

Title: Canine Nutrition - an Overview

Subtitle: Corso Information

Author: Bassclef © Copyright 2002 Lew Olson

Date: 2007/9/26

URL: <http://www.thefocc.com/xoops/modules/article/view.article.php/c6/24>

Summary: The dog has been a companion to humans for at least 10,000 to 14,000 years, although current molecular data shows that the dog may be much older.

Dogs - Anatomy of a Carnivore and Dietary Needs

This article is written to address the current confusion of the dietary needs of the domestic dog. The dog has been a companion to humans for at least 10,000 to 14,000 years, although current molecular data shows that the dog may be much older. Our domestic dog is closest genetically to the wolf, and they differ in only 1% to 2% in their gene sequences. This is quite significant, as dogs differ from coyotes by 7.5% and even further from jackals and foxes. Wolves and domestic dogs also have identical digestive tracts.

There are some differences in dogs and wolves, according to Ray Coppinger, a professor of biology at Hampshire College in Amherst, Massachusetts. He reports dogs skulls, teeth and brains are smaller than wolves, with a 20% smaller brain. Dogs can also carry traits of a sickle-shaped tail, floppy ears and pie-bald colour patterns. Domestic dogs also come into heat twice a year, while wolves only do so once a year. Dogs also continue to show submissive behaviour all their lives, such as licking and greeting their masters the way wolf puppies do to the older pack members.

Some of this is believed to have evolved due to humans selection of dogs. Humans tend to prefer more submissive dogs, that carry more neotenic, or immature features. It is felt submissive dogs would adapt better in human families, and humans preferred the less threatening look of a dog that carried juvenile features. (wagging high carried tail, larger eyes and licking the owner)

It is also interesting to note that all domestic dogs, from the Chihuahua to the St. Bernard carry the same DNA patterns. This suggests that dogs have a single, rather than a multiple origin. The only domestic dog that varies is the Arctic Elkhound, which appears to have evolved separately. These new studies, done by Robert Wayne, a University of California-Los Angeles evolutionary biologist shows wolves are the closest species to the domestic dog. This is the largest study ever done in this field, and includes 140 domestic dogs, covering 67 pure-breds and 4 crossbreeds. This was compared to samples of DNA collected from 162 wolves, in 27 localities world-wide.

Wolves are members of the carnivore family, known as *canis lupus*. The domestic dog is also of the carnivore family, known as *canis familiaris*. The book, "The Carnivores", written by R. F. Ewer (lecturer in biology at the University of Ghana) states that "*Canis Familiaris* is generally believed to have evolved from the wolf, the wild species that most closely resembles both anatomically and behaviourally. The differences between the two are not great enough to make it necessary to postulate a hypothetical ancestral wild species which has neither survived to the present day nor left any known fossil remains."

Some typical features common to carnivores are a large mouth opening, a single hinge joint that lays in the same plane as the teeth, and a large primary muscle on the side of the head for operating the

jaw. The teeth are short and pointed, made for grasping and shredding. These teeth come together to give a cutting motion and act like shears. The teeth and mouth of the carnivore are developed to swallow food whole, not for chewing or crushing. Carnivores do not have digestive enzymes in their saliva. Humans have amylase, which helps to begin to break down complex carbohydrates. The dogs digestive tract is one third to one half the length of an omnivore. This shortness is designed for adaption for quick, muscular digestion of raw meat and bones. Carnivores have a much higher concentration of hydrochloric acid in the stomach for break down of proteins and to kill any dangerous bacteria. Their stomach acidity is less than or equal to pH 1 with food in the stomach, while humans are pH 4 to 5.

This raises the question of what is the best food for carnivores, according to their digestive tract and physiology. Dogs, as carnivores, have difficulty digesting grains and other complex carbohydrates. With the lack of digestive enzymes in the mouth, complex carbohydrates are not pre-digested, and take a long time to break down in the stomach, and small intestine, if they break down at all. Most of the complex carbohydrates pass through undigested, and create large stools in the dog.

It is interesting to note that dry dog foods are mainly cereal, consisting of a large part of corn, wheat, rice and soy. While dog food companies would have you believe that grains are a good source of protein, the fact is that dogs have a very difficult time digesting and utilizing protein from carbohydrates. Studies show dogs do best on animal protein, and the higher the quality, the better the protein is assimilated. The poorer quality proteins create a stress on the dogs kidneys and it makes proper nutritional digestion difficult.

Dr David Kronfeld reports that carbohydrates are most important for dogs in two situations: puppies just coming off the mothers milk (which is 12% carbohydrates) and the lactating bitch, who 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.

Dr Kronfeld does state that of all the grains, oatmeal is resistant to milling, and since it is available in flaked form, it makes the best choice for dogs, as it has a higher protein and fat content.

Cooking animal protein also changes many of the amino acids chains, and makes some of the amino acids they need unusable or destroyed. Dog's need for amino acids differ from humans, and raw meat contains many or most needed for good tissue health, immunity and good coat and skin for carnivores.

Lastly, cooking and processed foods, such as dog foods, creates difficulty in digestion. It can take up to 15 hours to digest processed foods, while fresh foods digest in about 4 to 6 hours. The longer food stays in the system, the greater chance of allergies and digestive upsets.

Commercial dog foods did not become available until the late 50s' and early 60's. The draw of processed dog foods for the public are mainly convenience, and good marketing. Dog food companies began to convince the public that dog foods were complete in nutrition, and balanced. They also used marketing and advertising to convince the public that canine nutrition was complex, and only a dry, scientifically formulated diet could give their dog complete nutrition. Prior to that time, people gave their dogs scraps, raw meat, eggs and bones. The digestive enzymes and bacteria

found in fresh food helped dogs digest food better, and built stronger immune systems. These necessary nutrients are not found in processed foods, as the processing and cooking destroys them. Dogs began to develop coat, skin and allergy conditions. They also begin to show dental problems, as their teeth are not designed for chewing, but for tearing and swallowing. Raw meat and bones contain enzymes and acids that help keep teeth clean, and also help to develop good musculature in the jaw and head.

Most of the fat used in processed foods can easily go rancid, and need preservatives to help maintain their integrity. Many of these preservatives have been found to be detrimental to the dogs health and immune systems, most commonly ethoxyquin, BHA and BHT. These can inhibit the production of white blood cells, lower the immune system and block the absorption of glucose. Also lacking in processed foods are the omega 3 fatty acids, necessary for good coat and skin health. These fats cannot withstand the long shelf life of processed foods.

Fat is crucial to carnivores, in maintaining and creating energy, and to produce glycerol. While humans require some carbohydrates for energy and endurance, carnivores need fats, both animal and plant, for creating glucose and developing stamina.

I hope that this article has created some 'food for thought' for your dog's diet. There are several ways to improve your dog's diet, including adding fresh food to kibble, cooking fresh foods, or feeding a completely raw diet. Diet may not add longevity, but it can certainly add health and vitality for the duration of the life, and decrease health problems and vet bills.

© Copyright 2002 Lew Olson

References:

- API Report: What's Really in Pet Food, <http://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,
- Simpson, JW SDA BVM&S Mphil MRCVS, Anderson, RS BVMS Ph.D. MRCVS and Markwell, PJ, Bsc, BvetMed MRCVS: Clinical Nutrition of the Dog and Cat, Blackwell Scientific Publications, 1993