

Evolutionary Nutrition for the Dog



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Canis lupus—the Gray wolf

HISTORY OF THE DOG

The dog/human relationship began approximately 15,000 years ago. Man gave canines food from the hunt in return for protection at their campsites through the night. Man chose favorable characteristics in these wild canines such as submissive behavior, keen senses to accompany man on the hunt and protective instincts so as to alert the camp of danger. Here began the first breeding programs and domestication of the dog. From the beginning, man has valued the dog for his carnivorous and opportunistic nature. His ability to problem solve, form strong family bonds with those around him and form packs with a strict

hierarchy has played a significant role in the domestication of the species. Fifteen thousand years of selective breeding may have changed some superficial characteristics and behaviors of our canine companions, but on the inside they have remained virtually unchanged. High carbohydrate, dry dog food diets have been created in the last 80-100 years. On the evolutionary scale, this is not a significant amount of time compared to the millions of years dogs have spent specializing as meat eaters. It is likely that this short period of time does not allow for any drastic changes in the physiology and anatomy of a species.

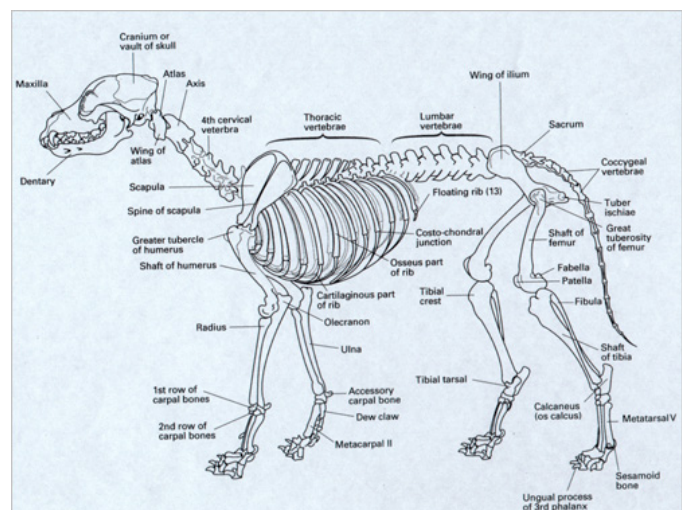
TAXONOMY

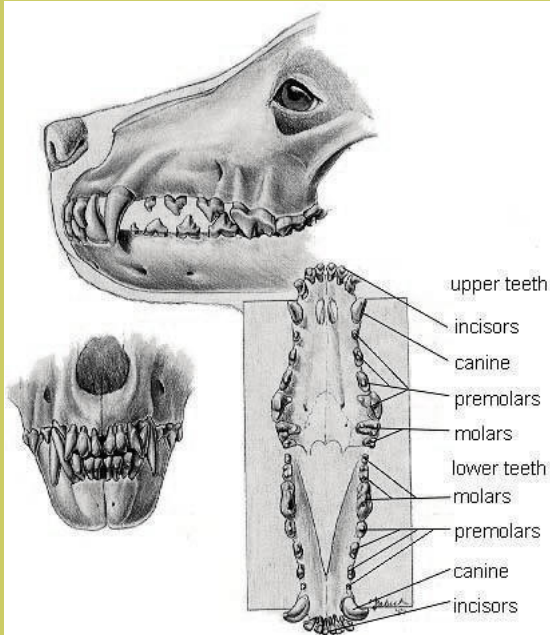
Order: Carnivora Family: Canidae Genus: *Canis* Species: *Canis lupus* Subspecies: *Canis lupus familiaris*

In 1993, after the DNA testing of *Canis lupus* (the wolf) and *Canis familiaris* (the dog), The Smithsonian National Museum of Natural History and the American Society of Mammologists renamed *Canis familiaris* as a subspecies of the wolf: *Canis lupus familiaris*. The findings show that domestic dogs arose from 26 gray wolf populations. Domestic dogs are 20 times more closely related to gray wolves than gray wolves are to coyotes. Another study showed that dogs may have originated from a gray wolf group in East Asia around 15,000 years ago as these wolves are even more closely related to dogs than the North American gray wolf. In either case the dog is a highly evolved predator and scavenger, easily distinguished when observing the anatomy and physiology of the *Canis lupus* species. It is one of the most easily recognized species of Order Carnivora.

ANATOMY & PHYSIOLOGY

The dog's anatomy and physiology shows the clear picture of a predator and carnivore. Looking first at the head, the eyes are located at the front of the head to enable forward vision of prey as they hunt. Dogs have a highly sophisticated sense of smell. According to the Natural History Museum of Los Angeles, dogs can sense odors in concentrations 100 million times lower than what humans can. It has been found that dogs can detect 1 drop of blood in 5 quarts of water. This allows them to track prey over long distances regardless of whether the prey is in view. This carnivorous trait is one of many that have made dogs so compatible with humans. The mouth





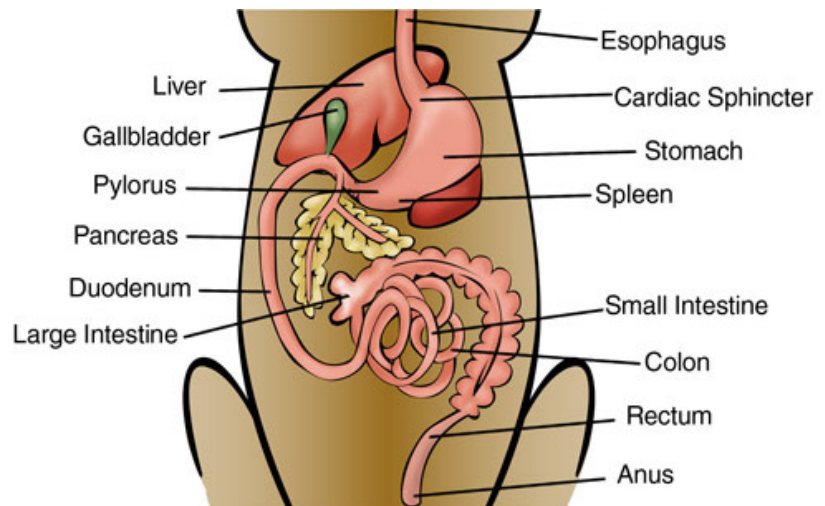
includes enlarged canine teeth and a strong muscular jaw, a defining feature of all carnivores. This enables the wolf/dog to dispatch prey quickly and tear large pieces of meat from a carcass with special teeth called incisors. The strong jaws also allow for the crushing of bones, which are rich in calcium and fat. The carnivore jaw does not allow for the sideways movement that herbivore jaws possess, but only an up and down action, perfect for crushing and tearing meat and bone. They do this by using a shearing action with the jaws and using specialized carnassial teeth found near the back of the mouth. This is characteristic of all carnivores.

The impressive muscular structure of the canid family allows for quick movement when chasing prey, admirable endurance and the ability to tackle and subdue animals many times larger than themselves. It has been recorded that wolves regularly take caribou, bison and occasionally muskox, the largest hoofed mammal in North America. Teamwork, keen sense of smell, great problem solving abilities and great endurance allow the canine to flourish as a

predator.

Inside the digestive system, the stomach is large and muscular, making it possible to eat large amounts of food in a small time span. This ensures that the animal is able to eat enough to sustain itself for as long as possible. The rest of the wolf pack of up to 20 members must also eat from the same carcass. The stomach is highly acidic, allowing for ingestion of whole bone pieces that can be broken down into a powder-like substance. It is believed that this extraordinary acidity may allow a canine to ingest large amounts of harmful bacteria without being affected. This provides dogs with the ability to eat rotting carcasses in times of need, a good survival mechanism. It has been shown that dogs can eliminate *Salmonella* spp. when given contaminated meat and single large doses of the bacteria. Furthermore, *Salmonella* spp. has been known to replicate and contaminate dry dog foods.

The pancreas of the dog is meant to supplement the enzymes ingested with the diet. This may be due to the fact that dogs and wolves obtain a large amount of the enzymes they require from dietary sources of raw foods. Food items that a dog eats must come complete with the active enzymes needed to bind with stomach acid and break down food for absorption. Otherwise, the pancreas is called on to produce the appropriate enzymes for the digestion of the food. Enzymes are the precursors for many metabolic processes in the mammalian body and are an essential part of any diet. Cooked food items are not well utilized in the canine species, since cooked food contains only denatured enzymes, useless for proper metabolic function. Dogs do not possess certain digestive enzymes. For example, amylase is found in the saliva of humans and is used to break down starches in the mouth. Canine saliva does not contain enzymes and is only used as a lubricant for swallowing large pieces of food. One could conclude that there was no need for canines to develop the ability to produce salivary amylase due to lack of dietary starch. The intestine and



the bowel of a carnivore are much shorter than a human's, allowing for quick absorption and elimination of waste products. This trait allows the animal to eat raw items that will be passed through before harmful bacteria have time to multiply and cause infection. Furthermore, the highly acidic gut kills harmful bacteria before it can begin to grow. This is an essential survival mechanism for wild carnivores who sometimes scavenge on prey items that may have been killed several days before and are not fresh.

It is usually agreed the dog is an omnivore with a highly carnivorous diet. It is clear that this is the case when we see some of the studies that have been done on pregnant and lactating bitches. In one study, bitches were fed a high fat, carbohydrate free diet with only 26% protein. These dogs developed hypoglycemia before whelping and had reduced blood plasma concentrations of lactate and alanine, reduced births, lethargy and reduced ability to care for pups. One could stipulate that the absence of carbohydrate was the problem. Another possibility is that the amount of protein provided (26%) was not sufficient for these dogs to maintain their health during pregnancy and whelping. We can see that the latter may be true when we examine another study done on pregnant bitches fed 51% protein in the diet, some with and some without carbohydrate. Both groups had a similar positive outcome. Therefore, one can assume confidently that the bitches in the first study were lacking protein in their diet, not carbohydrate. We can see that it is possible for dogs to utilize carbohydrate but it is clear that they can function without it but cannot function without high protein in the diet. Research has shown that a starch-free diet with no less than 33% protein in the diet required for dogs to supply needed glucose precursors. This means that dogs cannot regulate glucose without meeting these requirements and can become hypoglycemic or diabetic if left unattended. All of the above traits have allowed the order Carnivora to survive and thrive on carnivorous diets for 60 million years. Domestic dogs' ancestors roamed the earth millions of years before the appearance of the first human. This makes the evolutionary features of the modern canine family a truly winning design.

THE DIET OF THE DOG

Because of the various canine features discussed above, it is logical to conclude that the diet of the dog should be closely linked to the diet of wild canines like the wolf. This gives us a strong foundation for how to feed our own dogs. According to the Wisconsin Department of Natural Resources, the Timber Wolf diet is comprised of 55% white-tailed deer, 16% beavers, 10% snowshoe hares, 19% rodents and other small mammals. The wolf and the wild dog ingest almost the entire carcass of the prey they catch. This means that there is a small amount of pre-digested vegetation eaten when the stomach (tripe) of an herbivore is eaten. According to the University of Michigan Museum of Zoology, feral (wild) domestic dogs eat small animals as their main source of food. During tough seasons when meat is harder to come by, wolves and wild dogs become more opportunistic, eating eggs, fish, fermenting fruit, seeds, nuts and grasses to supplement the meat that they are able to catch. This adaptability is another beneficial survival tactic when meat is scarce in winter months.

Your dog can be fed in the exact same way. There are several meats you can choose from and many different prey items including: beef/buffalo meat and bones, chicken necks/carcasses, turkey necks, turkey meat, lamb meat, lamb necks, venison, offal and tripe. According to a wild canine diet, dogs should eat approximately 75% meat, bone, offal and tripe. About 25% of the diet should be composed of pureed green matter such as parsley, kale, dandelion, chard and a small portion of pureed root vegetation and fruit including parsnips, yams, beets, squash, apples, pears, and berries. Always keep in mind that you should keep the diet accurately proportioned, using a prey animal as your model of proportions to feed.



KIBBLE VS. RAW

There are several major ways that kibble and raw diets differ:

1. Kibble usually contains grain content (wheat, corn, barley, oats) that is more plentiful than the meat content. This is a problem for 2 reasons:

- A. Dogs have no nutritional requirement for carbohydrate.
- B. Dogs produce minimal enzymes to digest starch or obtain nutrients from it.



2. Kibble diets contain cooked meat and meat by-products, which are digestible but how much nutrition they receive is questionable. It has been stated that the quality of protein has an impact on fatty acid composition of tissues in cats. Since cats and dogs are carnivores, we can conclude, in this case, that the more processed/cooked/rendered the food is, the less valuable it is, as is all naturally occurring food. Kibble also contains a much smaller amount of essential fatty acids than a raw diet. It may be considered that the quality of protein and therefore, fatty acid composition affects the health of the dog. Fatty acids are an essential part of the carnivore diet since they are found in all prey items. A study on dogs showed that safflower oil and beef tallow (rendered beef fat) produced progressive deterioration in renal function in dogs but dogs supplemented with menhaden fish oil prevented renal deterioration. We can conclude that unaltered animal-based sources of food are safer and more valuable than vegetable sources or rendered meat sources, found in many processed pet foods.

3. Enzymes are catalysts for many essential chemical processes in mammalian species. They are destroyed in the cooking process and do not exist in commercial pet foods.

4. The nutritional analysis information listed on every bag of kibble is based on laboratory test results. The animals used in the studies are in a controlled laboratory environment. The food sources present in the kibble may contain the appropriate nutrients (as recommended by the American Feed Association) but the bioavailability (digestion and utilization) may be poor. There has never been a bioavailability test done on any brand of kibble. This means that no one knows if our dogs are actually absorbing adequate nutrients for long-term health from the food they are eating. There are also few long-term studies conducted for how dry foods affect dogs over their entire lifetime versus a more natural diet. Usually test trails are short, under 1 year and are conducted on younger animals. More research is needed to determine the long-term effects of dry food diets versus a species appropriate diet. Current studies by Dr. Jean Dodds DVM have proven to be a promising argument for feeding raw diets. Her study involved over 200 dogs of various breeds that were fed a raw diet for a minimum of 9 months prior to collection of the blood samples. The results of the laboratory tests were compared to healthy dogs that are fed dry dog food. The findings indicate that there are a different set of "normal" blood levels between dogs on a raw diet and dogs on a kibble diet.

5. Because processed foods contain no enzymes, the pancreas is called upon to provide the enzymes for digestion. This is a concern because it taxes the pancreas and could contribute to pancreatic problems such as endocrine pancreatic insufficiency, pancreatitis and absorption problems in dogs. This can lead to states of malnutrition. In turn, the body uses an unfortunate survival tactic: it begins to absorb enzymes and other essential nutrients from its own tissues to maintain the equilibrium of the body. This can only remain an equilibrium for so long and may prove to shorten the life spans of canines.

6. Kibble is systemically dehydrating to dogs, as their bodies are designed to absorb water from their prey. To compensate, they must drink large amounts of water to stay hydrated. This puts extra strain on the kidneys. The higher the protein content is, the higher the urea output is. Meat eaters must consume water with their food to excrete high urea levels properly. This naturally occurs with a whole prey diet.

7. Some kibble and canned dog foods contain toxic fillers like preservatives and dyes (BHA, BHT, Ethoxyquin, Yellow #5, Red Dye #40). Sugar and synthetic taste enhancers are also found in some commercial foods. Eating any of these substances daily can pose health risks,

8. Often, synthetic vitamins are added to commercial canine diets. These vitamins are not molecularly/nutritionally equal to the natural source vitamins found in raw food sources.

9. Kibble has only been formulated in the last 100 years. It is absurd to assume that dogs have evolved to eat kibble-based diets in this short amount of time. Evolution of physiological and anatomical proportions takes millions of years.

In comparison, the raw diet is rich in fresh, unaltered food sources. Meat, tripe, bone, organ and a portion of pureed vegetation are filled with the enzymes, vitamins, minerals, amino acids and fatty acids needed to create a balanced system. Nutritional analyses have been done on several types of raw prey items and they do contain all the essential nutrients required by the dog. Bioavailability of prey items has not been extensively studied in a laboratory yet but it has definitely proven to make for resilient animals in the wild. Wild canines are capable of surviving in harsh conditions with few or no chronic health problems. Kibble has only been fed to dogs for approximately 100 years whereas raw meat diets are the basis for the evolution of order Carnivora for 60 million years.

MAKING THE SWITCH TO RAW

The most successful way to switch your dog to a raw food diet is to begin adding a good quality (no by-products, carbohydrate, taste enhancers or dyes) canned dog food to the diet. Eliminate any dry food as quickly as possible and begin to mix small amounts of raw into the canned food. You may find your dog needs anywhere from 3 days to 2 weeks to make the transition smoothly, depending on age, weight, activity level and health status. If you are noticing loose stools or vomiting early in the process, cut back the amount of raw food being fed. Use the original amount of raw the dog was comfortable with and begin increasing the raw more slowly than before. It takes time to build up a proper acidic environment in the gut. This can lead to indigestion in some dogs during the transition. Don't be discouraged by a slow start and always make sure the meat you are feeding is fresh and of good quality.

During the transition to a raw meat diet, you should begin to notice positive changes in your dogs' health, including a shinier coat, decreased body odor, cleaner smelling breath, cleaner teeth that can be maintained with bone chewing instead of dental work, and better overall organ health e.g. a decrease in water consumption equals healthier kidneys. Problems that have improved on raw meat diets include, but are not limited to, impacted anal glands, skin problems, allergies, kidney and liver problems, pancreatic problems, digestive problems and poor dental health. Furthermore, animals that have any kind of existing health concerns or are having trouble making the switch to a raw diet should only proceed with a diet plan approved by a veterinarian versed in raw feeding for dogs. For more information on



holistic nutrition and veterinary practice, visit The Healing Place Veterinary Clinic in North Vancouver, BC.



BOOKS

The Barf Diet by Dr. Ian Billinghurst DVM

The Ultimate Diet: Natural Nutrition for Dogs and Cats by Kymthy Shultz

WEBSITES

Guide to writings on Predation, Food and Feeding Habits, Nutrition Studies of the Wolf: <http://www.albany.edu/~knee/pred.html>

Order this very insightful e-book “The Wolf’s Natural Diet: A Feeding Guide For Your Dog?” online at: http://k9joy.com/TheWolfsNaturalDiet/index.php?camp=1212_wolf

Dr. Ian Billinghurst’s site: http://www.barfworld.com/html/learn_more/evolutionary.shtml

Robert Wayne’s wolf/dog study: <http://www.idir.net/~wolf2dog/wayne2.htm>

Timber Wolf Nutrition from the Wisconsin Department of Natural Resources– percentages of food items within the diet: <http://www.dnr.state.wi.us/org/land/er/factsheets/mammals/wolf.htm#Food>

The University of Michigan Museum of Zoology – Canis lupus familiaris (the domestic dog) behaviour, reproduction, taxonomy and nutrition including information on feral domestic dog diets: http://animaldiversity.ummz.umich.edu/site/accounts/information/Canis_lupus_familiaris.html

The Chronology of Wolf Evolution:
<http://www.searchingwolf.com/wevolve.htm>

Club Canine Raw Food for Dogs and Cats :
www.clubcanine.net

Issues In Nutrition by Dr. Jean Dodds:
<http://www.homevet.com/petcare/documents/immunenutrition.pdf>

Natural Vs. Synthetic Vitamins – <http://www.vitamins-nutrition.org/vitamins/natural-vitamins-synthetic.html>

The Healing Place Veterinary Clinic:
www.healingplace.ca

DISCLAIMER

The above information is not meant to be used to treat animals for medical problems nor should it take the place of proper veterinary medicine. For more information on raw canine diets, please contact a veterinarian who has experience with the diet and uses it to supplement their practice.



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BIOGRAPHY

Sarah Godfrey has a 15-year professional background working with animals. She has trained animals for film , private owners and zoo animal husbandry. She was the nutritional consultant for The Healing Place Veterinary Clinic (North Vancouver, BC) . She had the unique opportunity of raising a pack of Timber wolf cubs and working with a pack of adult Arctic wolves at Creative Animal Talent. Forming a bond through food, trust , patience, problem-solving and positive association were important parts of raising the cubs. She saw first hand how the cubs thrived on the same diet that her dogs are at home. Sarah has also had the privilege of working with numerous species at Mountainview Conservation Center including two packs of African Wild Dogs , Cougars, African Servals, Caracals, Fishing Cats, Cheetahs, Geoffrey's Cats, Asian Leopard Cats, Rusty spotted Cats, a Clouded Leopards, Ocelots, Indian rhino, tapirs, Cape buffalo, pygmy hippos and hyenas.

Sarah has completed three and a half years at the Vancouver Homeopathic Academy. Other education she has received include: *Veterinary Nutrition: An Integrative Approach* from Standard Process Nutrition, *Exotic Cats: Husbandry and Basic Medicine* from The Veterinary Information Network. Her goals include obtaining a masters degree in ecology and conservation specializing in carnivores, working towards the conservation of wild habitats across the world and creating a rehabilitation center for dogs with behavioral challenges. Sarah currently has a dog, Zeus and two cats named Baxter and Harry who are happily on raw diets.

