



VETERINARY DENTAL SERVICE
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Dr. Tom Lonsdale
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Dear Tom:

Your July 20 package to Deans of Veterinary Schools was forwarded to me by my Dean.

Enclosed is a copy of an article requested by Veterinary Forum that will be included in their September issue in a series on Nutrition - the Editor was somewhat surprised when I replied to her invitation with a piece that does not simply extol the virtues of the latest offerings in processed foods!

Please keep me informed of any major developments at your end.

With best wishes,
Yours sincerely,

Colin E. Harvey
Professor of Surgery and Dentistry

Enc.

CEH:wea

cc: Dean E.J. Andrews

DIET AND PERIODONTAL DISEASE IN COMPANION ANIMALS

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The natural diet of the wild carnivore has a plaque-retarding effect. In rigidly controlling and optimizing the nutritional content, palatability to the pet, and acceptance of commercially available foods by the pet-owning public, pet food manufacturers have created nutrition materials that do not resemble the natural diet of wild carnivores in gross form. In addition, by selective breeding for specific body size, head shape and occlusive pattern, dog owners have created dogs that would not manage well even with a diet that closely resembles that of wild carnivores. By either route, plaque formation is enhanced, inflammatory periodontal disease is more common, and long-term health hazards secondary to intermittent or on-going bacteremia are more likely in an aging pet population. Periodontal disease thus can be considered as a disease of domestication.

Several studies have shown that the form of the diet is much more important in controlling plaque build up and gingival inflammation than is the nutritional content of the diet in dogs. At least over the short-medium term, gross changes in carbohydrate and protein content have no effect on rate of plaque build-up. A diet grossly deficient in calcium leads to secondary nutritional hyperparathyroidism and demineralization of periodontal

bone, but does not cause more rapid periodontal tissue break-down. The 'rubber jaw' syndrome of secondary (nutritional or renal) hyperparathyroidism is a periodontosis that does not affect connective and epithelial tissues unless the soft bone permits mobility of teeth that is mechanically harmful.

The general conclusion from reported studies is that a fibrous or dry food diet is beneficial compared to a soft food diet, though canned food and dry food diets have not been compared directly in reported controlled studies in dogs. Even if dry food is somewhat better at retarding plaque formation than is canned food, it is far from optimal: calculus accumulation still occurs, and few studies extend over a long enough period to permit documentation of any disease producing effect of a 'well balanced diet' that is inadequate as a dietary abrasive.

From published studies to date, the optimal oral health diet for dogs contains large pieces, each of which contain calcified material and softer but fibrous material (eg. whole ox-tail or whole trachea-esophagus). These materials may not be attractive to many owners of companion animals, particularly when the material has been partially chewed, and then left for some time as dogs are wont to do. Where esthetics are not a problem, such as in laboratory housed dogs, these materials are effective: for Beagle dogs, half of a raw oxtail given in addition to dry food every two weeks results in accumulation of plaque and calculus per year at a rate that approximates the rate per week in Beagles not given access to the ox-tails. The rapidity of the dietary abrasion effect has been demonstrated with whole versus minced trachea-esophagus fed to dogs - there is a significant increase in gingival fluid flow

(a measure correlated with gingival inflammation) within 24 hours when the diet is switched from whole to minced, and vice-versa. Many owners are reluctant to feed 'meat' pieces or bones to their dog or cat because of the purported risk of intestinal irritation, obstruction or perforation. Chicken limb bones that can develop sharp ends during eating, and pork chop or steak bones that have sawn edges that form spikes, probably should not be fed. Large knuckle bones are acceptable to some owners because they are 'clean', however this means there is little 'flossing' activity during chewing by dogs. The 'ideal' self-flossing material for dogs and cats is a whole prey animal or large part of a carcass that requires much oral work to separate into swallowable sections. Most zoological gardens have reverted to a 'large pieces' menu for carnivores because periodontal disease was rampant during the "mince and mix for balance" era of zoo animal feeding regimes. An often-overlooked source of chewing activity for dogs is the addition of raw vegetables to the diet, particularly items such as broccoli and cauliflower, which are attractive to some animals.

There are significant differences in extent of periodontal disease among ages and types (body-weights) of dogs. This may be due in part to differences in specific anatomical factors such as tooth size relative to jaw bone height or thickness, gingival sulcus depth, etc., or to a tendency for owners of small breed dogs to be more likely to feed a soft food diet. Recent epidemiologic evidence has shown that both factors may be involved, exacerbating the other. The end result is that small-breed dogs often have severe periodontal disease as they age, and pathological mandibular fractures are not uncommon.

In a Japanese study of 2,649 companion animal dogs, the prevalence of calculus

('present' or 'abundant') was significantly lower in dogs fed dry food or 'left overs' compared to canned, soft moist and home-cooked food. In a study of 1500 dogs in the USA that collected more specific data, regression analysis identified body weight and age as significantly correlated, inversely and directly respectively, with increasing calculus deposition and gingival inflammation; correlation with a dry food diet was less significant.

There are now several products available that are designed to improve oral health ("clean its own teeth") by encouraging chewing action by dogs. Biscuits, rawhide strips or shapes, rubber and nylon toys all help, but none is universally effective; the dog should be encouraged to use the product(s) daily. The evidence for a beneficial effect is most strong for rawhide chews, both in a controlled study comparing rawhide chews and biscuits, and in an epidemiologic study of USA domestic pet dogs. Similar results have been shown for 'collagen sticks' in Europe, where dried pig ears, rumen lining and ox-penis have been used for many years as a natural chewing material for dogs. Controlled studies have also shown a significant but less strong beneficial effect for hard biscuits. Large biscuits are more effective than small ones. Dried cattle hooves are now marketed extensively in the USA as a chewing material for dogs: they are very attractive to many dogs, and acceptable as a 'clean' object to owners, however, there are anecdotal reports of dogs that have fractured teeth or caused gingival trauma while chewing a dried hoof.

The need for plaque/calculus retardant techniques or materials in cats is now being given some attention. In laboratory housed cats, at least short-term, plaque deposition is reduced with dry food compared to canned food; however, regression analysis of data from

700 USA house-hold cats failed to show a strong statistical association between a dry food diet and reduced calculus deposition or gingival inflammation. Raw (or boiled for a few minutes in areas where there is a risk of Salmonella contamination of raw processed poultry) chicken wings, or chicken or turkey necks are often acceptable (and jealously guarded by individual cats in multi-cat households). Recently, a hard treat product that claims to reduce calculus deposition 50% in cats was marketed.

Plaque and calculus retardation in dogs is a rapidly developing science; recent developments include the addition of chemical calculus-retardants (pyrophosphates) in biscuits or sprayed on the surface of rawhide chews. In the next several years, the interfaces between diet, periodontal disease and nutritional content will receive increased attention as we attempt to optimize the oral health of our companion animals.

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