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Alternative and Raw Food Diets: What Do We Know?

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Every year in the US there are 76 million reported cases of food borne illness in people. Although the majority of these are self-limiting, 323,000 people are hospitalized and ~ 5,200 deaths are attributed to food borne illnesses each year. These figures are important because homemade and raw diets for pets are made with ingredients from the same food supply chain. In veterinary medicine few topics are associated with such strong opinions as the feeding of raw meat to dogs and cats. Both proponents and opponents are firmly entrenched in their views. Unfortunately, much of the information on both sides is based on anecdotes, theoretical concerns and personal opinion. Although objective information is increasing, this is still a field based largely on passion and opinion. This is an attempt to present a summary of the objective data for the nutritional adequacy, safety, and benefits of home prepared wellness and therapeutic diets and raw food diets.

Some health-conscious pet owners prefer preparing foods for their pets daily. Home preparation provides owners with a sense of involvement and allows them to select for or against specific ingredients. To maintain the nutritional adequacy and avoid contamination, owners must truly be committed to the long-term maintenance of proper hygiene and preparation methods. The meat and eggs produced for human consumption and used to prepare homemade pet foods are often contaminated with microbes.¹⁻³ Research indicates that many people are careless about cross-contamination during food preparation.⁴ The potential for food-borne illness in pets is reduced if owners use high-quality ingredients that have been stored properly, heat the foods to temperatures sufficient to destroy pathogens, and prepare only amounts that are readily consumed. Nutritional adequacy of home prepared diets is also of concern. Veterinary healthcare team members will inevitably work with pet owners that prefer alternative diets for their pets, and thus should be familiar with the objective data surrounding the nutritional adequacy, safety and benefits of home prepared wellness and therapeutic diets and raw food diets.

Raw Meat Diets

Raw meat feeding was popularized by Dr. Ian Billinghurst after the publication of his two books; *Give Your Dog A Bone* and *The BARF Diet*.^{5,6} The latter book introduced the term "BARF",

"Biologically Appropriate Raw Food' or "Bone And Raw Food", which has become widespread terminology. These books, which lack any scientific evidence, are based on the author's belief that commercial pet food is contributing to serious health problems in pets.

Many proponents have made very strong claims, including 'Dogs fed cooked and processed food and no bones will always develop a weakened immune system and poor dental health'.⁷

Some have reported that raw diets are useful for the prevention or control of a wide range of conditions including chronic digestive, allergic and metabolic disease, bladder stones, feline lower urinary tract disease, intermittent vomiting or diarrhea, seborrhea sicca and recurrent ear infections.⁷ More specific claims of the 'disappearance' of many dental problems, many skin problems, ear infections, anal sac problems, arthritis, incontinence, keratoconjunctivitis sicca, diabetes and reproductive problems, and improvement of behavioral problems have also been made.⁸ An interesting claim is that: 'As a general rule, any genetic fault that your pet may have inherited will have minimum chance of expression when the BARF diet is fed.'⁸ There is frequent discussion about presumed negative effects of cooking, including destruction of vitamins, enzymes, 'anti-ageing factors', reducing protein value and availability, and production of 'foreign foods'.⁷

Proponents tend to dismiss infectious disease concerns, with statements such as '*Salmonella* and *Campylobacter* are of absolutely no consequence to a healthy dog'.⁷ While Billingham claims that there are numerous feeding trials that show dogs fed raw foods are much healthier than dogs fed cooked foods, there is no objective evidence suggesting a beneficial health effect of feeding raw foods.

Nutritional adequacy, foreign body (i.e., bone) ingestion and infectious diseases are all cited as concerns regarding feeding raw foods. Infectious disease risks have received the most attention and is the area where more published research is currently available. As with any raw meat, there is the potential for contamination of raw meat-based pet foods. *Salmonella* spp has gathered the greatest attention as a possible risk; however *Campylobacter*, *Clostridium difficile*, *C. perfringens*, *C. botulinum*, *E. coli*, *Yersinia enterocolitica*, *Listeria monocytogenes* and enterotoxigenic *Staphylococcus aureus* are also of concern.⁸⁻¹⁰ Recent studies also suggest that the potential exists for foodborne disease in pets eating raw meat but also disease in humans who are in contact with raw meat or the pet. Additionally pets fed raw meat are capable of contaminating the environment.

Bacterial contamination can be present in meat prior to slaughter

in sick animals, however contamination occurs more commonly during slaughter, evisceration, processing and packaging. Ground meat, with its higher surface area to volume ratio and the need for additional processing, is more likely to be contaminated. The term 'human grade' has no regulatory definition and its use has been prohibited. However, since a significant portion of food sold for human consumption may be contaminated with a variety of pathogens, the use of 'human grade' meat does not indicate an absence of contamination. Once purchased, improper storage can result in bacterial growth. Some pathogens can grow at room temperature, while others can produce enterotoxins that cause disease.

In general, storage guidelines for raw meat are intended to prevent bacterial **growth**, not kill contaminants. Improper storage may create an environment which favors increases in bacterial numbers. As a result clinically irrelevant levels may become levels that can cause disease. Many organisms grow quickly at room temperature and sub-optimal refrigeration temperature highlighting the need for proper storage guidelines and concerns about growth in food residues in food bowls.¹¹

Ingestion of pathogens is the first step to developing disease. Many pathogens of concern, such as *Salmonella* spp, are dose dependent and large numbers are necessary to cause disease in most hosts, particularly if the host is otherwise healthy. However, some pathogens such as enterohemorrhagic *E. coli* can cause disease at very low doses and some individuals may be more susceptible.

Evidence Based Clinical Nutrition

Studies Documenting Nutritional Inadequacies

A 1992 survey of 200 homemade diets for both dogs and cats recommended by veterinarians for diagnosis and/or management of adverse food reactions found the majority to be nutritionally inadequate.¹² Another study compared 85 published home-cooked recipes for dogs and cats to AAFCO (American Association of Feed Control Officials) standards and found 86% inadequate in at least one nutrient, 55% deficient in protein and perhaps most importantly 77% of those diets deficient in taurine.¹³

Studies Documenting Contamination of Raw Foods

One study reported the isolation of a variety of serovars of *Salmonella* spp from 45% of raw meat samples.¹⁴ A more sensitive DNA probe detected *Salmonella* in 66% of samples. *Salmonella* spp were found in 56% of samples of meat fed to Greyhounds in another study.¹⁵ A small study reported isolation of *Salmonella* spp from 8/10 (80%) homemade raw meat diets.¹²

A study of commercial frozen raw meat diets in Ontario reported isolation of coliforms from all diets ranging from 3.5×10^3 to 9.4×10^6 CFU/g, *Salmonella* spp and *Clostridium perfringens* from 20% each, *C. difficile* from 4%, but no *E. coli* O157 or *Campylobacter* spp.¹¹ A larger Canadian study reported isolation of *Salmonella* spp from 22% of commercial frozen diets, spore forming bacteria from 100% and *C. difficile* from 8%. In this study, chicken diets were 4 times more likely to contain *Salmonella* spp than other types.¹⁶ *E. coli* O157:H7 is a significant human pathogen with a very low infective dose, and it is has been identified in raw dog food.¹⁷

Studies Documenting Fecal Shedding of Pathogens

Joffe and Schlesinger 2002 reported isolation of *Salmonella* spp from 30% dogs fed raw chicken, but 1/10 dogs fed commercial diets.¹² Murphy reports that feeding raw meat or raw bones to dogs was associated with shedding of resistant *E. coli*.¹⁸ A recent study evaluated *Salmonella* colonization of dogs fed commercial raw dog food that was identified as naturally contaminated with *Salmonella* spp. Seven/16 (44%) dogs fed **a single meal** of contaminated raw meat shed *Salmonella* compared to 0/12 dogs fed *Salmonella*-free raw meat. No abnormal clinical signs developed in dogs that were shedding *Salmonella*, but they shed *Salmonella* for up to 11 days.¹⁹ Preliminary results of a prospective study of pathogen acquisition and shedding by dogs involved in therapeutic visitation programs has identified a high incidence of *Salmonella* shedding in raw meat-fed dogs, and a cluster of infected dogs that were fed meat from the same butcher. This group is of additional concern because of contact with hospitalized humans, who must be considered at higher risk of infection.¹³

Studies Documenting Clinical Infection

In one report, *Salmonella* spp were isolated from feces and food samples of Greyhounds with diarrhea, leading the authors to conclude that the diet is the primary vehicle for *Salmonella* infection in this breed.¹⁶ Fatal *Salmonella* Newport gastroenteritis and septicemia was reported in two cats fed a home-prepared raw-meat diet. An indistinguishable isolate was found in the diet, strongly suggesting it was the source.²⁰

Studies Documenting Environmental Contamination

A recent study of cleaning and disinfection practices for experimentally-inoculated food bowls reported *Salmonella* could be isolated from food bowls experimentally inoculated with a residue of *Salmonella*-containing raw meat for the entire 2 week study period. Further, this study reported that common cleaning and disinfection practices were inadequate for complete elimination of *Salmonella* from bowls.²¹

Studies Documenting Human Infection

The potential public health risks associated with handling and feeding raw diets may be of greater importance than disease in animals. One study has reported an outbreak of salmonellosis in people associated with dried-beef containing pet treats, indicating the potential for human disease from *Salmonella*-contaminated pet products.²²

Recommendations

There is no objective information indicating a health benefit of feeding raw diets. There is evidence to support concerns about raw diets with respect to nutritional adequacy, pathogen contamination, fecal shedding and environmental contamination. Veterinarians that recommend and / or sell raw meat diets should be consider their legal liability if either pet or human disease occurs and proper counseling of risks and infection control measures has not been performed and documented.

For those who wish to feed raw foods, careful consideration should be given to the individual circumstances. Raw food may be contraindicated in households where the implications of infection are particularly serious and situations where clinical infection is more likely to occur.

In humans, infants, the elderly and immunocompromised (disease or treatment) individuals are classified into these groups. The Centers for Disease Control and Prevention (CDC) guidelines for preventing opportunistic infections among high risk groups such as hematopoietic stem cell transplant recipients and HIV infected persons state that eggs, poultry and meat products fed to pets must be well cooked.^{23,24} Similarly, feeding of raw meat is probably inappropriate in situations where animals in the household are likely at higher risk (i.e., breeding operations, immunocompromised pets).

Veterinarians and veterinary technicians should be responsible for carefully explaining household infection control practices to clients. Standard guidelines for handling raw meat and prevention of foodborne infections are available.²⁵ Hand hygiene is the most important general infection control practice. Hands should be thoroughly cleaned after handling raw meat. Raw meat should be stored so it will not come into contact with other food items. All items that contact the food should be disinfected after use. Cutting boards used for raw meat should not be used for anything else. Because many bacteria can grow quickly at room temperature, raw meat should not be thawed at room temperature or allowed to sit in bowls. Bowls should be cleaned shortly after feeding. Any remaining food should be removed; the bowl should be scrubbed to remove debris and then disinfected. High risk individuals should not have contact with food bowls. Water bowls should probably be treated with similar caution. Feces should be handled with care. Fecal contamination of

the environment should be cleaned promptly, with hands washed thoroughly after contact with feces.

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