



# NUTRITIONAL ASSESSMENT IN THE CAT

## Practical recommendations for better medical care

Angela Witzel Rollins and Maryanne Murphy



**Practical relevance:** Pet owners want dietary recommendations from their veterinarian. Providing a brief nutritional assessment for every cat at every visit will result in better medical care and build trust with clients.

**Clinical challenges:** Examination time is limited, and it can be challenging to ensure appointments are efficient, yet thorough. A range of practical assessment tools is available that can assist with this process.

**Patient group:** Every cat can benefit from a screening nutritional evaluation as the fifth vital assessment (after temperature, pulse, respiration and pain assessment). Identifying patients with nutritional risk factors or nutrition-responsive diseases should prompt a more in-depth review of dietary needs.

**Audience:** This article is aimed at all veterinary health professionals and is accompanied by videos demonstrating the body condition scoring process for a series of cats ranging from ideal body weight through to obese.

**Evidence base:** Information in the review is drawn from the current scientific literature, as well as the clinical experience of the authors.

**Keywords:** Nutrition; diet; body condition score; nutritional assessment

### Every cat, every veterinary visit

While all veterinary professionals (and likely most pet owners) would agree that nutrition is a key component of good health, many veterinarians feel ill-equipped to provide adequate nutritional assessments and recommendations for their patients.<sup>1</sup> According to the Pet Nutrition Alliance, 90% of pet owners reported wanting a nutritional recommendation from their veterinarian, but only 15% actually perceived receiving one.<sup>2</sup> In 2016 the global feline pet food market reached 26 billion US dollars.<sup>3</sup> With so much at stake, pet owners can be heavily influenced by the marketing claims of pet food manufacturers. Therefore, it is essential that veterinarians provide guidance based on evidence-based nutrition. Key to this are nutritional assessments for every cat at every visit to educate clients regarding the specific nutritional needs of their pet.

A nutritional assessment can be a fast and easy process that utilizes the entire veterinary team. To maximise efficiency, a nutritional history form (Figure 1) should be provided to pet owners for completion prior to their appointment; either it can be posted or emailed in advance or handed out at check-in for completion while they wait for the veterinarian. In addition, clients may be asked to bring along to the appointment a picture on their phone of their current cat food. Once completed, the history form can be reviewed by the veterinarian or a trained veterinary technician.

Three aspects are evaluated when performing a nutritional assessment: patient, diet and environment.<sup>4,5</sup> While a few quick screening questions will provide adequate evaluation for most healthy pets (Figure 1), the presence of nutritional risk factors or nutrition-responsive diseases necessitates more in-depth review.

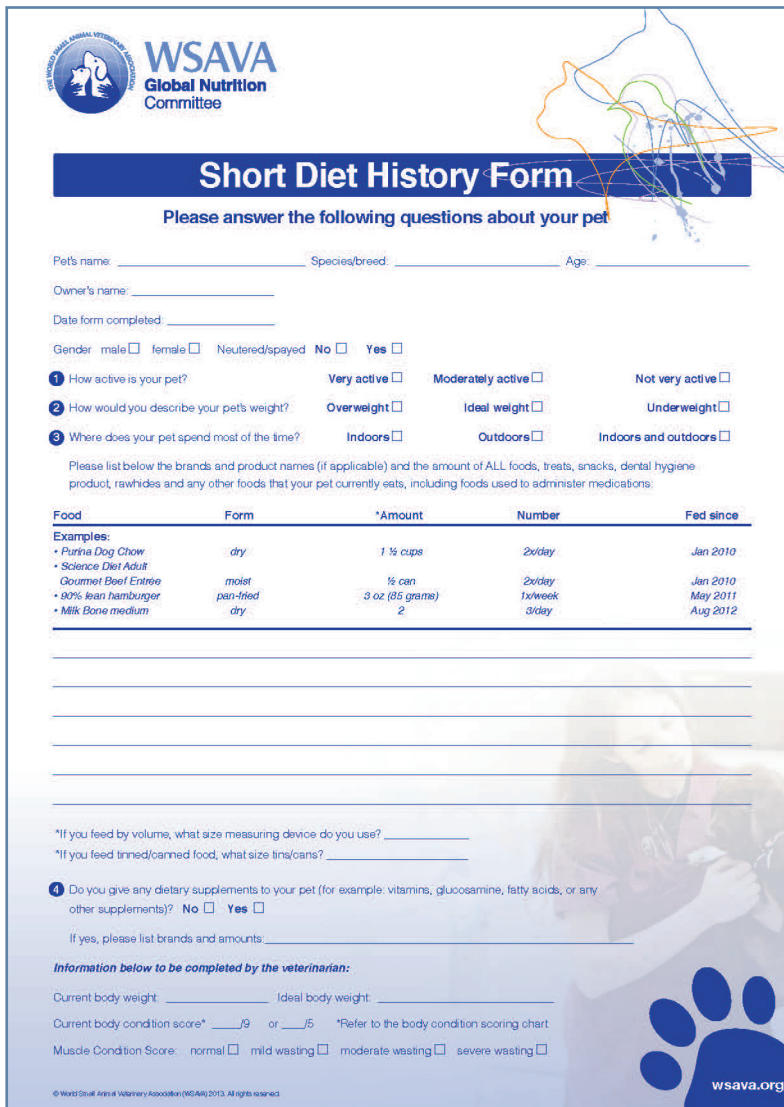
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## Short Diet History Form

Please answer the following questions about your pet

Pet's name: \_\_\_\_\_ Species/breed: \_\_\_\_\_ Age: \_\_\_\_\_  
 Owner's name: \_\_\_\_\_  
 Date form completed: \_\_\_\_\_

Gender: male  female  Neutered/spayed: No  Yes

1 How active is your pet? Very active  Moderately active  Not very active

2 How would you describe your pet's weight? Overweight  Ideal weight  Underweight

3 Where does your pet spend most of the time? Indoors  Outdoors  Indoors and outdoors

Please list below the brands and product names (if applicable) and the amount of ALL foods, treats, snacks, dental hygiene product, rawhides and any other foods that your pet currently eats, including foods used to administer medications:

Food	Form	*Amount	Number	Fed since
<b>Examples:</b>				
• Purina Dog Chow	dry	1 ½ cups	2x/day	Jan 2010
• Science Diet Adult Gourmet Beef Entrée	moist	½ can	2x/day	Jan 2010
• 90% lean hamburger	pan-fried	3 oz (85 grams)	1x/week	May 2011
• Milk Bone medium	dry	2	3/day	Aug 2012

\*If you feed by volume, what size measuring device do you use? \_\_\_\_\_  
 \*If you feed tinned/canned food, what size tins/cans? \_\_\_\_\_

4 Do you give any dietary supplements to your pet (for example: vitamins, glucosamine, fatty acids, or any other supplements)? No  Yes

If yes, please list brands and amounts: \_\_\_\_\_

**Information below to be completed by the veterinarian:**

Current body weight: \_\_\_\_\_ Ideal body weight: \_\_\_\_\_  
 Current body condition score\* \_\_\_\_/9 or \_\_\_\_/5 \*Refer to the body condition scoring chart  
 Muscle Condition Score: normal  mild wasting  moderate wasting  severe wasting

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**Figure 1** Example of a short nutritional history form that can be completed by pet owners prior to the appointment. Part of a suite of resources within the WSAVA's 'Global Nutrition Toolkit', the form is available to download from [www.wsava.org/Guidelines/Global-Nutrition-Guidelines](http://www.wsava.org/Guidelines/Global-Nutrition-Guidelines). Image courtesy of the World Small Animal Veterinary Association

### Assess the cat

The first step in providing a nutritional assessment is to examine the cat. Veterinarians are classically trained to record temperature, pulse, respiration and pain as vital assessments. Nutritional status is also now recommended as a fifth vital assessment to evaluate for every patient.<sup>5</sup> Patient characteristics to consider in the nutritional evaluation include age and physiologic status, activity, body condition score, muscle condition and nutrient-responsive disorders.

#### Age and physiologic status

Nutrient and energy requirements vary tremendously with age. Compared with adult cats, growing kittens need a calorically dense food with higher concentrations of vitamins

and minerals such as calcium, phosphorus and vitamin D.<sup>6</sup> A diet meeting the Association of American Feed Control Officials (AAFCO) recommendations for growth is best for kittens. The age at which cats should transition from kitten to adult feline food is debatable, but 9–12 months is an appropriate period for most.

Spaying and castration can also increase the appetite and lower the energy needs of cats.<sup>7</sup> Therefore, owners should be counseled on ideal body condition at the time of surgical discharge and directed to switch to a lower calorie kitten food if their pet becomes overweight. Adult cat foods or those designed for weight loss may not meet nutritional requirements for growth and should not be used prior to skeletal maturity.

The nutrient needs of adult cats also change as they become geriatric (ie, >12 years). While the energy needs of most animals decrease later in life, some elderly cats require more energy to maintain their body weight. In approximately 30% of cats older than 12 years of age fat absorption is decreased, and in 20% protein digestibility is decreased.<sup>8</sup> This attenuated digestion can also lead to deficiencies in other vitamins and minerals.<sup>8</sup> To compensate for impaired nutrient absorption, elderly cats tend to eat more food relative to their body weight than younger cats.<sup>9</sup> Healthy geriatric cats with weight loss benefit from highly digestible, calorically dense diets that are higher in fat and protein. Changes in diet should be made gradually to prevent gastrointestinal upset. Some geriatric cats may be unable to tolerate energy-dense diets if excess nutrients reach the colon, where they can be fermented.

In addition to age, physiologic processes such as pregnancy and lactation also change the nutrient needs of cats. Adult cats in either of these life stages should have their diet and body condition scores (see below) closely monitored to ensure that adequate nutrition and calories are provided.

#### Activity

While not specifically studied, it is reasonable to assume that most outdoor cats have higher overall activity levels compared with indoor cats. Activity also decreases with age in indoor cats.<sup>10</sup> Activity patterns should be assessed for individual patients and food intake increased or decreased accordingly.

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Five-point scale	Nine-point scale	% body fat	Body condition scoring
1	1	≤5	<b>Emaciated</b> – ribs and bony prominences are visible from a distance. No palpable body fat. Loss of muscle mass
2	2	6–9	<b>Very thin</b> – ribs and bony prominences visible. Minimal loss of muscle mass but no palpable fat
	3	10–14	<b>Thin</b> – ribs easily palpable, tops of lumbar vertebrae are visible. Obvious waist and may have an abdominal tuck
3	4	15–19	<b>Lean</b> – ribs easily palpable, waist visible from above. Abdominal fat may be present or absent. If present, it is made up of loose skin and no fat within
	5	20–24	<b>Ideal</b> – ribs palpable without excess fat covering. Cats have a waist and a minimal abdominal fat pad
4	6	25–29	<b>Slightly overweight</b> – ribs have slight excess fat covering. Waist is discernible from above but not obvious. Abdominal fat pad is apparent but not obvious
	7	30–34	<b>Overweight</b> – difficult to palpate ribs. Moderate abdominal fat pad and rounding of the abdomen
5	8	35–39	<b>Obese</b> – ribs not palpable, and abdomen may be rounded. Prominent abdominal fat pad and lumbar fat deposits. Fat deposit may be obvious in shoulder or abdominal area
	9	40–45+	<b>Morbidly obese</b> – heavy fat deposits over lumbar area, face and limbs. Large abdominal fat pad and rounded abdomen. Body appears broadened from above

**Body condition**

A key component of the physical examination should be an assessment of body condition. Body condition scoring (BCS) is a method for estimating body fat mass based on a combina-

tion of visual assessment and palpation (Table 1; Figure 2). The veterinarian can use either a five- or nine-point scale in which 1 is cachexic and 5 or 9 is obese.<sup>11,12</sup> Each point on the BCS scales correlates with a percentage range of body fat.

**Body condition scoring videos**

A series of videos that demonstrate the body condition scoring process for five cats with scores between 5 and 9 on a nine-point scale are available online as supplementary material.



**Figure 2** Nine-point body condition scoring chart. From the Global Nutrition Toolkit, provided courtesy of the World Small Animal Veterinary Association



**Table 2** Body fat index (BFI) system for assessing overweight and obese cats

	<b>BFI 30: 26–35% body fat</b>	<b>BFI 40: 36–45% body fat</b>	<b>BFI 50: 46–55% body fat</b>	<b>BFI 60: 56–65% body fat</b>	<b>BFI 70: &gt;65% body fat</b>
Face	Slight fat cover; defined bony structures on palpation	Slight to moderate fat cover; defined to slight bony structures on palpation	Moderate fat cover; slight to minimal bony structures on palpation	Thick fat cover; minimal to no palpable bony structures	Very thick fat cover; no palpable bony structures
Head and neck	Clear distinction between head and shoulder; loose scruff; slight scruff fat	Clear to slight distinction between head and shoulder; loose to snug scruff; slight to moderate scruff fat	Minimal distinction between head and shoulder; loose to snug scruff; slight to moderate scruff fat	Poor to no distinction between head and shoulder; snug to tight scruff; moderate to very thick scruff fat	No distinction between head and shoulder; tight scruff; very thick scruff fat
Sternum	Defined, slightly prominent; easy to palpate; slight to moderate pectoral fat	Minimally prominent; palpable; moderate pectoral fat	Poorly defined to not prominent; difficult to palpate; moderate to thick pectoral fat	Not prominent; very/extremely difficult to palpate; very/extremely thick pectoral fat	Not prominent; impossible to palpate; extremely thick pectoral fat
Scapula	Defined, slightly prominent; easy/very easy to palpate	Slightly prominent; easy to palpate	Minimally to not prominent; palpable	Not prominent; difficult to palpate	Not prominent; impossible to palpate
Ribs	Not prominent; easy to palpate	Not prominent; palpable	Not prominent; difficult to palpate	Not prominent; extremely difficult to impossible to palpate	Not prominent; impossible to palpate
Abdomen	Loose abdominal skin with minimal fat; easy to palpate abdominal contents	Obvious skin fold with moderate fat; easy to palpate abdominal contents	Heavy fat pad; difficult to palpate abdominal contents	Very heavy fat pad; indistinct from abdominal fat; impossible to palpate abdominal contents	Extremely heavy fat pad; indistinct from abdominal fat; impossible to palpate abdominal contents
Tail base	Slightly to minimally prominent bony structure; palpable; slight fat cover	Slightly to minimally prominent bony structure; palpable; slight to moderate fat cover	Poorly defined bony structure; difficult to palpate; moderate to thick fat cover	Bony structure very/extremely difficult to palpate; very thick to extremely thick fat cover	Bony structure very/extremely difficult to palpate; extremely thick fat cover
Shape from behind	Clear to poor muscle definition under a thin to moderate layer of fat	Poor muscle definition under a moderate layer of fat	Rounded appearance; thick layer of fat	Rounded to square appearance; thick layer of fat	Square appearance; very thick layer of fat
Shape from the side	No abdominal tuck	Slight abdominal bulge	Moderate abdominal bulge	Severe abdominal bulge	Very severe abdominal bulge
Shape from above	Slight hourglass/straightening of waist with no hourglass indentation	Straightening of waist with no hourglass indentation and/or mild distension of the abdomen	Broadened back	Severely broadened back	Extremely broadened back

BFI system validated as a method to estimate body composition in overweight and obese cats<sup>14</sup>

Ideally, body fat composition in cats ranges from 15–24%.<sup>13</sup> It is important to note that many obese cats may exceed the body fat percentages applicable to current BCS systems (>45% body fat). Therefore, additional assessment of body fat index (BFI) may be warranted for overweight and obese cats (Table 2).<sup>14</sup> Utilizing this system of assessment allows clinicians to estimate body fat percentages in even the most obese cases; this in turn will aid both client communication (eg, your cat is 60% body fat and should ideally be closer to 20% fat) and estimations of ideal body weight using the formula:

$$(\text{body weight} \times [100 - \% \text{fat}]) / 0.8$$

**Muscle condition**

Muscle condition should be assessed and described separately from body condition score as cats may be overweight, yet suffer from muscle loss. Palpation of musculature over the skull, scapula, spine and wings of the ilia can be performed using a 0–3 point scale, with categories defined as severe muscle wasting

(0), moderate muscle wasting (1), mild muscle wasting (2) or normal musculature (3).<sup>15</sup> Patients with reduced muscle condition should receive further medical and nutritional evaluation to determine the etiology of muscle loss.

**Nutrition-responsive disorders**

Cats suffering from diseases that may benefit from dietary intervention should have an in-depth nutritional evaluation performed. Examples of medical conditions that warrant nutritional intervention are given in the box below.

**Examples of medical conditions that benefit from nutritional intervention**

- ❖ Chronic kidney disease
- ❖ Feline lower urinary tract disease
- ❖ Acute or chronic enteropathy
- ❖ Obesity
- ❖ Dental disease
- ❖ Cutaneous adverse food reactions
- ❖ Diabetes mellitus

**Body fat percentages applicable to current body condition scoring systems are insufficient for many obese cats. Additional assessment of body fat index may be warranted.**



## Assess the diet

Assessing the quality of a diet based on packaging claims, ingredient lists or the guaranteed analysis is difficult. The AAFCO has established standards and regulations regarding animal feed and so one method for assessing the quality of a cat food brand in North America is to look for an AAFCO statement on the package. Foods can either undergo a standard AAFCO feeding trial or be formulated to meet AAFCO nutrient requirements. Feeding trials are considered the gold standard because they test nutrient bioavailability.

In addition to reading the AAFCO statements, when available, before selecting a food brand the veterinarian and cat owner should also rely on company reputation and look for those with good quality control and safety measures. Calling manufacturers directly to determine the credentials of the persons formulating their diet and steps they take to ensure their diets meet post-production safety and nutrient requirements can provide insight into the quality level of the company. Ideally, individuals with advanced degrees or board certification in animal nutrition should be responsible for cat food formulations. Reputable companies will also provide full nutrient profiles of their products when requested.

Some owners prepare their cat's food themselves and do not feed commercially manufactured diets. Nutritional imbalances can have severe health consequences. Home-prepared diets for cats are often deficient in calcium, iron, zinc and vitamin E, and thiamine, which can result in bone fractures/deformities, anemia, skin disorders and neurologic disease, respectively.<sup>16</sup> If cat owners insist on feeding home-prepared diets, veterinarians should recommend consultation with a board-certified veterinary nutrition specialist. A list of ACVN and ECVN diplomates providing consultations can be found at [www.acvn.org](http://www.acvn.org) and [www.esvcn.eu/college](http://www.esvcn.eu/college), respectively.

Feeding diets containing raw meat ingredients is another popular trend that should stimulate veterinarians to have a more detailed nutrition discussion with cat owners. A comprehensive review of the pros and cons of raw food feeding in pets is available.<sup>17</sup> Briefly, the risks of feeding undercooked meat

## At this time, the documented benefits of feeding raw meat do not justify the potential health risks.



with pathogenic bacteria extend to both pets and human household members. At this time, the documented benefits of feeding raw meat do not justify the potential health risks. Assuming companies utilize good manufacturing practices, some processes that destroy bacteria without using heat, for example high-pressure pasteurization, may provide viable alternatives for cat owners wanting to feed raw meat-based diets. However, dehydration and freeze-drying methods are not effective for killing many forms of pathogenic bacteria.

**Table 4** Estimated daily kilocalorie requirements for adult cats

Ideal weight (kg/lb)	Obese-prone	Neutered	Intact
3/6.6	160	192–225	225–255
4/8.8	200	240–280	280–320
5/11	235	280–330	330–376
6/13.2	271	325–380	380–433
7/15.4	300	360–420	420–480

Estimated daily energy requirements of adult cats are calculated using resting energy requirements of (body weight [kg]<sup>0.75</sup>) \* 70 and multiplying by a lifestage factor of 1.0 for obese-prone, 1.2–1.4 for neutered and 1.4–1.6 for intact cats. Energy requirements for active weight loss may require a factor lower than 1.0. Note these are guidelines only and individual cats may need more or less energy to maintain ideal body condition

When assessing feeding management (see box below), it is also important to quantify current calorie content, especially for under- or overweight cats. The calorie content of cat food is now a labeling requirement of AAFCO and available on most company websites. Clients may be given a target calorie intake and asked to calculate their cat's food volume based on the labeled calories per cup or gram. Alternatively, a member of the veterinary team can calculate food volumes for the client. Table 4 lists estimated energy needs of cats based on their ideal weight.

## When assessing feeding management, it is important to quantify current calorie content, especially for under- or overweight cats.



### Influence of feeding and environmental practices

Dynamics within a household can greatly affect a cat's access to food and willingness to eat. Interactions with other pets can create competition for food. Cats with medical conditions requiring therapeutic diets may need restricted access to other food. Some environmental factors such as indoor housing and ad libitum feeding patterns appear more frequently in obese vs

lean cats.<sup>18–20</sup> If a cat has an ideal body condition and is fed free choice, this feeding strategy is acceptable. However, overweight and obese cats may benefit from meal feeding instead. Providing meals through puzzle and food-dispensing toys may be used as an alternative to traditional bowls as a method of environmental enrichment.<sup>21,22</sup>

## When is extended evaluation warranted?

Every cat should receive a basic nutritional assessment evaluating the criteria discussed above. If abnormalities or concerns are detected, an extended nutritional examination is warranted. Some examples of criteria that may trigger a more in-depth evaluation are given below.

### Criteria that might trigger an extended nutritional examination

#### Patient history

- ❖ Recent castration or spaying
- ❖ Gastrointestinal signs such as vomiting, diarrhea or anorexia
- ❖ Growing (<1 year) or geriatric (>12 years)
- ❖ Pregnant or lactating
- ❖ Change in body weight (up or down)
- ❖ Nutrition-responsive diseases (see box on page 445)
- ❖ Feeding unconventional diets (home-prepared, raw, etc)
- ❖ Use of dietary or herbal supplements

#### Physical examination

- ❖ Overweight or underweight based on BCS (Table 1, Figure 2)
- ❖ Muscle wasting
- ❖ Poor skin or coat quality
- ❖ Dental disease

#### Laboratory evaluation

- ❖ Presence of nutrition-responsive disease (see box on page 445)
- ❖ Anemia
- ❖ Hypoalbuminemia
- ❖ Abnormalities in glucose, creatinine, thyroxine or electrolytes



## Incorporating nutritional assessment into daily practice

Incorporating nutritional assessments into everyday practice is a team effort. Veterinarians, technicians and front desk staff should all work together to collect accurate information and provide clear recommendations.

Suggested steps for incorporating nutritional assessments into practice include:

- ❖ Mailing or emailing a nutritional history form with each appointment reminder.
- ❖ Requesting owners complete a nutritional history form prior to their visit or while in the waiting room.
- ❖ Having a veterinary technician review the nutritional history form with the owner and calculate current calorie intake.
- ❖ Placing the nutritional history into the medical record.
- ❖ Including a body condition and muscle condition evaluation and making nutritional recommendations during the veterinary consultation (written recommendations should be provided if the feeding plan is changed).
- ❖ Following up with the owner by a veterinary technician to ask if there are any questions about the feeding plan and to provide informational handouts, brochures, measuring cups, and so on, if required.
- ❖ Dispensing of recommended food by front desk staff, if sold within the hospital, and answering any remaining questions.
- ❖ Whenever new food is dispensed or recommended, having front desk staff or a veterinary technician call or email the owner a few days later to see if the changes are accepted.

### Resources for nutritional assessment

- ❖ WSAVA Global Nutrition Toolkit: [www.wsava.org/Guidelines/Global-Nutrition-Guidelines](http://www.wsava.org/Guidelines/Global-Nutrition-Guidelines)
- ❖ Freeman L and WSAVA Global Nutrition Committee. New tools for the nutritional assessment and management for critical care patients. *J Vet Emerg Crit Care (San Antonio)* 2015; 25: 4–5. DOI: 10.1111/vec.12277
- ❖ American College of Veterinary Nutrition: [acvn.org](http://acvn.org)
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**Incorporating nutritional assessments into everyday practice is a team effort, and veterinarians, technicians and front desk staff should all work together to provide clear recommendations.**

### KEY POINTS

- ❖ Nutrition affects the health of every cat.
- ❖ It is the veterinarian's responsibility to provide evidence-based nutritional assessments and plans for every patient at every visit. Otherwise, marketing and misinformation will guide cat owners' decisions, often to the detriment of their pet.
- ❖ To increase efficiency and reinforce messages, veterinary practices should approach nutritional assessments as a team.
- ❖ Every cat should receive a screening assessment, while those with nutritional risk factors require evaluation that is more detailed.



## Supplementary material

A series of videos that demonstrate the body condition scoring process for five cats with scores between 5 and 9 on a nine-point scale.

## Conflict of interest

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