Nutritional Trends & Myths in Pet Food

Prof. dr. Myriam Hesta

DVM, PhD, Dip ECVCN

Labo Dierenvoeding, Universiteit Gent

myriam.hesta@ugent.be

GHENT UNIVERSITY

FACULTY OF VETERINARY MEDICINE
accredited by EAEVE

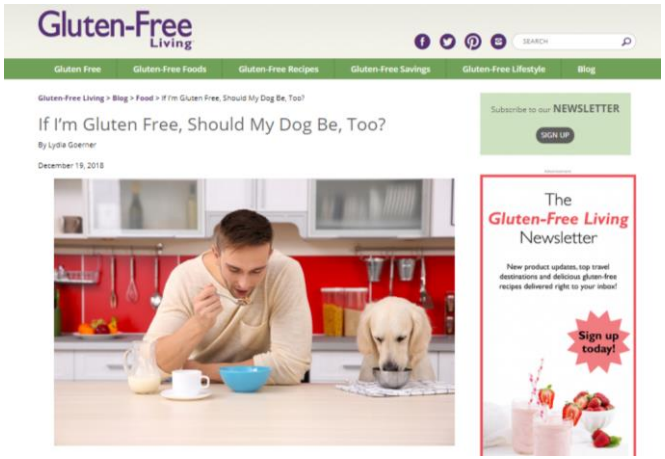


FACULTY OF VETERINARY MEDICINE
accredited by EAEVE

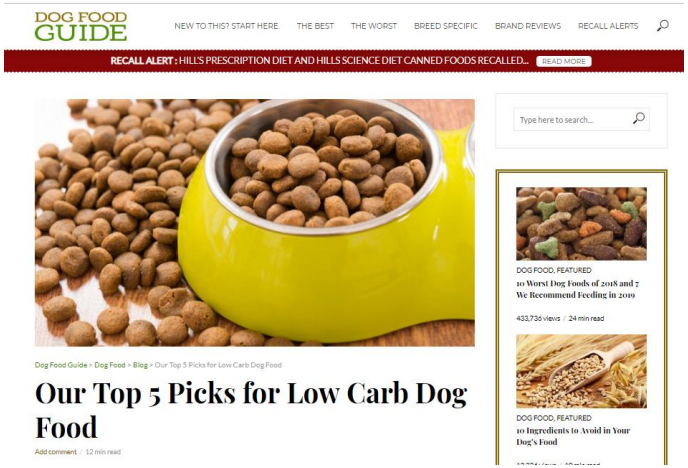
GHENT UNIVERSITY

Content

1. **Traditional commercial diets**
2. Grain free diets
3. Raw diet and BARF
4. Vegetarian and vegan diets
5. Home cooked diets









Why do owners seek alternatives?

Why do owners seek alternatives?

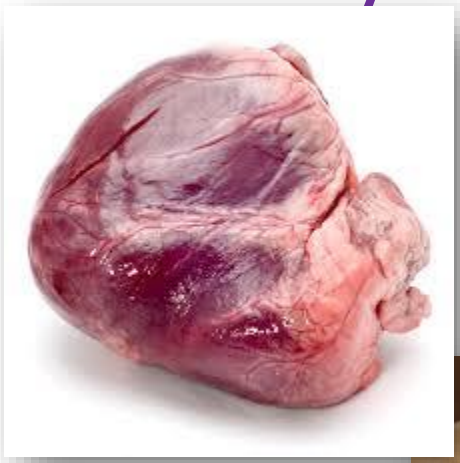






Why do owners seek alternatives?

Laflamme et al., 2014















Animal by-products?



Traditional commercial diets
Mythes

- **Animal byproducts, meat & bone meal**

1. What?

Organs, meat trimmings, bone

Contains essential nutrients <-> meat

Wolves => liver eaten first

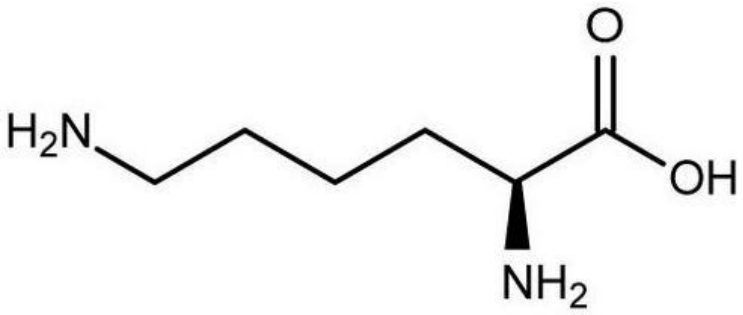
Humans: Delicacy in some countries

M&BM: process ‘rendering’ (~chicken soup) + drying

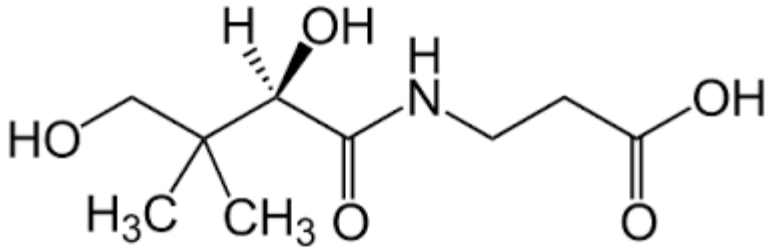
2. Contains valuable nutrients, good digestibility

3. Sustainability

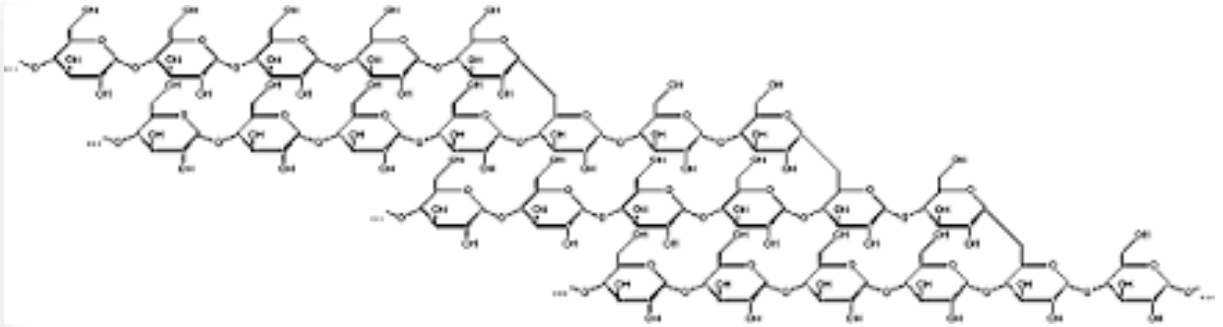
Why do owners seek alternatives?
Additives











What additives are there?

Hand et al., 2010

- Vitamins and minerals

  Pyridoxine hydrochloride = vitamine B6
- Antioxidant preservatives
- Antimicrobial preservatives
- Humectants
- Coloring agents/preservatives
- Emulsifying agents and stabilizers/thickeners
- Palatability enhancers
- …



Traditional commercial diets Mythes

Cooking destroys nutrients and lowers the nutritional value => feeding raw

- Correct cooking => increased digestibility
- Destroys potential pathogens

Why do owners seek alternatives?

Michel, 2006; Hand et al., 2010; Freeman et al., 2013



suspicion

			Reason/ Problem	Company
			Elevated monensin	ADM Animal Nutrition
		products	POSSIBLE CHEMICAL CONTAMINATION	United Pet Group, a division of Spectrum Brands, Inc.
		caw diets	Listeria monocytogenes	Vitakraft Sun Seed Inc.
			Salmonella	Loving Pets
		news	Potential contamination with Quaternary ammonium compount	United Pet Group
		CL Tablets, Tablets, USP 15mg, 30mg, 60mg, 100mg	Labeling mix-up	C.O. Truxton, Inc.
05/05/2017	Smallbatch	Dog and cat food	Salmonella	Smallbatch Pets Inc.
04/24/2017	Cocolicious	Beef & Turke Dog Food	Presence of pentobarbital	Party Animal

Why do owners seek alternatives?

Michel, 2006; Hand et al., 2010; Freeman et al., 2013











Why do owners seek alternatives?

Michel, 2006; Hand et al., 2010; Freeman et al., 2013









Why do owners seek alternatives?

Michel, 2006; Hand et al., 2010; Freeman et al., 2013









Content

1. Traditional commercial diets
2. **Grain free and other diets**
3. Raw diet and BARF
4. Vegetarian and vegan diets
5. Home cooked diets







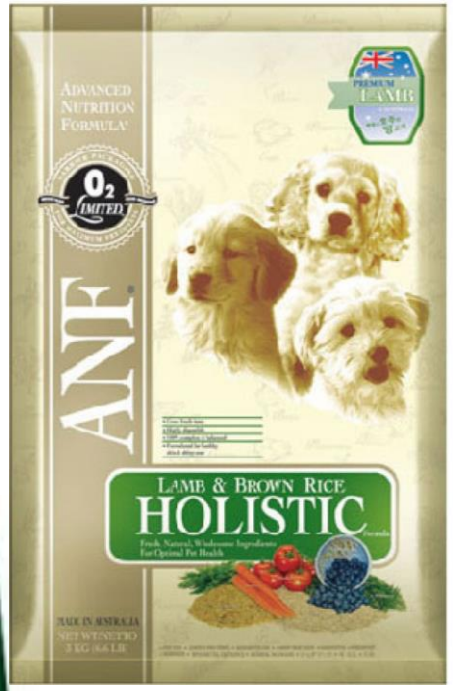




Natural/ Organic/ ”Holistic” diets/ “Human grade” diets without animal by-products



• No corn, wheat, soy or animal by-products







Definition Natural Diet

- **Legislation**

Only natural conservatives, no GMO (FEDIAF, 2011)

- **Pet owner**

➢Complete ingredients (meat, fruit, veggies)

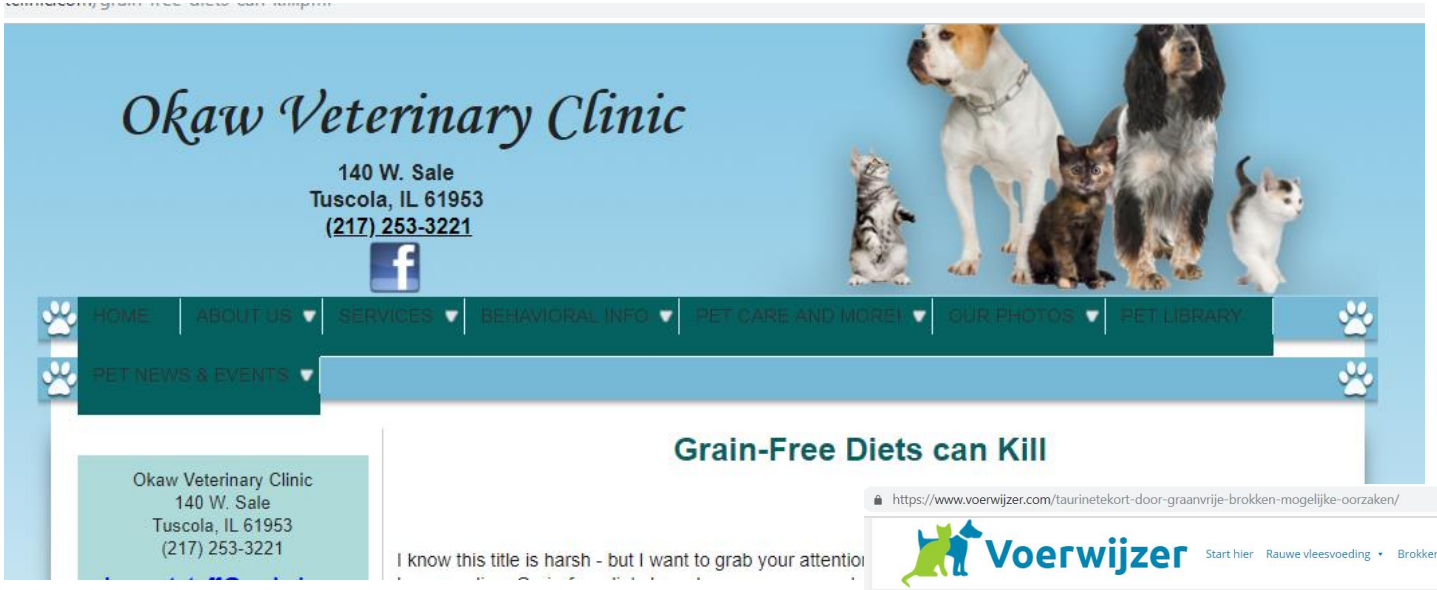
➢Unprocessed ingredients

➢Feeding ~ ancestors (physiology, preferences)

Buff et al., 2014



Grain free diets and risks?





Special topic: The association between pulse ingredients and canine dilated cardiomyopathy: addressing the knowledge gaps before establishing causation[1]

Wilfredo D. Mansilla,[†] Christopher P.F. Marinangeli,[‡] Kari J. Ekenstedt,[‖] Jennifer A. Larsen,[§] Greg Aldrich,[¶] Daniel A. Columbus,[††] Lynn Weber,[‡‡] Sarah K. Abood,[‖‖] and Anna K. Shoveller[†,2]

[†]Department of Animal Biosciences, University of Guelph, Guelph, ON N1G 2W1, Canada; and [‡]Pulse Canada, Winnipeg, Manitoba, Canada, R3C 0A5; [‖]Department of Basic Medical Sciences, College of Veterinary Medicine, Purdue University, West Lafayette, IN 47907; [§]Department of Molecular Biosciences, School of Veterinary Medicine, University of California, Davis, CA 95616; [¶]Department of Grain Science and Industry, Kansas State University, Manhattan, KS 66506; [††]Prairie Swine Centre, Saskatoon, SK S7H 5N9, Canada; [‡‡]Department of Veterinary Biomedical Sciences, University of Saskatchewan, 52 Campus Drive, Saskatoon, SK S7N 5B4, Canada; [‖‖]Department of Clinical Studies, University of Guelph, Guelph, ON N1G 2W1, Canada

ABSTRACT: In July 2018, the Food and Drug Administration warned about a possible relationship between dilated cardiomyopathy (**DCM**) in dogs and the consumption of dog food formulated with potatoes and pulse ingredients. This issue may impede utilization of pulse ingredients in dog food or consideration of alternative proteins. Pulse ingredi-

Taurine is a dispensable amino acid that has been linked to DCM in dogs. As such, adequate supply of taurine and/or precursors for taurine synthesis plays an important role in preventing DCM. However, requirements of amino acids in dogs are not well investigated and are presented in total dietary content basis which does not account for bioavailability or

Downloaded from https://academic.oup.com/jas/a

Journal of Animal Science, 2019

Grain free diets & taurine deficiency

Pulses

- Pea’s, lentiles, chickpeas, dry beans
- Already in pet food for 2 decades: protein & fiber source

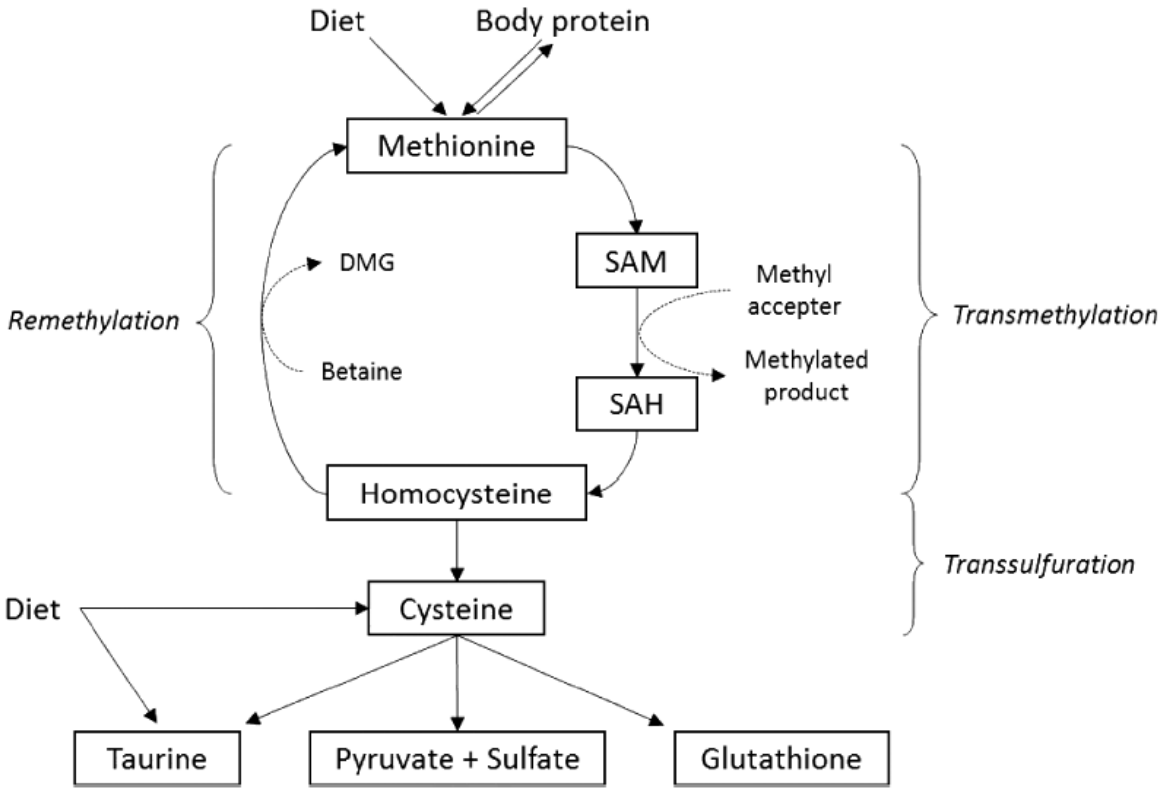


Figure 1. Metabolism of sulfur amino acids. DMG = dimethylglycine; SAH = S-denosylhomocysteine; SAM = S-adenosylmethionine.

Mansilla et al., 2019

Table 1. Crude protein (CP), fiber, selected amino acids, and carnitine contents in the principal legumes, cereals, and animal-derived ingredients used in dog food formulation

Ingredients		CP, %	Crude fiber,[1] %	α-amino acids, mg/g protein[1]			Tau, mg/kg[2]	Carnitine, mg/kg[3]
				Lys	Met	Cys		
Legumes	Fava beans	27.2	8.55	23.9	7.0	12.5	–	–
	Phaseolus beans	22.9	NR	72.9	12.7	12.7	–	–
	Kidney beans	20.0	6.40	26.5	14.0	12.0	–	–
	Lentils	26.0	NR	65.8	6.9	10.4	–	–
	Lupins	32.4	14.25	48.7	6.5	14.2	–	–
	Chick peas	20.3	6.16	69.4	14.8	21.6	–	–
	Soybean meal	47.7	3.89	62.0	13.8	14.7	–	–
Grains	Barley	11.3	3.90	35.3	17.7	22.9	–	–
	Corn, yellow dent	8.2	1.98	30.3	21.8	23.1	–	–
	Oats	11.2	2.20	43.9	60.9	32.3	–	–
	Rice	7.9	0.52	44.5	31.8	22.9	–	–
	Rye	11.7	2.71	36.9	13.7	16.3	–	–
	Sorghum	9.4	2.14	21.4	17.1	19.2	–	–
	Wheat hard, red	14.5	2.57	27.0	15.2	22.8		
Animal-derived ingredients	Beef, meat	15.0	–	77.3	28.7	15.3	296	150
	Chicken, meat and skin	17.6	–	81.2	26.7	13.1	159	57
	Chicken, by product	59.0	–	48.1	17.3	16.8	3049	120
	Lamb, ground	16.6	–	88.8	25.9	12.0	473	282.3
	Rendered meat	54.1	2.50	53.8	14.2	11.3	NR	NR

Cys = cysteine; Lys = lysine; Met = methionine; NR = not reported; Tau = taurine.
Values are presented on as-fed basis.
[1]NRC, 2006; NRC, 2012.
[2]Spitze et al. 2003.
[3]Arslan, 2006.

article-abstract/97/3983/5279069 by Proquest user on 08 March 2019

Mansilla et al., 2019

Variable effect of heat treatment on ANF

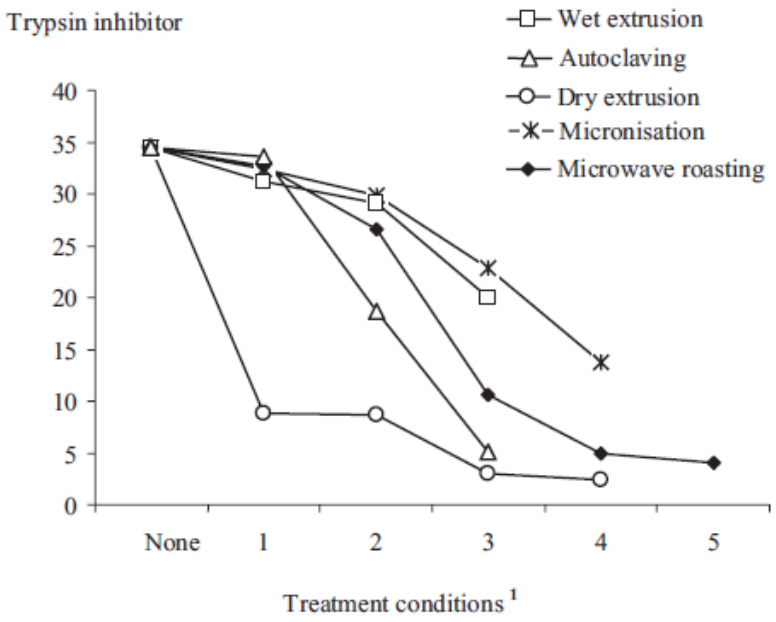


Figure 2. Effect of thermal processing methods on trypsin inhibitor levels (mg/g) soybean kernel. [1]Treatment conditions: None = no treatment; dry extrusion for 25 to 30 sec (1 = 100 °C; 2 = 125 °C; 3 = 140 °C; 4 = 150 °C); wet extrusion for 25 to 30 s with 6% to 8% added moisture (1 = 100 °C; 2 = 125 °C; 3 = 140 °C); micronization with near-infrared rays wavelength of 1.8 to 3.4 µm for 90 s (1 = 100 °C; 2 = 125 °C; 3 = 140 °C; 4 = 150 °C); microwave roasting at 800 W and 2450 MHz (1 = 1 min [kernel temp = 57 °C], 2 = 2 min [kernel temp = 88 °C], 3 = 3 min [kernel temp = 108 °C], 4 = 4 min [kernel temp =121 °C], 5 = 5 min [kernel temp = 132 °C]); Autoclaving at 120 °C and 1.2 bars (1 = 10 min, 2 = 20 min, 3 = 30 min). Reprinted with permission from Žilić et al. (2012).

Mansilla et al., 2019

Grain free diets & taurine deficiency

Multiple factors playing a role in DCM by taurine deficiency

- Other ingredients
- Taurine, Met & Cyst concentration & bioavailablility
- Carnitine concentration
- Fiber => enterohepatic cycle, bacterial degradation of taurine
- ANF

Commentary

Diet-associated dilated cardiomyopathy in dogs: what do we know?

Lisa M. Freeman DVM, PhD
Joshua A. Stern DVM, PhD
Ryan Fries DVM
Darcy B. Adin DVM
John E. Rush DVM, MS

From the Department of Clinical Sciences, Cummings School of Veterinary Medicine, Tufts University, North Grafton, MA 01536 (Freeman, Rush); Department of Medicine and Epidemiology, School of Veterinary Medicine, University of California-Davis, Davis, CA 95616 (Stern); Department of Veterinary Clinical Medicine, College of Veterinary Medicine, University of Illinois, Urbana, IL 61802 (Fries); and Department of Clinical Sciences, College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27607 (Adin).

Address correspondence to Dr. Freeman (lisa.freeman@tufts.edu).

Diet-associated DCM first came to light in cats in the late 1980s[1] and in dogs in the mid-1990s.[2] The association between diet and DCM in dogs has generally not been much in the news since the early 2000s, but over the past few years, an increasing number of DCM cases involving dogs appear to have been related to diet. The extent of this issue is not clear, not all cases have been confirmed to be linked to diet, and a true association has not been proven to exist. However, when one of the authors (RF) recently surveyed veterinary cardiologists about cases of possible diet-associated DCM in dogs examined in the past 2 years, information for > 240 cases was obtained, with responses received from the United States, United Kingdom, Canada, Israel, and Austria (unpublished data). Dogs for which breed was specified consisted of mixed-breed dogs (n = 134), Golden Retrievers (23), Labrador Retrievers (9), German Shepherd Dogs (8), Cocker Spaniels (7), and between 1 and 5 dogs each of 25 other breeds. Further, possible diet-associated

ever, Pion et al[1] published a landmark paper reporting that DCM in cats was associated with taurine deficiency and could be reversed by providing supplemental taurine. On the basis of that report and substantial subsequent research, the requirement for taurine in cat foods was increased, and taurine deficiency–related DCM is now uncommon in cats. However, it can still be seen in cats eating home-prepared diets or commercial diets prepared with inadequate nutritional expertise or quality control.

In 1995, veterinary cardiologists investigating the role of taurine deficiency in dogs with DCM suggested that certain breeds (eg, Golden Retrievers and American Cocker Spaniels) may be predisposed to taurine deficiency,[2] and a study in Cocker Spaniels subsequently showed that supplementation with taurine and L-carnitine could partially or completely reverse the disease.[4] Additional dog breeds potentially predisposed to taurine deficiency–associated DCM were identified, including Newfoundlands, English

Journal of the American Veterinary Medical Association
December 1, 2018, Vol. 253, No. 11, Pages 1390-1394
https://doi.org/10.2460/javma.253.11.1390



JLTY OF
ERINARY
edited by EAEVE

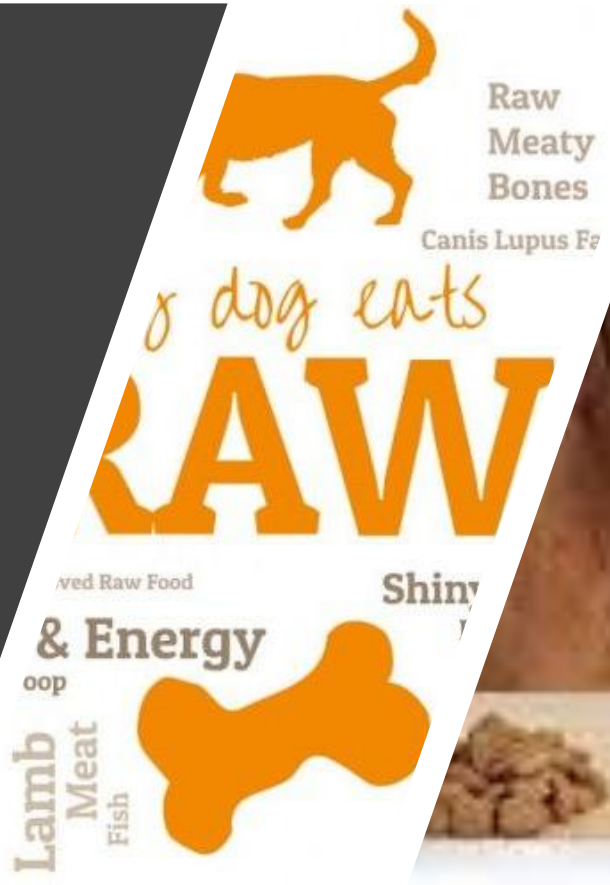




GHENT UNIVERSITY

Content

1. Traditional commercial diets
2. Grain free diets
3. **Raw diet and BARF**
4. Vegetarian and vegan diets
5. Home cooked diets





GHENT UNIVERSITY

Alternative feeding: What?

raw meat based diets

Complete Fresh meat -> BARF (Bone en Raw Food)

1. Commercial: fresh, frozen, freeze dried
2. Home made: often rotation of ingredients
3. Snacks: raw, dried, freeze dried









Raw food diets

- Not new: zoo, race dogs -> more recent: pets
- Popular due to assumed **'health benefits'**
- **Risks**: nutritional + food safety





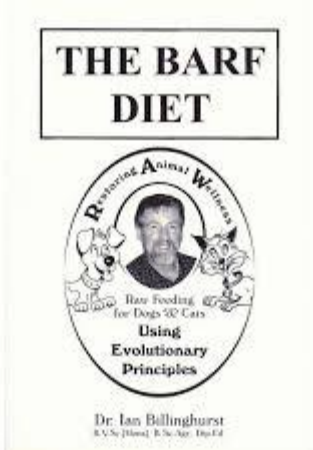


What is BARF?

Bones and Raw Food (dog, cat, ferret)

- 40-60% meat bones
- 15-20% organs
- 10-15% mix of vegetables
- 15% meat
- 5% healthy extra's





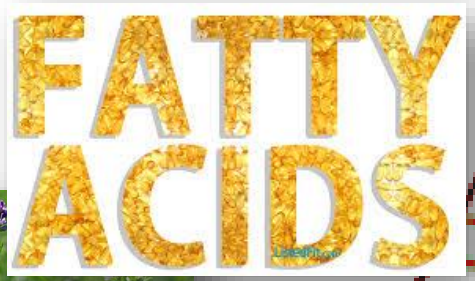
Ultimate diet

Schultze, 1998















Volhard diet

Volhard and Brown, 1995

!!

Yamato et al., 2005



































Wheat Germ









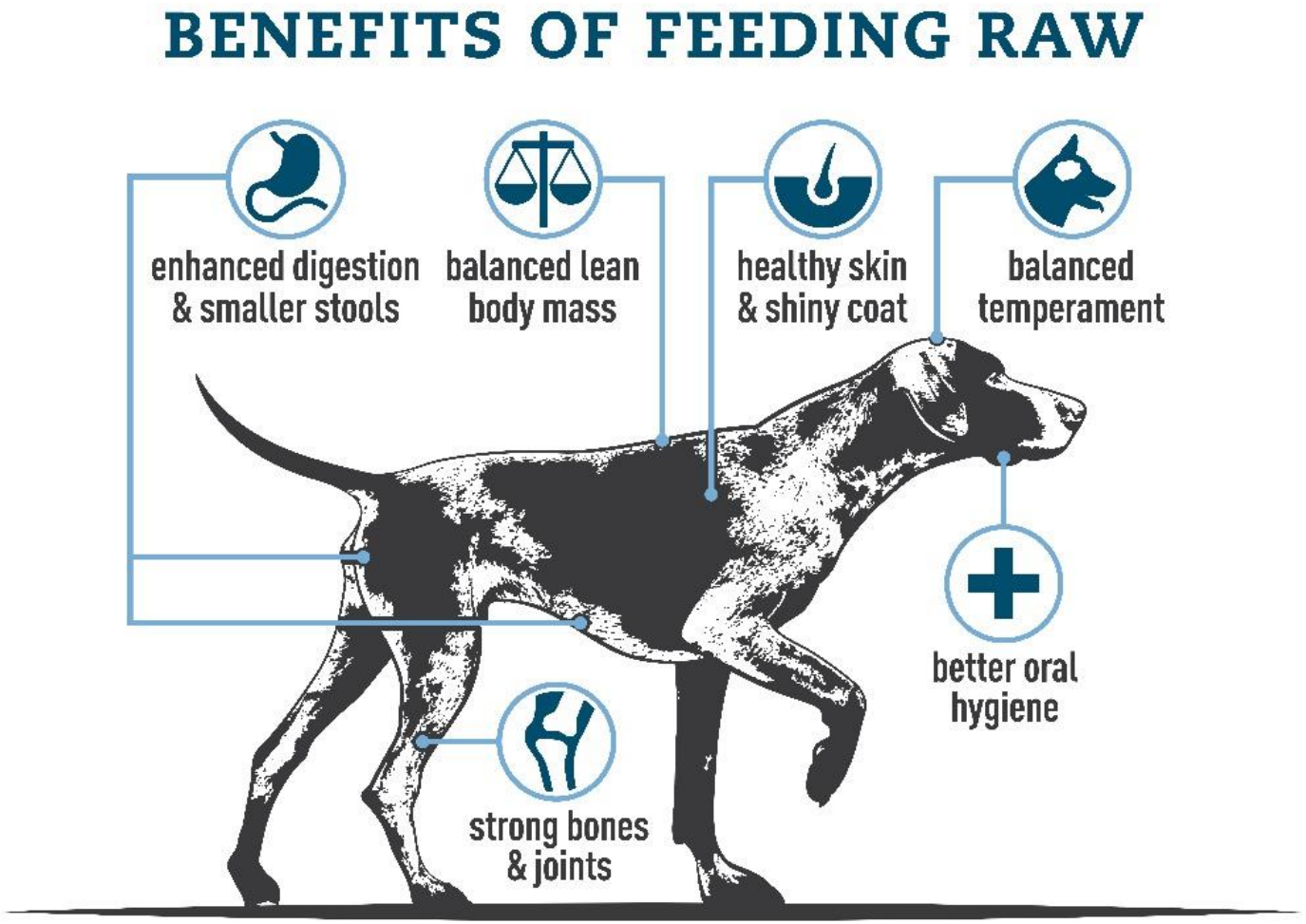


Whole carcasss feeding



RMB diets:
evidence of nutritional benefit?

Michel, 2006



Fecal Microbiota

Raw meat based diet influences faecal microbiome and end products of fermentation in healthy dogs

Misa Sandri[1*], Simeone Dal Monego[2], Giuseppe Conte[3], Sandy Sgorlon[1] and Bruno Stefanon[1]

Abstract

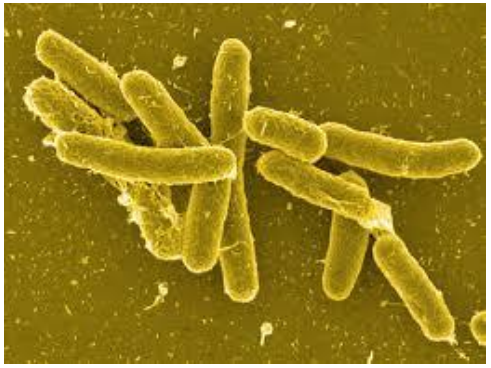
Background: Dietary intervention studies are required to deeper understand the variability of gut microbial ecosystem in healthy dogs under different feeding conditions and to improve diet formulations. The aim of the study was to investigate in dogs the influence of a raw based diet supplemented with vegetable foods on faecal microbiome in comparison with extruded food.

Methods: Eight healthy adult Boxer dogs were recruited and randomly divided in two experimental blocks of 4 individuals. Dogs were regularly fed a commercial extruded diet (RD) and starting from the beginning of the trial, one group received the raw based diet (MD) and the other group continued to be fed with the RD diet (CD) for a fortnight. After 14 days, the two groups were inverted, the CD group shifted to the MD and the MD shifted to the CD, for the next 14 days. Faeces were collected at the beginning of the study (T0), after 14 days (T14) before the change of diet and at the end of experimental period (T28) for DNA extraction and analysis of metagenome by sequencing 16SrRNA V3 and V4 regions, short chain fatty acids (SCFA), lactate and faecal score.

Results: A decreased proportion of *Lactobacillus*, *Paralactobacillus* ($P < 0.01$) and *Prevotella* ($P < 0.05$) genera was observed in the MD group while Shannon biodiversity Index significantly increased (3.31 ± 0.15) in comparison to the RD group (2.92 ± 0.31; $P < 0.05$). The MD diet significantly ($P < 0.05$) decreased the Faecal Score and increased the lactic acid concentration in the feces in comparison to the RD treatment ($P < 0.01$). Faecal acetate was negatively correlated with *Escherichia/Shigella* and *Megamonas* ($P < 0.01$), whilst butyrate was positively correlated with *Blautia* and *Peptococcus* ($P < 0.05$). Positive correlations were found between lactate and *Megamonas* ($P < 0.05$), *Escherichia/Shigella* ($P < 0.01$) and *Lactococcus* ($P < 0.01$).

Conclusion: These results suggest that the diet composition modifies faecal microbial composition and end products of fermentation. The administration of MD diet promoted a more balanced growth of bacterial communities and a

Fecal Microbiota



- **Commercial versus cooked beef => lower diversity + altered species & SCFA production** (Herstad et al., 2017)
- **Higher diversity on natural versus trad. Comm diet + differences in core microbiota** (Kim et al., 2017)
- **Lower Lactobacilli, Paralactobacilli, Prevotella on raw diet** (Sandri et al., 2017)

Evaluation of two raw diets vs a commercial cooked diet on feline growth

Journal of Feline Medicine and Surgery
1–11
© The Author(s) 2016
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/1098612X16634388
jfms.com
SAGE

Beth A Hamper[1], Joseph W Bartges[1,*] and Claudia A Kirk[1]

Abstract

Objectives The objective of this study was to determine if two raw feline diets were nutritionally adequate for kittens.

Methods Twenty-four 9-week-old kittens underwent an Association of American Feed Control Officials' (AAFCO) 10 week growth feeding trial with two raw diet groups and one cooked diet group (eight kittens in each). Morphometric measurements (weight, height and length), complete blood counts, serum chemistry, whole blood taurine and fecal cultures were evaluated.

Results Overall, the growth parameters were similar for all diet groups, indicating the two raw diets used in this study supported feline growth, within the limitations of an AAFCO growth feeding trial. Kittens fed the raw diets had lower albumin ($P = 0.010$) and higher globulin ($P = 0.04$) levels than the kittens fed the cooked diet. These lower albumin levels were not clinically significant, as all groups were still within normal age reference intervals. A red cell microcytosis ($P = 0.001$) was noted in the combination raw diet group. Increases in fecal *Clostridium perfringens* were noted in all groups, along with positive fecal *Salmonella* serovar Heidelberg and *Clostridium difficile* toxin in the combination raw diet group.

Conclusions and relevance The majority of the parameters for feline growth were similar among all groups, indicating the two raw diets studied passed an AAFCO growth trial. In theory, it is possible to pass an AAFCO growth trial but still have nutrient deficiencies in the long term due to liver and fat storage depots. Some of the raw feeders had elevated globulin and microcytosis likely associated with known enteropathogenic exposure. Disease risks to both pets and owners are obvious. Additional research in this area is needed to investigate the impact of raw diets on the health of domestic cats.

RMB diets: evidence of nutritional risk?

Schlesinger and Joffe, 2011

Journal of Feline Medicine and Surgery (2005) 7, 363–368
doi:10.1016/j.jfms.2005.05.004

ELSEVIER

jfms

CASE REPORT

Hypervitaminosis A in the cat: a review of the literature

Zoe S Polizopoulou DVM, PhD, Dip ECVCP, Assistant Professo
Michael N Patsikas DVM, PhD, Dip ECVDI, Assistant Professor
Nikolaos Roubies BSc, PhD, Associate Professor[1]

Journal of Feline Medicine and Surgery (2003) 5, 271–277
doi:10.1016/S1098-612X(03)00051-2

jfms

Feline pansteatitis revisited: hazards of unbalanced home-made diets

Jpn. J. Vet. Res. 41(2–4): 89–96 (1993)

NUTRITIONAL SECONDARY HYPERPARATHYROIDISM OCCURRING IN A STRAIN OF GERMAN SHEPHERD PUPPIES

Kayo KAWAGUCHI, Ignacia Syjuco BRAGA III, Akemi TAKAHASHI, Kenji OCHIAI and Chitoshi ITAKURA

(Accepted for publication: Sept. 9, 1993.)

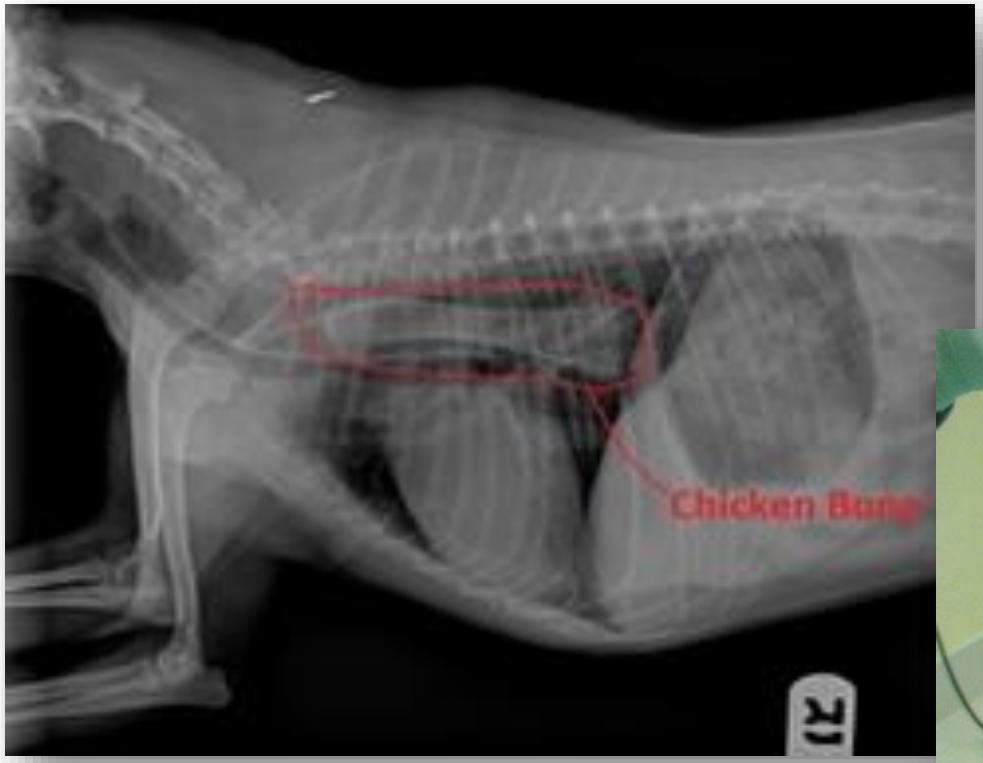
RMB diets: evidence of nutritional risk?

Freeman and Michel, 2001

Variable	AAFCO minimum	AAFCO maximum	Homemade diets* 1	Homemade diets* 2
Protein (g/100 kcal)	5.14	—	6.60	5.37
Crude fat (g/100 kcal)	1.43	—	8.10	8.17
Calcium (g/100 kcal)	0.17	0.71	0.12‡	0.15‡
Phosphorus (g/100 kcal)	0.14	0.46	0.13‡	0.06‡
Calcium:phosphorus	1	—	0.92‡	2.50‡
Potassium (g/100 kcal)	0.17	—	0.12‡	1.15
Sodium (g/100 kcal)	0.017	—	0.040	0.240
Magnesium (g/100 kcal)	0.011	0.086	0.010‡	0.170‡
Iron (mg/100 kcal)	2.3	86	3.9	2.0‡
Manganese (mg/100 kcal)	0.14	—	<0.10‡	0.09‡
Zinc (mg/100 kcal)	3.4	29	0.8‡	0.5‡
Vitamin A (IU/100 kcal)	143	7,143	5,270	4,145
Vitamin D (IU/100 kcal)	14	143	2,410‡	1,267‡
Vitamin E (IU/100 kcal)	1	29	160‡	5
Calories (kcal/100 g)	—	—	189	145

RMB diets:
evidence of disease risk?

Michel, 2006





Case: Rotweiler, 11 months

- **Male**, 41kg, BCS 4/9
- **Complaints**: panting, weight loss
- **Clinical exam**

TotT4: 116nmol/l (13-51), mild tachycardia

- **Feeding anamnese**:

Chicken and beef meat based diet

Diagnosis: Nutritional Hyperthyrodism



Cornelissen et al., 2014

RMB diets: evidence of infectious disease risk?

- Frozen, freeze dried <-> pathogens
- Comm. raw food diets: Salmonella: 20-48%
- 8/10 HMD chicken: + Salmonella
- US up to 40% chicken Hu consumption +Salmonella <-> beef, pork meat: 4%
- Also E. coli, Clostridia, Campylobacter, Toxoplasma
- Aujesky and rabies virus
- Parasites: Sarcocystis spp. Neospora caninum,…



Freeman et al., 2013; Lejeune and Hancock, 2001; Schlesinger and Joffe, 2011

Highly suspected cases of salmonellosis in two cats fed with a commercial raw meat-based diet: health risks to animals and zoonotic implications

Federica Giacometti[1*], Jacopo Magarotto[2], Andrea Serraino[1] and Silvia Piva[1]

Abstract

Background: Feeding raw meat-based diets (RMBD) to companion animals raises public health concerns for both animals and humans. While considerable attention has been paid to bacterial contamination of commercial pet food, few literature studies have investigated foodborne disease in companion animals. Salmonellosis is reported to be infrequent in cats but no known data or studies estimating feline salmonellosis are available or large-scale epidemiological studies assessing *Salmonella* risk factors.

Case presentation: Two highly suspected cases of salmonellosis in two cats fed with a commercial frozen poultry RMBD are presented, for the first time from the same household. The clinical presentation, diagnostics, treatment and follow-up are reported and the zoonotic implications are discussed.

Conclusions: This case highlights the health risks posed to both animals and owners by feeding RMBD to pets, and suggests that these risks should be considered by veterinary practitioners.

Keywords: *Salmonella* sp., Cat, Raw meat-based diet, Zoonotic risk

Epidemiol. Infect. (2013), **141**, 2526–2535. © Cambridge University Press 2013
doi:10.1017/S0950268813000356

Increased risk for *Campylobacter jejuni* and *C. coli* infection of pet origin in dog owners and evidence for genetic association between strains causing infection in humans and their pets

L. MUGHINI GRAS[1,2,3]*, J. H. SMID[2], J. A. WAGENAAR[4,5,6], M. G. J. KOENE[5], A. H. HAVELAAR[2,7], I. H. M. FRIESEMA[2], N. P. FRENCH[8], C. FLEMMING[4], J. D. GALSON[9], C. GRAZIANI[1], L. BUSANI[1] AND W. VAN PELT[2]

[1] *Department of Veterinary Public Health and Food Safety, Istituto Superiore di Sanità, Rome, Italy*

PLOS ONE

RESEARCH ARTICLE

Raw pet food as a risk factor for shedding of extended-spectrum beta-lactamase-producing *Enterobacteriaceae* in household cats

Valérie O. Baede[1c], Els M. Broens[1], Mirlin P. Span
Haitske Graveland[1], Jaap A. Wagenaar[1,2], Birgitta

Abstract

Background

Close contact between pets and owners provides the opportunity for transmission of antimicrobial resistant organisms like extended-spectrum beta-lactamase (ESBL)/AmpC beta-lactamase (AmpC)-producing *Enterobacteriaceae*, posing a risk to public health.

Objectives

To investigate whether raw feed is a risk factor for household cats to shed ESBL-producing *Enterobacteriaceae*, a cohort study was designed. Additionally, raw and non-raw commercial pet food products were screened for the presence of ESBL-producing *Enterobacteriaceae*.

Methods

Weekly fecal samples of 17 cats in the control group and 19 cats in the exposed group were collected for three weeks and analyzed for the presence of ESBL-producing *Enterobacteriaceae*. Questionnaires were obtained to determine additional risk factors. Fecal samples were cultured on MacConkey agar supplemented with 1 mg/L cefotaxime. PCR and sequence analysis was used for screening for ESBL genes in suspected isolates. Pet food samples were cultured in LB broth supplemented with 1 mg/L cefotaxime and processed as described above.

Results

In the cohort study, ESBL-producing bacteria were isolated from 3 of 51 (5.9%) samples in the control group compared to 37 of 57 (89.5%) samples in the exposed group. A significant association was found between ESBL shedding and feeding raw pet food products (OR = 31.5). No other risk factors were identified in this study. ESBL-producing

2017

Survey of owner motivations and veterinary input of owners feeding diets containing raw animal products

Stewart K. Morgan[1], Susan Willis[2] and Megan L. Shepherd[1]

[1] Department of Large Animal Clinical Sciences/Virginia-Maryland College of Veterinary Medicine, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA, United States

[2] Center for Survey Research, Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA, United States

ABSTRACT

Background. The practice of feeding of diets containing raw animal products (RAP) to pets (dogs and cats) is discouraged by veterinary organizations and governmental public health organizations. Nevertheless, the practice of feeding RAP to pets is increasing in popularity. Pet owner motivations for feeding RAP diets to pets have not been explored and the benefits of RAP diets remain largely anecdotal. We hypothesized that pet owners feeding RAP diets would not rely on veterinary advice in choosing their pet's diet. We also hypothesized that these owners would have lower levels of trust in veterinary advice with respect to nutrition relative to pet owners not feeding RAP.

Methods. An anonymous web-based survey was developed to identify pet owner motivations for feeding RAP diets, and to characterize the veterinarian-client relationships of individuals feeding RAP diets.

Results. There were 2,337 respondents and 2,171 completed surveys. Of survey respondents, 804 reported feeding RAP at the time of the survey. While 20% of pet owners feeding RAP relied on online resources to determine what or how much RAP to feed, only 9% reported consulting with a veterinarian in making decisions about feeding RAP. Pet owners feeding RAP reported lower levels of trust in veterinary advice both 'in general' and 'with respect to nutrition' than pet owners not feeding RAP. Most pet owners reported that a discussion regarding their pet's nutrition does not occur at every veterinary appointment.

Discussion. Pet owners feeding a RAP diet have lower trust in veterinary advice than pet owners not feeding a RAP diet. Owners feeding RAP are more reliant on online resources than their own veterinarian in deciding what and how much RAP to feed. Pet owners perceive that nutrition is not discussed at most veterinary appointments. Therefore, there is room for improvement in the veterinarian-client communication with regards to nutrition.

Conclusion

Effect on sustainability



Need for more large RMBD cohort studies,
but enough evidence to discuss human health implications











Content

1. Traditional commercial diets
2. Grain free diets
3. Raw diet and BARF
4. **Vegetarian and vegan diets**
5. Home cooked diets



Motivation?

- Emotional => no killing of animals
- Sustainability



Sustainability protein source

Protein: most expensive: economical as well as ecological

Factors influencing sustainability

- Source: animal versus vegetable
- Species: chicken versus beef
- Which part?
- Form (fresh, frozen, meal)
- Amount

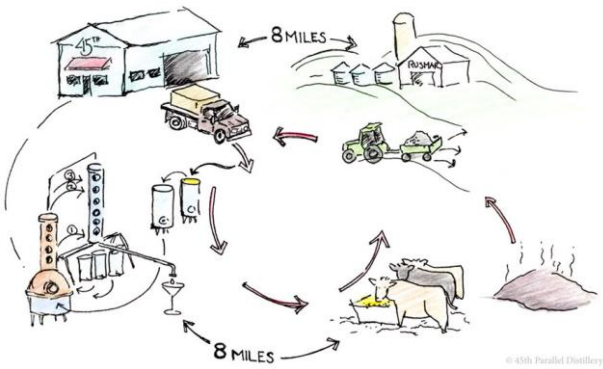


Table 3. Water footprints of common animal products[1]

Product	Water, m^3/ton
Cow's milk	1000
Chicken egg	3300
Chicken	4300
Goat	5500
Pig	6000
Sheep	10,400
Beef cattle	15,400

[1] Adapted with permission from (39).

Table 1. Fossil energy estimates to produce 1 kcal of animal protein[1]

Animal product	Fossil energy input (kcal):protein produced (kcal)
Broilers	4:1
Turkeys	10:1
Dairy (milk)	14:1
Swine	14:1
Beef cattle	40:1
Lamb	57:1

[1] Adapted with permission from (82).

Swanson et al., 2013

Protein sources and ingredients

- Competition with human food?

<-> Use of byproducts

- Alternative protein sources: lower organisms, expired human food

Swanson et al., 2013

- Feeding leftovers

Thompson et al., 2015





Other factors

FACULTY OF VETERINARY MEDICINE
accredited by EAEVE

GHENT UNIVERSITY

- High prevalence of overweight and obesity
- Overconsumption!

Swanson et al., 2013

problems including diabetes, orthopedic disease, and respiratory problems, and it can shorten life expectancy by as much as 2 y (81). Maintaining ideal body weight not only has health benefits of avoiding obesity-associated disease, but also minimizes food wastage through overconsumption. If the current population of overweight/overfed pets were suddenly fed the proper amount, it would have an immediate and significant impact on the health of those pets and overall footprint associated with the pet food industry. Thus, pet owner education programs focused on healthy body condition, proper feeding guidelines, and nutrient requirements (e.g., protein) can provide a means of influencing pet owner behavior to influence

Vegetarian or vegan diet?

- Cat = strict, dog = adapted carnivore
- Animal byproduct => sustainablility
- Commercial vegetarian diets => synthetic nutrients added
- Palatability!

Assessment of protein and amino acid concentrations and labeling adequacy of commercial vegetarian diets formulated for dogs and cats

Kayo Kanakubo, BVSc; Andrea J. Fascetti, VMD, PhD; Jennifer A. Larsen, DVM, PhD

Journal of Animal Physiology and Animal Nutrition

DOI: 10.1111/jpn.12506

ORIGINAL ARTICLE

Determination of mammalian deoxyribonucleic acid (DNA) in commercial vegetarian and vegan diets for dogs and cats

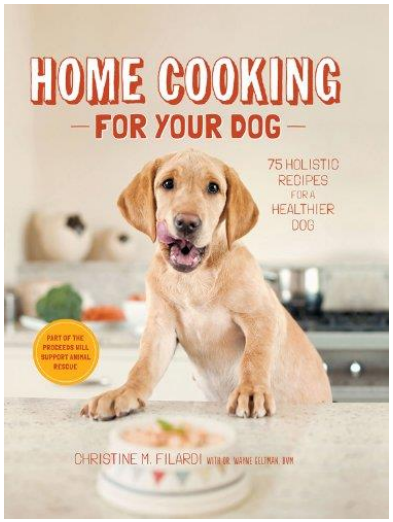
K. Kanakubo[1], A. J. Fascetti[2] and J. A. Larsen[2]

1 Veterinary Medical Teaching Hospital, School of Veterinary Medicine, University of California-Davis, Davis, CA, USA, and
2 Department of Molecular Biosciences, School of Veterinary Medicine, University of California-Davis, Davis, CA, USA

Content

1. Traditional commercial diets
2. Grain free diets
3. Raw diet and BARF
4. Vegetarian and vegan diets
5. **Home cooked diets**









RESEARCH ARTICLE

Analysis of recipes of home-prepared diets for dogs and cats published in Portuguese

Vivian Pedrinelli[1], Márcia de O. S. Gomes[2] and Aulus C. Carciofi[1]*

[1]*Department of Veterinary Clinic and Surgery, College of Agrarian and Veterinarian Sciences, UNESP – Sao Paulo State University, Via de Acesso Prof. Paulo Donato Castellane, Jaboticabal, SP, 14884-900, Brazil*

[2]*Department of Internal Medicine, College of Veterinary Medicine and Animal Science, University of Sao Paulo (USP) – São Paulo, Av. Prof. Dr. Orlando Marques de Paiva, 87, São Paulo, SP, 13690-970, Brazil*

(Received 14 November 2016 – Final revision received 16 February 2017 – Accepted 26 May 2017)

Journal of Nutritional Science (2017), vol. 6, e33, page 1 of 5 doi:10.1017/jns.2017.31

Abstract

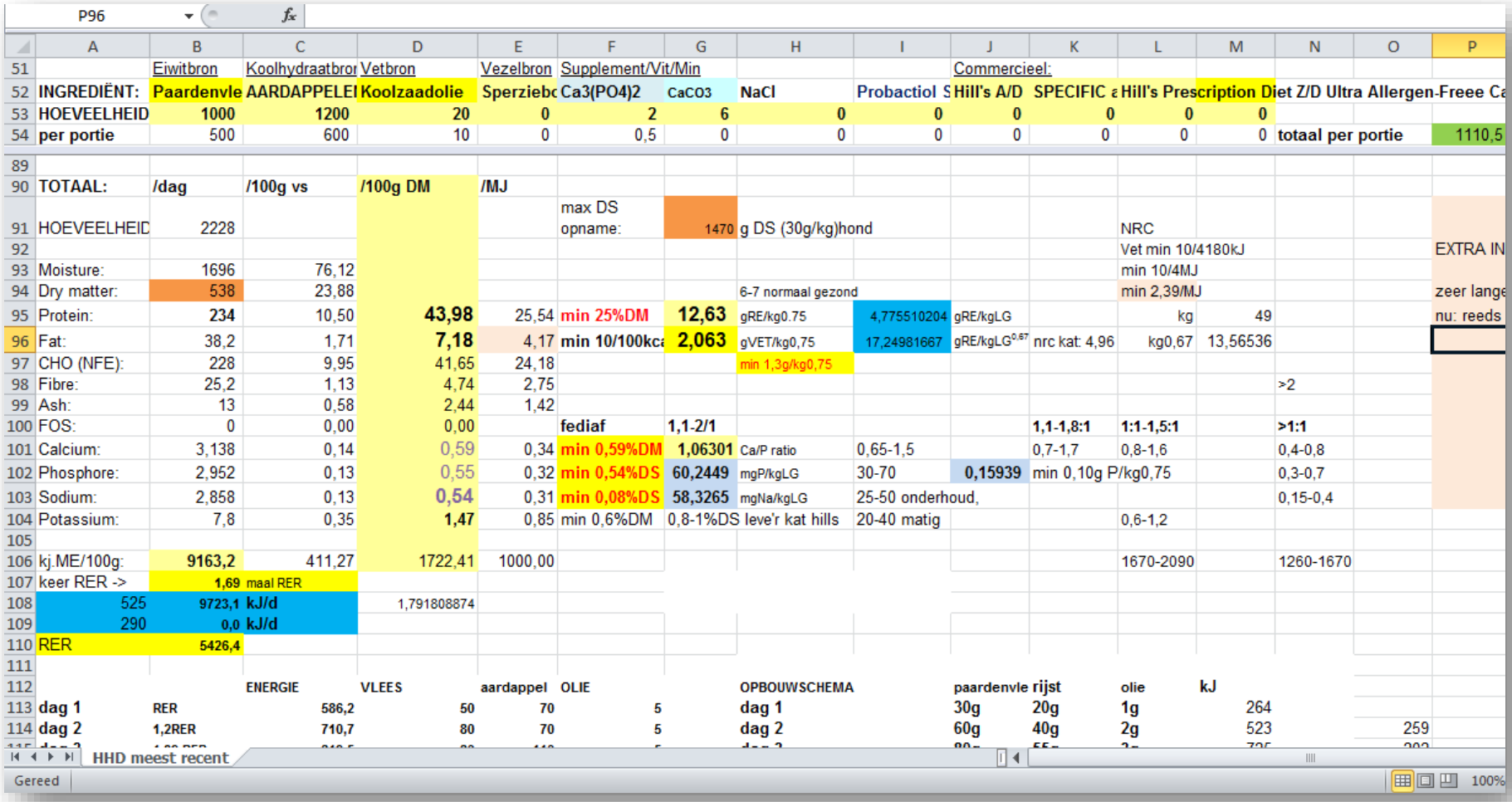
The present study evaluated recipes of home-prepared diets for dogs and cats published in Portuguese. A total of 106 diets were evaluated: eighty for dogs, twenty-four for cats and two intended for both species. A commercial software package was used to analyse the diets, and an ingredient chemical composition database was built based on the Brazilian Tables of Food Composition and United States Department of Agriculture Nutrient Database. The estimated chemical composition of each recipe was compared with the Nutritional Guidelines for Complete and Complementary Pet Food for Cats and Dogs (Fédération Européenne de L'industrie des Aliments Pour Animaux Familiers; FEDIAF, 2014) recommendations for maintenance (as units/MJ). Most recipes (48 %) had no precise determination of ingredients and quantities. All diets had at least one nutrient below the recommendations, and all investigated nutrients were deficient in at least one diet. The most frequent nutrients below recommendation were: Fe (68·3 % of the recipes for dogs; 100 % of the recipes for cats); vitamin E (82·9 % of the dog recipes; 84·6 % of the cat recipes); Zn (75·6 % for dogs; 88·4 % for cats); Ca (73·2 % for dogs; 73 % for cats); Cu (85·4 % for dogs; 69·2 % for cats); choline (85·4 % for dogs; 69·2 % for cats); riboflavin (65·8 % for dogs; 11·5 % for cats); thiamine (39 % for dogs; 80·7 % for cats); and vitamin B_{12} (61 % for dogs; 34·6 % for cats). These recipes may potentially expose animals to nutritional deficiencies, and it is important to inform the owners of the risks of providing home-prepared diets. Better training of professionals that intend to prescribe home-prepared diets is advisable.

Home made diets

- Wrong substitutions by owners
- Protein excess/deficiency
- Energy excess/deficiency
- Essential fatty acid deficiency
- Ca/P ratio
- Vit/min deficiency



Make one yourself?



P96

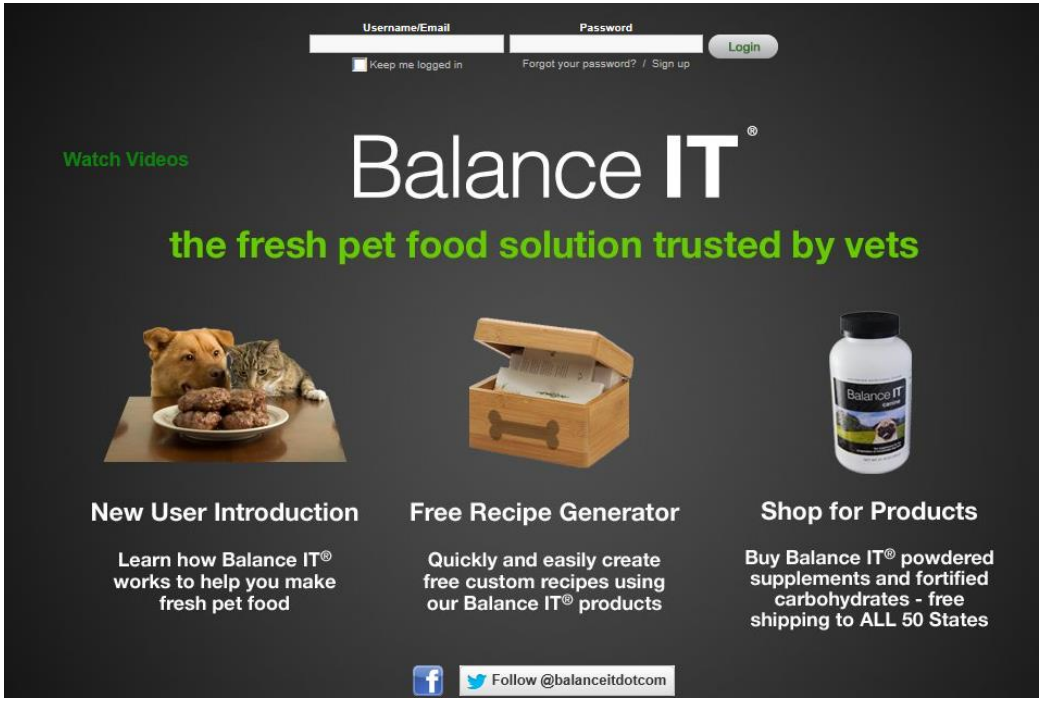
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
51		Eiwitbron	Koolhydraatbror	Vetbron	Vezelbron	Supplement/Vit/Min				Commercieel:						
52	INGREDIËNT:	Paardenvle	AARDAPPELEI	Koolzaadolie	Sperziebc	Ca3(PO4)2	CaCO3	NaCl	Probactiol S	Hill's A/D	SPECIFIC a	Hill's Prescription Diet		Z/D Ultra Allergen-Freee Ca		
53	HOEVEELHEID	1000	1200	20	0	2	6	0	0	0	0	0	0			
54	per portie	500	600	10	0	0,5	0	0	0	0	0	0	0	totaal per portie		1110,5
89																
90	TOTAAL:	/dag	/100g vs	/100g DM	/MJ											
91	HOEVEELHEID	2228				max DS opname:	1470	g DS (30g/kg)hond				NRC				
92												Vet min 10/4180kJ				EXTRA IN
93	Moisture:	1696	76,12									min 10/4MJ				
94	Dry matter:	538	23,88					6-7 normaal gezond				min 2,39/MJ				zeer lange
95	Protein:	234	10,50	43,98	25,54	min 25%DM	12,63	gRE/kg0.75	4,775510204	gRE/kgLG		kg	49			nu: reeds
96	Fat:	38,2	1,71	7,18	4,17	min 10/100kca	2,063	gVET/kg0,75	17,24981667	gRE/kgLG^{0,67}	nrc kat: 4,96	kg0,67	13,56536			
97	CHO (NFE):	228	9,95	41,65	24,18			min 1,3g/kg0,75								
98	Fibre:	25,2	1,13	4,74	2,75									>2		
99	Ash:	13	0,58	2,44	1,42											
100	FOS:	0	0,00	0,00		fediaf	1,1-2/1				1,1-1,8:1	1:1-1,5:1		>1:1		
101	Calcium:	3,138	0,14	0,59	0,34	min 0,59%DM	1,06301	Ca/P ratio	0,65-1,5		0,7-1,7	0,8-1,6		0,4-0,8		
102	Phosphore:	2,952	0,13	0,55	0,32	min 0,54%DS	60,2449	mgP/kgLG	30-70	0,15939	min 0,10g P/kg0,75			0,3-0,7		
103	Sodium:	2,858	0,13	0,54	0,31	min 0,08%DS	58,3265	mgNa/kgLG	25-50 onderhoud,					0,15-0,4		
104	Potassium:	7,8	0,35	1,47	0,85	min 0,6%DM	0,8-1%DS	leve'r kat hills	20-40 matig			0,6-1,2				
105																
106	kj.ME/100g:	9163,2	411,27	1722,41	1000,00							1670-2090		1260-1670		
107	keer RER ->	1,69	maal RER													
108	525	9723,1	kJ/d	1,791808874												
109	290	0,0	kJ/d													
110	RER	5426,4														
111																
112			ENERGIE	VLEES	aardappel	OLIE		OPBOUWSCHEMA		paardenvle	rijst	olie	kJ			
113	dag 1	RER	586,2	50	70	5		dag 1		30g	20g	1g	264			
114	dag 2	1,2RER	710,7	80	70	5		dag 2		60g	40g	2g	523		259	

HHD meest recent

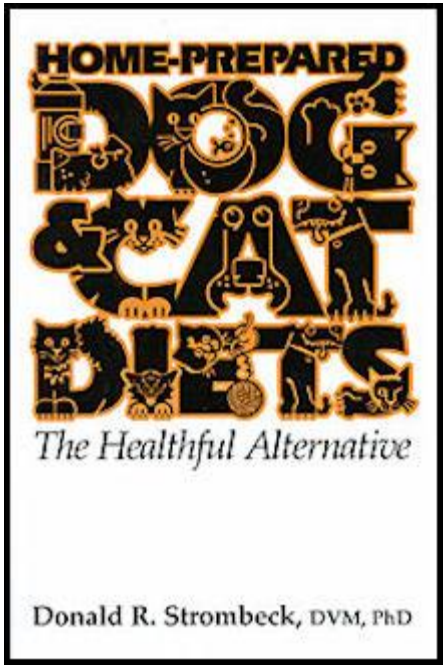
Gereed

100%

Make one yourself?



https://secure.balanceit.com/



ISBN-13: 978-0813821498

Software: University of Munich:
Dobenecker@lrz.uni-muenchen.de

Practical tips for owners

- Mix ingredients
- Cooking <-> pathogens
  digestibility
- Weight of ingredients: raw or cooked?
- Vitamin mineral supplement: no heating

Conclusion

Alternative pet food

- At the moment too much risks factors
- Evaluation by nutritionist

=> Need for more safe and balanced alternatives

