

## **Salmonella – Facts for the Health of You and Your Pet**

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What is *Salmonella*?

*Samonella* is a member of the family *Enterobacteriaceae* and is closely related to species of *E. coli*. and *Shigella*. There are over 2500 known serovars, with the most familiar being *Salmonella enteritidis* and *Salmonella typhimurium*. From our perspective *Salmonella enteritidis* and related serovars are of particular importance because they are the bacteria most commonly associated with cases of food-borne gastroenteritis (1).

How is *Salmonella* transmitted?

Infection occurs by eating food that is contaminated either from the source animal during slaughter or through cross-contamination during handling and preparation of the food (8). Improper hygiene can also be a source of contamination. Proper hand washing and sanitation of the area used during cooking can prevent bacteria from being introduced by the individual preparing the meal (7). Studies with humans show an infectious dose of  $10^5$  organisms, however infection can occur at lower doses in individuals who are immunocompromised such as infants, small children or the elderly (1).

Pets as a source of contamination?

Is it possible to get *Salmonella* from our pets? Yes, but it is important to look at how this transmission occurs. Approximately 36% of healthy dogs and 17% of healthy cats carry *Salmonella* in their digestive tract and therefore may shed the bacteria in their stool (4). They do after all walk around sniffing each other rear ends, routing through garbage and commonly come into contact with the feces of other animals. The transmission to humans occurs through the fecal-oral route in which bacteria get on your hands after contact with your pet's stool. If proper hand washing practices do not exist it can then be transmitted to your food or ingested directly through contact with your mouth.

Raw food and *Salmonella* – Is there a connection?

Raw food is a great source of nutrition for your pet. However because it is a raw meat product safe handling is required, just as you would do when preparing meat products for yourself. The food should be stored in the freezer and thawed in the refrigerator to limit bacterial growth. Most bacteria, including *Salmonella*, cannot grow at temperatures less than 5°C (7). When feeding a raw diet do not leave the food down available to your pet for an indefinite period of time. The food is then susceptible to bacterial growth because it is being exposed to a temperature range that is favorable to this growth. It all comes down to common sense, if the food has been sitting out for a long period of time (2 hours or more) throw it out and feed fresh food at the next mealtime. It is also important to remember to properly wash (using hot soapy water) all utensils, bowls or holding containers used and all surfaces that the food may have come into contact with. If left unwashed they can become potential sources of contamination for anyone in the home or new food when it is introduced at the next meal.

### Can raw food contain *Salmonella*?

Yes, it is possible for it to become contaminated with *Salmonella*, but some people advocate avoidance first without considering at all the facts. Firstly dogs have a very acidic stomach ( $\text{pH} \leq 1$ ), an environment that is not friendly to any bacteria. *Salmonella* cannot survive at that pH level and at minimum needs a pH of 4 or higher to grow. Optimal growth doesn't occur until the environment reaches the pH range of 6.5-7.5 (7). Secondly, there are differences between the length of our digestive tract (8-9m) and that of a dog's digestive tract (3-4m). This indicates a shorter transient time between intake and excretion and decreases the time that the bacteria have contact with our digestive system. The shorter the transient time the less likely it is that *Salmonella* can break through the gastrointestinal barrier and enter our system. Also important to note is the differences in the digestion of carbohydrates (significant because of the high grain content in dry dog food). Humans have  $\alpha$ -amylase, an enzyme dogs lack, in their saliva that starts digesting carbohydrates as soon as they enter our system. Dogs do not start to digest any carbohydrates they eat until it reaches their stomach with the majority of digestion taking place in their small intestine (4). The high percentage of carbohydrate in most dry dog food leads to situations where the food stays in the system longer (8-12 hours). However because a raw diet is meat based takes about half the time to digest (4-6 hours), thereby limiting the time that any possible bacteria may be exposed to their system (2).

Here at Mountain Dog Food preliminary testing is being carried out in an attempt to show what is occurring in the stomach of a dog during digestion. A solution of hydrochloric acid at a pH of 1, similar to that of the canine stomach, is prepared and samples of dog food (both raw and dry food) are added with the resultant pH being tested intermittently over time. Results have been graphed and can be seen in Figure 1.

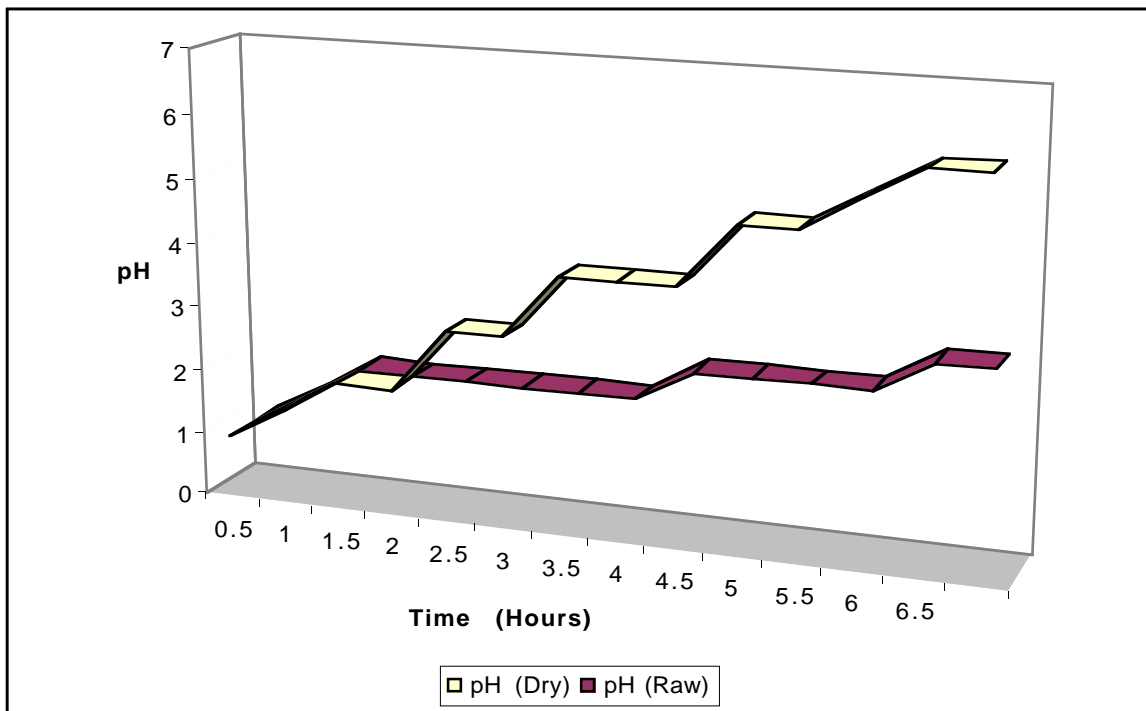


Figure 1. Changes in pH Over Time

While both samples show changes to the pH level the dry food sample shows movement across the scale towards a pH of 6, whereas the raw food levels off at a pH of approximately 3. Since dry food takes longer to digest, and therefore remains in the stomach longer this trend towards a more basic environment may have an impact upon the digestion of the food. This may be significant since the pH of a dog's stomach is one of the important barriers in *Salmonella* resistance. Results may give some indication of the differences between how dogs digest a raw meat based diet and a dry grain based one. While the findings may direct further study it is too early to tell if the results are statistically significant at this point.

One popular study done by Joffe and Schlesinger assesses the risk of *Salmonella* in dogs fed a raw diet. While the study does show positive results for *Salmonella* in 80% of the raw food and 30% of the stools sampled from dogs fed raw diets there are aspects that are overlooked in regards to these results and the study itself (6). The size of the study (10 raw fed and 10 kibble fed dogs) and number of samples taken (one stool and one food sample per dog) are too small to be statistically significant. As well the results may be biased since the owners were aware of the studies purpose ahead of time and they were also responsible for collecting the samples. The paper fails to show if measures were taken to control how the food was thawed, holding temperatures (i.e. did the food sit out for extended periods at room temp before sample was taken?), and sanitary practices surrounding feeding. Sanitation alone could be a huge contributing factor to the positive test result for *Salmonella* especially in the raw dog food. If feeding bowls, contact surfaces and utensils used were not properly cleaned after each meal bacteria could be introduced to fresh product that it comes into contact with. Independent tests done by PBR Laboratories on our raw food products have yet to this date show a positive test result for *Salmonella*.

It is also interesting to note that his findings give some credence the theory that a dog's digestive system can handle exposure to *Salmonella*. Of the 8 samples of raw food that tested positive for *Salmonella* only one of the three positive stool samples correlates back to the same species of *Salmonella* found in the food. In the remaining dogs the *Salmonella* was either dealt with by their system and was not present in their stool or was already in their gut microflora and was expelled in their stool. The positive results in 30% of the stool samples for dogs fed raw does not come as a surprise seeing that 36% of healthy dogs, regardless of diet, have *Salmonella* in their digestive tract (4). It was actually more surprising that none of the dogs fed a dry diet tested positive for *Salmonella*. Joffe states in his paper that feeding raw meat to dogs is a "public health concern" (6). However, oral and anal swabs taken from some of our dogs exclusively fed a raw diet all gave negative results for the presence of *Salmonella*.

Admittedly these results need to be replicated at a level that is statistically significant. However they do give evidence to contest his conclusion that dogs fed a raw diet are a health risk. His study fails to prove unequivocally that dogs fed a raw diet are a greater health concern than any other potential sources of contamination in our day to day environment. While we don't discredit the basis behind his work we feel that more definitive and statistically significant findings need to be produced before proclaiming a public health concern.

How can Salmonellosis be prevented in raw fed animals?

The point that cannot be emphasized enough in this matter is proper hygiene when dealing with *Salmonella* from any source (3,5). The following are some guidelines that, if followed, would greatly minimize the risk of infection:

- ✓ Store raw food in the freezer and thaw in the refrigerator
- ✓ Properly wash hands, all bowls, utensils and contact surfaces after handling raw food
- ✓ Limit time food is held at room temperature during feeding to less than 2 hours and dispose of food left out for periods longer than this (i.e. do not feed using a free-choice method where food is out and available at all times)
- ✓ After contact with animal feces wash your hands warm water and soap

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