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# DECIPHERING FACT FROM FICTION

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## Raw meat diets, are they worth the risk?

Raw meat diets can be homemade from various recipes (e.g., BARF or Ultimate Diet) and are also available commercially from a variety of companies. Commercial raw diets are typically frozen or freeze-dried but some can even look like regular dry food (e.g., diets with a raw meat coating).

### ARE RAW MEAT DIETS HEALTHIER?

Proponents of raw meat diets anecdotally report numerous benefits, but, at this time, there are no scientific studies showing any health benefits from raw meat diets. One recent study in cats did show a small increase in digestibility from a raw beef-based diet compared to a commercial extruded diet (about 8 percent higher for total energy digestibility [Kerr et al, 2012]). However, there was no difference in digestibility between the raw meat diet and a cooked meat diet, suggesting that the difference was not the result of the diet being raw. The effects of this small, but significant, difference in digestibility in non-extruded diets warrants additional research but does not appear to provide sufficient evidence to outweigh the potential risks for raw meat diets. There are an increasing number of studies that show important concerns for nutritional imbalances, health risks to the animal and public health concerns.

**FACT** No scientific studies have been published showing the health benefits from raw meat diets.



## NUTRITIONAL IMBALANCES

A small study from the United States in 2001 demonstrated that all homemade and commercial raw food diets tested (3 homemade and 2 commercial) had multiple nutritional imbalances, some of which could have important health effects for the animal (Freeman and Michel, 2001). A recent European study calculated levels of 12 nutrients (e.g., calcium, phosphorus, vitamin A) for 95 homemade raw meat diets being fed to dogs as reported by the owners (Dillitzer et al, 2011). In this study, 60 percent of the diets had major nutritional imbalances. Therefore, there is concern that both commercial and homemade raw meat diets may have important nutrient deficiencies and excesses. In addition, even if these diets meet the minimum nutrient levels and don't exceed the maximums, they may not provide an optimal nutrient profile. For example, many raw meat diets may be very high in fat compared to typical canned and dry diets, which may make the coat look shiny, but could cause health problems for some animals.

**FACT** Most homemade and many commercial raw meat diets are not nutritionally balanced.

## HEALTH RISKS

In addition to the many health problems that can develop as the result of deficient or excessive intake of nutrients (e.g., calcium: phosphorus imbalances; Taylor et al, 2009), other risks of raw meat diets include gastroenteritis (inflammation of the gastrointestinal tract, usually resulting in vomiting and diarrhea) which could be due to bacteria in the diet or high dietary fat levels and, for raw meat diets that contain bones, fractured teeth and gastrointestinal injury can occur. However, research is needed to better understand how frequently these complications arise. Because of the high potential for contamination with pathogenic bacteria (see below), bacterial infection can occur (e.g., *Salmonella* or *Clostridium*). This can result in gastrointestinal disease, septicemia and even death (Stiver et al, 2003; Morley et al, 2006). Other negative health effects are being identified as well. A recent study identified 12 dogs with hyperthyroidism caused by eating raw meat diets (Kohler et al, 2012).

Finally, an unpublished study found that dogs eating raw meat diets had significantly higher blood urea nitrogen, creatinine and hematocrit values compared to controls (Wynn et al, 2003). Similarly, albumin and cholesterol were higher than the reference range in cats fed a raw meat diet (Kerr et al, 2012). While it is unclear whether these findings have any long-term health implications for the animal, it emphasizes the importance of knowing the complete dietary history for all animals to be able to accurately interpret the results of laboratory tests.

**FACT** Potential health concerns of feeding raw meat diets include:

- Gastroenteritis
- Fractured teeth
- Sepsis

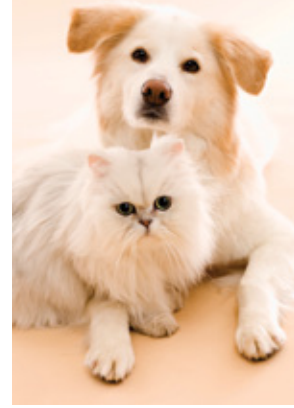
## CONTAMINATION RISKS

More research is needed to fully understand the potential health effects of raw meat diets. However, a large body of research has been completed on the high risk for pathogenic bacterial contamination of raw meat diets and the potential risks posed by this problem. Like any raw meat products we encounter at home or in restaurants, raw meat diets have the potential to carry pathogenic bacteria. Therefore, these diets pose a health risk, not only to the individual pet eating them, but also to the animals and people around them.

Recent scientific studies have shown that nearly all raw meat diets (whether commercial or homemade) are contaminated with bacteria. Some of these bacteria are unlikely to have negative effects on health, but others can have serious consequences. For example, studies have found that between 20-44 percent of commercial raw meat diets are contaminated with *Salmonella* (Weese et al, 2005; Strohmeyer et al, 2006; Finley et al, 2007). Animals eating raw meat diets can shed these bacteria in their feces (Joffe et al, 2002; Finley et al, 2007). In one study, approximately half the dogs fed a single meal of contaminated raw food shed *Salmonella* in their feces for up to 7 days (Finley et al, 2007). Other bacteria that have been found in raw meat diets include *E. coli* O157:H7 and *Clostridium* (Freeman and Michel, 2001; Weese et al, 2005). These bacteria are a risk, not only for the animals eating the diets, but also for other pets and people in the household. This is particularly true for any people or animals who are young, old, pregnant or immunosuppressed. Of even greater concern is the issue of antibiotic resistance. A study from Canada found that 21 percent of all raw meat diets tested were contaminated with *Salmonella* and that these bacteria showed resistance to 75 percent of the antibiotics tested (Finley et al, 2008).

**FACT** Potential nutritional concerns associated with feeding raw meat diets include:

- Nutrient excesses
- Nutrient deficiencies
- Nutrient imbalances such as calcium: phosphorus imbalance



# TOP TEN MYTHS ABOUT RAW MEAT DIETS

## MYTH 1: “Their benefits are proven.”

**FACT** No scientific studies have shown benefits of raw diets. Their appeal is based on word of mouth, testimonials and perceived benefits. For example, raw food diets may result in a shiny coat and small stools because they are generally high in fat and digestibility. However, these same properties can be achieved with commercial cooked diets without the risks of raw meat diets.

## MYTH 2: “This is what animals eat in the wild.”

**FACT** Wolves in the wild do eat raw meat (in addition to berries, plants, etc). However, the average lifespan for a wolf in the wild is only a few years. Therefore, what is nutritionally “optimal” for a wolf is not optimal for our pets that we hope will live long and healthy lives.

## MYTH 3: “Dogs and cats can’t get infections from Salmonella or other bacteria in raw meat diets.”

**FACT** Dogs and cats can become infected with *Salmonella*, *Clostridium*, *Campylobacter* and other bacteria found in raw meat diets, just as people can (especially young, old or immunosuppressed individuals).

## MYTH 4: “Raw food diet ingredients are human grade.”

**FACT** Even meats purchased at the best of stores for people can contain harmful bacteria, so purchasing “human grade” meat does not protect against the health risks of uncooked meats (would you eat raw ground beef?). It is also important to keep in mind that the term “human grade” has no legal definition for pet food.

## MYTH 5: “Freezing raw diets kills bacteria.”

**FACT** Most of the bacteria found in raw meat diets can easily survive freezing (and freeze-drying).

## MYTH 6: “As long as bones are raw, they’re safe.”

**FACT** Bones, whether raw or cooked, can fracture dogs’ and cats’ teeth. Bone also can block or tear the esophagus, stomach or intestine.

## MYTH 7: “Cooking destroys enzymes needed for digestion.”

**FACT** All the enzymes that dogs and cats (and people) need for digestion are already in the gastrointestinal tract. Therefore, additional enzymes from food are not required for digestion.

## MYTH 8: “Raw diets do not contain grains, because grains are added to pet foods only as fillers.”

**FACT** Corn, oats, rice, barley and other grains are healthy ingredients that contain protein, vitamins and minerals; they are not added as fillers and are unlikely to cause allergies. Although meat is an important component of diets for dogs and cats, grains can be part of a high-quality, nutritionally balanced diet.

## MYTH 9: “Most commercial pet foods contain harmful ingredients such as by-products.”

**FACT** By-products are the animal parts that Americans don’t typically eat, such as livers, kidneys or lungs. There are specific definitions for what by-products can and cannot include. For example, by-products must be the clean parts of slaughtered animals and cannot include feathers, hair, horns, teeth and hooves. Basically, by-products are organs and meats other than animal muscle. Note that some pet foods may actually list these ingredients (e.g., duck liver, beef lung) but these are really just “by-products.” Most commercial and many home-prepared raw diets also contain by-products.

## MYTH 10: “If bones or chicken necks are added to raw meat diets, they’re nutritionally balanced.”

**FACT** Most homemade (and even some commercial) raw meat diets are extremely deficient in calcium and a variety of other nutrients, even if chicken necks, bones or egg shells are added. This can be disastrous in any animal but especially in young, growing pets and can result in fractured bones.



# GENERAL DIETARY RECOMMENDATIONS FOR DOGS AND CATS\*



- Assess a patient's nutritional status at every visit
  - Including a thorough diet history and assessment of weight, body condition and muscle condition.
- Recommend the diet that is optimal for the individual pet, based on his/her individual health, body condition and activity level.
- Feed and recommend a diet made by a well-known and reputable company – some criteria include:
  - Employing at least one full-time qualified nutritionist (either a PhD nutritionist or an American College of Veterinary Nutrition board-certified veterinary nutritionist).
  - Having their own manufacturing plants.
  - Conducting and publishing nutritional research so that continued improvements are made to their diets (and to our collective knowledge about pet nutrition).
  - Using strict internal quality control testing and standards (e.g., ingredients, end product, shelf life, accountability).

\*Note that dogs and cats with certain medical conditions may benefit from customized dietary modifications where consultation with a veterinary nutritionist who is board-certified by the American College of Veterinary Nutrition (ACVN; [www.acvn.org](http://www.acvn.org)) may be beneficial.

## REFERENCES

Dillitzer N, Becker N, Kienzle E. Intake of minerals, trace elements and vitamins in bone and raw food rations in adult dogs. *Brit J Nutr* 2011; 106: S53-S56.

FDA guidance for industry: Manufacture and labeling of raw meat foods for companion and captive noncompanion carnivores & omnivores: [www.fda.gov/downloads/animalvet-erinary/guidancecomplianceenforcement/guidanceforindustry/ucm052662.pdf](http://www.fda.gov/downloads/animalvet-erinary/guidancecomplianceenforcement/guidanceforindustry/ucm052662.pdf)

Finley R, Reid-Smith R, Weese JS. Human health implications of *Salmonella*-contaminated natural pet treats and raw pet food. *Clin Infect Dis* 2006; 42: 686-691.

Finley R, Ribble C, Aramini J, et al. The risk of *salmonellae* shedding by dogs fed *Salmonella*-contaminated commercial raw food diets. *Can Vet J* 2007; 48: 69-75.

Finley R, Reid-Smith R, Ribble C, et al. The occurrence and antimicrobial susceptibility of *Salmonellae* isolated from commercially available canine raw food diets in three Canadian cities. *Zoonoses Public Health* 2008; 55: 462-469.

Freeman LM, Michel KE. Evaluation of raw food diets. *J Am Vet Med Assoc* 2001; 218: 705-709 (correction, *J Am Vet Med Assoc* 2001; 218: 1716).

Joffe DJ, Schlesinger DP. Preliminary assessment of the risk of *Salmonella* infection in dogs fed raw chicken diets. *Can Vet J* 2002; 43: 441-442.

Kerr KR, Vester Boler BM, Morris CL, et al. Apparent total tract energy and macronutrient digestibility and fecal fermentative end-product concentrations of domestic cats fed extruded, raw beef-based, and cooked beef-based diets. *J Anim Sci* 2012; 90: 515-522.

Köhler B, Stengel C, Neiger-Casas R. Dietary hyperthyroidism in dogs. *J Small Anim Pract* 2012; 53: 182-184.

KuKanich KS. Update on *Salmonella spp* contamination of pet food, treats, and nutritional products and safe feeding recommendations. *J Am Vet Med Assoc* 2011; 238: 1430-1434.

Lefebvre SL, Reid-Smith R, Boerlin P, Weese JS. Evaluation of the risk of shedding salmonellae and other potential pathogens by therapy dogs fed raw diets in Ontario and Alberta. *Zoonoses Public Health* 2008; 55: 470-480.

LeJeune JT, Hancock DD. Public health concerns associated with feeding raw meat diets to dogs. *J Am Vet Med Assoc* 2001; 219: 1222-1225.

Lenz J, Joffe D, Kauffman, et al. Perceptions, practices, and consequences associated with foodborne pathogens and the feeding of raw meat to dogs. *Can Vet J* 2009; 50: 637-643.

Leonard EK, Pearl DL, Finley RL, et al. Evaluation of pet-related management factors and the risk of *Salmonella spp.* carriage in pet dogs from volunteer households in Ontario (2005-2006). *Zoonoses Public Health* 2011; 58: 140-149.

Morley PS, Strohmeier RA, Tankson JD, et al. Evaluation of the association between feeding raw meat and *Salmonella enterica* infections at a Greyhound breeding facility. *J Am Vet Med Assoc* 2006; 228: 1524-1532.

Schlesinger DP, Joffe DJ. Raw food diets in companion animals: A critical review. *Can Vet J* 2011; 52: 50-54.

Stiver SL, Frazier KS, Mauel MJ, Styer EL. Septicemic salmonellosis in two cats fed a raw-meat diet. *J Am Anim Hosp Assoc* 2003; 39: 538-542.

Strohmeier RA, Morley PS, Hyatt DR, et al. Evaluation of bacterial and protozoal contamination of commercially available raw meat diets for dogs. *J Am Vet Med Assoc* 2006; 228: 537-542.

Taylor MB, Geiger DA, Saker KE, Larson MM. Diffuse osteopenia and myelopathy in a puppy fed a diet composed of an organic premix and raw ground beef. *J Am Vet Med Assoc* 2009; 234: 1041-1048.

Weese JS, Rousseau J, Arroyo L. Bacteriological evaluation of commercial canine & feline raw diets. *Can Vet J* 2005; 46: 513-516.

Weese JS, Rousseau J. Survival of *Salmonella* Copenhagen in food bowls following contamination with experimentally inoculated raw meat: Effects of time, cleaning, and disinfection. *Can Vet J* 2006; 47: 887-889.

Wynn SG, Bartges JW, Dodd WJ. Routine laboratory parameters in healthy dogs fed raw food diets (abstract). *AAVN Clinical Nutrition and Research Symposium*, Charlotte, NC, June 4, 2003.

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