

Use of Polyphosphates in Canine Diets to Control Tartar

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2793

ABSTRACT

Advances in the pet food industry have resulted in the marketing of diets and treats that claim to reduce tartar accumulation in companion animals. The most common approach for oral benefits is to utilize oversized, or tougher food substrates to clean away oral debris. Recently, an entire line of dental diets was introduced utilizing polyphosphate mineral sources that claim to achieve dental benefits without changing the diet shape or size. The purpose of this investigation was to measure the clinical benefits derived from feeding a Eukanuba® Reduced Fat (ERF) diet versus Eukanuba® Reduced Fat diet enhanced with a polyphosphate Dental Defense System® (ERF-DDS). Both diets were prepared on the same manufacturing date to ensure no base differences existed, and both were extruded with the same die to ensure consistent shape. For oral testing, twenty-eight adult beagles were recruited in a comparative crossover feeding study and stratified into two groups balanced for tartar levels. Diets were randomly assigned to each group. Prior to each test period, all dogs received a prophylaxis to remove supra- and sub- gingival tartar and plaque. A one-week washout period was utilized between assessment periods. Oral exams were conducted after four weeks diet usage. Testing results showed a 58% reduction in tartar (ERF: 3.05 vs. ERF-DDS: 1.29; $p < 0.05$) and a 9% reduction in plaque (ERF: 9.44 vs. ERF-DDS: 8.60; $p < 0.05$) for the polyphosphate enhanced diet. This data confirms that dental benefits can be derived from enhancing a diet with polyphosphates without changing diet size or shape.

INTRODUCTION

Few pet owners employ routine preventative measures, such as brushing, to improve oral health in companion animals. As a result, tartar deposits are a common occurrence. One approach to daily dental care is to offer a benefit through a dietary source. Recently, The Iams Company introduced a complete line of dental diets in North America based on a specialized polyphosphate coating process. The use of this technology allows the food to deliver dental benefits beyond the contact chewing surfaces as the polyphosphates are released during mastication. The result is a dental benefit that lasts beyond mealtime.

There are further broad scale applications as well as the polyphosphates can be applied to any dry matrix without altering size, texture, or nutritional value of the diet.

PURPOSE

The purpose of this investigation was to measure the oral benefits derived from feeding a Eukanuba® Reduced Fat (ERF) diet versus Eukanuba® Reduced Fat diet enhanced with a polyphosphate Dental Defense System® (ERF-DDS). The goal of the research was to identify a technology that has both the capabilities to improve oral hygiene and the versatility to be applied across multiple product lines.

MATERIALS AND METHODS

Twenty-eight adult beagles were recruited in a comparative crossover feeding study and stratified into two groups balanced for tartar levels. Animals were part of colony housed at the Indiana University School of Dentistry. Diets were prepared on the same manufacturing date to ensure no base ingredient differences existed. Extrusion was performed with the same die for a consistent shape. Diets were randomly assigned to each group. Prior to each test period, all dogs received a prophylaxis to remove supra- and sub- gingival tartar and plaque. Oral exams were conducted after four weeks diet usage. A one-week washout period was utilized between assessment periods. Canines were fed a diet calculated for maintenance of body weight. A standard 5 point clinical index was utilized to determine plaque and tartar coverage. For plaque, the gingival and occlusal half of each tooth was scored. For tartar, the buccal surface of the tooth was divided into three vertical sections and scored. Both measures included a measure of intensity that was multiplied by the area score. Tooth score was the sum of the coverage multiplied by the intensity for each of the surfaces. The sum of the teeth scores was then averaged to obtain a whole mouth mean score for each animal. Teeth measured included the buccal surfaces on both sides of the mouth at positions: Upper Jaw: I3, C, P3, P4, M1 & Lower Jaw: C, P3, P4, M1. Total duration of the study comprised 9 weeks.

This research study was conducted under the guidelines of the Veterinary Oral Health Council (VOHC).

Study Timeline:

Period:	Stratification	Leg 1	Washout	Leg 2
Duration:		4 weeks	1 week	4 weeks
Action:	Prophy	Grade	Prophy	Grade

RESULTS

Analysis of the 28 test subjects revealed a statistically significant reduction in plaque and tartar ($p < 0.05$ as determined by Tukeys Multiple Comparisons). Testing results showed a 58% reduction in tartar (ERF: 3.05 vs. ERF-DDS: 1.29) and a 9% reduction in plaque (ERF: 9.44 vs. ERF-DDS: 8.60) for the polyphosphate enhanced diet. There were no statistical differences in dietary consumption, or body weight data between groups.

DATA

Tartar Scores

Diet	Mean	SEM
ERF	3.05	0.32
ERF-DDS	1.29	0.20

Values differ significantly at $p < 0.05$

Plaque Scores

Diet	Mean	SEM
ERF	9.44	0.42
ERF-DDS	8.60	0.42

Values differ significantly at $p < 0.05$

DATA (cont.)

Dietary Consumption (Avg. Daily G/Kg)

Diet	Mean	SEM
ERF	20.77	0.91
ERF-DDS	21.32	1.09

Values do not differ significantly

Animal Weight Change (Kg)

Diet	Mean	SEM
ERF	-0.22	0.10
ERF-DDS	-0.09	0.10

Values do not differ significantly

CONCLUSION

Canines fed a daily diet with a polyphosphate coating had significantly less tartar and plaque accumulation after 28 days on the dental diet. There were no differences between diets in consumption or animal weights for the duration of the study. This data confirms that dental benefits can be derived from enhancing a diet with polyphosphates without changing the diet shape, size, or nutritional value.

