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A weight loss diet with alpha-casozepine and L-tryptophan improves health related quality of life in dogs

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Abstract

A weight loss programme with associated veterinary visits and lifestyle changes could cause stress in emotionally sensitive dogs, increase food-seeking or begging behaviours and reduce quality of life (QoL). A weight loss diet (30% protein, 9.5% fat, 27.8% total dietary fibre (TDF), ME (based on NRC 2006 TDF) 2701 kcal/kg, all as fed) fed for weight loss with behaviour-modulating ingredients (alpha-casozepine, L-tryptophan) may enable weight loss, decrease begging behaviour and positively impact QoL. In this single group study over 3 months, small or medium sized dogs with a BCS $\geq 7/9$ (body weight ≤ 15 kg, age: 1-10 years) with owner-reported behaviours indicating emotional sensitivity, such as separation anxiety or house soiling, were recruited. During three veterinary visits (day 0, after 4 and 12 weeks) a physical exam was performed, and body weight, body condition score and owner-reported begging behaviour on a 4-point scale were recorded. On day 0, after 4, 8 and 12 weeks, owners completed a validated behaviour-based questionnaire (VetMetrica™), which measures health-related QoL (HRQL) across 4 domains – energetic/enthusiastic (E/E), happy/content (H/C), active/comfortable (A/C) and calm/relaxed (C/R). Dogs (n=20) achieved an expected average weight loss of 0.8% body weight/week. Body condition

improved significantly over the course of the study ($p < 0.001$, linear mixed model, $n = 19$). HRQL improved significantly across all 4 domains, with dogs ($n = 20$) being significantly more E/E, H/C, A/C and C/R ($p < 0.001$ – 0.04 , linear or mixed model), as did owner-reported begging behaviour ($p = 0.01$, GLMM, $n = 19$). With the test diet, a healthy weight loss, a significant improvement in HRQL and reduced begging behaviour was achieved.

Introduction

It is estimated that more than 50% of dogs in the United States are overweight or obese.¹ Excess weight increases the risk of many diseases², reduces life expectancy³ and reduces aspects of quality of life.^{4,5} Weight loss on the other hand has been shown to improve aspects of quality of life related to activity and pain/comfort⁶ and activity itself.⁷

To ensure effective weight loss while meeting all essential nutrients, pets with a BCS of 7/9 or higher should be fed a veterinary weight loss diet with restricted calories and increased essential nutrients to compensate for caloric restriction.⁸ Regular veterinary visits during the programme are recommended to ensure weight loss progress and adjust caloric allocation, if needed.⁹ Veterinary visits are experienced as stressful by an estimated 30–75% of dogs.^{10,11} Activity and other exercises to build lean muscle mass should be encouraged.¹² Slow feeders could help to increase meal duration and encourage active behaviour and possibly even promote a feeling of fullness.¹³ Changes in activity and feeding regime could be stressful, if not carefully introduced.

In addition, prevalence of anxiety in the general dog population is high, with one recent Japanese study reporting that more than 50% of owners believe their dog shows anxiety related behaviours.¹⁴ Overweight dogs appear to be even more likely to display undesired behaviours than normal weight dogs based on one study in the UK.¹⁵

One therapeutic approach to support dogs suffering from the potential stress of a weight loss programme or other anxiety-related problems could be feeding of a therapeutic diet with micronutrients that have a behaviour modulating effect. A diet enriched with alpha-casozepine and L-tryptophan has been discussed to improve the ability to cope with stressful situations.¹⁶

A common undesired effect of caloric restriction is an increase in food-seeking behaviour.⁸ Food-seeking behaviour can be directed at the environment and present in an increase in behaviours, such as “stealing food”, emptying the bin or possibly even an increase in food guarding or it can be directed at the owner and present in “begging behaviour”. In one study, overweight dogs were more likely to guard food and steal food than normal weight dogs.¹⁵ Food seeking behaviour could be an important reason to abandon a weight loss programme.⁸ Therefore, a

weight loss diet should be formulated not only for caloric restriction, but also to reduce food-seeking behaviour and the behaviour should be assessed as part of a weight loss trial.

We hypothesised that a weight loss diet with behaviour-modulating ingredients would enable weight loss, decrease begging behaviour and positively impact QoL.

Materials and Methods

This is a single group, multi-site (8 veterinary clinics) study conducted in the greater Toronto area, Canada, from December 2017 to September 2018. Eligibility criteria included: overweight dogs with a BCS $\geq 7/9$, ideal weight ≤ 15 kg, age 1–10 years and a history of undesired behaviours, such as excitability, irritability, aggression, fear, separation anxiety, attention seeking or house soiling. Owners had to consent to participate in the trial, solely feed the test diet and to discontinue all other weight loss drugs/supplements or foods for the duration of the trial.

During an inclusion visit, 29 dogs underwent a physical examination including assessment of body weight and body condition score. A blood sample was taken for analysis of complete blood count and biochemistry. Owner-reported stool consistency on a scale one to five (1 – extremely liquid, 2 – very wet, 3 – moist, 4 – clearly defined shape, ideal, 5 – hard & dry) was recorded. Owners were asked to assess food-seeking or begging behaviour on a 4-point scale (0 – none, 1 – occasionally, 2 – often, 3 – constantly).

Dogs were excluded from the studies, if they had significant abnormalities on CBC/biochemistry, had known medical conditions that were unstable, or had been diagnosed with Cushing's syndrome, hypothyroidism, diabetes mellitus, cancer, moderate to severe osteoarthritis or other conditions causing chronic pain or if they had a history of food intolerance or adverse reaction to change of diet. Pregnant or lactating dogs were not eligible for the study.

Dogs on psychoactive medication, such as fluoxetine or clomipramine were eligible, if the dogs' behaviour, as well as the medication dose had been stable for at least 30 days and the medication dose was not adjusted during the course of the study.

One dog was not eligible for the study due to abnormalities on blood work. Owners of the remaining 28 dogs were then provided with the study diet and feeding instructions. The test diet (Royal Canin Multifunction SATIETY Calm) was a dry diet formulated for weight loss (30% protein, 9.5% fat, 27.8% total dietary fibre (TDF), ME (based on NRC 2006 TDF) 2701 kcal/kg, all as fed) and enriched with behaviour-modulating ingredients (alpha-casozopine, L-tryptophan). Energy requirements for weight loss were estimated as 70 kcal/kg^{0.75} of ideal body weight. If dogs lost less than one percent body weight in the first 4 weeks, energy allocation was reduced to 60 kcal/kg^{0.75} of ideal body weight.

Two follow-up visits were performed after week 4 and 12 weeks. During these visits, a physical examination was performed, and body weight and body condition score, as well as owner-reported begging behaviour and stool consistency were recorded.

Furthermore, owners were asked to complete online at home a generic behaviour-based questionnaire (VetMetrica™), which measures health-related QoL (HRQL) across 4 domains – energetic/enthusiastic (E/E), happy/content (H/C), active/comfortable (A/C) and calm/relaxed (C/R) on the same day of their veterinary appointment and in addition at week 8. The questionnaire, consisting of 22 questions for the owner had been previously validated¹⁷ and shown to be sensitive to changes in BCS.⁴

Statistical analysis

For body weight and quality of life scores, linear mixed models were fitted with dog as random effect. Bayesian Information Criterion (BIC) values was then calculated for models with (mixed model) and without (linear model) the random effect included. The model with the lowest BIC value was selected for analysis.

Faeces scores were analysed with ANOVA due to minimal within-animal correlation.

For analysis of food-seeking behaviour, a general linear mixed model was used with time as fixed factor and random intercept for each dog to test for significant changes from baseline.

Results

Of the 28 cases enrolled, 20 completed the study. The main reason for not completing the study was the owner not returning for a follow up visit.

All 20 dogs completing the study remained healthy over the course of the study. Dogs ($n=20$) achieved an expected average weight loss of 0.8% body weight/week or a 9.2% reduction in body weight over the 3-month study period ($p<0.001$, linear model, Fig.1).

Data for BCS were available for 19 dogs only. In line with the achieved expected weight loss rate, body condition improved significantly over the course of the study, with an expected average decrease in BCS by approximately 1 category ($p<0.001$, linear mixed model, $n=19$).

Stool consistency did not change over the course of the study ($n=20$, median 4, range 3–4).

For HRQL, not all owners filled out the questionnaire at each time point. Sample size for each time point is given in Fig. 2.

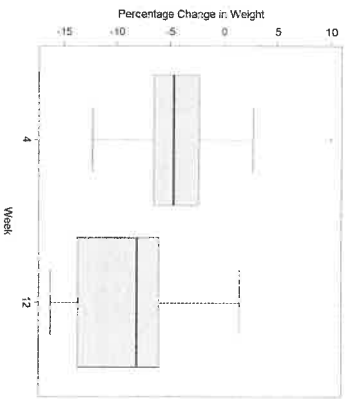


Figure 1: Change in weight predicted by time. Dogs achieved an expected average weight loss of 9.2% over the 3-month study period. This equals an expected average weight loss of 0.8% per week. ($p < 0.001$, linear model)

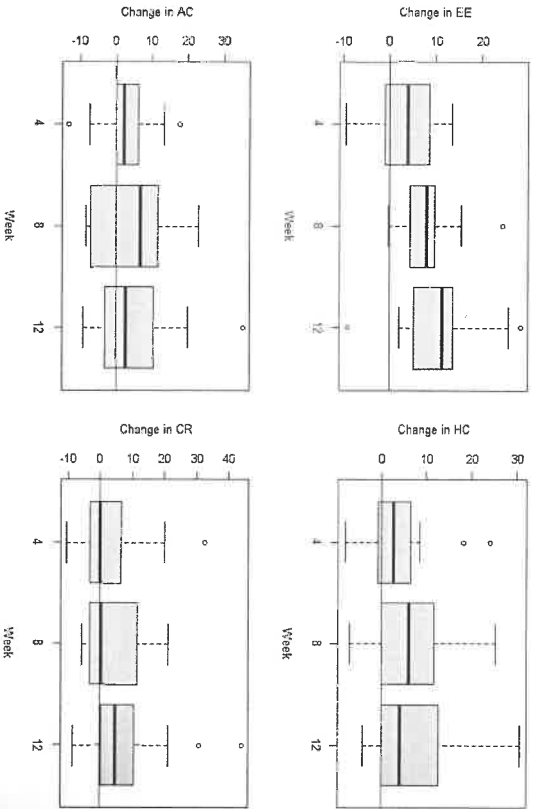


Figure 2: Change in HRQL predicted by time. EE: enthusiastic/energetic, HC: happy/content; AC: active/comfortable; CR: calm/relaxed. Not all owners responded to the questionnaire at each time point. Week 4: $n = 20$; week 8: $n = 13$; week 12: $n = 15$.

HRQL improved significantly across all 4 domains, with dogs being significantly more enthusiastic/energetic ($p < 0.001$, mixed model), happy/content ($p < 0.001$, linear model), active/comfortable ($p = 0.04$, mixed model) and calm/relaxed ($p = 0.009$, mixed model) after the 3-month period.

Begging behaviour significantly decreased over the course of the study ($p = 0.01$, GLMM, $n = 20$, Fig. 3).

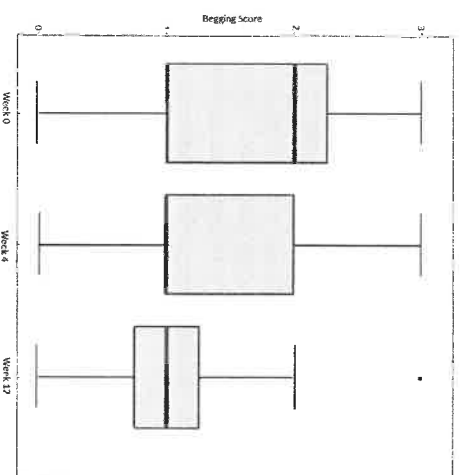


Figure 3: Change in begging score over the study period.

Discussion

For dogs, a weight loss rate of 1–3% starting body weight (SBW)/week is recommended during the first 3 months of a weight loss programme. While this rate is often achievable in a controlled colony setting^{18,19}, weight loss rates of 0.5–1% SBW/week are more common in client owned dogs, where success of the programme relies on owner compliance.^{7,20,21} In this study, a healthy weight loss of 0.8% SBW per week or 9.2% over the three month study period was achieved.

Excess weight has been shown to negatively impact some, but not all aspects of health related quality of life in dogs.^{4,6} In one study with 174 owners of dogs with varying body condition scores, overweight and obese dogs were significantly less energetic/enthusiastic and active/comfortable than normal weight dogs, but no differences were found in the domains happy/content and calm/relaxed.⁴

As would be expected, weight loss can improve these aspects of HRQL. In a study using a previous 60 item version of VetMetrica, 30 dogs that successfully completed a weight loss programme, showed improvement in vitality scores and decreases in scores for emotional disturbance and pain, but no improvement in anxiety scores.⁶ In one study even an incremental reduction in body weight of as little as 6% had a positive effect on lameness scores in obese dogs.²² A large, international, multi-centre weight loss trial with 926 dogs demonstrated a significant improvement in owner-reported dog activity after only 2 weeks of weight loss.⁷ Therefore, improvements in the domains energetic/enthusiastic and active/comfortable (or vitality and pain) may have been partly due to reduction in discomfort or pain, as a consequence of weight loss, as excess weight and

inflammation associated with obesity impact joints^{23,24}. In addition, the diet contained long-chain omega-3 fatty acids (EPA and DHA), glucosamine and chondroitine, which have been shown to improve the clinical signs of osteoarthritis.^{25,26}

Contrary to the previous study⁴, in this study, HRQL also improved in the domains happy/content and calm/relaxed.

The diet was enriched with alpha-casozepine, a natural biological compound from the alpha S1-casein portion of milk²⁷ and L-tryptophan. Previous studies in cats²⁸ and dogs¹⁶ with a test diet using the same ingredients have suggested a reduction in anxiety response to stressful situations. A possible behaviour-modulating and anxiety-reducing effect of these ingredients could explain the improvement in the quality of life domains related to happy/content and calm/relaxed.

Food-seeking was significantly decreased over the course of this study. This is in line with previous results using a diet with the same macronutrient profile (Royal Canin SATEITY dog).⁷ The satogenic properties of the diet have also been confirmed with voluntary food intake as a proxy, as, in one study, the diet was more effective than a competitor weight loss diet in reducing voluntary food intake.²⁹

As this is a small scale, single group, non-blinded study, improvements in HRQL and owner-reported begging behaviour could have been due to factors unrelated to the weight loss programme or due to owner bias. Further research testing the diet in fully blinded design with a control group could address this concern.

In conclusion, in a 3 month weight loss programme with Royal Canin SATEITY CALM, dogs experienced a significant reduction in body weight, expressed less begging behaviour and had improved HRQL across all domains.

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Sensitivity of benchmarked behavioural assays for distress – should we attend to certain behaviours during examinations?

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Behavioural, emotional and physical signs of distress are increasingly recognised in veterinary patients during routine care. Visits to veterinarians are associated with development or worsening of fearful behaviours. Fear and distress are humane and welfare concerns, themselves, but such behaviour may also result in deferred veterinary care and less thorough veterinary evaluations. This is part of our ongoing series of studies on assessing fear and distress in clinical situations using one population of dogs. In this phase, we sought to evaluate whether there was one, or a subset of, behaviours in a benchmarked, behavioural scale that evaluated 8 behavioural components for entry into the examination room and for each of 10 steps of a standardised physical exam, that best predicted or correlated with two 5 point, subjective scales evaluating the dog's behaviour during entry into the exam room and throughout the exam. Dogs (N = 60) were enrolled in a randomised, placebo-controlled, double blind study testing a novel pharmaceutical intervention for fear associated with veterinary exams, and were videotaped at the baseline visit and 2 weeks later at the interventional visit. All