WALTHAM Viewpoint

Dietary manipulation of canine odiferous flatulence

Catriona Giffard BSc, DPhil
Stella Collins BSc
WALTHAM Centre for Pet Nutrition, UK

Flatulence is widely recognised in dogs as a social nuisance, a source of humour, and an occasional cause of abdominal discomfort. There has been little research into the origins and nature of canine rectal gases, their physiological and clinical significance, or the efficacy of various remedies purported to reduce flatulence in dogs. Flatulence is a frequent everyday occurrence and is usually associated with no or very mild discomfort. However, odoriferous gas production is a common cause for complaint from the dog-owning public.

From human studies it is known that the major human rectal gases are nitrogen and oxygen, which are derived from air swallowing and diffusion from the blood, plus carbon dioxide, hydrogen, and methane, which are the products of bacterial metabolism and non-bacterial reactions within the bowel. Odoriferous gases constitute less than 1% by volume of flatus and much of the unpleasant odour is due to sulphur-containing gases, primarily hydrogen sulphide and methanethiol (1, 2). Aside from their odoriferous qualities, sulphur-containing rectal gases are potentially toxic and have been implicated in the pathogenesis of ulcerative colitis in humans (3). There are, therefore, potential health as well as social benefits to be obtained from reducing the production or availability (or both) of sulphur gases in the large bowel.

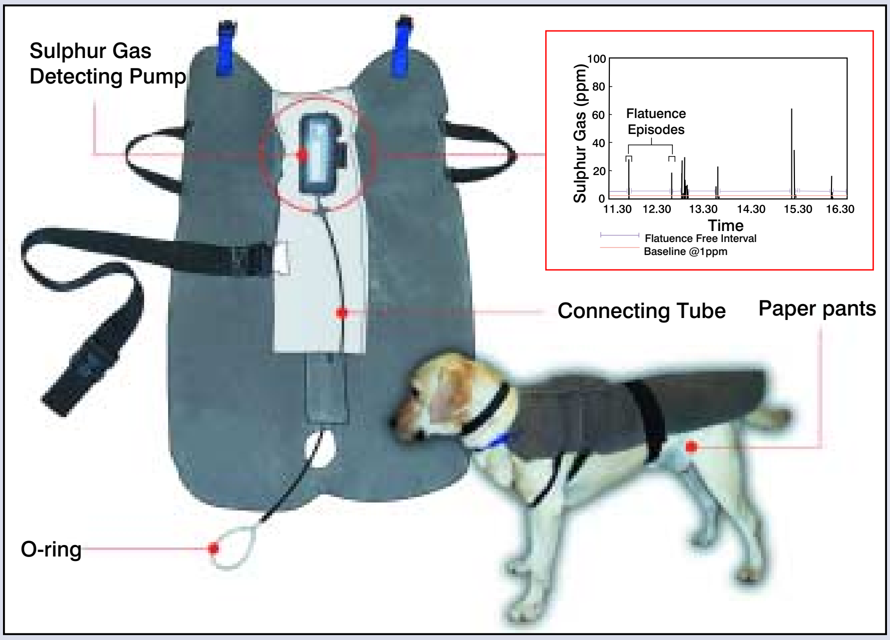
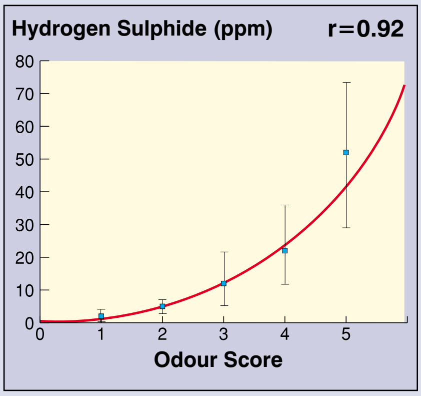


Figure 1 *Schematic representation of rectal gas sampling device and a representative flatulence profile demonstrating flatulence episodes and flatulence freeintervals. The baseline is set at 1 ppm hydrogen sulphide and all readings below this are ignored.*

Studies at the WALTHAM Centre for Pet Nutrition have developed an *in vivo* method for the assessment of odiferous canine flatulence (4). This technique involves a monitoring pump with a hydrogen sulphide detector that generates a real-time measure of individual flatulence episodes allowing normal variation in canine rectal gas production to be determined. In addition, a predictive model has been developed that enables the relative noxiousness of each emission to be determined from the levels of hydrogen sulphide measured on-line. This WALTHAM flatulence detection system has been used to determine the potential of dietary ingredients to ameliorate the frequency and odour characteristics of flatulence in dogs.

Figure 2
Correlation between human perception rating of flatulence and levels of hydrogen sulphide in rectal gas as measured by the sampling pump. The data represents the mean standard deviation and scores represent 1– no odour, 2 – slightly noticeable, 3 – mildly unpleasant, 4 – bad odour, 5 – unbearable.



WALTHAM flatulence detection system

Rectal gases are collected via a perforated Teflon tube, which is held close to the anus of the dog and is attached to a sulphur gas-monitoring pump carried in a jacket over the dog's shoulders (**Figure 1**). Dogs wear the coats for five hours during each measurement period. The sampling pump is fitted with a hydrogen sulphide sensor that measures hydrogen sulphide levels, in parts per million (p.p.m.), at 20-second intervals (**Figure 2**).

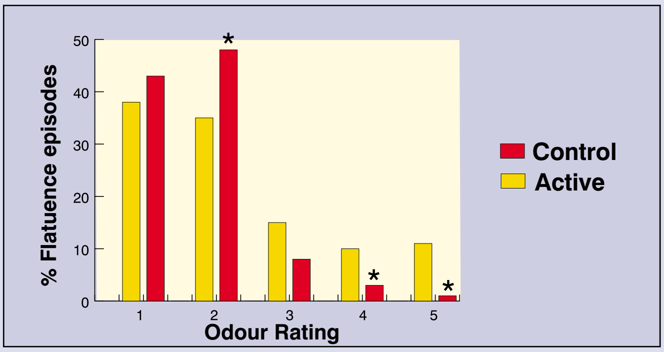


Figure 3 *Distribution of flatulence episodes according to odour rating in dogs fed active and control treats. Data are shown as mean frequency, with significant differences between treatments denoted by * ($p<0.05$).*

Three measures of flatulence can be calculated from the hydrogen sulphide data: namely number of episodes (NOE), mean interval free time (MIFT), and human perception of malodour (**Figure 1**). The NOE is the number of times during the sampling period that pump readings were greater than 1 p.p.m., which is the lower limit of sensory detection for humans in the same room as dogs. The MIFT is a measure of the frequency of flatulence and is calculated as the cumulative sum of flatulence-free intervals (in minutes) divided by the number of flatulence-free intervals. A flatulence-free interval was any 20-second period during which the level of hydrogen sulphide was less than 1 p.p.m. Human perception of odour rating for each episode of flatulence is calculated according to a power function, where rating (on a scale of 1 to 5) is equal to $1.51[H_2S]^{0.28}$. These odour ratings are categorised as no odour (= 1), slightly noticeable (= 2), mildly unpleasant (= 3), bad (= 4), and unbearable (=5), as shown in **Figure 3**.

Effect of diet on *in vivo* odoriferous canine flatulence production (5)

The potential for manipulation of the diet by the addition of activated charcoal, *Yucca shidigera* extract, and zinc acetate in an attempt to reduce the number, frequency, and odour characteristics of flatulence in dogs was evaluated. A prospective double-blinded placebo controlled cross-over study with eight dogs was used to assess the effects on the production of hydrogen sulphide when fed a supplemented treat 30 minutes after the dogs ate their daily rations. The number, frequency and odour characteristics of flatulence were then measured for five hours using the WALTHAM flatulence detection system.

Feeding this supplemented treat was associated with a small reduction in the number of flatulence episodes (2.05 ± 0.74 vs. 2.47 ± 0.82 *ln*/5 hours) and there was no difference between treatment groups and placebo treats in the mean interval free time (7.55 ± 0.75 and 7.20 ± 0.79 *ln* minutes, respectively). The distribution of odour ratings for flatulence episodes following feeding of test and placebo treats is shown in **Figure 3**. The percentage of episodes rated as 3 (mildly unpleasant), 4 (bad), or 5 (unbearable) was reduced when the dogs were fed the supplemented treat. Consumption of the activated treat reduced the percentage of bad and unbearable episodes by 86% compared with the placebo treats, such that episodes rated as 4 or 5 represented only 2.2% of all episodes versus 16.1% for the placebo treats.

Conclusion

Oral ingestion of a supplemented treat containing the above-listed ingredients is associated with a decrease in the frequency of malodorous flatulence episodes that will directly affect one of the social nuisances of dog ownership and, by reducing the production or availability of hydrogen sulphide, may be beneficial in diseases linked to the toxicity of this gas.

Results from this study form the basis of a patent application. This treat will be available as Easydose™ Flatulence Control, as one of a range of treats of this type within the United Kingdom.

● REFERENCES ●

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