Weight loss with a high-protein diet allows the recovery of optimal body composition and improves insulin sensitivity in obese cats

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WEIGHT

Introduction

Management of feline obesity is of the utmost importance because of its high prevalence and association with numerous diseases, such as diabetes mellitus. High-protein diets are preferable for cats, as obligatory carnivores; such diets are also often proposed in weight and diabetes management.

The aim of this study was to assess effects of energy restriction on body weight, body composition and some hormonal parameters in obese cats fed a new high-protein low-carbohydrate diet.

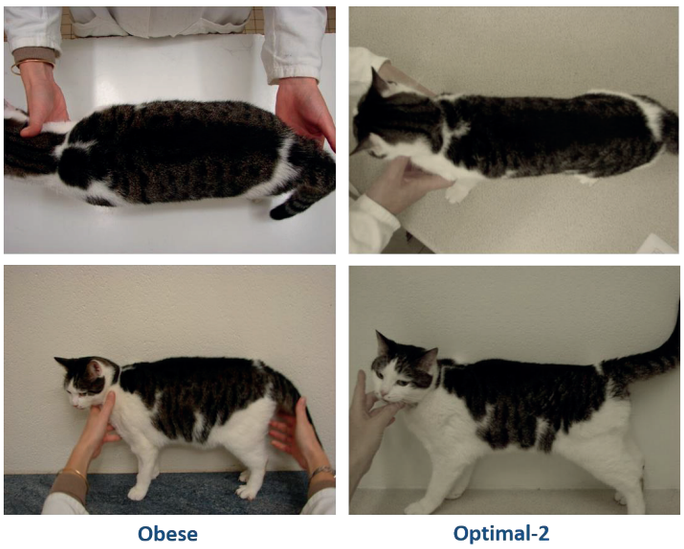
Animals, material and methods

Nine obese neutered adult cats (2.9±0.1 year old, mean BW 5.1±0.4 kg, BCS 8/9 (3 cats) or 9/9 (6 cats), mean overweight 46.0±4.0%) were included. They were fed the test diet (ME: 3190 kcal/kg DM, protein: 48% ME, fat: 29% ME, carbohydrate: 23% ME). The food allowance was adjusted every week for each cat to achieve weight loss between 1.5-2% per week.

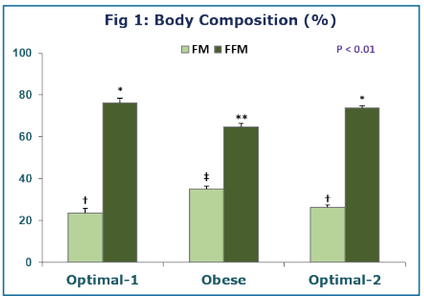
Euglycemic hyperinsulinemic clamps (assessment of insulin sensitivity) were performed, hormones were assayed, and body composition (BC) was determined using deuterium oxide dilution, when cats were obese and then when optimal BW was recovered. For statistical analysis, linear mixed effects models were used with a significance level of 5%.

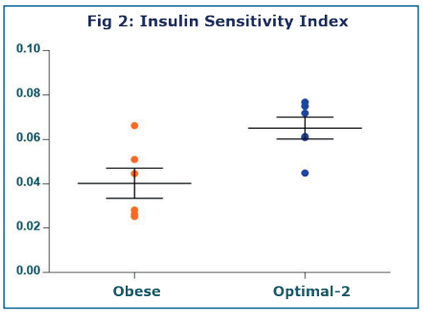
Results

During the weight loss period, the mean energy allowance was 28 kcal/kg optimal BW. The mean duration to achieve the cats' optimal BW (BW: 3.5±0.3 kg, BCS: 5/9) was 22 weeks, with a mean weight loss rate of 1.7% per week. Weight loss resulted in significant decrease of fat mass (FM: 0.9±0.1 kg vs 1.8±0.2 kg, p<0.001), and the final BC became optimal (%FFM/%FM: 74/26 vs 65/35) (Fig 1). The insulin sensitivity index was significantly higher after weight loss (0.07±0.01 vs 0.04±0.01, p<0.01) (Fig 2), and plasma leptin level was significantly lower (p<0.01).



Obese Optimal-2





Discussion and Conclusion

Results indicate that cats effectively lost BW, mainly from the fat mass, and insulin sensitivity was improved. The BC improvement despite a rapid weight loss can be related to the high protein intake. Because low insulin sensitivity is a risk factor for diabetes in cats, its improvement is considered desirable. The observed improvement in insulin sensitivity could have resulted from weight loss itself as well as from the high-protein and low-carbohydrate contents of the test diet, as it has been shown in other species.

Our results confirm that such a diet may be beneficial for the management of both obesity and diabetes mellitus in cats.

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A low-carbohydrate high-protein dry diet lowers postprandial glucose and insulin concentrations in obese dogs

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WEIGHT

Introduction

Recent evidence suggests that diets with high protein and low carbohydrate content may be beneficial in the prevention and management of diabetes mellitus by minimising postprandial (PP) glucose and insulin concentrations. Increased body fat mass and body weight are associated with decreased insulin sensitivity and are known risk factors for diabetes mellitus in companion animals.

The aim of this study was to compare the impact of a test low-carbohydrate high-protein (LC-HP) dry diet to that of a commercial high-carbohydrate moderate-protein (HC-MP) dry diet on PP glucose and insulin responses in obese dogs.

Animals, materials and methods

Eight adult obese Beagle dogs (mean BW 18.0±0.4 kg; mean optimal BW (OptBW) 13.1±0.7 kg; mean body condition score 8/9) were fed 2 different diets, LC-HP or HC-MP (Tables 1 and 2). Dogs, because of their obese status, had a reduced insulin sensitivity index which could emphasize differences in the effects of the 2 diets.

In a cross-over design with at least 7 days between the test meals, plasma glucose and insulin concentrations were measured for 360 minutes following a single meal of 130 kcal/kg OptBW$^{0.75}$. Incremental areas under the curves for glucose (AUCG) and insulin (AUCI) were calculated over the 360-min period.

Table 1: Composition of the tested diets

LC-HP diet	Dehydrated pork and poultry proteins, lignocellulose, potato starch, hydrolysed pork and poultry proteins, animal fat, bean hulls, minerals, beet pulp, psyllium fibre, fructo-ilogosaccharides.
HC-MP diet	Maize, dehydrated poultry proteins, rice, cellulose, animal fat, digest, pea bran, egg, vegetable oil, flaxseed, minerals.

Table 2: Nutritional characteristics of the tested diets (% DM)

	LC-HP diet	HC-MP diet
Crude protein	40.3	24.2
Crude fat	12.3	14.6
NFE	24.8	44.9
Crude cellulose	14.8	11.7
Insoluble fibre	24.5	18.4
Soluble fibre	1.7	0.9
ME (kcal/100g DM)	333	366
In vitro glycaemic index (%)	20.1	43.9

Results

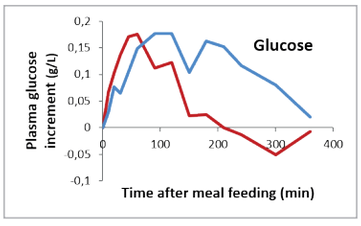
There was no significant difference in pre-meal baseline values for glucose and insulin between the diets. Whereas no difference was observed in mean glucose concentrations over the 360-min period between the groups, AUCG, AUCI, and the maximal glucose and insulin increments above baselines were significantly lower with the HP-LC diet compared to the MP-HC diet (Tables 3 & 4, Figures 1 to 4).

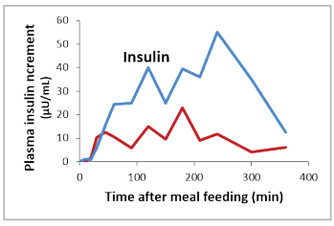
Table 3: Areas under the curve for glycemia and insulinemia in each group

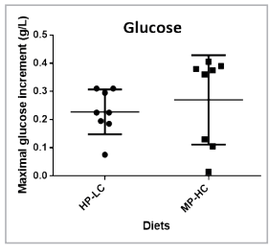
	LC-HP diet	HC-MP diet	p
AUCG (g·min)/L)	21 ± 10	44 ± 35	< 0.001
AUCI (µU·min)/mL)	3559 ± 2484	12391 ± 6382	< 0.001

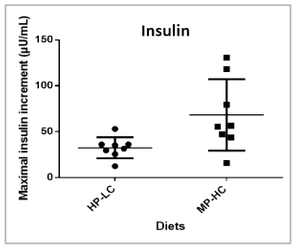
Table 4: Maximal glucose and insulin increments above baselines in each group

	LC-HP diet	HC-MP diet	p
Glucose(g/L)	0.23 ± 0.08	0.27 ± 0.16	< 0.001
Insulin (µU/mL)	32 ± 11	68 ± 39	< 0.01









Conclusion

We conclude that the LC-HP diet was associated with a lower impact on postprandial glucose and insulin responses compared to a HC-LP diet. Therefore, such a LC-HP diet may help in glycaemic control, which could be advantageous in the prevention or management of impaired glucose tolerance or diabetes mellitus in dogs.

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