



Soy Ingredients in Dog Food and Treats

Final Report

September 2024

This report was issued in fulfillment of Project No. 10-30-01-24033 for the Minnesota Soybean Promotion and Research Council.

AURI Reference: 24012

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Executive Summary

The future of soy products in dog food is promising, driven by economic factors such as a potential surplus in soybean meal due to increased soybean processing capacity, sustainable aviation fuel demand, and innovative soy by-product processing methods. This presents a significant opportunity for the dog food industry to diversify and cater to changing preferences.

Information collected through primary and secondary sources shows that the dog food market is divided into two parts – meat-based and vegetarian. Blue Buffalo pioneered the meat-based segment, focusing mainly on wolves and their need for high-quality meat. Blue Buffalo's recipe philosophy is real meat first, NO poultry by-product meals, and NO corn, wheat, or soy. Many brands have promoted "no grains, no corn, no wheat, no soy." In doing so, they have effectively stigmatized these ingredients and refocused pet owners' attention away from the omnivore diet from which dogs can benefit. Further, many premium pet food brands consider grains to be cheap filler ingredients with low nutritional value.

Many pet owners view their animals as family members and desire to feed them human-grade food because they view their dogs' dietary needs similarly to human needs. Longer, healthier lives, better gut health and digestion, and weight control are high priorities for dog owners. Soy has definite advantages for weight control, gut health, and digestion. Further, soy may have some benefits for supporting longer, healthier lives, given the popularity of plant proteins in human foods (e.g., tofu, edamame, soy proteins in meat substitutes.)

Post-pandemic, premium meat-based dog food sales are slowing. Inflationary cost increases are causing pet owners to pull back on premium meat-based dog foods. However, owners do not seem price-sensitive for special occasion treats. Healthy, high-protein baked treats may be an opportunity area for soy products.

Dog food manufacturers presently see soy products as a source of protein that can be used to balance nutritional formulations. Soy protein is highly digestible and is used extensively in premium dog foods formulated for sensitive stomachs or dogs with digestive issues. Soy is also used in lower-cost dog foods. Soybean meal could be used to create healthier, high-protein special occasion treats. Soybean meal can replace chicken, beef, lamb, and feather meals.

Soy oils with flavorings could be positioned to coat kibble, potentially extending the shelf life of dry dog food longer than products coated with beef or chicken fat. Soy oils, rich in Omega 3 and Omega 6 fatty acids, could be positioned as an anti-inflammatory ingredient benefiting skin, hair, and joint health. Soy oil can potentially replace chicken fat, beef tallow, and fish oil.

Soy hulls could be positioned as a fiber ingredient that produces less abdominal gas in pets. Hulls contain additional protein and sugars that could function as a prebiotic to stimulate canine gut flora. Rich in magnesium, soybean meal could be positioned as a calming agent for use in supplements. Soy hulls could replace fruit and fruit pulp or cellulose/cellulase products.

Enzymes and hydrolyzation offer interesting new frontiers that improve the palatability and flavor of soybean meal. Processing methods can dramatically decrease the size of peptide particles, eliminating allergy concerns. Although it is currently not economically viable to use protein isolates in dog food, future developments may change this. Potentially lucrative opportunities may exist to create new Association of American Feed Control Officers (AAFCO) categories for hydrolyzed soy products, as has happened with corn ingredients.

Key sources of dog food information include veterinarians, breeders, pet food retail personnel, and social media. Of these channels, veterinarians may be the first audience to tackle the benefits of soy products. Other audiences will be influenced by veterinary research. An example is the high awareness of veterinarians surrounding an extremely small sample dog study on cardiac issues resulting from eliminating grains from dog diets.

Because dog food prices are increasing, there is a bright opportunity for soy to grow as a protein source that is lower priced than meat, poultry, feather meals, or corn gluten. Presently, soybean meal constitutes approximately 5 percent of the ingredients in dog food and, in 2021, was less than one-third the volume of corn used. Despite making up one-quarter of the ingredient mix, meat and poultry products are the most expensive pet food components. Further, meat and poultry products are more than double the cost of products such as corn or soybean meal.

Acknowledgments

AURI gratefully acknowledges the Minnesota Soybean Research and Promotion Council for supporting this project and Mike Reiber of Axiom Marketing Communications, Inc., for his work on the soybean meal dog food assessment.

Project Goals and Tactics

The following is a summary of the project goals and tactics, which summarizes the outline of the report.

GOAL 1: Identify and assess market opportunities for soybean-based ingredients within the dog food, treat, and pre/probiotic industry.

- **OBJECTIVES**

1. Characterize dry pet food and treat markets (size, growth rates, needs)
2. Characterize wet pet food and treat markets (size, growth rates, needs)
3. Characterize refrigerated/frozen pet food and treat markets (size, growth rates, needs)

- **TACTICS**

1. Conduct a U.S. macro volume estimate for soybean-based ingredients. Breakdowns are dry, wet canned, and wet refrigerated/frozen.
2. Market analysis and channel analysis study to determine how much dog food is sold in the United States. Breakdown by dry, wet, and refrigerated/frozen.
3. Conduct five to seven interviews with dog food ingredient suppliers, dog food or treat manufacturers, or land grant Institutions/private formulation labs to determine attitudes toward soybean-based ingredients.
4. Leverage partnerships with three ingredient manufacturers already selling soybean-based ingredients to determine novel ingredient uses within the dog food, treat, and pre/probiotic industry. Knowledge from conversations and meetings will further outreach efforts.

GOAL 2: Analyze soybean-based ingredients in dog food, treats, and pre/probiotics.

- **OBJECTIVES**

1. Identify manufacturers that are utilizing soybean-based ingredients.
2. Examine formulations and ingredients to determine what could be replaced with soybean-based ingredients.
3. Model potential pricing advantages for soybean-based ingredients.

- **TACTICS**

1. Review nine different dry foods by content – three low-end, three medium-priced, and three high-end.
2. Review six different wet or refrigerated/frozen foods by content – one low-end, one medium, and one high-end canned. One low-end, one medium, and one high-end refrigerated or frozen.
3. Identify ingredients in formulations that can be replaced with soybean-based ingredients.

GOAL 3: Prepare a written report on ingredient potential and utilization avenues.

- **OBJECTIVES**

1. Identify utilization opportunities and barriers for the inclusion of soybean-based ingredients.
2. Prioritize target utilization opportunities.
3. Conduct outreach on the results.

- **TACTICS**

1. Identify utilization opportunities and barriers for soy-based ingredients and summarize the findings.
2. Identify two to three ingredients and product lines with the greatest potential for soybean-based ingredient inclusion.
3. Create a sell sheet on the opportunity to use soy as an ingredient for dog food, treats, and pre/probiotics.
4. Conduct outreach on results.

Goal 1: Identify and assess market opportunities for soybean-based ingredients within the dog food, treat, and pre/probiotic industry.

Tactic 1: Macro Volume Estimate for Soy Ingredients in Dog Food

Axiom Marketing conducted a macro volume estimation to characterize the volume and make-up of dog food in the United States. It was decided to forgo the inclusion of frozen/refrigerated dog food products for this section as, during an early investigation, it became clear that that sector did not use soybean ingredients much and that efforts towards other markets were more beneficial to the report. This section contains highlights of interest found during the analysis.

- The dog and cat food industry in the U.S. is valued at \$1.4 billion and uses 8.65 million tons of ingredients annually (Pet Food and Ingredient Analysis, 2020).
- Major pet food ingredients include the following categories: (Pet Food and Ingredient Analysis, 2020.)
 - 4.042 million tons of farm and mill-based (grains, oilseeds, processed grains, dairy, eggs, forages, fruits, herbs, nuts, root crops, sweeteners, tree oils, and vegetables). Mill-based is a process whereby raw materials are turned into pet food in various forms. (J-Six Enterprises, 2022)
 - 2.12 million tons of meat and poultry products
 - 1.54 million tons of rendered protein meals
- Farm and mill-based products comprise 46.8 percent of the ingredient tonnage but only 20.1 percent of the value. Meat and poultry products comprise 24.6 percent of tonnage but represent 46.7 percent of the value. (Pet Food and Ingredient Analysis, 2020.)
- Mill-based products, such as whole grains, account for 1.86 million tons, valued at \$297.4 million. Soy products comprise 534,000 tons at \$182 million (Pet Food and Ingredient Analysis, 2020.)
- U.S. pet food Ingredient usage in 2021: (Petfood Industry, July 26, 2023.)
 - 1.4 million tons of corn
 - 414,090 tons of other grains
 - 494,739 tons of soybean meal
- Other ingredients used in pet food include: (Pets International Study 2023)
 - Whole grains 21.6 percent
 - Chicken 9.9 percent
 - Meat and bone meal 7.3 percent
 - Corn gluten meal 5.5 percent
 - Soybean meal 5 percent

- Plant-related dog food ingredient volumes for dog food include the following (Pet Food and Ingredient Analysis, 2020)
 - 991,819 tons of corn,
 - 344,751 tons of soybean meal
 - 235,353 tons of corn gluten meal
- For dog food product labels, chicken, chicken fat, and chicken meal are the top three most frequently used animal ingredients. The top three most used plant ingredients that appear on ingredient lists are flaxseeds, peas, and carrots. (Pet Food and Ingredient Analysis, 2020.)
- Pet food manufacturers have begun including quinoa, spelt, sorghum, millet, and barley in recipes. Touted as “ancient grains” to differentiate from corn and soy. These products are sources of carbs and contain a quality mix of plant-based proteins. Ancient grains contain less than 25 percent protein compared to corn gluten and soybean meal, which can contain 30-80 percent protein depending on processing (Pets International Study 2023.)
- Pet food is manufactured in 42 of 50 states. (Pet Food and Ingredient Analysis, 2020.)
- Pet food ingredients are sourced from broad geographic and often multi-state areas. The leading states for farm and farm-product processing sales to pet food manufacturers include Missouri (\$999 million), Kansas (\$574 million), Pennsylvania (\$571 million), Iowa (\$422 million), and Ohio (\$367 million). (Pet Food and Ingredient Analysis, 2020.)
- Minnesota has 29 pet food facilities that utilize 84,855 tons of farm products worth \$72.8 million. (Pet Food and Ingredient Analysis, 2020.)

Summary and Implications

1. Soybean meal constitutes more than 5 percent of the ingredients in pet food.
2. Soybean meal volume in 2021 was less than one-third of the total corn used.
3. Farm and mill-based products constitute nearly half of the ingredient volume but only 20 percent of the cost.
4. Meat and poultry products are the costliest components of pet food despite making up one-quarter of the ingredient mix. They are more than double the cost of farm and mill-based products.
5. There is an opportunity for soy meal to provide lower-priced protein than meat, poultry, and corn gluten.
6. Widespread pet food manufacturing facilities in or near soybean growing areas could bode well for soy as an ingredient.

Tactic 2: Market and Channel Analysis for Dog Food Sales

Axiom conducted a market and channel analysis of dog food sales. The highlights were broken down into categories and are listed below. The categories were Sales Stats, Pet Ownership and Pet Owners' Spending, Desired Health Benefits, Consumer Preferences, and Pet Supplements and Treats.

Sales Stats

- Global pet food sales are expected to grow to \$133.18 billion in 2023, and U.S. pet food and treat sales are expected to reach \$53.2 billion by the end of 2023, down from \$58.1 billion in 2022. The growth rate for pet food from 2018-2023 was 37.3 percent. (State of the U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)
- Global vegan pet food is set to more than double from \$26 billion in 2022 to \$57.4 billion in 2032. According to Future Market Insights (FMI), this sector has expanded faster than the conventional pet food industry due to a greater focus on climate-friendly food post-pandemic. (Pets International Study 2023.)
- According to FMI, the global plant-based dog food market was valued at \$12.2 billion in 2021. Expected sales are set to rise by 6.9 percent in the next decade. Between 2016 and 2020, growth expanded by 4.7 percent. Kibble commands the highest vegan market share at 25 percent. Puppies account for 54 percent. (Pets International Study 2023.)
- Bloomberg Intelligence predicts the total U.S. pet market will achieve \$195.6 billion in sales by 2030. Pet spending in 2022 was up nearly 11 percent from 2021, mainly due to higher-than-anticipated inflation. Spending will remain steady in 2023. (U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)
- Global pet food as a category will still be the leader in growth potential versus other categories (healthcare, non-essential supplies, luxury, etc.) in 2023. Nielsen IQ predicts growth at 6-8 percent. (Pets International Study February 2023.)
- Americans spend the most on pet food per capita versus other countries. The compounded annual growth rate (CAGR) for the Americas (North, Central, and South America) is estimated at 3.2 percent from 2013-2026. North and South America accounted for 51 percent of revenue. (Statista 2021 report.)
- U.S. dry dog food sales between June 2022 and June 2023 increased by 19.7 percent. U.S. Wet dog food sales increased 12.5 percent. Dog treat sales increased by 12.8 percent. (State of the U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)
- The cost of pet food is up 11 percent from 2023. Premium dry dog food is losing share. Growth in non-premium pet food sales slowed to 14.8 percent in Q2 2023. (Wall Street Journal, September 12, 2023.)

- General Mills comments that owners are trading down or looking for smaller-size packaging options. Part of the shift has to do with supply-chain challenges that disrupted the pet food industry during the pandemic, forcing the consideration of alternatives (Wall Street Journal, September 12, 2023).
- Net sales for the General Mills pet food segment were down 3 percent to \$624.5 million in the third quarter of FY 2024. Gains in wet pet food partially offset Q3 declines. (Pet Food Processing, March 27, 2024.)
- Pet food and product retailers like Petco and Chewy are seeing a shift among some consumers toward value-driven spending. Smucker's, which in April sold several pet-food brands to Post Holdings, including Rachael Ray Nutrish, 9Lives, and Kibbles 'n Bits, said last month that their net sales in the U.S. pet foods segment dropped 40 percent or \$288 million compared with the prior year. (Wall Street Journal, September 12, 2023.)

Summary and Implications

1. Post-pandemic, premium meat-based dog food sales are slowing. Inflationary cost increases are causing consumers to reduce their purchases of premium meat-based dog foods.
2. Vegan/plant-based food is growing; total global market figures constitute >20 percent of the overall market.
3. There is an opportunity for soy meal as a cheaper protein source that may be more acceptable to consumers, given inflationary concerns and budget tightening.

Pet Ownership and Pet Parent Spending

- 66 percent of U.S. households own a pet. For the first time, the number of Gen Z and Millennial pet owners equals the number of Gen X and Baby Boomer pet parents. (State of the U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)
- Gen X pet parents spend the most on their pets annually at \$949, followed by Baby Boomers at \$842. Millennials spend \$679, and Gen Zers spend \$369 annually. (U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)
- 54 percent of Minnesota households own pets, and 35.5 percent own more than one dog. (Pet Ownership Statistics by State 2024.)

Summary and Implications

1. Treats seem to be popular among many age segments.
2. Healthier (and more expensive) protein-based treats may represent an interesting opportunity for soy byproducts.
3. Gen X and Baby Boomer pet parents are top spenders and may be more attuned to soy benefits in their human diets.

Desired Health Benefits

- Ingredients that support longer, healthier lives and address conditions like diabetes, obesity, and allergies include antioxidant-rich ingredients such as alfalfa meal, cranberries, and blueberries. Also, direct-fed microbials address immune, digestive, and oral health. (Pets International Study 2023.)
- Ingredients that help with pet gut health and digestion are the #1 benefit that 55 percent of pet owners look for in pet food products. Boosting the immune system is #2 at 47 percent. Supporting heart and cardiovascular health is #3 at 40 percent. Weight control is #4 at 34 percent. Brightened skin and cost tie for #5 at 24 percent. Boosting pet mental health and eyesight was also mentioned as a consideration. (Pets International Study 2023.)
- The humanization of pets and the increase in preventative pet health care have led to a rise in products with functional benefits, including dental health, weight management, and life stage-specific benefits. Pet owners also seek pet treats that mirror their own dietary demands, including no artificial flavors, colors, or preservatives (State of the US Pet Food and Treat Industry, 2023).
- Owners look for ingredients that help their pet's gut health and digestion, with 55 percent of consumers naming this as one of the three main benefits. Closely following in popularity is boosting a pet's immune system at 47 percent, strengthening joints and bones at 46 percent, and supporting the pet's heart and cardiovascular health. Benefits like weight control (34 percent) and pet skin and cost (24 percent) are looked for less often in pet food. (Pets International Study 2023.)

Summary and Implications

1. Longer, healthier lives, better gut health and digestion, and weight control are the most important.
2. Soy has definite advantages for weight control, gut health, and digestion.
3. Soy may have some advantages for longer, healthier lives, given the popularity of plant proteins in human foods.

Consumer Preferences

- 35 percent of consumers say it is essential that their pet food is human-grade. (Pets International Study 2023.)
- The five proteins that pet owners find most acceptable include: (Pets International Study 2023.)
 - Eggs 52 percent
 - Venison 44 percent
 - Sunflower seed 41 percent
 - Quinoa 39 percent
 - Algae 33 percent.

- Four out of ten pet owners like plant-based ingredients. (Pets International Study 2023.)
- Pet owners are more comfortable with well-known traditional “superfoods” than exotics, and they are more open to buying pet food containing the following: (Pets International Study 2023)
 - Carrots 66 percent
 - Sweet potatoes 58 percent
 - Pumpkin 51 percent
 - Spinach 49 percent
 - Blueberries: 47 percent
- One-third of U.K. pet owners wanted to move to vegetarian diets for their dogs. (Pets International Study 2023.)
 - 33 percent of pet parents are interested in vegan pet food if it is healthy.
 - 13-17 percent would buy it if the cost were comparable.
 - 40 percent said taste approval was the key factor.
 - Many respondents considered dogs carnivores, not omnivores, so they think meat is necessary for canine diets.
- Pet owners learn of new products from various sources, including: (U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)
 - 52 percent in 2022 learned about new products by browsing the pet food aisle.
 - 45 percent researched products online
 - 38 percent used social media or consulted with friends and relatives.

Summary and Implications

1. Many pet parents want human-grade pet food and view their dogs’ dietary needs as similar to human diets.
2. Plant-based ingredients are gaining acceptance in the U.K. (and on the coasts of the U.S., according to in-depth interviews.)
3. Because of plant-based ingredient acceptance, there is an opportunity to associate human soy products like tofu or edamame.
4. Store personnel tremendously influence consumer purchase behavior relating to dog food. They need to be educated about the value of soy in dog food formulations.

Pet Supplements and Treats

- The global pet supplement market was valued at \$1.9 billion in 2022 with a CAGR of 5.9 percent. The market is estimated to reach \$3.2 billion by 2030. It is believed that 20-30 percent of pets in the U.S. receive some supplement. (Pets International Study 2023.)
- 62 percent of pet parent respondents are likely to buy supplements. 63 percent of pet owners say they will likely purchase pet food products containing probiotics (Pets International Study 2023.)

- 2023 pet parent multivitamin purchases, antioxidants, and fish oil were up by 63 percent, 44 percent, and 39 percent, respectively. (Pets International Study 2023.)
- Pet treat sales in the U.S. topped \$11 billion in 2022. Dog treats account for 78 percent of this total. Indulgent treats account for 36 percent. (U.S. Pet Food and Treat Industry 2023, Pet Food Processing.)

Summary and Implications

1. The supplement, probiotics, and treatment market is growing.
2. There is an opportunity to promote soy omega oils as supplements and anti-inflammatories.
3. There is an opportunity to promote healthy high-protein treats.

Tactic 3: Depth Interviews with Dog Food Formulators and Retailers

Axiom and AURI conducted ten interviews with groups and individuals within the pet food, treat, and supplement industry. Remarks and notable comments were categorized in the following categories.

Disclaimer: These are the opinions of interview respondents. Respondent's comments are noted in italics.

Important Health Benefits of Nutrition

- *Same as the human side -- Slow aging, increased life span, better overall health, fewer allergy issues.*
- *Longer life – extending beyond the typical 10–12-year life span.*
- *Digestive issues: loose stools, vomiting. People come into the store with a particular problem to solve, most often digestive health.*
- *Weight reduction – lowering and maintaining the desired weight range for the breed. Extra pounds on dogs cause their joints to deteriorate faster.*
- *Palatability -- Keeping the dogs eating. Canned food helps dogs that have stopped eating to start eating and recover more quickly.*

Summary and Implications

1. Focus on digestive health issues first because pet parents search for alternatives when their pets have digestive problems.
2. Weight reduction could be the second front, given the advantages of soy proteins in human diets.

Pet Age, Function, and Breed

- *Age-specific nutrition – nutritional requirements for puppies, adults, overweight, and mature adults. Focus on age changes for protein digestion, vitamin absorption, and amino acid deficiencies. High protein diets help prevent muscle loss as pets age.*
- *Function-specific nutrition: Greater energy and protein requirements for sport dogs. Functions count—hunting versus lap dog requires more performance, protein, and energy. The higher the performance, the less likely they want/use soy. Because of this, pet parents are more focused on meat sources.*
- *Breeds have different genetic issues that nutrition could ameliorate (e.g., labs and joint socket issues.) Breeders often recommend specific dog foods. Royal Canin has breed-specific nutrition. Breed size is more about minerals and managing bone development.*

Summary and Implications

1. Linking to age-specific or condition-specific diets could be an exciting opportunity.
2. Increased protein for aging pets can come from soybean meal. More protein for young animals from soy isolate. More protein and fiber for overweight animals.
3. Linking to breed issues may be challenging but potentially rewarding. The higher price point differential for breed-specific diets merits further investigation.

Food, Treats, and Supplements

- *One side of the market is meat-based with (little to no soy) on the label. The other side is plant-based.*
- *Pet parents are slow to accept new ingredients because of perceived change of taste issues.*
- *Protein is king in food. Flavor is a significant factor in treats and supplements.*
- *“No list” ingredients (e.g., fillers, corn, soy, wheat, or other ingredients that producers or consumers wish to avoid) moving from food to treats.*
- *Treats focus on special occasions and indulgence. Many indulgent treats are coming online. Indulgent treats have higher prices and dramatically lower volumes/poundage than foods.*
- *Focus on healthy treats that are high in protein with few fillers. Healthy freeze-dried high-protein treats. Grain-free, healthier treats. More on the baked side.*
- *Most supplements focused on joint health. Other supplements are for digestibility, allergies, poor hair, arthritis, anti-aging, calming, breeding, skin and coats, probiotics, and immune issues. In these situations, the supplements are highly fortified with vitamins. Manufacturers are looking for cheap carriers to deliver these to animals. There is little place for soy as a carrier.*

- *Omega 3 oil supplements to improve coats and itchy skin problems. Imbalance of Omega 3 and 6.*

Summary and Implications

1. There are exciting opportunities for high-protein healthy treats. Many high-protein treats are meat-based, leaving a void for pet owners looking for high-quality, plant-based alternatives.
2. Omega-3 and Omega-6 are important. Soybean meal contains many omega oils that could fight inflammation and improve joint health.
3. Vitamins and other components that need supplement carriers may present opportunities. Respondents did not see a role for soybean meal as a carrier, but soybean hulls could play a role as carriers containing protein.
4. Supplements used for calming pets are starting to become more important. Soy meal is rich in magnesium, which is recommended as a calming agent for humans.

Meat Ingredients, Meat-based Diets

- Most frequently mentioned meat sources are chicken, beef, turkey, pork, and venison.
 - *Chicken—Dogs like the taste of chicken and eggs; however, they can create allergic responses. Chicken is perceived as the #1 meat protein in volume.*
 - *Lamb – characterized by some respondents as better than chicken because it is easier to digest.*
 - *Beef – used to use lots of beef but has declined due to allergy problems in the past 20 years.*
 - *Beef Bone meal – used as a phosphorus source.*
- *Alternative meat proteins such as turkey, salmon, and shrimp minnows are mentioned.*
- *Blue Buffalo created the category for high meat content by positioning it around wolf diets. The company was the first to claim that its dog food does not contain corn, wheat, or soy because they are fillers with no nutritional value. Blue Buffalo focused on the carnivore side, so there is no need for plant materials. (However, a Nestle study revealed that Blue Buffalo added pea protein.)*

Summary and Implications

1. One side of the dog food market (the larger side) is focused on premium meat-based ingredients, mainly due to marketing from Blue Buffalo (and other companies who followed after their success), which has removed corn, wheat, and soy.
2. Several retailers commented about allergies to chicken and beef due to high amounts of meat-based dog foods. There are few to no mentions of allergy concerns related to soy. This topic and incident rates should be analyzed further.

Plant Ingredients, Plant-based Diets

- *Grains and seeds have protein content to balance the overall nutrition content. Soy is added to enhance overall protein. Examples of grains and seeds mentioned include:*
 - *Corn*
 - *Soybeans*
 - *Sorghum*
 - *Rice*
 - *Ancient Grains*
 - *Wholesome Grains*
 - *Quinoa*
- *Plant-based ingredient mentions include:*
 - *Sweet potatoes*
 - *Potatoes*
 - *Carrots*
 - *Peas*
 - *Apple pulp*
- *Grains are used if the price point is right, depending on the type of product being manufactured. For extruded products like kibble, it is necessary to use grains to balance the overall protein content.*
- *High concern about fillers – mostly corn and other grains – as unnecessary.*
- *Unlike cats, dogs are omnivores and can survive on vegan and vegetarian diets. Many pet owners do not know this. Plant-based canine diets are not widely accepted in the U.S. except for the East and West coasts.*
- *The “No List” typically includes corn, grains, rice, and sometimes soy. Manufacturers create and promote this list.*
- *Pet owners do not look favorably upon corn and soy unless they have an animal with gastrointestinal or a vet-prescribed diet. Owners generally do not want to see soy or soy on the label because they are perceived as lower-quality fillers fed to livestock.*

Summary and Implications

1. The other (smaller) side of the dog food market is focused on plant ingredients. This market is especially strong in the U.K. and on the East and West coasts of the U.S.
2. Many pet owners do not realize that dogs are omnivores and can survive on diets other than meat-based diets.
3. Many pet owners (and retailers) focus on eliminating fillers they perceive as unnecessary and not value-added. They see corn and possibly soy this way. This merits further investigation.

Soybean Meal as an Ingredient

- *Soy is the only protein with complete nutrition and all essential amino acids. High digestibility. It is very close to animal protein.*
- *Oil is another factor. Soy is a nutritious oil with polyunsaturated fatty acids. Antioxidants promote good cardiovascular health and have anti-inflammatory characteristics. Isoflavones have this. Oil can be used to coat the exterior of the kibble, increasing shelf life.*
- *Pea protein “sucks” compared to soy protein. Everyone is looking for soy alternatives- peas, chickpeas, and oil seeds. Those other proteins always lag soy in nutrition and functionality.*
- *Soy concentrate works well or any snack food that goes through the extrusion process, e.g., puffs, meat alternatives. It adds to dietary fiber and is cheaper and more available.*
- *Soybean meal is often used in cheaper dog food brands. It is an inexpensive protein source for brands in an economic space where consumers are price-sensitive. There was a movement away from soybean meal-based formulations as pet parents decided to buy more expensive pet foods (during the pandemic.)*
- *As the pet food market changes (due to economic concerns), many pet owners want to spend less per bag, so soy may be a viable ingredient.*
- *Soy is still in pet food. It has a place and a position in pet food. It will not likely grow unless there is an economic driver.*
- *Soy is more sustainable than meat inputs and has a lower carbon footprint.*

Summary and Implications

1. Soy is a highly digestible protein with many amino acids, healthy oils, and fiber.
2. Dog food manufacturers' “no corn, no grains, no soy” marketing claims have displaced these positives. However, in human nutrition, these positives largely remain attractive.
3. Soy is an important, well-priced protein ingredient for non-premium dog foods. For pet parents who want to spend less on food, soy offers a solution.

Soybean Hulls as an Ingredient

- *Lots of interest in the hulls. It boils down to how much energy and cost goes into processing the hulls to get ingredients. Huge target for value-add.*
- *Fiber is essential. Hulls are typically used in dog food as a fiber agent. Both dogs and cats need fiber for easy stool pickup; however, there is somewhat low awareness (among manufacturers).*

- *Soy hulls are a good source of fiber; however, they are seen as a filler. Less than 0.05 percent of dry dog foods include it, and soy hulls inclusion is one percent in cat food to prevent hair buildup in the stomach and hairballs. Many pet food manufacturers presently use powdered cellulase.*
- *Soy hulls are 11 percent protein. Every mammal needs fiber. Soy hulls are readily digestible compared to other fiber sources like alfalfa. You do not need the same breakdown for a fibrous diet.*
- *Cellulase is some sugar, unlike cellulose, with a beta glucose linkage (that comes from hulls.) It may present some prebiotic opportunities.*
- *Soy hulls are fed in sow diets. Sows gain a lot of prebiotic nutrition. As with cows, soy hulls are fed to keep sows regular and provide extra energy. Hulls could be used for weight management strategy; however, it is limited to adult animals, not growing animals. Unlike beet pulp, sows show no evidence of soy hull flatulence. Soy hulls could be an opportunity to prevent gas. “Beano for dogs.”*

Summary and Implications

1. Soy hulls are an important fiber and sugar source that aid digestion and pet waste management and can enhance gut flora.
2. Very few dog food and cat food manufacturers use soy hulls but instead use cellulose.
3. Potentially interesting opportunities for gas prevention are based on experience with lactating sows. Value proposition: “Beano for dogs” made from soy hulls offers a highly understandable value proposition.
4. One major pet food processor was highly interested in developing value-added products from soy hulls.

Amino Acids

- *Plant-based amino acids can be perceived as not readily digestible by dogs or cats, unlike meat amino acids.*
- *Retail interview respondents had little to no knowledge of specific amino acids for dogs; however, some respondents recognized amino acids as being important to humans (and, by extension, important to pet parents.)*
- *Nutritionists and enzymologist respondents remind us that amino acids are not rare or exclusive to soy. For example, crude proteins, feathers, poultry meal, or corn gluten contain amino acids.*
- *Amino acid profile – balanced requirements and bioavailability. No single source provides all amino acids. Typically, combinations of ingredients and amino acids are utilized. For example, although soy is a good source of lysine, increasing levels of extra lysine is still necessary to get the quantity you need.*

- *Primary amino acids include tryptophan and lysine. Secondary amino acids include valine, threonine, phenylalanine+tyrosine, leucine, methionine+cystine, histidine, arginine, etc.*

Summary and Implications

1. Amino acids are a positive but not a hugely compelling reason to include more soybean meal in pet foods because they can be obtained from various sources and must be used in combinations.
2. Soybean meal competes with hydrolyzed feathers and poultry meal and should offer a cost advantage to promote increased use.
3. Industry perception in other markets is that soybean meal is expensive.

Enzymes, Isolates and Concentrates

- *Enzymes convert soy into soy concentrates and isolates for improved digestibility and taste, amino acid profiles, and increased peptide levels. Enzymes unlock soy isolates in small fractions to be more digestible, release small fractions of amino acids, and promote active peptides for different functionalities.*
- *Specific enzymes attack proteins and substrates in different directions. Endoenzymes attack the end of the protein. Exoenzymes attack wherever it touches the protein. Exoenzymes give off less good flavor. The use of both will help flavor and mask beany taste. Both are used in super-premium foods such as non-dairy cheeses and soy meat substitutes.*
- *Hydrolyzation produces many bioactive peptides, supporting soy's value. It also dramatically reduces particle size, reducing allergy concerns.*
- *The process of producing isolate is longer and requires more energy, water, and purification. It is more costly; however, you end up with a higher-quality protein. It is not likely to be cost-effective for dog food.*
- *Concentrate does not have lower-quality protein but is similar to isolate. The difference is that concentrate has more fiber than isolate. Concentrate has 50-80 percent protein and the rest fiber. Get rid of the sugars. It gives you a good texture, but unlike isolate, it has a beany flavor.*
- *Flavor is a tricky topic when it comes to dogs. Humans notice bitterness. This is not the case with cats and may not be the case for dogs.*
- *Soy concentrates can range from 35-80 percent protein by weight. Isolates are more than 90 percent protein by weight. Concentrates are used in baking products and meat alternatives due to their functionality when extruded. Isolates can also be extruded as meat. Higher protein content with less fiber.*
- *It may be possible to establish a new AAFCO ingredient category for soy isolates or concentrates similar to "corn fermented protein," a new ingredient introduced to formulations. Provides a new*

definition for a change in fractionation. Smaller pet food companies often do this in label gray areas.

- *Not using concentrates and isolates for dog food due to price. Hill's Science Diet and Purina use soy isolates for sensitive skin and stomach. Hydrolyzed soy protein is less likely to have an allergenic response.*

Summary and Implications

1. Enzymes are important tools that can make soybean meal and hulls more useful; however, awareness could be higher.
2. Enzyme capabilities provide new frontiers for soy by-products in discussions with pet food manufacturers.
3. Presently, only a few premium manufacturers use soy isolates due to cost. Given the rapid and recent improvements in enzyme technology and efficacy, cost structures may decrease and make isolates financially viable for use in pet food.

Noted National and Regional Manufacturers

- *Every manufacturer must meet AAFCO standard nutrient requirements, so everyone is equal when it comes to dog food ingredients. That statement is not true with treats.*
- *Which manufacturer is good is entirely based on pet parents' perceptions. Do I feed my dog like a barn dog or part of the family? Is it better because it has potatoes and salmon as my family eats?*
- *Both veterinarian and breeder recommendations are important in brand choice.*
- *National is desirable because of perceived research and development and increased science. Brands mentioned include:*
 - *Blue Buffalo -- started the premium meat-based positioning*
 - *Science Diet – vet formulated*
 - *Purina Pro – age and function-specific nutrition*
 - *Halo*
 - *Nestle, Iams, and Hill's Science Diet -- lots of research on allergens, dietary disorders, increased lifespan*
- *Regional is desirable because of sustainability and ingredient tracking. Brands mentioned include:*
 - *NutriSource – made in Minnesota, Minnesota ingredients*
 - *Natural Balance/Solid Gold (Dick Van Patten's line of dog food) – lots of vegetables and healthy grains, highly popular on the West Coast*
 - *Raw Bistro Pet Fare*

Summary and Implications

1. Premium brands with close relationships to veterinary science are well respected. Because of this, it will be important to understand what veterinarians think of soy and how it should be used to formulate dog food blends.
2. Regional/local is highly important. Retailers and pet owners perceive local manufacturing and locally sourced ingredients positively from a sustainability and ingredient tracing perspective.

Pet Owner Information Sources

- *Veterinarian and breeder recommendations are highly influential for pet owners. They mainly focus on the importance of meat-based diets.*
 - *Vets are an important, credible source of information because they screen information and process it with the dog's overall medical record in mind.*
 - *Breeders have recommendations for their specific breeds. They also have a vested financial interest in continuing to profit from the sale of pet food during the pet's lifetime.*
- *In-store retail respondents are well-educated about foods.*
 - *Most of the training for retailers is provided by dog food manufacturers via online seminars. Manufacturers offer samples and other incentives to increase staff participation. Samples are pretty helpful in promoting first-person recommendations among retail staff.*
 - *Retail training primarily focused on meat ingredients (likely due to high percentages of meat-based ingredients and foods) and not plant-based ingredients.*
- *Small population FDA study on heart issues and all meat diets mentioned by five of six in-person retail interviews about the importance of including grain in dogs' diets.*
- *Lots of food bloggers stigmatize soy based on anecdotal experiences. They do the same thing with gluten. This is gaslighted by manufacturer marketing strategies focusing on grain-free, soy-free, or gluten-free.*
- *Despite the inaccuracy of social media content, pet parents share an extremely high number of blogs and links, which have high credibility and recency.*

Summary and Implications

1. Learn more about small animal veterinarians and breeders to understand their perceptions of soy byproducts vis-à-vis meat byproducts.
2. The small population FDA study on canine dilated cardiomyopathy (DCM) changed minds and hearts about the importance of grains. There may be opportunities to amplify the study by referencing complementary studies.
3. Provide resources for retailer training on dog food brands that include soy byproducts.

Allergens

- *Soy is on the top seven list of allergens for pet owners – rightly or wrongly. Only ten percent of pets have allergy issues. When pet parents see itchy skin or hot spots, they often change their pet's diet. It is the same thing with gastrointestinal problems.*
- *Soy allergies are often overstated. If you look at the data, for example, only 0.05 percent of the population has soy allergies, and they typically grow out of it.*
- *No active mentions of soy as an allergen in retail interviews unless prompted. There are more mentions of corn and chicken allergies due to overfeeding and the predominance of these ingredients in dog food.*
- *Beef, dairy, chicken, and lamb are common allergens. It is harder to stigmatize these ingredients than soy. Many pet owners eliminate plant ingredients first before switching to meat.*
- *Hydrolyzed soy is palatable for dogs. Once soy is hydrolyzed, it is more of a hypoallergenic protein.*
- *It is possible to modulate the allergens in soy with hydrolyzation by reducing the average size to below 20,000 Daltons. Below this level, soy is no longer allergenic. When particle size is smaller, it is also more nutritionally available to pets.*

Summary and Implications

1. Enzymes and hydrolyzation offer an interesting scientific solution to control allergies to soy.
2. Allergies from soy occur in a tiny percentage of the pet population; however, they are dramatically overstated for various reasons. Do veterinarians know/agree with this premise? If not, what evidence is necessary to make the case?

Manufacturer Focus Areas

- *High digestible protein – the higher the content, the higher the value to manufacturers. Protein sources must be cost-effective.*
- *High palatability – to improve food intake and pet owner perceptions of pet food quality. Lots of palatability tests with dogs. In most cases, flavoring agents are animal-based liquids. Manufacturers can use artificial flavors as masking agents; however, it is expensive when balancing protein and amino acids.*
- *Low allergenicity – allergic reactions. Hyper concern because pet owners assume ingredients are responsible for allergic reactions or digestive problems.*
- *High Stability – shelf life. Dry dog food lasts longer than other types of dog food; however, there is confusion about “use by” or “manufacturing date” information by pet owners. Soy oil can be used to improve the shelf life of the kibble.*

- *Other focus areas include:*
 - *Process compatibility – formulations and production protocols.*
 - *Standardization – nutrient levels should not vary.*
 - *Labeling – requirements are ever more extensive. Label readers are more discriminating.*
 - *Increased ingredient misinformation is available for pet parents.*
 - *Supply chain and dating issues.*
 - *Controlling the odor of canned food (and sometimes dry dog food.)*

Summary and Implications

1. Soy can easily address digestible protein.
2. Soy should be able to address stability/shelf life because vegetable oils are less prone to rancidity than oils derived from chicken or beef fat.
3. Enzymes and hydrolyzation can help address palatability and allergenicity.
4. There may be an opportunity to create new AAFCO categories and names for soy by-products processed with enzymes.

Tactic 4: Leverage Partnerships for Novel Soy Ingredient Uses

Based on discussions with interviewees and during the market assessment, we highlighted several areas of interest and potential for soybean ingredients to be included in formulations or expand usage in specific sectors of the pet food, treat, and supplement market.

Potential Opportunities

1. Hydrolyzed soybean meal with smaller peptide sizes to eliminate allergenic response.
2. Flavored soy oil kibble coating to increase shelf life.
3. “Dental chew” or treat for assisting with overall oral pet health.
4. Prebiotics made from hydrolyzed soybean hulls to feed gut flora.
5. Healthy high-protein dog treats

Goal 2: Analyze soybean-based ingredients in dog food, treats, and pre/probiotics.

Tactics 1 and 2: Review Dry and Wet Dog Foods by Content

Results and findings for Tactics 1 and 2 are listed below, characterizing five wet and dry dog foods. This was a slight deviation from the proposal as, during our investigation, it was noted that many product ingredient lists and formulations were similar, most likely due to AAFCO’s strict nutrition requirements for dog food products. To limit redundancy, five product lines were chosen from wet and dry to highlight the product types while trying to mitigate redundancy in the reporting.

Hill’s Science Diet Dry (Colgate)

Domestic, Premium Product

Hill's Science Diet dry dog food features a range of ingredients designed to meet the nutritional needs of dogs in various stages of life. These ingredients are formulated to support multiple aspects of health, including skin and coat condition, digestive health, and overall wellness. The dry dog food line comprises nine families: Puppy, Adult, Adult seven and older, Small and Toy Breeds, Light, Sensitive Stomach and Skin, Perfect Weight, Healthy Mobility, and Oral Care.

Hill's Science Diet dry dog food products often contain soybean meal in some flavors; however, soybean meal did not appear on the ingredient searches.

Popular Ingredient Named Flavors	Condition
Chicken and Barley	Sensitive Stomach and Skin
Chicken and Brown Rice – No Corn, Wheat or Soy	Digestive Care
Chicken, Brown Rice, and Whole Oats	Kidney Care
Lamb and Brown Rice	Gastrointestinal Biome
Salmon, Oats and Rice	Perfect Weight
Pollock Meal, Barley and Insect Meal	Longevity
	Health Mobility

Common ingredients in Hill’s dry formulations include:

Protein Sources	Grains
Chicken meal Lamb Salmon Pollock Insect	Brewers Rice Whole Grain Wheat Whole Grain Corn Whole Grain Sorghum Barley

Fats and Oils	Fruits and Vegetables
Chicken Fat Soybean Oil	Carrots Green Peas Broccoli Dried Beet Pulp Apples Cranberries Blueberries

Vitamins and Minerals
Vitamin E, Vitamin C, Vitamin A, Vitamin D3, Vitamin B12, Riboflavin, Thiamine, Niacin, Biotin, Folic Acid Calcium Carbonate Ferrous Sulfate Zinc Oxide Copper Sulfate Manganous Oxide Calcium Iodate Sodium Selenite Potassium Chloride Amino Acids

NATURAL INGREDIENTS

INGREDIENTS: Chicken, Cracked Pearled Barley, Whole Grain Wheat, Whole Grain Corn, Whole Grain Sorghum, Corn Gluten Meal, Soybean Meal, Chicken Fat, Brewers Rice, Chicken Liver Flavor, Chicken Meal, Dried Beet Pulp, Soybean Oil, Pork Flavor, Lactic Acid, Calcium Carbonate, Flaxseed, Potassium Chloride, Choline Chloride, Iodized Salt, vitamins (Vitamin E Supplement, L-Ascorbyl-2-Polyphosphate (source of Vitamin C), Niacin Supplement, Thiamine Mononitrate, Vitamin A Supplement, Calcium Pantothenate, Riboflavin Supplement, Biotin, Vitamin B12 Supplement, Pyridoxine Hydrochloride, Folic Acid, Vitamin D3 Supplement), Taurine, minerals (Ferrous Sulfate, Zinc Oxide, Copper Sulfate, Manganous Oxide, Calcium Iodate, Sodium Selenite), Oat Fiber, Mixed Tocopherols for freshness, Natural Flavors, Beta-Carotene, Apples, Broccoli, Carrots, Cranberries, Green Peas.



MADE IN USA WITH GLOBAL INGREDIENTS
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GUARANTEED ANALYSIS



Crude Protein, Min. 20% (200 g/kg)
 Crude Fat, Min. 5.5% (55 g/kg)
 Crude Fiber, Max. 14% (140 g/kg)
 Moisture, Max. 10.5% (105 g/kg)
 Vitamin E, Min. 400 IU/kg (400 IU/kg)
 Ascorbic Acid* (Vitamin C),
 Min. 85 mg/kg (85 mg/kg)
 Carnitine*, Min. 200 ppm (200 mg/kg)
 Omega-6 Fatty Acids*,
 Min. 1.5% (15 g/kg)

*Not recognized as an essential nutrient by the AAFCO Dog Food Nutrient Profiles.

QUALITY INGREDIENTS

COMPOSITION

Chicken (10%), turkey, pork liver, potato starch, rice flour, rice, dried beans, digest, dried egg whites, dried carrots, ground pecan shell, minerals, flaxseed, dried beet pulp, dried citrus pulp, fish oil, vitamins, dried pumpkin, trace elements and beta-carotene. Total vegetables (3 %).

ANALYTICAL CONSTITUENTS

Protein 6.2%	Moisture 74.5%	Potassium 0.23%
Fat content 4.3%	Calcium 0.21%	Magnesium 0.02%
Crude fibre 0.95%	Phosphorus 0.16%	
Crude ash 1.5%	Sodium 0.08%	

per kg:

Vitamin A 14805 IU
 Vitamin D3 278 IU



Hill's Science Diet Wet (Colgate)

Domestic, Premium Product

Hill's Science Diet wet dog food offers a variety of flavors and textures to cater to different canine palates at various life stages. Wet formulations are designed to support overall health, promote healthy immune systems, and maintain lean muscle mass. The wet dog food line comprises seven different families: Puppy, Adult, Adult seven and older, Small and Toy Breed, Light, Sensitive Stomach and Skin, and Perfect Weight.

Hill's Science Diet wet formulations include soybean oil as a source of fatty acids.

Popular Ingredient Named Flavors	Condition
Rice, Vegetable, and Chicken Stew Tender Turkey and Rice Stew Chicken, Vegetables, and Rice Stew Chicken and Barley Entrée Chicken and Vegetable Entrée Chicken, Vegetables, and Rice Savory Stew Beef Beef and Barley Entrée Savory Stew with Beef and	Sensitive Stomach and Skin Care Digestive Care Kidney Care Gastrointestinal Biome Perfect Weight Longevity

Common ingredients found in Hill's wet formulations include:

Proteins Sources	Grains
Chicken Pork Liver Beef Turkey	Brown Rice Whole Grain Wheat Barley

Fruits and Vegetables	Vitamins & Minerals
Carrots Spinach Green Peas Potatoes Sweet Potatoes	Vitamin E L-ascorbyl-2-polyphosphate (source of Vitamin C) Thiamine Mononitrate Niacin Calcium Pantothenate Vitamin B12 Pyridoxine Hydrochloride Biotin Vitamin D3 Supplement Riboflavin Supplement Folic Acid Zinc Proteinate Iron Proteinate Copper Proteinate Manganese Proteinate Sodium Selenite Cobalt Proteinate Potassium Iodide

Other Ingredients
Chicken Broth Rice Starch Beet Pulp Soybean Oil Flaxseed Tomato Pomace

QUALITY INGREDIENTS

INGREDIENTS: Water, Chicken, Pork Liver, Whole Grain Corn, Cracked Pearled Barley, Beef By-Products, Soybean Meal, Chicken Liver Flavor, Dried Whey, Soybean Oil, Calcium Carbonate, Iodized Salt, Choline Chloride, vitamins (Vitamin E Supplement, Thiamine Mononitrate, Ascorbic Acid (source of Vitamin C), Niacin Supplement, Calcium Pantothenate, Vitamin B12 Supplement, Pyridoxine Hydrochloride, Biotin, Vitamin D3 Supplement, Riboflavin Supplement, Folic Acid), Iron Oxide color, Potassium Chloride, minerals (Zinc Oxide, Ferrous Sulfate, Manganese Sulfate, Copper Sulfate, Calcium Iodate), Magnesium Oxide, Beta-Carotene.



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CLINICALLY PROVEN NUTRITION

INGREDIENTS: Water, Chicken, Pork Liver, Brown Rice, Carrots, Modified Rice Starch, Wheat Flour, Potato Starch, Dried Beet Pulp, Pork Plasma, Dextrose, Potatoes, Green Peas, Spinach, Chicken Fat, Hydrolyzed Chicken Flavor, Calcium Carbonate, Guar Gum, Flaxseed, Potassium Chloride, Soybean Oil, Choline Chloride, Sodium Pyrophosphate, Disodium Phosphate, Sodium Hexametaphosphate, minerals (Ferrous Sulfate, Zinc Oxide, Copper Proteininate, Manganese Sulfate, Potassium Iodide), L-Carnitine, vitamins (Vitamin E Supplement, Thiamine Mononitrate, Niacin Supplement, Calcium Pantothenate, Vitamin B12 Supplement, Pyridoxine Hydrochloride, Biotin, Vitamin D3 Supplement, Riboflavin Supplement, Folic Acid), L-Lysine, Taurine, Caramel color.



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KEY BENEFITS

- ▶ Adult 7+ food made with high quality ingredients to ensure optimal nutrient absorption to keep your dog fit and healthy
- ▶ Easy to digest
- ▶ Balanced minerals for heart & kidney health



Dick Van Patten Natural Balance

Domestic, Premium Product

Dick Van Patten's Natural Balance Dog Food focuses on using premium ingredients like whole grains and a variety of vegetables and fruits to ensure a balanced diet. Natural Balance offers specialized formulas, including special diets and grain-free options, designed to cater to dogs with specific dietary needs and sensitivities. The line comprises six product families: Limited Ingredient Diets, Ultra, Delectable Delights, Platefulls, and Fat Dogs.

Natural Balance dog food generally does not use soybean products in its formulations. The brand focuses on providing high-quality ingredients and limited ingredient diets (LID) to cater to dogs with food sensitivities and allergies. Most Natural Balance recipes avoid common allergens like soy, wheat, and corn.

Popular Ingredient Named Flavors	Condition
Duck and Potato	Food Sensitivities and Allergies Weight Management Joint Health
Sweet Potato and Venison	
Lamb and Brown Rice	
Salmon and Sweet Potato	
Chicken and Sweet Potato	
Chicken and Barley	
Lamb Recipe Paté	
Beef Recipe Paté	
Chicken Formula	
Duck and Chicken Recipe in Broth with	
Pumpkin and Potato	
Chicken and Salmon Stew	
Beef and Brown Rice Stew	
Chicken and Pumpkin	
Beef Stew with Vegetables	
Turkey and Duck with Pumpkin in Broth	
Chicken and Salmon Formula	

Ingredients commonly found in Natural Balance dry dog food include:

Protein Sources	Grains
Chicken, chicken meal Lamb meal, lamb Duck meal, duck Salmon, salmon meal, fish meal Beef, beef meal Venison meal	Sweet Potatoes Brown Rice Barley Potatoes
Fats and Oils	Fruits and Vegetables
Canola Oil Salmon Oil	Carrots Peas Blueberries Spinach
Vitamins and Minerals	Fiber Sources
Vitamin E Vitamin A Vitamin B12 Zinc sulfate Iron proteinate Calcium carbonate. Amino Acids	Flaxseed Beet Pulp

Additional Ingredients
Natural Flavors Probiotics Prebiotics

Lamb & Brown Rice Recipe

INGREDIENTS: LAMB, LAMB MEAL, BROWN RICE, BREWERS RICE, RICE BRAN, BREWERS DRIED YEAST, CANOLA OIL (PRESERVED WITH MIXED TOCOPHEROLS), NATURAL FLAVOR, SALT, TAURINE, DL-METHIONINE, VITAMINS (VITAMIN E SUPPLEMENT, ASCORBIC ACID, NIACIN SUPPLEMENT, VITAMIN A SUPPLEMENT, THIAMINE MONONITRATE, D-CALCIUM PANTOTHENATE, RIBOFLAVIN SUPPLEMENT, PYRIDOXINE HYDROCHLORIDE, VITAMIN B12 SUPPLEMENT, FOLIC ACID, VITAMIN D3 SUPPLEMENT, BIOTIN), POTASSIUM CHLORIDE, MINERALS (ZINC PROTEINATE, ZINC SULFATE, FERROUS SULFATE, IRON PROTEINATE, COPPER SULFATE, COPPER PROTEINATE, SODIUM SELENITE, MANGANESE SULFATE, MANGANESE PROTEINATE, CALCIUM IODATE), CHOLINE CHLORIDE, CITRIC ACID (PRESERVATIVE), MIXED TOCOPHEROLS (PRESERVATIVE), ROSEMARY EXTRACT.

THIS PRODUCT IS MADE IN A FACILITY THAT HANDLES INGREDIENTS NOT INCLUDED IN THIS RECIPE. TRACE AMOUNTS OF THESE OTHER INGREDIENTS MAY BE PRESENT.

A COMPLETE & BALANCED RECIPE FOR ALL BREEDS

GUARANTEED ANALYSIS

CRUDE PROTEIN	5% MIN
CRUDE FAT	3% MIN
CRUDE FIBER	2.5% MAX
MOISTURE	78% MAX
TAURINE*	0.05% MIN

*Not recognized as an essential nutrient by the AAFCO dog food nutrient profiles

For questions and support, connect with our Customer Care Team of Registered Veterinary Technicians.

PLANT POWERED Vegetarian Recipe

Vegan friendly

INGREDIENTS: BROWN RICE, DAT GROATS, PEARLED BARLEY, PEAS, POTATO PROTEIN, CANOLA OIL (PRESERVED WITH MIXED TOCOPHEROLS), POTATOES, DICALCIUM PHOSPHATE, NATURAL VEGETABLE FLAVOR, TOMATO POMACE, CALCIUM CARBONATE, TAURINE, DL-METHIONINE, POTASSIUM CHLORIDE, CHOLINE CHLORIDE, SALT, MINERALS (ZINC PROTEINATE, ZINC SULFATE, FERROUS SULFATE, IRON PROTEINATE, COPPER SULFATE, COPPER PROTEINATE, SODIUM SELENITE, MANGANESE SULFATE, MANGANESE PROTEINATE, CALCIUM IODATE), VITAMINS (VITAMIN E SUPPLEMENT, VITAMIN A SUPPLEMENT, D-CALCIUM PANTOTHENATE, NIACIN SUPPLEMENT, BIOTIN, RIBOFLAVIN SUPPLEMENT, VITAMIN D3 SUPPLEMENT, VITAMIN B12 SUPPLEMENT, THIAMINE MONONITRATE, PYRIDOXINE HYDROCHLORIDE, FOLIC ACID, FLAXSEED, CITRIC ACID (PRESERVATIVE), MIXED TOCOPHEROLS (PRESERVATIVE), PARSLEY, SPINACH, L-LYSINE MONOHYDROCHLORIDE, CRANBERRIES, L-CARNITINE, Kelp MEAL, YUCCA SCHIDIGERA EXTRACT, L-ASCORBYL-2-POLYPHOSPHATE, ROSEMARY EXTRACT.

THIS PRODUCT IS MADE IN A FACILITY THAT HANDLES INGREDIENTS NOT INCLUDED IN THIS RECIPE. TRACE AMOUNTS OF THESE OTHER INGREDIENTS MAY BE PRESENT.



OUR LOW CALORIE FORMULA Low Calorie Diet for Overweight Dogs



The weight is over! Help your overweight dog slim down. Scale back on calories, not on the taste they love.

Most dogs are overweight due to overeating and lack of exercise. However, you can help change that and help your dog feel a healthier life by feeding them this Natural Balance® Fat Dogs Formula Adult Dry Food. Help manage their weight with a recipe filled with real protein, fiber, a delicious blend of vegetables, and large amounts of healthy fats. For best results, use this blend to help keep your dog's weight in check and reduce begging behavior.

Our expert formula is designed to help your dog lose weight in the gentlest way possible. We select the right mix of ingredients to help your dog feel full and satisfied, so your dog can enjoy life to the fullest. It's a great way to help your dog live a long, happy life.

When you begin this program, we want to make sure your dog is successful at getting it. This diet was formulated to be highly effective, but natural begging behavior can get in the way of progress. To help you, we bring you the success & exercise plan for your dog, visit us at www.naturalbalance.com or call for more information at 800-441-4411 (441-4411).

CRUDE PROTEIN ANALYSIS

Guaranteed Analysis

Guaranteed Analysis

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Cesar Wet Dog Food (Mars)

Domestic, Premium Product

Cesar Wet Dog Food offers a premium dining experience for small dogs. Convenient, single-serve trays simplify feeding time for pets and parents. The line comprises five products: Classic Loaf in Sauce, Filets in Gravy, Simply Crafted, Home Delights, Loaf, and Topper in Sauce.

Cesar wet dog food does not typically contain soy products, nor do they typically include cereals and grains.

Popular Ingredient Named Flavors	Condition
Filet Mignon Porterhouse Steak Beef Chicken and Liver Turkey Prime Rib New York Strip Chicken, Carrot, Potato and Peas, Chicken Sweet Potato, Apple, Barley, and Spinach Beef Stew Slow Cooked Chicken and Vegetable Dinner Pot Roast with Spring Vegetables Dinner Rotisserie Chicken Ham and Egg Angus Beef	Hydration Appetite Stimulation Protein Needs Bone Health Weight Management

Ingredients commonly found in Cesar wet dog food include:

Meat and Animal Derivatives (identified as derivatives)	Vegetable Derivatives (identified as derivatives)
Beef Beef Lung Chicken Chicken Liver Port By-Products Pork Liver Lamb	Peas Carrots Potatoes
Fats and Oils	Vitamins and Minerals
Sunflower oil Fish oil	Vitamin E B Vitamins Vitamin D Zinc Iron Calcium



Ingredients

Beef, Pork By-Products, Chicken Liver, Chicken Broth, Water, Beef Lung, Chicken Heart, Added Color, Calcium Carbonate, Sodium Tripolyphosphate, Carrageenan, Potassium Chloride, Xanthan Gum, Magnesium Proteinate, Dried Yam, DL-Methionine, Salt, Erythorbic Acid (Preservative), Filet Mignon Flavor, Guar Gum, Natural Flavor, Zinc Sulfate, Vitamin E Supplement, Monocalcium Phosphate, Sodium Nitrite (For Color Retention), Copper Sulfate, Thiamine Mononitrate (Vitamin B1), D-Calcium Pantothenate, Vitamin D3 Supplement, Potassium Iodide.

Guaranteed analysis (%)

Crude Protein (min.)	9.0%
Crude Fat (min.)	4.0%
Crude Fiber (max.)	1.0%
Moisture (max.)	82.0%

INGREDIENTS

Beef, Pork By-Products, Chicken Liver, Chicken Broth, Water, Beef Lung, Chicken Heart, Added Color, Calcium Carbonate, Sodium Tripolyphosphate, Carrageenan, Potassium Chloride, Xanthan Gum, Magnesium Proteinate, Dried Yam, DL-Methionine, Salt, Erythorbic Acid (Preservative), Filet Mignon Flavor, Guar Gum, Natural Flavor, Zinc Sulfate, Vitamin E Supplement, Monocalcium Phosphate, Sodium Nitrite (For Color Retention), Copper Sulfate, Thiamine Mononitrate (Vitamin B1), D-Calcium Pantothenate, Vitamin D3 Supplement, Potassium Iodide



Ingredients

Chicken, Chicken Liver, Beef Lung, Meat By-Products, Chicken Broth, Water, Beef, Chicken Heart, Dicalcium Phosphate, Calcium Carbonate, Fish Oil, Sodium Tripolyphosphate, Carrageenan, Potassium Chloride, Dried Yam, Xanthan Gum, Added Color, Magnesium Proteinate, Choline Chloride, Salt, Erythorbic Acid (Preservative), Natural Flavor, DL-Methionine, Guar Gum, Zinc Sulfate, Vitamin E Supplement, Biotin, Potassium Iodide, Copper Sulfate, Sodium Nitrite (For Color Retention), D-Calcium Pantothenate, Manganese Sulfate, Thiamine Mononitrate (Vitamin B1), Vitamin D3 Supplement

Guaranteed analysis (%)

Crude Protein (min.)	9.0%
Crude Fat (min.)	6.0%
Crude Fiber (max.)	1.0%
Moisture (max.)	80.0%



NutriSource Dry (Tuffies)

Domestic, Middle to Premium Tier Products

NutriSource dry dog food offers a variety of ingredients depending on the specific formula. The dry dog food line comprises nine different families of products, including Grain Inclusive, Grain Free, PureVita, Element, Small and Medium Breed Puppy, Large Breed, Performance, Weight Management, and Senior.

NutriSource dry dog food does not typically contain soy products.

Popular Ingredient Named Flavors	Condition
Chicken and Rice Lamb Meal and Rice Beef and Rice Seafood Select Chicken and Peas High Plains Select Salmon and Peas Duck and Lentils Entrée Beef and Red Lentils Turkey and Sweet Potato Entrée Prairie Select Woodland Select Northern Feast Trout and Rice Chicken and Pea Seafood Select Recipe	Food Sensitivities and Allergies Energy Demands Early Growth and Development Weight Management Joint Support Easy Digestion Senior Health

Common ingredients across NutriSource dry formulations include:

Protein Sources	Grains
Chicken Chicken Meal Beef Duck Turkey Lamb Meal Salmon Trout Menhaden Fish Meal	Brown Rice Barley Oatmeal

Fats and Oils	Fruits and Vegetables
Chicken Fat (preserved with mixed tocopherols) Flaxseed Fish Oil	Peas Sweet Potatoes Carrots Blueberries Apples Pumpkin Dried Beet Pulp
Vitamins and Minerals	Amino Acids and Supplements
Vitamin A, D3, E Supplements B Vitamins (Thiamine Mononitrate, Riboflavin, Niacin, Biotin, Folic Acid) Zinc Proteinate Iron Proteinate Copper Proteinate Manganese Proteinate Selenium Yeast	DL-Methionine Taurine L-Carnitine Glucosamine Chondroitin Sulfate
Probiotics and Prebiotics	Other Ingredients
Dried Fermentation Products (Enterococcus Faecium, Lactobacillus Acidophilus, Bacillus Subtilis) Inulin (from Chicory Root)	Natural Flavors Salt Potassium Chloride Yeast Culture Rosemary Extract

INGREDIENTS		
Chicken, chicken meal, brown rice, oatmeal, barley, natural chicken flavor, flax seed, chicken fat (preserved with tocopherols and citric acid), dehydrated alfalfa meal, sardine oil (preserved with tocopherols), dried tomato pomace, potassium chloride, salt, dried canola, dried cherries, dried apricots, dried cranberries, DL-methionine, minerals (zinc, iron, proteinate, copper, proteinate, manganese, potassium, potassium iodide), choline chloride, brewers dried yeast, vitamin E, vitamin A, vitamin D3, vitamin D3 supplement, vitamin E supplement, niacin, dicalcium phosphate, thiamine mononitrate, pyridoxine hydrochloride, niacin supplement, folic acid, biotin, vitamin B12 supplement, dried blueberries, L-methionine, dried chicory root, lecithin, rosemary extract, garlic, L-ascorbyl-2-polyphosphate (source of vitamin C), lactic acid, yucca schottigera extract, taurine, L-carnitine, calcium lactate, rosemary extract, yeast culture, dried Aspergillus oryzae fermentation extract, dried Bacillus subtilis fermentation product, dried Bacillus licheniformis fermentation product, dried Trichoderma longibrachiatum fermentation product, dried Enterococcus faecium fermentation product, dried Lactobacillus acidophilus fermentation product, and dried Bacillus subtilis fermentation extract. Contains a source of live (dried) naturally occurring microorganisms.		
GUARANTEED ANALYSIS		
Nutrient	U.S.	Metric
Crude Protein (Min.)	24.0%	24.0 g/kg
Crude Fat (Min.)	13.0%	13.0 g/kg
Crude Fiber (Max.)	6.0%	6.0 g/kg
Mosambi (Max.)	10.0%	10.0 g/kg
DL-Methionine (Min.)	0.25%	2.5 g/kg
Eicosapentaenoic Acid (EPA) (Min.)	0.05%	0.5 g/kg
Iron (Min.)	120 mg/kg	120 mg/kg
Copper (Min.)	15 mg/kg	15 mg/kg
Manganese (Min.)	20 mg/kg	20 mg/kg
Zinc (Min.)	175 mg/kg	175 mg/kg
Selenium (Min.)	0.35 mg/kg	0.35 mg/kg
Choline Chloride (Min.)	0.2%	2 g/kg
*Omega-6 Fatty Acids (Min.)	2.2%	22 g/kg
*Omega-3 Fatty Acids (Min.)	0.4%	4 g/kg
*Taurine (Min.)	0.08%	0.8 g/kg
*Glucosamine (Min.)	930 mg/kg	930 mg/kg
*Chondroitin Sulfate (Min.)	3,500 mg/kg	3,500 mg/kg
*L-Carnitine (Min.)	20 mg/kg	20 mg/kg
*Total Microorganisms (Min.)	100 million CFU/lb**	100 million CFU/lb**
(Lactobacillus acidophilus, Enterococcus faecium, Lactobacillus acidophilus) *Not recognized as an essential nutrient by the AAFCO Dog Food Nutrient Profiles. **Colony Forming Units per pound		



QUALITY INGREDIENTS

Good food feeds a pet. Great food nourishes your pet's whole body.



**Superior Palatability | Nutrient Dense
Feed Less, Spend Less, Less Waste**
No corn, wheat, soy or by-products

INGREDIENTS

Chicken, chicken meal, brown rice, barley, chicken fat (preserved with tocopherols and citric acid), oatmeal, menhaden fish meal, natural turkey and chicken flavor, dried plain beef pulp, flax seed, potassium chloride, brewers dried yeast, salt, DL methionine, choline chloride, minerals (zinc proteinate, iron proteinate, copper proteinate, manganese proteinate, selenium yeast), vitamins (vitamin A acetate, vitamin D3 supplement, vitamin E supplement, niacin, d-calcium pantothenate, thiamine mononitrate, pyridoxine hydrochloride, riboflavin supplement, folic acid, biotin, vitamin B12 supplement), lactic acid, L-ascorbyl-2-polyphosphate (source of vitamin C), yucca schottigera extract, taurine, L-carnitine, rosemary extract, yeast culture, dried *Aspergillus oryzae* fermentation extract, dried *Bacillus subtilis* fermentation product, dried *Bacillus licheniformis* fermentation product, dried *Trichoderma longibrachiatum* fermentation extract, dried *Enterococcus faecium* fermentation product, dried *Lactobacillus acidophilus* fermentation product, and dried *Bacillus subtilis* fermentation extract.

Contains a source of live (viable) naturally occurring microorganisms.

NutriSource® Adult Chicken & Rice Recipe Dog Food is formulated to meet the nutritional levels established by the Association of American Feed Control Officials (AAFCO) Dog Food Nutrient Profiles for all life stages including growth of large size dogs (70 lbs. or more as an adult).

GUARANTEED ANALYSIS

Nutrient	U.S.	Metric
Crude Protein (Min.)	26.0%	260 g/kg
Crude Fat (Min.)	16.0%	160 g/kg
Crude Fiber (Max.)	4.0%	40 g/kg
Moisture (Max.)	10.0%	100 g/kg
DL Methionine (Min.)	0.25%	2.5 g/kg
Eicosapentaenoic Acid (EPA) + Docosahexaenoic Acid (DHA) (Min.)	0.05 %	0.5 g/kg
Iron (Min.)	125 mg/kg	125 mg/kg
Copper (Min.)	12.4 mg/kg	12.4 mg/kg
Manganese (Min.)	12 mg/kg	12 mg/kg
Zinc (Min.)	120 mg/kg	120 mg/kg
Selenium (Min.)	0.35 mg/kg	0.35 mg/kg
Choline Chloride (Min.)	0.2%	2 g/kg
*Omega - 6 Fatty Acids (Min.)	2.6%	26 g/kg
*Omega - 3 Fatty Acids (Min.)	0.7%	7 g/kg
*Taurine (Min.)	0.1%	1 g/kg
*Glucosamine (Min.)		790 mg/kg
*Chondroitin Sulfate (Min.)		2,800 mg/kg
*L-Carnitine (Min.)		20 mg/kg
*Total Microorganisms (Min.)		100 million CFU/lb**

(*Saccharomyces cerevisiae*, *Bacillus subtilis*, *Bacillus licheniformis*, *Enterococcus faecium*, *Lactobacillus acidophilus*)

*Not recognized as an essential nutrient by the AAFCO Dog Food Nutrient Profiles.

**Colony Forming Units per pound



4960 V35



NutriSource Wet (Tuffies)

Domestic, Middle to Premium Tier Products

NutriSource wet dog food includes a variety of ingredients, focusing primarily on meat-based proteins and incorporating grains and vegetables for nutritional balance. The line comprises four different product families: Grain Inclusive, Grain Free, PureVita, and Element.

NutriSource wet dog foods do not contain soy products.

Popular Ingredient Named Flavors	Condition
Chicken and Rice Lamb and Rice Beef and Rice Lamb Stew Chicken, Lamb, and Ocean Fish Chicken Stew Chicken Formula Grain Free Chicken and Chicken Liver Protein Turkey Entrée Pork Entrée Salmon Entrée Trout and Rice Wild Boar, Turkey, and Pork Liver Beef, Pork, Lamb, and Venison Field and Forest	Food Sensitivities and Allergies Digestive Health Weight Management Joint Health Immune Support

Common ingredients across NutriSource wet formulations include:

Protein Sources	Grains
Beef Chicken Lamb Turkey Venison Chicken Liver Pork Liver Salmon Trout Whitefish	Pearled Barley Quinoa Brown Rice Rice Flour

Fats and Oils	Vegetables and Fruits
Salmon Oil Canola Oil	Carrots Peas Green Beans Pumpkin Spinach Sweet Potatoes
Vitamins and Minerals	Other Ingredients
Vitamin E Vitamin A Niacin Pantothenic Acid Thiamine mononitrate Vitamin D Riboflavin Pyridoxine Hydrochloride Folic acid Biotin Vitamin B12 Zinc Proteinate Iron Proteinate Copper Proteinate Selenium yeast Manganese Proteinate Tricalcium Phosphate. Taurine Choline Chloride	Brewers Dried Yeast

Purina Beneful Dry (Nestle)

Domestic, Middle to Premium Tier Product

Beneful dry dog foods contain a variety of meat protein sources that provide essential proteins for calorie-smart nutrition, with 25 grams of protein per cup. The dry dog food line comprises six different families of products, including Originals, Healthy Weight, IncrediBites, Grain Free, Playful Life, and Healthy Puppy.

Beneful dry dog foods include soybean meal as a source of protein.

Popular Ingredient Named Flavors	Condition
Farm-Raised Beef Real Chicken Natural Salmon Farm-Raised Chicken Farm-Raised Salmon Farm-Raised Beef and Egg	Weight Management Muscle Maintenance and Energy Puppy Development Small Breed Health Food Sensitivities and Allergies

Ingredients commonly found in Beneful dry dog food include:

Protein Sources	Grains
Beef Chicken Chicken Meal Salmon Soybean meal Corn gluten meal Chicken by-product meal	Whole Grain Corn Whole Grain Wheat Barley Rice Oatmeal
Fats and Oils	Fruits and Vegetables
Beef fat preserved with mixed tocopherols	Spinach (dried) Peas (dried) Carrots (dried)

Vitamins and Minerals	Other Ingredients
Calcium carbonate Salt Mono and dicalcium phosphate Potassium chloride Zinc sulfate Ferrous sulfate Manganese sulfate Copper sulfate Calcium iodate Sodium selenite Vitamin E supplement Niacin (Vitamin B-3) Vitamin A supplement Calcium pantothenate (Vitamin B-5) Pyridoxine hydrochloride (Vitamin B-6) Vitamin B-12 supplement Thiamine mononitrate (Vitamin B-1)	Egg and chicken flavor Natural flavors Glycerin

INGREDIENTS	
Salmon, whole grain corn, whole grain wheat, soybean meal, barley, chicken by-product meal, oat meal, rice, beef fat preserved with mixed-tocopherols, corn gluten meal, egg and chicken flavor, natural flavor, soybean oil, calcium carbonate, mono and dicalcium phosphate, salt, glycerin, dried sweet potatoes, dried green beans, dried carrots, potassium chloride, annatto color, vegetable juice (color), MINERALS [zinc sulfate, ferrous sulfate, manganese sulfate, copper sulfate, calcium iodate, sodium selenite], VITAMINS [Vitamin E supplement, niacin (Vitamin B-3), Vitamin A supplement, calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, thiamine mononitrate (Vitamin B-1), Vitamin D-3 supplement, riboflavin supplement (Vitamin B-2), menadione sodium bisulfite complex (Vitamin K), folic acid (Vitamin B-9), biotin (Vitamin B-7)], choline chloride, carmine, L-Lysine monohydrochloride. P409221	
GUARANTEED ANALYSIS	
Crude Protein (Min) 23.0% Crude Fat (Min) 13.0% Crude Fiber (Max) 4.0% Moisture (Max) 12.0% Linoleic Acid (Min) 1.8%	Calcium (Ca) (Min) 1.0% Selenium (Se) (Min) 0.35 mg/kg Vitamin A (Min) 15,000 IU/kg Vitamin E (Min) 100 IU/kg
Calorie Content (calculated)(ME): 3658 kcal/kg, 395 kcal/cup	



INGREDIENTS

Chicken, chicken by-product meal, whole grain corn, soybean meal, corn gluten meal, barley, rice, whole grain wheat, beef fat preserved with mixed-tocopherols, egg and chicken flavor, natural flavor, oat meal, calcium carbonate, fish oil, mono and dicalcium phosphate, salt, glycerin, dried peas, dried carrots, potassium chloride, annatto color, vegetable juice (color), choline chloride, **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), Vitamin A supplement, calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, thiamine mononitrate (Vitamin B-1), Vitamin D-3 supplement, riboflavin supplement (Vitamin B-2), menadione sodium bisulfite complex (Vitamin K), folic acid (Vitamin B-9), biotin (Vitamin B-7)], **MINERALS** [zinc sulfate, ferrous sulfate, manganese sulfate, copper sulfate, calcium iodate, sodium selenite], carmine, DL-Methionine, L-Lysine monohydrochloride. N409321

GUARANTEED ANALYSIS

Crude Protein (Min)	28.0%	Docosahexaenoic Acid (DHA) (Min).....	0.05%
Crude Fat (Min)	14.0%	Calcium (Ca) (Min)	1.1%
Crude Fiber (Max)	4.0%	Phosphorus (P) (Min)	0.9%
Moisture (Max)	12.0%	Vitamin A (Min)	10,000 IU/kg
Linoleic Acid (Min)	1.4%	Vitamin E (Min)	100 IU/kg

Calorie Content (calculated)(ME): 3658 kcal/kg, 388 kcal/cup



INGREDIENTS

Beef, whole grain corn, barley, rice, whole grain wheat, chicken by-product meal, corn gluten meal, beef fat naturally preserved with mixed-tocopherols, soybean meal, oat meal, poultry by-product meal, glycerin, egg and chicken flavor, mono and dicalcium phosphate, calcium carbonate, salt, poultry and pork digest, potassium chloride, dried spinach, dried peas, dried carrots, iron oxide (color), **MINERALS** [zinc sulfate, ferrous sulfate, manganese sulfate, copper sulfate, calcium iodate, sodium selenite], **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), Vitamin A supplement, calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, thiamine mononitrate (Vitamin B-1), Vitamin D-3 supplement, riboflavin supplement (Vitamin B-2), menadione sodium bisulfite complex (Vitamin K), folic acid (Vitamin B-9), biotin (Vitamin B-7)], choline chloride, L-Lysine monohydrochloride. O-4090

Purina Beneful Wet (Nestle)

Domestic, Middle to Premium Tier Product

Beneful wet dog foods feature high-quality protein sources to support muscle maintenance and overall vitality. They are formulated with soft textures and rich sauces suitable for adult dogs and seniors who have difficulty eating hard kibbles. The wet dog food line comprises four different families of products, including Prepared Meals, Medleys, Chopped Blends, and IncrediBites.

Beneful wet dog foods contain soy products. Soy flour is commonly used in several of their wet food recipes.

Popular Ingredient Named Flavors

Popular Ingredient Named Flavors	Condition
Chicken with Carrots, Peas, and Wild Rice	Weight Management Healthy Digestion Muscle Maintenance Immune Support Hydration Appetite Stimulation
Salmon with Sweet Potatoes, Brown Rice, and Spinach	
Lamb with Brown Rice, Carrots, Tomatoes, and Spinach	
Lamb, Brown Rice, and Carrots	
Beef Stew	
Chicken Stew	
Lamb Stew	
Roasted Turkey Medley	
Savory Rice and Lamb Stew	
Chicken, Liver, and Peas	
Beef, Carrots, and Tomatoes	
Romana Style with Chicken, Carrots, Pasta, and Spinach	
Mediterranean Style with Lamb, Tomatoes, Brown Rice, and Spinach,	
Tuscan Style with Beef, Carrots, Tomatoes, and Rice	
Real Beef, Tomatoes, Carrots, and Spinach	
Real Chicken, Tomatoes, Carrots, and Wild Rice	
Real Salmon, Tomatoes, Carrots, and Spinach	

Ingredients commonly found in Beneful wet dog food include:

Protein Sources	Grains
Beef Chicken Turkey Salmon Lamb Pork Animal By-Products (Liver) Soy Flour Wheat Gluten	Barley Wild Rice Brown Rice
Fruits and Vegetables	Vitamins and Minerals
Carrots Peas Green Beans Sweet Potatoes Tomatoes	Zinc Sulfate Ferrous Sulfate Manganese Sulfate Copper Sulfate Potassium Iodide Calcium Iodate Sodium Selenite Iron Manganese Vitamin E Supplement B Vitamins Vitamin A supplement

Beef Stew WITH PEAS, CARROTS, RICE & BARLEY

INGREDIENTS

Beef broth, beef, wheat gluten, peas, carrots, liver, meat by-products, rice, barley, corn starch-modified, soy flour, **MINERALS** [potassium chloride, zinc sulfate, ferrous sulfate, copper sulfate, manganese sulfate, potassium iodide, sodium selenite], tricalcium phosphate, **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), thiamine mononitrate (Vitamin B-1), calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, riboflavin supplement (Vitamin B-2), Vitamin A supplement, folic acid (Vitamin B-9), Vitamin D-3 supplement, biotin (Vitamin B-7)], choline chloride. E406120

GUARANTEED ANALYSIS

Crude Protein (Min) 10.0%
Crude Fat (Min) 2.0%
Crude Fiber (Max) 1.5%
Moisture (Max) 78.0%



GUARANTEED ANALYSIS: Crude Protein (Min) 11.0%, Crude Fat (Min) 2.0%, Crude Fiber (Max) 1.5%, Moisture (Max) 78.0%
INGREDIENTS: Chicken broth, chicken, wheat gluten, meat by-products, tomatoes, carrots, wild rice, corn starch-modified, soy flour, **MINERALS** [potassium chloride, zinc sulfate, ferrous sulfate, copper sulfate, manganese sulfate, potassium iodide, sodium selenite], tricalcium phosphate, choline chloride, **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), thiamine mononitrate (Vitamin B-1), calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, riboflavin supplement (Vitamin B-2), Vitamin A supplement, folic acid (Vitamin B-9), Vitamin D-3 supplement, biotin (Vitamin B-7)], choline chloride. E406120
Beneful is formulated to meet the nutritional levels established by the AAFCO Dog Food Nutrient Profiles for maintenance of adult dogs.
Calorie Content (calculated) (ME) 1051 kcal/kg, 81 kcal/can
Manufactured by: Nestlé Purina PetCare Company, St. Louis, MO 63164 USA
Purina trademarks are owned by Société des Produits Nestlé S.A. Printed in USA.
every ingredient has a purpose
to maintain ideal body condition. When feeding with dry product, one can of this product replaces approximately 1/4 cup dry pet food. Always provide fresh water in a clean container for your dog. Refrigerate unused portions.

GUARANTEED ANALYSIS: Crude Protein (Min) 11.0%, Crude Fat (Min) 2.0%, Crude Fiber (Max) 1.5%, Moisture (Max) 78.0%
INGREDIENTS: Beef broth, beef, wheat gluten, meat by-products, tomatoes, carrots, wild rice, corn starch-modified, soy flour, **MINERALS** [potassium chloride, zinc sulfate, ferrous sulfate, copper sulfate, manganese sulfate, potassium iodide, sodium selenite], tricalcium phosphate, choline chloride, **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), thiamine mononitrate (Vitamin B-1), calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, riboflavin supplement (Vitamin B-2), Vitamin A supplement, folic acid (Vitamin B-9), Vitamin D-3 supplement, biotin (Vitamin B-7)], choline chloride. E406120
Beneful is formulated to meet the nutritional levels established by the AAFCO Dog Food Nutrient Profiles for maintenance of adult dogs.
Calorie Content (calculated) (ME) 1071 kcal/kg, 81 kcal/can
Manufactured by: Nestlé Purina PetCare Company, St. Louis, MO 63164 USA
Purina trademarks are owned by Société des Produits Nestlé S.A. Printed in USA.
every ingredient has a purpose
to maintain ideal body condition. When feeding with dry product, one can of this product replaces approximately 1/4 cup dry pet food. Always provide fresh water in a clean container for your dog. Refrigerate unused portions.

GUARANTEED ANALYSIS: Crude Protein (Min) 11.0%, Crude Fat (Min) 2.0%, Crude Fiber (Max) 1.5%, Moisture (Max) 78.0%
INGREDIENTS: Chicken broth, chicken, wheat gluten, meat by-products, tomatoes, carrots, wild rice, corn starch-modified, soy flour, **MINERALS** [potassium chloride, zinc sulfate, ferrous sulfate, copper sulfate, manganese sulfate, potassium iodide, sodium selenite], tricalcium phosphate, choline chloride, **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), thiamine mononitrate (Vitamin B-1), calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, riboflavin supplement (Vitamin B-2), Vitamin A supplement, folic acid (Vitamin B-9), Vitamin D-3 supplement, biotin (Vitamin B-7)], choline chloride. E406120
Beneful is formulated to meet the nutritional levels established by the AAFCO Dog Food Nutrient Profiles for maintenance of adult dogs.
Calorie Content (calculated) (ME) 1071 kcal/kg, 81 kcal/can
Manufactured by: Nestlé Purina PetCare Company, St. Louis, MO 63164 USA
Purina trademarks are owned by Société des Produits Nestlé S.A. Printed in USA.
every ingredient has a purpose
to maintain ideal body condition. When feeding with dry product, one can of this product replaces approximately 1/4 cup dry pet food. Always provide fresh water in a clean container for your dog. Refrigerate unused portions.

chopped blends WITH CHICKEN, CARROTS, PEAS, & WILD RICE

ingredients

Chicken broth, chicken, wheat gluten, carrots, liver, peas, meat by-products, corn starch-modified, wild rice, rice, soy flour, tricalcium phosphate, **MINERALS** [potassium chloride, zinc sulfate, ferrous sulfate, copper sulfate, manganese sulfate, potassium iodide, sodium selenite], **VITAMINS** [Vitamin E supplement, niacin (Vitamin B-3), thiamine mononitrate (Vitamin B-1), calcium pantothenate (Vitamin B-5), pyridoxine hydrochloride (Vitamin B-6), Vitamin B-12 supplement, riboflavin supplement (Vitamin B-2), Vitamin A supplement, folic acid (Vitamin B-9), Vitamin D-3 supplement, biotin (Vitamin B-7)], choline chloride. D407820

guaranteed analysis

Crude Protein (Min) 11.0%
Crude Fat (Min) 2.0%
Crude Fiber (Max) 1.5%
Moisture (Max) 78.0%



Pedigree Dry Complete (Mars)

Domestic, Middle Tier Product

Pedigree dry complete dog food recipes contain no artificial flavors, high fructose corn syrup, or added sugar. The dry dog food line comprises six different families of products, including Complete Nutrition, Puppy Growth and Protection, High Protein, Healthy Weight, Small Dog, and Tender Bites.

Pedigree dry dog food includes soy products. Soybean meal is used as a source of protein in many of its dry formulations.

Popular Ingredient Named Flavors	Condition
Roasted Chicken, Rice, and Vegetable Roasted Chicken and Vegetable Flavor with Bacon Flavored Bites Chicken and Vegetable Chicken and Rice Chicken and Steak Chicken and Turkey Grilled Steak Grilled Steak and Vegetable Beef and Lamb Puppy Growth and Protection	Weight Management Muscle Maintenance and Energy Digestive Health Immune System Support Dental Health

Ingredients commonly found in Pedigree Dry Complete dry dog food include:

Protein Sources	Grains
Chicken Beef Lamb Corn Gluten Meal Soybean Meal	Ground Whole Grain Corn Brewers Rice Wheat Flour
Fats and Oils	Fruits and Vegetables
Animal Fat (preserved with BHA and Citric Acid) Omega 3 Omega 6	Dried Plain Beet Pulp

Vitamins and Minerals
Vitamin A supplement
Vitamin D3 supplement
Vitamin E supplement
B vitamins
Calcium Carbonate
Zinc sulfate
Ferrous Sulfate
Copper Sulfate
Potassium Chloride

INGREDIENTS:

GROUND WHOLE GRAIN CORN, MEAT AND BONE MEAL, SOYBEAN MEAL, ANIMAL FAT (SOURCE OF OMEGA 6 FATTY ACIDS) (PRESERVED WITH BHA AND CITRIC ACID), CORN GLUTEN MEAL, NATURAL FLAVOR, DRIED PLAIN BEET PULP, CHICKEN BY-PRODUCT MEAL, SALT, GROUND WHEAT, POTASSIUM CHLORIDE, BREWERS RICE, CALCIUM CARBONATE, CHOLINE CHLORIDE, DRIED PEAS, DL-METHIONINE, NATURAL GRILLED STEAK FLAVOR, ZINC SULFATE, MONOCALCIUM PHOSPHATE, VITAMIN E SUPPLEMENT, L-TRYPTOPHAN, RED #40, DRIED CARROTS, NIACIN SUPPLEMENT, YELLOW #6, COPPER SULFATE, BLUE #2, SODIUM SELENITE, POTASSIUM IODIDE, D-CALCIUM PANTOTHENATE, YELLOW #5, VITAMIN A SUPPLEMENT, RIBOFLAVIN SUPPLEMENT (VITAMIN B2), VITAMIN B12 SUPPLEMENT, THIAMINE MONONITRATE (VITAMIN B1), VITAMIN D3 SUPPLEMENT, PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), FOLIC ACID.

GUARANTEED ANALYSIS:

Crude Protein (min.)	21.0%
Crude Fat (min.)	10.0%
Crude Fiber (max.)	4.0%
Moisture (max.)	12.0%
Linoleic Acid (Omega 6 Fatty Acid) (min.)	1.5%
Calcium (min.)	1.0%
Phosphorus (min.)	0.8%
Zinc (min.)	80 mg/kg
Vitamin E (min.)	100 IU/kg

CALORIE CONTENT (Calculated):

3385 kcal ME/kg, 312 kcal ME/cup





Pedigree Wet (Mars)

Domestic, Middle Tier Product

Pedigree Wet Dog Food offers a hydrating option for pet owners looking to enrich their dog's diet with moisture-rich meals. The line includes eight families of meals: Chopped Ground Dinner, Meaty Ground Dinner, Choice Cuts in Gravy, chunky ground dinner, homestyle meals, Little Champions, Puppy Wet Food, and Senior Wet Food.

Pedigree wet foods do contain soy products in some formulations. These include soybean meal and soy flour, which provide protein and add texture to the food.

Popular Ingredient Named Flavors	Condition
Beef	Hydration Appetite Stimulation Protein Needs Weight Management Dental Health Appetite Enhancement Senior Health
Chicken	
Turkey	
Beef, Bacon, and Cheese	
Lamb and Vegetable	
Filet Mignon	
T-Bone Steak	
Chicken Casserole	
Beef, Noodle, and Vegetable	
Hickory Smoked Chicken	
Chicken and Duck	
Beef and Lamb	
Roasted Chicken	
Beef	
Lamb	
Prime Rib and Vegetable	
Porterhouse Steak and Vegetable	
Chicken and Turkey Cuts in Gravy	
Beef and Pork Tenderloin in Gravy	
Chicken and Beef Cuts in Gravy	

Ingredients commonly found in Pedigree Wet Dog Food include:

Protein Sources	Grains
Beef	Barley
Chicken	Wheat
Lamb	Wheat Flour
Turkey	Rice Flour
Duck	Corn
Poultry By-Products	Soybean Meal
Animal Liver	Soy Flour
Fats and Oils	Fruits and Vegetables
Sunflower Oil	Carrots
Fish Oil	Peas
Animal Fats	Beet Pulp

With Beef

INGREDIENTS: Chicken, Sufficient Water For Processing, Meat By-products, Animal Liver, Brewers Rice, Beef, Wheat Flour, Minerals (Potassium Chloride, Magnesium Proteinates, Zinc Sulfate, Selenium, Copper Proteinates, Manganese Sulfate, Copper Sulfate, Potassium Iodide), Added Color, Carrageenan, Sodium Tripolyphosphate, Dried Yam, Natural Smoke Flavor, Xanthan Gum, Vitamins (Choline Chloride, Vitamin E Supplement, Thiamine Mononitrate, Calcium Pantothenate, Biotin, Riboflavin Supplement, Vitamin A Supplement, Vitamin D3 Supplement, Vitamin B12 Supplement), Guar Gum, Red #3

GUARANTEED ANALYSIS:

Crude Protein (min.).....8.0% Crude Fiber (max.).....1.0%
Crude Fat (min.).....6.0% Moisture (max.).....78.0%

CALORIE CONTENT (calculated):

1119 kcal ME/kg, 420 kcal ME/can

Guaranteed Analysis

Crude Protein (min.).....8.0%
Crude Fat (min.).....6.0%
Crude Fiber (max.).....1.0%
Moisture (max.).....78.0%

Calorie Content (calculated):

1119 kcal ME/kg, 420 kcal ME/can

With Chicken

CHICKEN, SUFFICIENT WATER FOR PROCESSING, MEAT BY-PRODUCTS, ANIMAL LIVER, BREWERS RICE, WHEAT FLOUR, MINERALS (POTASSIUM CHLORIDE, MAGNESIUM PROTEINATES, ZINC SULFATE, SELENIUM, COPPER PROTEINATES, MANGANESE SULFATE, COPPER SULFATE, POTASSIUM IODIDE), CARRAGEENAN, SODIUM TRIPOLYPHOSPHATE, DRIED YAM, XANTHAN GUM, VITAMINS (CHOLINE CHLORIDE, VITAMIN E SUPPLEMENT, THIAMINE MONONITRATE, CALCIUM PANTOTHENATE, BIOTIN, RIBOFLAVIN SUPPLEMENT, VITAMIN A SUPPLEMENT, VITAMIN D3 SUPPLEMENT, VITAMIN B12 SUPPLEMENT), NATURAL FLAVOR, GUAR GUM, YELLOW #6, YELLOW #5

Vitamins and Minerals

Vitamin E
Vitamin B12
Vitamin A
Vitamin D3
B Vitamins



Tactic 3: Identify Ingredients and Product Lines with Potential for Replacement by Soybean Meal and other Soy By-Products

Examples of Manufacturers Using Soybean Meal

- Purina
- Hill's Science Diet
- Iams
- Eukanuba
- Pedigree
- Fromm's Gold Grain Inclusive

Chicken Meal and Feathers

- Soy meals contain many of the same amino acids as chicken and feather meals.
- Due to poultry viruses that eliminate entire flocks, chicken meal and feather meal prices can be volatile.
- With increased amounts of soybean meal becoming available, prices should be less volatile and potentially lower.
- Concerns about allergies due to chicken overfeeding may cause some pet parents to see soy products more positively, assuming that the low incidence of soy allergies can be affirmed and accepted by pet owners.

Meat Protein Sources in Age Specific or Condition-Specific Dog Food

- Premium puppy dry dog food typically includes high-quality protein sources to support growth and development. Soy protein isolate could be used similarly to how it is used in piglet supplements to increase survival, vigor, and overall development speed.
- Senior dog formulas often include added protein to maintain muscle mass and strengthen bones.
- Weight control formulas also include added protein and reduced carbohydrates.
- Common protein sources include chicken, turkey, lamb, and beef.

Fatty Acids

- Premium dog food often includes a variety of high-quality animal fats to provide essential fatty acids and energy. Common animal fats include chicken fat, beef fat, pork fat, fish oil, and salmon oil.
- These fats provide energy, help absorb fat-soluble vitamins and contribute to a healthy coat and skin.
- Omega 3 and Omega 6 oils in soybean meal should provide many nutritional benefits of the above animal-based fat sources.
- Soybean oil can be used to coat the kibble to increase shelf life. Because the oil is plant-based, it may be less prone to rancidity factors than animal fat.
- Soybean oil may cost less than fish and salmon oil due to increased soybean crushing plant counts.

Fruit and Vegetable Fiber

- Soy hulls could be an essential source of protein and fiber for dog foods.
- The fiber sources in premium dry dog food aid digestion, support overall gastrointestinal health, and promote healthy, easy-to-pick-up bowel movements.
- Common grains, fruit, and vegetable fiber sources include sweet potatoes, peas, beet pulp, pumpkin, brown rice, oats, apples, carrots, chicory root, flaxseed, and barley.
- Beet pulp is a common laxative for lactating sows that produces a lot of abdominal gas. In tests mentioned during in-depth interviews, soybean hulls significantly reduced abdominal gas.

Price Comparison of Soybean-based Ingredients

Tables 1-9 compare soybean ingredients with competing ingredients in dog food, treats, and supplements. For the tables, aggregated averages of commodity prices were sourced from several commodity trackers online and rounded for simplicity. References for the tables can be viewed under the Reference section of this report. Prices in the tables are meant to highlight cost differences and do not consider outside factors such as consumer preferences, sourcing, or any other producer or processing decisions.

Soybean Meal

Table 1: Price Comparison of Soybean Meal Versus Other Protein Sources in a Dog Food at 10 percent Inclusion Rate

	Soybean Meal 2024 Low	Soybean Meal 2024 Average	Soybean Meal 2024 High	Chicken Meal	Beef Meal	Corn Gluten Meal
\$/ton	\$390	\$420	\$450	\$1200	\$1500	\$800
\$/ton of dog food @ 10 percent inclusion rate	\$39	\$42	\$45	\$120	\$150	\$80
Cost savings/ton of dog food (Low Price)	-	-	-	\$81	\$111	\$41
Cost savings/ton of dog food (average price)	-	-	-	\$78	\$108	\$38
Cost savings/ton of dog food (High Price)	-	-	-	\$75	\$105	\$35

Information sourced from various commodity tracking sources (see References for details)

Table 2: Price Comparison of Soybean Meal Versus Other Protein Sources in a Dog Food at 15 percent Inclusion Rate

	Soybean Meal 2024 Low	Soybean Meal 2024 Avg	Soybean Meal 2024 High	Chicken Meal	Beef Meal	Corn Gluten Meal
\$/ton	\$390	\$420	\$450	\$1200	\$1500	\$800
\$/ton of dog food @ 15 percent inclusion rate	\$58.50	\$63	\$67.50	\$180	\$225	\$120
Cost savings/ton of dog food (Low Price)	-	-	-	\$121.50	\$166.50	\$61.50
Cost savings/ton of dog food (average price)	-	-	-	\$117	\$162	\$57
Cost savings/ton of dog food (High Price)	-	-	-	\$112.50	\$157.50	\$52.50

Information sourced from various commodity tracking sources (see References for details)

Table 3: Price Comparison of Soybean Meal Versus Other Protein Sources in a Dog Food at 20 percent Inclusion Rate

	Soybean Meal 2024 Low	Soybean Meal 2024 Avg	Soybean Meal 2024 High	Chicken Meal	Beef Meal	Corn Gluten Meal
\$/ton	\$390	\$420	\$450	\$1200	\$1500	\$800
\$/ton of dog food @ 20 percent inclusion rate	\$78	\$84	\$90	\$240	\$300	\$160
Cost savings/ton of dog food (Low Price)	-	-	-	\$162	\$222	\$82
Cost savings/ton of dog food (average price)	-	-	-	\$156	\$216	\$76
Cost savings/ton of dog food (High Price)	-	-	-	\$150	\$210	\$70

Information sourced from various commodity tracking sources (see References for details)

Table 4: Price Comparison of Soybean Meal Versus Other Protein Sources Found in Dog Food with Regards to Protein Content

	Soybean Meal 2024 Low	Soybean Meal 2024 Avg	Soybean Meal 2024 High	Chicken Meal	Beef Meal	Corn Gluten Meal
\$/ton	\$390	\$420	\$450	\$1200	\$1500	\$800
Avg Protein Content	44%	44%	44%	60%	50%	60%
\$/ton of protein in meal	\$886.36	\$954.55	\$1022.73	\$2000.00	\$3000.00	\$1333.33

Information sourced from various commodity tracking sources (see References for details)

Traditional Soybean Oil (TSO) and High Oleic Soybean Oil (HOSO)

Table 5: Price Comparison of Traditional and High Oleic Soybean Oil Versus Other Oil Sources in a Dog Food at 3 percent Inclusion Rate

	TSO 2024 Avg	HOSO 2024 High	Chicken Fat	Beef Fat	Pork Fat	Fish Oil	Salmon Oil
\$/ton	1050	\$1350	\$800	\$900	\$800	\$1750	\$3000
\$/ton of dog food @ 3 percent inclusion rate	\$31.50	\$40.50	\$24	\$27	\$24	\$52.5	\$90
Cost savings/ton of dog food (TSO Price)	-	-	\$7.50	\$4.50	\$7.50	\$21	\$58.50
Cost savings/ton of dog food (HOSO Price)	-	-	\$16.50	\$13.50	\$16.50	\$12	\$49.50

Figures in RED indicate that ingredient replacement would cost MORE based on the value listed.

Information sourced from various commodity tracking sources (see References for details)

Table 6: Price Comparison of Traditional and High Oleic Soybean Oil Versus Other Oil Sources in a Dog Food at 10 percent Inclusion Rate

	TSO 2024 Avg	HOSO 2024 High	Chicken Fat	Beef Fat	Pork Fat	Fish Oil	Salmon Oil
\$/ton	\$1050	\$1350	\$800	\$900	\$800	\$1750	\$3000
\$/ton of dog food @ 10 percent inclusion rate	\$105	\$135	\$80	\$90	\$80	\$175	\$300
Cost savings/ton of dog food (TSO Price)	-	-	\$25	\$15	\$25	\$70	\$195
Cost savings/ton of dog food (HOSO Price)	-	-	\$55	\$45	\$55	\$40	\$165

Figures in RED indicate that ingredient replacement would cost MORE based on the value listed.

Information sourced from various commodity tracking sources (see References for details)

Table 7: Comparison of Oil Content of Traditional (TSOF) and High Oleic Soybean Oil (HOSO) Versus Other Oil Sources Found in Dog Food

Fat/Oil	TSOF	HOSO	Chicken Fat	Beef Fat	Pork Fat	Fish Oil	Salmon Oil
Saturated Fat	15%	15%	30%	50%	40%	20%	20%
Monounsaturated Fat	23%	72.50%	50%	45%	45%	30%	30%
Polyunsaturated Fat	58%	12.50%	20%	5%	15%	50%	50%
Omega-3	7%	<1%	0.75%	0.1%	0.75%	30%	29%
Omega-6	51.50%	2%	17.50%	1.5%	12.50%	1.5%	1.5%
Omega-9	25%	72.50%	50%	45%	45%	30%	30%

Information sourced from various commodity tracking sources (see References for details)

Soybean Hulls

Table 8: Price Comparison of Soybean Hulls Versus Other Fiber Sources in a Dog Food at 2 percent Inclusion Rate

	Soybean Hull	Beet Pulp	Psyllium Fiber	Cellulose Fiber	Apple Pomace
\$/ton	\$200	\$250	\$2500	\$750	\$150
\$/ton of dog food @ 2 percent inclusion rate	\$4	\$5	\$50	\$15	\$3
Cost savings/ton of dog food	-	\$1	\$46	\$11	\$1

Figures in RED indicate that ingredient replacement would cost MORE based on the value listed.

Information sourced from various commodity tracking sources (see References for details)

Table 9: Price Comparison of Soybean Hulls Versus Other Fiber Sources in a Dog Food at 7 percent Inclusion Rate

	Soybean Hull	Beet Pulp	Psyllium Fiber	Cellulose Fiber	Apple Pomace
\$/ton	\$200	\$250	\$2500	\$750	\$150
\$/ton of dog food @ 7 percent inclusion rate	\$14	\$17.50	\$175	\$52.50	\$10.50
Cost savings/ton of dog food	-	\$3.50	\$161	\$38.50	\$3.50

Figures in RED indicate that ingredient replacement would cost MORE based on the value listed.

Information sourced from various commodity tracking sources (see References for details)

Goal 3: Prepare a written report on ingredient potential and utilization avenues.

Tactic 1: Identify utilization opportunities and barriers for soy-based ingredients and summarize the findings. (AURI)

After Goals 1 and 2 were completed, the data collected from the tactics used was reviewed for potential barriers to the advancement of soybean inclusion and areas of opportunity for soybeans to be utilized in the pet food, treat, and supplement space.

Barriers

- The idea that grain-free diets are better for dogs still holds sway with retailers and pet owners.
- While plant-based ingredients are gaining market share, products promoting their meat ingredients are still perceived as “higher quality” by many consumers.
- Pet owners still hold misconceptions about the severity and abundance of soy allergies in dogs.
- The Association of American Feed Control Officers (AAFCO) has strict definitions and wording requirements for many soybean ingredients.
 - With the FDA taking more control of regulations away from AAFCO, this could become less of a barrier in the future.

Opportunities

- Grain-based ingredients are typically cheaper than meat-based ingredients.
- Vegan pet foods are gaining traction and are expected to continue to grow over the coming decade.
 - This seems to indicate a growing acceptance of plant ingredients in pet food and treats.
- The shift by consumers towards more value-conscious spending presents an opportunity for soy to position itself as an alternative to higher-cost meat ingredients while maintaining protein content and quality.
- Soy is positioned well to promote its better sustainability profile within the pet food space.
- Pet health remains a strong focus among pet owners. An opportunity exists to highlight and link soybean ingredients with interest in health, including:
 - Protein
 - Omega 3 and Omega 6 fats
- An opportunity exists to use soybean ingredients as stock or substrate in fermentation processes to create higher-value ingredients.
 - Higher protein ingredient
 - Palatants and other flavored ingredients
 - Creation of higher digestible ingredients
- New studies have shown that dogs can survive and thrive with 100 percent plant-based diets.
 - Studies had limited participants but are a significant first step in highlighting.

- With increased research on gut health and its benefits, there are opportunities to highlight soy's positive benefits in that space.
- Edamame and other soy foods present opportunities to reposition and redefine soybean ingredients.

Tactic 2: Identify 2-3 Ingredients and Product Lines with Greatest Potential for Soybean-Based Ingredient Inclusion

For Tactic 2 of Goal 3, ingredient categories or product lines were investigated to determine which had the greatest potential for soybean-based ingredients to be included in their formulation. Nutritional content, functional purpose, ingredient functionality, and unique value propositions were examined to determine the potential success and opportunity for including soybean ingredients.

Healthy Treats

- Replaces calorie-laden ingredients for better weight management.
- Hydrolyzed soy protein with improved palatability and little to no allergenic response
- Meat-free but high protein
- High antioxidant, high fiber
- Baked, not fried.
- Edamame for dogs -- frozen soybeans in pods

Treats have gained popularity among consumers as a way to reward their pets and, in some cases, have been used to supplement meals with a sense of “indulgence.” Coupled with the growing concern for overall health and nutrition among consumers, treats that tout health benefits offer the opportunity for soybean ingredient inclusion due to soybeans' excellent protein content and quality and soy oil's Omega fat content.

Flavored Soy Oils with Omega Fats for Kibble Coatings

- Replace animal fats with healthier plant-based oils.
- Naturally higher Omega 3 and Omega 6 levels compared to animal fats.
- Reduced potential for rancidity versus animal fats
- Longer shelf life compared to animal fats.
- No cholesterol

Dry kibble is traditionally sprayed with oils containing palatants after extrusion to meet nutritional requirements. Kibble also includes oil-soluble palatants and flavorings that cannot be added before extrusion due to heat sensitivity. Soybean oil has the potential to replace these fats with oil that naturally contains higher levels of Omega fats and contains no cholesterol, allowing manufacturers to make claims about health that they would not be able to with traditional animal fats. The reduced potential for rancidity of soybean oil versus animal fats will also allow for a more extended shelf life without the need to add antioxidants and costs.

Dental Treats

- Excellent ability to be extruded.
- Hydrolyzed soy protein isolates have good plasticizer properties, which would be beneficial in a particular dental treat or chew products.
- Functionality of soy protein has the potential for inclusion or replacement of ingredients in existing formulas.
- The high protein content of soybean meal would allow for health comparisons versus traditional ingredients and formulas commonly used.

Dental treats or chews would offer a unique opportunity to include soybean ingredients due to the naturally functional nature of soy protein. In addition to being an excellent extrusion ingredient, specific hydrolyzed soy proteins can be used as a plasticizing agent within a formula. This would benefit specific dental treat/chew formulations looking to create a denser product that won't crumble under stress. This functionality would allow products that utilize soy protein to make claims centered around health compared to other products that utilize carbohydrate or sugar-based formulations.

Supplements

- Inflammation joint care with Omega oils
- Calming agents with soy magnesium
- Potential for hydrolyzed amino acids similar to human supplements

With increased concern for pets' overall health, consumers are turning to supplements to augment their pet's daily nutritional value or offer extra protection or defense against an ailment or condition. An easy target for the supplement sector would be to go after inflammation or joint health with soybean oils that naturally present Omega 3 and Omega 6. Another option would be to target anxiety by having a treat or supplement that highlights soy's naturally present magnesium content. Finally, there exists an opportunity for research into hydrolyzed soy protein for peptides or amino acids. Similar to how humans take peptide or amino acid supplements to augment certain health regimens, there could be potential for investigating if hydrolyzed soy protein contains any peptides or amino acid combinations that could be sought for health benefits.

Tactic 3: Create a Sell Sheet on the Opportunity for Soy-based Ingredients in Dog Food

Objectives

1. Update dog food manufacturers about what is new with soy-based ingredients.
2. Create consideration of soy-based ingredients in their formulations.

Key Message Points

- Consumers are concerned about increasing dog food prices and are trading down from premium meat-based dry dog foods.
- Soy-based ingredients are a cost-effective protein source that merits consideration, given spiraling production costs that have been passed onto consumers.

- Soy-based ingredients are more versatile than ever because of technological advancements in processing techniques.
- Soy-based ingredients have high sustainability.

Key Content Points – Soybean Meal

- Cost-effective replacement for higher-cost animal-based meals (chicken, beef, lamb) and chicken feather meal.
- Soybean meal is expected to be more affordable because of the increased number of crush plants being constructed.
- Soybean meal offers complete nutrition and is highly and easily digestible.
- Soybean meal is a high protein source for senior or weight-challenged dogs.

Key Content Points – Soy Oil

- Cost-effective replacement for higher-cost fish oils.
- Sustainable agricultural product versus fish oil, which further depletes sea fish populations.
- High in Omega 3 and Omega 6 oils.
- Prevents inflammation in skin, joints, and potentially vascular systems.
- Cost-effective replacement for higher-cost chicken fat or beef tallow used to coat the kibble with a potentially longer shelf life.

Key Content Points – Soy Hulls

- Underused digestible fiber source that contains beneficial proteins and sugars.
- Produces little to no abdominal gas, unlike vegetable and fruit pulp.
- Firms stools for easy fecal pickup.

Key Content Points – Processing Technology Improvements

- Technology advancements in enzymes and hydrolyzation techniques make soy more versatile than ever.
- Enzymes and hydrolyzation increase palatability by removing beany taste associated with soy products.
- Enzymes and hydrolyzation eliminate allergenicity by decreasing peptide sizes.

Tactic 4: Outreach

In support of Goal 3, a ‘pet food sell sheet’ handout was developed and is included in Appendix A. The handout will be disseminated at future tradeshow events attended by AURI. AURI Food Scientist Ben Swanson used the handout as a conversation tool while networking with industry professionals at the Pet Food Forum in Kansas City, Missouri, in April 2024. The Pet Food Forum was attended by nearly 4,000 people from 48 countries and had over 390 booths. It is one of the top two pet food conferences in the United States. Big industry players, such as Cargill, General Mills, J. M. Smucker Company, and commodity groups, have a presence at the event. Topics and themes for the 2024 Pet Food Forum included sustainability in pet food, alternative pet food ingredients, functional ingredients centered around health, and new and emerging packaging and processing technologies.

Outreach activities planned in the coming months include a podcast of the research findings in April 2025 and an article in the April/May 2025 issue of AURI's *Ag Innovations News* publication. In addition, AURI Business and Industry Development Director Harold Stanislawski will be attending Bio Innovations Midwest, September 23-24, 2024, in Omaha, Nebraska. This event highlights bio-innovations and value and supply chains. AURI will explore opportunities to advance the soy complex within the bio-innovations area. Ben Swanson will attend Bridge2Food North America, October 8-10, 2024, in Minneapolis, Minnesota. This event will be an opportunity to explore pathways for advancing soy in pet food.

During a guest lecture at Southwest Minnesota State University, Ben Swanson further highlighted the project as an example of AURI's work with commodity groups like Minnesota Soybean in the pet food space.

Conclusion

While soybean-based ingredients face barriers in their effort for inclusion or expansion of market share, including grain-free diets and the perception of plant-based ingredients, overestimation of soy allergies in pets, and limitations of ingredient definitions by AAFCO, an opportunity exists for soy to see further inclusion and expansion within the dog food industry. In a market where consumers are shifting towards more economical options, grain-based ingredients (including soy) are typically cheaper while maintaining a high-quality level of protein ingredients. Soybean ingredients also benefit from a growing acceptance of vegan and plant-based formulations, boosted again by soy's ability to position itself as a sustainable dog food ingredient, as well as new studies highlighting dogs' ability to thrive while on 100 percent plant-based diets.

Backed by findings from this report, four areas of opportunity for soybean ingredients have been identified: healthy snacks/treats, oil-based coating for dry dog food, dental treats/chews, and supplements. Pet health is a major consumer priority, and a soybean protein treat would allow consumers to spoil their pets while easing their consciousness about overindulging them. High oleic soybean oil has a much longer shelf life than fats or oils traditionally used in dog food formulas, allowing manufacturers to extend their product's shelf life without fearing significant cost increases. Dental treats have gained popularity as a reward for pets with the added function of helping with overall dental health. Soybean protein's excellent extrusion functionality and inherent plasticizer ability would allow for inclusion in formulations without sacrificing the treats' function as a dental health tool. Finally, soybean ingredients contain various health-related qualities with the potential to be marketed within the dog health space, including Omega fats, flavonoids, and overall protein quality.

Recommendations

In a follow-up to this study, work in the following areas is recommended:

- Experiment with dog food and treat formulas incorporating edamame instead of traditional soybean meal. This would allow for a more “consumer friendly” ingredient label while delivering high-quality soybean nutrition.
- Look at performance in extruded kibble as well as fresh, ground food or topper additives.
- Compare nutrition with standard soybean meal formula.
- Compare the palatability of edamame formulation with soybean meal formula.
- Experiment with a dental chew/treat formulation incorporating soybean protein and fiber.
- Better quantify petfood market trend changes on overall soybean meal demand – trend towards reducing meat ingredients with soy-based plant ingredients.

AURI is pursuing follow-up work based on the findings in this report with assistance from a student intern from Southwest Minnesota State University in Marshall, Minnesota. This will include implementing soybean-related formulations for kibble, a high-protein snack/treat, and a dental chew/treat, as well as possibly exploring opportunities for supplementing soy-based ingredients in the dog food space.

References

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Appendices

NOTE: Please see the PDF Attachment Section to view each Appendix included herein.

Appendix A: AURI Pet Food Sell Sheet Handout