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Monitoring Energy Requirement and Weight Gain in Adult Cats after Ovariectomy

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ABSTRACT

To evaluate the effect of ovariectomy on food intake and body weight gain in adult cats fed according to their maintenance energy requirement (MER) and cats fed 1.5 times their MER. Eleven crossbreed adult female cats were monitored and weighed daily before undergoing ovariectomy, and their MER was determined once a stable body weight had been achieved. The ovariectomies were performed afterwards the cats were divided into two groups: group 1, composed of 6 cats, receiving the amount of food corresponding to their MER; and group 2, composed of 5 cats, fed 1.5 times their MER. No significant differences were found regarding food intake, alometric factor (kcal/kg$^{0.67}$) and Metabolizable Energy (ME) intake (kcal/day) ($P>0.05$) for cats in group 1. However, these cats gained weight over the 30 days after ovariectomy ($P<0.05$). Cats in group 2 presented significant difference for food intake, alometric factor, ME intake (kcal/day) and body weight ($P<0.05$). Ovariectomy had influenced the MER. Spayed cats that continued receiving the same energy intake before ovariectomy had gained weight, showing that the MER for cats had decreased after the procedure. Cats in group 2 had gained more weight than those in group 1. In order to keep spayed cats within the optimal body weight, it is necessary to monitor their feed intake, considering that the MER changes after ovariectomy, and female cats tend to overeat and gain weight, which may lead to being overweight or obesity.

Key words: Spayed, Obesity, Food intake, Cat nutrition

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INTRODUCTION

Over the last 30 years, obesity in companion animals has been identified as an emerging problem, affecting the welfare and health of domestic dogs and cats. It has been estimated that obesity affects around 6-12% of domestic cats and 25-45% of the dogs population (Lazaroto et al., 1999; Bland et al., 2010; Brunetto et al., 2011). In the period from 2007 to 2011, in a general veterinary practice population in the USA, it was observed an increase in overweight and obesity in dogs and cats by 37% and 90%, respectively (Banfield, 2012). In most cases, it is related with excessive food intake, reduced physical activity, thereby increasing the predisposition of weight gain. Likewise, the spaying procedure has been correlated with weight gain. The chances of a castrated animal becoming obese is twice as often a regular cat, considering the hormonal changes caused by the absence of the gonads (Wolfsheimer, 1994).

Although weight control depends on a joint action involving both hormones and neurotransmitters, it is also influenced by many other factors, such as specie, breed, age, physical activity and nutritional management. The sexual hormones have an effect on body weight either by trigging the brain satiety and activity centers or indirectly by altering the cellular metabolism (Salmeri et al., 1991a; Salmeri et al., 1991b). The reduction of hormone production after castration and the following decrease of the basal metabolism rate affect the perception of satiety, bringing it to a higher threshold and leading to sedentariness (Nielson et al., 1997). The decrease concentration of estradiol observed in

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neutered cats may be a major factor influencing the increase in food intake (Larsen, 2016). It has been shown that administration of low-dose estradiol (0.5µg) to overweight neutered cats reduced food intake significantly (Cave et al., 2007). All of these metabolic changes provide greater chances to develop obesity in castrated animals. The aim of this study was to evaluate food intake and weight gain in adult cats fed their Maintenance Energy Rrequirement (MER) and 1.5 times their MER after spayed.

MATERIALS AND METHODS

Ethical approval

The Animals Ethics Committee at the Federal University of Rio Grande do Sul, Brasil approved all experimental procedures performed (Protocol number 23.953).

Animals and Requirements

Eleven crossbreed adult female cats were used in this study. All cats were healthy and with an average Body Condition Score (BCS) of 4.5 out of 9 (Laflamme, 1997). The cats were weighed daily and fed with a diet to maintain their BCS between 4 and 5 (Table 1). During 15 days previous to ovariectomy, the cats were monitored to determine their MER (kcal/day) (NRC, 2006), and the alometric factor (kcal/kg^0.67) was calculated to maintain each cat within its ideal body weight. After the ovariectomy procedure, cats were divided randomly into two groups: group 1, composed of 6 cats, fed the same MER achieved before ovariectomy; and group 2, composed by 5 cats, fed 1.5 times their MER. Over 30 days after the ovariectomy, food intake (g), body weight (kg) and BCS were recorded daily. Food was given twice a day (08:00 a.m. and 17:00 p.m hours), and the cats were fed individually. The cats were kept in individual cages located in a controlled environment, and between the two meals they were released into a collective area for exercise. During the night all cats were kept in an individual cage.

Table 1. Ingredients and chemical composition of experimental diet

Analyzed chemical composition at dry matter (DM) of diet	
Humidity, %	12.4
Ash, %	7.00
Crude Protein, %	31.7
Acid hydrolized fat, %	10.4
Crude fiber, %	2.30
Gross Energy, kcal/kg	4,949
Metabolizable Energy measured , kcal/kg	3,901

[1]Ingredients of basal diet: corn grain, 10.4 %; brewers rice, 30.5 %; corn gluten meal 10.0; full-fat rice bran 12,0 %; poultry byproducts meal 28.0 %; bovine meat and bone meal 3,5%; poultry fat 2,0 %; salt 0.7%; meat hydrolyzate 0.2 %; yucca extract 0.03 %; phosphoric acid 0.47%; vitamin/mineral premix 0.4 %. Premix composition per kg: vitamina A (10,800 IU), vitamin D3 (980 IU), vitamin E (60 mg), vitamin K3 (4.8 mg), vitamin B1 (8.1 mg), vitamin B2 (6.0 mg), vitamin B6 (6.0 mg) 12 vitamin (30 mcg), pantothenic acid (12 mg), niacin (60 mg), folic acid (0.8 mg), biotin (0.084 mg), manganese (7.5 mg), zinc (100 mg), iron (35 mg), copper (7.0 mg), cobalt (10 mg), iodine (1.5 mg), selenium (0.36 mg), choline (2400 mg), taurine (100 mg) antioxidant BHT (150 mg).

Statistical Analysis

The average values were compared according to the paired *t* test from SAS 9.4 (SAS Institute Inc., Cary, NC, USA) with $P < 0.05$. The BCS values were analyzed by the nonparametric Kruskal-Wallis test ($P < 0.05$).

RESULTS AND DISCUSSION

Before the ovariectomy procedure, all cats maintained a stable body weight allowing the calculation of MER (kcal/day) for each cat, which was used to calculate their food supply in the next period, after the ovariectomy. In this period, cats from both groups had gained weight (Table 2). In group 1, the ovariectomy had affected neither the food nor ME intake and alometric factor, demonstrating that the food supply had been controlled efficiently. Nonetheless, the cats gained weight during the 30 days after ovariectomy, without changing the BCS. The cats had gained an average of 103 g, which represents an increase of 4% over their initial body weight, even under restricted food supply. This effect can be directly attributed to castration. However, this study does not allow us to estimate the ideal restriction of ME that had enabled spayed cats to maintain their initial body weight. Mitsuhashi et al. (2011) found a reduction on the MER of 25% of NRC recommendation for adult cats to maintain BW after being spayed.

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Table 2. Food intake, maintenance energy requirement (MER), alometric factor (AF), body weight (BW) and the average body score condition (BSC) from group 1 and 2 before and after ovariectomy

Items	Group 1[1]			Group 2[2]		
	Before spaying[3]	After spaying[4]	P-value	Before spaying[3]	After spaying[4]	P-value
Food intake (g)	53.8	52.8	0.3046	55	74.2	0.0008
MER (kcal/dia)	178	176	0.7367	185	237	0.0084
AF[5] (kcal/kg$^{0.67}$)	90.4	86.3	0.1641	87.5	105	0.0233
BW (kg)	2.80	2.9	0.0209	3.11	3	0.0022
BCS[6]	4.8	4.8	0.4500	5.2	5.1	0.4000

[1]The cats received the amount of diet corresponding to their MER before and after ovariectomy. (MER = alometric factor* PV^0.67), n = 6 cats; [2]The cats received the amount of diet corresponding to their MER and to 1.5 MER before ovariectomy and after ovariectomy, respectively, n = 5 cats; [3]Before ovariectomy = period of 15 days prior to ovariectomy; [4]After ovariectomy = period of 30 days after ovariectomy; [5]Alometric fator; [6] Kruscall-Wallis Test P > 0.05.

A significant difference had been observed in food intake, ME intake, body weight and alometric factor ($P < 0.05$) in cats fed 1.5 times their MER after ovariectomy. Cats gained an average of 230 g after ovariectomy, which represents an increase of 7.5% over their initial body weight, showing the importance of controlling energy intake in spayed cats. This result is in agreement with that found in male cats by Wei et al. (2014), who observed a post-castration weight gain in cats fed *ad libitum* due to higher food intake with no changes on energy expenditure after castration. Cats naturally gain weight after being spayed, and offering more food than the required will permit overconsumption, which increases the risk of obesity. Choosing a specific diet might be a path to reduce the energy intake when food intake is not controlled. Specific diets for spayed cats can be formulated by decreasing the energy density, using sources of fibers and low energy feeds. Also, another strategy for reducing dietary energy density could be via addition of water to dry food (Alexander et al., 2014). At the Nutritional Guidelines for Complete and Complementary Pet Food for Cats and Dogs (FEDIAF, 2013), it is possible to find current information about how to meet the animal nutrient requirement when alometric factor has been reduced, decreasing the risk of nutritional deficiencies. Increasing physical activity, when used in combination with a diet management, contributes to maintaining an optimal body weight.

CONCLUSION

Spayed cats gain weight when they keep being fed with the same amount of food after an ovariectomy. Furthermore, spayed cats have no control on food consumption, and, as a consequence, tend to overeat, if food is available. The weight gain is progressive, and cats tend to become overweight or obese if food consumption is not controlled.

Competing interests

The authors have no competing interests to declare.

Author`s contribution

The authors Geruza S. Machado and Júlia G. Pezzali were responsible for collection and tabulation of data, experimental management of the cats, as well as the article writing. The authors Carlos Ongaratto, Bruna Schoroeder e Lucas M. Villela were responsible for collection and tabulation of data, experimental management of animals and review of the manuscript. The author Luciano Trevizan guided the project, wrote and revised the manuscript.

REFERENCES

Alexander JE, Colyer A and Morris PJ (2014). The effect of reducing dietary energy density via the addition of water to a dry diet, on body weight, energy intake and physical activity in adult neutered cats. England, 3:1-5. doi:10.1017/jns2014.22.

Banfield Pet Hospital (2012) State of Pet Health Report. https://www.banfield.com/Banfield/media/PDF/Downloads/soph/Banfield-State-of-Pet-Health-Report_2012.pdf Accessed May 28th, 2016.

Bland IM, Guthrie-Jones A, Taylor RD and Hill J (2010). Dog obesity: veterinary practices and owners opinions on cause and management. Preventive Veterinry Medicine, 94:310-315, 2010. doi: 10.1016/j.prevetmed.2010.01.013.

Brunetto MA, Sandra N, Fabiano CS, Peixoto M, Vasconcellos RS, Ferraudo AJ and Carciofi AC (2011). Correspondência entre obesidade e hiperlipidemia em cães. Ciência Rural, 41(2): 266-271.

Cave NJ, Backus RC, Marks SL, Klasin KC. 2007. Oestradiol and genistein reduce food intake in male and female overweight cats after gonadectomy. New Zealand Veterinary Journal, 55: 113–119.

Laflamme D (1997). Development and validation of a body condition score system for dogs. Canine Practice, 4:10-15.

Larsen JA, (2016). Risk of Obesity in the neutered cat. Journal Of Feline Medicine and Surgery. England, 1-5. doi: 10.1177/1098612X16660605jfms.com

Lazzaroto JJ (1999). Relação entre aspectos nutricionais e obesidade em pequenos animais. [Internet] Revista Universidade Alfenas, 5: 33-35. Available from: [http://www.unifenas.br/pesquisa/download/ArtigosRev1_99/pag33-35.pdf]. Acessed June 3rd, 2016.

Mitsuhashi Y, Chamberlin AJ, Bigley KE and Bauer JE (2011). Maintenance energy requirement determination of cats after spaying. British Journal of Nutrition, 106:135-138. doi:10.1017/S0007114511001899

National Research Council (2006). Nutrient requirements of dogs and cats. Washington, DC: National Academies Press.

Nielson JC, Eckstein RA and Hart BL (1997). Effects of castration on problem behaviors in male dogs with reference to age and duration of behavior. Journal of the Americal Veterinary Medical Association, 211:180–182.

Salmeri KR, Olson PN and Bloomberg MS (1991a). Elective gonadectomy in dogs: a review. Journal of the Americal Veterinary Medical Association, 7:1183-1192.

Salmeri KR, Bloomberg MS, Scruggs SL and Shille V (1991b). Gonadectomy in immature dogs: effects on skeletal, physical and development. Journal of the Americal Veterinary Medical Association, 7: 1193-1203.

The European Pet Food Industry – FEDIAF (2013). Nutritional Guidelines for Complete and Complementary Pet Food for Cats and Dogs. Bruxelas.

Wei A, Fascetti AJ, Kim K, Lee A, Graham JL, Havel PJ and Ramsey JJ (2014). Early Effects of Neutering on Eergy Expenditure in Adult Male Cats. PlosOne, San Francisco, v9. doi: https://doi.org/10.1371/journal.pone.0089557

Wolfsheimer KJ (1994). Obesity in dogs. The Compendium on Continuing Education for the Practicing Veterinarian, Trentonv, 16(8): 981 – 997.

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