

# Preliminary assessment of the risk of *Salmonella* infection in dogs fed raw chicken diets

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**Abstract** — This preliminary study assessed the presence of *Salmonella* spp. in a bones and raw food (BARF) diet and in the stools of dogs consuming it. *Salmonella* was isolated from 80% of the BARF diet samples ( $P < 0.001$ ) and from 30% of the stool samples from dogs fed the diet ( $P = 0.105$ ). Dogs fed raw chicken may therefore be a source of environmental contamination.

**Résumé** — Évaluation préliminaire du risque de salmonellose chez des chiens nourris de poulet cru. Cette étude préliminaire était destinée à évaluer la présence de *Salmonella* spp. dans de la nourriture à base d'os et d'aliments crus (OAC) ainsi que dans les fèces des chiens qui les consomment. Des salmonelles ont été isolées dans 80 % des échantillons d'AOC ( $P < 0.001$ ) et dans 30 % des échantillons de fèces des chiens qui en mangeaient ( $P = 0.105$ ). Les chiens nourris de poulet cru peuvent par conséquent être une source de contamination environnementale.

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## Introduction

**A** current trend among dog owners is the feeding of “natural” diets. Proponents argue that the processing methods used to produce commercial pet foods destroy essential nutrients and enzymes. They believe, therefore, that commercial pet foods do not meet the nutritional needs of dogs and may be a source of chronic health problems. One natural diet, proposed by Billinghurst (1), is commonly referred to as the BARF (bones and raw food) diet. It consists of pieces of whole raw chicken together with vegetables. Claims made for this diet by its champions include improved immune function and overall health, increased energy, improved coat and skin condition, and decreased body odor for the dogs that are on it (1). No publications, other than anecdotal testimonials, support or refute these claims. In one small-scale study, the nutritional adequacy of several “natural” diets was examined: significant nutritional imbalances existed (2).

Feeding raw chicken to dogs is a concern, given the many bacterial pathogens (especially *Salmonella* spp.) that are commonly present in raw poultry (3). Billinghurst (1) suggested that these pathogens are rendered harmless by the uniquely adapted canine intestinal tract. No reports documenting clinical salmonellosis in dogs fed a BARF diet have been published, though *Salmonella* spp. are well-described pathogens in dogs (4,5).

Since dogs are a potential source for several zoonotic pathogens, feeding raw meats to dogs is also a public health concern (5). Given the current popularity of the BARF diet, concern about environmental contamination with *Salmonella* spp. from the stools of dogs fed this diet is obvious. There are no published studies examining that

aspect of this nutritional trend. The present, preliminary study was conducted to determine if dogs fed a BARF diet shed *Salmonella* spp. in their stools.

## Materials and methods

Ten client-owned dogs fed a homemade BARF diet and 10 client-owned dogs (controls) fed various commercial dry dog foods were enrolled in the study. Clients were aware of the purpose of the study prior to the collection of any samples. Inclusion criteria were that the subjects had to be more than 1 y old and generally in good body condition, and they could not have undergone oral antibiotic therapy within the previous 2 mo. Prior to sample collection, the study animals were fed their usual diet (BARF or commercial) for at least 2 mo.

One meal-sized sample of food and 1 fresh stool sample were collected from each test subject by the owners. Samples were promptly presented to the chief study investigator, who submitted them to the Provincial Laboratory of Public Health for southern Alberta, where they were cultured for *Salmonella* spp. The specific serovar of any *Salmonella* sp. isolated was serologically identified. This laboratory is routinely used for detection of foodborne pathogens by the Calgary Regional Health Authority and is very experienced in the culture and identification of *Salmonella* spp. from food and stool samples.

The data were analyzed with a commercial software program (SAS System for Windows, Release 8.0; SAS Institute, Cary, North Carolina, USA). The *Salmonella* spp. culture-positive rates were compared between BARF and commercial-diet groups with 1-sided Fisher's exact tests (6).

## Results

The culture results from the food and stool samples are summarized in Table 1. All food and stool samples from the controls were negative for *Salmonella* spp. Eighty percent of the BARF-diet samples were positive for *Salmonella* spp.: *S. Braenderup* and

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**Table 1. *Salmonella* culture results in food and stool samples for 10 dogs fed a BARF (bones and raw food) diet and 10 dogs fed a commercial diet (controls)**

Subject no.	Fed commercial diet		Fed BARF diet	
	Food culture	Stool culture	Food culture	Stool culture
1	—	—	<i>S. Braenderup</i>	—
2	—	—	<i>S. Braenderup</i>	—
3	—	—	<i>S. Hadar</i>	—
4	—	—	<i>S. Schwarzengrund</i>	<i>S. Schwarzengrund</i>
5	—	—	<i>S. Schwarzengrund</i>	<i>S. Braenderup</i>
6	—	—	<i>S. Hadar</i>	—
7	—	—	<i>S. Schwarzengrund</i>	—
8	—	—	—	—
9	—	—	<i>S. Braenderup</i>	—
10	—	—	—	<i>S. Schwarzengrund</i>

— = negative culture for *Salmonella* spp

*S. Schwarzengrund* were each cultured from 3 samples, and *S. Hadar* was cultured from 2 samples. Thirty percent of the dogs fed a BARF diet had positive stool cultures for *Salmonella* spp.: 2 samples yielded *S. Schwarzengrund*, and 1 was positive for *S. Braenderup*. One BARF-fed subject had *S. Schwarzengrund* cultured from both its food and its stool sample. One subject that had *S. Schwarzengrund* cultured from its food sample had *S. Braenderup* identified in its stool sample. Another dog with a negative food sample was shedding *S. Schwarzengrund* in its stool.

From the results of this limited study, a BARF diet is significantly more likely than a commercial diet to contain *Salmonella* spp. ( $P < 0.001$ ), and BARF-fed dogs are more likely than commercially fed dogs to shed *Salmonella* spp. in their stools ( $P = 0.105$ ).

## Discussion

This preliminary study found that 30% of stool samples from dogs fed homemade BARF diets contained various *Salmonella* serovars, whereas none of the samples from dogs fed commercial dry diets contained *Salmonella* spp. Although these results are suggestive, they are not statistically significant owing to the small number of dogs studied. Larger numbers of dogs or multiple stool samples from each dog might have allowed the results to reach statistical significance. Unfortunately, the limited funding to this private clinic for this study did not allow for the inclusion of more study animals or multiple cultures from individual subjects. Though interesting, the fact that 80% of BARF food samples cultured positive for *Salmonella* spp. is not surprising, given the well-documented prevalence of *Salmonella* spp. in raw chicken (3). The fact that none of the commercial food samples cultured positive for *Salmonella* spp. was not unexpected.

Of the 3 positive stool samples, 1 was from a dog whose food contained the same *Salmonella* serovar, 1 was from a dog whose food contained a different serovar, and the 3rd was from a dog whose food tested negative.

The stool cultures may have reflected previous dietary contamination. Given the high number of positive food cultures, one could speculate that had multiple stool samples from dogs fed a BARF diet been assessed, more than 30% of them would have yielded *Salmonella* spp.

The results of this preliminary study prove that some dogs fed a BARF diet shed *Salmonella* spp. in their stools. This fact should be a consideration for owners choosing to feed this diet and be of especial concern for those with young children, the aged, or other people who may have compromised immune systems. We hope that this study will serve as an impetus for further study, with more subjects and multiple stool samples from each subject, to fully elucidate the public health concerns of this popular feeding trend. Given the high percentage of BARF diets that were positive for *Salmonella* spp. on culture, strict hygiene must be implemented when handling this food. In addition, the food bowl, the feeding area, and the pet's mouth must be considered as potential sources of *Salmonella*.

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## References

1. Billingham I. Feeding the adult dog. In: Give Your Dog a Bone. Alexandria, Australia: Bridge Printery, 1993:265–280.
2. Freeman L, Michel KE. Evaluation of raw food diets for dogs. J Am Vet Med Assoc 2001;218:705–709.
3. Houston DL. USDA and *Salmonella* control. Proc 91st Annu Meet US Anim Health Assoc, 1987:454–460.
4. Green CE. Salmonellosis. In: Infectious Diseases of the Dog and Cat, 2nd ed. Philadelphia: WB Saunders, 1990:235–240.
5. LeJune JT, Hancock DD. Public health concerns associated with feeding raw meat diets to dogs. J Am Vet Med Assoc 2001;219:1222–1225.
6. Daniel WW. Biostatistics: a Foundation for Analysis in the Health Sciences. 4th ed. New York: Wiley & Sons, 1987:537–552.