

# Top 5 Pet Food Protein Principles

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Protein is an essential dietary component for cats and dogs. However, questions from pet owners about protein content in pet food can cause difficulties for clinicians. This is largely due to conflicting recommendations about how much protein is needed for certain life stages and specific medical conditions. Further, pet owner and veterinary attention is frequently drawn to the protein value provided on the food product label,

despite lack of a clear understanding about how that number is derived or should be communicated.

To have an informative discourse with pet owners and improve dietary recommendations, clinicians should understand the following 5 important points regarding dietary protein.

## TOP 5 PET FOOD PROTEIN PRINCIPLES

1. The crude protein number on a pet food product label is a calculated estimate.
2. Animals require essential amino acids, not protein, from their diet.
3. Protein adequacy can only be assured through standardized feeding trials or nutritional review.
4. Pet food protein recommendations are suggested ranges.
5. Protein recommendations for dogs and cats with various medical concerns differ. The decision to adjust dietary protein concentration should be based on current protein intake.

### 1 The crude protein number on a pet food product label is a calculated estimate.

Although the term *protein* is easiest to refer to on the product label, this term actually refers to a calculated estimate. As such, product labels typically list *crude* protein.

The protein number (% as fed) is based on a laboratory determination of the total nitrogen content of the food, which is then divided by the average nitrogen content of proteins (ie, 16%).<sup>1</sup> Not all

nitrogen content in a food/product is in the form of protein; dietary ingredients (eg, carbohydrates, fat, fiber, supplements) contain nonprotein nitrogen that contributes to the total estimate for crude protein. Pet food labels typically list only the guaranteed minimum crude protein, so this value should not be taken as the actual protein content in the product. Understanding how the crude protein value is determined and expressed on the product label should help reduce the emphasis placed on this number by pet owners when comparing products or as a determinant of diet quality.

### CONSIDER THIS

In 2007, a compound called *melamine* was added to wheat gluten and rice protein concentrate to presumably raise the crude protein content of those ingredients and achieve a higher sale price from suppliers.<sup>2</sup> Melamine contains 67% nitrogen by weight but no protein.<sup>3</sup>

## 2 Animals require essential amino acids, not protein, from their diet.

Specific essential amino acids (not dietary protein) are required by each species to support growth, maintenance, gestation, and lactation and to avoid disease. After consumption and digestion of dietary proteins, animals use the essential amino acids and synthesize nonessential amino acids for serum proteins, muscles, and other necessary nitrogenous compounds the body requires. The crude protein number on the pet food label does not provide any information regarding concentration, ratio, or digestibility of the essential amino acids in the product.

It is important for clinicians to understand and explain to pet owners that there is no “perfect” protein ingredient for dogs or cats. In fact, a variety of protein ingredients are needed to meet the essential amino acid requirements. Therefore, pet food products may have individual synthetic amino acids (eg, methionine, taurine) added to

meet unique feline or canine requirements when the protein ingredient(s) is low or devoid of essential amino acids.

### CONSIDER THIS

A dry pet food with a product label minimum crude protein of 35% exceeds that recommended for both canine and feline growth; however, if the product does not contain the essential amino acid taurine or a sufficient concentration of arginine, a puppy will do poorly and a kitten will not survive. The crude protein number reveals nothing about taurine or arginine content. High-protein foods do not necessarily meet essential amino acid requirements any better than do low-protein foods.

## 3 Protein adequacy can only be assured through standardized feeding trials or nutritional review.

The nutritional adequacy of a product (and its protein) can be evaluated through standardized animal feeding trials, which measure protein bioavailability. The Association of American Feed Control Officials (AAFCO) is often cited for its published feeding protocols.<sup>4</sup> A food fed for 6 months as the sole diet to adult dogs (and with certain biologic criteria met) is allowed the claim of “nutritionally complete and balanced as substantiated by feeding studies.”<sup>4</sup> Identifying this statement on a product label should provide pet owners additional assurances regarding overall product quality, as it verifies through standardized testing that the amino acid content was bioavailable and adequate for a healthy pet outcome. None of these assurances can be made through the crude protein number.

Veterinary nutritionists often disregard the crude protein value listed on the pet food product and instead focus on amino acid content, which they will calculate as a percentage of the essential amino acid recommendations suggested by the National Research Council (NRC) or AAFCO for

the various life stages (growth, gestation/lactation, maintenance).<sup>5</sup> Listing specific amino acid information is not possible on pet food labels due to space constraints. However, pet food manufacturers can choose to list amino acid content online or in company product guides.

## 4 Pet food protein recommendations are suggested ranges.

Dietary protein concentrations recommended by NRC and AAFCO include a margin of safety to account for known negative ingredient interactions, losses, and bioavailability uncertainties across the variety of ingredients used by manufacturers.

NRC has 2 types of nutrient recommendations: minimum requirements (MR; ie, the amount needed if the nutrient is readily bioavailable to the animal) and recommended allowances (RA; ie, the greater amount needed when bioavailability is reduced by known food interactions). The RA value is equal to or higher than the MR value; for example, although the NRC protein MR for healthy adult cats is 40 g/Mcal, the RA is 50 g/Mcal because dietary protein sources are not 100% bioavailable from the food (*Table*).

AAFCO, which operates independently of the NRC, generally has a wider safety margin on pet food protein content for adult dogs and cats (*Table*).

Neither NRC nor AAFCO values should be mistaken as the minimum requirement for an animal, nor should they be interpreted as optimal. Multiple factors can impact desired protein content (eg, food digestibility and amino acid content, individual variation, disease processes), and an understanding of terminology and requirements is needed before veterinarians make a protein determination for a specific patient.

There is a wide range in protein values (15%-60% dry matter basis) listed and recommended by various pet food companies, even for similar products intended for the same life stage and sold by the

same company.<sup>5</sup> These values are typically higher than those recommended by NRC and AAFCO, even though increased protein is neither better nor is there a demonstrated nutritional need for it.

### CONSIDER THIS

A patient with high BUN but normal creatinine (and SDMA) and normal kidney function on urinalysis is eating an unnecessarily high protein (>30% dry matter basis) diet relative to its need. The pet's BUN indicates that the excess dietary protein is being metabolized to urea by the liver and then excreted from the body via kidneys, demonstrating that feeding excess (ie, unneeded) dietary protein is readily eliminated from the body within hours of consumption. Because protein ingredients are a major determinant of pet food price, the unnecessarily high-protein products will cost more to feed.

### TABLE

## CURRENT NRC & AAFCO CRUDE PROTEIN RECOMMENDATIONS

	NRC Crude Protein Minimum Requirement (MR) in g/Mcal	NRC Crude Protein Recommended Allowance (RA) in g/Mcal	AAFCO Crude Protein in g/Mcal
Canine Adult	20	25	45
Canine Growth	45	56	56
Feline Adult	40	50	65
Feline Growth	45	56	75

## 5 Protein recommendations for dogs and cats with various medical concerns differ. The decision to adjust dietary protein concentration should be based on current protein intake.

In many cases (eg, weight loss, osteoarthritis, feline diabetes, feline hyperthyroidism, senior pets with decreased protein metabolism), a protein level above AAFCO recommendations may be desirable.<sup>6,7</sup> In contrast, there are medical conditions for which protein levels closer to NRC RA or MR would be helpful (eg, late-stage liver or renal disease).<sup>8</sup> Clinicians should understand that for any medical condition, increasing or decreasing protein intake should be relative to the patient's current protein intake—not relative to NRC or AAFCO values. This underscores the significance of a dietary history.

Of importance, neither NRC nor AAFCO recommend specific nutrient levels for medical or health-related conditions. Recommended amounts of specific nutrients of concern (eg, fat, potassium) for medical conditions are typically set by nutritionists and allied specialists and are based on known specific disease processes. Thus, the recommended dietary concentrations for particular medical conditions will vary among pet food manufacturers and individual specialists.

For example, low-protein therapeutic diets (eg, those marketed for kidney conditions, liver conditions, or uroliths) designed for long-term feeding typically are at or above the NRC crude protein RA<sup>9</sup> and use highly digestible (>80%) ingredients with good amino acid profiles (eg, egg, liver, whey). This is done intentionally to ensure that essential amino acid needs are met while offering a lower total nitrogen (ie, crude protein) load to reduce impact on various body organs.

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### CONSIDER THIS

Diets with 10% dry matter protein that are properly formulated to first meet the essential amino acid needs have been safely fed to dogs for decades with poor kidney or liver function (eg, IRIS Stage 4, Dalmatians with urate urolithiasis, dogs with hepatic encephalopathy).

### Conclusion

There is no single “perfect” protein value for all pets or life stages. The following tips and an awareness of concurrent medical concerns can help guide an appropriate veterinary team response to common pet owner queries about protein needs:

- Suggest a range of crude protein values rather than a specific number based on the pet's life stage according to NRC (RA) or AAFCO recommendations. It may be helpful to emphasize to pet owners that high protein intake has not been shown to be medically superior in healthy pets. High dietary protein intake does not increase muscle mass in the absence of exercise.
- Explain the difference between food products that meet current recommendations through feeding trials and nutritional review versus those said to meet nutrient levels through analytical methods.
- Examine the patient, noting the current diet's crude protein value, and assess muscle mass and serum total protein, albumin, WBC and RBC counts, and hemoglobin. This information (if within normal limits) will suggest adequate protein intake.

In addition, asking pet owners about their concerns regarding protein concentrations can lead to further discussion about nutrition and will emphasize the shared goal of maximizing pet health. ■

See page 65 for references.



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