RAW ESSENTIALS

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RAW ESSENTIALS – Veterinary Communication Document

You may have some clients at your practice who engage in raw-feeding. We would like to take an opportunity to outline the services that we offer, and the support that we provide to the growing raw-feeding community.

We have ten retail shops selling raw food for cats and dogs in Auckland, two in Wellington, two in Christchurch and one in Hamilton, Cambridge & Mount Maunganui. Our staff provide nutritional advice and support for pet owners choosing to raw feed.

We offer nutritional support for primary veterinarians faced with raw-feeding clients.
We offer a *'specific and limited range of veterinary services'* in accordance with the VCNZ code of professional conduct. This takes the form of nutritional advice and support. Our clients are informed that we do not act as a primary veterinarian.

As a sustainability-focused company, we source the highest quality local product, with the lowest possible environmental impact. Our range is produced by New Zealand pet food manufacturers following MPI (Ministry for Primary Industries) regulations.

The following documents outline our feeding philosophy and cover the nutrient content of raw food, the non-nutritive aspects of raw food (including dental health and behavioural enrichment) and the food safety issues for human and pet health.

Dr Rebecca Brown

THE NUTRIENT PROFILE OF RAW DIETS

Nutrient profile based on a 15kg adult dog consuming 300g per day of a raw food diet. Daily intake is comprised of raw meaty bones, green tripe and organ meats from wild and domestic prey species.

SUMMARY STATEMENT

Whole prey diets encourage species-specific behaviours[1], however the nutrient composition of whole, raw prey is highly variable, and the majority of whole prey items are not sufficient to be fed as the sole dietary intake for domestic carnivore.[2,3]

The following nutrient analysis is based on feeding multiple wild and farmed prey species, such as rabbit, hare, wallaby, duck, possum, lamb, chicken and quail.

The National Research Council (NRC) Guidelines are the most influential, and arguably the most transparent set of published nutritional guidelines for companion animals.[2] For this reason, the following analysis has been based on NRC guidelines.[4]

MACRONUTRIENTS

Whole prey species exceed the minimum recommended macronutrient concentration for cats and dogs *(table 9)*.[2,5]

Macronutrient concentrations of whole wild prey can range from 24-35% DM, 55-69% CP, 9-31% fat, and 9-15% ash.[6] NRC requirements are easily met within these compositional parameters.

The calcium:phosphorus ratio of 1.29:1 *(table9)* is suitable for all life stages.[4,7,8] Calcium levels do not exceed the maximums suggested by the NRC.[4]

Taurine is of special concern. Animal tissues contain high concentrations of taurine; particularly muscle, viscera and brain.[9] A multi-prey species raw diet meets NRC requirements *(table 9)*.

MICRONUTRIENTS

Factors such as species, diet, breed, sex, age, and environment lead to variation in the mineral profile of whole prey.[2,10] Wild carnivores ensure adequate nutrient intake by consuming a range of whole prey species.[2,12] Captive carnivores fed exclusively on one prey species are potentially at risk of mineral imbalances.[2,3]

Cat and dog owners with access to a range of whole prey sources are able to feed a nutritionally balanced diet. Kerr et al (2014) documents the commercial availability of *"mineral replete whole prey"*.[2] Wild prey species are a particularly mineral-rich food source.[11]

It is therefore prudent to offer multiple prey-sources to raw-fed cats and dogs. This will provide micronutrient levels of K, Na, Cl, Mg, Cu, Mn, and Zn that meet minimum NRC recommendations.[2,6]

ESSENTIAL FATTY ACIDS

The majority of whole prey samples evaluated by Dierenfeld (2002)[1] and Kerr et al (2014)[2] met or exceeded NRC recommendations for essential fatty acids.

DIETARY FIBRE

There are no NRC recommendations for dietary fibre. Indigestible animal tissues, such as bones, tendons, hair and skin, enter the hindgut where they are able to contribute to intestinal microbial fermentation.[13]

Feeding multiple prey species in large pieces will provide important dietary fibre.

NRC RECOMMENDATIONS

TABLE 8: NRC RECOMMENDATIONS

table 8

amount/1000kcalME NRC recommendations		min	max	rdi
protein	g	20.00		25.00
fat	g		82.50	13.80
energy				
moisture				
ash				
calcium	g	0.50		1.00
Ca:P ratio				1.33
zinc	mg			16.00
taurine	g			
selenium	mcg			87.50
	ME			

TABLE 9: RESULTS OF RAW DIET NUTRIENT ANALYSIS

table 9

amount/1000kcal ME in AVERAGE RAW DIET
142.76
47.83
2.62
1.29:1
16.66
1.38
164.51
1000.00

"An understanding of the food habits of feral carnivores should influence the diets and feeding practices we impose upon domestic carnivores." [12]

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APPENDICES

- Nutrient information for these products has been gathered from a combination of Raw Essentials nutrient profiling (Asure Quality) and available literature (tables 1,13)
- The figures have been converted to 'amount/1000kcalME' to make them comparable to the 2006 National Research Council (NRC) suggestions. Because raw feeding is about achieving completeness and balance over a range of products, a typical group of raw products has been selected, and each given a 'weighting' depending on how much of each food would typically be fed (table 12). This allows the totals to be summed to give a proportional amount/1000kcalME. The NRC figures are also based on feeding a 15kg adult dog.
- The Atwater factors used to calculate ME are based on the digestibility of the ingredients in processed food. Atwater factors have been calculated based on the higher digestibility of raw food (tables 10,11 and 13).

TABLE 1

wet matter		Raw Essentials Lamb Mix	Raw Essentials Rabbit&Heart	Whole Rabbit	Tripe	Tongue	Heart	Kidney
protein	g/100g	16.10	19.10	17.55	12.10	14.90	16.50	15.70
fat	g/100g	8.40	3.00	6.42	3.70	16.10	5.70	3.00
energy	cal/100g	138.00	104.00	45.40	85.00	224.00	122.00	97.00
moisture	g/100g	72.40	72.50	73.00	84.20	64.50	76.70	79.20
ash	g/100g	3.50	4.70	4.05	0.50	0.80	0.90	1.30
calcium	g/100g	0.79	1.20	0.18	0.07	0.01	0.01	0.01
Ca:P ratio		1.5:1	1.6 : 1	1.7:1	1:1	0.05:1	0.03:1	0.05:1
zinc	mg/100g	2.80	2.60	2.31	1.40	2.90	1.90	2.00
taurine	g/100g	0.78	0.02	0.04		1.75	0.65	0.24
selenium	mcg/100g	20.00	5.20	9.80	12.50	9.40	32.00	127.00

table 2

dry matter		Raw Essentials Lamb Mix	Raw Essentials Rabbit&Heart	Whole Rabbit	Tripe	Tongue	Heart	Kidney
		27.6gDM/100g	27.5gDM/100g	28.4gDM/100g	15.8gDM/100g	35.5gDM/100g	23.3gDM/100g	20.8gDM/100g
protein	%	58.33	69.45	65.00	76.58	41.97	70.82	75.48
fat	%	30.43	10.91	23.78	23.42	45.35	24.46	14.42
energy								
moisture								
ash	%	12.68	17.09	15.00	3.16	2.25	3.86	6.25
calcium	%	2.86	4.36	0.67	0.44	0.02	0.03	0.05
Ca:P ratio		1.52	1.62	1.20	1.00	0.05	0.03	0.05
zinc	mg/kg	101.45	94.55	85.56	88.61	81.69	81.55	96.15
taurine	%	2.81	0.07	0.15	0.00	4.93	2.79	1.15
selenium	mg/kg	0.72	0.19	0.36	0.79	0.26	1.37	6.11

table 3

table 4

dry matter in average raw diet		Raw Essentials Lamb Mix	Raw Essentials Rabbit&Heart	Whole Rabbit	Tripe	Tongue	Heart	Kidney	total DM in AVERAGE RAW DIET
		27.6gDM/100g	27.5gDM/100g	28.4gDM/100g	15.8gDM/100g	35.5gDM/100g	23.3gDM/100g	20.8gDM/100g	
protein	%	6.42	7.64	21.45	25.27	1.68	2.83	3.02	68.31
fat	%	3.35	1.20	7.85	7.73	1.81	0.98	0.58	23.49
energy									
moisture									
ash	%	1.39	1.88	4.95	1.04	0.09	0.15	0.25	9.76
calcium	%	0.31	0.48	0.22	0.14	0.00	0.00	0.00	1.16
Ca:P ratio		1.52	1.62	1.20	1.00	0.05	0.03	0.05	1.26:1
zinc	mg/kg	11.16	10.40	28.23	29.24	3.27	3.26	3.85	89.41
taurine	%	0.31	0.01	0.05	0.00	0.20	0.11	0.05	0.72
selenium	mg/kg	0.08	0.02	0.12	0.26	0.01	0.05	0.24	0.79

table 5

amount/1000kcalME (in each raw product)		Raw Essentials Lamb Mix	Raw Essentials Rabbit&Heart	Whole Rabbit	Tripe	Tongue	Heart	Kidney
protein	g	115.41	177.86	139.75	149.73	68.46	138.52	167.34
fat	g	60.22	27.94	51.12	45.79	73.97	47.85	31.97
energy		989.25	968.46	361.52	1051.83	1029.21	1024.21	1033.86
moisture		519.00	675.13	581.30	1041.93	296.36	643.91	844.14
ash		25.09	43.77	32.25	6.19	3.68	7.56	13.86
calcium	g	5.66	11.17	1.43	0.85	0.03	0.05	0.12
zinc	mg	20.07	24.21	18.39	17.32	13.32	15.95	21.32
taurine	g	5.56	0.19	0.32	0.00	8.04	5.46	2.56
selenium	mcg	143.37	48.42	78.04	154.68	43.19	268.65	1353.60

table 6

table 7

amount/1000kcalME total AVERAGE RAW DIET		Raw Essentials Lamb Mix	Raw Essentials Rabbit&Heart	Whole Rabbit	Tripe	Tongue	Heart	Kidney	amount/1000kcalME in AVERAGE RAW DIET
protein	g	12.70	19.56	46.12	49.41	2.74	5.54	6.69	142.76
fat	g	6.62	3.07	16.87	15.11	2.96	1.91	1.28	47.83
energy									
moisture									
ash									
calcium	g	0.62	1.23	0.47	0.28	0.00	0.00	0.00	2.62
Ca:P ratio									1.29:1
zinc	mg	2.21	2.66	6.07	5.72	0.53	0.64	0.85	16.66
taurine	g	0.61	0.02	0.11	0.00	0.32	0.22	0.10	1.38
selenium	mcg	15.77	5.33	25.75	51.04	1.73	10.75	54.14	164.51
	ME	110.00	110.00	330.00	330.00	40.00	40.00	40.00	1000.00

table 8

table 9

amount/1000kcalME NRC recommendations		min	max	rdi	amount/1000kcalME in AVERAGE RAW DIET
protein	g	20.00		25.00	142.76
fat	g		82.50	13.80	47.83
energy					
moisture					
ash					
calcium	g	0.50		1.00	2.62
Ca:P ratio				1.33	1.29:1
zinc	mg			16.00	16.66
taurine	g				1.38
selenium	mcg			87.50	164.51
	ME				1000.00

table 10

ME calculation	%(g/100g)									
nutrient	Raw Essentials Lamb Mix	Raw Essentials Rabbit&Heart	Whole Rabbit	Tripe	Tongue	Heart	Kidney	% digestibility	kcal/gm	atwater
fat	8.40	3.00	6.42	3.70	16.10	5.70	3.00	95.00	9.40	8.93
protein	16.10	19.10	17.55	12.10	14.90	16.50	15.70	93.00	4.40	4.09
carbs	0.00	0.70	0.00	0.00	3.70	0.20	0.80	84.00	4.15	3.49
moisture	72.40	72.50	73.00	84.20	64.50	76.70	79.20			
ash	3.50	4.70	4.05	0.50	0.80	0.90	1.30			
ME (kcal/kg)=	1394.99	1073.87	1255.81	808.11	2176.42	1191.16	938.23			
1000kcalME=?g of each raw product	**716.85**	**931.21**	**796.30**	**1237.45**	**459.47**	**839.52**	**1065.83**			

table 11

equations	
carbohydrates=	NFE=100%-moisture%-CP%-Cfat%-Cfibre%-ash%
atwater factors=	%digestibility x kcal/gm
ME(kcal/kg)=	10x [(AFx%CP)+(AFx%CF)+(AFx%NFE)]
1000kcalME=?g of food	(1000kcalME x 1000g) / [MEkcal/kg]

table 12

AVERAGE RAW DIET	15kg adult dog consuming 2%bodywgt daily = 300g daily
	proportion of a whole (1000kcalME)
Tripe	0.33
Whole Rabbit	0.33
Lamb Mix	0.11
Rabbit&Heart	0.11
Tongue	0.04
Heart	0.04
Kidney	0.04

table 13

resources	
Fat & protein digestibilities for raw food atwaters	***Evaluation of four raw meat diets using domestic cats, captive exotic felids, and cecectomized roosters*** K. R. Kerr, A. N. Beloshapka, C. L. Morris, C.M. Parsons, S. L. Burke, P.L. Utterback and K. S. Swanson J ANIM SCI 2013, 91:225-237
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Nutrient profiles for Raw Essentials Lamb Mix and Rabbit&Heart	Profiled by Asure Quality, Auckland
Nutrients in Tripe	http://nutritiondata.self.com/facts/beef-products/3483/2
Nutrients in Whole Rabbit	***Nutrient composition of whole vertebrate prey (excluding fish) fed in zoos.*** Dierenfeld, E. S.,Alcorn, H. L., & Jacobsen, K. L. (2002) U.S. Dept. of Agriculture,Agricultural Research Service, National Agricultural Library,Animal Welfare Retrieved from purl.access.gpo.gov/GPO/LPS80845
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Nutrients in raw Heart	http://nutritiondata.self.com/facts/lamb-veal-and-game-products/4660/2
Nutrients in raw Kidney	http://nutritiondata.self.com/facts/lamb-veal-and-game-products/4666/2

EVIDENCE-BASED MEDICINE

THE TRUE SCIENCE BEHIND RAW FEEDING

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Introduction

In this era of evidence-based medicine, a criticism that is often levelled at raw-feeding a species-appropriate, prey-based diet to pets, is that there is a lack of scientific research to support the practice. The purpose of this document is to highlight the research that supports feeding pets their evolutionary diet. The research covers three important aspects of feeding a raw prey based diet:

- *The nutrient content of raw food.*

- *The non-nutritive aspects of raw food (including dental health and behavioural enrichment).*

- *Food safety issues or raw-feeding (for human and pet health).*

It is imperative that we define the nutrient profiles of cats and dogs based on current evidence, but we should look further than just nutrient profiles and include the non-nutritive aspects of food. Finally, the evidence available must support the safety of a raw food diet for pets and their owners.

Defining Nutrient Profiles

Outlined below is a brief history of the challenges in defining nutrient profiles for cats and dogs. The National Research Council (NRC) of the United States National Academy of Science, and the Association of American Feed Control Officials (AAFCO) are the two most influential bodies when it comes to feeding domestic cats and dogs.(1)

Since the 1940's, the NRC have released reports on the nutrient requirements of cats and dogs, based on available literature and research. The reports have been updated as new research has come to light. The NRC receives no direct funding for the reports, and is dependent on sponsorship to fund the reports.[1]

AAFCO was formed in 1909 to establish a framework for uniform regulation of the feed industry. Although not a government agency, it operates within the guidelines of federal and state legislation, including laws administered by the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA).[1]

While companion animals are the ultimate beneficiary of the NRC guidelines, the pet food industry is the key user of the reports. There is currently a very legitimate and real concern about how to maintain the high standard and objectivity of the NRC guidelines in the face of the potential tensions of the pet food industry.

The NRC guidelines assume that availability and digestibility of nutrients is uncompromised.[1] Unfortunately, due to the nature of the raw materials used in the commercial production of pet food, this assumption does not hold true. As a result, pet food manufacturers concluded that the NRC recommendations could not be used in a manufacturing environment.[1] To resolve this, in the early 1990's, AAFCO formed the Canine and Feline Nutrition Expert Subcommittees. These subcommittees comprised representatives from the pet food industry and academia, and were chaired by a representative of the FDA.[1] They provided industry, and industry regulators, with a vehicle for translating the NRC recommendations into a set of practical guidelines which better suited the pet food industry. These guidelines made life easier for the manufacturer. AAFCO has accepted some of the NRC's recommendations, but certainly not all. These guidelines have not been reviewed since the 1990's.[1]

In 2006 the NRC published an update of recommendations for cats and dogs.[1] The 2006 document represents a substantial improvement

from previous guidelines but has become an expensive document to produce; severely limiting its outreach. It would certainly appear that AAFCO have not taken note of the most recent nutritional research.

To summarise, AAFCO provides some basic nutritional guidelines; a rough framework to build upon. The guidelines are very much concerned with the practicalities of making pet food from a vast array of low quality ingredients. They are minimum requirements, not optimal requirements. AAFCO acknowledge the NRC guidelines, but do not uphold them. In the words of Quinton Rogers (DVM, PhD), one of the AAFCO panel experts,

> *"although the AAFCO profiles are better than nothing, they provide false securities. I don't know of any studies showing their adequacies or inadequacies."* [1]

Based on available nutritional science, it is best to take the AAFCO profiles as a starting point. These profiles are well-established minimal nutritional requirements of cats and dogs. Meeting a minimum requirement is important for the pet food industry. However, optimising our pets' nutrition is essential for improving their health and wellbeing.

The Nutritive and Non-Nutritive Aspects of Food

We feel it is important to recognise food as not only having a nutrient profile, but also as having a form and function appropriate to the species being fed. The literature contains numerous references to the food habits of feral carnivores and therefore the appropriate nutrient profile is readily available.[2] It is important to meet a minimum nutrient profile using species-appropriate food - minimally processed and fed in a physical form that meets a pet's behavioural, needs and enriches their lives.

We are concerned with the nutritive and non-nutritive aspects of an evolutionary diet of whole prey for cats and dogs. Our recommended raw feeding regimes are based on the following research.

Ellen Dierenfield's report[4] on the nutrient composition of whole vertebrate prey shows that a whole prey diet is more than adequate to meet the needs of our carnivorous pets. The report discusses the nutrient composition of prey species, focussing on the differences in composition of particular prey species, with age, and sex and nutrient intake of the prey species itself. The report confirms that whole prey, as long as the soft tissues and some bones are consumed, meet all the nutrient requirements of carnivores, and at the same time enhance and positively influence behaviour.[4]

The report covers water, protein, fat, ash, fat soluble vitamins, macro-minerals and trace minerals, and suggests that the diet consumed by the prey species should be carefully assessed with respect to nutrient content, interactions and persistence in tissues. The value of the prey species is dependent on what the prey species consumes. Wild sourced prey are likely to be more nutrient dense than farmed prey.[4] Based upon current research the study concludes that supplementation of whole prey-based diets appears unwarranted.[4]

It is also important that we recognise the impact of diet on the psychology and dental health of all of our pets. In the words of veterinarian Dr Jon Lumley:

> *"you do not need a degree in nutrition to evaluate the effects of raw bones on a dog's dentition – in fact, it appears that the qualification would be a serious disadvantage!"* [3]

Improved appetites, longer periods spent feeding and greater possessiveness of food were noted in captive cheetahs fed a carcass based diet[5]. The study notes that processed foods lack the 'hassle factor' and as a result of eating them, animals suffer tooth decay, dental pathologies, muscle atrophy and poor health.[5] The study references Fagan's 1980 presentation to the American Association of Zoo Vets (6) where the 'hassle factor' is defined. Dr Fagan, Zoo Veterinary Dental Consultant, states

> *"it is possible to do something immediately and significantly to minimise oral problems in (captive exotic) carnivores. That*

'something' is to re-evaluate their diet. Animals need more 'hassle factor' per mouthful of nutrients. The best kept secret of the last fifty years is that we must eliminate the pre-processed, the overcooked, the smashed, the blended and the pureed foods and feed our animals a more appropriate diet, duplicating the feeding habits of feral conditions." [6]

For the last eighty years we have ignored the literature with respect to oral disease in our pet carnivores.

The study concludes that a more natural diet (for example carcasses) better meets the psychological as well as nutritional needs, by taking into account diet consistency, texture, temperature, palatability and variability.[5] Non-nutritive factors should be considered when feeding carnivores. Consumption of whole prey provides for a relatively high intake of raw animal derived fermentative substances which may enhance gut health, stimulate growth of microbial commensals and optimise immune function in a very different way from heat treated, largely plant derived processed foods.[7]

Recent studies have shown that changes in the macronutrient content of the diet alters faecal microbial populations in the domestic cat.[8] Cats have evolved as strict carnivores with little or no carbohydrate in their diet. Dry processed diets, with low protein to carbohydrate ratio have been linked to obesity in cats. Emerging evidence suggest that microbiota are critical to the development of obesity[8,9] and shifts in the faecal microbiota may be as a result of an increased carbohydrate load entering the large intestine due to the low protein:carbohydrate ratio in the dry diets.[9] Emerging science continues to support the importance of the evolutionary diet of the domestic cat.

Food Safety Issues

An increasingly global and complex pet food supply chain further complicates the already substantial challenge of assuring pet food safety. This is a shared concern applying to commercially prepared petfoods, raw food diets and home prepared diets.[10] As increasing numbers of consumers rely on commercially produced pet foods, the potential impacts of hazards associated with the manufacture, distribution and use of pet foods is amplified. Common sourcing of ingredients (from a global supply chain) and increased size of production lots lead to escalating problems. Documented problems include: chemical contaminants in food (melamine and cyanuric acid), high levels of aflatoxins due to improper sourcing of ingredients, botulism in improperly canned dog food, and several recent bouts of salmonellosis directly linked to contamination of dry pet foods and pet treats. Microbiological issues are often traced back to the use of contaminated raw materials, typically grains such as peanut flour. Managing Salmonella in the production of dry pet food can be very challenging, as many of the raw materials are naturally contaminated.

The most prevalent argument against raw feeding is to do with food safety as it pertains to both humans and pets. Earlier this year the American Veterinary Medical Association (AVMA) released a statement regarding raw-feeding.[11] They referenced several studies which suggested that raw protein sources may be contaminated with pathogenic organisms, and that pets may develop clinical illness from these organisms. They also stated that cats and dogs with either clinical illness, or subclinical infection are a health risk to other animals and humans. They concluded with a recommendation to (in the interests of public health) avoid feeding raw food (inadequately treated animal-source protein) to cats and dogs.

Certainly food safety must be considered as a potential hazard when dealing with raw animal protein, and given the numbers of pet owners feeding their cats and dogs raw food the Veterinary profession would be wise to establish guidelines to educate owners about harm reduction. Instead, the AVMA released a blanket statement advising against any kind of raw feeding. This is unhelpful to a large number of pet owners, and only serves to marginalise them.

Upon examining the references, (which we discuss in greater detail in a separate document) on which the statement is based, one could be forgiven for feeling somewhat confused as to what the AVMA believes constitutes evidence-based policy. Many of the

conclusions drawn were only very loosely based on study results, if at all.

The AVMA have been questioned about their motivations for this policy when there is currently a relatively much greater problem regarding contamination of processed foods, and the known incidences of human illness caused by these foods (*"raw pet foods comprise approximately less than 1% of the pet food market"* [12]). Dr David M. Chico, chair of the AVMA Council on Public Health and Regulatory Veterinary Medicine, acknowledged that there are concerns regarding commercial processed foods. The reason he gave for addressing raw food rather than processed were that *"the council had simply dealt first with issues connected with raw meats."* [12]

Conclusion

A thorough search of the literature reveals the depth of nutritional information available to us as veterinarians. The literature shows the importance of a minimal nutrient profile being a starting point for the selection of an optimal diet for domestic pets, and confirms the importance of the diet being presented in a physical and functional form that meets the physiological and psychological needs of our companion animals. Food safety is confirmed as an issue affecting the global supply chain of pet food and an issue which must be addressed by all pet food manufacturers. In this era of evidence-based medicine, the current and emerging science supports the feeding of a raw prey-based, species-appropriate diet, to domesticated carnivores for optimal health and wellbeing.

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ANALYSIS OF THE 2012 AMERICAN VETERINARY MEDICAL ASSOCIATION POSITION STATEMENT ON RAW-FEEDING

RAW OR UNDERCOOKED ANIMAL-SOURCE PROTEIN IN CAT AND DOG DIETS

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Earlier this year the American Veterinary Medical Association (AVMA) released a statement regarding raw-feeding[1]*.*

They referenced several studies which suggested that raw protein sources may be contaminated with pathogenic organisms, and that pets may develop clinical illness from these organisms.

They also stated that cats and dogs with either clinical illness, or subclinical infection are a health risk to other animals and humans.

They concluded with a recommendation to (in the interests of public health) avoid feeding raw food (inadequately treated animal-source protein) to cats and dogs.

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In the first study referenced by the AVMA[2], 10 dogs in a non-randomised, non-blinded study were fed a processed, dry, commercial diet; and 10 were fed a Bones and Raw Food (BARF) diet. The commercial diet was not named. There was no information regarding the source, and storage conditions of the chicken used for the BARF diet. This information would be of great value when interpreting the results.

Food samples and stools were cultured for Salmonella serovars. None of the commercial diet group tested positive for Salmonella in either their food samples or their stools. Eight of the ten BARF food samples, and three of the ten stool samples tested positive for Salmonella. Interestingly, only one of the stool samples tested positive for the same serovar of Salmonella as was detected in the food sample. One dog that tested positive in its stool had no Salmonella found in its diet. Therefore, only one of the ten dogs was shown to be shedding the pathogen that was detected in its diet. None of the dogs in either group displayed clinical signs.

The study was, in the words of the authors, *"limited"*. They point out that, due to a small sample size, the results were not statistically significant. In order for this study to support the AVMA's stance, they must also provide evidence that there is a causal relationship between the shedding of pathogens in stool, and ill-health in humans. Due to the regularity with which commercial pet foods are recalled due to pathogenic contamination, they must also show that this causal relationship is smaller, or non-existent, in commercial pet foods.

The second referenced paper[3] examined the human health implications of Salmonella contamination, and discussed the theoretical risk of disease.

The authors stated that, despite the increasing popularity of raw diets, and despite the presence of Salmonella on some raw diets (particularly those of chicken-origin) *"no confirmed cases of human salmonellosis have been associated with these diets."*[3]

Although there have been reports of raw-fed dogs developing clinical Salmonellosis, there have been none associated with commercial raw diets.

The authors highlighted the fact that there is no common agreement about what constitutes a raw diet. This makes the interpretation of controlled studies, where 'raw diets' are compared with commercial diets, very difficult. The authors incorrectly stated that *"raw food diets are made from animal by-products, they are not considered to be fit for human consumption, and, as such, they are not subject to the same regulations as is food intended for humans."*[3] An appropriate raw food diet makes use of the whole carcass, not just the parts that humans do not use. The food is routinely sourced from the human food chain.

The paper references a *"limited number of reports"*[3] of human infection associated with ill, or carrier animals.

As stated in the paper, processed pet treats of animal origin are commonly found to be contaminated with Salmonella, and have been associated with numerous outbreaks.

The authors suggested that pet owners be educated about the potential health risks that may be associated with raw feeding, and animal-origin pet treats. It would seem prudent, then, to also educate the public about the established and widespread contamination issues surrounding commercial pet foods. They also suggested that animals used within retirement homes and hospitals should not be raw-fed because of the possibility that the diet was contaminated. Again, the contamination of commercial diets should be considered too.

The third paper referenced[4] is put forward as an example of raw-food-associated Salmonellosis in cats. Septicaemic salmonellosis was diagnosed post-mortem in two cats. Raw meat eaten by both cats was thought (but not confirmed) to be contaminated with Salmonella serotype Newport. This serotype was isolated from the intestines and lungs of one of the cats. One cat was presented dead, and salmonellosis was diagnosed at post mortem and presumed to be the cause of death. The other was a kitten who was euthanased shortly after a distemper vaccine. The kitten was found to be suffering from *"severe, acute, suppurative pneumonia with severe, multifocal, coalescing alveolar and bronchiolar infiltrates."*[4]

The purpose of the fourth paper[5] was to summarise the microbiological infections that dogs may acquire through the consumption of raw meat. The authors fingered raw-feeding as a potential public health risk, but they also acknowledged that meat intended for human consumption is routinely contaminated with microbes.

The authors stated that: *"Outbreaks of Salmonella-related gastroenteritis in dogs consuming diets containing raw meat are documented."*[4] The study which they referenced[5] to support this statement compared Salmonella serovars in the diet and feces of a group of racing Greyhounds. The dogs were fed 50-75% of their diet as *"Raw meat from rendering plants, which comes primarily from dead, dying, debilitated, and diseased animal".*[5] The packages of

raw meat were thawed for 24 hours at room temperature and then mixed with supplements prior to feeding. This study is irrelevant to raw feeders who employ common sense, and good hygiene practices (the same as they do when they deal with meat intended for their own consumption). These feeders do not use by-products that are unfit for human consumption, and they do not defrost for 24 hours at room temperature.

In keeping with the stance taken by the AVMA, the authors remind us that: *"There is also a risk of humans becoming infected with Salmonella spp after handling contaminated meat products intended for dogs."* [5] There is an implication by omission that kibble is a safe option. The many product recalls of Salmonella-tainted kibble prove this is not so.

The authors referenced a study from the New Zealand Medical Journal[7] which found that dog ownership was a major risk factor for human Campylobacter infections in Christchurch. No information was supplied regarding the level of raw feeding in these dogs. It would be reasonable to assume that the majority of them were kibble-fed. Therefore, this study does not support a claim that raw-feeding, as opposed to kibble-feeding, constitutes a public health risk. To leap to the conclusion that these dogs have been infected by a raw diet would be erroneous, especially given that: *"The routes by which dogs can become infected with Campylobacter spp are not precisely known."* [7]

In the section on E. coli it was noted that the organism could be found particularly in fresh ground hamburger meats, and that when you feed Greyhounds meat that is contaminated with E. coli, they become ill[5]. There was no discussion of the prevalence of Escherichia coli in a raw diet appropriate for dogs.

In the section on Yersinia enterocolitica[5] the authors noted that: *"Household transmission of this pathogen from dogs to people has been documented"* and supplied as their reference a case study[8] of a group of 21 people in two neighbouring houses who contracted (in two cases, fatally) Yersinia enterocolitica enteritis. There were dogs kept in these households, and there had been some recent diarrhoea in a litter of puppies, however all dogs were destroyed without cultural examination. The houses did not have running water, and relied instead upon wells, and a stagnant pond (which was assumed to be contaminated). While it is *possible* that the dogs were a source of infection, there was no evidence for this in the original paper. To come up with the above statement based on this case study suggests, at the very least, an astonishing inability of the AVMA to interpret literature.

In addition to public health risks, risks to the health of dogs were mentioned. *"Dogs are susceptible to the neurologic effects of C botulinum toxin, and some packaged foods, such as bacon, are capable of supporting growth of C botulinum and toxin production."*[5] Bacon would not be used as part of a well-planned raw diet for dogs.

The final study referenced[9] found a variety of coliforms in a group of commercial raw diets. The authors suggested that this created a risk to public health, but as was the case for the other references, they failed to find any evidence for this.

"There is currently inadequate information regarding the safety of raw diets in terms of both animal and human disease. However, considering the variety of infectious and potentially zoonotic pathogens identified here and in other studies, the potential risks must be taken seriously." [8]

Raw pet food is a potential source of pathogenic organisms. So too is processed pet food, along with a great number of products produced for human consumption.

Increasing numbers of dog and cat owners are seeking non-processed and species-appropriate alternatives to kibble and canned foods. They are currently at the mercy of google-searches and internet forums to help them decide how to provide a complete and balanced diet; and how to source and handle food safely. They should be able to look to Veterinarians for sound advice on how best to make these decisions. New Zealand has an opportunity to create a position statement that supports, rather than marginalises, this growing group of pet owners; and that is based on an honest, thorough and erudite evaluation of the scientific literature.

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