



Reduced protein food with L-carnitine maintains lean mass and renal health in senior cats

N.Z. Frantz, M.R. Panasevich, L.J. Kats and L. Daristotle
Blue Buffalo Co. LTD 11 River Rd. Wilton, CT



Abstract

A study was conducted to determine whether feeding a grain free, reduced protein (29.11% crude protein/20.97% crude fat/4.84% crude fiber, all DMB), complete and balanced food containing added L-carnitine (484 mg/kg DM) maintains lean muscle and renal health in senior cats. The study protocol was approved and followed by an independent facility's Institutional Animal Care and Use Committee (Susquehanna, PA). Nine female and three male clinically normal cats (age, 13.81 + 1.34 years; BCS, 3/5; body weight, 3.67 + 0.85; mean + SD) were transitioned from the standard colony baseline diet (35.28% crude protein/14.67% crude fat/1.62% crude fiber, all DMB; no added L-carnitine) to the reduced protein test food, which was offered to each cat for 6 months (m) at amounts to maintain ideal body condition. Lean body mass (LBM) via DEXA, serum symmetric dimethylarginine (SDMA), whole blood taurine, and clinical hematologic and biochemical values at baseline, 2m, 4m and 6m were analyzed with paired t-tests (Minitab v18). Compared with baseline, mean values over the test feeding period for LBM, SDMA, and blood taurine remained stable (P>0.05), and with other mean blood values, were within normal ranges. Mean baseline and 6m values for LBM, serum SDMA, and blood taurine were 3031 vs 3062 g, 16 vs 16 μ g/dl, and 610 vs 549 nmol/ml, respectively. These study findings indicate that the reduced-protein test food with a balanced amino acid profile and added L-carnitine promotes maintenance of lean muscle mass and renal health in senior cats.

Introduction

- Development of chronic kidney disease and loss of muscle mass are important health risks in senior cats.
- Senior cats are often fed reduced-protein diets, including those formulated to address kidney disease, which may exacerbate age-related loss of lean tissue.

Purpose: To determine whether feeding a grain-free, reduced protein, complete and balanced food containing added L-carnitine maintains lean muscle and renal health in senior cats.

Design

- 9 female and 3 male clinically normal senior cats
- Age, 13.81 \pm 1.34 years; body weight, 3.67 \pm 0.85 (mean \pm SD); BCS, 3/5
- Transitioned from all-life-stages baseline food without added L-carnitine to reduced-protein test food with L-carnitine and a balanced amino acid profile¹
- Test food offered at amounts to maintain ideal body condition for 6 months
- Measurements at baseline (Day 0) compared with those at 2, 4, and 6 months of feeding by paired t-tests in Minitab v18
- Lean body mass by DEXA
- Serum SDMA
- Blood taurine
- Complete blood count & serum biochemical analysis

¹Blue Buffalo Natural Veterinary Diet K+M Kidney + Mobility Support dry formula



Diet composition

Nutrient, DMB	Baseline Food ¹	Test Food
Crude Protein %	35.3	29.1
Crude Fat %	14.7	14.1
Crude Fiber %	1.6	4.8
L-carnitine mg/kg	NA	484

Table 1: Diet composition of baseline and test food. ¹Baseline food=Purina Cat Chow, composition data based on Guaranteed Analysis. NA=not available

Lean body mass maintained with reduced protein food

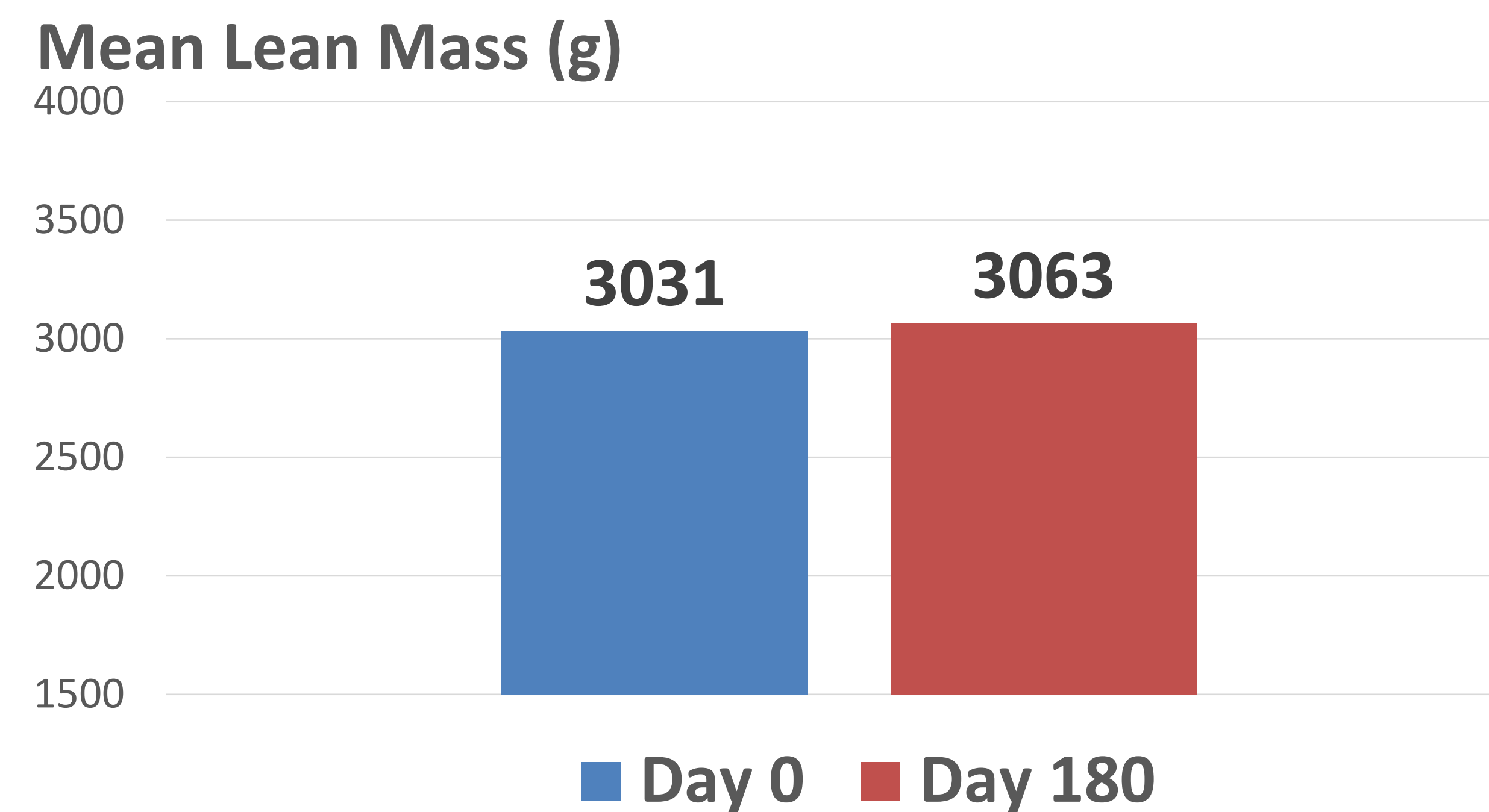


Figure 1: Mean lean mass by DEXA on baseline food (day 0) and after 180 days of feeding the test food. No significant difference was detected between day 0 and day 180 values (shown here, P>0.05), as well as between day 0 and month 2 and 4 values.

Results

Stable SDMA values over 6 months on reduced protein food

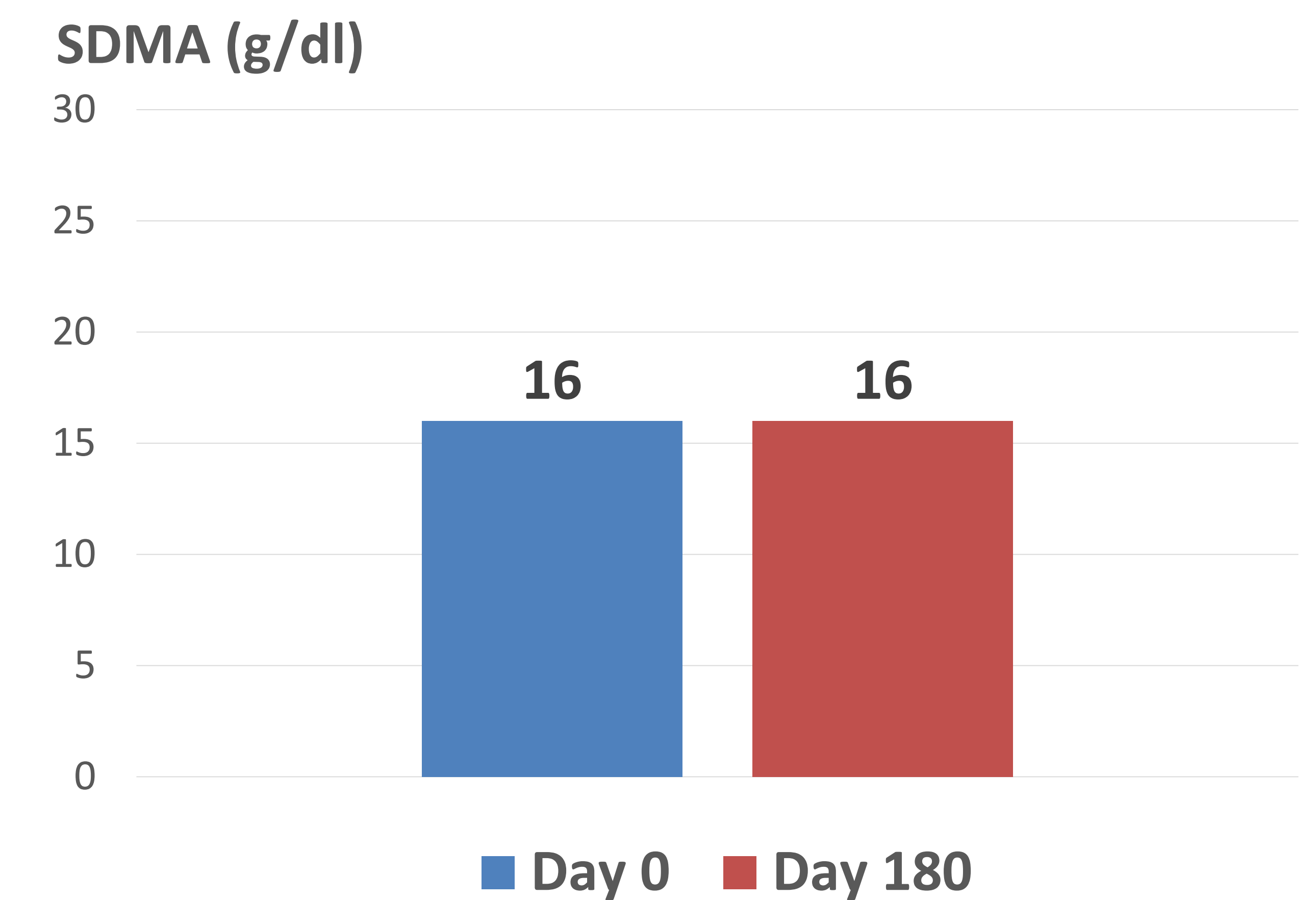


Figure 2: Mean SDMA values on baseline food (day 0) and after 180 days of feeding the test food. No significant difference was detected between day 0 and day 180 values (shown here, P>0.05), as well as between day 0 and month 2 and 4 values.

- Mean blood taurine was not significantly different between day 0 and day 180, as well as between day 0 and month 2 and 4 mean values
- 610 vs 549 nmol/ml, day 0 vs 180
- Mean hematologic and serum biochemical values remained stable and within normal ranges.

Summary and Conclusions

- Findings indicate that the reduced-protein test food with a balanced amino acid profile and added L-carnitine promotes maintenance of lean muscle mass, renal health and taurine status in senior cats.
- These results support feeding the diet to senior cats to minimize muscle mass loss and maintain overall health.
- No conflicts of interest to disclose.

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A moderate-sodium novel dry diet dissolves naturally occurring struvite cystoliths in cats

K.M.Tefft¹, J.K.Byron², E.T.Hostnik², L.Daristotle³, V.Carmella³, N.Z.Frantz³

¹Department of Clinical Sciences, North Carolina State University, Raleigh, NC

²Department of Veterinary Clinical Sciences, The Ohio State University, Columbus, OH

³Blue Buffalo Co. Ltd., Wilton, CT

INTRODUCTION

Urolithiasis is responsible for 10-23% of lower urinary tract signs in cats.¹⁻³ Approximately half of feline uroliths submitted to North American analysis centers are composed primarily of struvite.⁴⁻⁶ The precipitation of struvite into uroliths depends on many factors. In cats, unlike dogs, struvite uroliths are usually formed in sterile urine.⁷ Dietary dissolution is the standard of care for treatment of struvite uroliths.⁸

In pre-marketing studies, the commercially available diet studied herein (Blue Natural Veterinary Diet W+U Weight Management + Urinary Care feline dry formula) maintained a 24-hour urinary relative supersaturation (RSS) level less than 1 for struvite and maintained a mean urine pH of 6.0.⁹ These properties are predicted to prevent and dissolve struvite cystoliths.¹⁰

OBJECTIVES

- To determine the efficacy and speed of this moderate-sodium test diet in dissolution of naturally occurring feline struvite uroliths

METHODS

- Prospective, open-label, two-center study
- Client-owned, adult cats with naturally occurring cystolithiasis
- Inclusion criteria: radiographic appearance of uroliths (i.e. moderately opaque, round or discoid) and urinalysis parameters (i.e. pH \geq 6.5)
- Exclusion criteria: nephrolithiasis, ureterolithiasis, urinary tract obstruction, hypercalcemia, systemic disease or treatment with urinary acidifiers, corticosteroids, diuretics or fed a diet formulated to dissolve struvite uroliths in the previous 3 weeks
- Cats were fed the test diet exclusively, at amounts calculated to supply maintenance energy requirements, for up to 56 days.
- Cats were evaluated every 2 weeks with radiographs and urinalysis until urolith dissolution was evident or the end of the study period was reached.
- Cats with radiographically apparent uroliths at the end of the study period underwent cystotomy for stone retrieval and analysis.

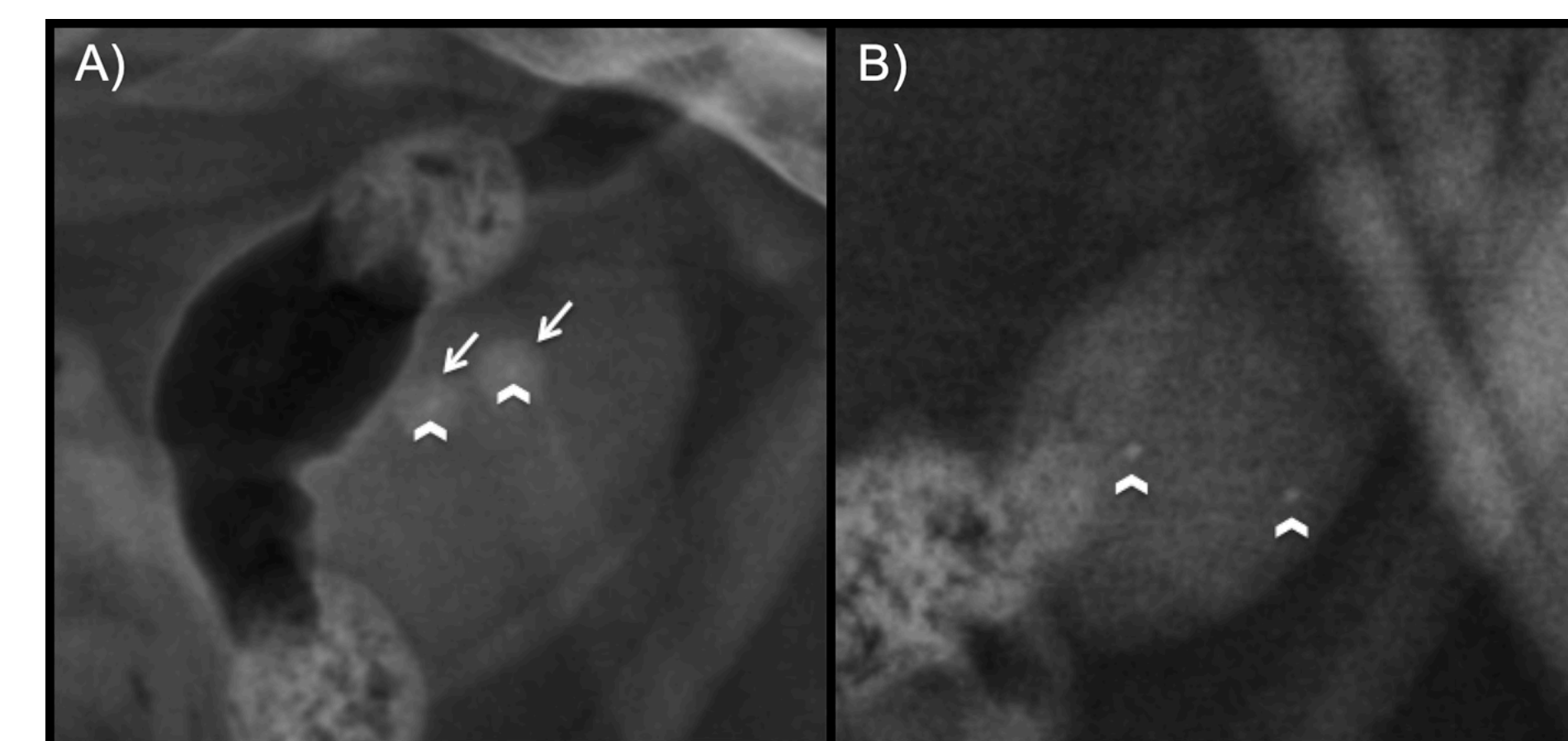
Radiography and urinalysis findings

Cat	Screening			Dissolution		
	Radiographs	Urine pH	Urine USG	Time (days)	Urine pH	Urine USG
1	1 round calculus, 6.29 mm diameter	7	1.050	28	6	1.050
2	1 discoid calculus, 9.19 mm x 1.87 mm	9	1.048	14	6	1.050
3	8 ovoid calculi, largest 4.43 mm x 2.62 mm	8	1.040	28	6	1.035
4	\geq 21 round calculi, largest 5.16 mm diameter	6.5	1.020	70	6	1.050
5	3 ovoid calculi, largest 6.34 mm x 3.62 mm	7	1.043	28	6	1.062
6	7 round calculi, largest 4.11 mm diameter	6.5	1.051	28	6	1.065
7	2 round calculi, largest 7.9 mm diameter with 1.3 mm more opaque center	7.5	1.047	N/A	6 (day 56)	1.045 (day 56)
8	TNTC round calculi, largest 0.8 mm diameter	6.5	1.047	28	6	1.058
9	2 discoid calculi, largest 7.36 mm x 3.24 mm	N/O	N/O	14	6	1.025
10	1 discoid calculus, 5.09 mm x 2.38 mm	6.5	1.039	14	6.5	1.051

USG = urine specific gravity; TNTC = too numerous to count; N/A = not applicable; N/O = not obtained

RESULTS

- Thirteen cats were enrolled; 10 completed the study
- Radiographic dissolution occurred within 28 days in 8 cats
- When complete dissolution took >14 days, radiographs revealed progressive reduction in urolith size, number, and opacity at each subsequent recheck
- Cat #4 with a large urolith burden had incomplete dissolution after 56 days; the owner declined cystotomy and continued to feed the test diet, complete radiographic dissolution was achieved at day 70
- Cat #7 with moderate opaque shells around more opaque centers had radiographic dissolution of the shells by day 42; two calcium oxalate cores were removed at cystotomy on day 56
- Nine cats were still eating the diet 6 months after study completion; only 1 cat had recurrence of lower urinary tract signs, this cat was getting additional food items



A) Screening radiograph from cat #7 with two suspected struvite cystolithiasis. The white arrows show the peripheral less radiopaque shells of the calculi. White chevrons highlight the central more radiopaque cores of the calculi. **B)** 56 days later, the peripheral, less radiopaque shells of the calculi are no longer identifiable and the white chevrons highlight the remaining, unchanged cores.

Nutrient composition of test diet

Nutrient	Content (g/100 kcal ME)
Protein	11.97
Fat	3.72
Crude Fiber	3.22
Sodium	0.12
Magnesium	0.02
Total Dietary Fiber	4.42

SUMMARY & CONCLUSIONS

This moderate-sodium test diet was successful in dissolving suspected struvite cystoliths, most within the first month of feeding, and is clinically useful for managing feline struvite urolithiasis. Dissolution was achieved with aciduria and without urinary dilution.

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Conflict of interest: Drs. Daristotle, Carmella, and Frantz are employees of Blue Buffalo Co., Ltd.





Novel food containing antioxidants and fish oil improves mobility scores in arthritic dogs.



N.Z. Frantz¹, M.R. Panasevich¹, and R.M. Yamka²
¹Blue Buffalo Co. LTD 11 River Rd. Wilton, CT
²Luna Science and Nutrition, LLC, Trumbull, CT

Abstract

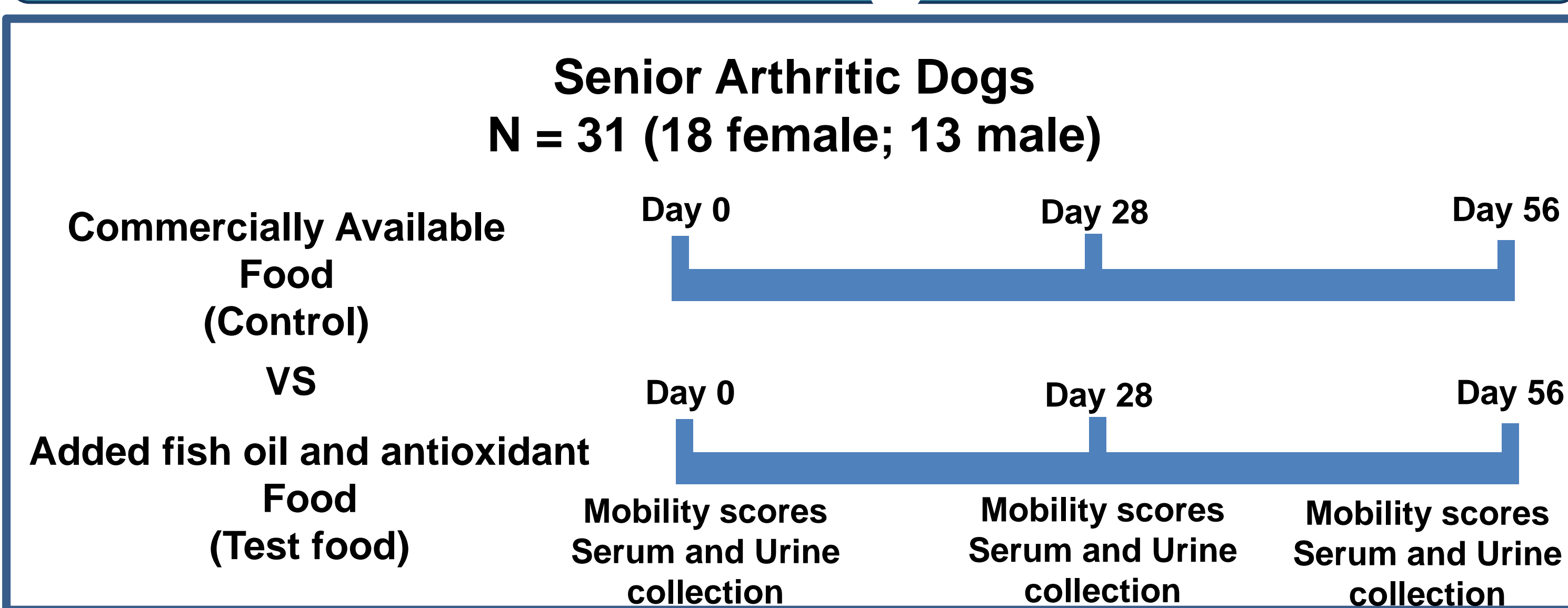
A study was conducted to determine whether a test diet containing higher concentrations of antioxidants and omega-3 fatty acids (Crude Protein 29.0%, Fat 16.5%, Fiber 5.0%, and omega-3 fatty acids, 4.1%, dry matter basis [DMB]) could improve mobility in arthritic dogs. This study protocol was first approved by the facility's (Fergus, Ontario) Institutional Animal Care and Use Committee and followed throughout. Eighteen female and thirteen male dogs (12.13 ± 1.93 years old, 14.21 ± 2.64 kg) exhibiting lameness were radiographed to confirm arthritis in forelimb, hind limb, or both and were randomly assigned the diets. Dogs were offered control food (Crude Protein 23.9%, Fat 14.1%, Fiber 3.3%, DMB, without added omega 3 fatty acids) or test food once daily to maintain body weight for 56 days and evaluated by an veterinary orthopedic surgeon for arthritis (ACVS Canine Orthopedic Index© (0-4 scale from no to extreme arthritis)), as well as urine and serum ELISA analyses for cartilage synthesis/degradation (CTX-II, C1, 2C, C2C, and CP-II) and inflammation marker C-reactive protein at days 0, 28, and 56. Dietary effects were analyzed in Minitab v18 using ANOVA. Dogs fed test food had improved delta arthritis scores (day 56 minus day 0) compared to control (-0.81 vs 0.33, P < 0.04). Urine and serum markers were minimally changed; however, serum C-reactive protein was lower (P<0.05) in test- versus control-fed animals at day 28, but not day 56. These findings support a role of antioxidants and omega-3 fatty acids in the clinical management of arthritic dogs.

Introduction

- Osteoarthritis is a common reason for canine visits in veterinary practice
- Feeding fish oil, a source of omega 3 fatty acids (Eicosapentaenoic acid), as well as antioxidants (Vitamins E and C) and L-carnitine may be clinically useful to moderate inflammation and improve mobility in dogs with OA.

Purpose: To demonstrate that feeding a food containing higher concentrations of omega-3 fatty acids from fish oil and antioxidants is effective at improving mobility scores and inflammatory markers in senior arthritic dogs.

Design



- Eighteen female and thirteen male dogs (12.13 ± 1.93 years old, 14.21 ± 2.64 kg) exhibiting lameness were radiographed to confirm arthritis in forelimb, hind limb, or both and were randomly fed control or test diets for 56 days.
- Before receiving dietary treatments, all dogs had no NSAID for 28 days. All dogs were fed to maintain ideal body weight.
- Mobility scores (ACVS Canine Orthopedic Index© (0-4 scale from no to extreme arthritis)), as well as urine and serum assessments of cartilage synthesis/degradation and inflammation were assessed on study days 0, 28, and 56.

Results

Improvement in mobility scores in dogs fed test diet

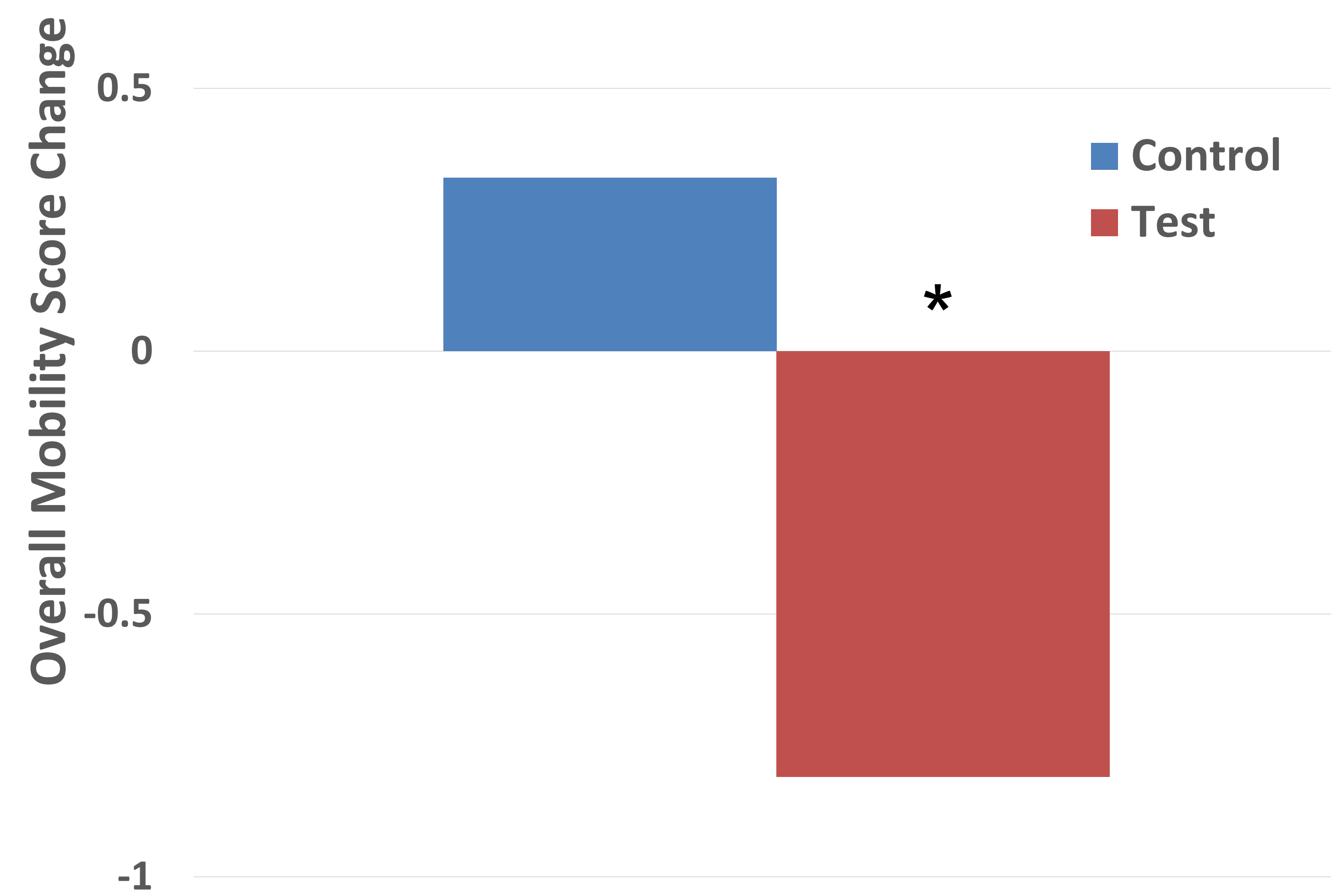


Figure 1: Mean change in mobility scores between control and test diets over a 56-day period. Mobility was scored by an orthopedic surgeon according to ACVS Canine Orthopedic Index (0-4 scale from no to extreme arthritis). *Denotes a significant difference between control and test diets (P<0.05) (Day 56 minus Day 0). Data were analyzed by one-way ANOVA in Minitab v18.

Serum inflammatory and cartilage synthesis/degradation outcomes

	Day 0		Day 28		Day 56	
	Con	Test	Con	Test	Con	Test
CRP, ng/ml	17.58 ± 7.84	8.90 ± 0.81	18.35 ± 8.39	7.35 ± 0.41*	12.46 ± 4.28	8.21 ± 0.51
CP-II, ng/ml	2773 ± 98	2698 ± 147	2707 ± 205	2003 ± 104	2099 ± 139	2578 ± 249
C2C, ng/ml	351 ± 8.08	341 ± 13.8	340 ± 13.8	311 ± 13.5	311 ± 14.8	320 ± 16.6
C1, 2C, mg/ml	0.75 ± 0.06	0.70 ± 0.03	0.79 ± 0.05	0.95 ± 0.23	0.77 ± 0.05	0.80 ± 0.11
CP-II/C2C	7.92 ± 0.27	7.90 ± 0.26	7.94 ± 0.45	6.61 ± 0.48	6.96 ± 0.56	7.97 ± 0.60

Table 2. Serum inflammatory and cartilage synthesis markers in dogs fed control and test diets. *Denotes a significant difference (P< 0.05) between control and test diets within time point. All values are mean ± SEM. Data were analyzed by one-way ANOVA in Minitab v18.

Diet composition

	Control Diet ¹	Test Diet
Nutrient, % DMB		
Crude Protein	23.9	29.0
Crude Fat	14.1	16.5
Crude Fiber	3.3	5.0
Omega-3 Fatty acid*	-	4.1
Vitamin E, IU/kg	114	750
Vitamin C, ppm*	-	400
L-carnitine, ppm*	-	450

Table 1: Diet composition of control and test diets. ¹Control Diet=Purina Dog Chow, composition data based off GA values. *No added fish oil or omega-3, Vitamin C, or L-carnitine GA reported for control diet.

Conclusions

- Overall, feeding a diet with added fish oil and antioxidants improved arthritis scores in senior dogs over a 56 day feeding period.
- Mobility scores were unchanged in the control diet.
- Minimal changes were observed in serum inflammatory and cartilage synthesis/degradation markers over time.
- These findings support a role of antioxidants and omega-3 fatty acids in the clinical management of arthritic dogs
- No conflicts of interest to disclose.



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