

Forty month-follow up of renal function in dogs fed a high-protein diet

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Introduction

Despite the absence of evidence of any deleterious effect of high-protein diets on pets' renal function¹⁻⁴, there are still concerns regarding the safety of such diets in the long term. Besides blood analyses commonly performed in vet practices for the renal function assessment, symmetric dimethylarginine (SDMA) has been shown to be an accurate kidney biomarker, not affected by protein intake or lean body mass.⁵⁻⁷ Our hypothesis was that a high-protein content in a complete and balanced diet had no impact on the renal function of healthy dogs.

The objective of this study was to follow up selected parameters of the renal function in adult dogs fed a dry high-protein diet for 40 months.

Animals, materials and methods

Ten healthy entire adult Beagles (16±6 month old) previously fed a standard maintenance diet^a, were fed exclusively a new high-protein diet^b (Tables 1 and 2). The daily rations were calculated to maintain dogs' body weight. Fasting blood samples were collected at the start of the study (M0) and then every 2-3 months for 40 months, meaning 19 time points.

Six serum parameters were measured to assess the renal function. Statistical comparisons were performed between each time and M0 for each renal parameter, by ANOVA with repeated measures and Friedman tests, with a 5% significance level.

^a Virbac Vet Complex™ adult dog
^b Virbac Veterinary™ HPM adult dog L&M



Table 1: Composition of the previous and test diets

Previous: Dehydrated animal protein, maize, wheat, animal fat, soybean, beet pulp, maize protein, linseed, wheat bran, FOS, chondroitin sulfate, chitosan, minerals.

Test: Dehydrated pork and poultry protein, rice, pea, animal fat, hydrolysed animal protein, potato starch, lignocellulose, linseed, bean hulls, minerals, beet pulp, FOS, psyllium fibre, chitosan, pasteurised Lactobacilli, chondroitin sulfate.

Table 2: Characteristics of the previous and test diets

Nutritional characteristics	Previous	Test
Metabolisable Energy (ME) (kcal/100g as fed)	398	369
Protein (% ME)	25	34
Fat (% ME)	41	41
Carbohydrate (% ME)	34	25
Calcium (g/Mcal)	3.5	3.5
Phosphorus (g/Mcal)	2.5	2.7
Sodium (g/Mcal)	1.3	1.6

Results

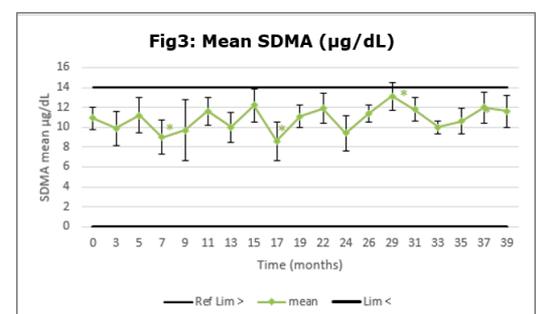
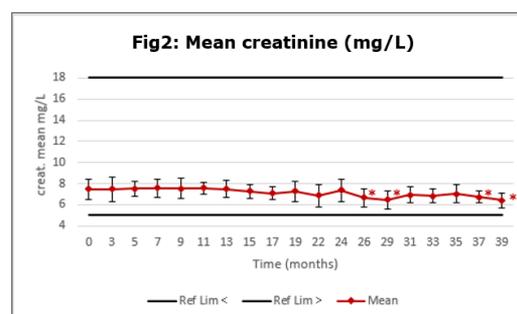
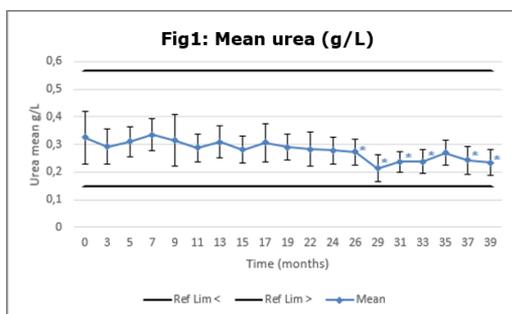
Palatability of the new diet was high, food consumption was correct and the digestive tolerance was good in all dogs. Dogs remained healthy throughout the study, no side effect in relation with the food has been reported.

Individual values of kidney parameters remained within the reference ranges over the study, except for urea in 1 dog (0.14 g/L at M29), creatinine in 1 dog (4.9 mg/L at M26), total protein in 3 dogs (50-51 g/L at M3, M29 and M33), albumin in 2 dogs (42-46 g/L at M9 and M15), phosphates in 1 dog (76.6 mg/L at M35), and

SDMA in 5 dogs (15 µg/dL at M15, M22, M29, M37 and M40). These exceptions, very close to the reference values and without any correlation between them, can be considered incidental and due to biological variability of the biomarkers. **Mean values** of some criteria showed significant changes at some time points vs M0 (decrease for urea, creatinine, albumin and phosphates, increase for total proteins, and decrease or increase for SDMA), but always remaining in the safety ranges (Table 3 and Figures 1 to 3).

Table 3: Mean values and standard deviations after 11,24 and 40 months feeding the test diet (*: significant difference compared to M0)

Serum renal parameters	M0	M11	M24	M40	Range in study	Laboratory ref ranges
Urea (g/L)	0.32±0.10	0.29±0.05	0.28±0.05	0.23±0.05*	0.21-0.32	0.15-0.57
Creatinine (mg/L)	7.5±1.0	7.6±0.6	7.4±1.0	6.4±0.7*	6.4-7.6	5.0-18.0
Total proteins (g/L)	52.7±1.5	60.1±3.1*	58.4±2.6*	57.9±2.9*	52.7-62.7	52-82
Albumin (g/L)	36.2±2.6	34.3±2.8*	31.5±2.8*	31.6±2.5*	30.9-36.7	23-40
Phosphates (mg/L)	46.7±7.5	39.9±5.0*	41.6±4.4	38.3±2.7*	34.6-46.7	25-68
SDMA (µg/dL)	10.9±1.1	11.6±1.4	9.4±1.8	11.6±1.9	8.6-13.1	0-14



Conclusion

Our results showed that a high-protein content in a balanced diet had no negative impact on the renal biomarkers in healthy adult dogs during 40 months.

References: ¹Laflamme DP. Top Companion Anim Med 2008; 23:154-157. ²Pibot P. Thesis Doc Vet, Nantes, France, 1988. ³Finco DR et al. Am J Vet Res 1994; 55: 1282-1290. ⁴Bovee KC. J Nutr 1991; 121: S128-S139. ⁵Hall JA et al. J Vet Intern Med 2015; DOI: 10.1111/jvim.12607. ⁶Nabity MB et al. J Vet Intern Med 2015; DOI: 10.1111/jvim.12835. ⁷Relford R et al. Vet Clin Small Anim 2016; 46: 941-960.

