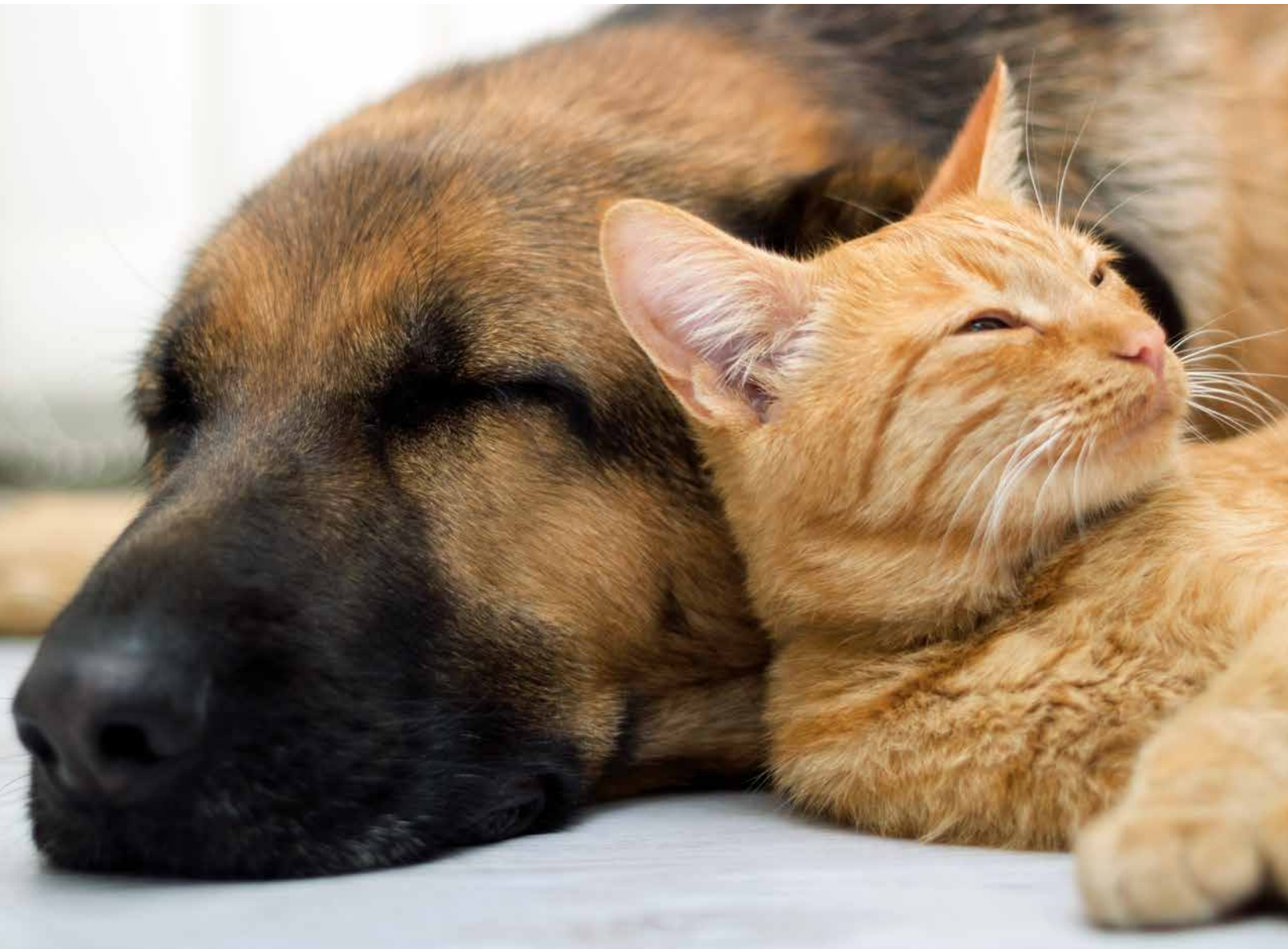


Soybean Use – Companion Animals



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Pet Food Industry Profile

In 2002, the global market for pet food and pet care products was valued at \$46 billion, up 2.6 percent from the previous year. This translates into nearly 17 million tons of food produced annually (Crossley, 2003). Sales in North America were responsible for 41 percent of the global market value (39 percentage units of that from the United States). Western Europe accounted for an additional 30.5 percent of the global market, and Japan another 13 percent (Crossley, 2003). In regard to animal numbers, 2001 estimates indicate that 67 million dogs and 65 million cats were owned by Americans (Anonymous, 2002).

The continued expansion of the industry is driven by increased pet populations, increased spending per pet and an increased use of prepared pet foods

and treats in both developed and emerging nations. Premium dog and cat food sales have experienced dynamic growth in the three regions of the world listed above, but economy and mid-priced foods continue to have a large customer base. Consumers who are cost-conscious regard these foods as being of sufficiently high quality to ensure adequate nutrition. In addition, many of these foods are formulated based on lifestage/lifestyle concepts previously available only within the premium food sector. In terms of volume, sales of these foods are higher than those of premium foods (Crossley, 2003).

Pet Food Ingredients

The two main categories of food ingredients used by the pet food industry include grains

and milling byproducts and animal tissue byproducts from the meat packing, poultry processing, and fish canning industries (Morris and Rogers, 1994). To achieve adequate dietary concentrations of essential amino acids, several ingredients with high crude protein concentrations are included in pet foods. Meat meals, meat and bone meals, poultry meals, poultry byproduct meals and soybean proteins (meal, concentrate, isolate) added in varying concentrations to complete diets are major protein sources used in pet foods.

Soy in Pet Foods

Soybean products used in pet foods include soybean meal, soy flour, grits, hulls, soy protein concentrates and isolates and textured vegetable protein. Their composition is presented in Table 1, as reported in Grieshop and Fahey (2000).

Table 1 | **Chemical Composition of Soybean Products Used in Pet Foods**

SOYBEAN PRODUCT	Crude protein	Fat	Crude fiber	Neutral detergent	Gross energy
	% as-is basis				kcal/kg
Full fat soy flour	38.9	20.9	----	----	5,227
Grits	49.3	2.6	3.0	----	4,019
Hulls	11.0	1.9	36.4	58.0	3,980
Isolated soy protein	84.3	0.5	0.1	----	5,370
Meal, solvent-extr.	44.6	1.4	6.2	13.5	4,150
Protein concentrate	65.8	1.5	2.6	----	4,520
Textured soy protein	48.8	2.7	----	----	3,967



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Soy products are commonly included in companion animal diets as a source of crude protein and (or) amino acids.

Their benefits include:

- ① They are an economical source of protein;
- ② They are readily available and of consistent quality;
- ③ They are palatable to the animals as demonstrated using standard palatability tests;
- ④ They have a balanced amino acid profile that complements the amino acid pattern of cereals like corn;
- ⑤ They improve diet texture;
- ⑥ In vegetarian diets, they can serve as the major protein source;
- ⑦ They serve as a source of dietary fiber; and
- ⑧ One in particular (textured soy protein) retains its appearance (i.e., looks like meat) after canning.

Disadvantages associated with the feeding of soy products to cats and dogs include:

- ① They have a negative image on the part of the pet owner;
- ② They contain anti-nutritional factors such as trypsin inhibitor (inactivated by extrusion and canning) and oligosaccharides, the latter being responsible for increased production of flatulence;
- ③ They have low methionine and cysteine concentrations;
- ④ Their use may increase the taurine requirement of cats;
- ⑤ Their use results in more voluminous and higher moisture feces;
- ⑥ Some animals may exhibit an allergic reaction to soy protein;
- ⑦ Soy protein may reduce trace mineral availability because of its phytate and fiber concentrations; and
- ⑧ Soy product inclusion in diets may provide excessive quantities of soluble dietary fiber (modified from Hill [1995]).

Bioavailability of Soy Protein in Pet Foods

Using the ileal cannulated dog model, three studies conducted at the University of Illinois showed that diets containing soy protein resulted in equal or higher amino acid bioavailability than did those containing animal protein sources.

Zuo et al. (1996) fed diets to dogs that contained poultry meal as the principal protein source, or diets in which soybean meal replaced 50 or 100 percent of the protein from poultry meal. Ileal digestibilities of most individual amino acids, total essential amino acids, and total nonessential amino acids increased as soybean meal replaced poultry meal.

Bednar et al. (2000) fed soybean meal, poultry meal, poultry byproduct meal and beef and bone meal as the major protein sources in diets of ileal cannulated dogs. Ileal amino acid digestibilities were similar for dogs fed diets containing soybean meal and the two rendered poultry products, but were slightly lower when dogs were fed the beef and bone meal-containing diet.

Clapper et al. (2001) studied the effects, including several soybean protein sources (soybean meal, soy flour, soy protein concentrate, extruded soy protein concentrate and a modified molecular weight soy protein concentrate) and poultry meal in diets on ileal amino acid digestibilities. Total amino acid, total essential amino acid and total nonessential amino acid digestibilities were higher for soybean meal, soy flour and soy protein concentrate-containing diets than for the poultry meal-containing diet.



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Summary Comments

Soybean protein has been shown to be of high quality when evaluated in complete and balanced diets fed to dogs and cats. It is inadequate in sulfur-containing amino acids, so other protein sources or supplemental amino acids must be added to pet foods containing soybean products to achieve proper amino acid balance. Soybeans contain many anti-nutritional factors but, fortunately, extrusion and canning conditions inactivate most of them. However, the oligosaccharides — stachyose, raffinose, and verbascose remain in soybean products such as soybean meal. In addition, the fiber fraction of the plant travels with these products as well. It is not well established exactly how much flatulence results from the presence of the soy oligosaccharides in pet diets, but there is no question that the feces from animals fed soy products contain greater moisture concentrations and is more voluminous. This may be the greatest obstacle in promoting the benefits of soy product inclusion to pet owners. Many health benefits have been attributed to soy consumption by humans, but these have not yet been studied using the companion animal.



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