

Halitosis in Dogs and the Effect of Periodontal Therapy¹

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EXPANDED ABSTRACT

KEY WORDS: • dogs • halitosis • malodor • periodontal disease

Bad breath (halitosis or oral malodor) is a common problem in companion animals as well as humans (Culham and Rawlings 1998). Extensive studies of human halitosis have established that microbial metabolism of proteinaceous substrates in the oral cavity leads to the production of volatile sulfur compounds (VSC) such as hydrogen sulfide and methyl mercaptan. Volatile sulfur compounds and the bacteria responsible for their production have also been implicated in the pathogenesis of periodontal disease in humans.

In companion animals, bad breath constitutes a significant psychosociological problem in the companion animal-owner relationship. However, the association between bad breath and periodontal disease in companion animals poses an important issue because this may also be the first clinical sign of periodontal disease noticed by the owner. Limited research has been conducted into bad breath in companion animals; most of the information available on halitosis has been derived from human studies. We have initiated a series of studies to examine the cause and effect of oral malodor in dogs. The aim of these studies is to establish an appropriate methodology for assessing bad breath and the relationship between bad breath and oral hygiene.

Materials and methods. The study was conducted at the Waltham Centre for Pet Nutrition where the dogs were housed in purpose-built, environmentally enriched facilities (Loveridge 1994) and treated in accordance with the Centre's noninvasive research ethics. Eleven dogs of different breeds and ages (mean 8.2 y; range 1.5–16 y), reported to have varying degrees of malodor as assessed by the people who worked with them, were used in this study. One dog was used as a reference dog against which all other dogs were compared. The dogs were fed a number of different commercial diets throughout the study. Measurement of VSC was performed using a portable sulfide monitor (Halimeter, Interscan). Measure-

ments were made three times a day on five separate occasions over a 6-wk period. Readings were obtained before feeding, and 1 and 5 h after feeding. To compare the VSC levels with the perception of oral malodor, a panel of five judges, previously trained in assessing aromas/flavors, subjectively assessed the dogs and recorded their findings on a visual analog scale with 0 representing no odor and 100 severe odor. The organoleptic assessment was performed 1 h after the morning feeding and was repeated on two separate days, 1 wk apart.

To determine the effect of periodontal therapy on halitosis, five dogs with some of the highest VSC scores and in need of routine veterinary dental treatment were identified. Therapy included supragingival scaling and polishing to remove all dental deposits, and the extraction of teeth where this was felt appropriate for the health of the dog. After treatment, VSC measurements and organoleptic assessment of the dogs' breath were repeated on a weekly or biweekly basis for the subsequent 12 wk.

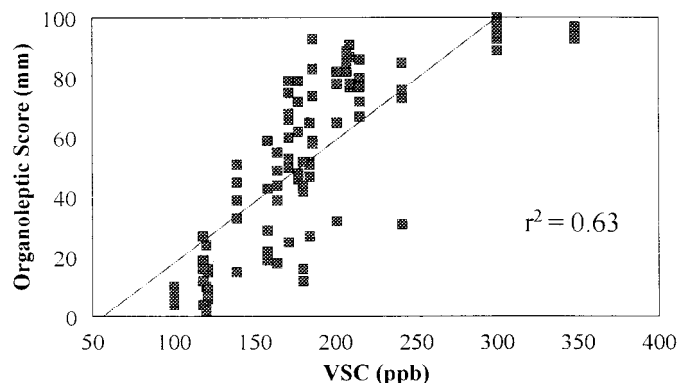


FIGURE 1 Correlation between volatile sulfur compound (VSC) levels and organoleptic scores determined by five people with 10 dogs repeated on two separate days.

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TABLE 1

Percentage reduction in organoleptic scores and volatile sulfur compound (VSC) levels after periodontal therapy¹

Week	Organoleptic scores	VSC levels
1	60.90 ± 20.77	47.59 ± 10.93
2	36.30 ± 28.36	56.40 ± 10.84
3	64.56 ± 23.38	50.32 ± 13.00
4	62.06 ± 19.97	43.86 ± 11.95
6	32.79 ± 50.36	34.98 ± 17.76
8	52.26 ± 24.61	40.09 ± 22.59
10	56.37 ± 25.42	29.44 ± 16.03
12	46.69 ± 35.55	41.39 ± 11.82

¹ Values are means ± sd for 5 dogs.

Results. There was a highly significant ($P < 0.001$) correlation between VSC scores and organoleptic assessment ($r^2 = 0.63$; **Fig. 1**). However, perception of malodor by the organoleptic panel appeared to have a VSC threshold of 100 ppb, whereas VSC levels >250 ppb were all scored as maxi-

mal. Those dogs with the lowest VSC levels were dogs that had clinically healthy gingiva, had their teeth brushed daily and were perceived as having no oral malodor. Dogs with the highest VSC levels demonstrated the greatest diurnal variation, with the maximum VSC levels recorded before the morning feeding. After periodontal therapy, there was a marked drop in both VSC levels and organoleptic scores (**Table 1**), which remained significantly below pretreatment values over the subsequent 12 wk.

This study demonstrates the following: 1) measurement of VSC levels is an appropriate method of determining halitosis in dogs; 2) there was a positive link between halitosis and periodontal disease; and 3) periodontal therapy markedly reduced the production of VSC and the perception of oral malodor.

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