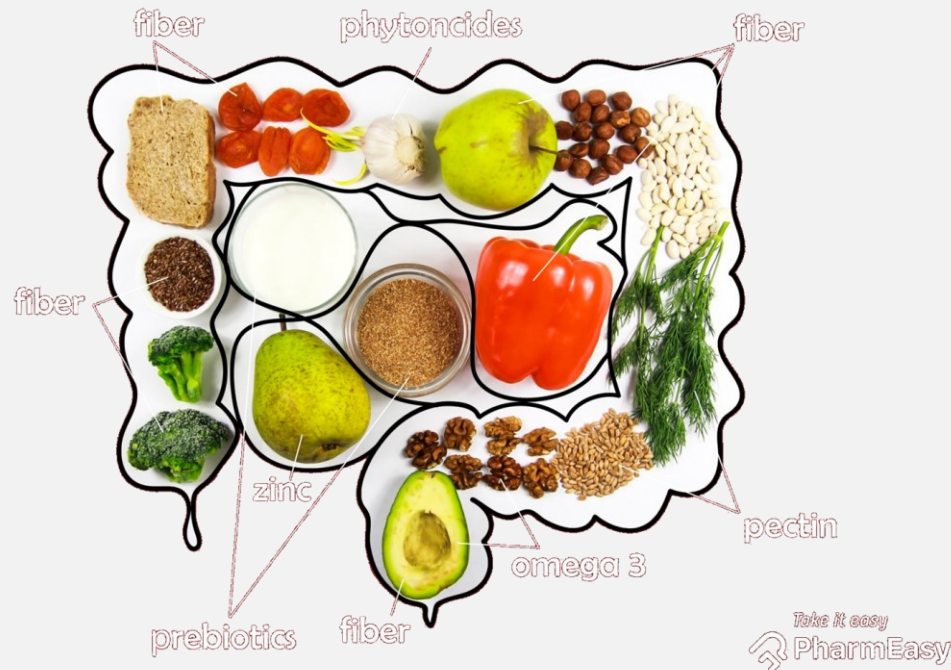


# Aspectos relacionados à saúde intestinal de animais alimentados com Dieta Caseira

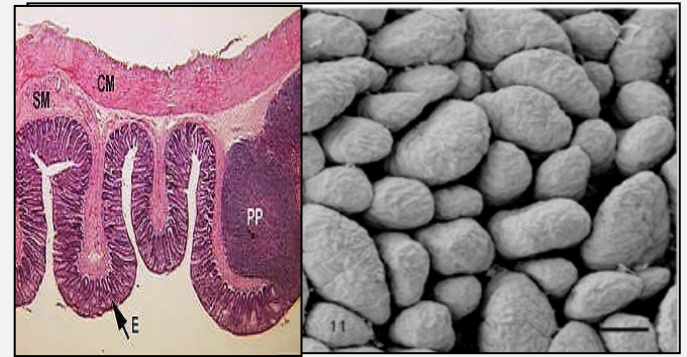


Fonte: [www.pharmeasy.in](http://www.pharmeasy.in)



**Ricardo Souza Vasconcellos**  
Universidade Estadual de Maringá

# Funções gerais



➤ Digestão e absorção de nutrientes

➤ Barreira física

➤ Barreira imunológica

- ✓ **100** trilhões de m.o.
- ✓ > **1.000** espécies
- ✓ **2** kg de massa bacteriana
- ✓ < **6%** do PV, > **20%** do Gasto energético
- ✓ Turnover celular de **3-5** dias

➤ Eliminação de produtos metabólicos



# Nutrientes em alimentos completos

## MINERAIS

Cálcio  
Fósforo  
Potássio  
Sódio  
Cloro  
Magnésio  
Ferro  
Cobre  
Iodo  
Zinco  
Manganês  
Selênio

## ÁCIDOS GRAXOS

Ácido Linoléico  
Alfa-linolênico  
Docosahexaenóico  
Eicosapentaenóico  
Acido araquidônico

## VITAMINAS

Vitamina A  
Vitamina D  
Vitamina E  
Colina  
Tiamina  
Ác. Pantotênico  
Riboflavina  
Ácido Fólico  
Piridoxina  
Niacina  
Cianocobalamina

## AMINOÁCIDOS

Arginina  
Histidina  
Isoleucina  
Leucina  
Lisina  
Metionina  
Cistina?  
Fenilalanina  
Tirosina?  
Treonina  
Triptofano  
Valina  
Taurina

## Carboidratos

Amido  
Fibras  
Açúcares

## Funcionais

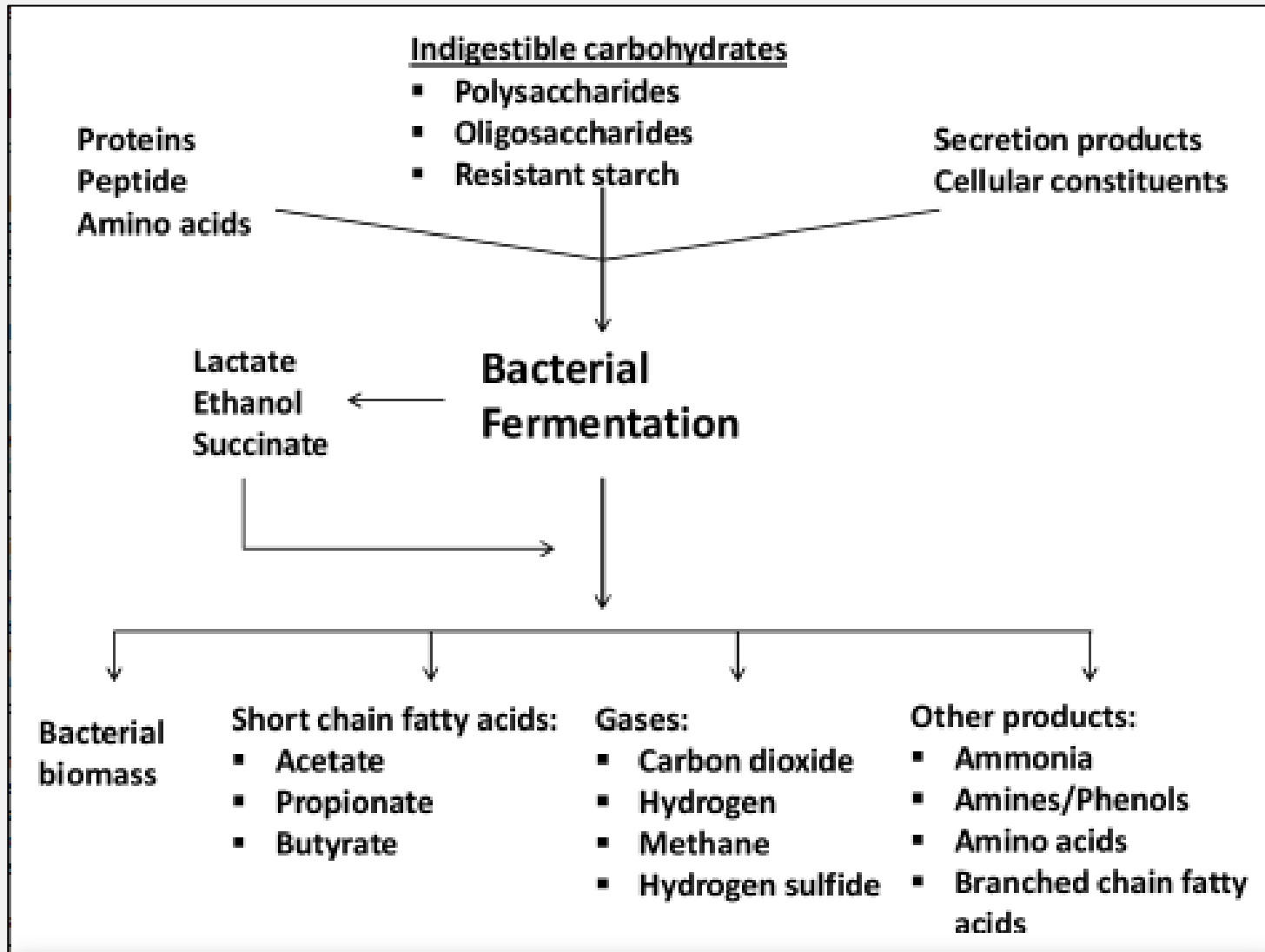
Prebióticos  
Probióticos  
Posbióticos  
Antioxidantes  
Ácidos graxos funcionais  
Condroprotetores  
Peptídeos bioativos  
Modificadores metabólicos  
Etc..

# Fatores que favorecem a saúde intestinal

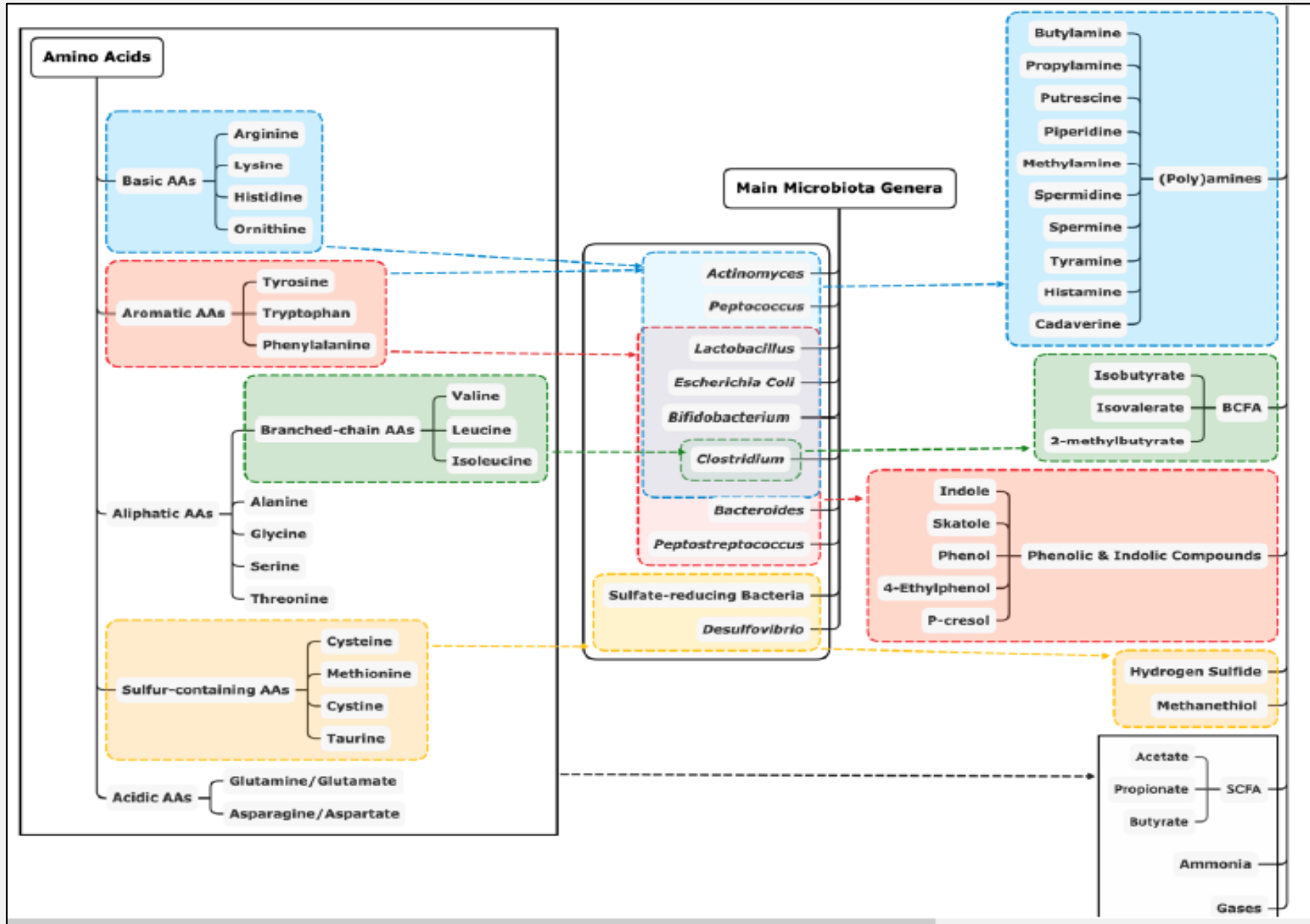
- Atendimento de nutrientes essenciais
- Nutrição da microbiota
- Aspectos fisiológicos individuais
- Nutracêuticos e AF



# Substratos fermentativos no intestino

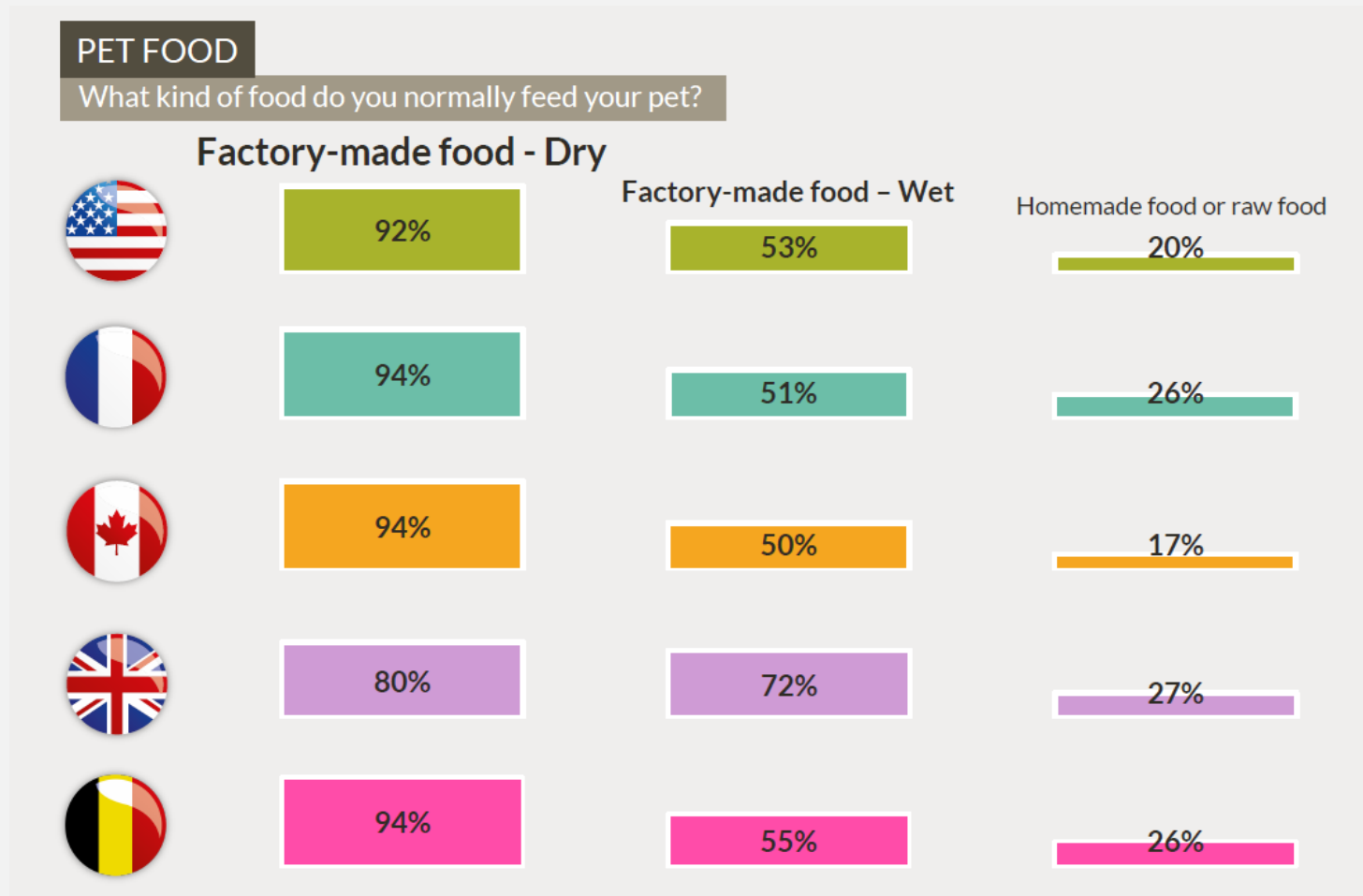


# Metabólitos e microbiota intestinal



# Alimentação de cães

- **1.673 tutores** (Symrise, 2023)



# Dieta caseira vs extrusada

[J Anim Sci](#). 2021 Feb; 99(2): skab028.

PMCID: PMC8611730

Published online 2021 Jan 29. doi: [10.1093/jas/skab028](https://doi.org/10.1093/jas/skab028)

PMID: [33511410](https://pubmed.ncbi.nlm.nih.gov/33511410/)

Nutrient digestibility and fecal characteristics, microbiota, and metabolites in dogs fed human-grade foods

[Sungho Do](#),<sup>1</sup> [Thunyporn Phungyiwatnikul](#),<sup>1</sup> [Maria R C de Godoy](#),<sup>1,2</sup> and [Kelly S Swanson](#)<sup>1,2,3</sup>



- *Life Protection Formula Chicken and Brown Rice Recipe*

(extruded; Blue Buffalo);

- *Roasted Meals Tender Chicken Recipe with Garden Vegetables*

(fresh; Freshpet);

- *Beef and Russet Potato*

(HG beef; JustFoodForDogs);

- *Chicken and White Rice*

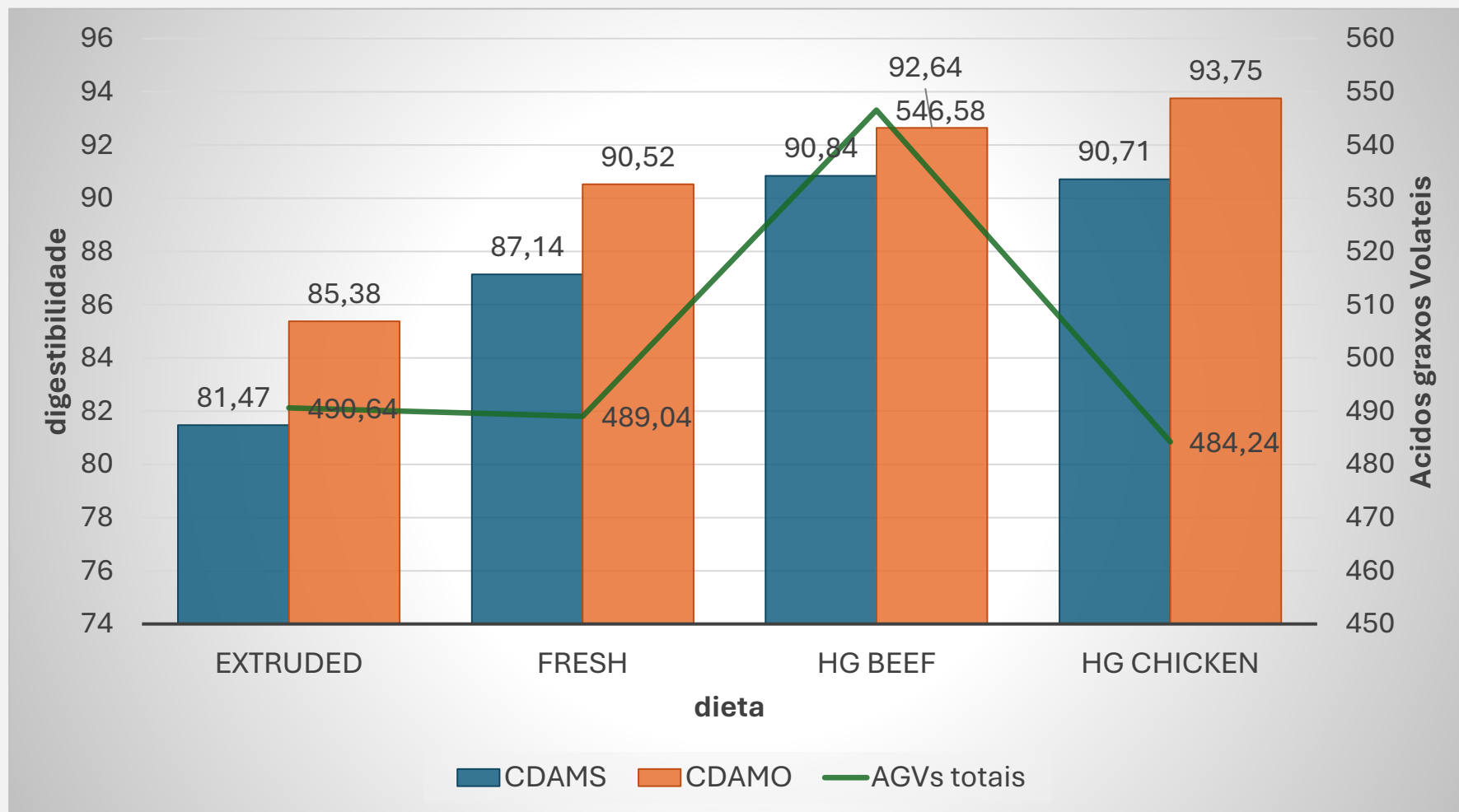
(HG chicken; JustFoodForDogs).



# Composição dos alimentos

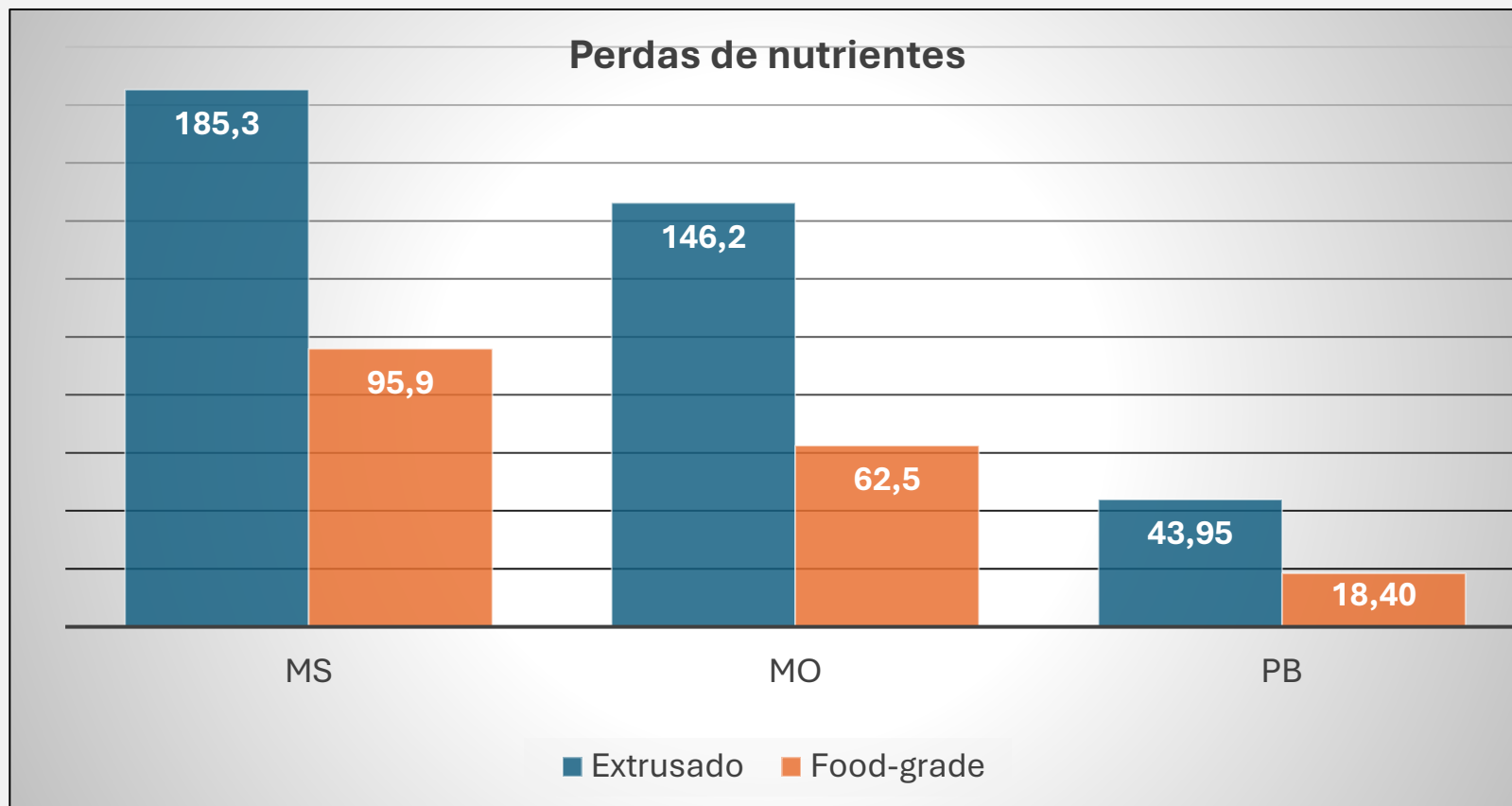
Item	Treatment			
	Extruded <sup>1</sup>	Fresh <sup>2</sup>	HG beef <sup>3</sup>	HG chicken <sup>4</sup>
DM, %	91.01	41.13	30.61	31.18
	----- DM basis -----			
OM, %	93.63	86.38	95.65	93.88
Ash, %	6.37	13.62	4.35	6.12
Acid-hydrolyzed fat, %	➡ 14.25	25.54	37.04	14.57
CP, %	➡ 26.46	36.41	29.62	29.53
Total dietary fiber, %	➡ 14.22	11.63	7.02	7.09
Gross energy, kcal/g	5.12	5.40	6.58	5.03
Digestible energy, kcal/g	➡ 4.43	4.97	6.24	4.74

# Digestibilidade das dietas e fermentação



# Perdas nutricionais vs fermentação

	Extrusado	Food-grade
PB	26,46	29,53
EB	5,12	5,03
CDAEB	86,53	94,27
CDAMS	81,47	90,41
CDAMO	85,38	93,75
CDAPB	83,39	93,77
PERDAS DE NUTRIENTES		
MS	185,3	95,9
MO	146,2	62,5
PB	43,95	18,40



# Papel das dietas na microbiota de cães



## Ingredientes

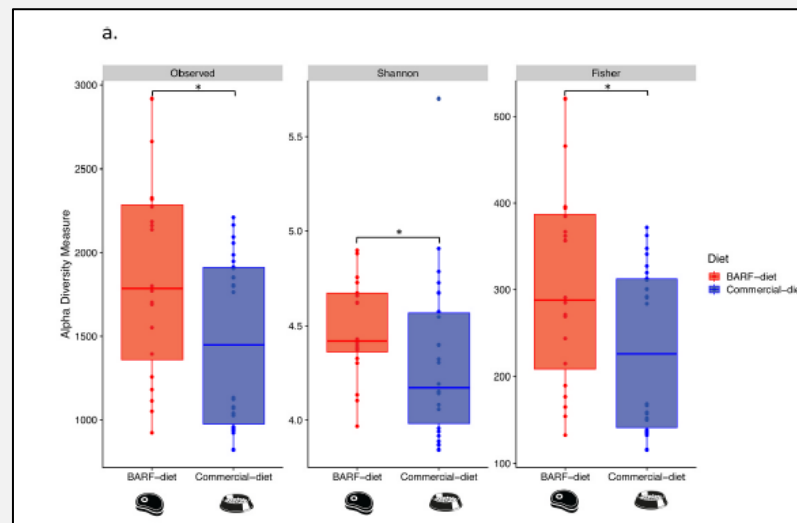
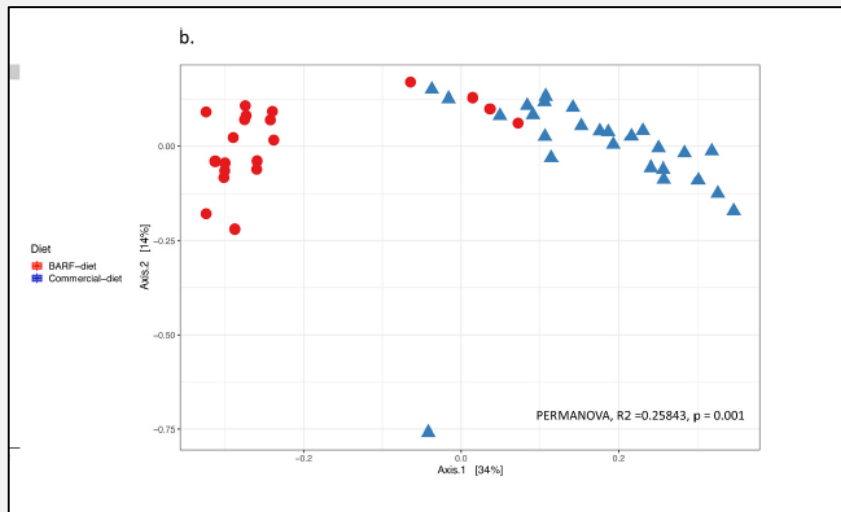
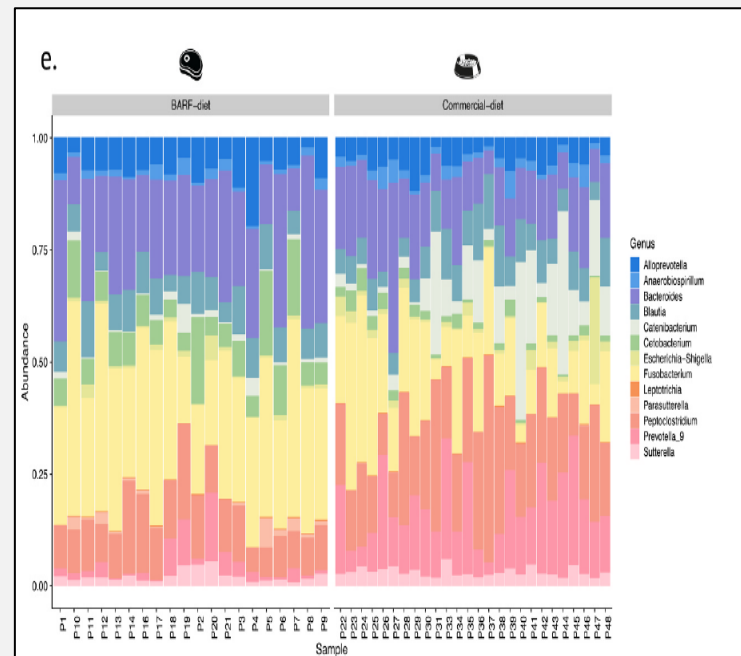
Carne fresca, vegetais/frutas, grãos/cereais, iogurte

Proteína animal, gordura, fibras e vegetais

## Proporção

80:15:5

28:15:5



# Modulação da microbiota pelas fibras em cães

Table 2

Main effects of different types of fiber in the fecal microbiome and metabolome of dogs

Fiber Type	Main Findings	Method	References
Beet pulp	↓ Erysipelotrichi and Fusobacteria ↑ Firmicutes and Clostridia	16S rRNA seq.	Middelbos et al, <sup>29</sup> 2010
Inulin-type fructans	↑ Firmicutes, Erysipelotrichaceae, and Turicibacteraceae	16S rRNA seq.	Alexander et al, <sup>50</sup> 2018
Inulin	↓ Enterobacteriaceae ↑ <i>Megamonas</i> and <i>Lactobacillus</i>	16S rRNA seq.	Beloshapka et al, <sup>52</sup> 2013
Potato fiber	↓ <i>Prevotella</i> and <i>Fusobacterium</i> ↑ <i>Faecalibacterium</i> , <i>Lachnospira</i> , fecal acetate, propionate and butyrate	16S rRNA seq.	Panasevich et al, <sup>48</sup> 2013; Panasevich et al, <sup>49</sup> 2015
Soybean husk	↓ <i>Clostridium</i> cluster XI ↑ Total lactobacilli, <i>Faecalibacterium</i> , <i>Bacteroides-Prevotella-Porphyrromonas</i> , and <i>Clostridium</i> cluster XIVa	qPCR	Myint et al, <sup>51</sup> 2017
Yeast cell wall	↑ <i>Bifidobacterium</i>	16S rRNA seq.	Beloshapka et al, <sup>52</sup> 2013

# Modulação da microbiota pelas fibras em cães

**Table 3**

**Summary of findings from studies that evaluated the effect of high-protein diets on the fecal microbiome of dogs**

<b>Diet</b>	<b>Main Findings</b>	<b>Time on diet, n</b>	<b>Reference</b>
Bones and raw foods (BARF)	↓ <i>Bifidobacterium</i> and <i>Faecalibacterium</i> ; ↑ <i>Fusobacteria</i> , <i>Escherichia coli</i> , <i>Streptococcus</i> , and <i>Clostridium</i>	4 wk to 9 y, n = 27	Schmidt et al, <sup>54</sup> 2018
Red meat	↓ <i>Faecalibacterium</i> , <i>Peptostreptococcus</i> , <i>Bacteroides</i> , and <i>Prevotella</i> ↑ <i>Fusobacterium</i> , <i>Lactobacillus</i> , and <i>Clostridium</i>	9 wk, n = 7	Bermingham et al, <sup>53</sup> 2017
Raw diet	↑ Richness, evenness, <i>Clostridium perfringens</i> , <i>Clostridium hiranonis</i> , <i>Dorea</i> , and <i>Fusobacterium varium</i>	At least 1 y, n = 6	Kim et al, <sup>55</sup> 2017
Kibble with boiled beef	↓ <i>Faecalibacterium prausnitzii</i> ↑ <i>Clostridium hiranonis</i> , <i>Dorea</i> , <i>Slackia</i> , and unidentified Clostridiaceae	1 wk per combination, n = 11	Herstad et al, <sup>57</sup> 2017

# Modulação da microbiota pelas fibras em gatos

**Table 5**  
Main effects of different types of fiber in the fecal microbiome and metabolome of cats

Fiber Type	Main Findings	Method	References
FOS	↑ <i>Bifidobacterium</i>	qPCR	Kanakupt et al. <sup>89</sup> 2011
	↑ Actinobacteria	16S rRNA seq.	Barry et al. <sup>39</sup> 2012
GOS	↑ <i>Bifidobacterium</i>	qPCR	Kanakupt et al. <sup>89</sup> 2011
FOS and GOS	↑ <i>Bifidobacterium</i> , total SCFA, butyrate and valerate	qPCR	Kanakupt et al. <sup>89</sup> 2011
FOS and inulin	↓ Gammaproteobacteria ↑ Veillonaceae	16S rRNA seq.	García-Mazcorro et al. <sup>42</sup> 2017
Inulin	↓ <i>Faecalibacterium</i> and <i>Fusobacterium</i> ↑ <i>Bifidobacterium</i>	16S rRNA seq.	Young et al. <sup>88</sup> 2016
Cellulose	No changes	16S rRNA seq.	Barry et al. <sup>39</sup> 2012
Wool hydrolysate	No changes	16S rRNA seq.	Deb-Choudhury et al. <sup>96</sup> 2018
Pectin	↑ Firmicutes	16S rRNA seq.	Barry et al. <sup>39</sup> 2012
Mixed insoluble fibers	↓ isobutyric, 2-methylbutyric, and isovaleric acids ↑ <i>Blautia</i> , <i>Bacteroides</i> , <i>Turicibacter</i> , acetic and propionic acids	16S rRNA seq.	Wernimont et al. <sup>97</sup> 2019
Inulin and cellulose	↓ <i>Clostridium</i> , <i>Fusobacterium</i> , and <i>Eubacterium</i> ↑ <i>Prevotella</i> , <i>Bifidobacterium</i> , <i>Lactobacillus</i> , <i>Megamonas</i> , and unclassified Lachnospiraceae	16S rRNA seq.	Hooda et al. <sup>81</sup> 2013

Abbreviations: FOS, fructooligosaccharides; GOS, galactooligosaccharides; qPCR, quantitative polymerase chain reaction; rRNA seq., ribosomal RNA sequencing; SCFA, short-chain fatty acid.

**Table 4**  
Summary of findings from studies that evaluated the effect of high-protein diets in the fecal microbiome of cats

Diet	Main Findings	Age	Time on Diet, n	Reference
High-protein low-carbohydrate dry food	↓ <i>Lactobacillus</i> , <i>Bifidobacterium</i> , and <i>Escherichia coli</i>	Kitten, weaning diet	8 wk, n = 7	Vester et al. <sup>80</sup> 2009
	↓ Actinobacteria, <i>Bifidobacterium</i> , <i>Dialister</i> , <i>Acidaminococcus</i> , <i>Megasphaera</i> , and <i>Mitsuokella</i> ↑ <i>Fusobacteria</i> , <i>Clostridium</i> , <i>Faecalibacterium</i> , <i>Ruminococcus</i> , <i>Blautia</i> , and <i>Eubacterium</i>	Kitten, weaning diet	8 wk, n = 7	Hooda et al. <sup>81</sup> 2013
to 3-day-old chicks	↑ species diversity; Affected 194 metabolic pathways, including amino acid synthesis and metabolism	Kitten, weaning diet	8 wk, n = 6	Deusch et al. <sup>82</sup> 2014
	↑ <i>Peptococcus</i> , <i>Pseudobutyrvibrio</i> , and unidentified Lachnospiraceae	Adult	10 d, n = 5	Kerr et al. <sup>83</sup> 2014
Raw	↑ <i>Clostridium</i> , <i>Fusobacterium</i> , <i>Eubacterium</i> , and molar ratio of butyrate	Adult	3 wk, n = 12	Butowski et al. <sup>84</sup> 2019
Raw plus plant fiber	↓ <i>Clostridium</i> , <i>Fusobacterium</i> , and <i>Eubacterium</i> ↑ <i>Prevotella</i>	Adult	3 wk, n = 12	Butowski et al. <sup>84</sup> 2019
Canned	↓ Firmicutes, <i>Bacteroides</i> , <i>Lactobacillus</i> , and <i>Streptococcus</i> ↑ <i>Fusobacterium</i> , <i>Clostridium</i> , unidentified Peptostreptococcaceae and Prevotellaceae	Kitten, weaning diet	9 wk, n = 10	Birmingham et al. <sup>86</sup> 2013
	↓ <i>Lactobacillus</i> , <i>Megasphaera</i> , and <i>Olsenella</i> ↑ richness, <i>Fusobacteria</i> , <i>Proteobacteria</i> , <i>Clostridium</i> , <i>Blautia</i> , <i>Bacteroides</i> , and unidentified Peptostreptococcaceae	Adult	5 wk, n = 16	Birmingham et al. <sup>62</sup> 2013
	↓ <i>Lactobacillus</i> , <i>Bifidobacterium</i> , and <i>Collinsella</i> ↑ <i>Bacteroides</i> , <i>Clostridium</i> , <i>Fusobacterium</i> , genes involved in vitamin biosynthesis, metabolism and transport	Kitten, weaning diet	9 wk, n = 10	Young et al. <sup>88</sup> 2016

(Pilla e Suchodolski, 2021)

# Desafio das fontes de fibra em dieta caseira

- Geralmente mais pobres em fibra

(Vendramini et al., 2020)

Table 1. Ingredient composition of homemade diets formulated for dogs for the present study, as fed.

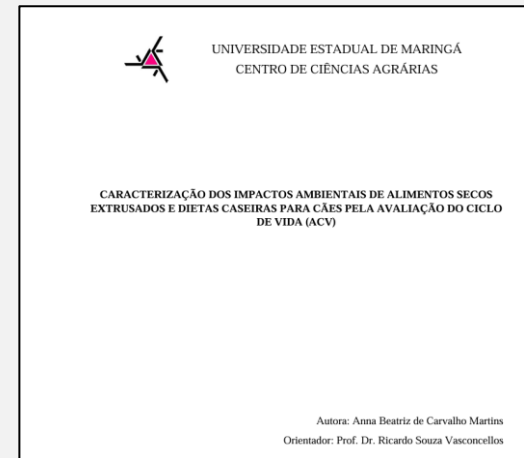
Ingredient (%)	Maintenance		Obesity		Congestive heart failure		Diabetes mellitus		Hepatic encephalopathy		Chronic kidney disease		Food hypersensitivity	
	Chicken	Beef	Chicken	Beef	Chicken	Beef	Chicken	Beef	Chicken	Beef	Chicken	Beef	Tilapia	Lamb
White rice	47.9	47.2	39.0	39.6	41.8	41.7	32.4	31.2	68.8	69.1	63.6	65.5	-	-
Potato	-	-	-	-	-	-	-	-	-	-	-	-	65.2	66.8
Chicken breast	33.6	-	30.7	-	34.8	-	26.3	-	-	-	-	-	-	-
Chicken thigh	-	-	-	-	-	-	-	-	9.8	-	18.8	-	-	-
Beef shank	-	34.4	-	-	-	36.1	-	27.0	-	8.4	-	15.5	-	-
Lean beef shank	-	-	-	29.4	-	-	-	-	-	-	-	-	-	-
Tilapia	-	-	-	-	-	-	-	-	-	-	-	-	25.7	-
Lamb	-	-	-	-	-	-	-	-	-	-	-	-	-	26.4
Beef liver	2.4	2.5	5.2	5.5	5.7	5.5	3.7	3.1	1.5	1.5	2.3	2.1	-	-
Carrot	9.9	12.0	7.3	7.6	10.4	10.3	7.1	7.4	7.4	7.6	7.3	7.8	4.1	4.1
Lentil	-	-	-	-	-	-	15.7	15.4	-	-	-	-	-	-
Zucchini	-	-	-	-	-	-	10.5	11.1	-	-	-	-	-	-
Green beans	-	-	7.0	8.1	-	-	-	-	-	-	-	-	-	-
Pumpkin	-	-	6.6	7.0	-	-	-	-	-	-	-	-	-	-
Mozzarella cheese	-	-	-	-	-	-	-	-	5.1	5.2	-	-	-	-
Vitamin and mineral supplement <sup>1</sup>	2.5	2.4	3.0	2.8	-	-	2.5	2.6	-	-	-	-	-	-
Vitamin and mineral supplement with low sodium <sup>2</sup>	-	-	-	-	2.4	2.6	-	-	4.7	4.7	-	-	-	-
Vitamin and mineral supplement without protein additives <sup>3</sup>	-	-	-	-	-	-	-	-	-	-	-	-	1.8	2.0
Vitamin and mineral supplement with low phosphorus <sup>4</sup>	-	-	-	-	-	-	-	-	-	-	5.1	4.5	-	-
Soybean oil	3.8	1.5	0.8	0.1	5.0	2.9	1.9	1.2	2.7	3.5	3.0	4.4	3.2	0.7

+/-30% FDT



# Ingredientes usados em dietas comerciais

- 10 empresas representativas
- 2 produtos de cada empresa



AMIDO	
Caseira	Extrusada Premium
Arroz integral	Ervilha
Inhame	Milho integral moído
Arroz	Quirera de arroz
Batata doce	Farelo de arroz
Mandioquinha	Farelo de trigo
Arroz parbolizado	Sorgo integral
Farinha de aveia	Cevada em grão
Batata Inglesa	Trigo integral
Ervilha	Farelo de milho
	Grão de milho

GORDURA	
Caseira	Extrusada Premium
Óleo de girassol	Óleo de peixe
Sebo bovino	Farinha de Algas (schzo.)
Óleo de linhaça	Gordura de frango
Óleo de peixe	Gordura suína
Óleo de coco	Óleo de soja
Óleo de oliva	
Óleo de canola	
Banha suíno	

# Fontes usadas

- 10 empresas representativas
- 2 produtos de cada empresa

PROTEÍNA	
Caseira	Extrusada Premium
Peito de frango	Farinha de vísceras de frango
Fígado bovino	Proteína isolada de suíno
Carne Bovina	Farelo de gluten de milho 60
Carne suína	Farinha de carne e ossos
Sardinha	Farelo de soja
Coração bovino	Farinha de atum
Fígado de frango	Farinha de soja
Shitake	CMS
Fígado suíno	Bandinha de feijão
Ovo	
Lentilha	
Língua bovina	
Lectina de soja	
Moela de frango	
Peixe Filé	
Rim bovino	
Fígado de porco	

FIBRA	
Caseira	Extrusada Premium
Abóbora	Polpa de beterraba
Chuchu	Semente de linhaça
Abobrinha	Linhaça integral moída
Cenoura	Casca de soja
Beringela	Fibra de Cana
Pepino	Celulose
Brócolis	
Vagem	
Quiabo	
Aveia em flocos	
Repolho roxo	
Semente de Linhaça	
Semente de Chia	

# Por que os tutores optam pelas dietas caseiras

- Não confiam em alimentos industrializados
- Palatabilidade
- Digestibilidade
- Customização



H. Armstrong Roberts/Retrofile/Getty Images



**Figure 1** Advert for 'Spratt's' patent cat food, which appeared in *The Cat* magazine in 1934. Courtesy of Cats Protection

# Problemas potenciais

- Não cumprimento das receitas
- Custo
- Ausência de análises
- Erros de formulação
- Dificuldade em diagnosticar falhas precocemente

## Case Report Rapport de cas

Dietary imbalances in a large breed puppy, leading to compression fractures, vitamin D deficiency, and suspected nutritional secondary hyperparathyroidism

Moran Tal, Jacqueline M. Parr, Shawn MacKenzie, Adronie Verbrugge

## Timely Topics in Nutrition



### Evaluation of recipes of home-prepared maintenance diets for dogs

Jonathan Stockman, DVM; Andrea J. Fascetti, VMD, PhD, DACVM, DACVN; Philip H. Kass, DVM, MPVM, PhD, DACVM; Jennifer A. Larsen, DVM, PhD, DACVN

Case Report



**Metabolic bone disease and central retinal degeneration in a kitten due to nutritional inadequacy of an all-meat raw diet**

Journal of Feline Medicine and Surgery  
Open Reports  
1-5  
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sagepub.co.uk/journalsPermissions.nav  
DOI: 10.1177/2055116915579682  
jfmopenreports.com  
SAGE

Catherine Lenox<sup>1</sup>, Iveta Becvarova<sup>2</sup> and Wendy Archipow<sup>3</sup>

### Seizures and severe nutrient deficiencies in a puppy fed a homemade diet

Dana Hutchinson, DVM, DACVN; Lisa M. Freeman, DVM, PhD, DACVN; Robert McCarthy, DVM, MS, DACVS; John Anastasio, DVM; Scott P. Shaw, DVM, DACVECC; James Sutherland-Smith, BVSc, DACVR

SMALL ANIMALS

Veterinary Record Case Reports

COMPANION OR PET ANIMALS

Severe nutritional deficiencies and osteopenia in a dog fed a homemade raw diet

Georgina Hall , Craig Breheny, Zohra Khan, Tobias Schwarz, Richard J Mellanby 

# Conclusão

- Efeito na saúde intestinal dependente da **composição** da dieta e menos dependente do **tipo**
- Estudos comparativos insuficientes (**delineamento**)
- Marcadores de saúde intestinal confiáveis em **longo prazo?**