


NUTRIÇÃO DE ANIMAIS CASTRADOS: O QUE MUDA?

MV. Dr^a. Camila Goloni
Pós doutoranda no Laboratório de Pesquisa
em Nutrição e Doenças Nutricionais de
Cães e Gatos – FCAV/Unesp





NUTRIÇÃO DE ANIMAIS CASTRADOS: O QUE MUDA?

Castração

- **Hormônios sexuais**

Diferenças Metabólicas

- **Castrado e Inteiros**

Nutrientes

- **Gordura**
- **Amido**
- **Proteína**
- **Fibra**

CASTRAÇÃO ELETIVA

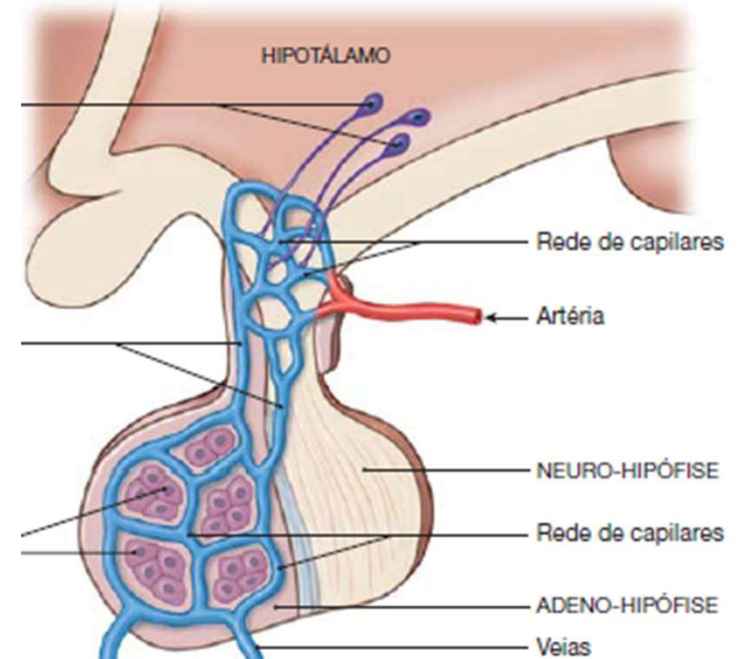
Método cirúrgico contraceptivo

- ✓ **Fêmeas:** retirada dos ovários ou ovários e útero
- ✓ **Machos:** retirada dos testículos



↓ Estrógenos

↓ Testosterona



LH e FSH

PARA OS ORGÃOS-ALVO

LH e FSH



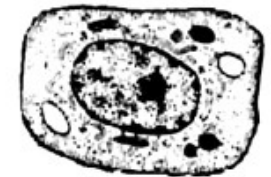
Estrógenos

Testosterona

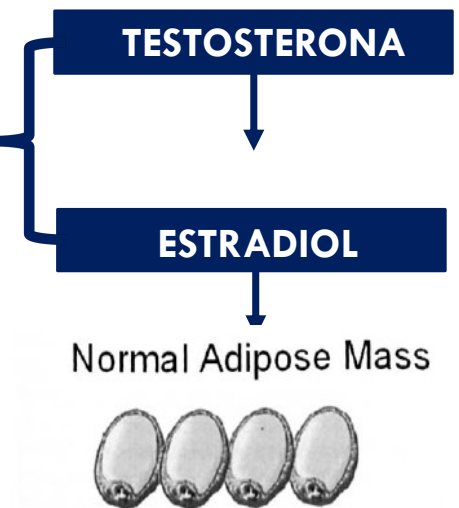
HORMÔNIOS SEXUAIS

Testosterona

- ✓ Esteróide androgênico
- ✓ **Produção:** pelas Células de Leydig a partir do LH e menor porção no córtex da adrenal
- ✓ **Função:** epitélio secretor de órgãos sexuais, libido, características corporais dos machos, efeito miotrópico (↑MM) (GRIGGS et al., 1989; WOOD & SANTON, 2012)
- ✓ Testosterona na células de Sertoli é convertida em estrogênios



Célula de Leydig



HORMÔNIOS SEXUAIS

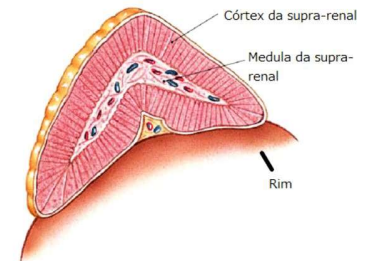
Estrogênios

✓ Estradiol e Estrona

✓ Produção:

- ✓ Células da granulosa nos ovários (FSH)
- ✓ Córtex da adrenal
- ✓ Testosterona (LH) na teca interna do folículo em desenvolvimento

- ✓ **Função:** reprodutiva, interrompe o crescimento de ossos longos na linha epifisária, regula adipogênese



Role of Estrogens in Adipocyte Development and Function

PAUL S. COOKE*, †¹ AND AFIA NAAZ*

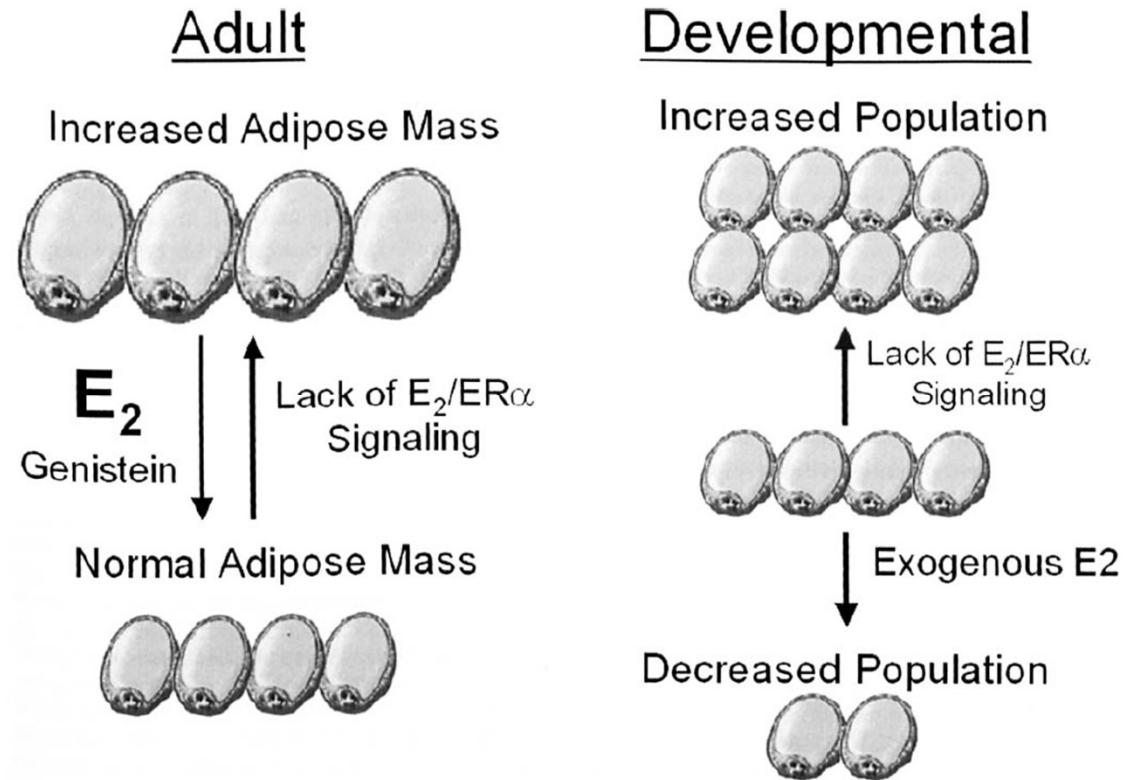
*Department of Veterinary Biosciences and †Division of Nutritional Sciences,
University of Illinois at Urbana-Champaign, Urbana, Illinois 61802

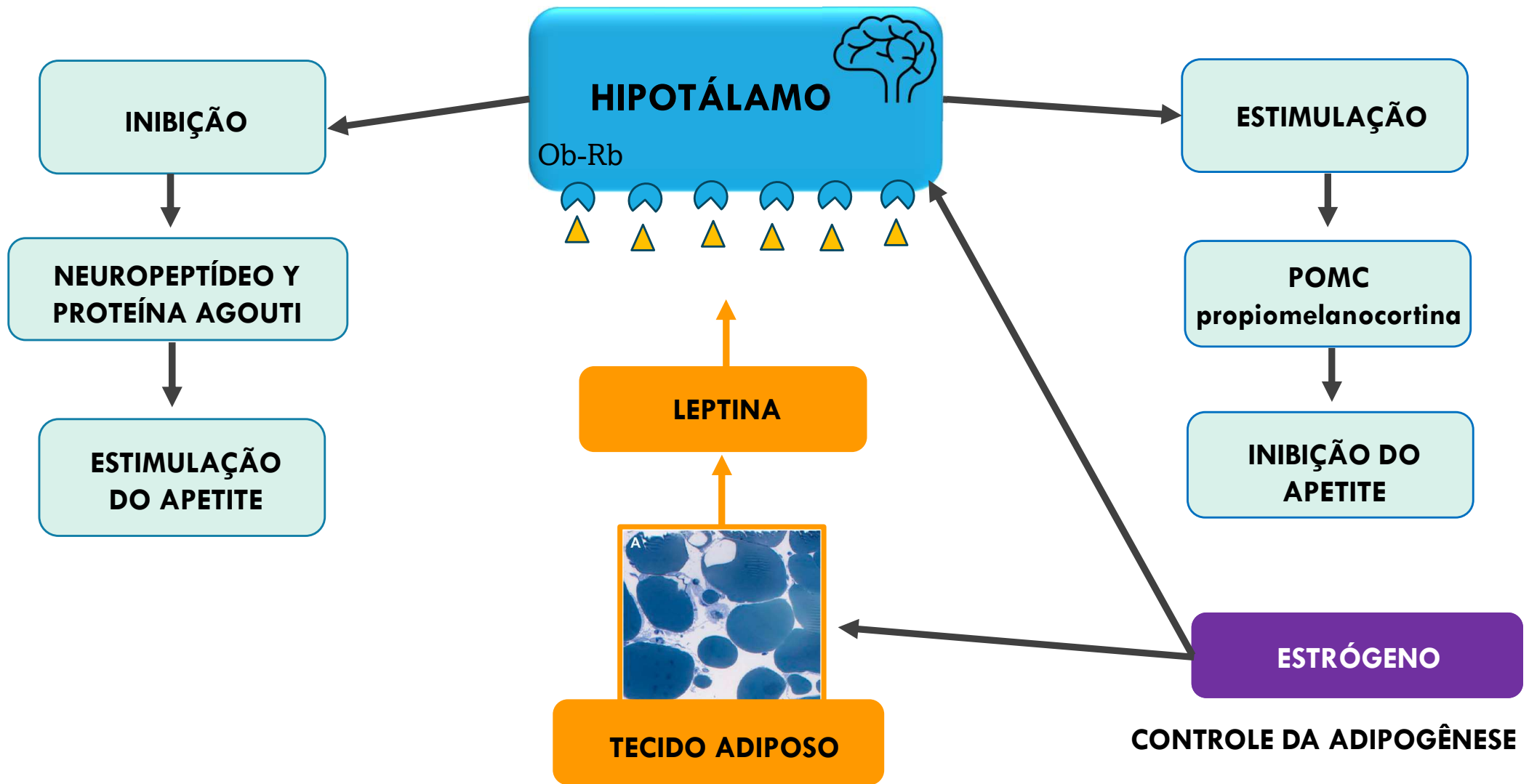
Estradiol (E2)

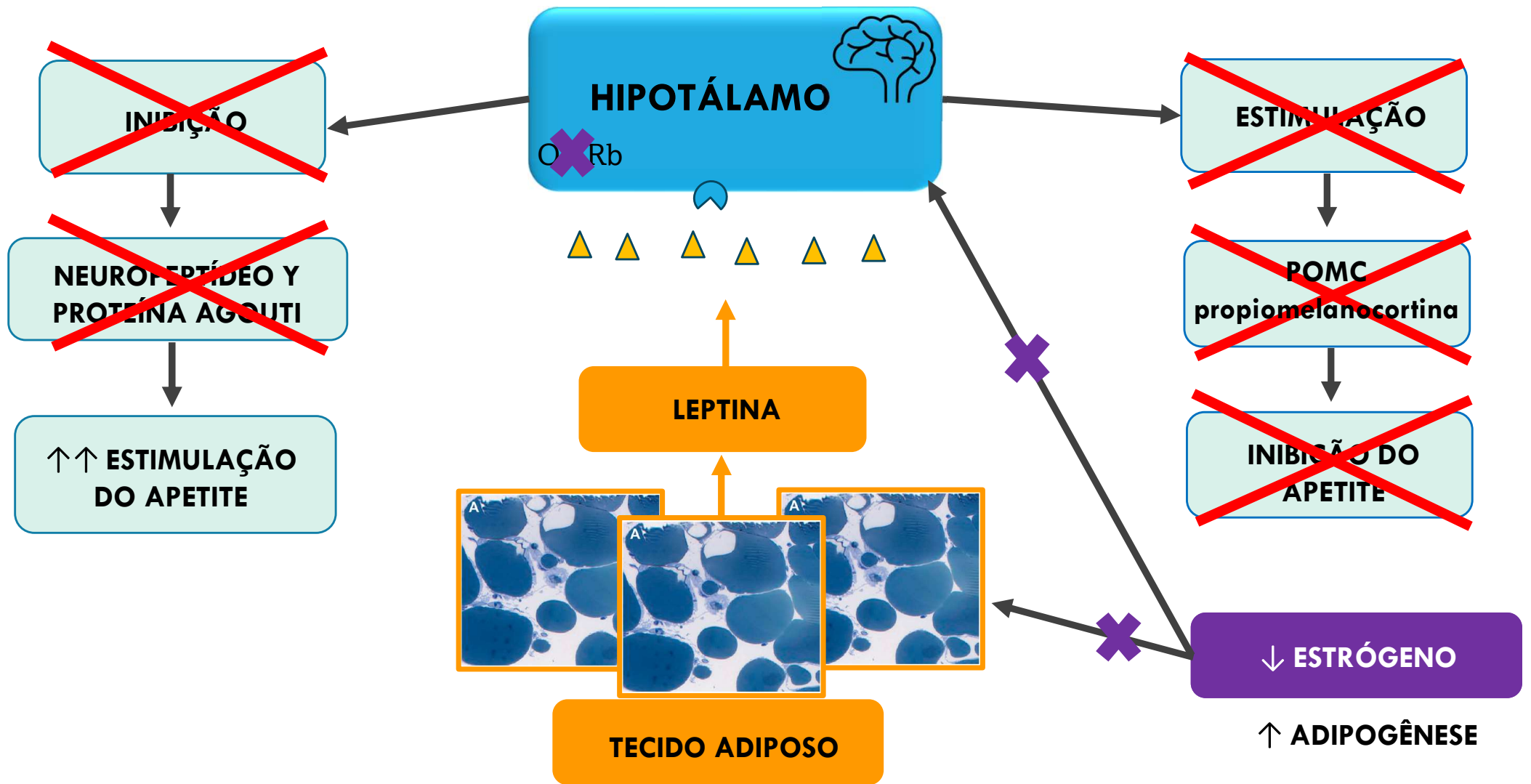
- ↓ Lipogênese: ↓ lipoproteína lipase (LPL): regula a captação de lipídios pelos adipócitos

Ovariectomia

- ↑ **LPL**: deposição de lipídios nos adipócitos
- ↓ **Estrógeno**: ↓ receptor de Leptina no hipotálamo (Ob-Rb)







A photograph of a grey and white cat nuzzling a golden retriever dog. The cat is on the left, standing and leaning towards the dog. The dog is lying down on the right, looking towards the cat. The background is a plain, light-colored wall. The overall tone is soft and intimate.

EFEITOS METABÓLICOS DA CASTRAÇÃO EM CÃES E GATOS



ORIGINAL ARTICLE

Effect of ovariectomy and *ad libitum* feeding on body composition, thyroid status, ghrelin and leptin plasma concentrations in female dogs*

I. Jeusette^{1,†}, S. Daminet², P. Nguyen³, H. Shibata⁴, M. Saito⁵, T. Honjoh⁴, L. Istasse¹ and M. Diez¹

1 Animal Nutrition Unit, Faculty of Veterinary Medicine, University of Liège, Belgium,

2 Department of Medicine and Clinical Biology of Small Animals, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium,

3 Nutrition and Endocrinology Unit, National Veterinary School of Nantes, France,

4 Morinaga institute of Biological Science, Shimosueyoshi, Tsurumi-ku, Yokohama, Kanagawa, and

5 Department of Biomedical Sciences, Graduate School of Veterinary Medicine, Hokkaido University, Sapporo, Japan

4 fêmeas Beagle, 2 anos, ECC 5

P0 = 6 semanas antes da ovariectomia

P1 = 6 meses após ovariectomia

P2 = 4 meses – alta energia, **20% EE** (EM 4 kcal/g)

P3 = 1 mês – **16% EE** (EM 4,3 kcal/g)

Manutenção do peso corporal

Ad libitum



**Consumo diminuiu
29% em 6 meses para
manter o peso corporal**

Table 1 Mean body weight, energy intake, ghrelin and leptin concentrations in the four spayed female Beagle dogs during phase 1, 2 and 3*

	Body weight (kg)	FFM (kg)	FM (kg)	Energy intake (kJ/kgIBW ^{0.75})	Ghrelin (pg/ml)	Leptin (ng/ml)
★ P0						
Weeks 6-0	14 ± 0.3 ^a	ND	ND	807 ± 13 ^b	ND	ND
Day 0	13.6 ± 0.8 ^a	9.4 ± 0.6 ^a	4.2 ± 0.2 ^b	ND	ND	ND
★ P1						
Months 0-6	13.7 ± 0.1 ^a	ND	ND	573 ± 13 ^a	3513 ± 773 ^a	ND
Month 0	13.6 ± 0.8 ^a	ND	ND	ND	3480 ± 1220 ^a	ND
Month 6	13.6 ± 0.8 ^a	10.8 ± 0.4 ^b	2.7 ± 0.5 ^a	ND	3546 ± 1142 ^a	4.8 ± 2.1 ^a ★
★ P2						
Months 7-11	15.7 ± 0.3 ^b	ND	ND	912 ± 13 ^b	7222 ± 3184 ^a	ND
Month 7	14.8 ± 0.5 ^a	ND	ND	1033 ± 21 ^c	13400 ± 4666 ^b	ND
Month 10	16.7 ± 0.7 ^b	ND	ND	820 ± 29 ^b	1047 ± 320 ^a	10.7 ± 4.4 ^b
★ P3						
Month 12	17.8 ± 0.6 ^c	10.9 ± 0.5 ^b	6.9 ± 0.8 ^c	862 ± 17 ^b	867 ± 188 ^a	10.9 ± 3.7 ^b

FFM, fat free mass; FM, fat mass; IBW, ideal body weight; ND, not determined.

*Data are expressed as mean ± standard error of the mean.

^{a,b,c}Differing letters indicate significant ($p < 0.05$).

Ad libitum: ↑ PC, 30% MG e consumo de energia

Ad libitum: ↑ Leptina



Ad libitum feeding following ovariectomy in female Beagle dogs: effect on maintenance energy requirement and on blood metabolites

By I. JEUNETTE¹, J. DETILLEUX², C. CUVELIER¹, L. ISTASSE¹ and M. DIEZ¹

J. Anim. Physiol. a. Anim. Nutr. 88 (2004), 117–121

Table 2. Mean values of plasma cholesterol, triglycerides, glucose and insulin at the end of the transition period between periods II and III and during period III, expressed as mean \pm standard error of the mean

	End of the transition period High energy diet at maintenance level	Period III High energy diet <i>ad libitum</i>	Reference values (KANEKO et al., 1997)
Cholesterol (mmol/l)	5.22 \pm 0.33	5.07 \pm 0.15	3.5–6.99
Triglycerides (mmol/l)	<u>0.42 \pm 0.08</u>	<u>0.63 \pm 0.05</u>	0.2–1.3
Glucose (mmol/l)	5.92 \pm 0.06	5.86 \pm 0.11	3.61–6.55
Insulin (pmol/l)	<u>56.10 \pm 8.71</u>	<u>85.79 \pm 6.09</u>	36–144

Sem alterações significativas nos parâmetros avaliados



Plasma oestrogen changes in adult male cats after orchietomy, body-weight gain and low-dosage oestradiol administration

Robert Backus*

Department of Veterinary Medicine and Surgery, College of Veterinary Medicine, University of Missouri, A384 Clydesdale Hall, 900 East Campus Drive, Columbia, MO 65211, USA

♂ N = 6; 1,3–1,6 anos; 4,3–7,1 kg; Alimento extrusado, EM 4,27 kcal/g

Table 1. Effects of orchietomy (OX), oestrogen replacement and *ad libitum* consumption of diet on study outcomes in adult male cats (Mean values with their standard errors, n 6)

Condition/treatment	3 semanas		Trial 1 6 semanas				Trial 2 8 semanas			
	Pre-OX		Vehicle		E ₂		Restricted		Ad libitum	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Body weight (kg)	5.2	0.3	5.3	0.4	5.4	0.3	5.7	1.0	6.1*	0.4
Body fat mass (%)	21.9	0.5	ND	ND	ND	ND	22.8	3.2	28.7†	2.0
Food intake (kJ/kg per d)	314	10	292	17	264	9	218	13	261‡	17
Plasma E ₂ (pg/ml)	4.3	1.0	2.1‡	0.3	3.8§	0.5	2.1	0.5	2.9	0.7
Plasma E ₁ (pg/ml)	32.0	8.3	27.6	8.0	27.8	8.1	21.2	7.2	22.6	6.9

E₂, estradiol; ND, not determined; E₁, estrone.

*Mean value was greater than the restricted values ($P=0.01$).

†Tended to be greater than the restricted values ($P=0.09$).

‡Less than the pre-OX values ($P=0.04$).

§Tended to be greater than the vehicle value ($P=0.02$).

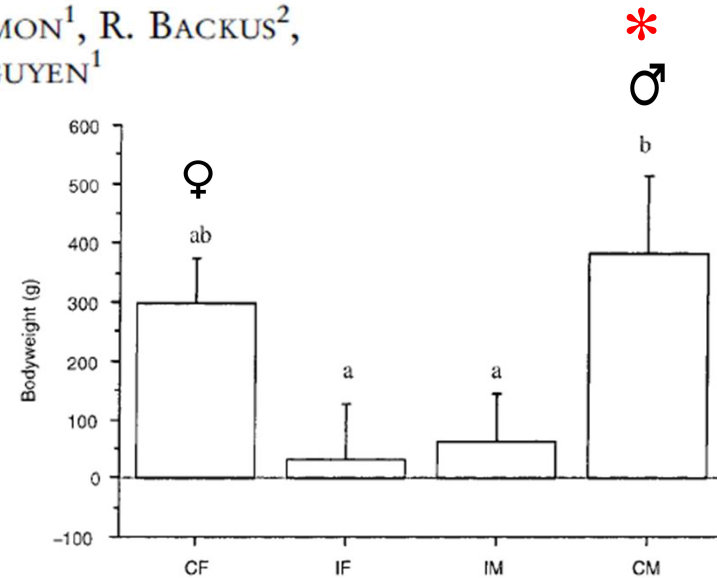
PC e MG: ↑ no consumo *ad libitum* mesmo com ingestão menor comparado ao pre-OX



Leptin, body fat content and energy expenditure in intact and gonadectomized adult cats: a preliminary study

By L. MARTIN¹, B. SILIART¹, H. DUMON¹, R. BACKUS²,
V. BIOURGE³ and P. NGUYEN¹

N = 42; Idade 19.5 ± 3 meses; PC 4,5 ± 0,1
21 females: 12 inteiras e 9 castradas,
21 machos: 11 inteiros e 10 castrados
 Alimento extrusado *ad libitum* por 6 meses



	Body fat (% BW)	Leptin (ng/ml)
Intact males	<u>23.8 ± 1.0 a</u>	<u>2.5 ± 0.2 a</u>
Intact females	<u>30.1 ± 1.7 b</u>	<u>4.2 ± 0.9 ab</u>
Neutered males	<u>32.9 ± 1.7 bc</u>	<u>4.7 ± 0.5 b</u>
Neutered females	<u>35.5 ± 1.8 c</u>	<u>6.7 ± 0.5 c</u>

Mean values of the same column sharing the same letter are not significantly different (p < 0.05)

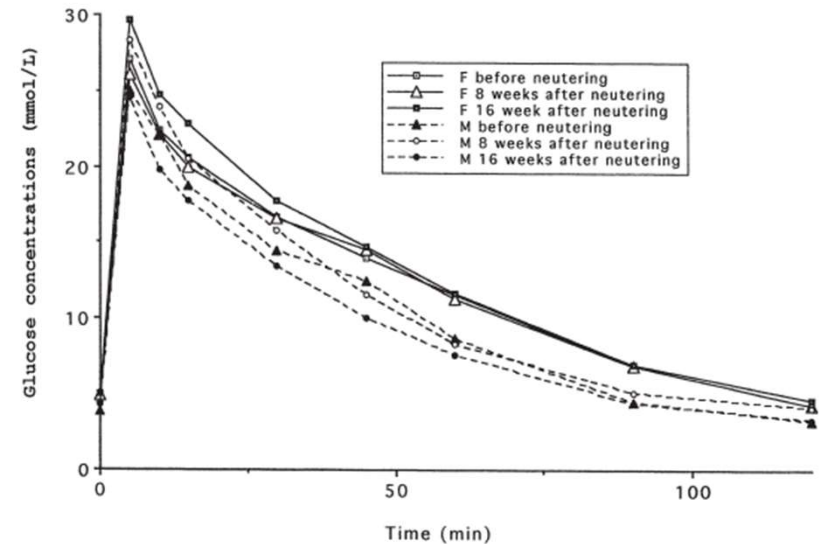


Effects of neutering on hormonal concentrations and energy requirements in male and female cats

Margarethe Hoenig, Dr med vet, PhD, and Duncan C. Ferguson, VMD, PhD

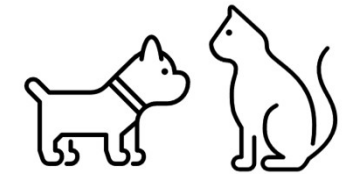
- 10 machos e 10 fêmeas adultos
- 4 semanas antes e 4, 8 e 16 semanas após castração
- Alimento extrusado para peso constante

Cats	Time	Body weight (kg)	Body mass index (kg/m ²)	Caloric intake (kcal/kg)
Males	Before neutering	4.0 ± 0.6 ^a	42.0 ± 2.8 ^e	68.3 ± 4.6
	4 weeks after	4.0 ± 0.6 ^b	ND	68.2 ± 4.6
	8 weeks after	4.1 ± 0.7 ^c	41.1 ± 3.1	69.5 ± 9.5 ^f
	16 weeks after	4.0 ± 0.6 ^d	40.4 ± 5.4	58.5 ± 15.6 ↓15%
Females	Before neutering	3.4 ± 0.3 ^a	37.6 ± 2.9 ^e	65.6 ± 4.1
	4 weeks after	3.4 ± 0.4 ^b	ND	67.9 ± 2.5 ^{g,h}
	8 weeks after	3.5 ± 0.4 ^c	38.8 ± 3.3	60.1 ± 6.1 ^{f,g}
	16 weeks after	3.4 ± 0.4 ^d	37.0 ± 3.9	57.0 ± 7.7 ^h ↓13%



Glicose semelhante (P>0,05)

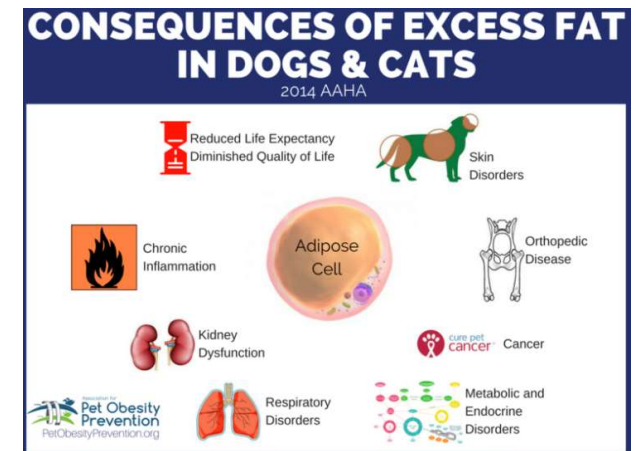
EFEITOS DA CASTRAÇÃO

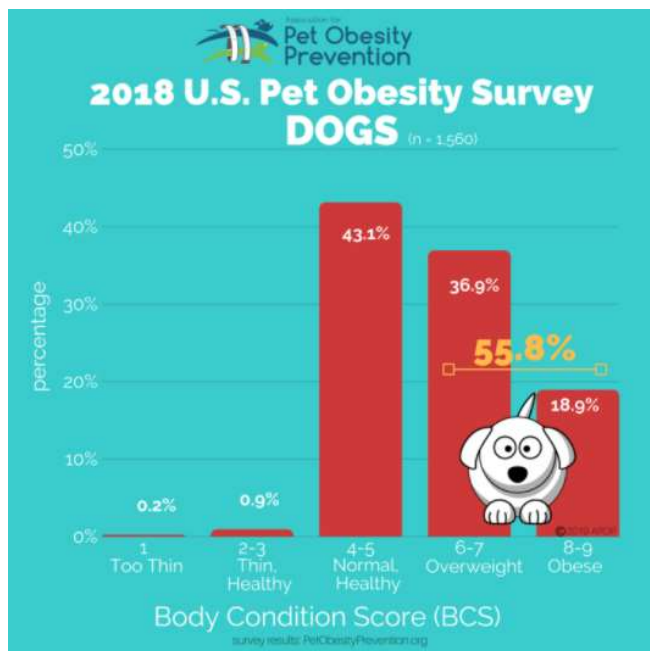


Sistema alimentar: Ad libitum

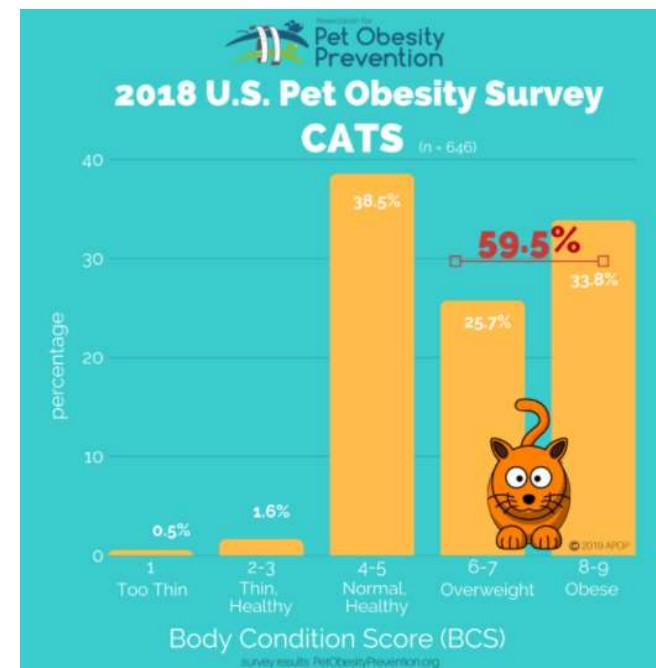
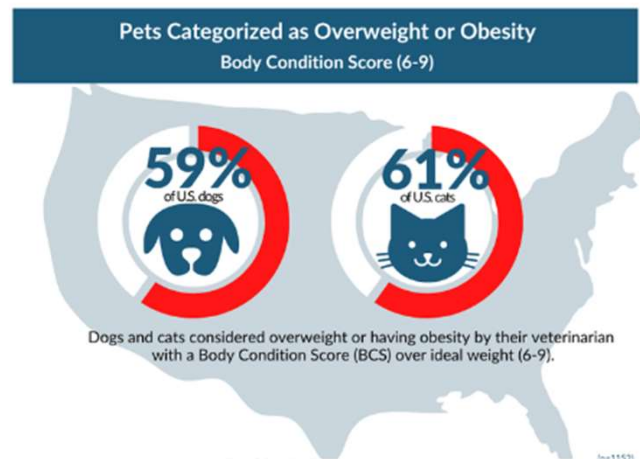
- **Composição corporal:** ganho de peso corporal com ↑ de massa gorda
- **Metabolismo energético:** para manutenção do peso corporal, o consumo alimentar e a taxa metabólica ↓
- **Aumento do apetite:** ↓ estradiol = ↑ adipogênese
 - Leptina ↑ com aumento MG = estradiol inibe os receptores para leptina no SNC
- **Metabolismo de glicose e insulina:** normais (referência)
 - Insulina maior após castração (numericamente)
 - Período em meses de avaliação

Obesidade





Pet Obesity Prevalence Survey 2022



PREVALÊNCIA DA OBESIDADE

PREVALÊNCIA DA OBESIDAD



DADOS DE 2018

DOGS			CATS		
n = 1560			n = 646		
Median Age = 6.5 years			Median Age = 7.4 years		
BCS (1 to 9)			BCS (1 to 9)		
1 to 3	17	1.1%	1 to 3	13	2.1%
4 to 5	672	43.1%	4 to 5	249	38.5%
6 to 7	576	36.9%	6 to 7	166	25.7%
8 to 9	295	18.9%	8 to 9	218	33.8%
Male	5%	★	Male	4%	★
Male neutered	47.6%		Male neutered	43.6%	
Female	7.2%	★	Female	5.8%	★
Female spayed	40.2%		Female spayed	46.6%	

Prevalence of canine obesity in the city of São Paulo, Brazil

Mariana Yukari Hayasaki Porsani¹, Fabio Alves Teixeira¹, Vinicius Vasques Oliveira¹, Vivian Pedrinelli¹, Ricardo Augusto Dias¹, Alexander James German² & Marcio Antonio Brunetto¹✉

Scientific Reports | (2020) 10:14082 |
<https://doi.org/10.1038/s41598-020-70937-8>

- Sexo – fêmeas
- **Estado reprodutivo – animais castrados**
- Visitas ao veterinário
- Frequência do alimento
- Fornecimento de petiscos

Cães com sobrepeso e obesos 40,5%

PREVALÊNCIA DA OBESIDADE — BRASIL



CASTRAÇÃO E NUTRIENTES



Effect of sterilization and of dietary fat and carbohydrate content on food intake, activity level, and blood satiety-related hormones in female dogs¹

S. Schauf,* A. Salas-Mani,† C. Torre,† G. Bosch,‡ H. Swarts,§ and C. Castrillo*²

Table 1. Ingredient and chemical composition of the experimental diets

Item	Diets ¹	
	HC	HF
Analyzed chemical composition, g/kg DM		
Ash	77.5	78.7
CP	269.0	307.0
Ether extract	105.0	213.0
Crude fiber	82.7	78.9
Nitrogen-free extractives ³	465.8	322.4
Starch	313.0	191.0
Total dietary fiber	226.0	211.0
Insoluble dietary fiber	198.0	174.0
Soluble dietary fiber	28.2	37.3
Energy content, MJ/kg DM		
GE ⁴	20.0	22.8
ME ⁵	14.8	16.9

3,5 kcal/g **4,0 kcal/g**

12 fêmeas inteiras, 2 a 6 anos, ECC 5,3 ±0,3

SG: grupo castrado

CG: grupo controle

Fase I antes castração

Fase II após castração (SG)

Experimento: 6 meses

Fase 1 = 74 dias – início do verão

Fase 2 = 84 dias

Effect of sterilization and of dietary fat and carbohydrate content on food intake, activity level, and blood satiety-related hormones in female dogs¹

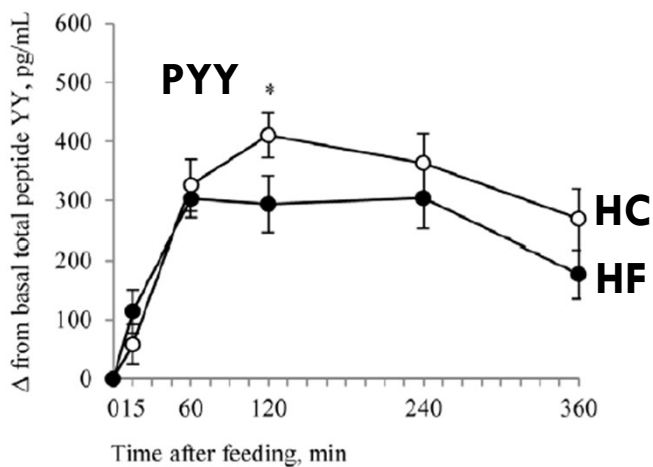
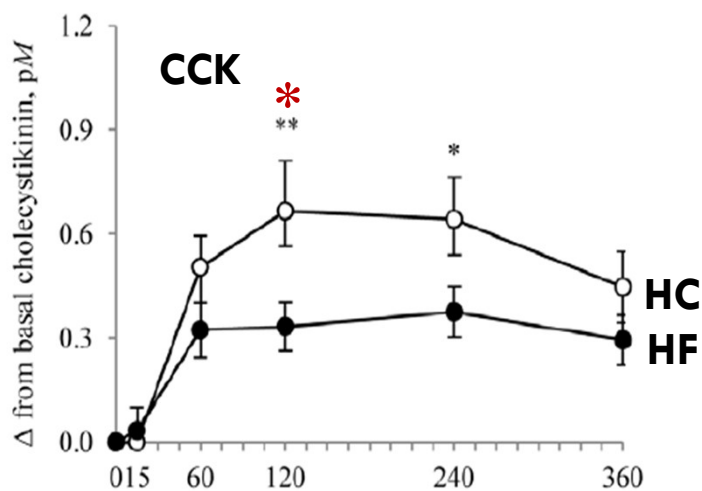
S. Schauf,* A. Salas-Mani,† C. Torre,† G. Bosch,‡ H. Swarts,§ and C. Castrillo*²

Item	Diet ²		Sterilization ³				SED ⁴	SED ⁵	P-value ⁶		Group × phase
	HC	HF	CG		SG				Diet	Phase	
			Ph.I	Ph.II	Ph.I	Ph.II					
DMI, g/kg BW ^{0.75}	47.7	55.5	46.2	50.6	52.4	57.1	3.7	5.7	0.044	0.056	0.973
★ ME intake, kJ/kg BW ^{0.75}	671	940	719	795	817	887	61	86	<0.001	0.057	0.960
ChFI, ⁷ g/kg BW ^{0.75}	44.2	41.2	35.0	46.6	34.8	54.4	2.7	3.8	0.279	<0.001	0.147
★ Activity, counts/min	211	188	147	228	200	223	11	17	0.057	<0.001	0.022

Castrados ↓ atividade

+ 81

+ 23



Efeito de saciedade não diferiu entre dietas após 4 horas do consumo

Grelina e Insulina sem efeito entre dietas

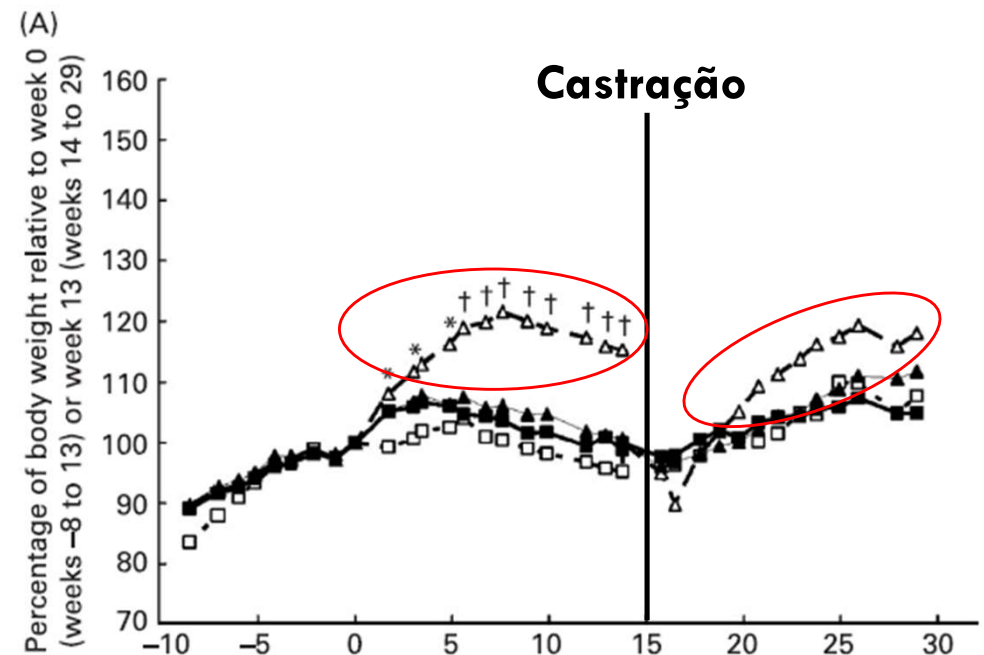


Gonadectomy and high dietary fat but not high dietary carbohydrate induce gains in body weight and fat of domestic cats

Robert C. Backus^{1*}, Nick J. Cave² and Duane H. Keisler³

British Journal of Nutrition (2007), 98, 641–650

	Diet				
	Adaptation	1	2	3	4
DM (w/w %)					
Carbohydrate	40.5	4.0	56.4	44.8	27.3
Fat	12.0	40.0	4.0	12.0	24.0
Protein	40.0	46.8	32.7	35.8	40.5
ME (kJ/kJ %) [†]					
Carbohydrate	37.7	2.8	57.0	41.3	22.2
★ Fat	25.1	★63.5	9.1	24.9	44.0
Protein	37.7	33.0	33.0	33.0	33.0
ME density (kJ/g) [‡]					
DM basis	18.0	23.8	16.7	18.0	20.5
As-presented basis	13.0	23.0	12.1	12.5	15.5



↑ gordura na dieta, mas não de carboidratos, induz ganho de peso e ↑ insulina
 Castração ↑ sensibilidade ao ganho de peso induzido pela gordura dietética



Effect of dietary protein intake on the body composition and metabolic parameters of neutered dogs

Iris Mayumi Kawauchi¹, Juliana Tolo Jeremias¹, Paula Takeara¹, Danilo Ferreira de Souza¹, Júlio Cesar de Carvalho Balieiro², Karina Pfrimer³, Marcio Antonio Brunetto² and Cristiana Fonseca Ferreira Pontieri^{1*}

14 cães adultos: 9 machos e 5 fêmeas (diferentes raças)

- 59,7 g proteína/1000 kcal
 - 94,0 g proteína/1000 kcal
 - 26 semanas após castração
- Manutenção do peso

Glucagon

■ P60 inicial 63,8 → 53,7 pg/mL (P = 0,04)

■ P94 se manteve, final 69,1 pg/mL *

IGF-1: ↓ após castração (P=0,008)

→ Leptina, frações lipídicas, glicose, insulina (P>0,05)

Consumo de alimento com proteína elevada foi benéfico para cães após a castração

Fat body mass (kg)					
★ P60	1.9	0.57	2.3	0.57	0.009
P94	1.6	0.52	1.8	0.52	0.760
P	0.400		0.037		
Fat body mass (%)					
★ P60	14.7	1.52	18.1	1.52	0.026
P94	15.2	1.39	18.1	1.39	0.250
P	0.973		0.430		
Lean body mass (%)					
★ P60	85.3	1.52	81.6	1.52	0.026
P94	84.8	1.39	81.9	1.39	0.250
P	0.973		0.430		

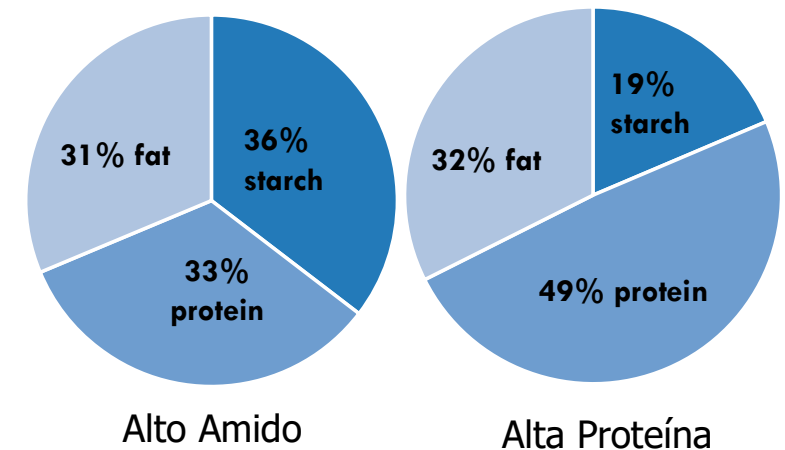


Starch:Protein Ratio in Energy Expenditure and Body Composition in Neutered and Intact Male Cats



Item	Diets			
	High Starch		High Protein	
	Mean	† SD	Mean	† SD
Moisture (%)	5.62	0.44	6.20	0.27
Crude Protein (%)	37.91	0.45	55.87	0.56
Fat (%)	14.69	0.78	15.66	0.11
Starch (%)	40.28	0.48	20.56	1.30
Crude Fiber (%)	1.81	0.19	1.31	0.03
Ash (%)	6.29	0.53	7.25	0.31
Metabolizable Energy (kcal/g)	3,9		4,0	

Energy Distribution



- **Cross-over design, 4 months of each diet intake**
- **Ad libitum feeding** as owners already performed

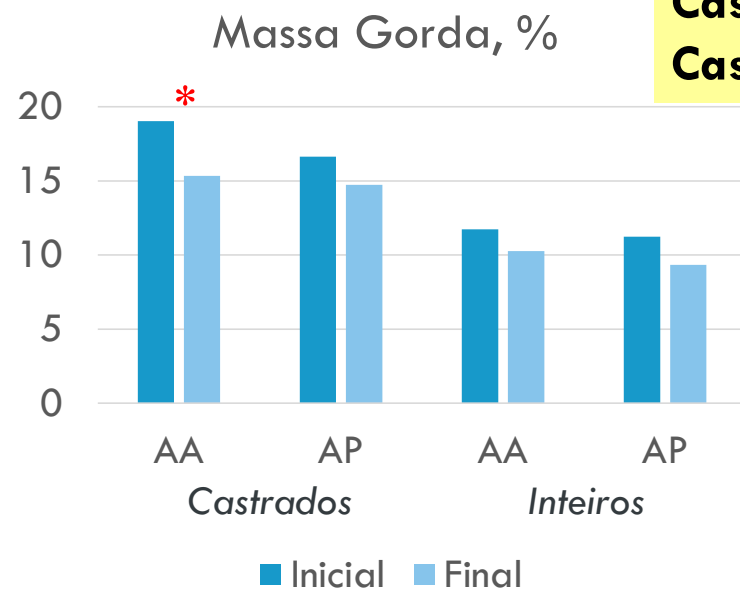
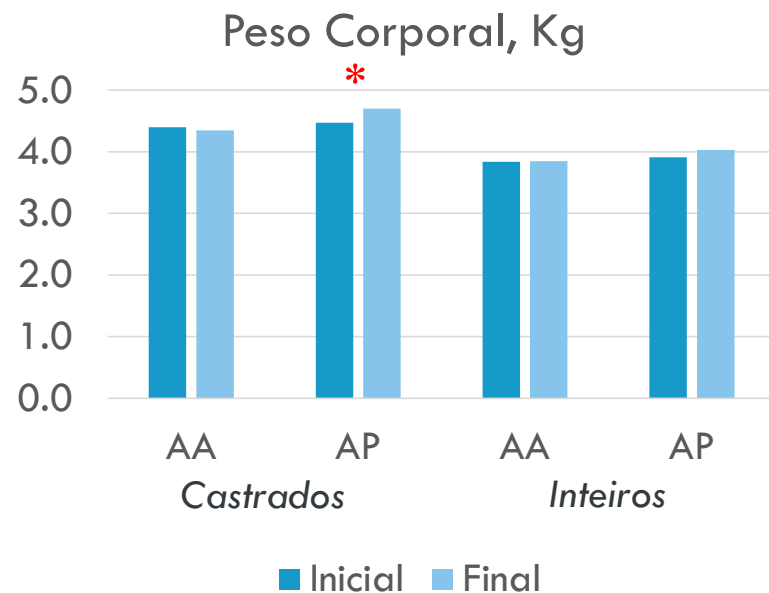
Goloni et al., dados não publicados



Starch:Protein Ratio in Energy Expenditure and Body Composition in Neutered and Intact Male Cats



	Castrados	Inteiros	
Idade	2.2 ± 1.2 anos (n=9)	1.6 ± 0.8 anos (n=10)	(P=0.540)
ECC	5.1 ± 0.5	5.0 ± 0.0	(P=0.999)

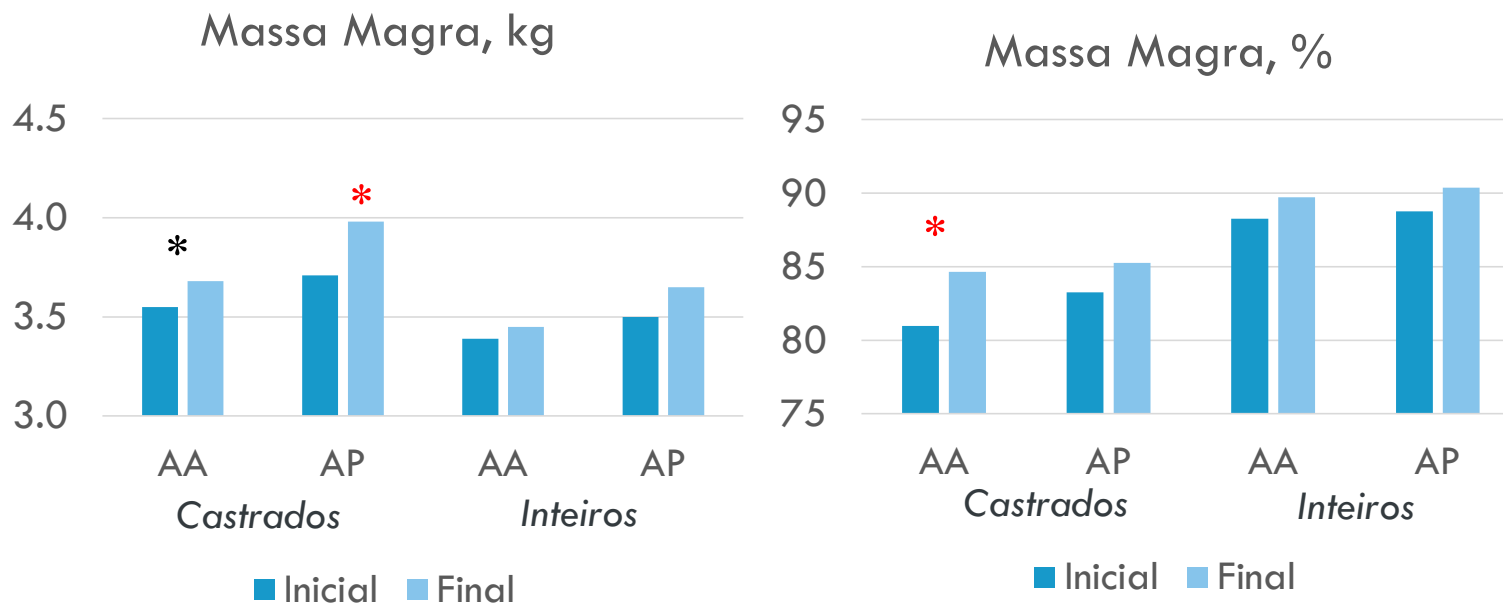


Castrados AA ↑ MM
Castrados AP ↑ MM



Starch:Protein Ratio in Energy Expenditure and Body Composition in Neutered and Intact Male Cats

	<i>Castrados</i>	<i>Inteiros</i>	
Idade	2.2 ± 1.2 anos (n=9)	1.6 ± 0.8 anos (n=10)	(P=0.540)
ECC	5.1 ± 0.5	5.0 ± 0.0	(P=0.999)



Castrados AP ↑ PC
Castrados AA ↓ MG

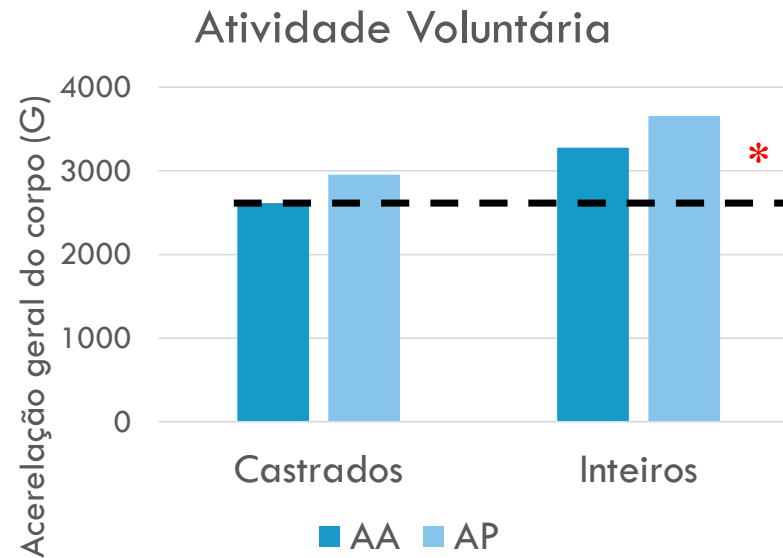
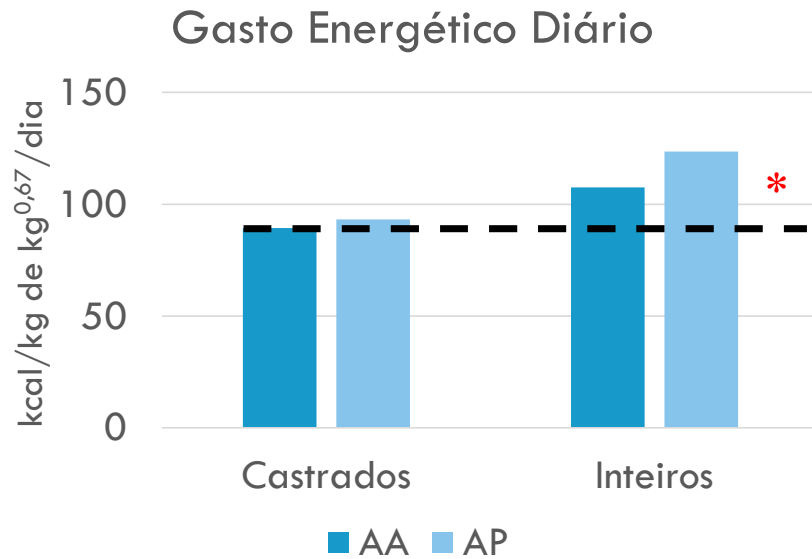


Starch:Protein Ratio in Energy Expenditure and Body Composition in Neutered and Intact Male Cats



	<i>Castrados</i>	<i>Inteiros</i>	
Idade	2.2 ± 1.2 anos (n=9)	1.6 ± 0.8 anos (n=10)	(P=0.540)
ECC	5.1 ± 0.5	5.0 ± 0.0	(P=0.999)

↑ EE e atividade: inteiros
AP tendência a ser maior
comparado a AA



Goloni et al., dados não publicados



Body composition of lean outdoor intact cats vs lean indoor neutered cats using dual-energy x-ray absorptiometry

Journal of Feline Medicine and Surgery
1–6

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Martha G Cline, Angela L Witzel, Tamberlyn D Moyers
and Claudia A Kirk

- ✓ **Gatos Inteiros:** 10 machos e 11 fêmeas
- ✓ **Gatos Castrados:** 10 machos e 6 fêmeas
- ✓ Idade: 1 a 6 anos
- ✓ ECC: 4 e 5

Castrados indoor 22.1% (17.3–28.2%)
Inteiros outdoor 17.3% (10.0–33.6%)
($P = 0.002$)

Gatos inteiros em ambiente outdoor

→ maior atividade e menor MG

High starch intake favours body weight control in neutered and spayed cats living in homes fed *ad libitum*

Camila Goloni^{1*}, Letícia G. Pacheco¹, Letícia W. Luis¹, Stephanie S. Theodoro¹, Lucas B. Scarpim¹, Daniela Dalpubel², Meire Gallo Rosenburg², Isabelle C. Jeusette³, Celina Torre³, Gener T. Pereira¹ and Aulus C. Carciofi¹

Animal	Inicial						Final					
	ECC	PC	MG (kg)	MM (kg)	MG (%)	MM (%)	ECC	PC	MG (kg)	MM (kg)	MG (%)	MM (%)
Aurora	5	4,01	0,67	3,34	16,7	83,2	5	3,80	0,38	3,42	9,8	90,1
Merida	7	4,59	1,26	3,33	27,4	73,0	5	3,36	0,62	2,74	18,3	81,6
Bartô	8	7,50	2,26	5,24	30,1	69,8	6	6,30	1,16	5,14	18,3	81,6
Antônio	7	4,78	1,35	3,43	28,3	71,7	5	4,28	0,49	3,79	11,4	88,5

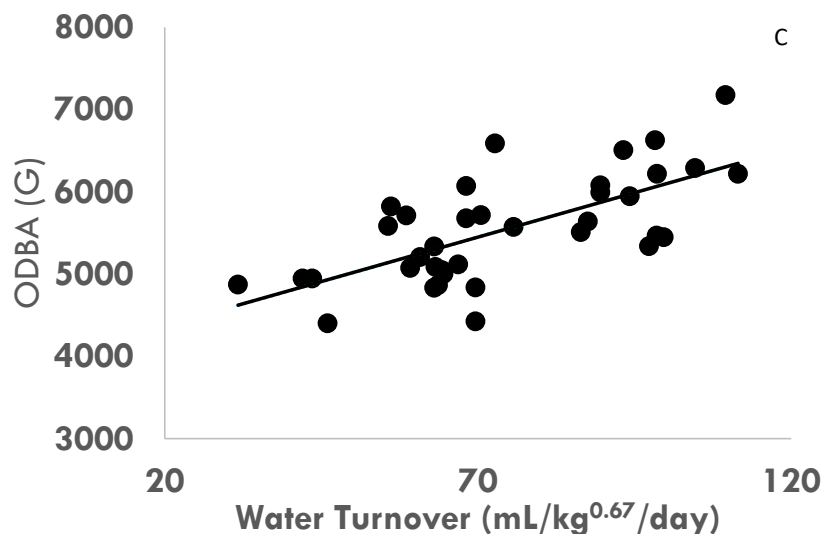
Aurora, Merida e Bartô: mudaram de ambiente, apartamento → casa com quintal (mesmo tutor)

Antônio: teve acesso frequente à rua

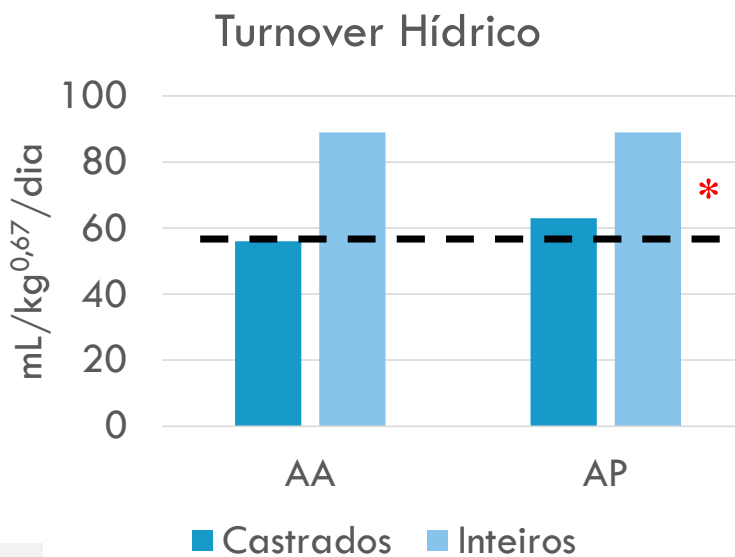


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$y = 21.61x + 3935.80; R^2 0.46; n=37; P<0.01$





Fluxo de água ↑ inteiros

Machos castrados tem maior probabilidade de desenvolver DRC (Greene et al., 2014)

PROTEÍNA E FIBRA

Effects of a high-protein, high-fiber diet rich in antioxidants and L-carnitine on body weight, body composition, metabolic status, and physical activity levels of cats after spay surgery

Eiji Iwazaki,^{†,‡} Anne H. Lee,[‡] Alissa M. Kruis,[‡] Thunyaporn Phungviwatnikul,[‡] Helen Valentine,[‡] Lídia S. Arend,[‡] Robert V. Knox,^{‡, } Maria R. C. de Godoy,^{‡,§} and Kelly S. Swanson^{‡,§,1, }



Antes da castração, consumo controlado ou *ad libitum*
Idade: 9.5 ± 0.1 meses; 24 semanas

Effects of diet on body weight, body composition, metabolic status, and physical activity levels of adult female dogs after spay surgery

Thunyaporn Phungviwatnikul,[‡] Helen Valentine,[‡] Maria R. C. de Godoy,^{‡,||} and Kelly S. Swanson^{‡,§,||,1}



Antes da castração, consumo controlado ou *ad libitum*
 3.02 ± 0.7 anos; 24 semanas

Chemical Composition	MPMF (% DM)	HPHF (% DM)
Dry matter	94.27	95.26
Organic matter	94.55	92.57
Crude protein	37.16	52.32
Acid-hydrolyzed fat	16.18	12.34
Omega-3 fat	0.29	0.32
Total dietary fiber	14.3	25.6
Gross energy, kcal/g DM	5.09	5.04
Metabolizable energy (ME); kcal/g	3.82	2.96
Vitamin C, mg/100 g	–	14.78
Tocopherol, IU/100 g	39.40	73.60
Carnitine, mg/100 g	2.13	49.63

Item	Treatment ¹		
	CO	HP-HF	HP-HF-O
Ash	4.74	8.29	8.48
Crude protein	22.31	41.94	42.91
Acid-hydrolyzed fat	15.59	12.00	12.50
Crude fiber	2.60	5.08	4.48
Total dietary fiber	12.10	20.90	21.00
Insoluble fiber	6.80	13.60	14.00
Soluble fiber	5.30	7.30	7.00
Nitrogen-free extract ⁷	45.26	16.87	15.11
Gross energy ⁷ , kcal/g	4.61	4.66	4.64
Metabolizable energy (ME) ⁷ , kcal/g	3.69	3.08	3.09

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Antes da castração, consumo controlado ou *ad libitum*
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Castração: efeito marcante

- PC e MG ↑
- NE ↓
- Atividade física ↓

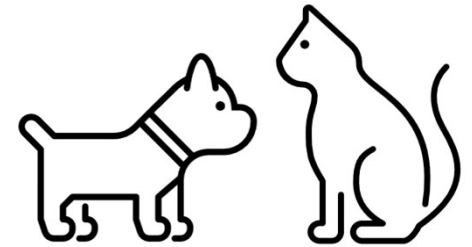
Sistema de alimentação: ↑ PC e MG *ad libitum*

Dieta: consumo diário HPHF > MPHM

Dieta HP-HF

- Limita ganho de peso e MG
- Atenua colesterol, triglicérides e leptina sérica após castração
 - *Ad libitum* e consumo controlado

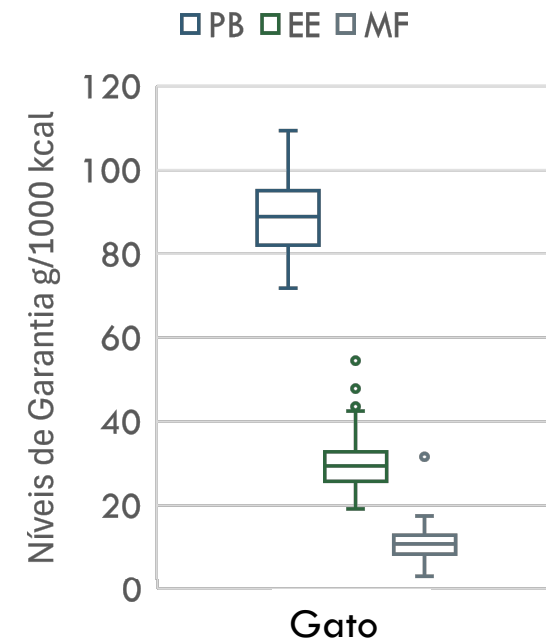
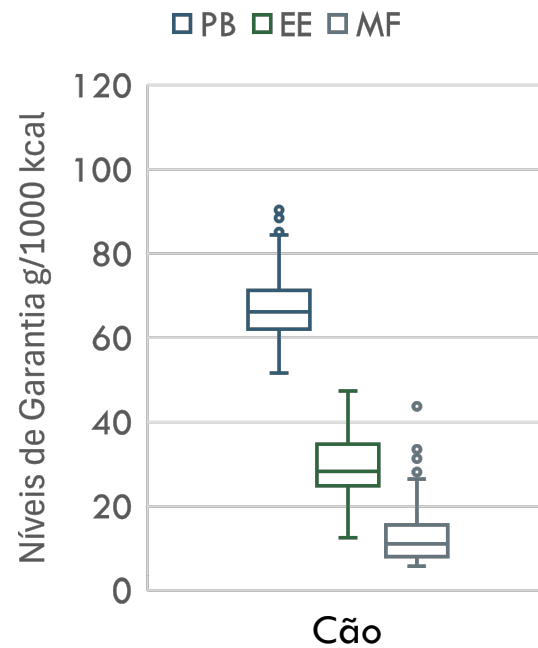
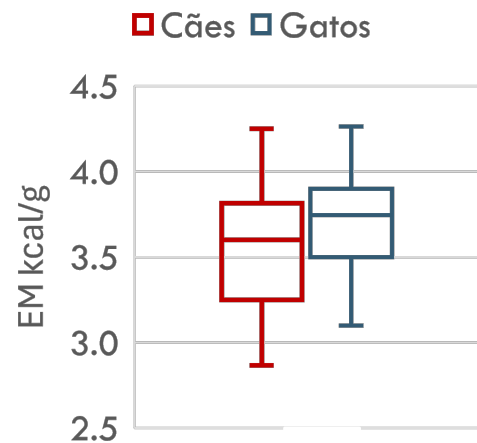
CONSIDERAÇÕES FINAIS



- ✓ O metabolismo de cães e gatos altera após a castração
- ✓ **Animais Castrados:** ↑ adipogênese e ↓ taxa metabólica basal
- ✓ Fator de risco para obesidade
- ✓ Manejo *ad libitum* ↑ massa gorda após castração + ↑ **gordura da dieta**
- ✓ Atividade física é fator determinante para a composição corporal e GE
- ✓ **CÃES:** se beneficiam de alimento com maior proteína e fibra
- ✓ **GATOS:** maior amido na dieta pode contribuir CC de gatos machos adultos jovens

CONSIDERAÇÕES FINAIS – DENSIDADE ENERGÉTICA DOS ALIMENTOS

Muito Baixa	Baixa Caloria	Média Caloria	Alta Caloria	Muito Alta
<3,0 kcal/g	< 3,3 kcal/g	3,4 – 3,7 kcal/g	3,8-4,1 kcal/g	>4,2 kcal/g



Rações Extrusadas Adultos
Cães, n=118; Gatos, n = 90

Siqueira; Goloni, dados preliminares



CONSIDERAÇÕES FINAIS – RECOMENDAÇÕES

Cão	Baixa (g/1000kcal)	Médio (g/1000kcal)	Alto (g/1000kcal)
Proteína Restrição de proteína	52,1 – 59 <40	60 - 94	>95 ★
Extrato Etéreo Restrição de gordura	★ 13,75 – 24 <13	25 - 49	>50
Fibra Bruta	<5,0	6 - 24	>25
Fibra Dietética	<15	16 - 49	>50 ★
Cálcio	1,45 – 2,5	2,6 – 4,4	>4,5
Fósforo Restrição de fósforo	1,16 – 1,8 <1,0	1,9 – 2,4	>2,5
Sódio Restrição de sódio	0,5 – 0,8 <0,4	0,9 – 2,2	>2,3

CONSIDERAÇÕES FINAIS – RECOMENDAÇÕES



Gato	Baixo (g/1000kcal)	Médio (g/1000kcal)	Alto (g/1000kcal)
Proteína Restrição de proteína	83,3 – 90 <70	91 - 110 ★	>111
Extrato Etéreo Restrição de gordura	★ 22,5 – 25 <21	26 - 50	>51
Fibra Bruta	<4,5	5 - 23	>24
Fibra Dietética	<14	15 - 46	>47 ★
Cálcio	1,97 – 2,5	2,6 – 4,0	>4,1
Fósforo Restrição de fósforo	1,67 – 1,9 <1,5	2,0 – 2,4	>2,5
Sódio Restrição de sódio	0,5 – 0,8 <0,4	0,9 – 2,3	>2,4

OBRIGADA!

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