



**CASE STUDY**  
**NUTRITION – SCENARIO 2**

# Case scenario: Goldie



## INTRODUCTION

Pet obesity is a growing problem. In a cross-sectional study of pets attending five veterinary practices (Courcier et al., 2010) it was found that 39% of cats and 59% of dogs were found to be overweight or obese when body condition score was assessed. Owner perception of pets' bodyweight differs from these findings with the PDSA Animal Welfare Report (2013) stating that just 18% of dog owners reported their dogs as being overweight or obese, and 36% of cat owners choosing a picture of an overweight or obese cat when asked to choose a cat of normal body condition. Obesity is not as clearly defined in animals as it is in humans as the variation in body morphology make a simple BMI calculation impossible, but definitions include the animal being more than 15% over its ideal weight, and the occurrence of fat deposits over the ribcage, spine, base of tail and in the abdomen (Halsberg et al., 2006). To assess obesity and body condition, 5-point or 9-point body condition scoring charts may be used, as well as recording body weight and taking neck, chest and waist measurements.

Obesity is not just a matter of appearance; obesity is identified as a risk factor for many common canine diseases including osteoarthritis, cardiorespiratory disease, diabetes mellitus, some cancers, dermatological problems, and increased risk to animals under anaesthesia (German, 2006). It has also been shown that longevity is affected by body condition when factors other than food intake are equal. A group of Labrador Retrievers with a mean BCS of 4.5/9 lived an average of 1.8 years longer than the group with a mean BCS of 6.8/9 (Lawler et.al. 2005). Both groups suffered from similar illnesses and causes of death, but the overweight group was affected earlier in life.

## **PRESENTATION AND HISTORY**

Goldie is a 4 year old Golden Retriever. She has been brought in for a routine check-up, and the owner notes that she has been lacking in energy and enthusiasm over the last few months. She was neutered at 6 months old prior to her first season. She thinks it might partly be due to her weight, which they have been struggling to control over the last couple of years.

## **INITIAL ASSESSMENT**

Goldie's clinical history suggests weight control has been an issue since puppyhood with numerous notes on her record that her food intake and weight gain should be monitored. Goldie weighed 32.1kg at her Annual Health Check in June 2019 (aged 2 years) but had ballooned to 42.5kg by June 2020. After advice from the vet, Goldie's owners did manage to get her to lose almost 2 kg, but this was soon put back on. Goldie's owners felt her weight had become a major problem over the last year as, due to their own mobility problems, Goldie had been receiving minimal outdoor exercise. To compensate for a lack of walks Goldie's owners have given her treats and chews including dog biscuits, rawhide chews and dental sticks. If Goldie was present during the family mealtimes she would beg at the table and be fed. In an attempt to stop the begging, Goldie is now shut away from the owners at mealtimes.

Over the last year Goldie has been having one or two short walks a day as her male owner has hip problems and her female owner had knee surgery. Now the female owner is more mobile she is trying to take Goldie for two or three 40-minute walks a day. She is on lead until they get to the beach, then off lead. Goldie enjoys off-lead walks in the field behind the owners' house but is not allowed to do this at the moment as she rolls in cowpats. Goldie 'plods along' in her owners' words on beach walks and isn't interested in chasing or retrieving balls. She does like to sniff on beach walks. Goldie is groomed about once a week. Goldie doesn't chew toys but will chew rawhide and dental chews.

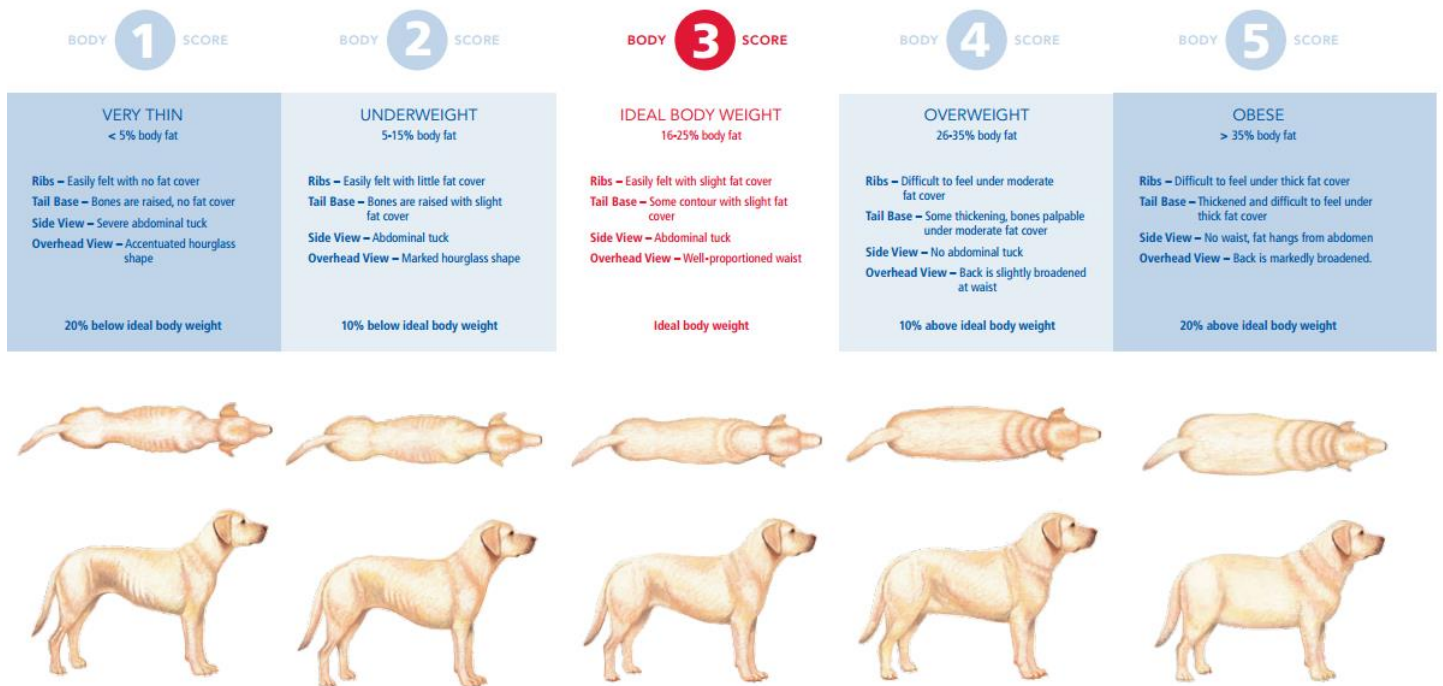
Heart and respiratory rate were recorded. Her heart rate is around 100 in the clinic and she is panting gently, but otherwise healthy. Further physical examination makes hypothyroidism (an endocrine disorder that can slow the metabolic rate) an unlikely diagnosis, although Goldie was overweight and rather lethargic. You decide with the owner that Goldie should be put on a weight loss diet, and suggest that blood tests to check the thyroid hormone levels could be considered if Goldie does not lose weight as expected.

Observe the photographs of Goldie taken at the initial consultation. (Because Goldie has a profuse coat the Before and After images are not as striking as they might have been in a smooth coated dog).





Compare Goldie's body condition to the Body Condition Scoring Chart below.



**Question 1.** What body condition score do you estimate that Goldie is currently?

You weigh Goldie on the scales in the waiting room, and she is currently 42.7 kg. the normal bodyweight for a female Golden retriever is 25-32kg with show types like Goldie being at the higher end (Dog Breed Information, 2015). If Goldie's ideal body weight is 32kg she was nearly 30% over ideal.

You recommend to the owner that Goldie should have her diet assessed and changed, with a view to putting her on a weight loss diet. You suggest that a reasonable initial target for weight loss would be 35 kg.

## NUTRITIONAL ASSESSMENT

Goldie's owner reports that she is feeding Goldie two cans (700g cans) of Optimum wet dog food daily (divided into two meals), plus 1.5 cups (approx. 150g) of 'dry' kibble. She has ad-lib kibble food available all day as well as dog biscuits, chews and human food at mealtimes.

Examine the labels on the food that Goldie is currently being fed:



Starch is included at approximately 5 % in this canned food.

### INGREDIENTS:

Meat (chicken, beef, lamb &/or pork); rice; egg; gelling agents; vegetable oil; vegetable fibre; antioxidants (including marigold meal); natural flavours (including garlic); minerals; vitamins; colouring agent.

### TYPICAL COMPOSITION

Protein, Crude	6.5 % (as fed)
Fat, Crude	7.0 %
Fibre	1.0 %
Moisture	75 %
Metabolisable energy	100 kcals/100g; 0.42 MJ/100g



### INGREDIENTS:

Meat & meat by-products (poultry, beef and lamb); sorghum and/or rice and/or wheat; barley and/or corn; chicken digest; cereal protein; beet pulp; vegetables; salt; vegetable oil; minerals (potassium chloride, zinc sulphate, ferrous sulphate, copper sulphate, potassium iodide and selenium); sodium tripolyphosphate; vitamins (A, B1, B2, B3, B5, B6, B9, B12, C, D, E and choline) and antioxidants.

### TYPICAL COMPOSITION (% values are as fed)

Protein, Crude	26.0 %	Linoleic Acid (Omega 6)	2.50%
Fat, Crude	10.0 %	Zinc	450 mg/kg
Moisture	9.0 %	Vitamin E	200 IU/kg
Fibre	8.0 %	Vitamin C	75 mg/kg
Calcium	0.90 %		
Phosphorus	0.85		
Metabolisable Energy	335 kcals/100g; 1.4 MJ/100g		

Starch is included at approximately 40% in this kibble ('dry') food.

**Question 2:** Non-fibre carbohydrate (starch) levels are not quoted in the nutritional composition label - why not?

**Question 3:** Would a lot of starch be present in the diet of a wild dog?

**Question 4:** Why are the protein levels apparently much lower in the canned food compared with the kibble?

**Amount of macronutrients fed:**

**Question 5.** Based on these labels, calculate the total amount of each macronutrient that Goldie is being fed each day, and write these in the table below:

Macronutrient	Amount in canned food (g; as fed)	Amount in dry food (g; as fed)	Total amount (g; as fed)
Carbohydrate (starch)	<div></div>	<div></div>	<div></div>
Protein	<div></div>	<div></div>	<div></div>
Fat	<div></div>	<div></div>	<div></div>
Fibre	<div></div>	<div></div>	<div></div>
	Amount in canned food (MJ)	Amount in dry food (MJ)	Total amount (MJ)
Energy	<div></div>	<div></div>	<div></div>

## NUTRITIONAL REQUIREMENTS

Look at the nutritional requirements for macronutrients provided below. Write down the requirements for energy (MJ/day) and protein and fat (%) that we should be aiming to achieve in Goldie's weight loss diet

Adult dog energy requirements:

Table 2: Adult Dog Energy Requirements (kcal/day)		
Adult weight in kg	Energy Requirement in kcal/d	Energy Requirement in MJ/d
10	669	2.80
15	907	3.80
20	1125	4.71
25	1370	5.57
30	1525	6.39
35	1712	7.17
40	1893	7.92
42.7	1988	8.32
45	2068	8.66
50	2238	9.37

Note: The calculations are based on resting energy requirements (RER) of  $\text{kcal/d} = 70 \times W^{0.75}$ , Where:  $W$  = body weight in kg (see graph below).  $1 \text{ MJ} = 238.85 \text{ kcal}$ . And then a factor of 1.6 is applied to account for normal activity of an adult pet dog (a higher factor would be applied to puppies, pregnant or lactating bitches etc.).

The following recommendations are from NRC guidelines:

Macronutrient:	Recommended amount for an adult dog
Protein	1 – 1.5 g/kg BW [or 20-25 g per 1000 kcal consumed]
Fat	0.5 - 0.7 g/kg BW [or 10-14 g per 1000 kcal consumed]

**Question 6.** Comment on the diet that Goldie is currently being fed. Is it meeting / exceeding / or deficient in the different macronutrients?

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## FEED CALCULATION

You decide that a suitable target weight for Goldie that should be achievable would be 35kg.

The next challenge is to select a more suitable feed for Goldie (could you just feed less of the Optimum diet?).

Now open the feed calculator and save to your computer.

Select a diet (either canned or kibble) from the drop-down list and choose the number of cans or cups that provides sufficient (but not excessive) energy, plus sufficient protein. Also, low levels of fat and starch are required (concentrated energy). You may combine a canned food with a dry food if you wish, by using both of the two worksheets.

**Question 7.** Which macronutrient is commonly added to weight loss diets in place of fats and starch, in order to bulk out the feed and make the animal feel full (satiated) and reduce begging behaviour?

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## IVP case study Feed calculator for CANNED diets

Feed	Chum	Weight (kg)	35
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Nutrient composition:

	%	g/kg food
Protein	4.5	45
Fat	6.0	60
Fibre	2.0	20
	kcal/100g	MJ/100g
Metabolisable energy	80.0	0.33

Can of feed contains	700	g FW
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(FW = fed weight)

Energy:		
Animal requires	7.19	MJ/d
Amount of food	2100	g FW/d
Animal receives	7.03	MJ/d

# of cans fed  
per day:

3
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Cost:

7.17	\$ per da
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Protein:	from:	to:
Animal requires	35.0	52.5 g
Amount of food	2100	g FW/d
Animal receives	95	g protein

Fat:	from:	to:
Animal requires	17.5	24.5 g
Amount of food	2100	g FW/d
Animal receives	126.00	g fat

Fibre:		
Amount of food	2100	g FW/d
Animal receives	42.00	g fibre

## DIETARY PLAN ADVICE TO THE OWNER

As the owner likes to feed a combination of dry and wet food, you recommend feeding Goldie 1.5 cans (700g cans) per day of Advance Adult Weight Control wet food, fed twice daily, supplemented with Advance Adult Healthy Weight dry food (2.5 cups [250g] per day).



TYPICAL COMPOSITION	
Protein, Crude	6.5 % as fed
Fat, Crude	4.3 %
Fibre	3.0 %
Metabolisable Energy	70 kcals/100g; 0.29 MJ/100g



TYPICAL COMPOSITION	
Protein, Crude	25 % as fed
Fat, Crude	9.0 %
Fibre	12 %
Metabolisable Energy	345 kcals/100g; 1.44 MJ/100g

This diet provides a relatively high proportion of protein (26% DM) with a restricted calorie content (just under 7 MJ of metabolizable energy per day; appropriate for a 32-25 kg dog). This type of diet was found to be effective in promoting rapid weight loss in dogs while maintaining muscle mass (Blanchard et al. 2004). In addition, this diet is high in fibre (12% DM) compared to the diet Goldie was previously fed (around 5% DM fibre). A high-fibre content contributes to a feeling of fullness (satiety) after a meal, reduces begging, and improves weight loss (Weber et al. 2007). This diet is much lower in starch. The new diet also includes the amino acid L-Carnitine which helps maintain or increase lean mass and decrease fat mass during weight loss (Heo et al., 2000) and the diet supplies the required levels of vitamins and minerals for health.

Additional dog biscuits should not be given.

This diet should give between 1 and 3% weight loss each week and to take up to 12 weeks to reach her target of 35kg.

## RESULTS

The owner brought Goldie into the practice regularly to weigh her on the waiting room scales, and provided the following updates to the nurses:

### *Week 2*

- Goldie had lost some weight (41.5 kg)
- Goldie's owners reported she was enjoying the new chew/feeding toys.
- Goldie is not eating her full allowance of food but is eating around 312g/day with no extras or treats.
- Goldie's owners are struggling to get her to engage in play with toys on her walks, but they have been playing a 'run away' game which she seems to enjoy (and which the owner says is good for her fitness too!).

### *Week 3*

- There was no change in Goldie's weight or measurements this week. She enjoys chasing toys but will not retrieve which limits their use on walks. Goldie enjoys running into the sea after thrown stones.
- The biggest change was in Goldie's general demeanour. She walked into the practice with her head up and tail wagging gently. Goldie's owners said she was keener to go for walks and more interested in interacting with other dogs.

### *Week 5*

- Goldie and her owners are now settled into their new routines and Goldie appears to get as much pleasure from simple social contact or grooming from her owners as she previously did from her owners supplying food treats.

## SECOND VISIT

7 weeks after the initial appointment, Goldie is brought back in for a further consultation.

Goldie's weight loss has continued, and she now weighs 39.5 kg.

Goldie's owners see her as a laid back, content dog. They have been happy to leave her resting in her bed and have not encouraged play, hunting or retrieving games on walks as Goldie appears content just walking beside them. Goldie's owners had found it hard to change Goldie onto the new food and had resorted to handfeeding and adding cooked vegetables. They have fed her treats or table scraps when she has tried to initiate social contact. Feeding Goldie not only has the effect of temporarily making her feel better, but also enhances her owner's feeling of wellbeing, so feeding Goldie when she 'asks' for treats is rewarding both for Goldie and her owners. Shutting Goldie away when her owners eat has physically stopped her begging, but it could lower her mood state further by making her feel isolated.

You advise the owners to split the canned food into two meals and suggest the feeding times should coincide with human mealtimes to reduce begging without Goldie feeling isolated. The dry food should also be fed at two specific times. Ad-lib feeding, which Goldie was previously used to, is associated with dogs becoming overweight (Lawler et al. 2005).

Try and find a toy Goldie will play with on walks. Use this for tug, fetch or hunting games. Replace giving treats with alternative interaction such as playing with a toy, grooming or giving a puzzle feeder. Perhaps feed two meals a day of 1/3 of the kibble each and reserve 1/3 of the kibble for use in chew feeders, puzzle feeders or for 'treats'.





**Question 8.** What would you estimate her body condition score to be now?

*Week 10 update*

Weight loss continues, and Goldie's mood state continues to be good. Goldie's owners did suffer health problems during this period and couldn't walk her as much but continued to find games to play indoors such as hide and seek which have kept Goldie happy and reduced her begging for food.

### THIRD VISIT (*Week 12*)

Goldie's weight loss has continued, and she now weighs 35.8 kg.

**Question 9.** What would you estimate her body condition score to be now?



Goldie continued to visit the practice for monthly weigh-ins. Her weight at the end of week 15 was 34.4 kg and her BCS was 3/5. Her owners are now aiming for an eventual ideal weight of 32 kg.

## DISCUSSION

Obesity in pets is an increasing problem (Courcier, 2010) and is a contributing factor in many common canine diseases (German, 2006). Although weight gain can be a symptom of diseases such as hypothyroidism, or a side effect of medication such as corticosteroids (Ahrens, 1996) the most common cause is simply more calories being consumed than are expended (German, 2006). Many factors affect the likelihood of a dog developing obesity including the energy density of the foods available, the amount of exercise done, and genetic factors.

A number of breeds are over represented in the population of overweight dogs seen at vet's clinics suggesting a dog's breed or type can have an influence on its tendency to gain weight. Overrepresented breeds include: Labrador Retriever, Cairn Terrier, Cavalier King Charles Spaniel, Scottish Terrier, and Cocker Spaniel (Edney and Smith, 1986). Research in humans suggests that numerous small genetic variations can add up to an increased risk of obesity (Day and Loos, 2001). In dogs it is thought that selective breeding may mean certain breeds have a small number of very influential genetic mutations that affect a breed's propensity to gain weight (Raffan, 2013). Leptin is a hormone produced by adipose cells which acts on the hypothalamus to regulate food intake, however mutations in the leptin gene and its receptors in rats can predispose to obesity (Jeffrey and Jeffrey 1998). Human research has shown that gene variations affect weight gain by altering the mechanisms that link energy expenditure to food seeking behaviours and reducing the satiety that eating should bring (Raffan, 2013). If the same breakdown in the link between energy intake and output and the same increased drive to seek out food but be less satisfied by it exists in dogs, then it shouldn't be surprising that some dogs struggle to lose weight. Therefore, a behavioural approach can also help in achieving weight loss e.g. through the use of puzzle feeders or scatter feeding to allow the dog to engage in food seeking behaviour for a larger proportion of the day, whilst ingesting fewer calories.

There are currently no weight loss drugs marketed for dogs in Australia, however two drugs were launched onto the veterinary market in 2007; dirlotapide (Slentrol: Zoetis) and mitratipide (Yarvitan: Janssen Animal Health). Both drugs are microsomal triglyceride transfer protein (MTP) inhibitors which reduce the absorption of fat from the intestines. Dirlotapide was also shown to reduce appetite in dogs (Wren et. al, 2007).

Neutering is often cited as a factor in pet obesity (German 2006) A lower metabolic rate in neutered animals is suggested as the main cause in some studies (Flynn et. al. 1996). The control of appetite is complex, and oestrogens have been found to have an effect on numerous feedback controls (Asarian and Geary 2006). Although the exact mechanisms by which neutering predisposes dogs and cats to weight gain are not clear, careful management of pets post-neutering is recommended to prevent obesity.

Dieting can be difficult in both humans and animals as the need to eat is a primary one and food cannot be avoided as cigarettes can be for a human, or balls for a ball obsessed dog. With companion animals the situation is complicated by feeding the pet making the owner feel good. A behavioural approach which also considers the owner's feeling and needs seems more likely to succeed. This might include suggesting grooming or play with the dog as an alternative to feeding.

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