



ORIJEN | BIOLOGICAL FOOD FOR CATS AND DOGS

The Biological Food Concept and the Dietary Needs of Domestic Dogs and Cats

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1 | ANATOMY OF A CARNIVORE

To understand the nutritional needs of dogs and cats, it is useful to begin with a basic understanding of their anatomy, and how they differ from herbivores and omnivores.

While the dog has been a companion to humans for at least 10,000 to 14,000 years, he is closest genetically to the wolf - differing only 1% or 2% in their gene sequences.

Like wolves and lions - dogs and cats are opportunistic carnivores that thrive on diets that are almost exclusively meat-based, and with very few carbohydrates.

ANATOMICAL DIFFERENCES | HERBIVORES, OMNIVORES, CARNIVORES

The anatomical specialization of dogs and cats to a meat based diet can be seen in the length of their gastro-intestinal tract, the development of their teeth and jaws, and their lack of digestive enzymes needed to break down starch.

1. HERBIVORES (cows, sheep) have:

- long digestive tracts that are designed to ferment and process vegetation.
- flat molars to grind grasses and are built for grazing.
- the ability to break down cellulose found in plant materials and depends on vegetation for complete nutrition.

2. OMNIVORES have:

- medium length digestive tracts giving them the ability to digest vegetation and animal proteins.
- flat molars and sharp teeth developed for some grinding and some tearing,
- the ability to eat either plants or animal proteins - but most often need both categories of food for complete nutrition.

3. CARNIVORES have:

- short, simple digestive tracts for digesting animal protein and fat. (dogs and cats fall into this category).
- sharp, blade-shaped molars designed for slicing, rather than flat grinding molars designed for grinding.
- jaws that cannot move sideways (unlike herbivores and omnivores that grind their food by chewing) and are hinged to open widely to swallow large chunks of meat whole.

CARNIVORES | EVOLVED FOR MEAT

To summarize, the anatomical features that define all carnivores are:

1. MOUTH AND TEETH

- A large mouth opening with a single hinge joint.
- Short and pointed teeth made for grasping and shredding (not grinding).
- Teeth and mouth designed to swallow food whole (not for chewing or crushing).



2. SALIVA

- Carnivores do not have digestive enzymes in their saliva. Humans have amylase, which helps to begin to break down complex carbohydrates.

3. DIGESTIVE CAPABILITY

- A short digestive tract that is one-third the length of an omnivore and designed for the quick digestion of meat.
- A higher concentration of hydrochloric acid in the stomach to break down proteins. Carnivores have a stomach acidity of about pH 1 - compared to humans at pH 4 to 5.

A THREE POINT CONCLUSION

1. Dogs and cats evolved to eat food that is meat or amino-acid based.
2. The gastro-intestinal tract of cats and dogs – which is central to health and wellness – is specialized to a largely carnivorous diet.
3. The adaptation of cats and dogs to a low carbohydrate diet is evident in the structure of their teeth and jaws, and in their lack of amylase or other digestive enzymes that break down starch.



2 | THE DIETARY NEEDS OF DOGS AND CATS

Section 1 illustrated that dogs and cats have short digestive tracts and gastro-intestinal systems that are designed to consume and metabolize animal flesh and fat.

This raises the question of what foods are best for carnivores according to their digestive tract and physiology.

NOURISH LIKE NATURE | **MEAT CONCENTRATED FOODS**

- As carnivores, dogs and cats have difficulty digesting grains and other complex carbohydrates.
- An ideal diet is to mirror nature, and as closely as possible match the natural balance of meat foods that dogs and cats would find by hunting in the natural environment.
- The solution is simple – dogs and cats are best fed an assortment of minimally processed meat proteins and fats, with no grains and very few carbohydrates.
- Studies show clearly that both dogs and cats do best on animal protein and fats from meat - and the higher the meat quality, the better the protein and fat is assimilated.

Section 5 defines protein quality.

NOURISH LIKE NATURE | **FEWER CARBOHYDRATES**

- As explained in Section 1, dogs and cats lack digestive enzymes in the mouth.
- This means carbohydrates are not predigested and take a long time to break down in the stomach and small intestine. Most complex carbohydrates pass through undigested, and create large stools in the dog.
- Dr. David Kronfeld reports that carbohydrates are important for dogs in just two situations: puppies just coming off the mother's milk (which is 12% carbohydrates) and the lactating bitch, which needs three times the usual turnover of blood glucose for production of milk. He goes on to state that "no carbohydrates need be provided in the diet for pups after weaning or adult dogs, not even for those subjected to hard work.
- The liver is easily able to synthesize sufficient glucose (from amino acids derived from protein and glycerol derived from fats) for transport in the blood and utilization in other tissues."
- He also goes to state that he feels the high carbohydrate content in dog foods is what contributes to coprophagy (stool eating), and hypoglycemia.

NOURISH LIKE NATURE | **BIOLOGICAL FOODS**

Biologically foods like ORIJEN are designed to match the digestive capability of dogs and cats – they are high-protein, low-



carbohydrate foods with a high concentration of meats and fats.

- Dogs and cats have difficulty digesting grains and other carbohydrates.
- Dogs and Cats lack digestive enzymes in the mouth, and as complex carbohydrates are not predigested they take a long time to break down in the stomach and small intestine.
- Most complex carbohydrates pass through undigested, creating larger stools.

NOURISH LIKE NATURE |

CONCLUSIONS

1. Section 1 illustrated that dogs and cats have short digestive tracts and gastrointestinal systems that are designed to consume and metabolize animal flesh and fat.
2. Yet most commercial dog and cat foods are created upon the premise that the digestive system of the dog is similar to humans - with a correspondingly heavy emphasis on carbohydrates.
3. Biologically foods like ORIJEN are designed to match the digestive capability of dogs and cats – they are high-protein, low- carbohydrate foods with a high concentration of meats and fats.



3 | ORIJEN DEFINED

“Although life styles have changed, the digestive systems of cats and dogs haven’t changed for hundreds of years”

By matching the foods that dogs and cats naturally evolved to need, ORIJEN provides the ultimate solution to dog and cat nutrition.

A SIMPLE CONCEPT FOLLOW NATURE

- A Biological diet matches the anatomical specialization of dogs and cats to high protein, low carbohydrate food.
- A Biological diet contains only foods for which dogs and cats are evolved to eat (in the correct ratio and quantity)
- A Biological diet excludes ingredients like for which dogs and cats are not biologically adapted.

BIOLOGICALLY APPROPRIATE 5 KEY DIFFERENCES

A BIOLOGICALLY APPROPRIATE food matches the anatomy of the dog or cat, keeping in mind today’s modern lifestyle and reduced calorie requirement.

1. HIGH PROTEIN FROM FRESH MEATS
2. GRAIN FREE
3. LOW CARBOHYDRATE
4. RICH IN FRUITS AND VEGETABLES
5. HEALTH-PROMOTING BOTANICALS

1. HIGH PROTEIN FROM FRESH MEATS

Dogs and cats are carnivores. Their bodies are adapted for high protein, low carbohydrate, meat concentrated foods.

- ORIJEN diets contain 70% meat and naturally high in protein to provide the amino acids essential for optimal wellness and vitality.
- ORIJEN diets are high-protein to naturally eliminate the need to rely upon grains and carbohydrates as inappropriate energy sources.
- ORIJEN is formulated with minimum 70% inclusions of meat ingredients, including fresh grain-fed chicken, fresh-caught Whitefish and fresh-whole eggs (30%). These fresh meats are low temperature cooked (90c) to preserve their original amino and essential fatty acid content.

2. GRAIN-FREE

Dogs and cats did not evolve to eat grains.

Grains first appeared in pet foods about 70 years ago - when consumers wanted the convenience of pet food in a bag and manufacturers wanted to reduce costs with inexpensive calories from carbohydrates.

- Grains such as rice or wheat provide low-cost calories but their high carbohydrate content contributes to obesity, diabetes and a host of other health problems.



- Either as a carbohydrate or as a protein, grains are always a second best choice for dogs and cats.
- Although still widely practiced, the “grain-and-carbohydrate” approach to nutrition overlooks the most fundamental purpose of pet food: enhancing the pet’s health!

3. LOW CARBOHYDRATE (LESS THAN 20%)

The average “super premium” pet food contains over 40% carbohydrate – yet dogs and cats have no biological requirement for carbohydrates.

In contrast, ORIJEN is very low in carbohydrate. In addition to promoting every day vitality and wellness, low carbohydrate foods reduce obesity, insulin resistance and diabetes.

- In the body of a cat or dog, carbohydrates are recognized as sugar, which easily convert to fat and contribute to a variety of health problems.
- High carbohydrate diets lead to blood sugar fluctuations and problems of insulin resistance.
- Despite this, carbohydrates from grains remain popular among producers for their low cost, ready availability, and easy processing. Most commercial pet foods feature two or more grain ingredients and exceed 40% in total dietary carbohydrate!

4. FRUITS AND VEGETABLES (MINIMUM 25%)

Instead of grain, ORIJEN contains healthful fruits and vegetables that – along with limited carbohydrate - supply important vitamins, minerals and phytochemicals.

- ORIJEN is made with potatoes, tomatoes, carrots, kelp, spinach, black currants, cranberries and apples.
- Unlike “holistic” pet foods that rarely contain more than five percent fruit and vegetables, ORIJEN contains 25% of these health-promoting foods!
- Fruits and vegetables supply natural protector nutrients like B-vitamins, essential minerals and valuable enzymes that enhance immunity and digestive motility.

5. BOTANICALS AND ENZYMES

Dogs and cats have the instinctive ability to select and consume grasses and plants that enhance their life-force and botanicals bridge the gap between good nutrition and total physical well-being.

BOTANICALS AND TONIC HERBS

A tonic herb is a plant used by the body to heal, strengthen or balance itself.

- Tonic herbs support the function of different organs, which, in turn, improve overall health of the body.
- Animals naturally seek out and consume the plants that their bodies need.
- Botanicals serve as tonics that strengthen organs, glands and tissues in



specific parts of the body – such as strengthening the heart or aiding digestion.

- Botanicals assist in the healing process by helping the body to eliminate toxins, through physiological processes like the emptying of the bowels or bladder or cleansing of the liver.
- The native botanicals featured in ORIJEN are selected by holistic veterinarians for their broad supportive role as natural antioxidants in promoting the daily health of cats and dogs, and their efficacy in helping solve common health problems of allergic dermatitis, inflammatory bowel disease and chronic hepatitis.



4 | A SHORT HISTORY OF COMMERCIAL PET FOOD

If dogs and cats are carnivores, then why do so pet food producers make low-protein, high-carbohydrate foods with high concentrations of grain?

To answer this question, it is important to understand the history of commercial pet food.

The history of commercial pet food is short when compared to the length of time that dogs have been companion animals.

- Dry dog and cat foods became popular after World War II.
- Most commercial pet foods are simply heavily processed 'people food' - made for shelf life and economy rather than for the health of the dog or cat.

WHAT DOGS ATE BEFORE COMMERCIAL DOG FOOD

Before commercial dog foods were available, dogs ate whatever food was available in their environment. Farm dogs, ate meat scraps, milk, eggs and food found scavenging, and city dogs depended on scraps from the owners' table, and cheap cuts of raw meat from the butcher.

THE EVOLUTION OF PET FOODS

In 1860, the first processed dog food was introduced by James Spratt, of Cincinnati, Ohio who developed a biscuit made of wheat, beet root, vegetables and beef blood.

- Other companies quickly jumped on the bandwagon, and more baked dog products were on the market.

- The depression in the 1930's prompted dog owners to look for less expensive methods to feed their pets.
- Less meat was fed, and more grains and cereal products were introduced in home diets.

IN THE 1960s marketers of dog foods were claiming their products were superior, as they were able to utilize waste products such as grain hulls, sweepings and meat unusable for human consumption.

- While fresh meat and vegetables were superior, pet food producers argued that dogs and cats could be fed at lower cost with by products.
- The sales of dry pet foods increased considerably after World War II.
- Mill operators and grain dealers were finding a good source for their by-products in the dog industry.
- Convenience was the first selling point for prepared and packaged dog foods.
- Pet food companies began labeling their dog foods as "complete, with no additional foods or supplements" being necessary.
- Pet food companies advised that table scraps could actually be dangerous to the dog's health.

BY THE 1970s, pet food marketing expanded to celebrities in television commercials, making dog kibble into various shapes and using colors to make foods look pleasing to consumers.

- Pet foods moved from animal feed stores to the grocery shops, with bright labels and appealing pictures.
- The marketing strategies worked as pet food sales surpassed baby food sales.
- Aisle and shelf space for pet foods expanded as more pet food producers came on board.



Then came specialty diets, formulated for specific diseases or disorders in pets.

- These diets portrayed nutrition as complex, and consumers relied on veterinarian's advice about nutrition, rather than trusting their own judgment.
- Shopping expanded from supermarkets to the veterinarian's office.

BY THE EARLY 1980s "premium" and "super premium" dog foods arrived and producers claimed they were more nutritional, offering different formulas for puppy diets, maintenance diets, performance diets and senior dog diets.

- Although advertised as 'premium' these foods still used old standards of high carbohydrate and low protein.

IN THE 1990s, consumers became more educated on nutrition for their own diets and began reading pet food labels and questioning some of the ingredients – such as chemical preservatives.

- Many pet food companies eliminated chemical preservatives, and are now using vitamin C and vitamin E for preserving fat in dog food.

This takes us to today – where pet foods are labeled as natural, either by offering organic foods or novel meats - such as venison, fish or rabbit.

Yet today's pet foods continue to heavily process ingredients and rely heavily on grains, grain fillers, fibers and grain by-products.

THE HISTORY OF PET FOOD | CONCLUSIONS

Although consumers today are much better educated and increasingly aware of the ingredients in dog food – many are not

aware of the amount of carbohydrate in their pet foods.

History shows that dried pet foods have always been made with grains – which is the primary reason consumers accept grains as part of their pet's diet – they've always been there.

- When questioned as to why grain and carbohydrate are suitable for their dog or cat, most consumers come to the realization that these ingredients are not part of the natural canine or feline diet.
- Despite advances in marketing – from Premium, Super-premium and "holistic diets" – pet foods really haven't changed over the last 40 years. They are still low-protein, high-carbohydrate foods, made with high percentages of grains.
- The simple truth is this – pet foods are designed primarily to appeal to consumers at the lowest cost, rather than enhancing the health of dogs and cats as their focus.



5 | PROTEIN QUALITY

PLANTS VERSUS MEAT PROTEINS

For carnivores, animal proteins are considered complete and plant proteins are considered incomplete, due to their respective amino acid profiles.

PLANTS

- Plant proteins are usually missing arginine, taurine, methionine, lysine and tryptophan.
- Corn, for example, does not contain glycine, lysine or tryptophan.
- The lack of these essential amino acids reduces the protein quality of the food.

MEATS

- Meat contains all the essential amino acids and is considered high quality.
- The measure for assessing protein quality is based on the egg, which is considered to have all essential amino acids in sufficient amounts.

DIGESTIBILITY

Protein digestibility is the key quality measure. And in the short digestive systems of dogs and cats, plant proteins are far less digestible than meat proteins.

- It takes more plant proteins than animal proteins to give the adequate protein percentages, and even then, essential amino acids will be lacking.
- Meat protein is the best choice - it is easily digested and contains the amino acids essential for dogs and cats.

TABLE 1 - PROTEIN DIGESTIBILITY

PROTEIN SOURCE	% DIGESTIBLE
Egg whites	100%
Muscle meats (Fish, chicken)	92 %
Organ meats (kidney, liver)	90 %
Milk, cheese	89 %
Wheat	64 %
Corn	54 %

LOW TEMPERATURE COOKING

Cooking or processing has a major impact on overall protein (and fat) quality.

ORIJEN diets have the highest possible fresh meat inclusions from chicken, fish, egg. To preserve protein quality and amino acid integrity, ORIJEN ingredients are low temperature cooked at 90C for 3 – 5 minutes – substantially lower temperature and less time than what most people would cook their dinner.

- High temperatures and long exposure to heat alter amino acid chains and lowers the quality of protein.
- High temperatures create bonds between protein and carbohydrates, which interferes with protein digestibility (specifically lysine).
- High temperature cooking destroys amino acids methionine and histidine.



6 | PROTEIN QUANTITY

It was once believed that excess protein could cause problems in dogs.

Science has since shown that dogs have the ability to metabolize excess proteins and that protein is the most essential element of the canine and feline diet - necessary to sustain life and maintain the integrity of the internal organs.

Today, it is considered harmful to restrict protein, and high levels of quality proteins are essential for optimal health, especially for older pets.

HIGH PROTEIN DOES NOT OVERWORK THE KIDNEYS

- The myth that high protein diets are harmful to kidneys probably started because, in the past, patients with kidney disease were commonly placed on low protein (and thus low nitrogen) diets.
- Science has since shown that for patients with kidney disease the concern is rather protein quality, not quantity.
- High quality protein is digestible and produces fewer nitrogen by-products.

NUTRITIONAL SCIENCE SUPPORTS HIGH PROTEIN DIETS

Long term studies feeding 19%, 27% or 56% protein diets over four years to dogs with reduced renal function show:

- Dietary protein restriction does NOT prevent the development of kidney disease.
- There is no correlation between progression of kidney disease and dietary protein level.
- Kidney function is better in dogs fed a diet of 54% protein than 27% protein.

PUPPIES | HIGH PROTEIN

Puppies need large amounts of quality protein. In its natural environment, the puppy diet will range between 35-45% proteins.

- Dietary protein requirements are higher for growing puppies than adults.
- In addition to supplying protein needed to support protein turnover and cellular metabolism, puppies need protein to build muscles and other tissues.
- English setter puppies fed a low-protein diet showed stunted growth compared to puppies fed higher levels of protein.

When the protein level was increased in the puppies the deficiency was corrected.

- Low protein diets negatively affect the immunological response of puppies - this is true for large and small-breeds.

ADULT DOGS | HIGH PROTEIN

Dogs are carnivores. Their digestive systems are designed to handle large amounts of meat and fat – it is logical that they would do better on high protein, meat concentrated diets that match their natural foods.



Protein is an essential part of the canine diet, necessary to sustain life and maintain the integrity of the internal organs.

- Protein is important for dogs in all stages of life, and the quality of the protein is equally important.
- It is important to insure that a wide spectrum of amino acids is being provided from fish, poultry and eggs.
- Protein needs cannot be met by feeding grains, starches and vegetables.
- While plants may lend fiber, some minerals and vitamins - only animal based proteins supply a complete balance of amino acids needed good health and longevity.

SENIOR DOGS | HIGH PROTEIN

The belief that senior dogs need less protein is false. Diets formulated produced on this premise are full of fiber, have higher levels of carbohydrates and reduced amounts of protein and fat.

This results in dogs that are less satisfied causing them to appear hungry and beg for more food. These ingredients lead to the loss of coat and skin quality and they do not lead to any weight loss.

More recent studies show today that it is harmful to restrict protein in senior dogs and that high quality proteins are needed for our older pets.

Higher protein means less carbohydrate, and reduced carbohydrates are important for the senior dog's diet

- Older dogs have a higher protein requirement than do younger adult dogs.

- Older dogs require more dietary protein to maintain body condition and muscle mass than do young dogs.
- Older dogs actually require a higher level of protein to maintain their body stores of protein.
- If the dog does not absorb enough protein, its body goes into negative nitrogen balance. With a negative nitrogen balance, enough protein for metabolism is not provided from the diet, and protein is pulled from muscle to provide the body the protein it needs. This leads to muscle wasting, loss of body weight, and protein deficiency.

Many commercial foods now sell formulas designed specifically for the needs of the senior dog. These are often diets that offer lower protein, but studies show that this can cause more harm than good.

- A diet rich in protein is especially important for older dogs.
- Senior dogs appear less efficient at metabolizing protein, so they require additional protein in their diets to help compensate.
- In fact, research has shown that healthy older dogs may need as much as 50 percent more protein than normal young healthy adult dogs.

PERFORMANCE DOGS | HIGH PROTEIN

Current research shows that high protein diets achieve endurance and stamina.

- Increasing protein allows for glycogenesis, which is the ability to make glucose from amino acids. Raising protein values has been found to be a definite advantage in other areas as well. (www.working-retriever.com/library/dietper.html)



- One example is research on the value of protein. Dogs in intense training were fed foods with protein levels varying from 16% to 40%. Dogs fed the lower-protein foods (16% and 24%) had injuries during training and all of the dogs on the 16% protein food were removed from training due to injuries.
- Dogs fed 32% and 40% protein had no injuries during the training process. An important goal of canine nutritionists is to provide the performance dog with a food that supplies sufficient calories from other sources to allow minimal protein usage for caloric needs. This spares the protein for tissue repair, hormone production, and the other crucial functions of protein."
(www.purina.com/breeders/magazine.asp?article=430)
- Protein is important to help reduce the risk of training anemia. One study showed that endurance dogs fed 19 percent of their calories as protein suffered significantly more injuries, had decreased oxygen uptake and fewer red blood cells than dogs fed diets containing 24, 32 or 40 percent protein.
- Dogs fed 40 percent protein had the highest circulating plasma than any group throughout training, showing that the increase in nutrient needs associated with exercise cannot be met with a low-protein diet.
- In a study of racing greyhounds, Hill found that a diet containing higher fat and protein and lower carbohydrate increased performance. "We compared a 32 percent fat, 25 percent protein and 43 percent carbohydrate diet to one with 25 percent fat, 21 percent protein and 54 percent carbohydrate." He says, "These greyhounds ran an average of 0.2 seconds faster - the difference between winning and losing a race - when fed the diet containing higher fat and protein and lower carbohydrate."
(www.acsma.org/csmtdbt5.htm)
- "Protein is both an energy source and a source of amino acids. High-quality animal source proteins provide superior digestibility, amino acid balances, and palatability. Exercise increases an athlete's protein requirement. Exercise places excess demands upon the body which result in tissue disruption and occasionally tissue damage. These tissues must be remodeled and repaired which can result in an increased protein demand. This demand can be met by increased protein ingestion. Protein can also be used for an energy source with an energy yield of 3.5 kcal per gram."
- The above references and research on diet and energy needs for a performance dog indicate that high quality bioavailable proteins are key to increased stamina and endurance.
- Carbohydrates tend to be an area of controversy. So far, the above data has suggested a diet of up to 40% protein and as much as 50% fat. This would leave little room for carbohydrates.
- It is difficult to find unbiased research on the carbohydrate issue. Part of this is due to the fact that most research is funded by dog food companies and the dry foods are mostly grains and starches. While a high protein, high fat diet may be recommended, one would not find this in a dry dog food.



7 | CARBOHYDRATE

While starches in carbohydrates are useful for herbivores, they slow down the digestion process for dogs and can cause irritation and spasms in the large intestine.

HOW CARBOHYDRATES AFFECT DIET QUALITY

- Dogs and cats lack the digestive enzymes for starch and have a short digestive tract, and carbohydrates are difficult for them to digest.
- Starches (carbohydrates) convert into glucose (sugar).
- Too much glucose in a dogs system can lead to hypoglycemia, hyperactivity and diabetes and - according to Dr. Olgivie DVM's studies at Colorado State University - can lead to accelerating tumor and cancer growth in canines.
- Grains and starches contain phytates, which block mineral absorption. These include calcium, magnesium, zinc, iron and iodine.

While carbohydrates can provide an energy source (sugars) fat is a much better energy source for stamina and endurance.

CARBOHYDRATES AFFECT DIGESTIBILITY

In humans, the pancreas releases amylase, a digestive enzyme to break down starch to maltose.

- Unlike omnivores, dogs do not have amylase in their saliva to help break down starches in the mouth.

- Consequently, dogs are not as efficient at digesting starches, and have a difficult time with a diet high in most complex carbohydrates.
- Carbohydrates stay in the dogs' digestive tract longer, causing more energy to be used to try and absorb these foods. The consequence of eating a diet high in starches is seen in bulky, thick stools.

CARBOHYDRATES AFFECT STOOL QUALITY

Feces are most often 25% solid material, and 75% water. This can vary with the type of diet fed.

A high carbohydrate diet will produce larger stools and contain more water.

- Odor depends on the amount of bacteria available for fermentation, and so a diet of meat (protein) produces far less odor than a diet with grains.
- Grains take longer to digest and spend more time in the digestive system.
- Carbohydrates that are not entirely digested in the small intestine continue to ferment in the colon.

CARBOHYDRATES AS ENERGY

Many texts state that the glucose found in grains is necessary for stamina, endurance and performance. However, fat can convert to glucose in the liver. This process, which is called gluconeogenesis, is easily achieved in dogs fed a high ratio of protein (40%) and a higher ratio of fat.



REFERENCES

API Report: What's Really in Pet Food, www.api4animals.org/Petfood.htm

Case, Linda P. MS, Carey, Daniel P D.V.M. and Hirakawa, Diane A, Ph.D., *Canine and Feline Nutrition*, Mosby Press 1995

Cohn, Jeffery: How Wild Wolves Became Domestic Dogs, *Bioscience*, Vol 47, December 1997

Ewer, RF: *The Carnivores*, Cornell University Press, 1977

Kronfeld, DE Ph.D. Dsc MVSc: Home Cooking For Dogs: Pure-Bred Dogs American Kennel Gazette, July, 1978.

Kronfeld, DS Ph.D. Dsc, MVSc: Protein Quality and Amino Acid Profiles of Commercial Dog Foods: Journal of the American Animal Hospital Association, July/August 1982.Vol 18

Londale, Thomas D.V.M.: [Pet Foods Insidious Consequences](#)

Mestel, Rosie: Ascent of the Dog: Discover, October, 1994.

Mills, Milton R MD.: [The Comparative Anatomy of Eating](#)

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