marked (3-4 BCS points) amounts of weight (P=0.627). Mean decrease in body fat per BCS unit change was 5% (3-9%). A model based on a change of 10% of starting weight per unit of BCS above ideal (5/9) most closely estimated actual TW, but marked variability was seen. Therefore, although such calculations may provide a guide to final TW in obese dogs, they can either over- or under-estimate the appropriate end point of weight loss

#### **HYPOTHESIS:**

Key determinants of outcome of weight loss, including energy allocation and body composition, are influenced by both individual and weight program factors.

#### **ANIMALS:**

Nineteen client-owned dogs with naturally occurring obesity.

#### **METHODS:**

In this prospective clinical study, body composition was quantified by dual-energy X-ray absorptiometry before and after weight loss on an individually tailored program that incorporated a high-protein and moderate-fiber diet.

#### **RESULTS:**

Mean percentage weight loss was 18% (range, 6-29%), and mean rate of weight loss was 0.85% per week (range, 0.35-1.56%). Mean energy allocation required to achieve weight loss was 60% of maintenance energy requirement at target weight (MERTW) (range, 50-82%). Significant dietary noncompliance was reported (mean, 1.0% MERTW; range, 0.0-9.5%). The mean composition of tissue lost was 84: 15:1 (fat : lean : bone mineral content [BMC]). Lean tissue loss was positively associated with overall percentage of weight loss (Pearson correlation coefficient [Rp] = 0.591, P = .008), whereas BMC loss was greater in retrievers compared with other breeds (1.9% +/- 1.16% versus 0.8% +/- 0.44%; P = .008)

<https://vcahospitals.com/know-your-pet/creating-a-weight-reduction-plan-for-dogs>