

THE INFLUENCE OF SOME ENDOGENOUS AND EXOGENOUS PREDISPOSING FACTORS IN OVERWEIGHT CATS

S.-I. Petrescu^{1*}, M. Matei¹, C.G. Radu- Rusu¹, I.M. Pop¹

¹Faculty of Food and Animal Sciences, Iasi University of Life Sciences, Romania

Abstract

Overweight was identified and monitorized in a group of 23 cats that were included in a weight management programme at a veterinary clinic. The risk factors studied in the population of cats in relation with the body score (between 5.5-9 according to the body score scale provided by the WSAVA) were endogenous like breed, age, sex and neuter status of the cats.

It was elaborated a specific questionnaire before the enrolment of cats in the weight management programme, asking the owners to complete about their cats' eating behaviour, the type of used feed and the amount of food intake, to establish the caloric intake that contributes to their body weight.

The analysis of risk factors for feline obesity revealed exogenous causes that produce or enhance weight gain in cats, namely lack of room or limited space in which cats are kept, sedentary lifestyle and/or ad-libitum feeding offered by cat owners.

Key words: cats, overweight, obesity, risk factors

INTRODUCTION

Obesity has been classified as an epidemic defined as an excessive and abnormal accumulation of fat that can affect health [1].

According to the literature and studies conducted on domestic cat populations the prevalence of obesity and overweight has ranged from 11.5% to 63% [2, 3, 4, 5, 6, 7, 8, 9].

The most common diseases diagnosed in domestic cats are periodontal diseases, with the second most common disease being obesity [10].

Risk factors associated with weight gain among cats according to studies conducted over time are related to the animal such as breed, age sex or neuter status and exogenous factors related to diet, environment but also the relationship of the animal with the owner [11].

MATERIAL AND METHOD

The biological material was represented by a group of 23 cats that were presented to the veterinary practice for general or specific consultations and were diagnosed as overweight or obese based on: body weight, visual inspection and body score from 1 to 9 according to the body score scale provided by the World Small Animal Veterinary Association, but also by palpation of thoraco-abdominal areas of interest.

Cats examined and classified as having a body score (above the ideal body score, i.e. above 5 according to WSAVA) [12] were integrated into a weight monitoring programme and their diet was modified to initiate weight loss. During the first consultation, the owner's consent was obtained regarding the participation of the animals in the study, thus the anamnesis followed the essential data for the identification of the animal, the medical history of the animal, the food history of the

* Corresponding author: silviaioanapetrescu@gmail.com

The manuscript was received: 04.12.2023

Accepted for publication: 25.03.2024

animal, data about the environment in which the cat lives and the time spent by the owner with the cat.

RESULTS AND DISCUSSION

Nutritional consultations for 23 patients were carried out in the veterinary clinic as well as during home visits between October 2020 and May 2023, and nutritional monitoring involved observing the evolution of the cats' weight and health status.

The first part of the obesity research involved examining internal, body-related factors that may contribute to weight gain.

Cats were divided by sex, with females at the top of the table, followed by males.

Medical terms describing the passage through ovariohysterectomy in females or orhidectomy in males (surgery involving removal of the ovaries and uterus or testicles) were used to characterize reproductive status at the time of diagnosis of obesity in cats. Therefore in Table 1 the term neutered has been used for males and spayed for females.

According to Table 1, all patients under follow-up were already neutered at the start of the nutritional obesity management programme, a result confirmed by extensive studies in the literature which state that spaying or neutering is one of the major causes of obesity in cats [2, 4].

Table 1 Characterization of the population of cats monitored

Nr. Crt.	Name	Breed	Sex	Hormonal status	Age
1.	ARIA	Maine Coon	Female	Spayed	1 year
2.	SUSHI	European	Female	Spayed	1 year
3.	CALECITA	European	Female	Spayed	6 years
4.	MOLY	European	Female	Spayed	8 years
5.	MIU	European	Female	Spayed	7 years
6.	FULGA	European	Female	Spayed	3 years
7.	MARIE	European	Female	Spayed	3 years
8.	ANAKIN	Maine Coon	Male	Neutered	1 year
9.	BUBU	European	Male	Neutered	3 years
10.	PISU	European	Male	Neutered	13 years
11.	MİŞCA	European	Male	Neutered	7 years
12.	MOG	British Shorthair	Male	Neutered	4 years
13.	TOM	European	Male	Neutered	5 years
14.	MAU	European	Male	Neutered	3 years
15.	TOMIȚĂ	European	Male	Neutered	9 years
16.	YUKI	European	Male	Neutered	1 year
17.	CHUCKY	European	Male	Neutered	5 years
18.	WHISKEY	European	Male	Neutered	2 years
19.	MILO	British Shorthair	Male	Neutered	2 years
20.	MUSHU	European	Male	Neutered	6 years
21.	FREDDY	European	Male	Neutered	2 years
22.	BLU	European	Male	Neutered	4 years
23.	TOMMY	European	Male	Neutered	8 years

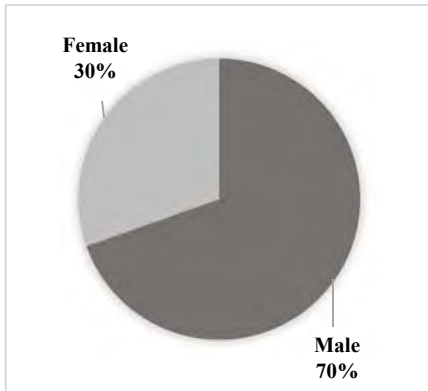


Fig. 1 Proportion of overweight cats according to sex

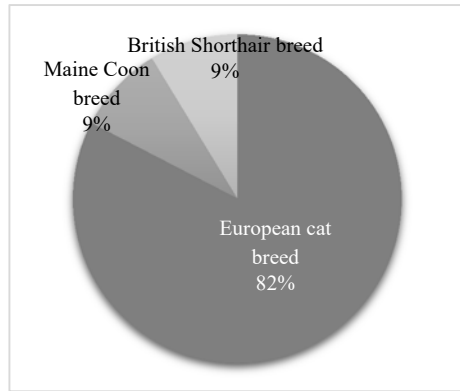


Fig. 2 Proportion of overweight cats by breed (%)

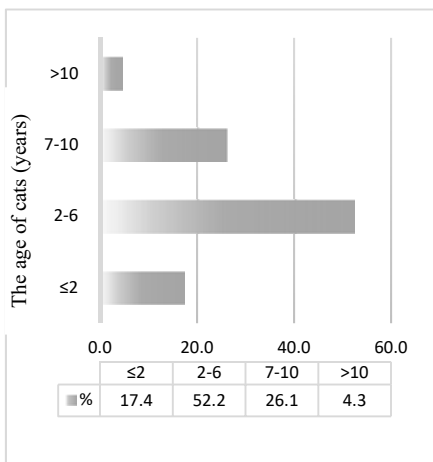


Fig. 3 Proportion of overweight cats by age

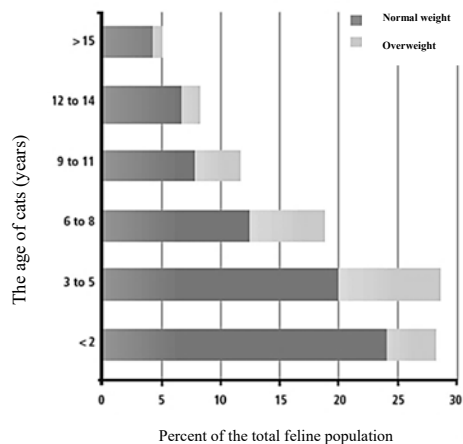


Fig. 4 Proportion of overweight cats by age (adapted from Robertson et al., 1999)

Research carried out until recently shows that the cats most affected by obesity are the European breed (including short, medium and long-haired cats - produced by crossing two unknown breeds) [3], which is also confirmed by the results of the current study. Of the total number of cats that have been monitored, 82% belong to the European cat breed, isolated cases belong to the Maine Coon cat breed, i.e. 9%, on a par with the British Shorthair breed (Fig. 2).

According to one study, middle-aged or adult cats between 3 and 5 years are associated with an increased risk of overweight and/or obesity.

Results from the same study showed that cats under 13 years of age had significantly higher body scores than cats over 13 years of age [3]. In another study conducted in North America, the prevalence of overweight and obesity was found to be higher in cats aged 5 to 11 years, as shown in figure 4 [13, 3]

Using the American Animal Association Hospital Feline Life Stage guidelines [14], cats were integrated into age categories as follows: up to 2 years of age, junior cats with a body score above that considered ideal; adult cats aged 3 to 6 years; mature cats aged 7 to 10 years; senior cats aged over 10 years.

Table 2 Dietary history: the analysis and energy intake of owner-provided food compared to the recommended food for monitored cats

Nr. crt	Name	Initial bodyweight (kg)	Food provided by the owners	Quantity (approx. by owners)		ME/energy (kcal)	Recommended food	Recommended quantity of food (grams)	ME/energy (kcal)
				Dry food (grams)	Wet food (grams)				
1.	ARIA	6,3	R.C. Kitten and Concept for life	110	25	468	R.C. V.D. Gastrointestinal Mod. Cal.	75	278
2.	SUSHI	3,0 (5 months)	Devora Kitten	150	-	585	Purina P.P. sterilized + R.C. V.D. Skin &Coat	50	180
3.	CALECITA	7	Purina One Sterilised and Gourmet	90	40	357	R.C. V.D. Satiety Support Weight Management	65	201
4.	MOLY	10,4	Whiskas adult	150	-	562	R.C.V.D. Gastrointestinal Mod. Cal.	105	317
5.	MIU	5,8	Devora adult and Purina Pp Sterilised	80	-	288	Hill's P.D. Weight Reduction R/D	70	216
6.	FULGA	5,0	Devora adult and Purina Pp Sterilised	80	-	288	Hill's P.D. Weight Reduction R/D	65	200
7.	MARIE	4,3	Purina Pro Plan Sterilised	90	-	301	Purina P.P. V.D. St/Ox Hypo.	60	171
8.	ANAKIN	7,9	R.C. Kitten and Concept for life	110	25	468	R.C.V.D. Gastrointestinal Mod. Cal.	85	315
9.	BUBU	5,6	Whiskas adult wet&dry	100	40	411	R.C. V. D. Skin&Coat	51	194
10.	PISU	6,5	Royal Canin Digestive and Felix	70	25	294	R.C.V.D. Gastrointestinal Mod. Cal.	49	187
11.	MIȘCA	5,3	R.C. Digestive Care and Urinary Care	100	-	365	R.C.V.D. Gastrointestinal Mod. Cal.	56	195
12.	MOG	6,1	Royal Canin Sterilised Regular	90	-	328	R.C. Canin Neutered Satiety Balance	55	187
13.	TOM	6,8	Prescription Diet c/d Multicare	60	-	246	Hill's P.D. c/d Urinary Stress + Metabolic	49	173
14.	MAU	4,5	Purina One Sterilised and Gourmet	70	85	308	Hill's P.D. Digestive/Weight Management	63	198
15.	TOMIȚĂ	5,9	Whiskas adult wet&dry	100	85	432	Hill's P.D. Weight Reduction R/D	75	234
16.	YUKI	6,1	Purina One Indoor,Urinary	100	-	525	Hill's P.D. c/d Urinary Multicare	65	234
17.	CHUCKY	6,4	Purina One Sterilised and Mi Amour	80	30	289	Hill's P.D. Weight Reduction R/D	66	210
18.	MILO	5,2	Hill's S.P.Sensitive + P.D. Urinary	80	85	386	Hill's P.D. c/d Urinary Stress + Metabolic	55	198
19.	MUSHU	5,4	R.C. Digestive Care + R.C. Sterilised	90	-	335	R.C.V.D. Gastrointestinal Mod. Cal.	58	216
20.	FREDDY	5,9	R.C.V.D. Urinary S/O	120	-	464	R.C.V.D. Gastrointestinal Fibre Response	58	234
21.	BLU	7,9	Hrană uscată marca Auchan	100	-	323	Hill's P.D. Weight Reduction R/D	90	285
22.	TOMMY	6,4	Hill's P.D. Kidney Care k/d+1 bag of wet food	60	85	310	Hill's P.D. Kidney Care k/d	63	251
23.	WHISKEY	6,0	Perfect fit sterile	120	-	444	Hill's P.D. Weight Reduction R/D	75	234

R.C. = Royal Canin; Mod. Cal. = Moderate Calorie; V.D.= Veterinary Diet; S.P. = Science Plan; P.D.= Prescription Diet; PP=Pro Plan; Hypo= Hypoallergenic

The results of the current research indicate that the age group most affected by overweight represented adult cats, which made up 52.2% of the study population. Next, the age group of mature cats (aged 7 to 10 years) accounted for 26.1% of the monitored population, as shown in figure 3.

Cats, a carnivorous species with a more sedentary lifestyle compared to dogs as a result of their confined space, have also become even more selective with the food offered by their owners.

During nutritional consultations, cat owners often complain that they find it difficult to change their cats' diet. The reason is that they notice a lack of interest in new food options and a clear preference for a particular type of food.

Situations have been encountered where cats prefer food from a particular manufacturer or show a strict preference for dry or wet food. Also, some cats become dissatisfied when a certain type of food is removed from their diet (sometimes wet food cannot be excluded from some cats' diets). In Table 2 we see a greater variety of recommended dry food types.

In a study of cat owners' behaviour, the tendency of owners to 'humanise' the (now obese) cat is discussed and the cat is seen as a substitute for human interaction [15], therefore clarifying the human need to provide the cat with the food the pet wants without calculating the dietary risks to which it is exposed.

Also in the research carried out so far and after conducting nutritional questionnaires with cat owners, an inability/unwillingness of cat owners to notice their cat's weight gain has been detected, as they consider the cat to be of an ideal weight. Following the dialogue with cat owners, a clearer reluctance to carry out the nutritional consultation or to change the cat's or their lifestyle was also identified.

Research shows that detecting obesity in a cat and prescribing a diet is relatively straightforward but the real challenge is convincing the owner to make the necessary

dietary and lifestyle changes to achieve and maintain significant weight loss thus German et al. have reported that any suggestions for change may be opposed by the owner and the cat.

In the case of obese cats, it will be seen in Table 2, that the energy restriction for reaching the recommended or ideal weight is higher. The calculated daily energy requirement for weight management and reaching the recommended weight (initial calculation) in cats is calculated according to the American Animal Association Hospital [16] and following consultation of the literature [17, 18].

CONCLUSIONS

Endogenous factors and their relationship to weight gain have been observed without being able to intervene on them, therefore the research aimed to carry out nutritional questionnaires that revealed:

- the practice of ad-libitum feeding or giving food in large and unknown quantities, thus the food not being weighed until the nutritional monitoring programme began;
- choice of food varieties inappropriate for age or neuter status.

By carrying out nutritional questionnaires with cat owners, it was also observed behaviours that made it more difficult to implement the nutritional plans, being highlighted the owners' difficulty to impose the pet to switch to a new food, a reluctance to change the cat's lifestyle but also a difficulty to strictly follow the nutritional program, being mentioned by them the obvious more independent behaviour of cats compared to dogs.

ACKNOWLEDGMENTS

The present scientific study is part of a larger scientific research, a PhD thesis focused on the study of dietary obesity prevention in dogs and cats.

REFERENCES

1. World Health Organization. Obesity and Overweight, **2021**. Available online at: <https://www.who.int/newsroom/factsheets/detail/obesity-and-overweight>.
2. Allan, F; Pfeiffer, D; Jones, B; Esslemont, D; Wiseman, M; A cross-sectional study of risk factors for obesity in cats in New Zealand. *Preventive Veterinary Medicine* **2000**, 46, 183–196.
3. Russell, K; Sabin, R; Holt, S; Bradley, R; Harper, EJ Influence of feeding regimen on body condition in the cat. *Journal of Small Animal Practice* **2000**; 41, 12–17.
4. Lund, E.M., Armstrong, P.J., Kirk, C.A., Klausner, J.S., - Prevalence and risk factors for obesity in adult cats from private US veterinary practices. *Internal Journal of Applied Research Veterinary Medicine*. **2005**, 3 (2), 88–96.
5. Colliard L, Paragon B, Lemuet B, Bénét J, Blanchard G Prevalence and risk factors of obesity in an urban population of healthy cats. *Journal of Feline Medicine and Surgery* **2009** 11, 135–140.
6. Courcier, EA; O'Higgins, R; Mellor, DJ; Yam, PS Prevalence and risk factors for feline obesity in a first opinion practice in Glasgow, Scotland. *Journal of Feline Medicine and Surgery* **2010**; 12, 746–753.
7. Cave, NJ, Allan, FJ, Schokkenbroek, SL, Metekohy, CA, Pfeiffer, DU A cross-sectional study to compare changes in the prevalence and risk factors for feline obesity between 1993 and 2007 in New Zealand. *Preventive Veterinary Medicine* **2012**; 107, 121–133.
8. Courcier, EA; Mellor, DJ; Pendlebury, E; Evans, C; Yam, PS An investigation into the epidemiology of feline obesity in Great Britain: Results of a cross-sectional study of 47 companion animal practises. *Veterinary Record* **2012**: 171, 560.
9. Corbee, RJ Obesity in show cats. *Journal of Animal Physiology and Animal Nutrition* **2014**; 98, 1075–1080.
10. O'Neill, DG; Gunn-Moore, D; Sorrell, S; et al. Commonly diagnosed disorders in domestic cats in the UK and their associations with sex and age. *Journal of Feline Medicine and Surgery* **2023**;25(2).
11. Tarkosova, D; Story, M.M.; Rand, J.S.; Svoboda, D Feline obesity – prevalence, risk factors, pathogenesis, associated conditions and assessment: a review, *Veterinarni Medicina* **2016**, 61, (6): 295–307. doi: 10.17221/145/2015-VETMED.
12. World Small Animal Veterinary Association, **2020**. Available online at: <https://wsava.org/global-guidelines/global-nutrition-guidelines/>.
13. Robertson, I.D.; The influence of diet and other factors on privately owned cats from metropolitan Perth Western Australia. *Preventive Veterinary Medicine*, **1999**, 40:75–85.
14. American Animal Hospital Association, **2021**, Available online at: <https://www.aaha.org/aaha-guidelines/life-stage-feline-2021/feline-life-stage-home/>.
15. German, A.J.; Holden, S.; Bissot, T.; Morris, P.J., Biourge V.; Changes in body composition during weight loss in obese client-owned cats: loss of lean tissue mass correlates with overall percentage of weight lost. *Journal of Feline Medicine Surgery* **2008**.
16. Cline, M.; Burns, K., Coe, J.; Downing, G., Durzi, T.; Murphy, M.; Parker, V.; AAHA Nutrition and Weight Management Guidelines for Dogs and Cats. *Journal of American Animal Hospital Association*, **2021**.
17. Hand, M.S.; Thatcher, C.D.; Remillard, R.L.; Roudebush, P.; Novotny, B.J.; Small animal clinical nutrition (5th ed.), Mark Morris Institute, Topeka, Kansas, **2010**.
18. Ramsey, J. J.; Determining Energy Requirements. *Applied Veterinary Clinical Nutrition*, **2012**, 23–45.