Ingredients: Where Pet Food Starts

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Every clinician is asked "What should I feed my pet?" Understanding the ingredients in pet food is an important part of making the best recommendation. Pet food can be as simple as one ingredient or as complicated as containing more than 60 ingredients. Pet food and its ingredients are regulated by the Food and Drug Administration and state feed officials. Part of that regulation is the review and definition of ingredients. Existing ingredients change and new ingredients become available so the need for ingredient definitions grows. Ingredients for product formulations are chosen based on their nutrient content, digestibility, palatability, functionality, availability, and cost. As an example, a typical, nutritionally complete dry dog food with 42 ingredients is examined and the ingredients are discussed here. Safe, healthy pet food starts with safe ingredients sourced from well-monitored suppliers. The ultimate goal of both veterinarians and pet food manufacturers is the same—long healthy lives for dogs and cats.

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Every animal visiting a veterinary clinic has eaten some form of food. Ideally, every veterinary record should include a complete detailed diet history for the animal. Since nutrition is critically important to the health of animals, veterinarians must understand what the animal has been fed. Pet food products are those that provide "taste, aroma or nutritive value," for dogs and cats.[1] From a regulatory perspective, pet food is a subset of animal feed.

Ingredients are the building blocks for pet foods. Pet food can be one simple ingredient, such as a treat of freeze-dried salmon, or as complicated as a complete and balanced food containing in excess of 60 separate ingredients. Pet food is a collection of many inputs from many sources with one output, which goes into the home to be fed to the pet cat or dog.

The earliest record of dogs living with humans is 14,000 BC in Germany.[2] The domestication of cats is more recent, but they still have spent significant time eating the food that humans provide them. While dogs are classified in a branch of *Carnivora*, they are more closely related to omnivores like bears. Dogs are opportunistic carnivores. Cats, on the other hand, are considered strict carnivores with special biochemistry that requires specific essential nutrients from animal-based ingredients, such as arachidonic acid and taurine. Each pet is unique and each has a unique owner with his/her own set of food beliefs. Many owners seek advice about what to feed their pet from their veterinarian. Each owner then goes home to implement all or part of that advice based on their own food beliefs. So not only do the needs of the pet influence the veterinary recommendations, but so do the preferences of the owner. Knowledge of pet foods and their ingredients help provide for the best recommendation and the best explanation of that recommendation possible.

Regulation

Ingredients currently are defined and allowed for use in pet foods via review by the Food and Drug Administration (FDA) or by the Association of American Feed Control Officials (AAFCO) Ingredients Definition process.[3] In 2007, the US Congress mandated the federalization of pet food ingredient definitions and standards with the requirement to include input from AAFCO and other relevant stakeholders, including veterinarians.[4] While the exact nature of these standards and definitions cannot be predicted, the current AAFCO system will certainly be considered, and significant parts of it will likely be incorporated.

Pet foods are made with ingredients previously defined and allowed by these agencies. However, new ingredients can be allowed following submission of data to the FDA or AAFCO. The length of time from this submission until an ingredient is added to the list of allowed ingredients can be several years.

The AAFCO Official Publication cannot contain all the possible ingredients and thus includes language for acceptance of ingredients reviewed by the FDA, as well as those known as "common and usual terms," such as wheat, oats, beef, water, etc.[3] The earliest adoption of an ingredient definition was 1928 and ingredients are added every year. New ingredients come with new crops, such as low erucic acid rapeseed (canola) and from new processing technologies, such as selenium yeast. Older definitions are sometimes amended but broad-scale revamping of definitions is unlikely due to the extensive use of the ingredient definitions in inter-

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national and contractual trading agreements. Definitions written in the detailed language of regulation are not always understandable to people outside of the industry. This results in some of the bewilderment surrounding pet food ingredients. Table 1 contains various AAFCO ingredient definitions along with simpler explanations.

What Is this Ingredient and Why Is It in my Pet's Food?

Many veterinarians and consumers alike want to know what an ingredient "really is" and why it is in the pet food. A product development scientist considers the following factors for each ingredient: nutrient levels; functionality; palatability; digestibility; availability; and cost. Every ingredient has to be safe and result in a safe finished product. Every ingredient in a pet food is included for a purpose. The ingredient has to deliver the right nutrition with the right functionality (eg, chicken for protein, moisture for water balance and processing), be palatable, be digestible, be available year round, and still allow for the product to be profitable. The claim that pet food contains "fillers" is erroneous. There is no room in a pet food formula for any ingredient that is added just to fill space. As noted above, every ingredient provides some dietary benefit or has a function in the food.

A pet food can be a single ingredient treat or a highly complex, 60-plus ingredient complete product. A product development scientist knows the various attributes of the ingredients and works to combine them to meet the finished product specifications. Each type of product: wet (cans, pouches, trays), dry (kibble, biscuits), or soft moist (kibble, burger); and every processing method: retorting, baking, or extrusion, need different ingredients and have differing effects on the ingredients. Consider the most common of pet foods: a dry dog food. The product is typically made via the process of extrusion. Extrusion is a rapid cooking process that uses a combination of heat, pressure, and steam to quickly cook the ingredients, sterilize the product, and form a structure from the ingredients via expansion (like bread rising), creating a final product ready to be dried and coated.

By law, the label of each product must include an ingredient list that shows the ingredients in descending order of inclusion by weight. A typical ingredient list for a dry dog food is given in Table 2A. The ingredients must supply the nutrients required to meet the guaranteed nutrient analysis and provide the proper nutrition for the intended use of the product, which in this case is all life stages of the dog. This example contains 42 ingredients.

In selecting ingredients, the product development scientist first seeks readily available ingredients that supply the different nutrient categories: protein, carbohydrates and fiber, fat, vitamins, and minerals. There are many ingredient options available. The scientist, in collaboration with the nutritionist, must balance the nutrients and be sure that they are all supplied in the proper amounts for the intended use of the product. The scientist must make sure that the product will be stable for its shelf life. When specialty ingredients are used, such as inulin or beneficial bacteria, or when nutritional modifications are needed to manage pets with diseases, the product development considerations become even more complicated.

Sources of Vitamins and Minerals

A commonly asked question is: what are all those chemical-sounding names? In most cases, they are the vitamin and mineral sources. The AAFCO Nutrient Profiles contain 23 and 25 essential vitamins and minerals for dogs and cats, respectively.[3] Usually they are provided to the product via a prepared "packet" called a premix. This is the multivitamin/mineral of the complete food. While vitamins and minerals are added in very small amounts, they account for close to half of the ingredients in a pet food and are the longest part of the ingredient statement. Removing the vitamins and minerals from the original 42 ingredients listed in the ingredient statement in Table 2A, the list now contains 16 ingredients as shown in Table 2B. There are only two or three "chemical-sounding" names remaining in the list. Two of those are essential amino acids: lysine and methionine.

Sources of Protein and Amino Acids

The three largest nutrient components of pet food are protein, carbohydrate, and fat. There are many combinations of protein sources that deliver a balanced amino acid profile. Think of the spectrum of combinations between the human who eats steak and the vegan. Both can get a proper balance of amino acids in their diets through the use of various ingredients. The protein sources in the example are as follows: poultry byproduct meal, corn gluten meal, meat and bone meal, and soybean meal, with some contribution of protein from whole corn, whole wheat, barley, rice, animal digest, and the amino acids. This mixture of ingredients provides the amino acids not only for the desired amount of crude protein (in this case, 21% minimum), but for the proper balance of essential amino acids. In a wet product, typical protein sources would be meats and meat byproducts, poultry and poultry byproducts, and fish and fish byproducts. Plant protein sources are sometimes used in wet foods but to a lesser extent.

The description, "byproducts," in pet food has been the center of some controversy. Some Internet sites and some packages claim that their products contain no byproducts, implying that byproducts are bad for pets. The truth is that the word "byproducts" can apply to a vast array of useful ingredients from many sources. Plant byproducts include flours, meals, glutens, grits, and oils.

Animal byproducts are simply the parts of animals that "we" (in this case, most of the meat consuming public in the US) have decided not to eat, primarily organ meats (see Table 1). In the United States, we rarely consume the wide variety of organ meats (liver, hearts, kidneys, tripe, etc) that other cultures consider delicacies. There is a lot more to a cow than hamburger and to a chicken than chicken breasts.