



Dr A C Beynen was professor of veterinary nutrition at the Faculty of Veterinary Medicine, Utrecht University, The Netherlands in the period of 1993-2007.



Diet and Doggy Breath

Bad breath is a common condition in companion dogs and an annoying problem for owners. Mouth odor is usually caused by bacteria that produce volatile sulfur compounds with offensive smell. The bacteria can be controlled by regular teeth brushing and professional cleaning, which improves breath in most cases. Suitable dry foods and treats can further help combat stinky breath. The marketplace offers products for fresh breath, but their efficacy is usually unknown beforehand.

To evaluate breath-freshening foods and treats, oral malodor in dogs has to be quantified. Human perception, by sniffing and scoring of mouth air, represents the real-life situation. Mouth air can also be examined with a sulfur monitor. The results of sniff and sulfur tests are reasonably interchangeable as they move in tandem. Worsening bad breath goes hand in hand with increasing plaque and calculus on the tooth surface and with more severe gum inflammation.

The type of diet and certain dental chews can influence dog breath. Experiments showed that large-sized kibbles with enhanced teeth contact can improve breath smell. Dogs given chew treats in addition to their base diet had less offensive breath. The abrasiveness of dental kibbles and chews brings about mechanical removal of dental plaque. There is no solid evidence that herbal bacteria killers in dog food contribute to control of oral malodor.

On a scale of 0 to 10, with 0 indicating no noticeable malodor and 10 representing extremely intensive malodor, an effective dental diet or chew may improve average breath odor by about one scale unit. The improvement is perceivable by dog owners, but seems small, while many individual animals will respond below average. Nevertheless, effective dental diets and treats help freshen breath between brushing.

Halitosis and Dental Disease

Halitosis can have an oral or non-oral etiology. Hydrogen sulfide and methylmercaptan, produced by certain bacteria in the oral cavity, are seen as the most common reason for bad breath. Oral malodor in dogs is quantified by human perception or by measuring breath volatile sulfur compounds. Sensory assessment is the gold standard as it simulates everyday practice.

Sensory ratings and breath sulfur concentrations are linearly related, but the explained variation is only about 50% (1, 2). Increasing degrees of dental plaque, calculus and gingivitis are associated with higher breath scores (3) and sulfur concentrations (4). Dental prophylaxis in dogs reduces breath sulfur (5), but mechanical removal of plaque by daily toothbrushing has a durable impact (2, 6). Canine periodontal disease unquestionably leads to halitosis.

Food Texture

In a double-blinded, cross-over trial with 7-day periods, 20 dogs were fed a reference dry food or a veterinary dental diet (7). The dental food consisted of large, abrasive, more fibrous kibbles with enhanced resistance to crumbling on chewing, thus providing mechanical plaque control. On a 0-10 scale, mean baseline sensory malodor score was 2.6. The dental diet induced a statistically significant improvement of 0.5 units. When compared with the same reference food, the dental food has been shown to reduce dental plaque by 19% after one week (8) and by 39% after six months (9).

For four months, dogs were fed one of three diets: the above-mentioned textural kibbles, a canned food or a mixture (10). Compared with the wet food, the kibbles alone or as inclusion were found to reduce halitosis. No reference was made to score values and blinding of scoring.

Herbal Supplements

Switching from a control diet to the same diet with an extract of green tea leaves diminished breath sulfur in dogs and cats after 7 weeks (11, 12). There also was a decrease in gingivitis and plaque-derived *Porphyromonas*, which produces volatile sulfur compounds. However, the studies lacked control groups and reported breath sulfur concentrations are improbably high.

In a cross-over experiment with 30-day periods, 32 dogs were fed a dry food without or with herbal supplement (13). To formulate the test food, chicken



meal in a commercial diet was replaced by 6.5% of a complex herb mixture and fish meal. Breath hydrogen sulfide and methylmercaptan were markedly reduced by the test diet, but the presented concentrations are improbably low.

Probiotic

Mixing *Streptococcus salivarius* tablets with the morning meal of dogs lowered malodor scores (14). In oral gas, hydrogen sulfide and methylmercaptan were undetectable throughout. Possibly, the tablets were swallowed intact and affected extra-oral halitosis.

Dental Chews

Addition of different types of dental chews to a dry diet reduced breath sulfur in dogs (6, 15, 16). Prior to testing, the dogs' teeth were scaled and polished. There were 17-30 dogs per treatment, which lasted 4 weeks. Average control sulfur concentrations corresponded with 3.6 on a 0-10 sensory scale (2) while chew-mediated lowering was 1.6 units. In another study (17), undefined halimeter scores pointed to a smaller chew effect on halitosis.

Feeding a dental chew six days per week has been shown to maintain low breath sulfur for up to 21 months (15). A once-daily chew regimen appears to control oral malodor as it preserved a low, flat diurnal pattern of breath sulfur (18). All the chews that improved halitosis also reduced accumulation of dental deposits, just like severity of gingivitis (6, 15-17).

Antimicrobials

Topical (19-22) or pill (5) administration of various antimicrobials reduced halitosis levels in dogs.

List of references is available on request from the author (beynen@freeler.nl)

* Dr Anton C Beynen writes this exclusive column on dog and cat nutrition every month. He is affiliated with Vobra Special Petfoods.