Raw Pet Food Diets: Parasites, Pathogens, & Perceptions

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Introduction

The issue of feeding dogs and cats raw meat diets has spurred much controversy and debate among the veterinary community, government regulatory agencies, and consumers. The recent melamine contamination has brought increased attention to raw diets and more pet parents are choosing to prepare raw food for their pets or to purchase commercially prepared raw diets. So, with the rise in raw food popularity and the availability of pet food cookbooks or commercial diets, the topic of raw food and potential zoonosis is gaining considerable attention.

Critics claim raw food diets are dangerous to pet and human health because of the risk of spreading helminths, protozoans, bacteria, viruses, and prions. They argue that raw diets represent a human and public health threat despite proper food handling and sanitation practices. Further, they state that pathogens in raw meat are capable of causing illness in dogs/cats and that bone leads to dental and gastrointestinal trauma. More importantly, critics are concerned about nutritional adequacy with regard to long-term feeding. Critics want scientific data supporting the health claims touted by raw food defenders.

Supporters of raw diets defend the health benefits of raw food, arguing raw diets are far superior to that of cooked food. While scientific data is lacking, they cite thousands of anecdotal reports and counter the critics with an explanation of dog/cat physiology, biology, behavior, and evolutionary ancestry. Proponents of raw food argue that many of the health issues facing pets today stem from the introduction of cooked pet food in the second half of the 20th century. They view raw diets as biologically correct nutrition, low risk, and are passionate about their beliefs.

Types of Raw Food Diets

1. Raw diets used at zoos, wildlife parks, wolf rescues, and greyhound facilities are usually fresh or frozen bulk raw meat purchased from slaughterhouses; meat quality is highly variable and may include 4-D (dead, dying, diseased, downed) animals, road kill, or other animals not fit for human consumption. Moreover, meat may be rotten and not handled/stored in a sanitary manner. Formulations may not

include added vitamins and minerals and typically have not been through American Association of Feed Control Officials (AAFCO) feeding trials.

2. Bones and Raw Food (BARF) diets are consumer-bought meat and bones prepared at home; pet parents may or may not follow a recipe and meat quality/freshness is unknown. Bones are usually whole and purchased from butchers, which carries the risk of sharp edges and fragments. Raw meat and bones may not be handled/stored in a sanitary manner. Pet parents may or may not add vitamins and minerals and the formulation has most likely not been through AAFCO feeding trials.
3. Blends of dry fruit/vegetables/grains with added vitamins and minerals are designed to be purchased by the pet parent and combined with fresh meat from the grocery store to make a complete and balanced raw diet. Meat is typically human-grade and bones are usually not used unless as a treat. The raw meat may not be handled/stored in a sanitary manner. Formulations may or may not have been through AAFCO feeding trials.
4. Commercially-prepared raw diets are a mixture of raw meat, organs, vegetables, fruit, grains, and/or ground bones that may or may not include added vitamins and minerals. Diets are typically produced in accordance with Good Manufacturing Practices (GMP), are pre-packaged, and are sold frozen at specialty pet stores. The raw meat and bones are typically from inspected animals deemed fit for human consumption. If bones are included in the diet, they are usually ground; some companies sell whole bones that have been cut to minimize sharp edges or fragments. Some brands of raw diets, but not all, have been through AAFCO feeding trials.

Nutritional Adequacy of Homemade vs Commercial

Commercially prepared raw frozen diets typically do not contain raw soybeans or grains, sources of potentially anti-nutritive factors. As a commercially sold pet food, they must follow AAFCO guidelines, including a guaranteed analysis, feeding directions, and lifestage information. The issue of "complete and balanced" is less clear-cut since most manufacturers do not add vitamins and minerals; diets may not meet AAFCO nutrient guidelines for "complete and balanced" and must undergo feeding trials to carry such a claim. Conversely, homemade raw diets are typically formulated from recipes pet parents devise or glean from books and the internet. The source of the meat is often unknown and may be improperly handled/stored. Homemade diets have ambiguous nutritional profiles and are not consistent from batch to batch. Some owners may use added vitamins and minerals, but this

poses a greater risk of nutrient overdose or deficiency; homemade diets are not complete and balanced unless a veterinary nutritionist has been consulted.

It is the veterinarian and pet parent's responsibility to discuss the issues of raw diets (dental and gastrointestinal trauma, nutritional benefit, pathogen risk) and whether such a diet is appropriate for the client. Pets that are immuno-compromised or are undergoing chemotherapy should not be fed raw diets. Moreover, households with immuno-compromised members should seriously weigh the risks and benefits of a raw pet food. Healthy dogs and cats, however, and pets with severe food allergies or those that require highly digestible diets may benefit greatly from a raw diet. When choosing raw diets, pet parents should contact and question manufacturers directly. This is not different from questioning kibble or can manufacturers. Currently, raw diets do not have specific regulations and are treated as any other animal feed, subject to FDA rules and state feed laws.

Commercial Raw Diets: Risk Assessment

Commercially prepared raw diets from large manufacturers with nationwide distribution typically utilize GMPs and quality ingredients; these diets pose little risk of pathogen transmission. Smaller, regional companies should be thoroughly investigated; these raw diets may pose a slightly elevated risk of pathogen transmission depending on manufacturer handling procedures and ingredient quality. The following discussion focuses on large commercial manufacturers of raw diets.

Helminths and Protozoans

Most diets are frozen at temperatures of -10°C or lower and are shipped and stored frozen. The average amount of time spent in the frozen state before consumption is about 18 days. It has been shown that most parasites (i.e., *Toxoplasma*, *Trichinella,* Tapeworms) cannot survive cold temperatures.[1-5] Similarly, the manner in which commercial raw diets are handled and processed also limits parasite risk. Tapeworms (*Taenia*, *Echinococcus*) and flukes that may occur in raw organs cannot be transmitted to pets because the lifecycle is broken.[1] Because brain, intestine, bladder, fetuses, and condemned carcasses harbor many parasites (i.e., *Neospora*, tapeworms, flukes), reputable commercial raw diets do not include these high risk parts. While raw fish is notorious for harboring a variety of parasites, there are few fish-based raw diets on the market and of those, grinding the muscle is sufficient to eliminate the risk of a pet contracting a parasite. Roundworms (i.e., *Ascaris*, *Toxocara*, and *Baylisascaris*) that inhabit the intestinal tract of mammals are not present in commercial diets. Wildlife passing eggs into the environment are of greater risk to pets.

Viruses and Prions

Viruses and prions are a minor concern in raw diets because commercial raw diets use only meat and organs from animals deemed fit for human consumption. Pseudorabies, associated with raw pork, is perhaps the most notable virus of concern. It is important to know that through vaccinations and culling, the US has successfully eradicated pseudorabies from all pork herds. Since 2003, no US-raised pig has tested positive for pseudorabies. Avian influenza is a worldwide concern and extends into the human food chain. In the US, surveillance systems and commercial flock testing ensures the poultry supply is safe and avian flu-free. Spongiform encephalopathies (i.e., BSE, CWD, Scrapie) may be contracted from infected animals when specified risk material (SRM) is consumed (tissue from the central nervous system of the ruminant). Most commercial raw diet manufacturers do not include SRM material in their diets. Moreover, lamb and venison (elk, deer) is typically purchased from Scrapie-free and CWD-free herds, respectively.

Bacteria (Focused on Human Health Risk)

All pet food may be contaminated with bacteria, both pathogenic and non-pathogenic strains. Pet foods that have been heat processed and considered "sterile" have been recalled due to pathogen contamination. The risk of pets contracting Tularemia (*Francisella tularensis*) from rabbit meat, *Mycobacterium* spp. from bovine organs, Anthrax (*Bacillus anthracis*) from sheep meat, *Pseudomonas* sp. from horse glandulars, and pathogenic strains of *E. coli, Salmonella, Clostridium, Staphylococcus, Yersinia, Campylobacter,* and *Listeria* is manageable when using commercial raw diets because of the source and quality of the meat. To illustrate, there are few documented cases of septicemia in pets fed raw diets. In one recent case, 2 cats died from *Salmonella* septicemia after being fed a home-prepared raw diet.[6] While this is a validated case of clinical salmonellosis due to diet, it appears to be a rare occurrence. Over 15 million pounds of commercial raw pet food is sold annually in the US. Despite the large number of dogs and cats consuming raw food, there are very few reports of sick pets and apparently no reports that link human illness with raw-fed pets. There have been no definite human illnesses linked to raw-fed pets despite the fact that approximately 50% of all pets share their owners' bed.[7] Interestingly, pets are at greater risk of contracting disease from their human owners.[8]

Salmonellosis is a reportable disease; health officials and veterinarians have a legal responsibility to report human illness and probable source of infection. To date there is only one evidence based-CDC report of a dog/cat to human transmission of *Salmonella*[9] yet there are numerous Centers for Disease Control

(CDC) reports detailing *Salmonella* transmission between reptile and child or rodent and child. Similarly, there are reports highlighting the potential danger of *Salmonella* and *E. coli* transmission at petting zoos. It is important to realize that pets, even those fed canned or dry food[10] are at risk for bacterial septicemia and may be sub-clinical carriers. Feces from dogs fed conventional dry diets are rich in many bacterial pathogens.[11] Sanitation is critical. Along with proper handling of fecal material, food bowls should be stainless steel and scrubbed daily with bleach to remove any bio-film created by canned, raw, or dry food.[12]

Pathogen Risk: What We Know

There are relatively few scientific studies exploring the risks of raw diets and even fewer that have investigated the nutritional benefits of raw diets. The published papers discussing raw diets and pathogens describe findings from all 4 types of raw diets. Moreover, some of the papers are strictly reviews or opinions, not original research. Of those that are true scientific studies, a number of strongly worded "Letters to the Editor" resulted.[13-17] The following is a brief review of current literature on raw diets.

Stiver *et al*., 2003[6]

Two house cats were diagnosed with multi-organ septicemia following necropsy. *Salmonella* was found to be the culprit; the subtype in the food matched that from the cats. It was learned that the cats were fed a beef-based home prepared diet, not a commercial diet.

Strohmeyer *et al*., 2006[18]

This study evaluated the presence of bacteria and protozoa in commercial raw diets. Bacterial culture and polymerase chain reaction (PCR) was conducted on 240 raw diet samples and 20 dry/canned samples. Non-type specific *E. coli* was found in raw and dry/canned. *Salmonella* was found in raw but not dry/canned. PCR detected *Cryptosporidium* in raw and *Campylobacter* in canned. Authors concluded commercially prepared raw diets are a potential source of pathogens. This study did not feed the diets to dogs and therefore could not assess whether pets would shed pathogens. It is important to note *Campylobacter* was found in "sterile" diets.

Finley *et al*., 2007[19]

Dogs were fed *Salmonella*-positive raw diets or *Salmonella*-negative raw diets. Diets were purchased from pet stores and tested for *Salmonella*. None of the control dogs shed *Salmonella*. Of the dogs fed contaminated food, only 44% shed *Salmonella*;

none showed clinical signs. Importantly, of the dogs shedding, not all shed the same serotype isolated from the food. The paper did not describe how the raw diet was handled, stored, or thawed prior to feeding.

Bagcigil *et al*., 2007[20]

The degree of *Salmonella* shedding by100 dogs admitted to a European veterinary hospital or 100 dogs living in a crowded kennel was determined by a single rectal swab. Dogs showed no signs of salmonellosis and it was noted that they were fed "good quality food" that consisted of commercial food and table scraps. Results indicated *Salmonella* shedding was extremely low. It should be noted that rectal swabs were taken only once despite the intermittent nature of *Salmonella* shedding.

Morley *et al*., 2006[21]

Samples were taken from food, feces, and the environment at a greyhound breeding facility following *Salmonella*-related deaths of several puppies. Dogs were housed in outdoor dirt runs; fecal matter removed daily but runs were not disinfected. All dogs were fed a raw meat diet consisting of inedible meat thawed at room temperature for 24 hours. Food was provided *ad libitum* from stainless steel bowls cleaned only when new food was added. The facility lacked proper sanitation methods. *Salmonella* was isolated from many locations and insect vectors. This study clearly demonstrates the hazards that could occur when raw meat diets are not handled properly, husbandry practices are lax, and inferior meat from condemned or 4-D animals is used.

Weese *et al*., 2005[22]

Commercially prepared and frozen raw diets were purchased and cultured for pathogens. The diets were thawed at room temperature before culturing. Several species of bacteria were detected. The raw diets were never fed to dogs to assess whether fecal shedding occurred. Meat quality was not specified. Furthermore, diets were not thawed in the refrigerator as is recommended.

Joffe and Schlesinger, 2002[23]

After feeding a commercial dry or BARF diet for 2 months, food and feces were tested for *Salmonella*. Commercial dry food and dog feces were negative. Over 80% of BARF diets were positive for *Salmonella* but only 3 fecal samples were positive, and not always with the same serotype isolated from the corresponding diet. While they concluded that BARF is more likely to increase the risk of zoonosis, this study had several flaws: 1) clients made the diet and did not specify how it was handled, the meat quality, or the number of different batches of food, and 2) dog feces were

sampled only once (*Salmonella* is shed intermittently).

Freeman and Michel, 2001[24]

Three types of raw diets (BARF, Commercial, and Mix) were evaluated for nutritional adequacy and *E. coli* contamination. All failed to meet AAFCO nutritional guidelines. The Commercial was the most adequate and had a balanced calcium-phosphorus ratio. It was negative for *E. coli*. The BARF had major nutritional imbalances and was positive for *E. coli*. The Mix was nutritionally deficient but negative for *E. coli*. The authors did not feed these diets to dogs and conducted wet lab chemistry on a single sample of each diet. It was later found that several nutrient values were incorrectly reported; a correction was printed.

LeJeune and Hancock, 2001[25]

This is a literature review of the public health concerns associated with raw diets (parasites, bacteria, etc). Authors assert that despite proper food handling, dogs fed raw meat may shed pathogens as subclinical carriers and represent a real risk to humans. They noted that there are several studies in which food and feces contained the same pathogen strain. Authors assumed raw pet food was made with low quality and less stringently regulated meat (condemned, 4-D, inedible offal).

Lewis *et al*., 2002[26]

Following a *Salmonella* outbreak in zoo-captive carnivores, the zoo switched its feeding practices. Prevalence of shedding decreased to zero. It was determined that low quality raw meat was responsible for 94% of all the zoo's felids actively passing *Salmonella*. Previously, all felids were fed raw horsemeat and raw chicken (including condemned and 4-D animals) blended in a non-approved facility. The zoo switched to a raw horsemeat diet made in a USDA approved facility that banned 4-D and condemned animals. This study demonstrated that changes to meat quality without changes to husbandry practices are sufficient to reduce risk.

Conclusion

Home prepared raw diets pose a greater risk than commercially prepared raw diets because the source of the meat is often unknown. Meat quality, source, and processing are critical hazard points[2,21,26,27] that can be controlled or eliminated by purchasing commercially prepared raw frozen diets. Consumers need to use common sense when handling raw meat; many commercial raw diets have instructions printed directly on the bag of raw food.

Nutritional adequacy of home prepared diets will continue to be an issue. For pet parents wanting to feed raw diets, selecting a commercially prepared diet that has been through and passed

AAFCO feeding trials is the healthiest option. Owners should contact the company and feel comfortable with the quality and nutritional adequacy of the brand--owners should not rely solely on blogs or similar websites to obtain company information or recommendations. Veterinarians should request a dietary history of each pet client in order to identify potential nutritional insufficiencies as it relates to the pets' medical condition.

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