

SUMMARY

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Overeating and sedentary lifestyles are two of the main causes of the worrying rise in obesity prevalence rates among dogs and cats, with obesity classified as an epidemic. Following internships in veterinary clinics and discussions with veterinarians, overweight pets are more and more frequently present in clinics, and the main causes highlighted by doctors as leading to weight gain are a sedentary lifestyle, *ad-libitum* food consumption, poor quality food and associated health conditions of which owners were not aware until further medical investigations were carried out. Studying the incidence of obesity in dogs and cats and finding possibilities to combat it through tailored nutritional programmes for each animal by correcting the energy intake they consume was therefore the overall purpose of conducting this research.

The PhD thesis entitled *Contributions to the study of the possibilities of combating obesity in pets (dogs and cats) through nutrition* is structured in two parts: the first part refers to the bibliographical study of the issues addressed, having two chapters: a first one in which nutrition and feeding of dogs and cats are addressed, and a second chapter about nutrition and metabolism disorders encountered in the two species, focusing on the central theme of the study, namely obesity.

The second part of the thesis comprises six chapters addressing the proposed topics and ends with conclusions, recommendations and proposals for future research on obesity in dogs and cats. Hence, in chapter three, the aim, objectives and structure of the research were presented in order to obtain favourable results for the patients. In chapter four, the criteria for the choice of the biological material studied were discussed, as well as the working methods applied, the equipment used and the types of food integrated into the nutritional programme of the patients monitored, all in order to achieve the proposed goal. Chapters five and six aimed to characterize the study group consisting of dogs and cats as well as the types of food proposed in the nutritional programme to combat obesity for the monitored patients. The last two chapters highlighted the exogenous factors that either generated weight gain in dogs and cats or influenced the development of the nutritional plan, and finally it discussed in detail the nutritional programme created to help obese patients.

The inclusion of dogs and cats in the weight monitoring programme was based on the following criteria: initial weight of the animals and comparison of that weight with the recommended weight for the pet's species and breed, followed by visual examination of the patients and an assessment of their body score, always above the score considered ideal (>5) in the body fat rating system provided by the WSAVA's Global Companion Animal Nutrition Committee. The last criterium was monitoring nutrition and metabolic conditions associated with weight gain. A nutritional consultation was integrated as part of the preventive health consultations in the veterinary clinic, achieving therefore a change in the dogs and cats owners' perception of what a healthy lifestyle means for their pet.

The nutritional programme was implemented and completed with a success rate of 86 % of the dog and cat population studied. The results indicate that lowering the body weight of dogs and cats was possible by setting a recommended or ideal weight for each individual studied, modifying their diet (both qualitative and quantitative), and setting the actual daily energy requirements following the new recommended weight. All of these combined with gradually increasing physical activity were practical modalities applied as a result of studying the nutrition guidelines and nutritional recommendations made for prevention and treatment of obesity in dogs and cats. In addition, regular monitoring of patients by weighing, recalculation of energy requirements, modification of the nutritional programme and review of the medical analysis plan ensured the success of the programme carried out.

Obesity risk factors were investigated separately, initially discussing endogenous factors such as breed, size (in dogs), gender, hormonal status and age, which may predispose pets to weight gain. Thus, according to the data regarding dogs, females accounted for 59 % of the total dogs studied. In

terms of hormonal status of the total population of monitored dogs, 65 % were neutered at the start of the nutritional programme.

The dog breed most affected by obesity or overweight was the Labrador Retriever, and large dogs were, at 44 %, most overrepresented. In terms of the age groups studied, dogs aged 2 to 6 years accounted for 50 % of the total.

When studying endogenous factors in cats, a higher representation of males was observed, in proportion of 70 % of the total cat population monitored, all cats being neutered at the beginning of the nutritional programme. Similar to other studies, the most overweight or obese cats belong to the European breed. Similar to dogs, the age group most affected by overweight in cats was between 2 and 6 years, representing 52,2 % of all cats monitored.

Among the exogenous factors that may predispose dogs and cats to obesity or weight gain, the following were highlighted: overfeeding and/or inadequate food in terms of energy intake, as well as an excessive number of treats or leftovers from the owners' meals.

During the experimental period, not only the behaviour of the pets participating in the study was observed, but also the behaviour of the owners and their beneficial or non-beneficial implications in the course of the weight loss programme, behaviours that were considered direct exogenous factors influencing weight loss or even the treatment of associated conditions.

Two types of commercial foods were used during the nutritional monitoring, namely a prescribed food for obesity, called *reduction diet* (abbreviated *r/d*) and a weight loss feed called weight loss. The following results were obtained in dogs fed the first type of food:

- the highest weight loss percentage, 16.3 %, was recorded by a male Labrador Retriever; in contrast, the lowest weight loss percentage, 3,3 % was recorded by a female Labrador Retriever;
- in terms of size of the dogs, the best results in terms of average weight loss duration, namely 11,3 weeks, and average weight loss per week, namely 1,04 %, were recorded by small dog breeds.

Results from dogs that participated in the weight management programme and were recommended weight loss food achieved the following results:

- of all the cases of obesity recorded in dogs, a maximum weight loss percentage of 22,8 %, with 99,7 % reaching the target weight, was recorded by a 9-year-old male half-breed, who managed to go from 39 kg to 30,1 kg;
- of the large breed dogs, the highest weight loss of 16,4 % was recorded by Ziggy, a neutered female Labrador Retriever, over a 24 week period; Ziggy thus also recorded the highest average weight loss per week, namely 0,68 %;
- the minimum percentage of weight loss, namely 3,5 %, belonged to a large male Labrador Retriever, explained by the short period of participation in the weight loss programme;
- there was also one particular case of weight gain due to non-compliance with the nutritional programme, the cause cited by the owner being lack of time and aggressive behaviour of the dog when limiting the food portions.

The participation of cats in the nutritional monitoring programme showed the following results:

- several types of therapeutic food prescribed for obesity but also for several obesity-related conditions, low-fat food or dual purpose food types for the main condition, but also for obesity, were integrated;
- for dual purpose foods for both obesity and associated conditions, the maximum weight loss percentage was 13,2 % over 14 weeks, while the minimum one in the same category was 3,3 %, over 16 weeks, with the same dual role food;
- in cats which followed the obesity diet, the maximum weight loss percentage was 13,7 %, and the minimum one 3,3 %;
- by highlighting the results obtained with the two types of feed used in cats, it was observed that a shorter duration of weight loss was obtained, i.e. 15,4 weeks, when the recommended feed belonged to the dual purpose category, compared to the food prescribed only for obesity, where the duration was

16,5 weeks. For this type of food (prescribed for obesity), the average weight loss yield was more effective, with a value of 8,91 % and an average weight loss per week of approximately 0,56 %, similar to the average percentage for the dual purpose food of 0,56 %;

However, the results of this study do not prove that the weight loss food used was superior to other types of food available on the market, or that the results can necessarily be applied to other weight loss programmes for dogs and cats.

Following data aggregation, a maximum follow-up period for the weight loss programme of 6 months, 26 weeks or 181 days was recommended. Patient monitoring ran from September 2020 to January 2023, which included a quarantine period in response to the coronavirus pandemic, during which time owners became closer, more responsible and perhaps more aware of the needs and ailments of their pets. Thus, this period felt differently to cat owners compared to dog owners, the latter being able to give their dogs more freedom of movement and therefore more physical activity, which helped them to maintain or even reduce their body weight. The cat owners noticed that the pet showed more noticeable bored behaviour, followed by vocalizations that were met with increased food intake and rewards, which irreversibly led to weight gain.

Because of the sensitive nature of the subject for pet owners, it is suggested that weight gain in dogs and cats be addressed in detail during a general veterinary consultation. A first recommendation of the nutritionists is to determine the body maintenance level of the animal by consulting body score evaluation tables and risk indicators predisposing to weight gain or obesity, a recommendation that is helpful for both pet owners and veterinarians.

The advice from nutrition specialists highlights the importance of implementing a nutritional programme tailored to the individual needs of dogs and cats precisely to prevent the onset of obesity at an early age. Current research has also shown that the critical moments that can lead to early onset of obesity are considered to be spaying/neutering and ageing, at which time it is recommended to carry out a nutritional reassessment involving an adjustment of energy requirements to meet the real nutritional needs of the dog or cat. Finally, the priority is to make the owner aware of the weight related problems affecting the pet, and this can only be achieved by communicating as effectively as possible with medical staff in veterinary clinics and hospitals.

The current research represents a first step in the management and prevention of obesity and overweight in dogs and cats in Romania, and future research objectives are proposed:

- a comparative study of the adipose layer with the help of modern high-performance imaging equipment such as computer tomography or magnetic resonance;
- integration of "smart" feeding devices as an automatic way of counting the amount of feed given to pets, especially for owners with a busy schedule;
- the use of physical activity and heart rate monitoring technology is proposed to observe the contribution of exercise in weight loss programmes.