

CONTROL OF DENTAL CALCULUS IN EXPERIMENTAL BEAGLES¹

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SUMMARY • *Dental calculus was a major cause of secondary tooth loss in beagle dogs housed in runs and cages and fed soft diets. Dental calculus was reduced when the diet was supplemented with one-half oxtail weekly. Four groups of 6-8 dogs were fed oxtails at one- and two-week intervals to determine the amount and frequency of feeding oxtails necessary for the control of calculus formation. Approximately 85% of the accumulated dental calculus was removed from the surface of the teeth after four-oxtail feedings. Approximately 35% of the individual teeth of the dogs showed calculus deposits after the test period, compared to 85% before oxtails were fed. The test confirmed the feasibility of preventing the accumulation of dental calculus in experimental beagle dogs by regular weekly feedings of oxtails.*

Experimental beagle dogs, in controlled housing, fed soft diets tend to accumulate heavy deposits of dental calculus. Dental calculus (tartar) is the major cause for loss of secondary teeth in dogs. Gingival ulcers form and cause the gum to recede from the teeth which can cause alveolar periostitis and loosening and loss of the teeth (3). The calculus is composed of calcium salts, epithelial cells, bacteria, and food debris. It collects on the teeth in a soft, light-grey film. As calculus accumulates, the under layers change to a hard, brown, brittle compound. Calculus is either supragingival or subgingival, the latter being harder and darker in color, and held to the teeth by mucin (2).

Manual removal of calculus is a laborious process, usually requiring anesthesia, which may interfere with the experimental protocol. Whitney (4) stated that hard biscuits fed exclusively as the dogs only diet for 3 weeks removed the heavy tartar accumulation on the molars and most of the staining on the canine teeth. Andersen and Hart (1) reported that regular feeding of oxtails to dogs decreased calculus accumulation. Oxtail feeding in our colony confirmed its

therapeutic and prophylactic value. However, it was necessary to determine the amount of oxtails and frequency of feeding required to obtain optimum effectiveness at minimal cost.

METHODS

Twenty-six, 4-5-year old female beagles were randomly separated into 4 groups of 6-8 dogs. The dogs were not given the regular oxtail diet for 5 weeks prior to the test. Group I was fed one-half oxtail and Group III, 1 oxtail, at 7-day intervals. Group II was fed one-half oxtail and Group IV, 1 oxtail at 14-day intervals. All groups were examined for calculus deposits before and after each oxtail feeding. Groups I and III were examined 7 days after the final oxtail feedings and Groups II and IV were examined 14 days after the final oxtail feedings. Tooth charts were scored from visual observations before and after chewing oxtails. Each dog's teeth were observed for the percent of total teeth surface covered by dental calculus (Fig. 1) and the percent of teeth with calculus (Fig. 2). All calculations were based on the tooth charts (Figs. 3-7).

The standard diet was a moist kibble diet fed once daily. No kibble diet was fed on the day oxtails were fed. Frozen, U. S. Department of Agriculture inspected oxtails, weighing approximately 2 pounds each were

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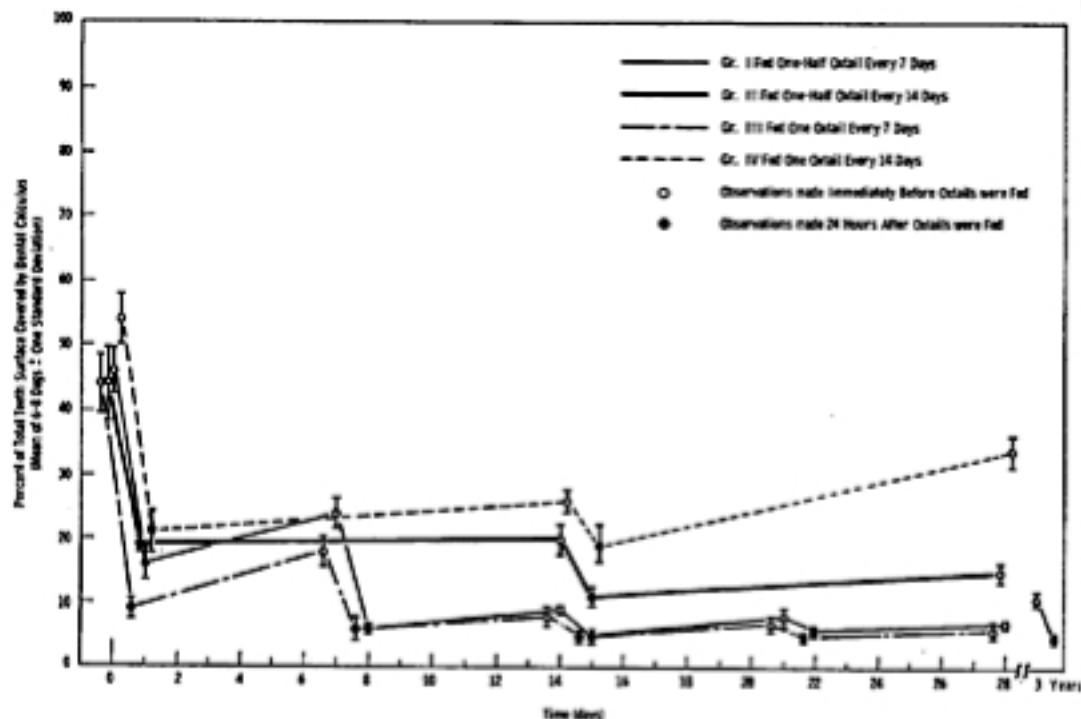


Fig. 1. Fraction of dental calculus removed by oxtail feeding.

fed raw. The dogs had access to the oxtails for 24 hours.

RESULTS

Approximately 45-55% of all dogs' teeth surfaces were covered with dental calculus at the beginning of the test period, before oxtails were fed. Approximately two-thirds of the accumulated calculus was removed 24 hours after the first oxtail feeding (Fig. 1). Figure 3 shows the calculus accumulated and the amount remaining on the teeth of 1 of the dogs in Group II 24 hours after the first one-half oxtail was fed. The premolars and molars were almost completely covered with calculus before the oxtail feeding. Twenty-four hours after one-half oxtail feeding, the canines, incisors, and premolars showed some calculus deposition remaining at the gingival line. The chart indicates, however, that the molars were almost completely clean and the calculus deposits on

the incisors, canines, and premolars were greatly reduced.

In Groups I and III, calculus accumulation dropped to approximately 5% of the total teeth surfaces after the second oxtail feeding and remained about the same throughout the test period. Figures 4 and 5 show the calculus deposits on the teeth of representative dogs from Groups I and III before oxtails were fed and at the end of the test period. In both groups, calculus was removed effectively when dogs were fed one-half or more oxtails once a week. The molars and premolars were almost completely free from calculus deposits, and the amount on the canines and incisors was greatly reduced at the end of the test period. In a dog from Group I, the tooth chart indicated the loss of a loose first molar, covered with calculus, in the left maxilla after the second feeding of oxtails.

In Groups II and IV, calculus accumulation dropped to about 15% after the sec-

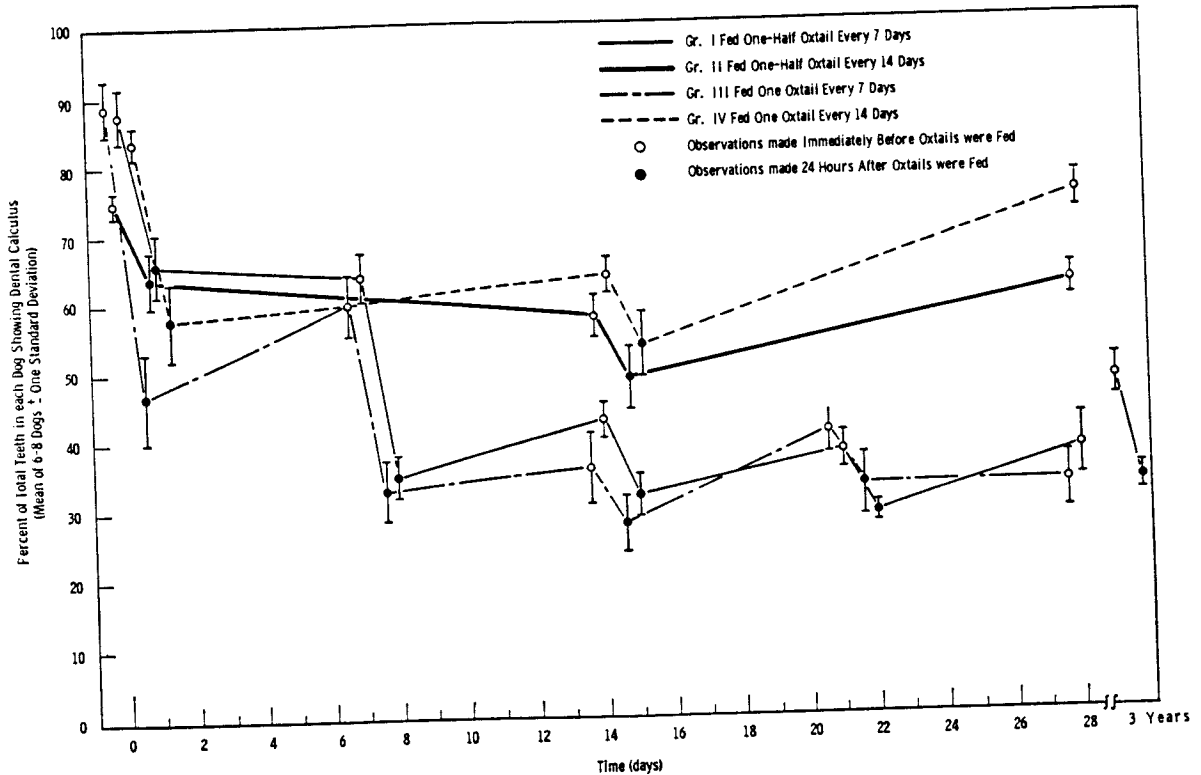


Fig. 2. Effect of oxtail feeding on number of teeth showing dental calculus.

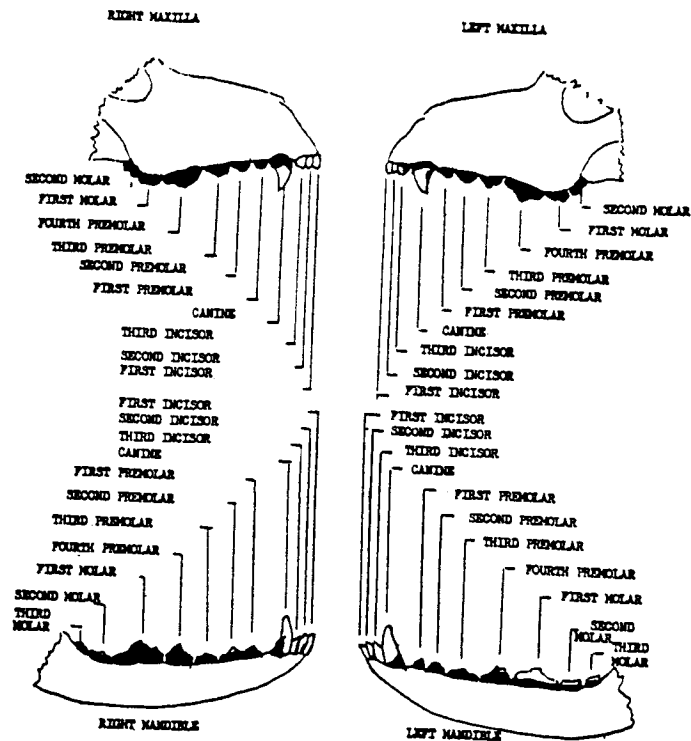
ond feeding, followed by a slight increase at the end of the test period. Tooth charts (Figs. 6 and 7) of representative dogs from Groups II and IV show the calculus deposits before and after oxtail tests. No significant differences were seen between the 2 groups fed oxtails every 2 weeks. Almost all teeth showed small amounts of calculus deposits along the gingival line.

Approximately 75-90% of the individual teeth in each dog in all groups had calculus deposits at the beginning of the test period (Fig. 2). The dogs in Groups I and III had about 30% fewer teeth with calculus deposits after the first oxtail feeding and approximately 50% fewer after the second and subsequent feedings. Tooth charts (Figs. 4 and 5) show that 75% of the dogs' molars, premolars, and incisors were completely cleaned of dental calculus. Groups II and IV dogs had about 20% fewer teeth with calculus deposits after the first oxtail feeding and about 30% fewer after the second

feeding. Tooth charts (Figs. 6 and 7) of representative dogs in these 2 groups show that 70% of their teeth had accumulated calculus deposits 14 days after the final feeding. Only 10% of the canine and the first and second premolar teeth were completely clean at the end of the test period. Fifty percent of the third premolars and molars were cleaned.

Only 1 dog in Group IV refused to chew oxtails initially, but was soon encouraged to do so. Fights occurred between some dogs housed together when oxtails were fed, but these were minimized if the dogs were separated the first 2 hours after they were given oxtails. Ten dogs used in the above test are still in the colony. Tooth charts were prepared after they received one-half oxtail every week for the last 3 years. Calculus accumulation was observed to be approximately the same as was observed in Group I dogs (Figs. 1 and 2) fed oxtails.

The cost of feeding oxtails once weekly



Dental Calculus Records

Before half oxtail feeding.

Black Mark Out = Dental Calculus

24 hours after half oxtail feeding.

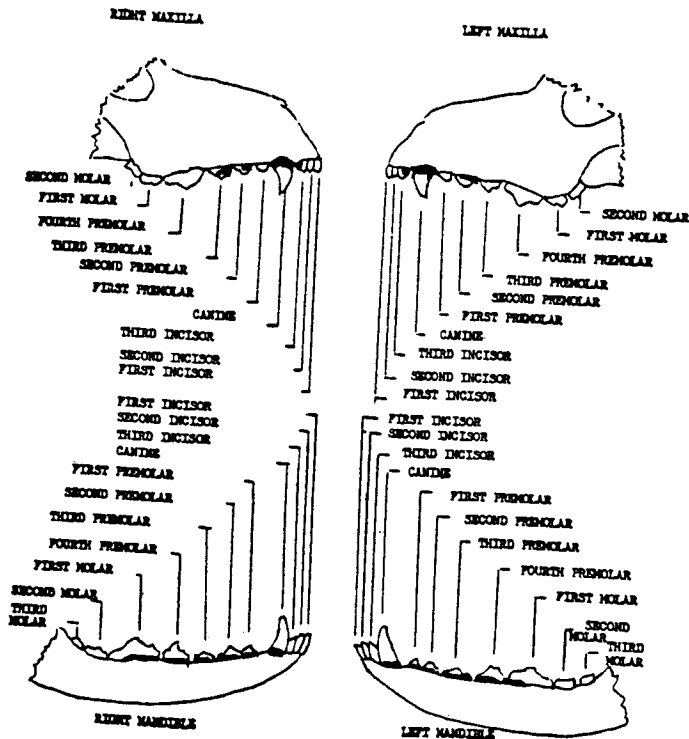


Fig. 3. Calculus deposits on teeth before and 24 hours after half oxtail feeding.

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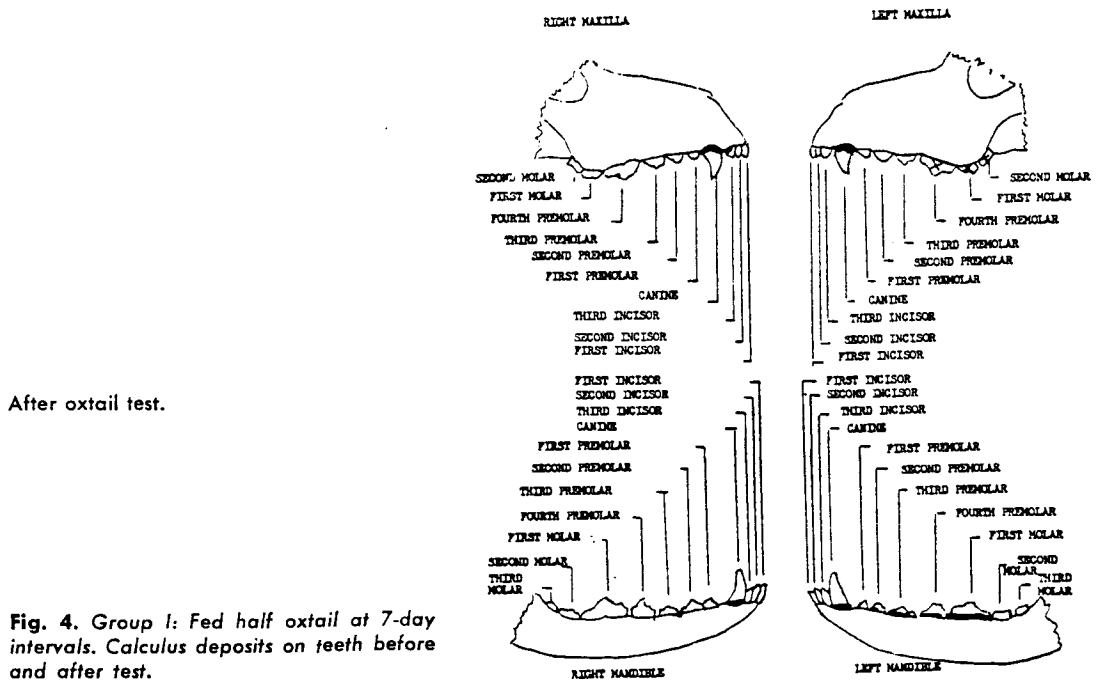
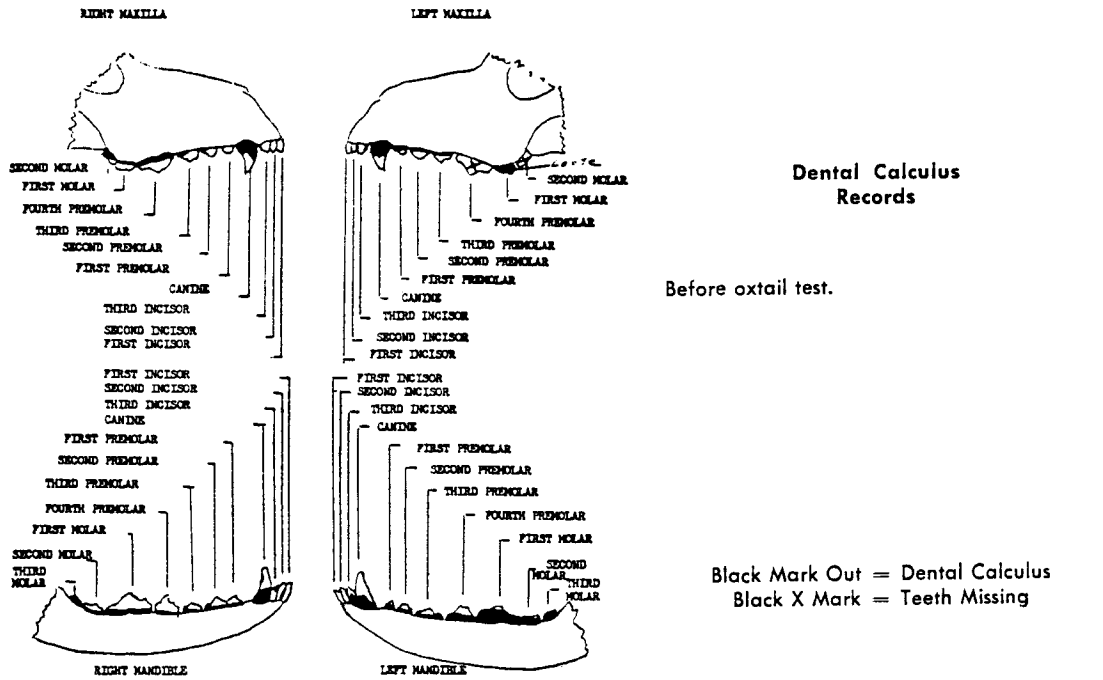


Fig. 4. Group 1: Fed half oxtail at 7-day intervals. Calculus deposits on teeth before and after test.

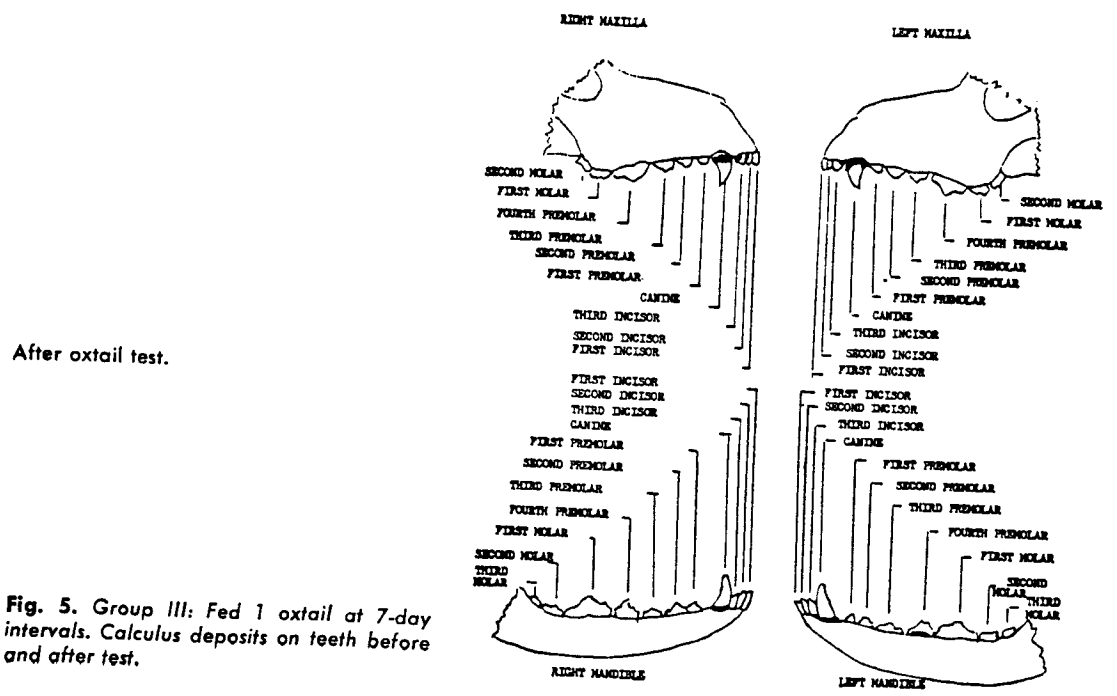
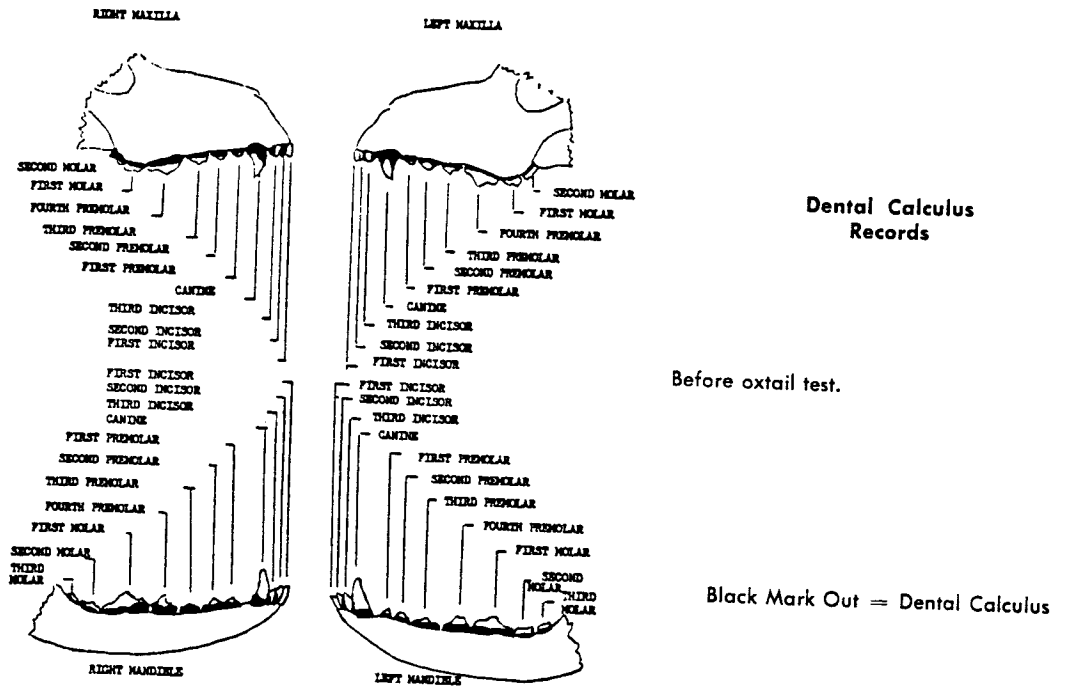
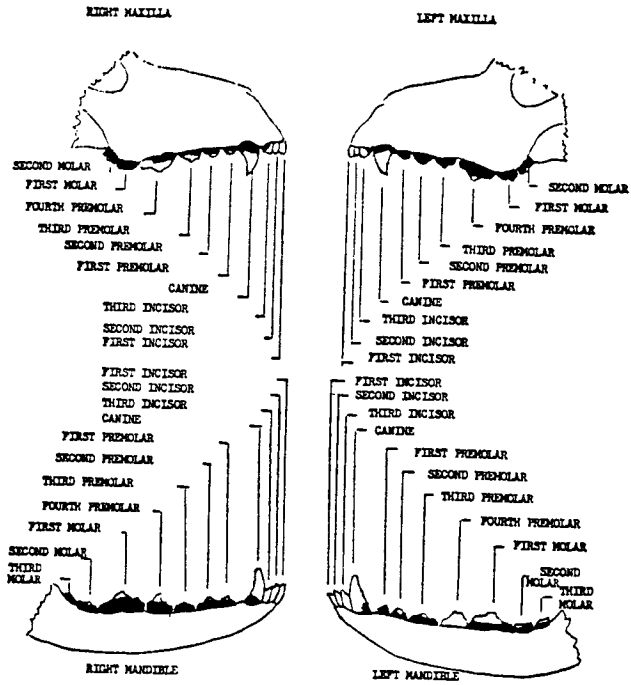


Fig. 5. Group III: Fed 1 oxtail at 7-day intervals. Calculus deposits on teeth before and after test.



Dental Calculus Records

Before oxtail test.

Black Mark Out = Dental Calculus

After oxtail test.

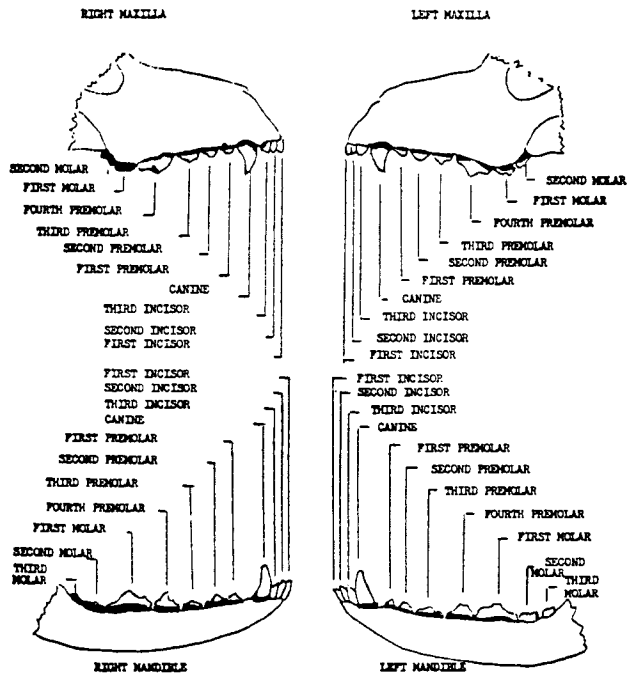
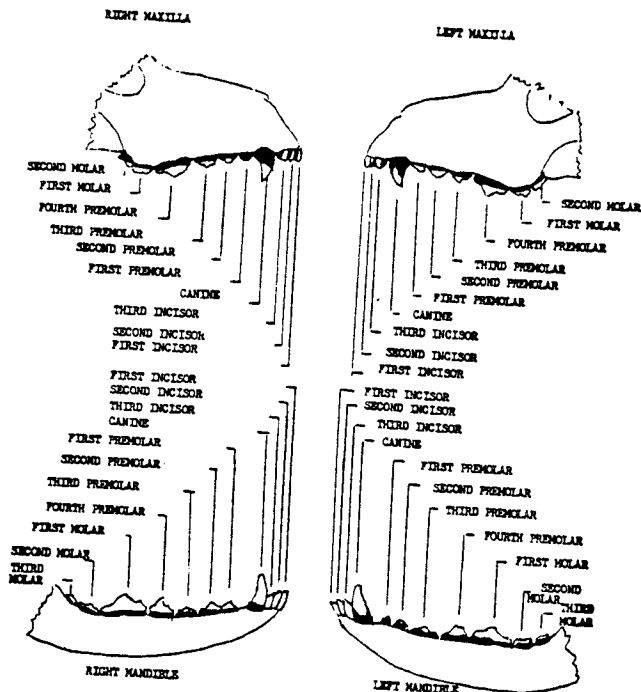


Fig. 6. Group II: Fed half oxtail at 14-day intervals. Calculus deposits on teeth before and after test.

Dental Calculus Records



Before oxtail test.

Black Mark Out = Dental Calculus

After oxtail test.

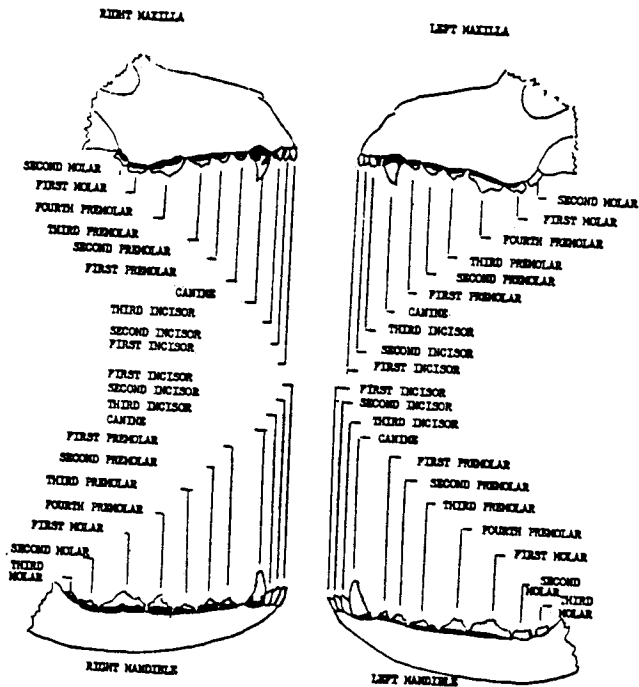


Fig. 7. Group IV: Fed 1 oxtail at 14-day intervals. Calculus deposits on teeth before and after test.

was approximately twice as much per feeding as dry kibbled dog food. No harmful effects of feeding oxtails have been observed in the colony of 200 dogs after more than 6 years.

CONCLUSIONS

This test confirmed the feasibility of preventing the accumulation of dental calculus in experimental beagle dogs by regular feeding of oxtails. Manual removal of calculus was not required when dogs were fed one-half or one whole oxtail per week. Biweekly feeding of one-half to one oxtail was 20-30% less effective.

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