COMPARISON OF 2 DIFFERENT RENAL-TYPE DIETS IN SENIOR DOGS WITH BORDERLINE BLOOD UREA AND/OR CREATININE VALUES

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INTRODUCTION

In dogs, consumption of a fiber mix (guar gum, sugar beat pulp, inulin and cellulose) has been observed to induce a decrease in urinary N waste excretion, by increasing fecal N excretion and improving N retention (Jeusette *et al*, unpublished observation). The objective of the present study was to compare the effect of a protein and phosphorus-restricted renal diet unsupplemented (Diet A) or supplemented with this fiber mix, vitamin E, and omega-3 fatty acids (Diet B), on reduction of blood urea, creatinine, lipids and urinary F2-isoprostane (marker of oxidative status) in senior dogs with borderline blood urea and/or creatinine levels.

ANIMALS, MATERIALS AND METHODS

Experimental design and diet compositions are presented in figure 1 and table 1. Eight senior dogs (>8 years) with IRIS stage 1 or 2 (urea 38-141 mg/dL; creatinine 0.7-1.6mg/dL) were selected. Firstly, dogs were fed a maintenance diet (MD) for 4 weeks (T0). Then, 4 dogs received a control renal diet (Diet A) and 4 dogs received a fiber-renal diet (Diet B) for 4 weeks (T1). Then, after a 4-week wash-out period with the MD (T2), dogs were fed the other renal diet (A or B) for 4 weeks, in a cross over design (T3). Dogs were fed *ad libitum* during the whole study and individual body weight and food intake were recorded. Blood and urine analysis (including urinary F2-isoprostane) were performed at T0, T1, T2, T3. Differences from baseline (T1-T0 or T3-T2, according to the period) were calculated and analysed for diet effect (A vs. B) (SPSS mixed model with diet and sequence as fixed effect and subject (sequence) as random effect). Data from dogs with diet A and B were pooled and analysed for the renal-type diet effect (maintenance vs. renal diet) (SPSS mixed model with diet-type as fixed effect and subject (sequence) as random effect). Values are presented as mean ± SD.

Fig. 1. Experimental design

Group 1 (n=4)	Maintenance diet (MD)				Control Renal diet (Diet A)				Maintenance diet (MD)				Fiber Renal diet (Diet B)			
Group 2 (n=4)					Fiber Renal diet (Diet B)								Control Renal diet (Diet A)			
Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Sampling				T0				T1				T2				T3

Table 1. Diet composition (Dry matter basis)

	Units	Maintenance diet (MD)	Control Renal diet (Diet A)	Fiber Renal diet (Diet B)
Protein	%	25.88	14.94	16.67
Fat	%	13.27	15.83	19.80
Phosphorus	%	1.36	0.39	0.48
Sodium	%	0.54	0.19	0.24
Crude fiber	%	3.65	1.30	3.74
Total dietary fiber	%	11.62	5.19	9.94
EPA+DHA	%	0.14	0.16	0.53
Vitamin E	mg/Kg	82.96	340.91	641.16
Measured ME	kcal/100g	ND	481.60	475.53
Fiber mix		No	No	Yes
First 3 ingredients		Wheat, pork, poultry	Corn, rice, egg	Corn, rice, egg

(ME=Metabolizable Energy; ND= Not Determined)

RESULTS AND DISCUSSION

EFFECT OF TRANSITION TO A RENAL TYPE DIET

Compared to maintenance diet (MD), both renal diets resulted in a significant decrease in protein, phosphorus and sodium intake ($P<0.001$), with no difference between renal diets A and B (Figure 2). Compared to the maintenance diet (MD), both renal diets induced lower blood urea ($P=0.003$) and creatinine ($P<0.001$) (Figure 3), lower urinary fractional excretion of sodium ($P=0.004$) and phosphorus ($P=0.02$) (Figure 4) and higher blood cholesterol ($P=0.003$) and fructosamine ($P<0.001$) concentrations (Figure 5), with no difference between A and B at short term.

Fig. 2. Protein, phosphorus and sodium intake

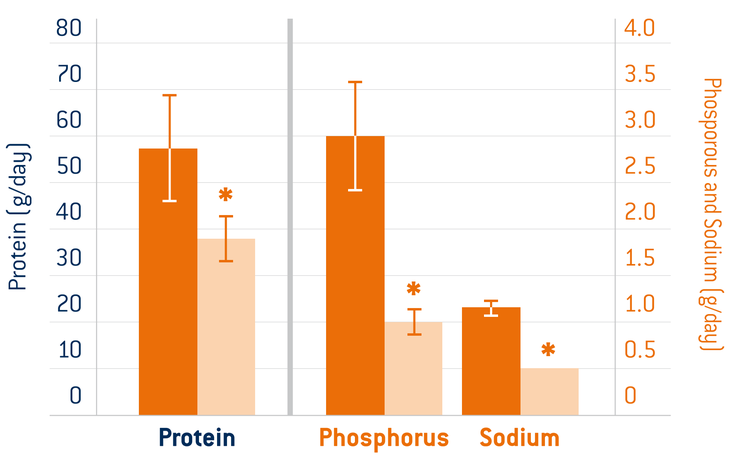


Fig. 3. Blood urea and creatinine levels

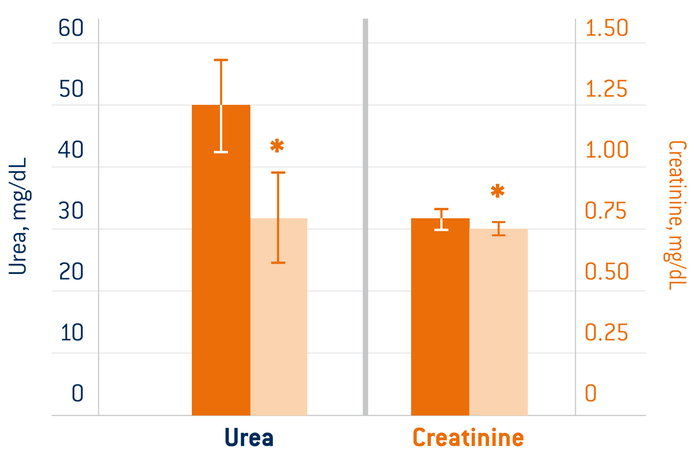


Fig. 4. Urinary fractional excretion of sodium and phosphorus

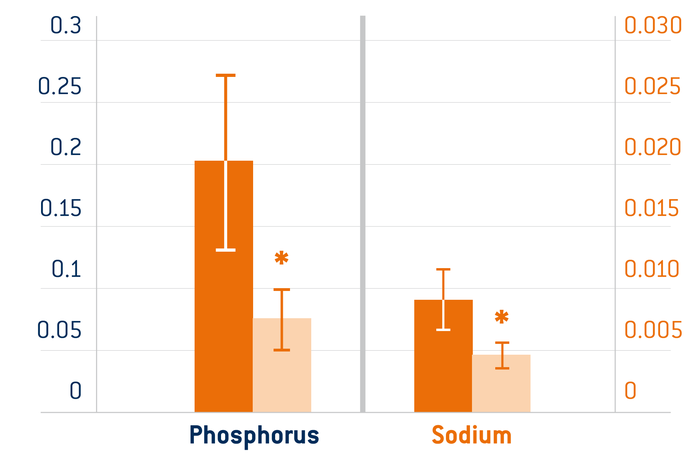
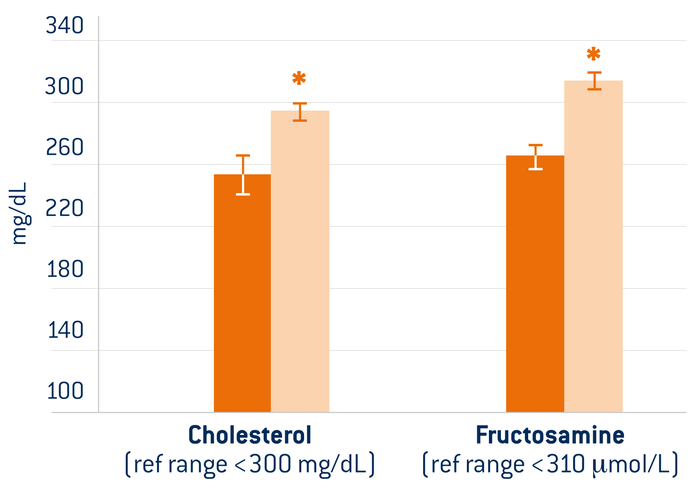


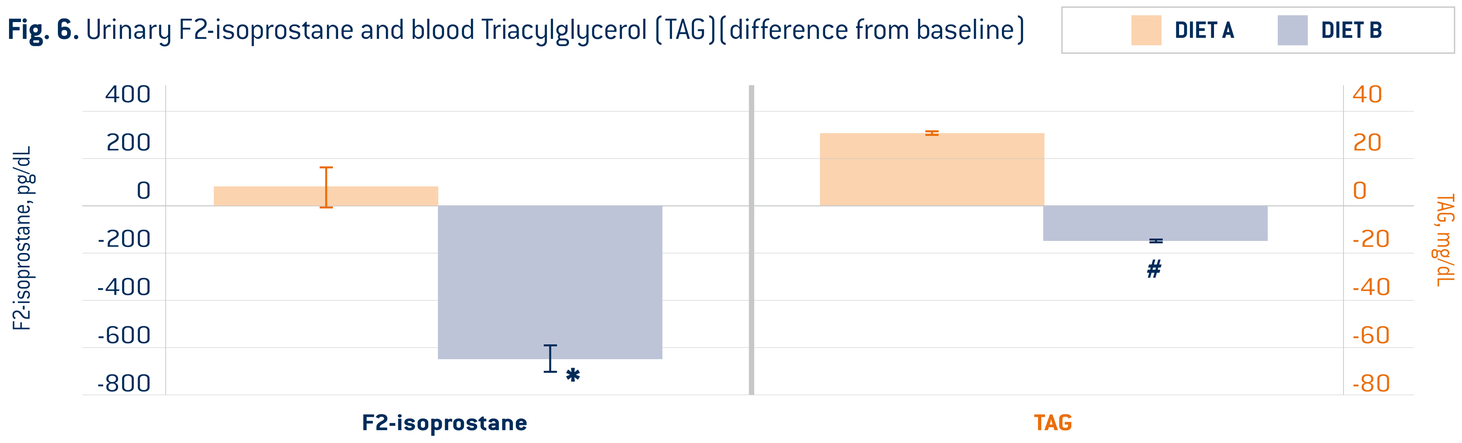
Fig. 5. Blood cholesterol and fructosamine levels



EFFECT OF FIBER MIX, OMEGA-3 and VITAMIN E

Diet B resulted in a higher decrease of urinary F2-isoprostane ($P=0.02$) and tended to induce a higher decrease in blood triacylglycerol ($P=0.06$), compared to diet A (Figure 6).

Fig. 6. Urinary F2-isoprostane and blood Triacylglycerol (TAG) (difference from baseline)



CONCLUSIONS

Both renal diets were effective at decreasing blood urea, creatinine and urinary fractional excretion of sodium and phosphorus, as expected for a renal diet. Although no additional short term benefits were observed on blood urea or creatinine values, Diet B resulted in a higher decrease in blood TAG and urinary F2-isoprostane (an index of oxidative status) than diet A, which could be beneficial for renal patients. However, a limitation of this study is that beside supplementation with soluble and insoluble fibers, omega-3 and vitamin E, other nutritional variations were present between diets A and B, which restrict interpretation of results. Increased fructosamine level should be investigated with diabetic dogs.