



SILVER PET ECONOMY:

นวัตกรรมขนมอบฟังก์ชันที่ตอบโจทย์สุขภาพ
สำหรับสัตว์เลี้ยงสูงอายุ



อ.สพ.ญ.ดร.สาธิตา อารีรัตน์
ภาควิชาสรีรวิทยา คณะสัตวแพทยศาสตร์ มหาวิทยาลัยเกษตรศาสตร์
fvetsia@ku.ac.th



Outline

Life Stage Nutrition

โภชนาการสัตว์เลี้ยง:
 ความต้องการที่แตกต่างกัน
 ในแต่ละช่วงวัย

Market Trends

เทรนด์รูปแบบขนมยอดนิยม
 สำหรับสุนัขและแมว

Functional Treats

การพัฒนาขนมฟังก์ชัน
 ในอาหารสัตว์เลี้ยงสูงวัย



Pet Life Stage

Physiological status

- **Growth**

- Cat: Birth – 1 year old
- Dog: Varies by body size and breed

- **Maintenance**

- Cat: 1 – 7 years old
- Dog: 1 – 5 or 7 years old
- Reproduction

- **Senior**

- Geriatric

Condition

- *Intact/Neutered, Inactive/Active or Disease*



Kitten Birth up to 1 year	Young adult 1–6 years	Mature adult 7–10 years	Senior >10 years
End of life Variable			

Pet Life Stage —

Growth

- Large & Giant breed puppies grow rapidly and reach full skeletal maturity later than smaller breed dogs
- Less energy-dense growth diet formula
 - Help reduce excessively rapid growth rates



Maintenance

- Fully grown
- Nutrition goals
 - Maximize longevity, Quality of life and Disease prevention
- **Diseases:**
 - Dental disease
 - Obesity
 - Musculoskeletal disease
 - Kidney disease
 - Feline Lower Urinary Tract Disease
 - Skin and coat problem

Pet Life Stage

Comparative Clinical Pathology (2021) 30:101–106
<https://doi.org/10.1007/s00580-020-03193-x>

CASE REPORT



Nutritional secondary hyperparathyroidism–induced facial osteodystrophy in a Labrador puppy

Deeksha Bharti¹ · Y. Ajith^{1,2} · E. Madhesh¹ · Naveen Kumar Verma³ · Mamta Singh¹ · E. Kalaiselvan³ · Raja Raghuvaran¹ · Srishti Soni¹ · Kruti Debnath Mandal¹ · Reena Mukherjee¹ · Umesh Dimri¹

Received: 28 July 2020 / Accepted: 28 December 2020 / Published online: 7 January 2021
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Abstract

Parathormone is a key polypeptide hormone controlling bone remodeling by influencing calcium, phosphorus, and vitamin D homeostasis in mammalian body. This report describes unusual presentation of osteodystrophy causing facial hyperostosis due to nutritional secondary hyperparathyroidism in a puppy. A female Labrador Retriever dog aged 5 months was presented with progressive bilaterally symmetrical swelling on facial region, hypersalivation, and reduced growth rate. Excessive meat intake in daily ration since weaning was reported. Clinical examination revealed dyspnoea, open mouth breathing, epiphora, excessive nasal secretions, tachycardia, pale mucous membranes, debility, loosely attached teeth, and pigmented oral mucosa of the upper jaw. Microcytic anemia, lymphocytosis, eosinophilia, monocytopenia, hypoproteinemia with hypoglobulinemia, hyperalbuminemia, hypocalcemia, hyperphosphatemia, and decreased Ca:P ratio were evident in the hemato-biochemical study. Lateral radiographic view of the head revealed hyperostosis of the facial bones with irregularly arranged teeth on the upper jaw. Nutritional secondary hyperparathyroidism–induced facial osteodystrophy was diagnosed in the animal based on the history and other supporting clinical evidence. The animal was treated with a protocol extending for 4 weeks using calcium, calcitriol, essential minerals, vitamins, and steroids. The animal showed considerable improvement on day 14 and regained normal facial architecture by day 28 of the therapy.

Keywords Big head disease · Dogs · Hyperostosis · Hyperphosphatemia · Meat · Nutrition · Osteodystrophy fibrosa



Figure 33-6. Littermate Great Dane puppies fed two different levels of dietary calcium. The puppy on the left was fed a growth food containing 1.1% dry matter calcium. The puppy on the right was fed a similar growth food containing 3.3% dry matter calcium. Note the poor growth and angular limb deformities in the puppy consuming excess calcium.

Dietary imbalances in a puppy



Pet Life Stage

Senior

- The global senior pet population is steadily increasing
- **Aging isn't a disease**
- Aging is a gradual and irreversible pathophysiological process
- Nutrition goals:
 - Optimize quality and longevity of life
 - Minimize disease



- Age
- Sleep



- Active
- Sensory receptor
- Muscle and bone mass
- Immunity
- Organ function

Pet Life Stage

Senior



No single or universal age cut-off for the senior stage

- Based on breed and/or body size

Species	Body size	Senior	Geriatric
Dog	Small breed (<10 kg)	8 years	>/= 12 years
	Medium breed (10-25 kg)	7 years	>/= 10 years
	Large breeds (25-45 kg)	6 years	>/= 9 years
	Giant breeds (>45 kg)	5 years	>/= 7-8 years
Cat	All	10 years	>/= 15 years

Nutrient Requirement

Recommendation

- National Research Council (NRC) 2006
- Organization
 - Association of American Feed Control Officials (AAFCO)
 - European Pet Food Industry Federation (FEDIAF)
- Small animal nutrition textbook
- Research article / Publication

AAFCO Dog Food Nutrient Profiles Based on Dry Matter^a

Nutrient	Units DM Basis	Growth and Reproduction Minimum	Adult Maintenance Minimum ^b	Maximum
Crude protein	%	22.5	18.0	
Arginine	%	1.0	0.51	
Histidine	%	0.44	0.19	
Isoleucine	%	0.71	0.38	
Leucine	%	1.29	0.68	
Lysine	%	0.90	0.63	
Methionine	%	0.35	0.33	
Methionine-cystine	%	0.70	0.65	
Phenylalanine	%	0.83	0.45	
Phenylalanine-tyrosine	%	1.30	0.74	
Threonine	%	1.04	0.48	
Tryptophan	%	0.20	0.16	
Valine	%	0.68	0.49	
Crude fat ^c	%	8.5	5.5	
Linoleic acid	%	1.3	1.1	
alpha-Linolenic acid	%	0.08	ND ^d	

(continued)

2026 Official Publication

Nutrient	Units DM Basis	Growth and Reproduction Minimum	Adult Maintenance Minimum ^b	Maximum
Eicosapentaenoic + Docosahexaenoic acid (Linoleic + Arachidonic):(alpha-Linolenic + Eicosapentaenoic + Docosahexaenoic) acid ratio	%	0.05	ND ^d	30:1
Minerals				
Calcium	%	1.2	0.5	2.5 (1.8) ^e
Phosphorus	%	1.0	0.4	1.6
Ca:P ratio		1:1	1:1	2:1
Potassium	%	0.6	0.6	
Sodium	%	0.3	0.08	
Chloride	%	0.45	0.12	
Magnesium	%	0.06	0.06	
Iron ^f	mg/kg	88	40	
Copper ^g	mg/kg	12.4	7.3	
Manganese	mg/kg	7.2	5.0	
Zinc	mg/kg	100	80	
Iodine	mg/kg	1.0	1.0	11
Selenium	mg/kg	0.35	0.35	2
Vitamins and others				
Vitamin A	IU/kg	5000	5000	250,000
Vitamin D	IU/kg	500	500	3000
Vitamin E ^h	IU/kg	50	50	
Thiamine ⁱ	mg/kg	2.25	2.25	
Riboflavin	mg/kg	5.2	5.2	
Pantothenic acid	mg/kg	12	12	
Niacin	mg/kg	13.6	13.6	
Pyridoxine	mg/kg	1.5	1.5	
Folic acid	mg/kg	0.216	0.216	
Vitamin B ₁₂	mg/kg	0.028	0.028	
Choline	mg/kg	1360	1360	

^aPresumes a caloric density of 4000 kcal ME/kg, as determined in accordance with Regulation PF9. Formulations greater than 4000 kcal ME/kg should be corrected for energy density; formulations less than 4000 kcal ME/kg should not be corrected for energy. Formulations of low-energy density should not be considered adequate for reproductive needs based on comparison to the Profiles alone.

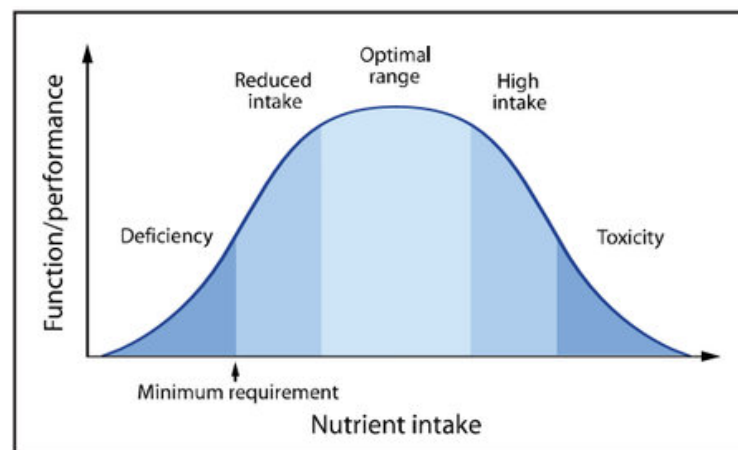


Figure 5-2. Total biologic dose-response curve. This response curve spans intakes ranging from deficiency to adequacy to toxicity.

^bRecommended concentrations for maintenance of body weight at an average caloric intake for dogs of a given optimum weight.

^cAlthough a true requirement for crude fat per se has not been established, the minimum concentration was based on recognition of crude fat as a source of essential fatty acids, as a carrier of fat-soluble vitamins, to enhance palatability, and to supply an adequate caloric density.

^dND = not determined. Although a minimum requirement has not been determined, sufficient amounts of omega-3 fatty acids are necessary to meet the maximum omega-6:omega-3 fatty acid ratio.

^eThe maximum of 1.8% is applicable to formulas that may be fed to large size puppies (those weighing 70 lb. or greater as mature lean adults). For other life stages, including non-large-size growth formulas, the maximum calcium is 2.5% DM.

Nutrient Requirement

Nutrients (%DM)*	Protein						Fat						Carbohydrate	
	Puppy	Adult dog	Senior dog	Kitten	Adult cat	Senior cat	Puppy	Adult dog	Senior dog	Kitten	Adult cat	Senior cat	Adult dog	Adult cat
AAFCO, 2025	> 22.5	>18.0	-	>30.0	>26.0	-	>8.5	>5.5	-	>9.0	>9.0	-	-	-
FEDIAF, 2024	>20.0	>18.0	-	>28.0	>25.0	-	>8.5	>5.5	-	>9.0	>9.0	-	-	-
Textbook	22-32	15-30	15-23	35-50	30-45	30-45	10-25	10-20	10-15	18-35	10-30	18-25	>23.0	<40.0

* Dry matter

** Healthy animal with ideal BCS



Energy Requirement

- Resting Energy Requirement (RER; kcal/day)**

- RER (kcal/day) = $70 \times (\text{Body weight}^{0.75})$

- Daily Energy Requirement (DER; kcal/day)**

- DER (kcal/day) = **Life stage factor** x RER

- Protein requirement per day**

- Dog: 2.5 g/kg BW
 - Cat: 5 g/kg BW

Snack or Treats

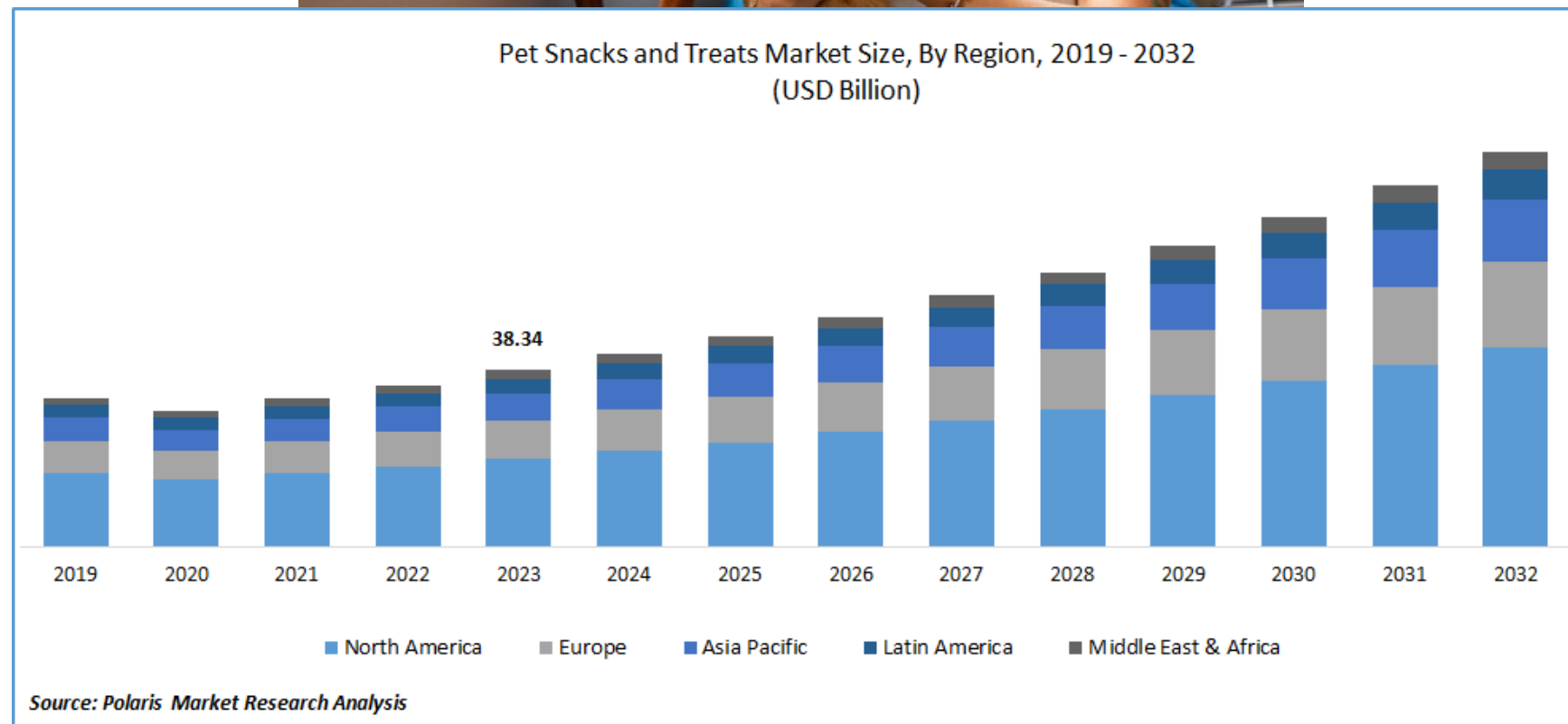
- < 10–15% of Daily Energy Requirement**



Nutritional Assessment Factors	Feline Life Stage Factors*	Canine Life Stage Factors*
Neutered adults	1.2–1.4	1.4–1.6
Intact adult	1.4–1.6	1.6–1.8
Inactive/obese prone	1.0	1.0–1.2
Weight loss	0.8	1.0
Gestation	1.6–2.0	3.0 (for last 21 days)
Lactation (based on number of offspring and weeks of lactation)	2.0–6.0	3.0 to ≥ 6.0
Growth	2.5	<4 mo: 3.0 ≥ 4 mo: 2.0
Work		Light: 1.6–2.0 Moderate: 2.0–5.0 Heavy: 5.0–11.0

*The above life stage factors are general guidelines for estimating caloric intake. Sedentary and/or indoor pets may require less caloric intake than indicated above. Adjustment of caloric intake should be done by monitoring BW and BCS.

Pet Snacks Market



- **“Pet Humanization”**

- Pet owners are focused on wellness, quality, functionality, and value

- Tailored products (Personalize)

- Age
- Size
- Breed
- Health condition

- Efficiency

- Health benefits



Pet Snacks Market



Brazil

- Species: Cat
- Purchase criteria: Veterinary indication, brand, attractive price, financial condition, easy access, functionality, and cat accepted

DOI: 10.31533/pubvet.v13n7a367.1-9



USA & Canada

- Species: Cat
- Perceptions:
 - 'treat' as "anything I give my pet that they enjoy"
 - Treats are part of pet's normal diet
 - Commercial pet treats

DOI.org/10.1371/journal.pone.0296011



Italy

- Species: Dog
- Owner's attitudes:
 - Treats = Reward
 - Several types of treats (biscuits and dental care sticks)
 - Read the labels: ingredients list, health benefits claims, flavor, brand, shape and follow the feeding instructions

DOI.org/10.1080/10888705.2019.1579095



China

- Species: Dog and Cat
- Purchase criteria: Brand, ingredients, and retailer reputation
- Dog: Dry food (dog size and owners' budget)
- Cat: wet food

DOI.org/10.1080/10971475.2021.1890360

Pet Snack Characteristics



1. BISCUITS / COOKIES



2. SOFT TREATS



3. JERKY / STRIPS



4. DENTAL TREATS



5. TRAINING TREATS



6. FREEZE-DRIED TREATS



7. AIR-DRIED TREATS



8. FUNCTIONAL TREATS



9. FROZEN TREATS



10. CHEWY STICKS



11. WRAPS



12. FISH TREATS



13. VEGGIE / PLANT-BASED TREATS



14. PUFFS / PUFFED SNACKS



15. TOPPERS / SPRINKLES



16. STUFFED TREATS



17. ROLLS



18. MOLAR / LONG-LASTING CHEWS



19. EXTRUDED KIBBLE (DRY)



20. EXTRUDED SHAPES



21. EXTRUDED STICKS



22. EXTRUDED RINGS



23. EXTRUDED NUGGETS



24. EXTRUDED WITH POCKET



25. EXTRUDED POCKET STICKS



26. EXTRUDED POCKET BITES



27. EXTRUDED DUAL-FLAVOR POCKETS



28. HOMEMADE-STYLE TREATS



29. LIQUID / PASTE TREATS



30. POWDER TREATS



Dog Snack



TABLE 1 Types of treats – advantages, disadvantages and risks.

Type of treats	Risks	Advantages	Disadvantages	Caloric density kcal/100g	Protein g/1000 kcal	Fat g/1000 kcal
Biscuits	Aggravates diabetes (Morelli et al., 2018)	Extended shelf life (Almeida et al., 2022)	High level of sugar – up to 51.7 g/1000 kcal (Morelli et al., 2018)	329.2 (Morelli et al., 2018)	47.0 ± 12.0 (88.6–91.6) (Morelli et al., 2018)	27.0 ± 9.5 (15.8–35.9) (Morelli et al., 2018)
Soft treats	1. Overweight (Morelli et al., 2018) 2. Involuntary ingestion (Castrica et al., 2021)	1. Decreases the dental calculus, dental plaque and gingivitis (Stookey, 2009) 2. Incorporate functional nutrients (He et al., 2020)	Easy to eat overfeeding (Larsen and Farcas, 2014)	294.0 (Morelli et al., 2018)	108.9 ± 54.1 (22.0–204.2) (Morelli et al., 2018)	19.7 ± 15.4 (4.8–53.9) (Morelli et al., 2018)
Jerky treats	Zoonosis (Nemser et al., 2014)	Stability and safety during storage (Kim et al., 2020)	1. Fanconi syndrome (Nybroe et al., 2022) 2. Microbiological contamination (Nemser et al., 2014)	284.4 (Morelli et al., 2018)	99.8 ± 14.2 (89.8–109.9) (Morelli et al., 2018)	24.8 ± 9.8 (17.9–31.8) (Morelli et al., 2018)
Dental chews	Esophageal blockage (Leib and Sartor, 2008)	Promote dental hygiene (De Godoy et al., 2014)	Oral injuries (Arhant et al., 2021)	267.7 (Morelli et al., 2018)	29.4 ± 15.6 (10.8–48.9) (Morelli et al., 2018)	11.5 ± 3.7 (6.5–14.6) (Morelli et al., 2018)
Animal parts	Dental fractures and oral injuries (Arhant et al., 2021)	1. Mental stimulation (Morgan et al., 2023) 2. Stable at room temperature (Davidson, 2019)	Constipation, vomiting or diarrhea (Arhant et al., 2021)	312.2 (Morelli et al., 2018)	–	–
Rawhide	Gastrointestinal blockage (Hooda et al., 2021)	1. Affordable (Stern and Martin, 2021) 2. Dental benefits (Stern and Martin, 2021)	Significant variability in terms of digestion (He et al., 2020) Formation of calcium-oxalate uroliths (Morelli et al., 2018)	309.5 (Morelli et al., 2018)	171.9 ± 67.5 (78.0–244.6) (Morelli et al., 2018)	10.7 ± 9.9 (1.2–23.7) (Morelli et al., 2018)

Cat Snack

Preference

- Cats use **smell** in the detection and selection of food
- More significantly attractive odour > less attractive food
- None of the especially attractive food, cats will taste the food and make their decision based on smell and taste
- Diets having **one dominant taste** result in a higher feed intake
- Overall product formulation and processing > specific flavor

Behavior

- Obligate carnivores
- Kittens follow the mother's feeding habits
- Preferences can change considerably during at least the first year of life

Market Survey in June 2026





Functional

Functional food

- First promoted in 1984 by Japanese scientists
- Food products fortified with **special constituents** that possess advantageous physiological effects
 - may improve the general conditions of the body
 - **Ex.** Pre- and Probiotics
 - decrease the risk of some diseases
 - **Ex.** Cholesterol-lowering products
 - could even be used for curing some illnesses

Siró, I., Kápolna, E., Kápolna, B., & Lugasi, A. (2008). Functional food. Product development, marketing and consumer acceptance—A review. *Appetite*, 51(3), 456-467.

— Ingredient List —

Ingredient List

Deboned Lamb, Chicken Meal, Brewers Rice, Whole Brown Rice, Whole Grain Sorghum, Split Peas, Lamb Meal, Chicken Fat (preserved with Mixed Tocopherols), Rice Bran, Dried Plain Beet Pulp, Natural Flavor, Flaxseed, Potassium Chloride, Salt, Choline Chloride, DL-Methionine, Mixed Tocopherols and Citric Acid (preservatives), Zinc Sulfate, Niacin Supplement, Biotin, Vitamin E Supplement, Iron Amino Acid Chelate, D-Calcium Pantothenate, Selenium Yeast, Riboflavin Supplement (Vitamin B2), Copper Amino Acid Chelate, Vitamin B12 Supplement, Pyridoxine Hydrochloride (Vitamin B6), Manganese Amino Acid Chelate, Vitamin A Supplement, Thiamine Mononitrate (Vitamin B1), Potassium Iodide, Vitamin D3 Supplement, Folic Acid, **Rosemary Extract.**

PROTEIN

Meat should always be the first ingredient, as labels are written in most to least order.

CARBS

Provide energy and a source of fiber to help your dog feel full.

FATS

Delicious energy source and building blocks for muscles and body tissues.

NATURAL FIBERS

Aids digestion and promotes solid poops.

VITAMINS & MINERALS

Complete and balanced dog food should have a long list of required vitamins. These appear at the end because of their small amounts.

NUTRITION FACTS

Ingredients:

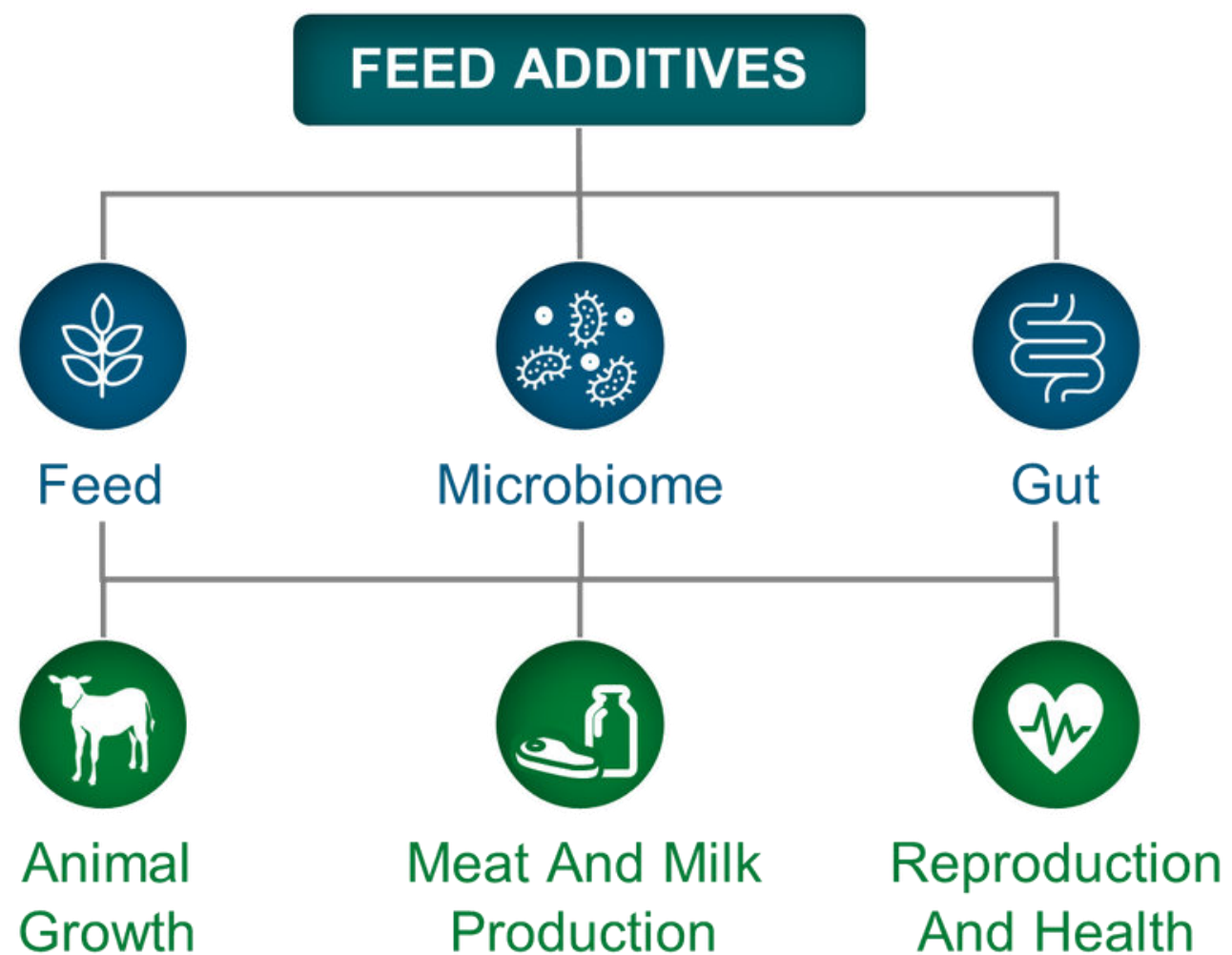
Chicken, cracked pearled barley, brown rice, brewers rice, whole grain wheat, whole grain corn, corn protein meal, chicken meal, chicken fat, chicken liver flavor, soybean meal, dried beet pulp, soybean oil, lactic acid, flaxseed, pork liver flavor, potassium chloride, iodized salt, whole grain oats, **fructooligosaccharides (FOS)**, choline chloride, calcium carbonate, vitamins (vitamin E supplement, L-Ascorbyl-2-Polyphosphate (source of vitamin C), niacin supplement, thiamine mononitrate, vitamin A supplement, calcium pantothenate, biotin, vitamin B12 supplement, riboflavin supplement, pyridoxine hydrochloride, folic acid, vitamin D3 supplement), taurine, minerals (ferrous sulfate, zinc oxide, copper sulfate, manganous oxide, calcium iodate, sodium selenite), mixed tocopherols for freshness, natural flavors, **beta-carotene.**

Guaranteed Analysis:

Crude Protein (MIN)	.19% (190 g/kg)
Crude Fat (MIN)	11.3% (113 g/kg)
Crude Fiber (MAX)	4% (40 g/kg)
Moisture (MAX)	10% (100 g/kg)
Vitamin E (MIN)	400 IU/kg
Ascorbic Acid* (Vitamin C) (MIN)	.75 ppm (85 mg/kg)
Chondroitin Sulfate* (MIN)	300 ppm (300 mg/kg)
Glucosamine* (MIN)	250 ppm (250 mg/kg)
Omega-6 Fatty Acids* (MIN)	2.5% (25 g/kg)

*Not recognized as an essential nutrient by the AAFCO Dog Food Nutrient Profiles.

Additives



- วัตถุดิบที่เติม (Feed additives) หมายความว่า วัตถุดิบที่ใช้เติมในอาหารสัตว์ **เพื่อวัตถุประสงค์** ในการปรับปรุงคุณภาพของอาหารสัตว์และซากสัตว์หรือเพิ่มประสิทธิภาพในการผลิตสัตว์และสุขภาพของสัตว์
<https://dld.go.th/webnew/images/stories/book/66-12-01.pdf>

- An ingredient or combination of ingredients added to the basic feed mix or parts thereof **to fulfil a specific need**. Usually used in micro quantities and requires careful handling and mixing. (AAFCO, 2000)

- Feed additives are used to enhance flavour of feed, **to meet the need** for certain nutrients or to increase the performance of animals in good health. (EFSA)

Additives

- Additives in pet food **serve various purposes:**
 - **Nutritional additives**
 - **Technological additives**
 - Texture, stability and resistance to spoilage
 - **Sensory additives**
 - Colour and flavour



Raw material + Feed additive

FACT SHEET

Additives

Additives
 Additives in pet food serve various purposes: The first one is to provide nutritional benefits, e.g. vitamins. The second purpose concerns technological additives for safety and maintaining the desirable features of texture, stability and resistance to spoilage and lastly there can be sensory additives providing the colour and flavour.

The term 'additive' can be applied to a range of ingredients that manufacturers add to the basic ingredients that are at the heart of pet food. These minor ingredients include mainly essential nutrients such as vitamins and minerals, but also flavours, colours and agents to prevent harmful spoilage of the pet food due to fats going rancid or through bacterial contamination.

Vitamins and minerals are presented in the factsheet 'Nutritional needs of Cats and Dogs'.

Preservatives
 Pet food safety is of critical importance. Preservatives may be added, largely depending upon the type of pet food product and processing, to ensure that food products remain nutritious and safe for consumption throughout their shelf life. The food must be protected from bacterial or mould contamination and spoilage, further it must be protected from degradation and the loss of nutrients during storage. The method of preservation used depends on the type of food because the way of processing also contributes to the food integrity and shelf life.

Dry pet food: The manufacturing process kills microbes and the low moisture content helps to inhibit the growth of most organisms.

Moist pet food: The heat applied in cooking of canned or pouch pet food kill microbes and the packaging excludes air, protecting the food.

Chilled pet food: Processed chilled pet food has undergone a controlled thermal process and this, together with refrigeration during storage helps suppress spoilage.

Semi-moist pet food: This generally has a low pH and contain humectants that bind water to the product, making it less available for use by invading organisms.



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FACT SHEET

Antioxidants
 Antioxidants are used to protect pet food from deterioration due to oxidation. All pet food has some fat and/or oil content and these should be stabilised by including antioxidants to prevent fats from reacting with oxygen in the air (oxidising) and food becoming rancid which leads to losses in nutritional quality. The inclusion of antioxidants helps to maintain wholesomeness and quality of the food. Antioxidants are incorporated into dry and semi-moist pet food to protect them from exposure to oxygen after processing. Antioxidant preservatives that might be included in dry pet food include: a variety of herbal or plant extracts including: vitamin E (tocopherols), vitamin C (ascorbates) or man-made antioxidants, which have been used in various human food for many years.

Colouring agents
 Colouring agents may be added to pet food to enhance the appearance of the food. These include a range of naturally occurring food colours, food dyes or mineral based colours.

Emulsifiers and stabilisers
 Emulsifiers help keeping the fat in the food and prevent the water from separating. Gums and lecithin are used to prevent separation of ingredients and to create the gravy or gel in canned, pouch and other moist pet food. Food gums include seaweed extracts and seed gums such as guar gum (from the guar plant).

Flavours
 Flavours are used to enhance the palatability in some pet food and to provide product variation. Much of the appeal of prepared pet food to the dog or cat stems from the choice of raw materials, such as fish, meat, vegetables or cereals. As with food for humans, the cooking process often increases the palatability of pet food. Some flavours may be added to some pet food and these can be natural flavours such as extracts from fish or poultry, or agents designed to mirror natural flavours.

Gut flora stabilisers
 Gut flora stabilisers such as live micro-organisms can be added to pet food and have a positive effect on the gut microbiota. These live micro-organisms, classified as zoo-technical feed additives by the European authorities and commonly known as "probiotics", can be a good alternative to reduce the use of antibiotics in animals and more specifically in pets.



More advice can be found at www.fedial.org
 Status: December 2018

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https://europeanpetfood.com/comingsoon.site/wp-content/uploads/2022/02/FEDIAF_Additives.pdf

— Indications —

**Safety and Regulatory
Compliance**

Efficacy and Quality

1
Define the
Purpose and
Target Outcome



4
Evaluate the
Manufacturer
and Supplier

Feed additive

Product Claim



Dog treats + Beta-glucan

กระตุ้นภูมิคุ้มกัน

Ingredients: Chicken meat, Wheat flour, Sugar, Yeast cell wall extract, Liver flavor, Vitamins and Minerals, Vitamin E

ME 250 kcal/100g

Feeding guide

- 1-5 kg..... 1-3 pcs
- 6-10 kg..... 4-6 pcs
- 11-15 kg..... 7-9 pcs
- 16-20 kg..... 10-12 pcs



Cat treats

Joint care, Skin and Coat care

Ingredients: Water, Tuna meat, salmon meat, Gum, Salmon oil, Krill oil, Canola oil, Egg shell membrane, Vitamins and Minerals

ME 35 kcal/100g

Feeding guide

- 1-2 kg..... 3-4 sachets
- 2-4 kg..... 4-6 sachets
- 4-6 kg..... 6-9 sachets

Additives

Gastrointestinal

- - biotics
- Fiber
- Glutamine
- Enzyme

Kidney

- Protein
- Minerals
- Betaine
- Pre-, Probiotics

Digestibility

- Enzyme
- Hydrolyzed protein
- High quality ingredient

Fecal odor

- Protein
- *Yucca schidigera*
- *Quillaja saponaria*

Hairball control

- Fiber
- Keratinolytic enzyme

Bone & Joint

- Glucosamine & Chondroitin
- Collagen type II
- Hyaluronic acid
- Omega-3
- Cannabinoids

Behavior & Stress

- Antioxidants
- Alpha-Casozepine
- L-theanine
- Tryptophan

Palatability

- Protein
- Fat (Lipid)
- Nucleotide
- Palatant

Skin & Coat

- Omega 3 & 6
- Amino acid
- Minerals
- Vitamins

Allergy

- Novel protein
- Hydrolyzed protein

Oral health

- Calcium lactate
- Hexametaphosphate
- Lactic acid
- Propolis + Lysozyme

Immunity

- Vitamin
- Antioxidants
- Pathogen-like substances

Urinary & Urolith

- Control urine pH
- Water consumption
- Cranberry extract
- Minerals

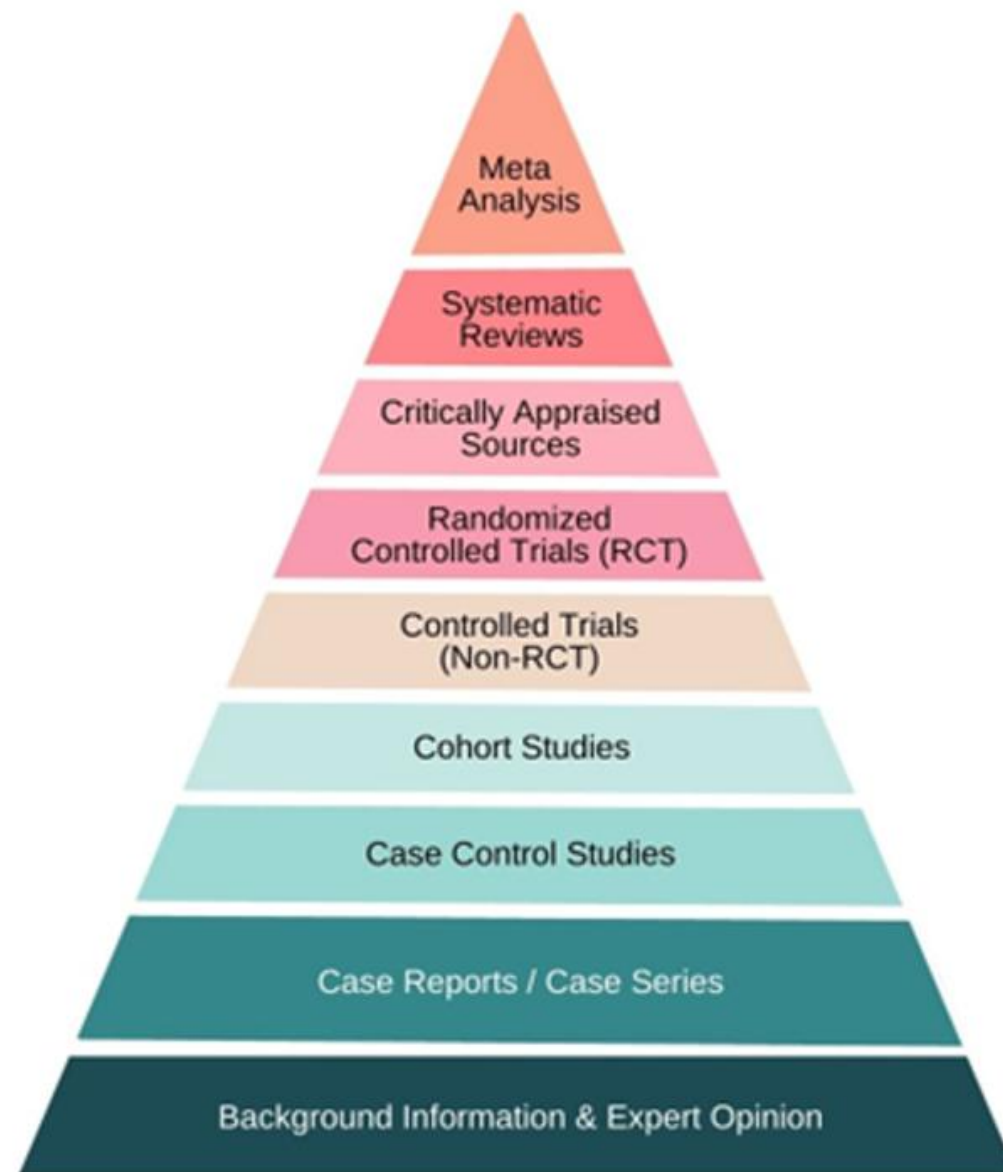
Obesity

- L-carnitine
- Low fat, Calories
- High fiber
- Antioxidants s

Additives

Supplement	Indications	Reference
Omega – 3	Osteoarthritis (reduced pain and anti-inflammation)	Johnson, K. A., Lee, A. H., & Swanson, K. S. (2020). Nutrition and nutraceuticals in the changing management of osteoarthritis for dogs and cats. <i>JAVMA</i> , 256(12), 1335–1341.
Medium-chain triglycerides (MCT)	Cognitive Function, Brain Aging	Pan, Y. (2021). Nutrients, cognitive function, and brain aging: what we have learned from dogs. <i>Medical Sciences</i> , 9(4), 72.
Vitamin B₁, B₆, B₉, and B₁₂	Neurodevelopment and cognitive function	May, K.A. and Laflamme, D.P., 2019. Nutrition and the aging brain of dogs and cats. <i>Journal of the American Veterinary Medical Association</i> , 255(11), pp.1245–1254.
L-carnitine	Mitochondrial function, Antioxidant	
Antioxidants	Oxidative stress	
– biotics	Gut microbiota	Oh, W. S., Armstrong, P. J., & Han, H. J. (2025). Lifestyle factors affecting aging and healthspan in dogs and cats. <i>J. Vet. Sci.</i> 26(Suppl 1), S220.

— Efficacy and Quality —



Research article

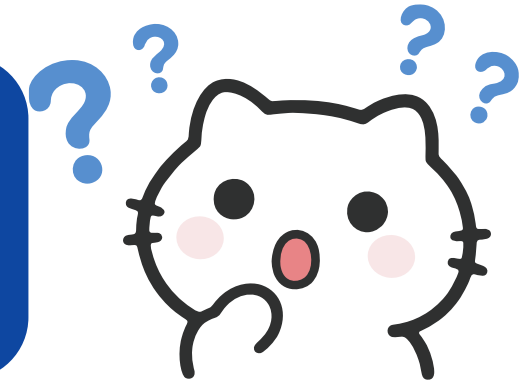
Adapted from "Levels of Evidence Pyramid", Andy Puro, 2014

- **Reliable databases**
- **Animal**
 - Species
 - Age
- **Inclusion and Exclusion Criteria**
- **Health Condition**
 - Healthy / Normal
 - Disease state
- **Test Substrate**
- **Experimental Design and Statistical Analysis**
- **Repeatability**

— Efficacy and Quality —

Dosage

- Dietary dosage *or* Body weight–based dosage
- Amount intake per day *or* Caloric intake per unit



Dosage use

- **Feed manufacturers:** Feed formula
- **Animal:** Daily dose, per body weight or per serving

Feeding method

- Main diet
- Top-dressing
- Snack / Treats
- Pills, capsules, *or* spoon

Experiment

RESEARCH ARTICLE

The effect of dietary olive polyphenols on markers of inflammation and bodyweight in senior domestic cats

D.G. Thomas¹ , P. Dyer² and C.J. Andrews¹

¹Animal Science Group, School of Agriculture and Environment, Massey University, Private Bag 11-222, Palmerston North 4442, New Zealand; ²Callaghan Innovation, 69 Gracefield Road, Lower Hutt 5040, New Zealand

*d.g.thomas@massey.ac.nz

Received 29 October 2023 | Accepted 19 February 2024 | Published online 12 March 2024

Abstract

The high rates of obesity and degenerative joint disease in companion animals has resulted in a demand for dietary supplements that support joint health and reduce inflammation. Polyphenols have received considerable attention in this space, although literature in companion animals is lacking or conflicting. This study determined whether a diet supplemented with olive polyphenol extract had the potential to reduce inflammation and/or bodyweight. Eight senior domestic cats aged 11.01 ± 0.74 years (mean \pm standard error of the mean) and weighing 3.6 ± 0.3 kg (mean \pm SEM) were used for this study. The cats were fed, *ad libitum* with a complete (AAFCO) canned diet supplemented with 0.1% olive polyphenol extract for 56 days. Cats were weighed weekly and blood samples taken on day 0 (baseline), 28, and 56 of the study. Biochemistry, haematology, and cytokine (19 cytokines or chemokines) panels were run for each blood sample. While there was an initial aversion to the supplemented diet, intakes of the cats increased, and they consumed enough to meet or exceed their daily maintenance energy requirements by day 10 of the trial. On average, the cats lost approximately 8% of their starting weight over the trial, which was interesting given that feed intake exceeding maintenance energy requirements for most of the study. Whether the decrease in bodyweight was due to seasonal changes, the supplemented diet, or a combination of the two warrants further investigation. There were little to no changes to any of the blood parameters, which was surprising given that previous studies have reported reductions in pro-inflammatory cytokines following polyphenol supplementation. Perhaps a higher concentration of olive polyphenols is required to elicit the anti-inflammatory response observed in other species. A study evaluating the dose-dependent effects of dietary polyphenols on inflammatory and oxidative markers in cats would be valuable in this context.

- **Animal condition:** Senior cat with obesity and degenerative joint disease
- **Test Substrate:** Olive polyphenol extract
 - Properties: improve joint health and function through their anti-inflammatory and antioxidant properties, lipid-lowering, and hypoglycemic (beneficial for weight loss) in humans
- **Study design:**
 - Diet: canned food, *ad libitum* (3,160 g) + 0.1% olive polyphenol extract (31.6 g/day)
 - MER (kcal) = $100 \times \text{kg BW}^{0.67}$ // ME diet = 765 kcal/kg
 - Duration: 56 days
 - Data collection: Weekly body weight, feed intake, hematology, blood chemistry, cytokine on day 0, 28, and 56
- **Result:**
 - Weight loss ~ 8% of initial body weight
 - No changes to any of the blood parameters and cytokine concentrations
 - A higher concentration of olive polyphenols is required

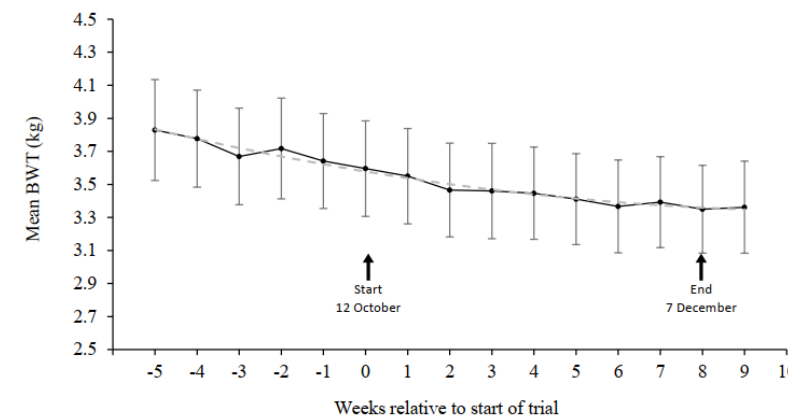


FIGURE 1 Mean \pm standard error of the mean (SEM) bodyweights of the cats (n=8) over time relative to the start (week 0) and end (week 8) of dietary supplementation with 0.1% olive polyphenols. The grey dashed line represents the linear regression line ($r^2=0.9, P<0.001$).

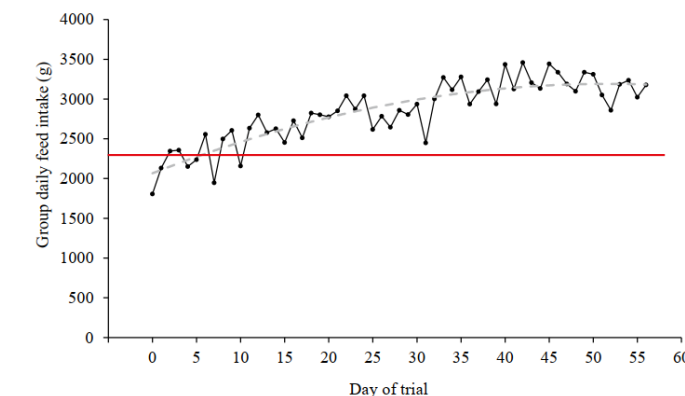


FIGURE 2 The daily voluntary feed intake of the group of cats (n=8) given a diet of Chef Classic chicken supplemented with 0.1% olive polyphenols. The grey line represents polynomial regression ($r^2 = 0.77$). The red line represents the daily dietary intake required to meet the maintenance energy requirements of the group of cats based on their starting bodyweights.

Experiment

COMPOSITION: 51% Chicken (Freshly Prepared Chicken 45%, Chicken Fat 6%)*, Potato, Peas, Field Beans, Pea Protein, Chickpeas, Lucerne, Brewer's Yeast, Minerals, Vegetable Gravy, Chicory (5g/kg), Carrot (10mg/kg), Freshly Prepared Egg, Marigold, Spirulina (10mg/kg), Camomile, Broccoli (10mg/kg), Cleavers

NUTRITIONAL ADDITIVES (PER KG): Vitamins: Vitamin A 14,423 IU, Vitamin D3 1,923 IU, Vitamin E 96 IU; Trace Elements: Zinc (Zinc Sulphate Monohydrate & Zinc Chelate of Amino Acids Hydrate) 69mg, Iron (Iron (II) Sulphate Monohydrate & Iron (II) Chelate of Amino Acids Hydrate) 48mg, Manganese (Manganese Chelate of Amino Acids Hydrate) 34mg, Copper (Copper (II) Chelate of Amino Acids Hydrate) 12mg, Iodine (Calcium Iodate Anhydrous & Potassium Iodide) 1.04mg, Selenium (Selenised Yeast *Saccharomyces cerevisiae* CNCM I-3060, inactivated) 0.22mg

ANALYTICAL CONSTITUENTS: Crude Protein 21%, Crude Fat 10.5%, Crude Fibre 4%, Crude Ash 6.5%, Moisture 8%, NFE 50%, Metabolisable Energy 352 Kcal/100g, Omega-6 2.8%, Omega-3 0.4%, Calcium 0.6%, Phosphorus 0.4%

between groups and statistical significance considered to be $p < 0.05$. Dogs fed diets supplemented with *Spirulina* demonstrated enhanced immune status by showing significantly higher vaccine response and higher levels of fecal IgA as compared to the control group. Supplementing diets with *Spirulina* also resulted in significantly increased gut microbiota stability in the test group. **In conclusion, diets supplemented with *Spirulina* significantly enhanced immune response and gut health in dogs.**

Satyaraj E, Reynolds A, Engler R, Labuda J and Sun P (2021) Supplementation of Diets With Spirulina Influences Immune and Gut Function in Dogs. *Front. Nutr.* 8:667072. doi: 10.3389/fnut.2021.667072

Materials and Methods

Animals and Diets

Thirty adult dogs (Husky crosses, 2–7 years, mean 2.9 years) were used in this study. During an 8-week pre-test period all dogs were fed a commercially available nutritional complete and balanced dog food [Nestlé Purina product: ~29% protein, 36% carbohydrate, 19% fat; 1.4% fiber, 3894 ME Kcal/Kg] (**Supplementary Table 1**). At week 0, dogs were vaccinated with a rabies vaccine (IMRAB® 3, Merial Inc, Duluth, GA) as part of their normal veterinary care. At this time point dogs were randomly assigned into two feeding groups ($n = 15$ per group) based on sex, age, and fecal IgA (used as a marker of immune status). Dogs in the control group continued to be fed the "Control" pre-test diet and the other half fed the "Test diet" which was pre-test diet supplemented with **0.2% spray-dried *Spirulina*** (*Arthrospira platensis*, Cyanotech Corporation, Kailua-Kona, Hawaii, USA) (**Figure 1**). Dogs were fed twice per day, once in the morning and once in the evening. Food intake was recorded daily, and body weight was recorded weekly. All dogs were fed their respective diet until the end of the study.

Dose Calculation

- Diet supplemented with **0.2%** dried *Arthrospira platensis* (Spirulina) powder
 - action on monocytes and natural killer (NK) cells, components of the innate immune system
- 30 dogs were vaccinated with a rabies vaccine
- Duration: Pre-test 8 weeks + Test 42 weeks
- Complete and balanced dog food: 29% protein, 36% carbohydrate, 19% fat; 1.4% fiber, 3,894 ME Kcal/Kg

**Dosage in
Complete Diet**

≠

**Dosage in
Snack / Treats**

≠

**Dosage in
Body Weight**

Dose Calculation

Dosage in Complete Diet

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Dosage in Snack / Treats

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Dosage in Body Weight

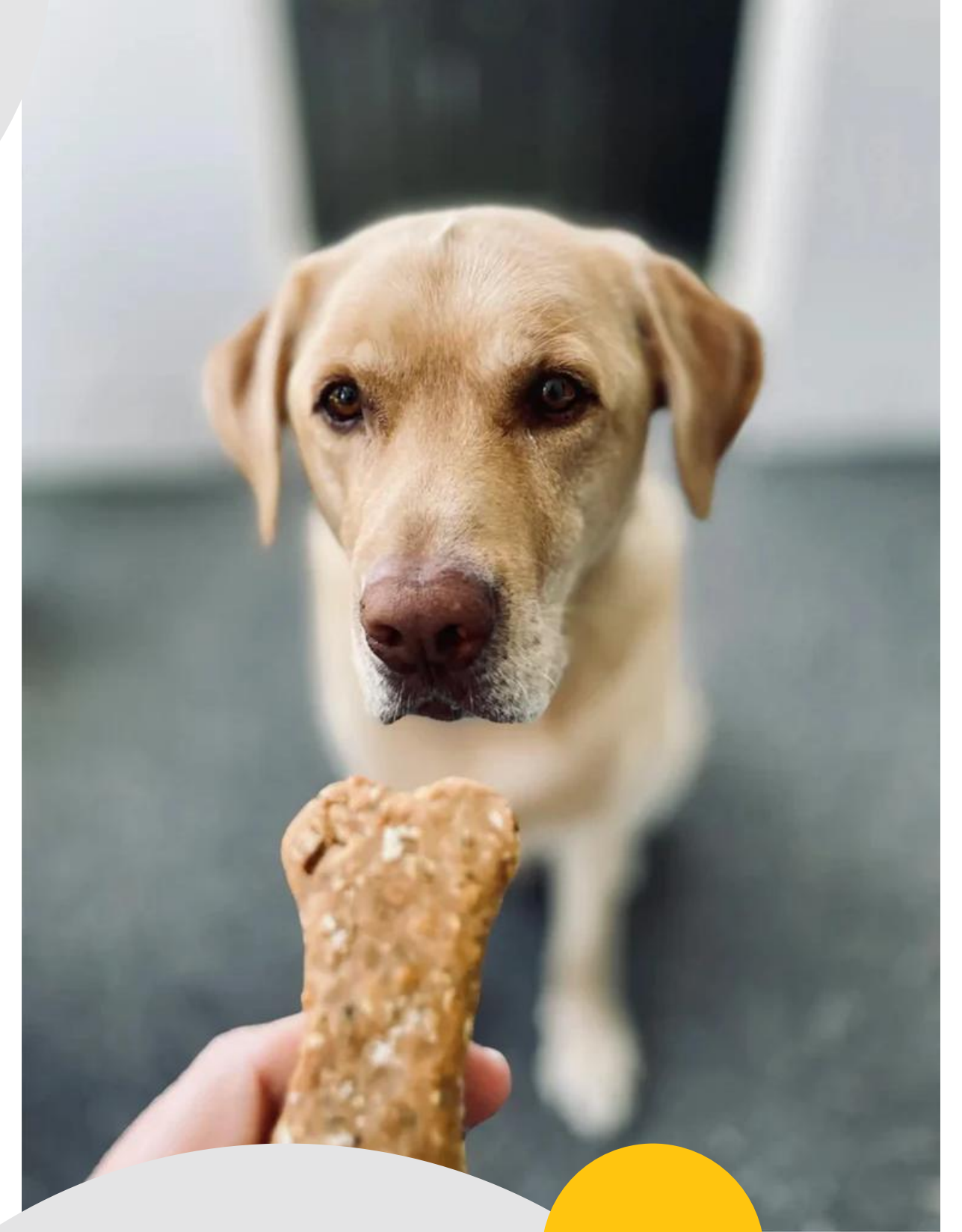
ME	3894	kcal/kg			
Additives dose	0.2	% of diet			
DER Factor	1.6				
Index Unit	Animal BW kg	DER kcal/day	Feeding g/day	%Additive g/day	
	1	112	29	0.06	
	5	374	96	0.19	
	10	630	162	0.32	
	15	854	219	0.44	
	20	1059	272	0.54	
	25	1252	322	0.64	
	30	1436	369	0.74	
	35	1612	414	0.83	
	40	1781	457	0.91	

ME	1200	kcal/kg			
Additives dose	0.2	% of diet			
DER Factor	1.6				
Index Unit	Animal BW kg	DER kcal/day	10% of DER Kcal/day	Feeding g/day	%Additive g/day
	1	112	11	13	0.03
	5	374	37	45	0.09
	10	630	63	76	0.15
	15	854	85	102	0.20
	20	1059	106	127	0.25
	25	1252	125	150	0.30
	30	1436	144	172	0.34
	35	1612	131	193	0.39
	40	1781	178	214	0.43

Increase Additive dose

Conclusion

- To achieve measurable health benefits in senior dogs and cats, functional ingredients must be provided at an effective dose
- This consideration is particularly important for pet treats, where daily intake is limited
- Therefore, successful functional treat development requires balancing ingredient efficacy with realistic consumption levels





“The effectiveness of a functional ingredient depends not only on its biological activity, but also on delivering an effective dose within the limited amount of treats consumed by pets”

**Thank You For
Your Attention**