How to Control Bacteria in Raw Food Naturally

Many different methods are used to kill pathogens in raw pet food, but they can affect the color, taste, texture and odor of ingredients. Instead, some innovative raw pet food companies are using this effective, natural, nonchemical solution to make raw food harmless for the most vulnerable pets.

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STORY AT-A-GLANCE

- Bacteriophages, aka phages, are a type of naturally occurring virus that can dramatically reduce salmonella in raw pet food
- Bacteriophages are present on and inside most living things on earth, as well as in the ocean
- Bacteriophages are approved by the FDA for use in human foods, and are safe for dogs and cats as well
- A small number of raw pet food producers in the U.S. and Canada are using phage technology as a form of pathogen control
- In one study, a phage spray reduced salmonella in raw pet food ingredients by 60 to 92%

Typically, a discussion of viruses involves the illnesses they cause and how to eradicate them. But what many people don't realize is there are certain naturally occurring viruses that are beneficial.

In 2016, a group of scientists concluded that viruses called bacteriophages (or simply, phages) can reduce the presence of salmonella, listeria, and E. coli in raw pet food, and published their findings in the journal Bacteriophage.[1] In case you were wondering, phages are safe for dogs and cats to eat. They've been approved for use in human foods under the FDA's Generally Recognized as Safe (GRAS) rule.

Bacteria Eaters Target and Kill Specific Foodborne Pathogens

Bacteriophages (Greek for "bacteria eaters"), as the name implies, are naturally occurring viruses that target specific bacteria, infecting and killing them. Phages are ubiquitous, meaning they're found everywhere on earth — they're inside our bodies, on our skin, in the soil, on the inside and outside of plants and animals, and even in the ocean. Intralytix, Inc. is a company that creates natural products to kill harmful foodborne pathogens, and describes the viruses this way:

> "*Typical phages have hollow heads, where the phage DNA is stored, and tunnel tails, the tips of which have the ability to bind to specific molecules on the surface of their target bacteria.*
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> *The phage DNA is then injected through the phage tail into the host cell, where it directs the production of progeny phages, often more than 100 in 20 - 40 minutes. These 'young' phages burst from the host cell, killing it, and infect more bacteria.*

> *Phages are very specific. They can only infect their targeted bacteria, and they have no effect on any human, animal, plant, insect, etc. cells."*[2]

Raw Pet Food Producers Are Using Phage Technology

When it comes to raw pet food, phages present an opportunity to provide natural bacteria control in lieu of synthetic chemicals or aggressive manufacturing techniques (including high pressure pasteurization). According to lead study author Nitzan Soffer, research scientist at Intralytix, in an interview with PetfoodIndustry.com:

> "*There is a small but growing number of manufacturers, in both the U.S. and Canada, that are using bacteriophages in their pet food production.*"[3]

Unlike other methods used to kill pathogens, for example, irradiation, pressurization, or chlorine washes, bacteriophages don't affect the color, taste, texture, or odor of ingredients. It's a 100% natural approach to killing bacteria in raw food.

Phage technology is also less expensive and easier to use than other methods. It's applied as a fine mist to ingredients, so raw pet food producers — many of whom are small operators — don't need to purchase highly specialized equipment. I asked James Pendergast, product manager at Darwin's Pet Products, why they decided to pursue using phages to control potentially pathogenic bacteria.

> "*We all agree that for a healthy animal with a non-compromised immune system, normal loads of bacteria found in fresh foods are typically a non-issue," said Pendergast.*

> "*However, in our ongoing commitment to safety," he continued, "it's prudent to assume there are some situations where an animal (or their caretaker) may be more vulnerable to bacteria ubiquitously present in certain foodstuffs, such as raw meat.*

> *We believe, and concluded from our extensive testing, bacteriophages are an effective, natural, non-chemical solution when applied in a multi-hurdle approach to treating foodborne pathogens in raw, meat-based pet foods.*

> *It's also a less invasive approach, when compared to other treatments such as Irradiation and HPP (high pressure pasteurization) currently being utilized in the pet food industry.*"

Biopreservation of Food: A Benign Ecological Approach

The use of bacteriophages to reduce pathogens in food falls into the category of "biopreservation," which is defined as "... the use of natural or controlled microbiota or antimicrobials as a way of preserving food and extending its shelf life."[4]

Interestingly, the biopreservation of food has been practiced since the early ages, at first unintentionally, and more recently as a result of a growing body of scientific evidence proving its effectiveness. It's considered a benign ecological approach to food preservation.

However, during the 1950s, scientists became very interested in research and development of broad-spectrum antibiotics, and bacteriophage studies took a backseat. However, now that the medical and scientific communities are grappling with the problem of antibiotic-resistant bacteria, research on bacteriophages has regained momentum.

Phages Reduced Salmonella by 60% to 92%

The researchers, led by Soffer, evaluated an Intralytix product called SalmoLyse®:

> "*The active ingredients in SalmoLyse® are naturally occurring lytic bacteriophages that selectively and specifically kill Salmonella, including strains belonging to the most common / highly pathogenic serotypes Typhimurium, Enteritidis, Heidelberg, Newport, Hadar, Kentucky, Thompson, Georgia, Agona, Grampian, Senftenberg, Alachua, Infantis, Reading, and Schwarzengrund.*
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> *SalmoLyse® is specifically designed for treating pet foods that are at high risk for Salmonella contamination.*"[5]

The phage was tested against salmonella in a variety of raw pet food ingredients, including raw chicken, turkey, tuna, cantaloupe, and lettuce. The foods were contaminated with one to three different strains of salmonella bacteria. The SalmoLyse® was sprayed on the ingredients and reduced salmonella by 60 to 92% depending on the ingredient and the concentration of phage used.

Stronger concentrations proved more effective at reducing salmonella, regardless of the ingredient. Part of the study also involved a 2-week **feeding trial** in which 12 dogs and 12 cats were fed dry kibble treated with SalmoLyse® (not sure why they weren't fed raw diets). None of the animals showed signs of illness or digestive issues.

Phages Kill Only Pathogenic, Not Beneficial, Bacteria

The study authors caution that phages are "not a silver bullet" and should be used in conjunction with other methods to reduce or eliminate pathogens in pet food. This is in part because phages attack only specific bacteria. For example, SalmoLyse® targets salmonella, but not listeria or E. coli. However, here's the upside, according to Soffer:

> "*On the other hand, because of this specificity, bacteriophages will not impact normal flora, and often beneficial, bacteria in pet foods, and therefore will not deleteriously impact the nutritional value of those foods.*"[6]

Phage "cocktails," which are combinations of bacteriophages, can be created to address a variety of different bacteria species, which is what Darwin's uses to accomplish natural control of several different potentially pathogenic bacteria.

What Pet Parents Need to Know About Salmonella and Raw Food

I realize salmonella infection is a common concern among raw feeders and pet parents who are thinking of switching their companion to a raw diet. It's also a problem for many veterinarians, and the reason they warn people away from raw pet food.

The potential for contamination by salmonella or other pathogenic bacteria is a fact of life. The term "potentially pathogenic bacteria" describes over 1,800 species of bacteria that live in many species of mammals. Of the 53 types of Salmonella that are most often isolated in dogs, the two most common serotypes are S. typhimurium and S. anatum.

Dogs and cats naturally have salmonella in their gastrointestinal (GI) tracts much of the time, regardless of what they are fed, and many ultraprocessed pet foods contain high amounts of bacteria that pets can cope with, but people can't.[7] Their bodies are familiar with it, as they have evolved with a multitude of bacteria and viruses over thousands of years.

Studies have shown from 1% to 20% prevalence of salmonella organisms in the feces of healthy dogs, and from 1% to 14% in healthy cats.[8]

Whether or not a pet develops disease from the presence of salmonella in the GI tract depends on a variety of factors. These include age, nutritional status, the presence of an illness or disease, as well as the administration of antibiotics, chemotherapy, or glucocorticoids.

Healthy companion animals can handle significant bacterial loads from food. Your dog's or cat's body is designed by nature to deal with considerable amounts of both familiar and foreign bacteria — the type of bacteria he or she would encounter by eating wild prey.

Happy, healthy food animals have less potentially pathogenic bacteria (their meat is healthier), giving credence to the idea that ethically raised and sustainably sourced meats from local farmers are highly preferable to meat obtained through the horrors of factory farming.

There are two reasons carnivorous pets can handle a heavy bacterial load: stomach acid and bile. Their stomachs are naturally so highly acidic there aren't many organisms that can survive it. Dogs and cats also produce a tremendous amount of bile, which is both antiparasitic and antipathogenic. If the stomach acid doesn't kill a pathogen, chances are the bile will.

How to Keep Your Pet Safe From a Salmonella Infection

If you feed raw, I recommend freezing meat or meat mixtures in individual serving-size packets for at least 3 days before serving (3 weeks for salmon). Defrost in refrigerator overnight. Use safe food handling techniques. Clean and sterilize all utensils, bowls, surfaces, and equipment after each use.

Discard any uneaten raw food after 30 minutes. A strong, resilient digestive system is necessary to handle a bacterial load and to support immune system function. Three steps you can take to keep your pet's GI tract in good shape include:

- Minimize physiological stress by feeding a nutritionally diversified, species-specific diet (and don't use guesswork to determine if your pet's meals are nutritionally complete)
- Minimize the unnecessary drugs your pet takes, including routine dewormers
- Reseed the gut during and after antibiotic therapy with a probiotic and feed probiotic-rich foods
- A good-quality digestive enzyme for pets will help promote your dog's or cat's body to get the most out of the food you feed

Sources and References

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[8] Salmonella in Domestic Animals, CAB International 2000