

PETFOOD FORUM EUROPE presents:

Emerging Pet Food Nutrition Trends

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Vegan and other alternative
pet foods for dogs and cats

PROF. ANDREW KNIGHT

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Vegan and other alternative
pet foods for dogs and cats

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The evidence to date



Evaluation of cats fed vegetarian diets and attitudes of their caregivers

Lorelei A. Wakefield, VMD; Frances S. Shofer, PhD; Kathryn E. Michel, DVM, DACVN

Objective—To determine motivation and feeding practices of people who feed their cats vegetarian diets as well as taurine and cobalamin status of cats consuming vegetarian diets.

Design—Cross-sectional study.

Animals—34 cats that had been exclusively fed a commercial or homemade vegetarian diet and 52 cats that had been fed a conventional diet for ≥ 1 year.

Procedures—Participants were recruited through a Web site and from attendees of a national animal welfare conference. Caregivers of cats in both groups answered a telephone questionnaire regarding feeding practices for their cats. Blood was obtained from a subset of cats that had been fed vegetarian diets. Blood and plasma taurine and serum cobalamin concentrations were measured.

Results—People who fed vegetarian diets to their cats did so largely for ethical considerations and were more likely than people who fed conventional diets to believe that there are health benefits associated with a vegetarian diet and that conventional commercial cat foods are unwholesome. Both groups were aware of the potential health problems that could arise from improperly formulated vegetarian diets. All cats evaluated had serum cobalamin concentrations within reference range, and 14 of 17 had blood taurine concentrations within reference range.

Conclusions and Clinical Relevance—Vegetarian diets are fed to cats primarily for ethical considerations. Results of this study should aid practitioners in communicating with and providing advice to such clients. (*J Am Vet Med Assoc* 2006;229:70–73)

Vegetarianism has become increasingly popular in the United States. Individuals choose a vegetarian lifestyle for various reasons such as ethical, health, or religious considerations or taste preference. It is well-known that cats are obligate carnivores (ie, some of their required nutrients are only found naturally in animal sources). Despite this fact, some people feed their cats a vegetarian diet. Commercially prepared vegetarian cat foods, home-prepared diets, and supplements can be added to or replace standard commercial diets. Such products and recipes, along with related information, are often found on the Internet. Presently, in the United States, there are 2 cat food product manufac-

From the Department of Clinical Studies, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA 19104-6010. Supported by a Veterinary Student Summer Research Grant from the Nestlé Purina PetCare Company, St Louis, Mo. Dr. Michel is a member of the Nestlé Purina Nutritional Advisory Council. Presented in part at the 2004 Nestlé Purina Nutrition Forum, St Louis, Mo, October 2004 and the 2005 American Academy of Veterinary Nutrition Symposium, Baltimore, June 2005. Address correspondence to Dr. Michel.

ABBREVIATIONS	
AAFCO	Association of American Feed Control Officials
LUTD	Lower urinary tract disease

turers that exclude all animal-derived ingredients, including dairy, from their products. These foods are formulated to meet the AAFCO Cat Food Nutrient Profiles. The manufacturers use the formulation method rather than an AAFCO protocol feeding trial to substantiate claims of nutritional adequacy.

Several studies have called into question the nutritional adequacy of a vegetarian diet for cats. A 2004 study¹ found that 2 commercially available vegetarian cat foods failed to meet AAFCO Cat Food Nutrient Profiles on the basis of nutritional analysis. Both diets were deficient in taurine and arachidonic acid, and 1 was also deficient in vitamin A.¹ In the literature is a published abstract as well as a case report of nutritional deficiencies in cats fed vegetarian diets.^{2,4} Diets other than those found deficient in the 2004 study¹ had been fed to the cats in these 2 earlier reports.^{2,4}

The purpose of the study reported here was to determine motivation and feeding practices of people who feed their cats vegetarian diets as well as taurine and cobalamin status of cats consuming vegetarian diets.

Materials and Methods

Study participants were recruited through a Web site created specifically for recruitment purposes.⁵ The Web site shared reciprocal links with other sites, including sites promoting vegetarian lifestyles (for humans as well as companion animals) and animal welfare. Attendees of a national animal welfare conference were also recruited for participation in the study.⁶ The study underwent institutional review and approval.

Two groups of cats and their caregivers from households in which cats were exclusively fed a commercial or homemade vegetarian diet for ≥ 1 year (group V) and from households in which cats were exclusively fed a conventional feline diet for ≥ 1 year (group C) were investigated. All cats were required to have a veterinary practice of record and to have been evaluated at least once at that practice over the course of 1 year. Only 1 cat per household was included, and all participants had to reside in the United States. For multiple-cat households, the caregiver was instructed to respond about the oldest cat.

A telephone questionnaire was developed to gather information about the feeding practices and motivation of people who chose to feed their cats vegetarian diets. The questionnaire collected information about signalment, housing (including whether there were other pets in the household and whether the study cat was permitted outdoors), body condition, details of the diet including any supplements or treats fed, and the caregiver's perception of the cat's health status. With regard to feeding a vegetarian diet, the caregivers were asked why they had made this choice, whether they were aware of any health benefits or risks of such a diet,

1st large-scale study of the long-term health of vegetarian cats

- Wakefield L. *et al* (2006).
J Amer Vet Med Assoc. 229: 70-73.



- 34 cats maintained on vegetarian diets for 1+ yrs
- 52 cats maintained on meat-based diets for 1+ yrs

Variable	Vegetarians	Carnivores	<i>P</i> value
Age (mean +/- SD)	7.0 +/- 4.7	7.8 +/- 4.8	0.48
No. of years diet fed (mean +/- SD)	4.6 +/- 4.1	6.5 +/- 4.7	0.06
Sex distribution (spayed female; castrated male [%])	38;62	56;44	0.13
Kept strictly indoors (%)	65	69	0.80
Reported to be in ideal body condition (%)	82	65	0.17
Reported to be healthy or generally healthy (%)	97	96	0.38

- No significant differences in age, sex, body condition, housing, or perceived health status.
- Most cats described as healthy or generally healthy.



An experimental meat-free diet maintained haematological characteristics in sprint-racing sled dogs

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A dog's nutrient requirements can theoretically be met from a properly balanced meat-free diet; however, proof for this is lacking. Exercise places additional demands on the body, and dogs fed a meat-free diet may be at increased risk of developing sports anaemia. We hypothesised that exercising dogs would remain in good health and not develop anaemia when fed a nutritionally balanced meat-free diet. To this end, twelve sprint-racing Siberian huskies were fed either a commercial diet recommended for active dogs (*n* 6), or a meat-free diet formulated to the same nutrient specifications (*n* 6). The commercial diet contained 43% poultry meal, whereas soyabean meal and maize gluten made up 43% of the meat-free diet, as the main protein ingredients. Dogs were fed these diets as their sole nutrient intake for 16 weeks, including 10 weeks of competitive racing. Blood samples were collected at weeks 0, 3, 8 and 16, and veterinary health checks were conducted at weeks 0, 8 and 16. Haematology results for all dogs, irrespective of diet, were within normal range throughout the study and the consulting veterinarian assessed all dogs to be in excellent physical condition. No dogs in the present study developed anaemia. On the contrary, erythrocyte counts and Hb values increased significantly over time ($P < 0.01$) in both groups of dogs. The present study is the first to demonstrate that a carefully balanced meat-free diet can maintain normal haematological values in exercising dogs.

Sled dogs: Exercise: Vegetarian diet: Blood count

There has been a steady increase in the number of articles on vegetarian nutrition in humans appearing in the biomedical literature, and this has been attributed to the increased popularity of vegetarianism⁽¹⁾ and the documented health benefits associated with well-balanced vegetarian diets⁽²⁾. In contrast to this, there is a dearth of research into vegetarian nutrition in the canine. In this regard, some dog and cat owners wish to feed their pets a totally meat-free diet⁽³⁾ for the same ethical reasons that they themselves are vegetarian⁽⁴⁾. However, none of the currently available meat-free dog and cat foods base their claims of nutritional adequacy on recognised feeding protocols, such as those specified by the Association of American Feed Control Officials (AAFCO)⁽⁵⁾. Furthermore, an independent analysis of two commercial vegan diets for cats, claiming to be nutritionally complete and balanced, found the diets to have multiple nutrient deficiencies⁽⁶⁾.

Unlike the obligatory carnivorous cat, dogs can synthesise nutrients such as taurine and vitamin A⁽⁷⁾ and theoretically it is possible for the dog to subsist on a diet based solely on plant ingredients. Commercial dry dog foods typically contain a high proportion of plant ingredients, as a high grain content is necessary for successful extrusion⁽⁸⁾. It is only a small step from some of the popular cereal-based dry dog foods to one

that contains no meat at all. Conceptually, however, the gap is much larger, and demonstrating that a meat-free diet is adequate in sedentary dogs will not change the perception of many dog owners that meat is required for dogs that are actively working, or racing⁽⁹⁾. For this reason, sprint-racing sled dogs were chosen for our experiment to challenge the concept that meat is an essential dietary ingredient for exercising dogs. Our aim was to develop a nutritionally adequate meat-free diet, based on chemical analysis, and to demonstrate nutritional adequacy by feeding the diet in a controlled experiment to active dogs. We hypothesised that dogs would remain in good health, based on veterinary health checks and haematological characteristics, and not develop anaemia.

Experimental methods

Twelve pure-bred Siberian huskies participated in the study, which ran from 24 May to 20 September 2004 to coincide with the Australian sled-dog racing season. The experiment was of 16 weeks' duration, incorporating 2 weeks of pre-race training, 10 weeks of competitive racing and 4 weeks of recovery. Throughout the study, dogs were fed either the experimental meat-free diet (*n* 6) or the meat-based control

Sprint-racing sled dogs

- Brown *et al* (2009).
Brit J Nutr. 102: 1318-1323.

Abbreviations: BW, body weight; CP, crude protein; Cr, creatine; ME, metabolisable energy; PCV, packed cell volume.

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- 12 sprint-racing Siberian huskies were fed either a commercial diet recommended for active dogs (n 6), or a meat-free diet formulated to the same nutrient specifications (n 6)
- Sole nutrient intake for 16 weeks, including 10 weeks of competitive racing
- Blood samples were collected at weeks 0, 3, 8 and 16, and veterinary health checks were conducted at weeks 0, 8 and 16
- Haematology results for all dogs, irrespective of diet, were within normal range throughout the study
- The consulting veterinarian assessed all dogs to be in excellent physical condition





animals

Review

Vegetarian versus Meat-Based Diets for Companion Animals

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<http://www.mdpi.com/2076-2615/6/9/57>



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“Both cats and dogs may thrive on vegetarian diets, but these must be nutritionally complete and reasonably balanced. Owners should also regularly monitor urinary acidity, and should correct urinary alkalinisation through appropriate dietary additives, if necessary.”



Dietary change

- Easing the transition
- Safeguarding health
 1. Use a complete and balanced nutritional supplement or complete diet
 2. Prevent urinary alkalization and urolithiasis (the formation of urinary crystals and stones)



PET FOOD INNOVATION

For Pets, Their People and Our Planet





Dr. Andrew Knight
 (Cat & Dog Veterinarian)
 European Veterinary Specialist in
 Welfare Science, Ethics and Law
 Fellow, Oxford Centre for Animal Ethics

- Dairy Fr
- Gluten F
- Cholesterol
- Bases of Organic
- Half the fat of Dai
- Suitable for Veggies
- Hand made in Sw
- Made with Filtered & Er
- Perfect for Lactose
- Great for Gift Baskets,
Pizzas, etc
- ect for Catered Ev
- ed & Breakfasts

Is it unnatural for cats and dogs to be on a vegetarian or vegan diet?

Vegusto UK

  420

1,681

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 52  3



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RESEARCH ARTICLE

Open Access

A cross-sectional study of owner-reported health in Canadian and American cats fed meat- and plant-based diets



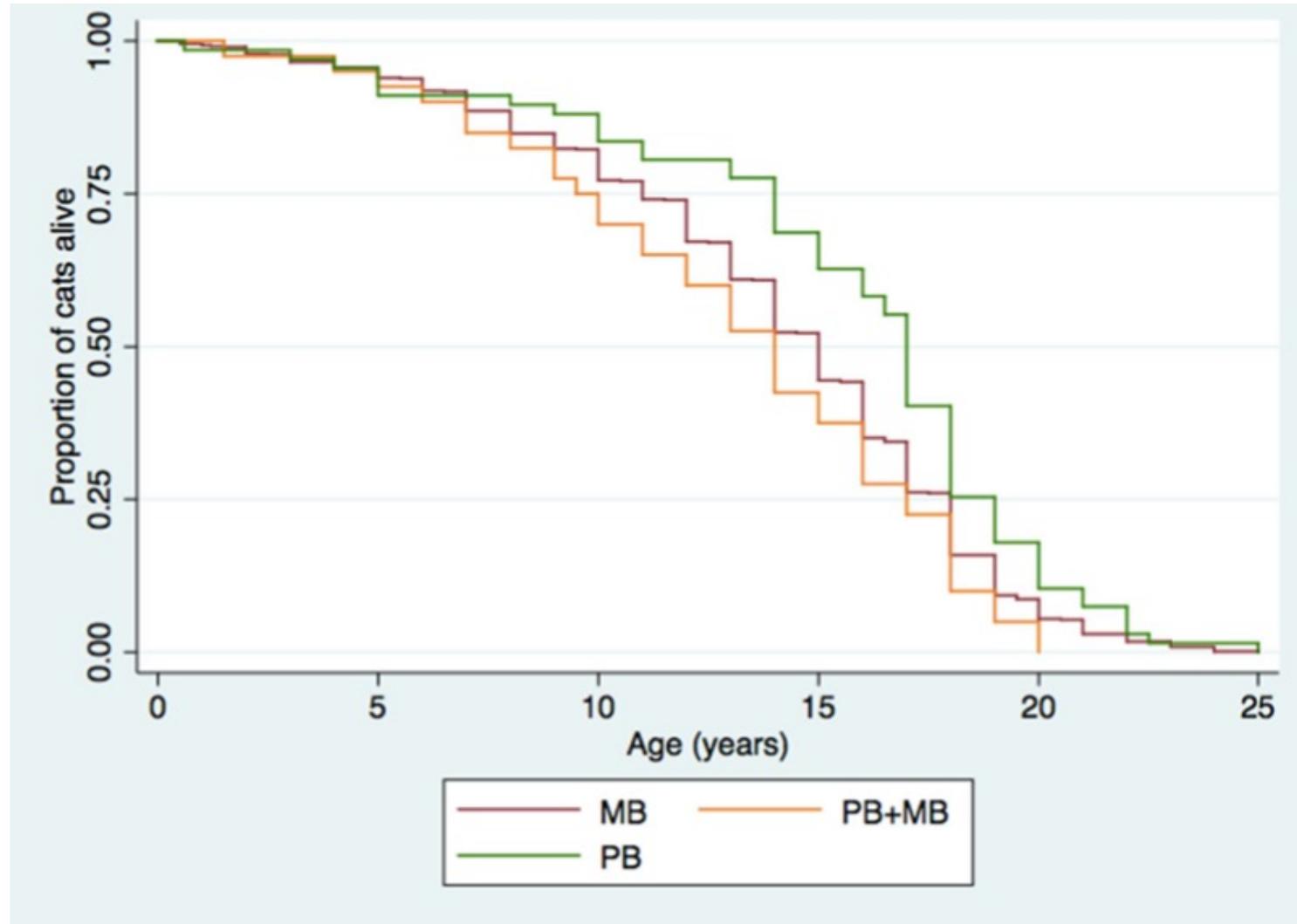
Sarah A. S. Dodd^{1,2}, Cate Dewey¹, Deep Khosa¹ and Adronie Verbrugghe^{2*} 



Results: A total of 1325 questionnaires were complete enough for inclusion. The only exclusion criterion was failure to answer all questions. Most cats, 65% (667/1026), represented in the survey were fed a meat-based diet and 18.2% (187/1026) were fed a plant-based diet, with the rest fed either a combination of plant-based with meat-based (69/1026, 6.7%) or indeterminable (103/1026, 10%). Cat age ranged from 4 months to 23 years, with a median of 7 years, and was not associated with diet type. No differences in reported lifespan were detected between diet types. Fewer cats fed plant-based diets reported to have gastrointestinal and hepatic disorders. Cats fed plant-based diets were reported to have more ideal body condition scores than cats fed a meat-based diet. More owners of cats fed plant-based diets reported their cat to be in very good health.

Conclusions: Cat owner perception of the health and wellness of cats does not appear to be adversely affected by being fed a plant-based diet. Contrary to expectations, owners perceived no body system or disorder to be at particular risk when feeding a plant-based diet to cats. This study collected information from cat owners and is subject to bias, as well as methodological limitations. Further research is warranted to determine if these results are replicable in a prospective investigation.





Previous cats



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Consumer concerns



RESEARCH ARTICLE

Plant-based (vegan) diets for pets: A survey of pet owner attitudes and feeding practices

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Only 27% (58/212) of vegans reported feeding their pets a plant-based diet, yet 78% (131/168) of vegan pet owners indicated they would feed a plant-based diet to their pet if one were available which met the pet owners' required criteria (Figs 2 and 3). In total, 35% (1,083/3,130) of pet owners who did not already feed a plant-based diet to their pet indicated interest in doing so, with 55% of those pet owners (599/1,083) stating further stipulations needed to be met before they would do so. Of these pet owners who indicated further stipulations, 45% (269/599) reported a need for further evidence of nutritional sufficiency. Veterinary approval (20%; 122/599) and greater availability (20%; 117/599) were also commonly reported. Motiva-





Consumer survey



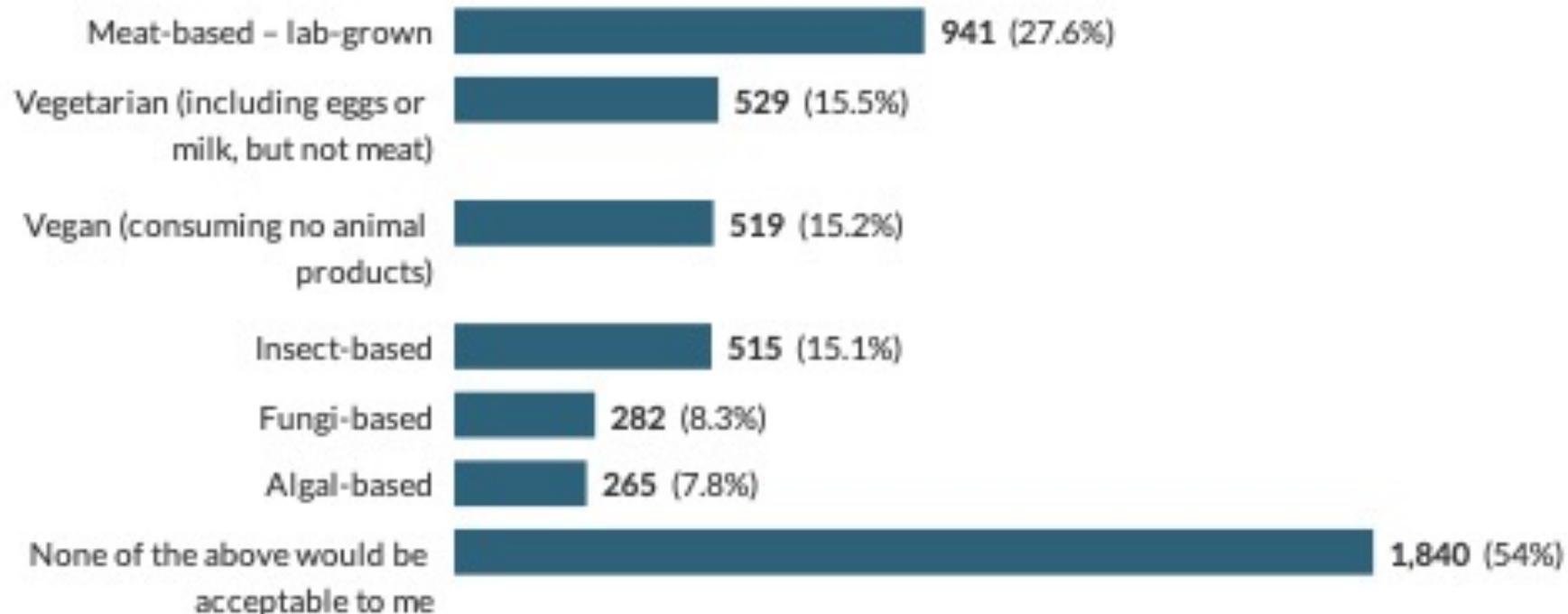
Nutritional soundness and quality control of dog and cat diets - survey of pet food manufacturers

Purpose of this research

The pet food sector is expanding. Driven by a range of contemporary concerns about the health of their animals and environmental sustainability, consumers are increasingly interested in new and emerging pet food diets, such as those based on raw-, plant-, cell-, insect-, fungal- and algal-based protein sources. This potentially allows companies to expand their range of product offerings, increasing earnings. However, surveys have also indicated that concerns about nutritional soundness inhibit many consumers from purchasing these new products. Yet, there seems to be no published evidence that nutritional soundness and quality control vary with main ingredient type. Evidence of consistency in manufacturing approaches could reassure such consumers, unlocking this emerging market. Hence, this study aims to discern whether pet food manufacturers have consistent approaches to ensuring the nutritional soundness and quality control of their products, or whether this varies depending on the main ingredient type.

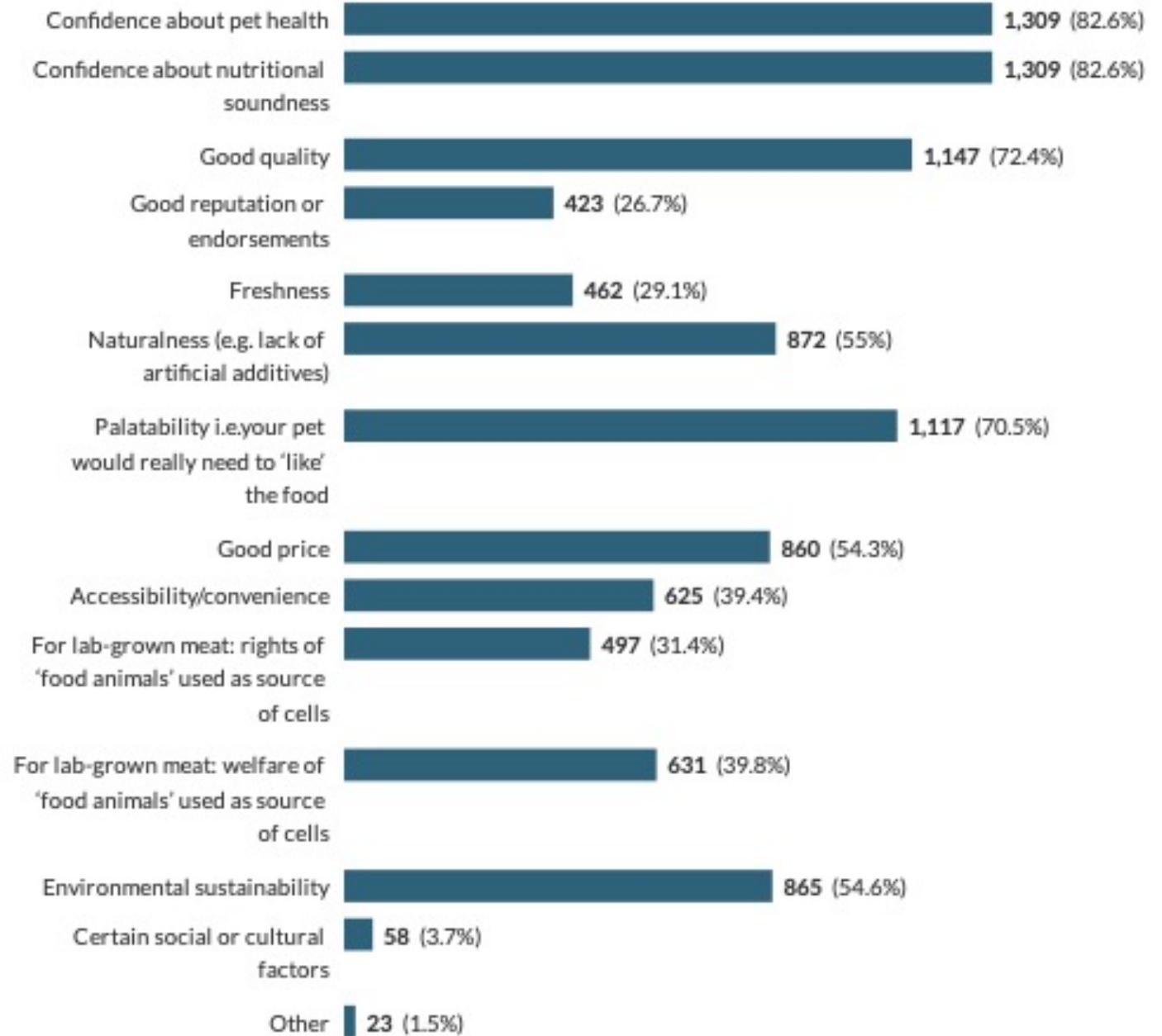
Manufacturers
survey

If you could choose other options that offered your desired attributes and met your standards, might you realistically choose any of the following: (multiple answers are OK)



Multi answer: Percentage of respondents who selected each answer option (e.g. 100% would represent that all this question's respondents chose that option)

What would be essential for this new diet to provide, before you would choose it?



Top consumer concerns



Pet health



Nutritional soundness



Good quality



Palatability



Environmental sustainability

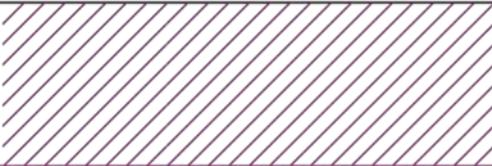
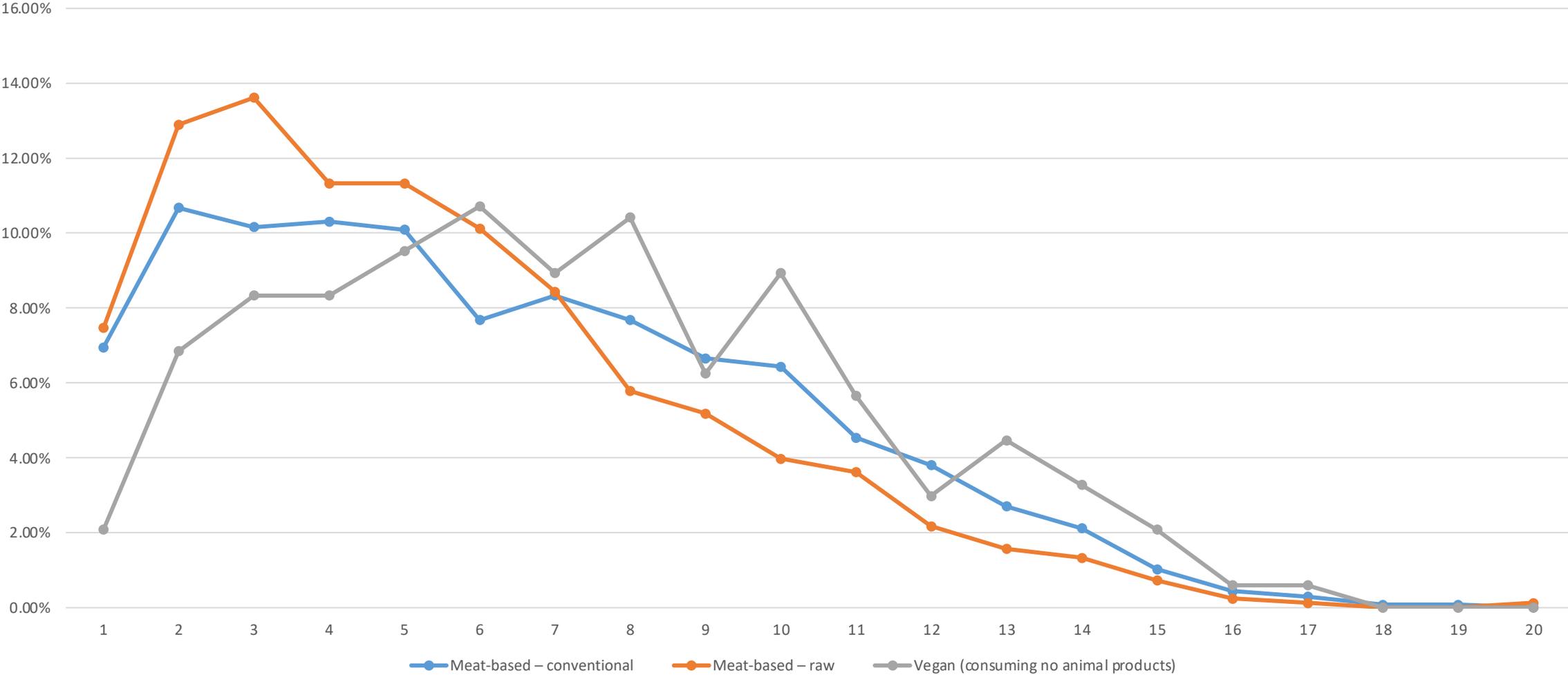


Health outcomes - 2,536 dogs

Conventional meat	Raw meat	Vegan	Total
1370	830	336	2536



Fig. X. Proportions of ages of 2,534 dogs fed the three main diets.



5 general health indicators

- on meds or not
- progressed to therapeutic diet or not
- no. of vet visits in last year
- reported opinion of vet re health status
- opinion of owner re health status

22 specific disorders

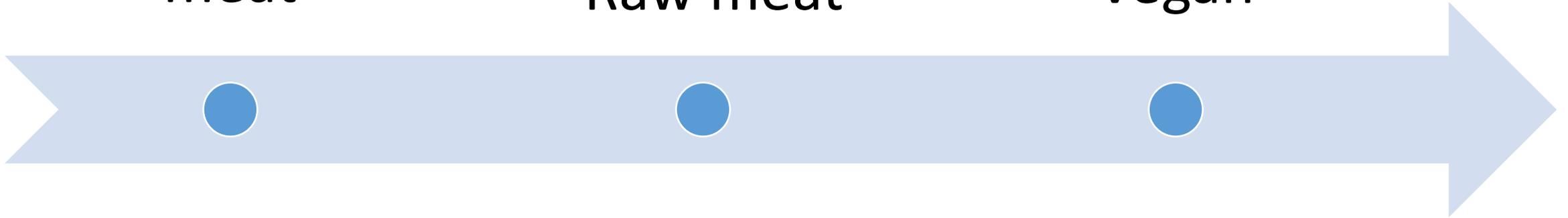


Dogs & cats: least to most healthy

Conventional
meat

Raw meat

Vegan



Top consumer concerns



Pet health



Nutritional soundness



Good quality



Palatability



Environmental sustainability



Manufacturers: 19 meat-based (M), 10 plant-based (V) pet foods

Steps to ensure formulation quality and nutritional soundness	M	V	Overall
Diet formulation – expertise	acceptable	superior	acceptable
Diet formulation – ensuring soundness	acceptable	acceptable	acceptable
Ingredients – ensuring quality	superior	superior	superior
Nutritional supplementation	superior	acceptable	superior
Preservation – physical	mixed	acceptable	mixed
Preservation – additives incl antimicrobials	inferior	mixed	inferior
Nutrient degradation – monitoring	acceptable	acceptable	acceptable
Nutrient degradation – adjustment	acceptable	superior	acceptable
Storage and shipping	acceptable	superior	acceptable

Top consumer concerns



Pet health



Nutritional soundness



Good quality



Palatability

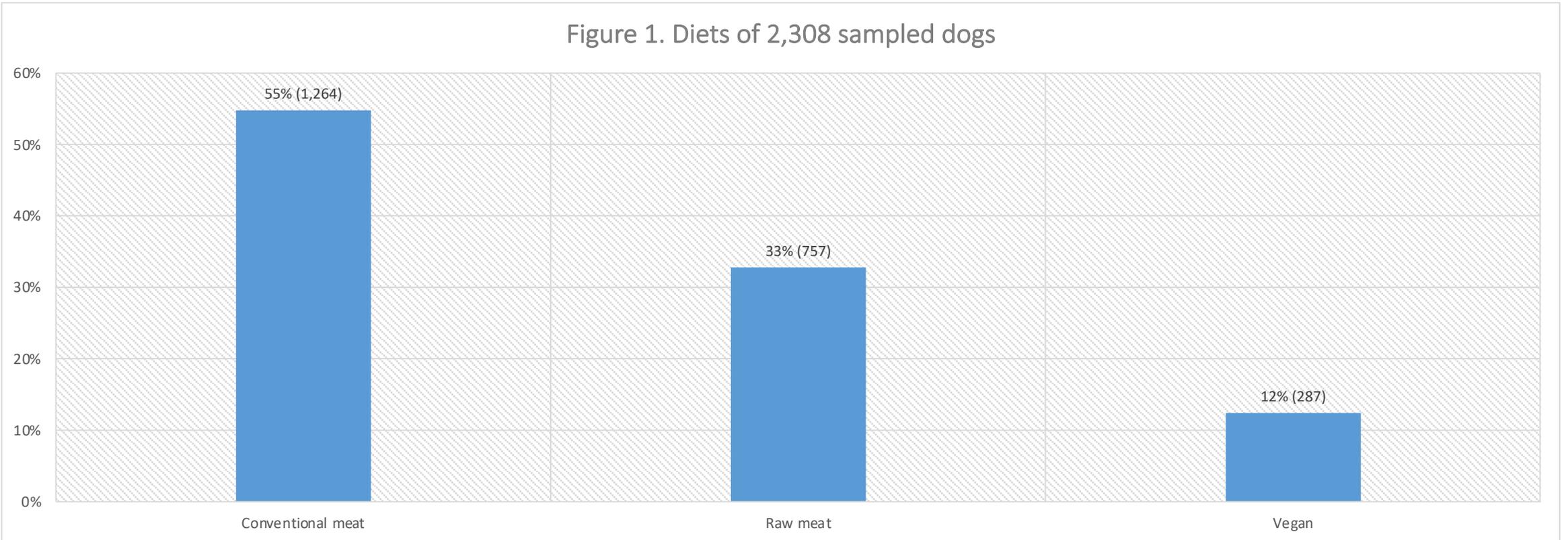


Environmental sustainability



2,308 dogs - diets

Figure 1. Diets of 2,308 sampled dogs



2,308 dogs -

10 palatability indicators

Eats Quickly

Approach

Wag tail

Sniffs Food

Jump

Vocalise

Salivate

Licks lips

Stays near bowl

Guards food



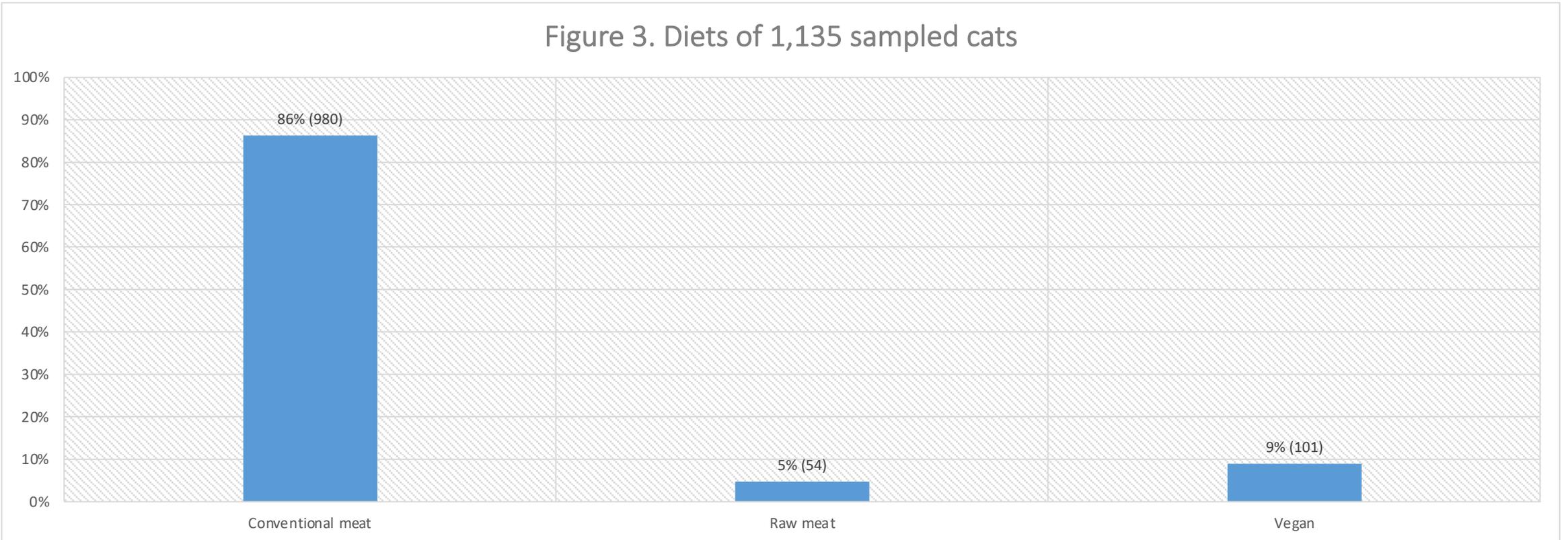
“...reliably demonstrated small effects of increased appetitive behaviour by dogs on a raw meat diet as opposed to a conventional diet.

There was no consistent evidence of a difference between vegan diets and either the conventional or raw meat diets.”



1,135 cats - diets

Figure 3. Diets of 1,135 sampled cats



1,135 cats -

15 palatability indicators

Rapid Approach

Vocalisations

Eating Quickly

Stays Near Bowl

Guards Food

Flick Ears

Flick Tail

Licking Lips

Licking Nose

Licking Food

Licking Bowl

Sniff/Investigate

Drop Food

Leaving Food Uneaten

Grooming



“... cats on vegan diets were reported as licking their food less often than for those on conventional meat and raw meat diets.

... the cats on conventional meat diets were more likely to leave their food unfinished than the raw meat diet and to a lesser extent the vegan diets.

Overall, ... the diets made little difference to the food-orientated behaviour of the cats ... except perhaps that cats on vegan diets lick their food less often, and cats on conventional diets leave more food.”



Palatability conclusions

“... the results from our study, which concur with limited existing studies in this field, do not support views that vegan pet food may have reduced palatability, and thus compromise the welfare of dogs or cats in this manner.”



Top consumer concerns



Pet health



Nutritional soundness



Good quality



Palatability



Environmental sustainability



RESEARCH ARTICLE

Environmental impacts of food consumption by dogs and cats

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Abstract

In the US, there are more than 163 million dogs and cats that consume, as a significant portion of their diet, animal products and therefore potentially constitute a considerable dietary footprint. Here, the energy and animal-derived product consumption of these pets in the US is evaluated for the first time, as are the environmental impacts from the animal products fed to them, including feces production. In the US, dogs and cats consume about $19\% \pm 2\%$ of the amount of dietary energy that humans do ($203 \pm 15 \text{ PJ yr}^{-1}$ vs. $1051 \pm 9 \text{ PJ yr}^{-1}$) and $33\% \pm 9\%$ of the animal-derived energy ($67 \pm 17 \text{ PJ yr}^{-1}$ vs. $206 \pm 2 \text{ PJ yr}^{-1}$). They produce about $30\% \pm 13\%$, by mass, as much feces as Americans ($5.1 \pm \text{Tg yr}^{-1}$ vs. 17.2 Tg yr^{-1}), and through their diet, constitute about 25–30% of the environmental impacts from animal production in terms of the use of land, water, fossil fuel, phosphate, and biocides. Dog and cat animal product consumption is responsible for release of up to 64 ± 16 million tons CO_2 -equivalent methane and nitrous oxide, two powerful greenhouse gasses (GHGs). Americans are the largest pet owners in the world, but the tradition of pet ownership in the US has considerable costs. As pet ownership increases in some developing countries, especially China, and trends continue in pet food toward higher content and quality of meat, globally, pet ownership will compound the environmental impacts of human dietary choices. Reducing the rate of dog and cat ownership, perhaps in favor of other pets that offer similar health and emotional benefits would considerably reduce these impacts. Simultaneous industry-wide efforts to reduce overfeeding, reduce waste, and find alternative sources of protein will also reduce these impacts.

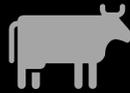


Knight 2021:

The relative sustainability of meat-based and alternative pet foods (for dogs and cats)



the number of additional humans who could be fed annually using energy saved by plant-based pet foods



number of 'food' animals whose lives would be spared annually



relative environmental impacts (land, water, fossil fuel, phosphate and biocides)



greenhouse gases (GHGs) produced

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