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Assessing oral health and hygiene in dogs

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INTRODUCTION

Periodontal disease is one of the most common diseases in cats and dogs (1, 2). It is caused by the buildup of bacterial plaque on the tooth, which initiates a host inflammatory response known as gingivitis. If the plaque is not removed, gingivitis may lead to a more destructive form of periodontal disease—periodontitis. This is an inflammatory response involving the supporting tissue of the tooth, including the periodontal ligament, root cement, and alveolar bone, and results in tissue destruction, loss of tooth support, and ultimately tooth loss. Plaque can also be calcified to form calculus, which is a much harder substance than plaque and therefore more difficult to remove from the tooth surface. Calculus itself is inert and does not cause gingivitis, but it does provide a rough surface on which further plaque can accumulate.

Daily toothbrushing with a veterinary toothpaste and toothbrush is the most effective way of removing plaque and reducing the effects of periodontal disease. However, many dog owners find it difficult to brush their pets' teeth because of time constraints or because the animal is unwilling. If toothbrushing is not performed daily or if the correct brushing technique is not used, it may not always be effective and alternatives may need to be investigated.

EVALUATION OF DIETARY AGENTS

Studies at the WALTHAM Centre for Pet Nutrition have investigated the use of dietary agents to reduce the buildup of plaque and calculus, and also to reduce gingivitis. These can be used as an alternative to, or in conjunction with, toothbrushing to improve canine oral health. Examples of products that have been tested in this way include PEDIGREE® DentaRask/Dentabone. These studies evaluate the efficacy of a test product in terms of reducing gingivitis and/or the accumulation of dental deposits (plaque and calculus). The methods used for scoring gingivitis and dental deposits at the WALTHAM Centre for Pet Nutrition are modifications of well established human techniques.

Table 1
Criteria for assessing gingivitis

0	No gingivitis
1	Slight inflammation—slight redness but no bleeding on probing
2	Mild inflammation—slight redness and swelling, with delayed bleeding on gentle probing of the gingival sulcus
3	Moderate inflammation—the gingiva is red and swollen and bleeds on gentle probing of the sulcus
4	Severe inflammation—the gingiva is red or reddish-blue, the gingival margin is swollen, and there is a tendency to spontaneous hemorrhage or profuse hemorrhage on probing and/or ulcerations along the gingival margin

Table 2
Criteria for scoring plaque and calculus deposits

	Coverage			Thickness/intensity	
Score	*Plaque*	*Calculus*	*Score*	*Plaque*	*Calculus*
0	No observable plaque	No observable calculus	1	Light = pink to light red	Light <0.5 mm
1	1–24% coverage	1–24% coverage	2	Medium = red	Moderate 0.5–1.0 mm
2	25–49% coverage	25–49% coverage	3	Heavy = dark red	Heavy >1.0 mm
3	50–74% coverage	50–74% coverage			
4	75–100% coverage	75–100% coverage			

SCORING METHOD

For each dog, 22 teeth are scored in all three oral health parameters. A mean mouth score for each parameter is calculated, and statistical analyses are then performed. The teeth scored are as follows (I = incisor, C = canine, P = premolar, M = molar):

- Maxilla—I3, C, P2, P3, P4, M1
- Mandible—C, P2, P3, P4, M1

Studies have shown that scores from the 22 selected teeth described above are representative of the scores obtained when all the teeth are assessed. Therefore, in the oral health studies at the WALTHAM Centre for Pet Nutrition, only the selected 22 teeth are scored in order to minimize the length of time required.

Gingivitis

Gingivitis is assessed using a modification of the method designed by Löe and Silness (3). The buccal gingiva for each tooth is visually divided into thirds (mesial, buccal, and distal) **(Figure 1)**. Each site is evaluated by the criteria listed in **Table 1** and given a score between 0 and 4. The mean gingivitis score for each dog is the mean for all teeth scored.

Plaque and calculus

Plaque is scored using the Quigley and

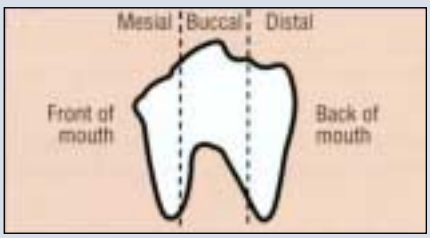

Figure 1 *Division of tooth for gingivitis and calculus measurements.*

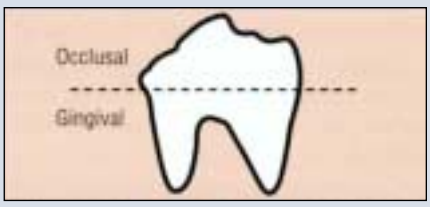

Figure 2 *Division of tooth for plaque measurement.*

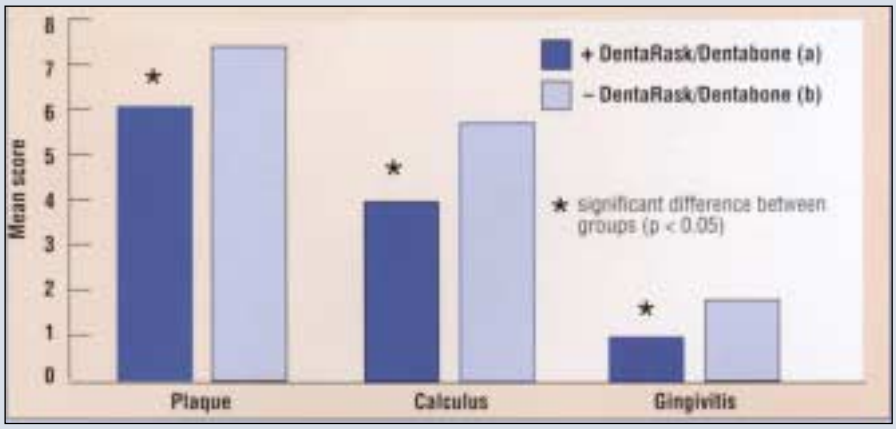

Figure 3 *Twelve-month mean plaque, calculus, and gingivitis scores in dogs fed complete PEDIGREE diet plus one of the following:* **(a)** *One PEDIGREE® DentaRask/Dentabone six times a week (n = 25).* **(b)** *No additional treats (n = 24).*

Hein method (4), which has been slightly modified (5). Plaque is disclosed by applying undiluted disclosing solution to the buccal surface of each tooth and immediately rinsing with water. The gingival and occlusal half for each tooth **(Figure 2)** is scored based on plaque coverage and plaque thickness **(Table 2)**.

Calculus is assessed using the method of Warrick and Gorrel (6). The disclosed plaque is removed with a toothbrush and then further rinsed from the teeth using a dental air–water syringe. The tooth is then air-dried. The buccal surface of the tooth is visually divided vertically into mesial, buccal, and distal thirds **(Figure 1)**, and each third is assigned a numerical score for both coverage and thickness. A probe is used gently to verify the visual impression of cover and thickness.

For both plaque and calculus, the cover is multiplied by the intensity factor (plaque) or the thickness factor (calculus) to give scores for each section of each tooth. The scores from each section of the tooth are added together to obtain a tooth total. The score for each dog is the mean for all teeth scored.

PERFORMANCE OF DIETARY PRODUCTS

Many studies at the WALTHAM Centre for Pet Nutrition have used this scoring method to investigate the effect of various dietary products on the oral health of dogs. A long-term study assessing the oral health performance of PEDIGREE® DentaRask/Dentabone was performed in dogs (7).

The dogs were divided into two groups: one group was fed one DentaRask/Dentabone six times a week while the other was fed no additional chews. Gingivitis, plaque and calculus was measured after 12 months using the methods described above. All three oral health parameters were significantly lower in the group of dogs fed the DentaRask/Dentabone **(Figure 3)**.

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