

Oral Products and Dental Disease

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Dental disease is a common problem in dogs and cats. A study of North American pets showed a 20% incidence of calculus and/or gingivitis in dogs of all ages, while 24% and 13% of cats of all ages had calculus and gingivitis, respectively.¹ Dental disease in older pets is especially common, and as pets age, the incidence of dental disease increases. One study identified periodontitis in 82% of dogs aged 6 to 8 years and in 96% of dogs aged 12 to 14 years.² Dietary strategies to promote dental health have been established and can be useful additions to a complete home oral care regimen.

The Importance of Regular Oral Care

Dental plaque consists of salivary glycoproteins, food debris, and bacteria. As plaque ages and thickens, it extends under the unattached gingiva at the tooth base and the bacterial population shifts from aerobic to anaerobic species. Salivary calcium salts are deposited on the plaque layer, causing it to mineralize and become calculus. The presence of calculus allows further bacterial attachment. Production of bacterial toxins results in an inflammatory response (gingivitis and periodontitis). The host reaction is of primary importance in the pathogenesis of disease. If allowed to become chronic, this process leads to local tissue destruction, including gingival recession and bone loss. In severe cases, the result is a tooth root abscess, tooth loss, and even jaw fracture. In addition, entry of oral bacteria into the bloodstream can have negative consequences for the heart, liver, and kidneys.³

Routine veterinary oral examinations are an important part of preventive care for all pets. In addition, regular home care is necessary to delay and prevent plaque deposition and avoid calculus accumulation. For some dogs with healthy gingiva, toothbrushing at least three times weekly is ideal,⁴ while for other individuals, such as those with established gingival inflammation, daily brushing is necessary.^{5,6} However, not all owners can commit to such a routine, and not every pet is amenable to this procedure. In addition, home care procedures have little impact when established

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disease is present. They are most effective when instituted immediately after professional oral health assessment and treatment. While some owners believe that preferentially feeding kibble rather than canned food or that providing bones for gnawing and/or ingestion will improve oral health or prevent dental disease, the efficacy of these practices is questionable. In contrast, diets and treats that are specially formulated for dental disease can serve an important role as adjunct tools for preventing and managing periodontal disease in pets. These products do not replace appropriate veterinary prophylaxis and treatment or proper home care; however, they can reduce the accumulation of plaque and calculus in dogs⁵ and cats.⁷

Products for Maintaining Oral Health

Pet owners are increasingly interested in functional foods that play a role in addressing specific diseases. Providing treats is also important to owners, with 41% of dog owners and 21% of cat owners reporting daily feeding of commercially available treats in one survey.⁸ Globally, the treat industry generated over 4.6 billion dollars in 2005, with continued growth expected.⁹ Both of these factors have an impact on the popularity of dental care treats. Complete foods that incorporate various strategies for addressing dental health are also increasingly available. Veterinary-exclusive products, as well as over-the-counter maintenance diets that are specifically formulated for dental care, are based on two general strategies: (1) mechanical and (2) chemical disruption of the plaque and/or calculus on teeth.^{10,11}

Mechanical Methods to Promote Oral Health

Mechanical disruption of the plaque layer on the tooth surface is an effective means of reducing accumulations of plaque and calculus. Physical removal of plaque can be achieved by engineering the size and shape of a treat or kibble to prolong chewing time and enhance tooth contact. Additionally, the abrasive action of special fiber matrixes, collagenous animal tissues (as in rawhide), and other textures can result in deeper and more effective tooth penetration and subsequent cleaning of the tooth surface.^{7,12,13} There is some evidence that rawhide can be effective in prevention of calculus accumulation over the course of weeks^{12,13}; however, longer-term controlled studies are not available, and results of trials with other animal-source chews are scarce.

While there are many proponents of the use of a “natural diet” for the maintenance of good oral health, scientific evidence is not available to support this practice. No data have been reported that compare the incidence of dental disease in domestic dogs eating commercial diets with that in dogs eating “natural” diets consisting of bones, skin, and connective tissue. However, one small study of the skulls of African wild dogs showed that the incidence of periodontal disease was 41%, similar to the incidence reported for modern domestic dogs.¹⁴ African wild dogs eat mainly impala, but other ungulates are also part of the diet.¹⁵ It is noteworthy that calculus was mild and only noted on two of 29 (7%) skulls.¹⁴ Similar findings were reported from a study of the skulls of feral cats eating a diet of mostly birds: periodontal disease was noted on 62% (186 of 301) of the skulls, despite

a low incidence of calculus accumulation (9% of skulls).¹⁶ Another study comparing domestic and feral cats also found a lower incidence of calculus in the feral cats, while the groups did not differ in periodontitis scores; the feral cats were eating primarily rodents, lizards, and birds.¹⁷ Taken together, these findings suggest that consuming a natural diet is not protective against the development of periodontal disease in dogs and cats. However, because such diets may prevent or remove calculus, there is concern that owners using natural diets for this purpose may not recognize and effectively address significant dental disease in their pets. It is well recognized that plaque and associated bacteria, not calculus, are responsible for the development of gingivitis and periodontitis; however, tooth surfaces visibly free of calculus are aesthetically desirable to the pet owner. All patients, irrespective of diet, should undergo regular professional oral health assessment and treatment, regardless of the degree of calculus accumulation.

Chemical Methods to Promote Oral Health

Chemical agents for reducing bacterial numbers (antimicrobials) or impeding the formation of calculus (calcium chelators) are also used in the manufacture of dental foods and treats, usually in conjunction with one or more mechanical strategies. Antimicrobials such as enzymes and the antiseptic chlorhexidine are included in some dental treat products. These compounds are also components of toothpastes, rinsing solutions, and other dental care products for pets. Zinc salts and grape and green tea polyphenols are included in some treats and complete foods for antimicrobial effects that may promote periodontal health; however, data evaluating their efficacy are not currently available. Some research suggests that the mechanical properties of treats, rather than antimicrobial additives, are responsible for positive effects on dental health.^{18,19}

Calcium chelators (e.g., sodium hexametaphosphate [HMP]) reduce the amount of salivary calcium available to mineralize plaque material into calculus. These substances are commonly used in various dental treats and diets. One short-term study showed an 80% reduction in calculus formation with the feeding of only a small amount of HMP-coated diet daily.¹²

Regulation and Proof of Efficacy

Proof of efficacy of dental health products is not always clear. Under AAFCO (Association of American Feed Control Officials) Model Regulations, prevention or treatment claims for dental disease are not allowed; however, manufacturers can assert that the mechanical actions of food products “cleanse, freshen, or whiten teeth” without evidence of efficacy.²⁰ Further, the US Food and Drug Administration Center for Veterinary Medicine (FDA-CVM) has decided that if a product claims effectiveness in “plaque or tartar reduction or

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prevention, or control of breath odor...only with respect to the product's abrasive action, enforcement would be a low priority.²⁰ However, if such claims are attributed to nonmechanical means, the product must be registered as a drug or otherwise have an approval for sale from the FDA-CVM.²⁰

With a plethora of products marketed to consumers, veterinarians need guidelines for evaluating product efficacy. An increased interest in evidence-based medical practice is promoting expectations of scientific validity. A wide range of methods used for control and prevention of oral disease in dogs and cats have recently been reviewed based on the strength of published evidence.²¹ Current regulations under AAFCO are likely not adequate for determining the usefulness of individual products for dental health. However, well-designed clinical trials can provide objective information and are truly the gold standard. Data from such trials should be published in peer-reviewed journals and can be submitted to the Veterinary Oral Health Council (VOHC) to receive a Seal of Acceptance for plaque and/or tartar control. The VOHC is an organization within the American Veterinary Dental College, the professional organization of board-certified veterinary dentists. The VOHC provides guidelines for conducting clinical trials and reviews data from such trials when considering products for its Seal of Acceptance. VOHC-approved diets, treats, and other treatment products are listed at www.vohc.org/accepted_products.htm.

Other Nutritional Considerations

A final consideration for dental treats is unrelated to their impact on dental health. Although such products are primarily designed with dental health in mind, they are also palatable, edible, and digestible. As such, they add calories and other nutrients to the daily diet. Most treats do not contain sufficient quantities of essential nutrients to be considered a "balanced" diet. Many treats are quite energy dense, so consideration of the calories they contribute to the diet is important. To avoid unbalancing the overall diet, treats should be fed in moderation so that no more than 10% of the daily intake of calories comes from treats.

CLINICAL PEARLS

- While regular toothbrushing is the gold standard for prevention of periodontal disease in dogs and cats, treats and foods specifically formulated for dental health can be useful adjuncts.
- Treats used for dental care can add significant calories to the daily diet.

Summary

Dental disease is very common in dogs and cats, especially older animals. The proven effectiveness of regular toothbrushing cannot be replaced; however, diets, treats, and other products can be useful tools in a complete home dental care plan.

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