Diferenças metabólicas entre cães, gatos e humanos

Marcio Antonio Brunetto

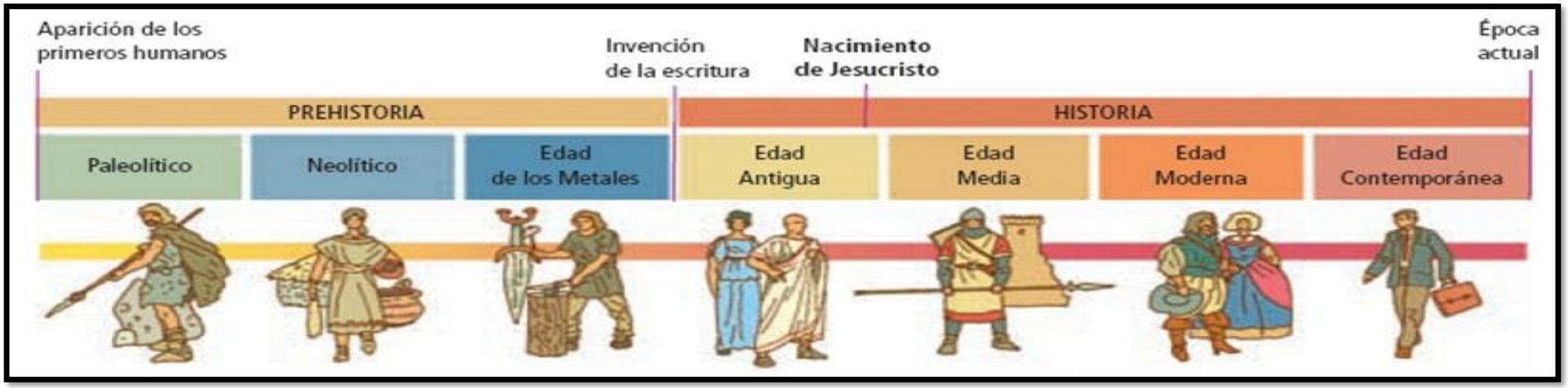
FMVZ/USP

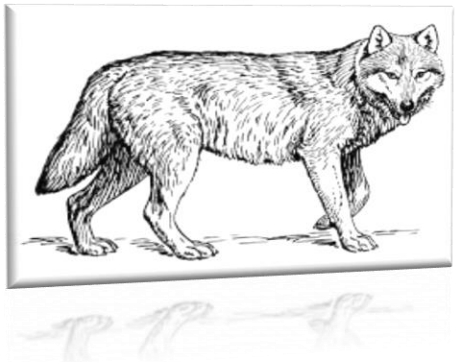
mabrunetto@usp.br

Introdução

- História evolutiva das espécies
  - Implicações importantes nos hábitos e nas necessidades




Aparición de los primeros humanos
Invención de la escritura
Nacimiento de Jesucristo
Época actual
PREHISTORIA
HISTORIA
Paleolítico
Neolítico
Edad de los Metales
Edad Antigua
Edad Media
Edad Moderna
Edad Contemporánea

















COMPORTAMENTO ALIMENTAR

- Carnívoro estrito
- Caçador solitário
- Várias refeições ao dia
- Baixo consumo de água



F.s. catus


Naci
de Je
Edad
Antigua

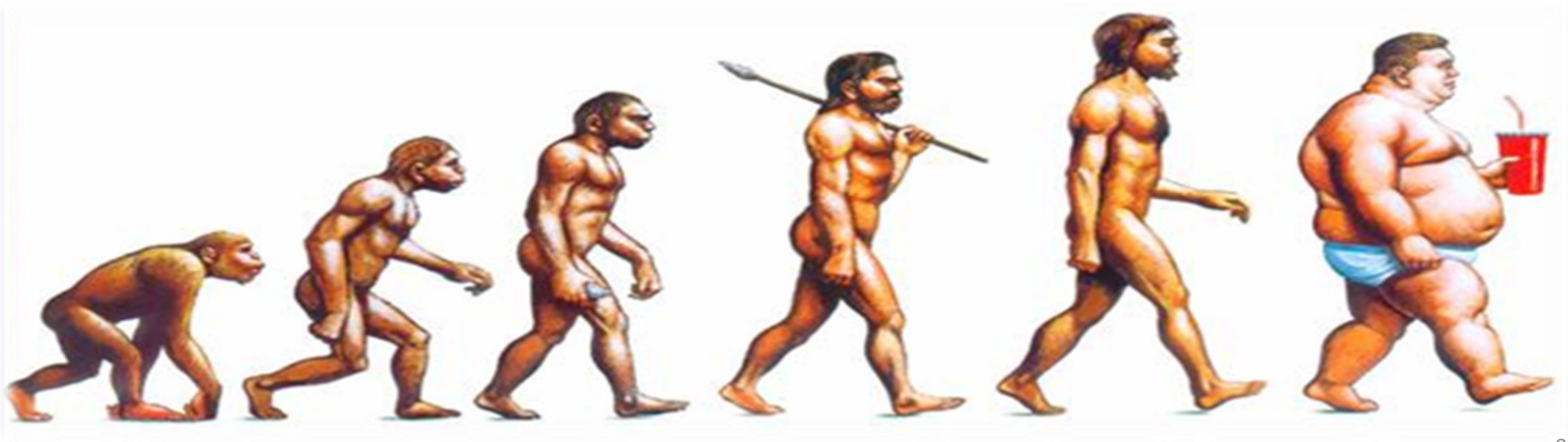
Metabolomics (2017) 13:15
DOI 10.1007/s11306-016-1153-0

ORIGINAL ARTICLE

Ultra high performance liquid chromatography–high resolution mass spectrometry plasma lipidomics can distinguish between canine breeds despite uncontrolled environmental variability and non-standardized diets

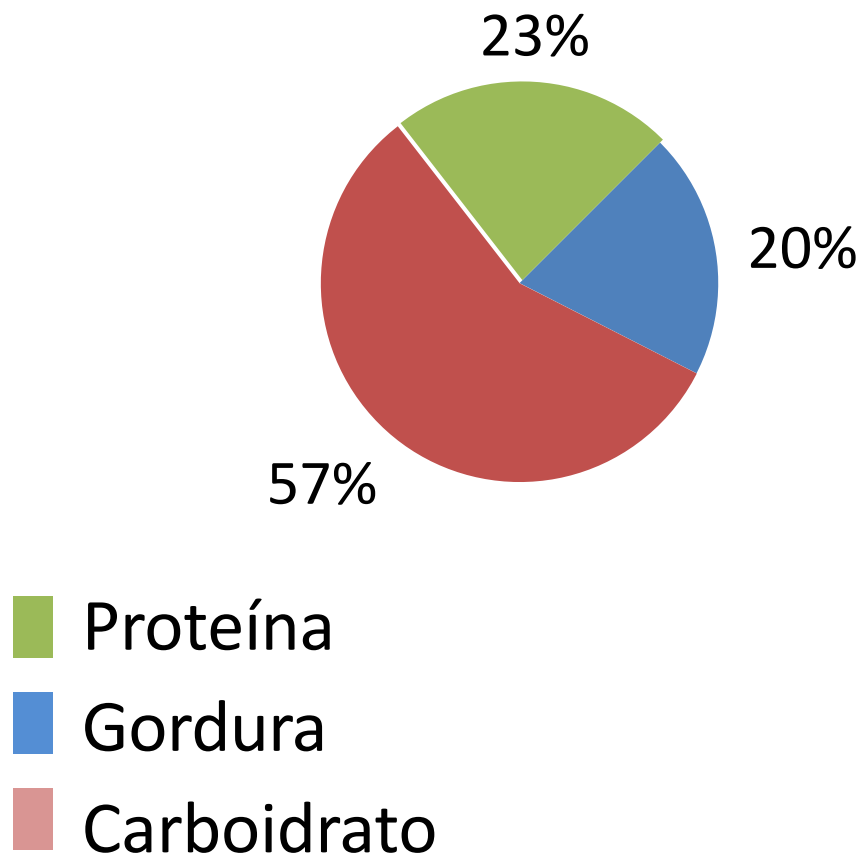
Amanda J. Lloyd[1] · Manfred Beckmann[1] · Thomas Wilson[1] · Kathleen Tailliart[1] · David Allaway[2] · John Draper[1]

Em humanos....



Valor calórico total diário (VCT) - humanos

- **Proteinas:** 10-15%
- **Gorduras:** 20-30%
- **Carboidratos:** 55-60%



Alimento comercial para cão adulto

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Total Water and Macronutrients

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	*Total* Water[a] (L/d)	Carbohydrate (g/d)	Total Fiber (g/d)	Fat (g/d)	Linoleic Acid (g/d)	α-Linolenic Acid (g/d)	Protein[b] (g/d)
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0 to 6 mo	0.7*	60*	ND	31*	4.4*	0.5*	9.1*
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Children							
1–3 y	1.3*	130	19*	ND[c]	7*	0.7*	13
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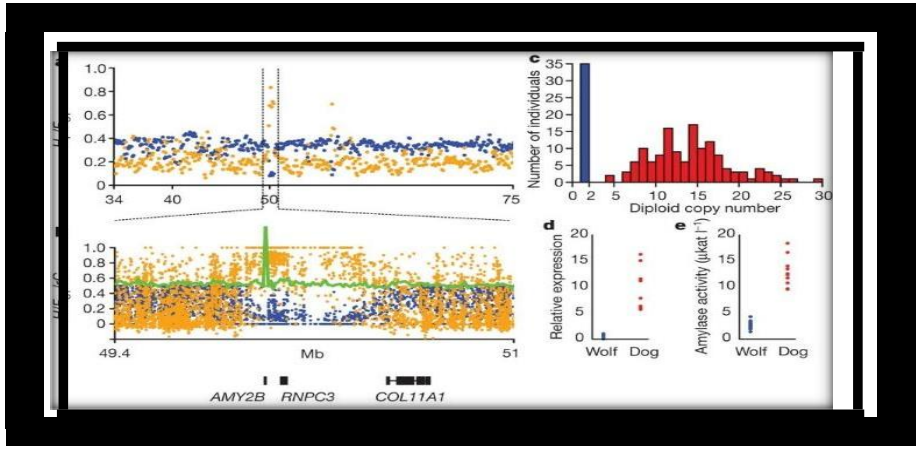
NOTE: This table (also from the DRI reports, [illegible]) presents Recommended Dietary Allowances (RDA) in

LETTER

doi:10.1038/nature11837

The genomic signature of dog domestication reveals adaptation to a starch-rich diet

Erik Axelsson[1], Abhirami Ratnakumar[1], Maja-Louise Arendt[1], Khurram Maqbool[1], Matthew T. Webster[1], Michele Perloski[2], Olof Liberg[3], Jon M. Arnemo[4,5], Åke Hedhammar[6] & Kerstin Lindblad-Toh[1,2]

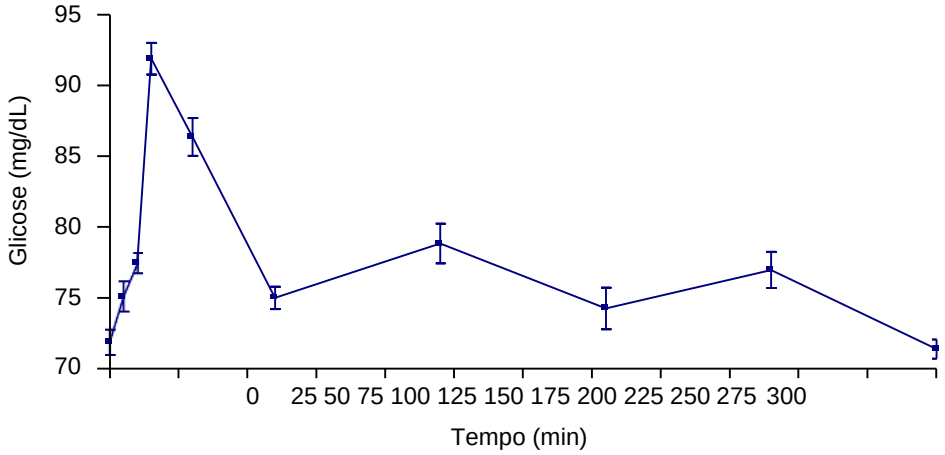




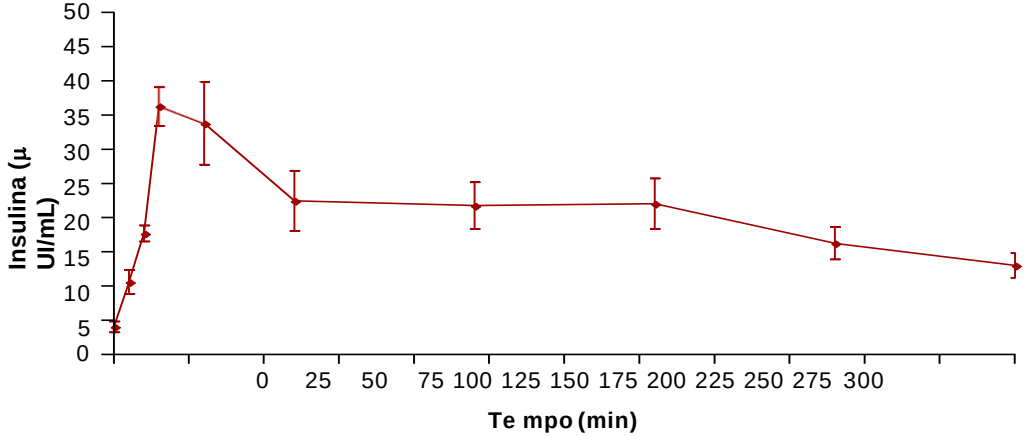
C. lopus C.. familiaris

Carboidratos: respostas metabólicas em cães

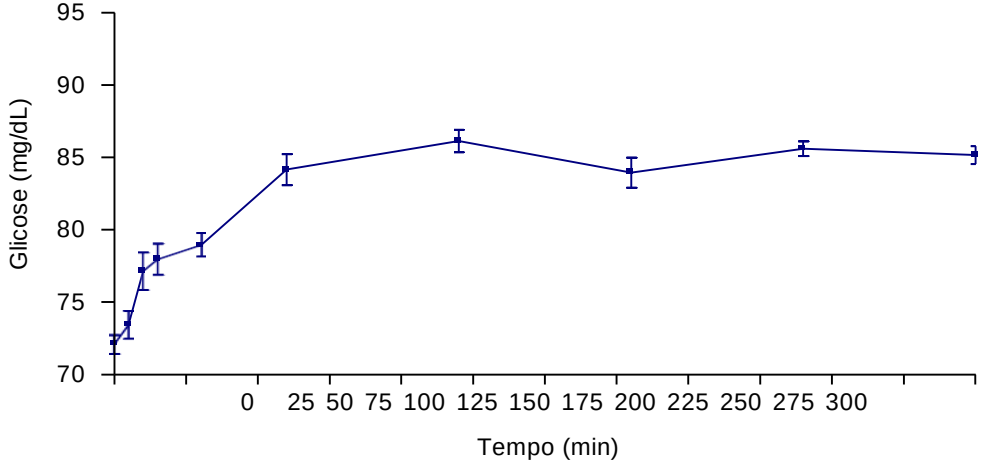
(Carciofi et al., 2008)



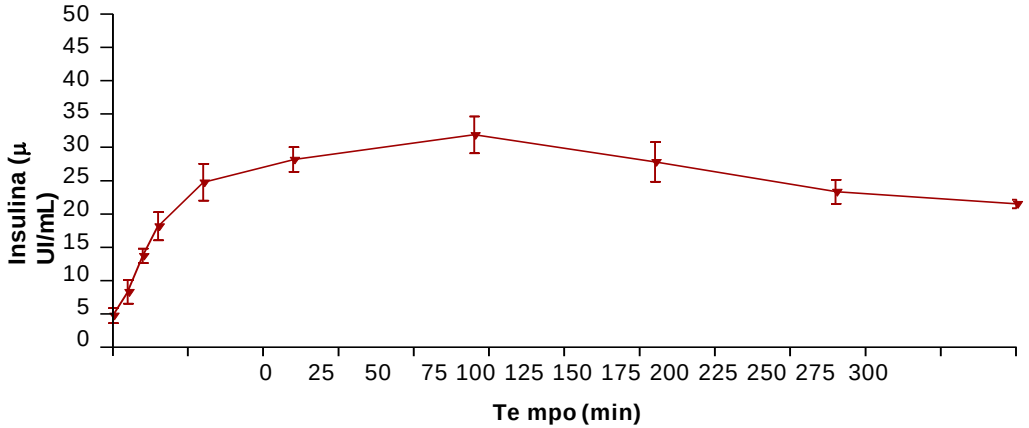
Glicemia - Arroz



Insulinemia - Arroz

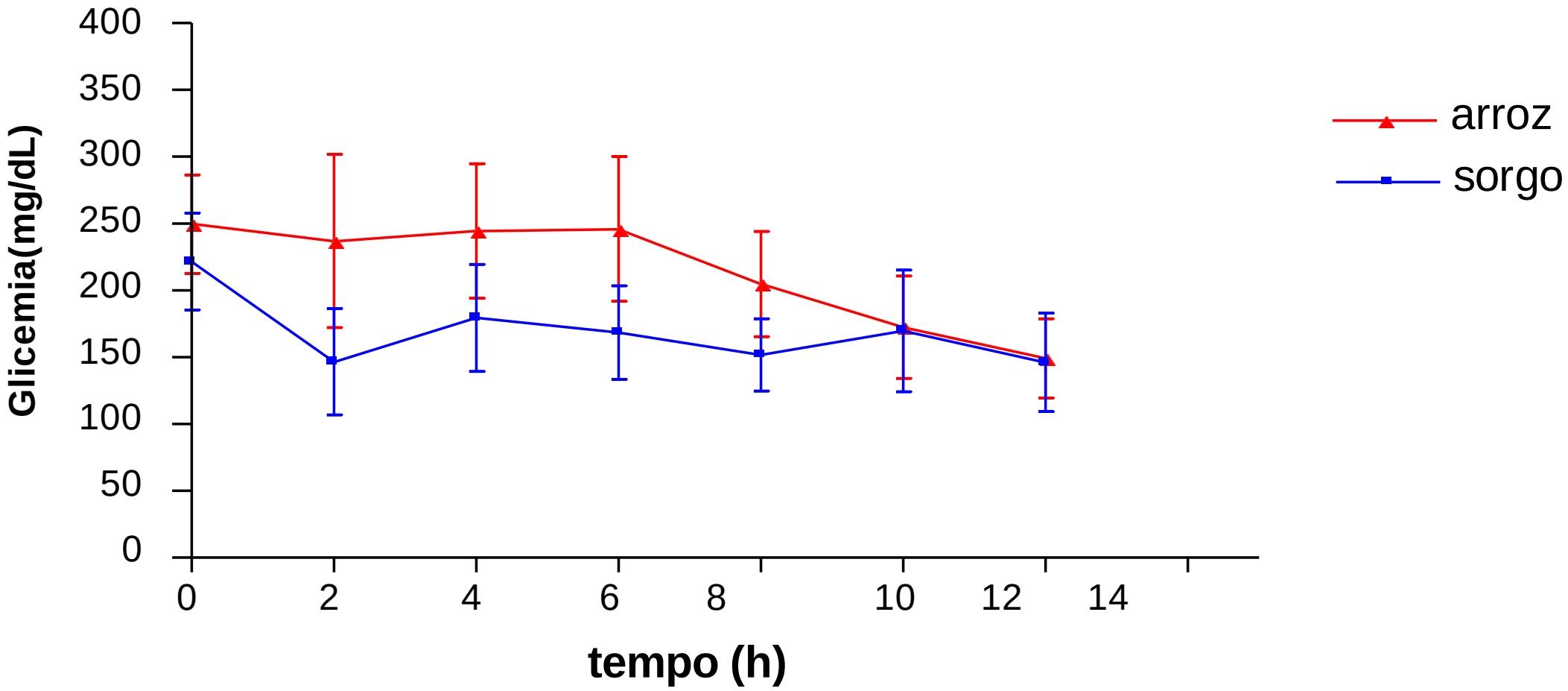


Glicemia - Sorgo



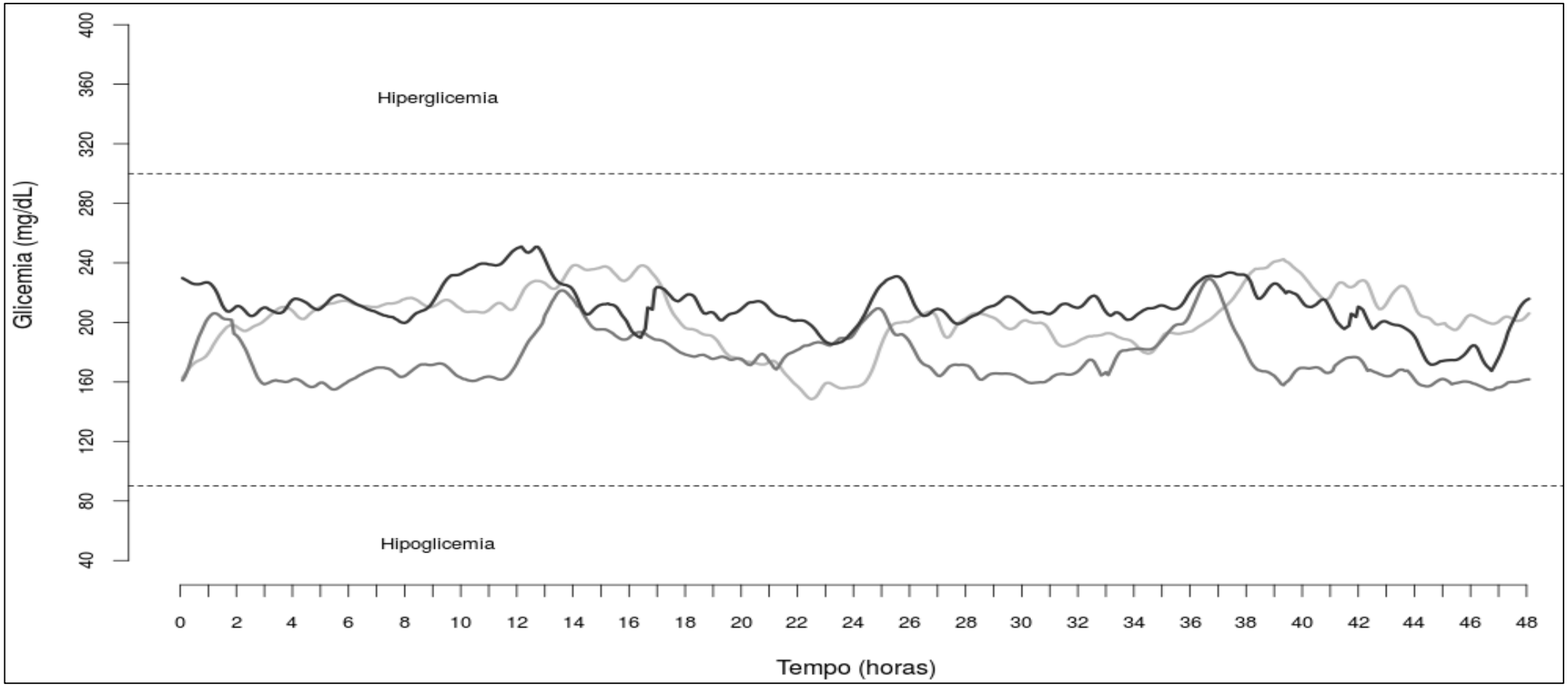
Insulinemia - Sorgo

Efeitos de diferentes tipos de amido no controle glicêmico de cães diabéticos



Teshima (2010)

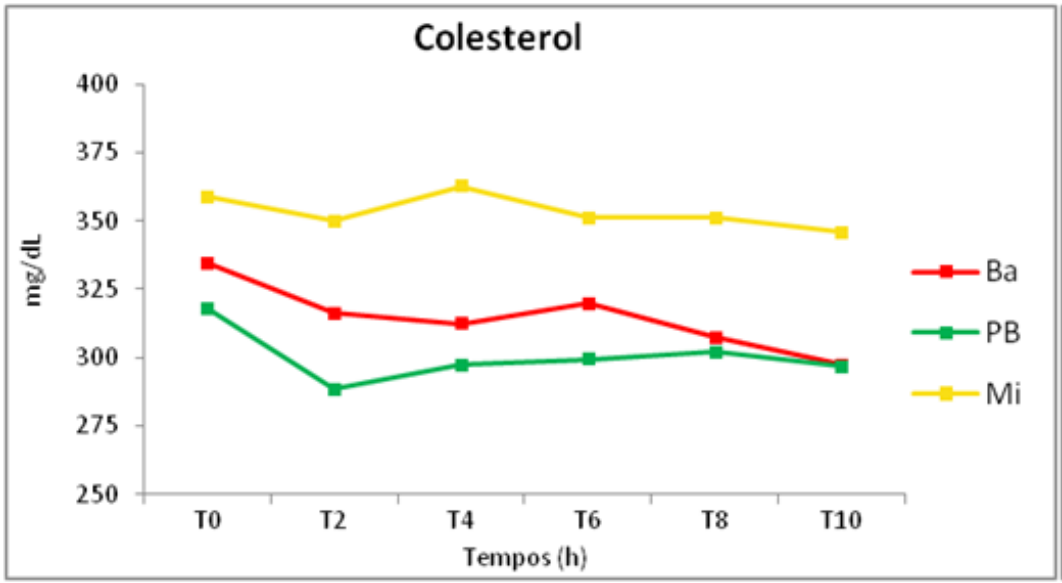
Efeitos de diferentes tipos de amido no controle glicêmico de cães diabéticos

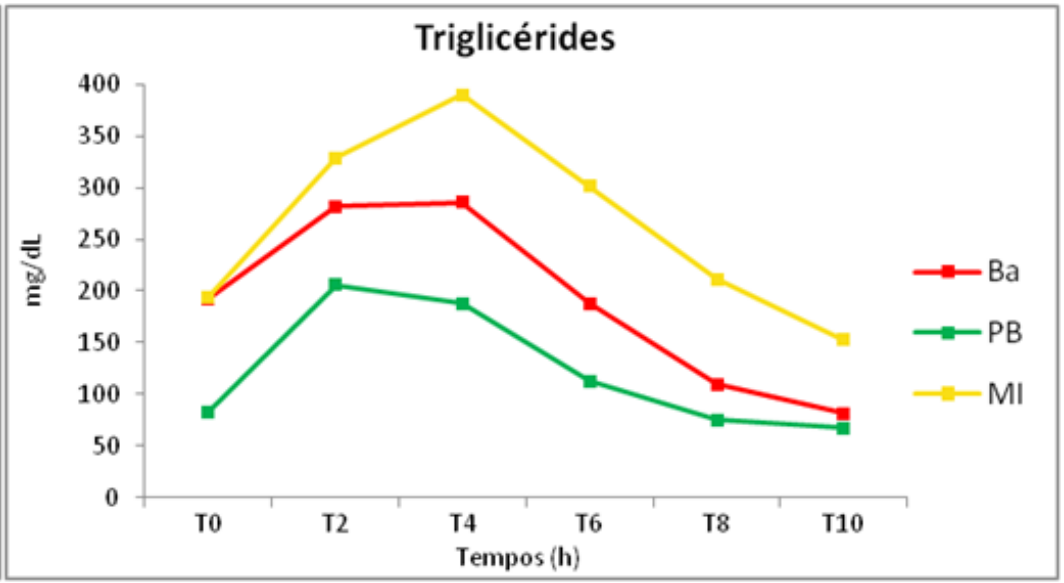


Cinza-claro: alimento alta fibra (obesidade)
Cinza-escuro: alimento a base de ervilha e cevada
Preta: milho menos processado

Teixeira et al. (2017)

Efeitos de diferentes tipos de amido na lipidemia de cães diabéticos





Ba:alimento alta fibra
PB: alimento a base de ervilha e cevada
Mi: milho menos processado

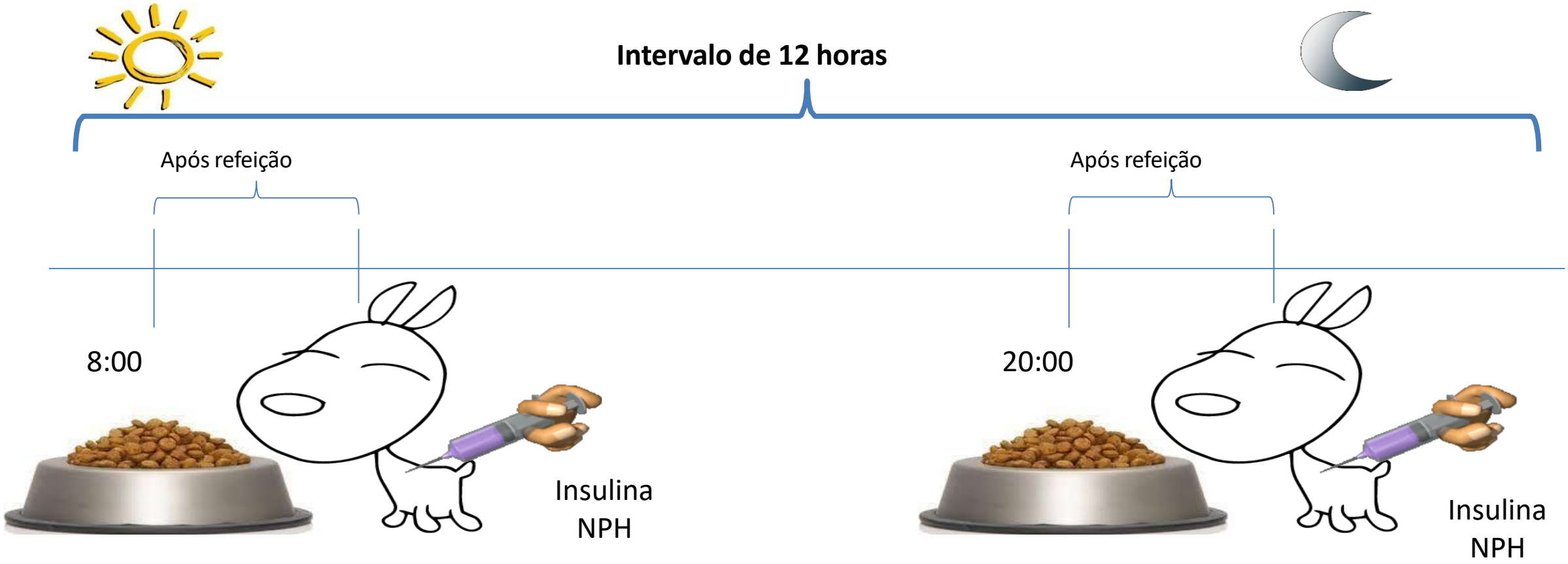
Teixeira et al. (2018)

Glicosímetro de mensuração contínua



Fonte: HOVET/USP

Esquema de alimentação e insulinoterapia




E os gatos?

Effects of six carbohydrate sources on diet digestibility and postprandial glucose and insulin responses in cats[1]

L. D. de-Oliveira,* A. C. Carciofi,*[2] M. C. C. Oliveira,* R. S. Vasconcellos,* R. S. Bazolli,* G. T. Pereira,* and F. Prada†

*Sao Paulo State University, Faculty of Agrarian and Veterinary Sciences, Jaboticabal, SP 14884-900, Brazil; and †University of Sao Paulo, Faculty of Veterinary Medicine and Animal Sciences, Sao Paulo, SP 05508-270, Brazil

Table 3. Nutrient intake, apparent total tract digestibility, and fecal characteristics of cats fed experimental diets containing different starch sources

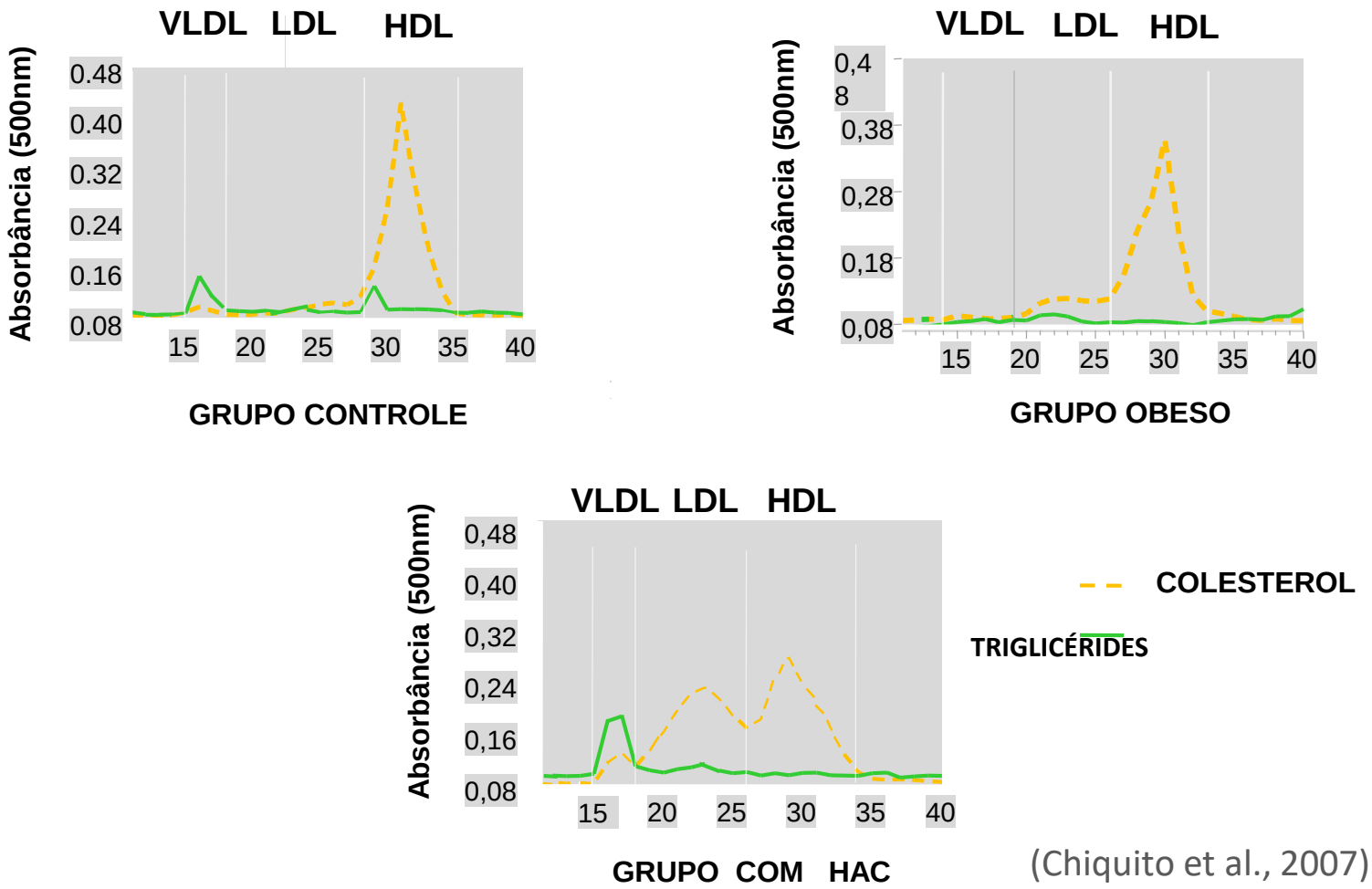
	Diet						
Item	Cassava flour	Corn	Sorghum	Brewers rice	Lentil	Pea	SEM[1]
Intake, g·kg of $BW^{-1}·d^{-1}$							
DM	17.7	16.3	17.9	16.2	16.3	17.7	0.5
OM	16.4	15.0	16.7	15.1	15.0	16.4	0.5
CP	5.6	5.1	5.0	5.7	5.0	5.2	0.2
Starch	6.5	5.6	6.7	5.8	5.6	5.7	0.2
Acid-hydrolyzed fat	2.2^{a}	1.9^{abc}	1.7^{cd}	2.0^{abc}	1.6^{c}	2.0^{abc}	0.1
Total dietary fiber	1.0^{cd}	1.5^{bc}	2.0^{ab}	0.8^{d}	2.3^{a}	2.0^{ab}	0.1
DM intake,[2] g/d	71.0	67.4	73.2	67.6	64.4	70.0	1.7
Apparent digestibility values, %							
DM	80.3^{ab}	78.5^{b}	76.3^{b}	83.2^{a}	76.5^{b}	75.9^{b}	0.6
OM	84.3^{ab}	82.5^{bc}	80.0^{c}	87.9^{a}	79.0^{c}	79.1^{c}	0.6
CP	82.0^{b}	83.2^{ab}	80.6^{b}	87.7^{a}	80.8^{b}	82.3^{b}	0.5
Starch	98.0^{ab}	97.5^{ab}	93.9^{d}	98.6^{a}	95.2^{dc}	96.3^{bc}	0.5
Acid-hydrolyzed fat	89.6^{a}	85.5^{bc}	83.3^{c}	87.8^{ab}	85.3^{bc}	88.0^{ab}	0.3
Gross energy	84.2^{ab}	82.6^{bc}	79.6^{c}	87.6^{a}	80.1^{c}	80.5^{bc}	0.6
Total dietary fiber	5.6^{b}	18.1^{ab}	29.0^{ab}	10.6^{ab}	33.1^{a}	15.8^{ab}	2.7

Do lobo ao totó

A evolução dos cães



Perfil de distribuição percentual de colesterol total (CT) e triacilglicerol (TAG) nas frações de lipoproteínas (LP) em cães controle, obeso e com hiperadrenocorticismo (HAC)



(Chiquito et al., 2007)

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Total Water and Macronutrients

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	*Total* Water[a] (L/d)	Carbohydrate (g/d)	Total Fiber (g/d)	Fat (g/d)	Linoleic Acid (g/d)	α-Linolenic Acid (g/d)	Protein[b] (g/d)
Infants							
0 to 6 mo	0.7*	60*	ND	31*	4.4*	0.5*	9.1*
6 to 12 mo	0.8*	95*	ND	30*	4.6*	0.5*	11.0
Children							
1–3 y	1.3*	130	19*	ND[c]	7*	0.7*	13
4–8 y	1.7*	130	25*	ND	10*	0.9*	19
Males							
9–13 y	2.4*	130	31*	ND	12*	1.2*	34
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NOTE: This table (taken from the DRI reports, see www.nap.edu/catalog/ Recommended Dietary Allowances (RDA) is

Ciência Rural, Santa Maria, v.41, n.2, p.266-271, fev, 2011
ISSN 0103-8478

Correspondência entre obesidade e hiperlipidemia em cães

Correspondence between obesity and hyperlipidemia in dogs

Márcio Antonio Brunetto[I*] Sandra Nogueira[II] Fabiano César Sá[III] Mayara Peixoto[I] Ricardo Souza Vasconcellos[I] Antonio José Ferraudo[IV] Aulus Cavalieri Carciofi[I]

Tabela 1 - Colesterol total e triglicérides séricos dos grupos experimentais obesos e controle (média ± desvio padrão; mínimo-máximo).

Grupos	Colesterol total (mg dL^{-1})	Triglicérides (mg dL^{-1})
Obesos		
ECC 8 (n=10)	332,6±50,9 [b] (139,0-368,6)	78,9±29,9 [a] (35,1-122,5)
ECC 9 (n=20)	374,6 ± 67,9 [a] (151,7-482,8)	89,3±40,8 [a] (43,2-182,4)
Controle		
ECC 5 (n=10)	211,2±28,6 [b] (166,9-250,5)	56,41±19,8 [b] (28,8-81,9)

[a, b] – médias na coluna sem uma letra em comum diferem pelo teste de Wilcoxon (P<0,05).

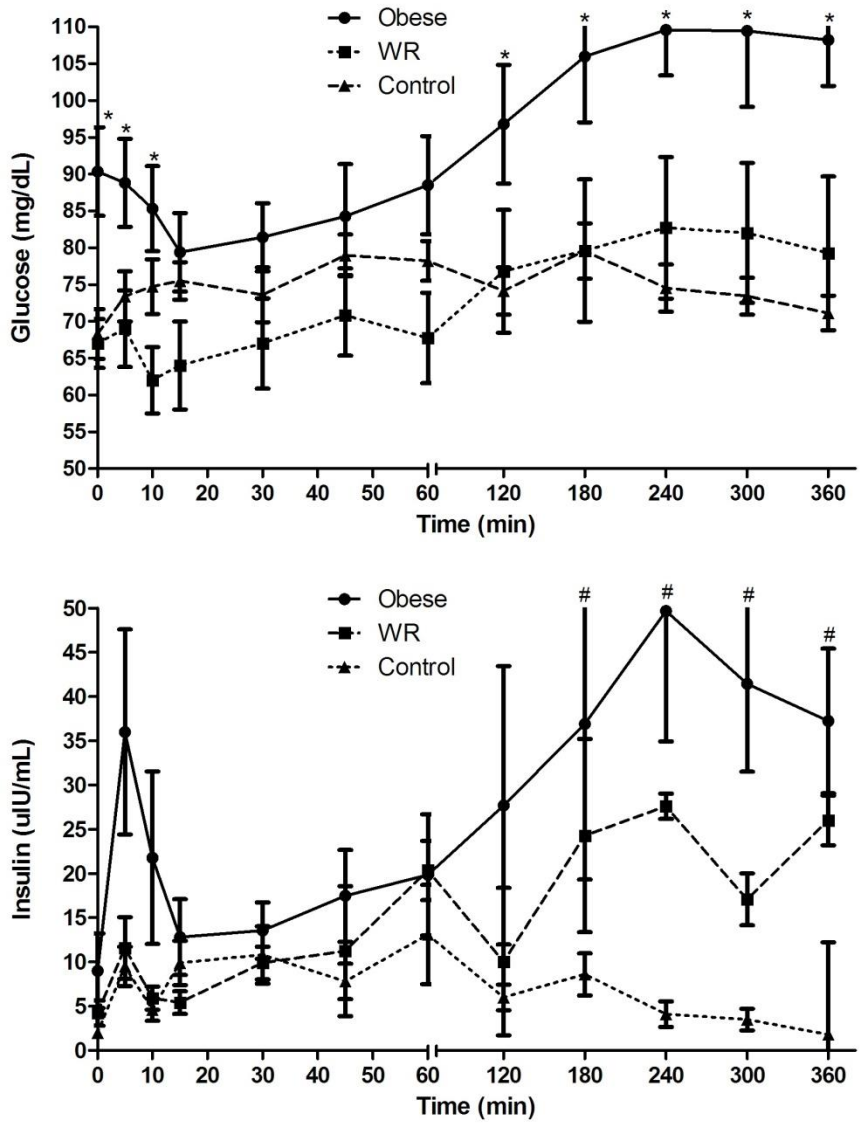


Costa, FA

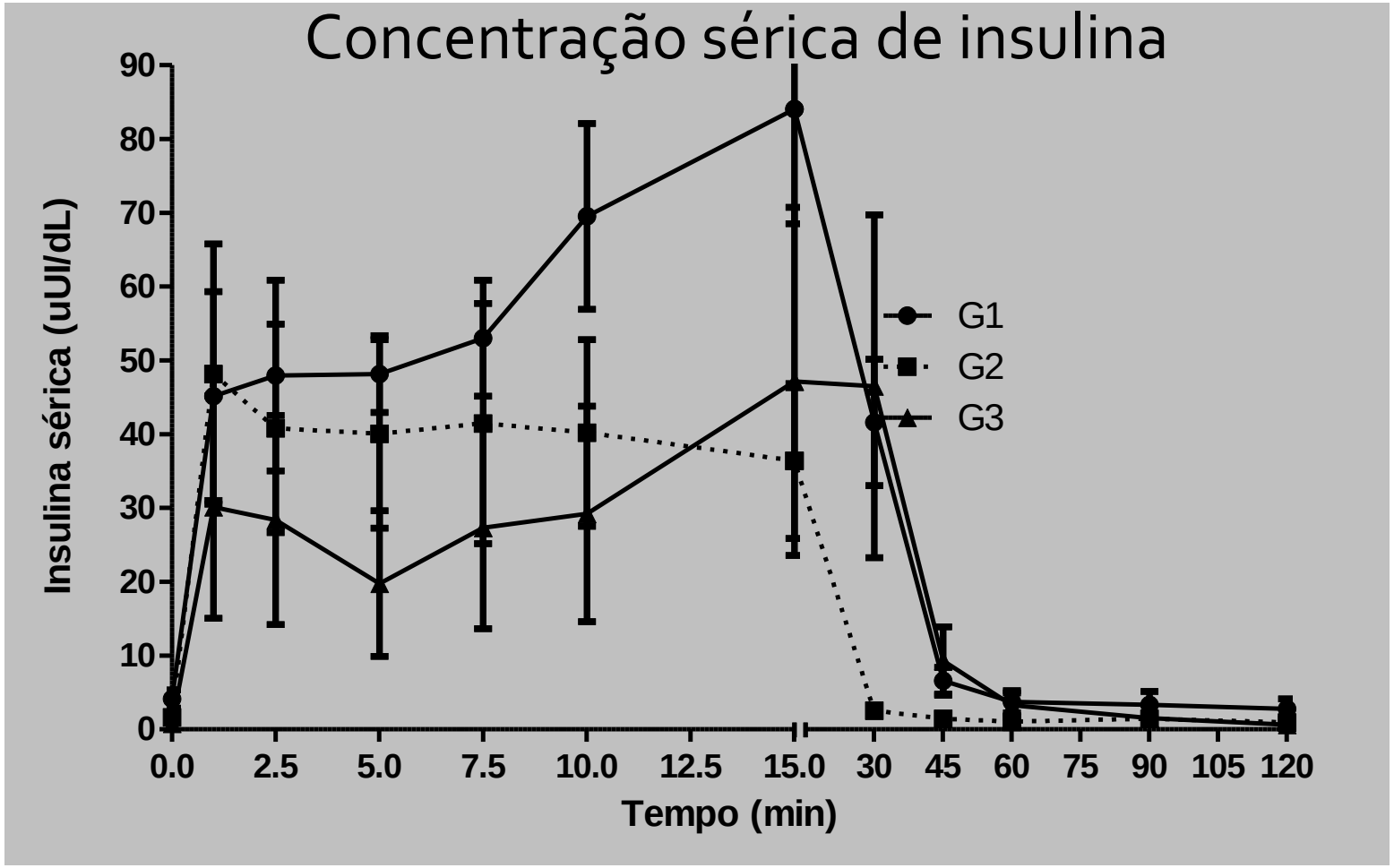


Fonte: HOVET/USP

Teste de ingestão oral de amido em cães obesos



Brunetto et al. ***British Journal of Nutrition (2011)***



G1: Obesos – G2: obesos após perda de 20% peso inicial – G3: escore normal

Brunetto (2010)

Proteinas e aminoacidos

Caes e gatos

Essenciais

Arginina, histidina, isoleucina, leucina
lisina, **metionina**, **fenilalanina**, treonina
triptofano e valina

Não essenciais

Alanina, ac. aspático, citrulina, **cisteina**,
ac. glutâmico, glicina, hidroxiprolina,
prolina, serina e **tirosina**.

Gatos **Taurina**

Humanos

Essenciais

Isoleucina, **metionina**, leucina, fenilalanina
Lisina, treonina, triptofano e valina

Semi essenciais: **cisteina** e tirosina

Nao essenciais:

Cistina, serina, glutamina, glicina, alanine, prolina
arginina

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Obrigado!!!

mabrunetto@usp.br