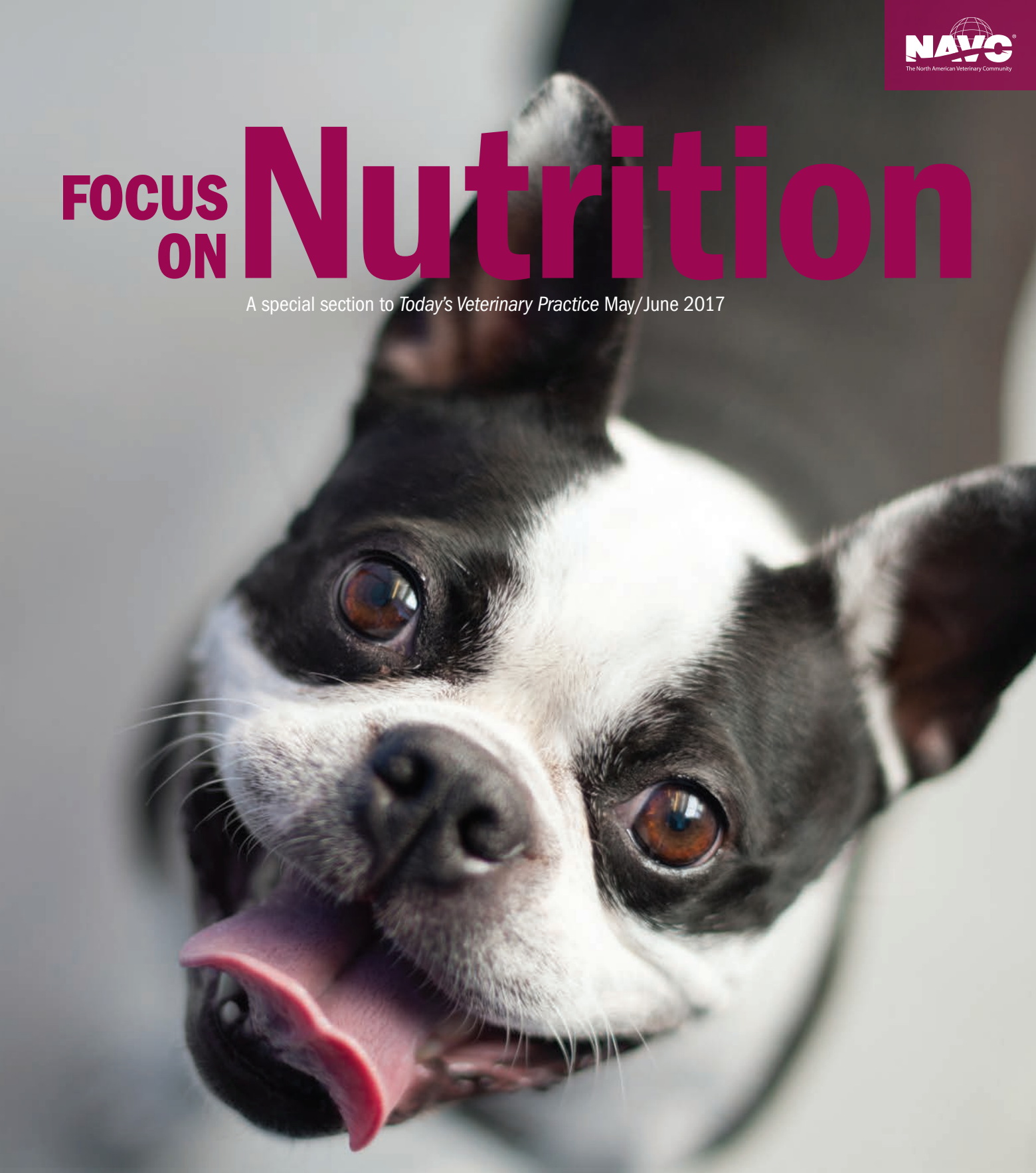

FOCUS ON Nutrition

A special section to *Today's Veterinary Practice* May/June 2017

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A Hand-in-Hand Approach to Pet Nutrition

Welcome to our special nutrition section, designed to bring you some of the latest developments in nutrition news, science, and innovative products. *Today's Veterinary Practice* is also dedicated to helping veterinarians and staff keep up-to-date on important topics in this area by providing peer-reviewed articles in a partnership with the American College of Veterinary Nutrition. Recently we covered…

- **Diets and the Dermis: Nutritional Considerations in Dermatology**
  March/April 2017
- **Featuring Fiber: Understanding Types of Fiber & Clinical Uses**
  January/February 2017
- **To Feed or Not to Feed? Controversies in the Nutritional Management of Pancreatitis**
  November/December 2016

CONTENTS

Many more topics are available under the "Nutrition" clinical topic on the **tvpjournal.com** website.

Nutrition continues to grow as a critical area of service for the veterinary practice. Clients seek advice and prescription diets for many different medical concerns and conditions, and veterinarians now have more solutions available to them than ever before. In this section, we offer articles on the following topics:

- **Behavior Monitoring in Nutrition Plans**
- **Neurologic Breakthrough in Canine Nutrition**
- **Over-the-Counter Versus Therapeutic Veterinary Diets**

Behavior Monitoring Taking Pet Healthcare to a New Level

» **S. Dru Forrester**, DVM, MS, DACVIM

Technology provides actionable insights to improve patient care and enhance client communication and compliance

Because pets lack the ability to describe their clinical signs or explain how they feel, the veterinary healthcare team is at a disadvantage when it comes to successfully diagnosing and treating patients. The limited time with patients in the examination room means that diagnosis relies heavily on perceptions and observations of pet owners, who may not recognize or may misinterpret important signs.

For example, clients with an overweight dog on a recommended exercise plan might think that their dog is active, but can they measure how many minutes per day the dog spends resting versus running or walking? And what about dogs with allergic skin disease or otitis that are home alone for much of the day—is it possible to know how many minutes per day they spend scratching or head shaking?

Today's technology can help close this information gap, and veterinarians are taking note.

"Advances in technology continue to provide veterinarians with tools to deliver higher-quality care to their patients. Remote monitoring of a dog's activity and movement can actually assist the veterinarian to fine-tune treatment choices, while at the same time providing the client with objective information about just how well their dog is responding to a care plan. This is a win–win for all involved," said Robin Downing, DVM, MS, DAAPM, DACVSMR, CVPP, CCRP, of the Downing Center for Animal Pain Management in Windsor, Colorado.

GATHERING DATA

The limited time with patients in the examination room means that diagnosis relies heavily on perceptions and observations of pet owners, who may not recognize or may misinterpret important signs.

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ABOUT THE AUTHOR

S. Dru Forrester, DVM, MS, DACVIM

S. Dru Forrester is director of Global Scientific Affairs for Hill's Pet Nutrition. Dr. Forrester was invited by *Today's Veterinary Practice* to author this column. Dr. Forrester received her DVM from Auburn University. She completed an internship and residency in internal medicine and received a Master of Science degree at Texas A&M University. Dr. Forrester was a faculty member in the Department of Small Animal Clinical Sciences at the Virginia-Maryland Regional College of Veterinary Medicine for 13 years and a professor at the Western University College of Veterinary Medicine in southern California for 2 years. She has received many awards in recognition of teaching excellence, including the national Carl Norden/Pfizer Distinguished Teacher Award in 2004. Dr. Forrester is also an adjunct faculty member in the Department of Clinical Sciences at Kansas State University. Her professional interests include urology and nephrology.

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"As veterinary dermatologists, we ask pet parents how itchy their dogs are, but they don't know because they're not home for most of the day."

— DR. JOEL GRIFFIES

THE TECHNOLOGY

A number of lightweight sensors that can attach to a dog's collar and collect a variety of data are available. The best systems go beyond basic activity tracking to provide more advanced behavior monitoring. These devices can provide continuous (24/7), detailed, and actionable insights to the veterinary healthcare team to help inform veterinarians as they recommend treatment options and provide valuable behavioral information related to pets' underlying health conditions.

For example, AGL's Vetrax™ system captures multidimensional, high-frequency data, which is then processed by cloud-based algorithms developed by scientists at Georgia Tech. The algorithms can match waves of energy, which are the pets' movements detected by the sensor, to a database of identified behaviors. Specific actions, such as resting, walking, running, scratching, and head shaking, can then be quantified, informing the veterinary healthcare team of the amount of time per day the dog exhibits each behavior.

Going beyond the ability to collect and process data, advances in software design now allow the entire veterinary healthcare team to effectively and efficiently analyze this information and clearly present their findings to clients.

Web portals serve as the hub of information where veterinary healthcare team members can see a dashboard with infographics that visually summarize an overview for all patients. The team members can also access a detailed view of data for individual patients and set goals to help manage the pet's underlying conditions.

For example, through the Vetrax portal, the veterinary healthcare team can schedule reminders, send questions to pet owners, or request photos or videos between visits to the hospital. This provides an opportunity to enhance communication with clients and increase productivity and quality of each hospital visit. Clients can view progress and communications through a smartphone app, which provides a vehicle to see measurable changes from their veterinarian's treatment plan and can improve compliance.

NUTRITION INTEGRATION

With the ability to monitor and quantify specific behaviors, technology can help play a vital role in gauging the effectiveness of a nutrition therapy plan for a healthcare team.

This year, Hill's Pet Nutrition announced the launch of Hill's® SmartCare, a combination of the Vetrax behavioral monitoring system and Prescription Diet nutrition available exclusively through veterinarians. With this program, dogs wear the Vetrax sensor on their collars as part of a veterinarian-prescribed plan, which includes therapeutic nutrition to help manage dermatologic disorders (allergic skin disease, otitis), obesity, or osteoarthritis. Through the online portal and smartphone app, the veterinary healthcare team and owner can monitor the dog's behaviors (eg, scratching, head shaking, sleep quality) and have a more objective measurement to show the benefits of therapeutic nutrition.

Dr. Joel Griffies, DACVD, has used the Hill's SmartCare and Vetrax technology with his patients at the Animal Dermatology Clinic in Marietta, Georgia.

"As veterinary dermatologists, we ask pet parents how itchy their dogs are, but they don't know because they're not home for most of the day. Now, Hill's SmartCare powered by Vetrax helps bridge the communication gap by giving us an objective measurement, rather than relying on human observation," Dr. Griffies said.

With new technology, veterinarians will be able to extend their care beyond in-office consultations and monitor effects of their recommendations in real time. Access to quantitative data provides a new level of understanding about how a veterinarian's treatment plan affects patient behaviors and, ultimately, helps transform the lives of dogs with common conditions, including dermatologic disorders, obesity, and osteoarthritis.

The availability of a behavioral monitoring system allows veterinarians and clients to partner like never before and maximize effectiveness of a pet's healthcare program. Moving forward, technology will advance to be able to recognize and track additional behaviors and provide veterinarians with even more powerful tools to help transform the lives of pets. ■

Neurologic Breakthrough in Canine Nutrition

» **Jason Gagné**, DVM, DACVN
Director, Veterinary Technical Marketing | Purina Pro Plan Veterinary Diets

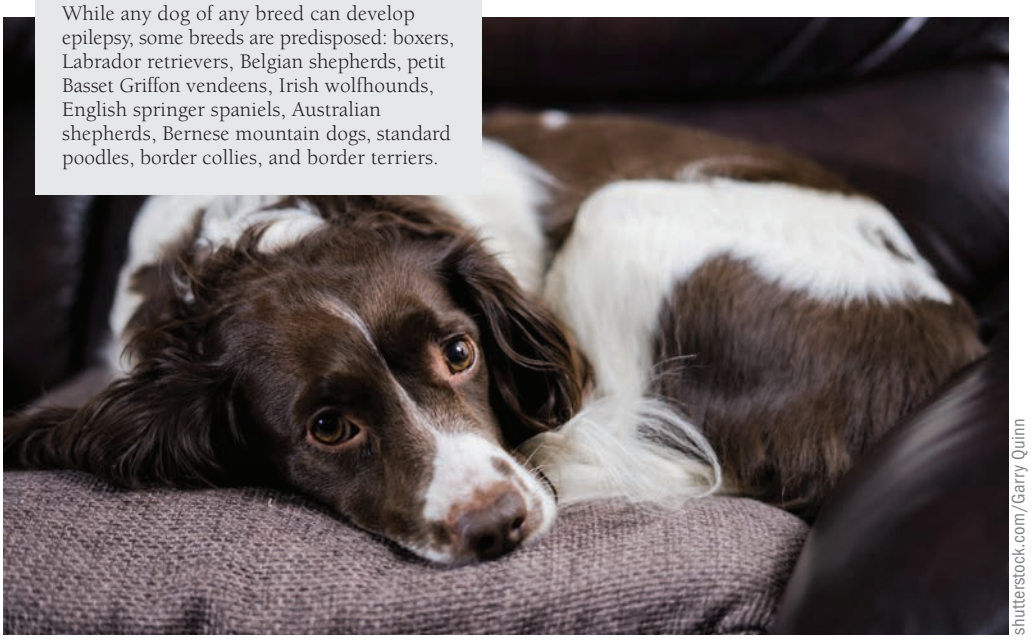
Veterinarians in companion animal practice are familiar with canine idiopathic epilepsy, a neurologic condition that affects an estimated 1 in 111 dogs.[1] Companion animal practitioners are also familiar with the shortcomings of current therapeutic approaches, which include medication side effects and breakthrough seizures.

While the precise cause of canine idiopathic epilepsy is unknown, the effect in the brain has been documented as a rapid, uncontrolled discharge of neurons within the brain's cerebral cortex that leads to seizures.[2] Epilepsy appears to be a heritable condition in dogs; while any dog of any breed can develop the condition, some breeds are predisposed. These include Labrador retrievers, Belgian shepherds, petit Basset Griffon vendeens, boxers, Irish wolfhounds, English springer spaniels, vizslas, Bernese mountain dogs, standard poodles, border collies, Australian shepherds, and border terriers.[3] The condition is also more common in males than females, with neutering having no effect on this predisposition.[2]

Anti-epilepsy drugs (AEDs) such as phenobarbital and potassium bromide are commonly used for canine epilepsy.[2] Patients typically have their first seizure between 1 and 3 years of age[4] and begin treatment with one of these medications, with others added if and when treatment results are unsatisfactory (a 50% reduction in seizures is considered a successful response[5]). The challenge: two-thirds of affected dogs continue to suffer from seizures in spite of medication,[6] and 20% to 30% remain poorly controlled.[7–9] Meanwhile, AEDs themselves are associated with side effects, including

A HERITABLE CONDITION

While any dog of any breed can develop epilepsy, some breeds are predisposed: boxers, Labrador retrievers, Belgian shepherds, petit Basset Griffon vendeens, Irish wolfhounds, English springer spaniels, Australian shepherds, Bernese mountain dogs, standard poodles, border collies, and border terriers.



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ABOUT THE AUTHOR

Jason Gagné, DVM, DACVN

Dr. Jason Gagné is a board-certified veterinary nutritionist employed by Nestlé Purina as a Director, Veterinary Technical Marketing. Jason works closely with innovation and renovation, development of clinical trials, and the Sales and Marketing departments of the Purina® Pro Plan® Veterinary Diets Brand. Prior to, and throughout his residency at Cornell, he served as an Associate Veterinarian in a small animal practice in Syracuse, New York. Jason has authored a number of publications in veterinary journals and textbooks, given scientific presentations at the regional and national level, taught a series of courses at Cornell, and serves as a scientific reviewer for leading journals.

polyphagia, polydipsia, polyuria, restlessness, lethargy, and ataxia, leading veterinarians to walk a narrow line between achieving medication benefits and causing harm. As a result, only 4% of veterinarians surveyed are "totally" or "mostly" satisfied with current treatment options.[1]

DIETARY THERAPY: A NEW APPROACH TO MANAGING DOGS WITH EPILEPSY?

Traditional ketogenic diets, which are designed to force the body to burn fat instead of carbohydrate and put the body into a state of ketosis, have been used for decades in children whose seizures are not controlled with medication.[10] The rationale is that brain glucose metabolism, which allows for production of adenosine triphosphate (ATP) as well as substrates for the generation of neurotransmitters,[11] is disrupted in epileptic patients, creating a need for alternative sources of brain energy.[11–16]

While high-fat, low-carbohydrate diets utilizing long-chain triglycerides have been used and studied in children, this type of diet has yet to be shown to significantly improve seizure control in dogs.[17] In addition, such diets also are unsatisfactory from a nutrient and palatability standpoint for dogs requiring lifelong therapy. Fortunately, dogs can metabolize medium-chain triglycerides (MCTs) to produce ketones,[18] and experts believe that dietary MCTs may also have direct antiseizure effects via blocking the alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptors in the brain.[19] Diets supplemented with MCT oil for dogs can also be formulated with lower amounts of fat and higher proportions of protein and carbohydrates than traditional ketogenic diets—an important factor when a diet needs to be fed for the remainder of a dog's life.

EPILEPSY STUDY EXAMINES THE EFFECTS OF TEST DIET WITH MCT OIL ON SEIZURES

Neurologic researchers at the Royal Veterinary College (RVC), in partnership with Purina, recently investigated the potential role of diet in the nutritional management of dogs whose seizures were not being well controlled with AEDs. While achieving complete remission was not considered realistic for many patients, the goal was to reduce seizure frequency in epileptic dogs on chronic AED therapy.

A total of 21 dogs with idiopathic epilepsy that had experienced at least 3 seizures in the 3 months prior to enrollment completed a 6-month, randomized, placebo-controlled, double-blinded crossover study at the RVC. The study demonstrated for the first time that a test diet with MCT oil can have positive effects on reduction of seizure frequency when fed as an adjunct to veterinary therapy.[18] Dogs in the 2 groups were fed either a test diet containing MCT oil or a placebo diet for a period of 3 months—then switched to the other diet. In the study, the following results were noted:

- 71% of dogs showed a reduction in seizure frequency
- 48% of dogs showed a 50% or greater reduction in seizure frequency
- 14% of dogs achieved complete seizure freedom

DIET HELPS NUTRITIONALLY MANAGE DOGS WITH EPILEPSY AS AN ADJUNCT TO VETERINARY THERAPY

The results of this study inspired Purina to develop the Purina® Pro Plan® Veterinary Diets NC NeuroCare™ diet, which is formulated with MCT oil to help nutritionally manage dogs with epilepsy that are also being administered AEDs. The diet is enhanced with a unique blend of nutrients—eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), arginine, antioxidants, and B vitamins, as well as MCT oil—to promote cognitive health and help nutritionally manage dogs with cognitive dysfunction syndrome. ■

While the precise cause of canine idiopathic epilepsy is unknown, the effect in the brain has been documented as a rapid, uncontrolled discharge of neurons within the brain's cerebral cortex that leads to seizures.

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NUTRITIONAL SUPPORT

A properly planned diet can help nutritionally manage dogs with epilepsy as a supplement to veterinary therapy.

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Nutritionists' View: Over-the-Counter Versus Therapeutic Veterinary Diets

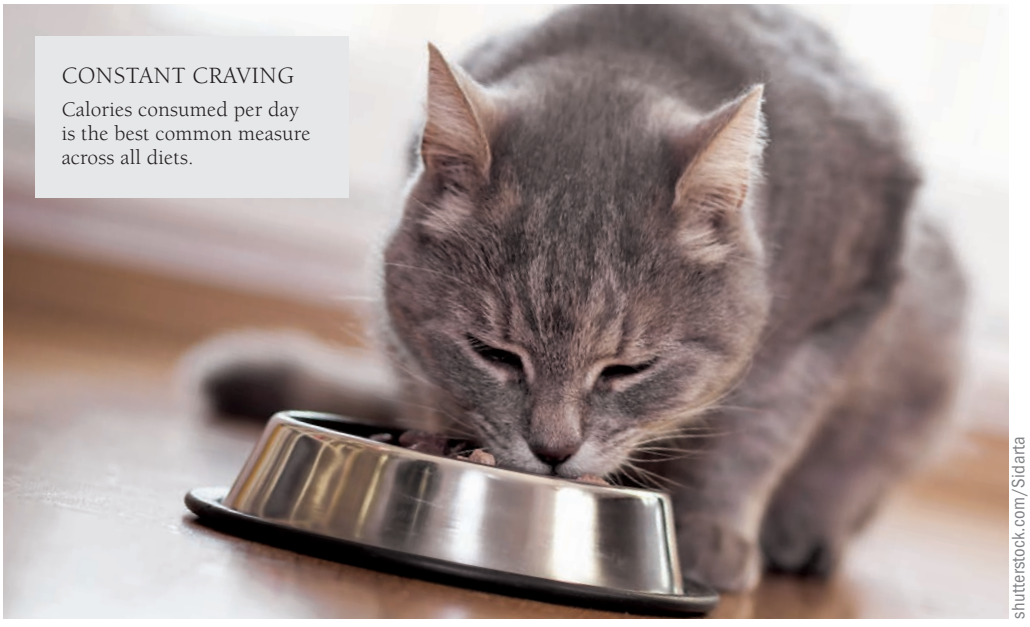
» **Donna Raditic**, DVM, DACVN
» **Joe Bartges**, DVM, PhD, DACVN, DACVIM

With so many brands and types of foods available (pet food sales exceed $24 billion in the United States, with Nestle Purina PetCare, Mars PetCare Inc, Big Heart Pet Brands, Hill's Pet Nutrition, Diamond Pet Foods, and Blue Buffalo accounting for approximately 70% of the market), owners, veterinarians, and veterinary nurses can have difficulty interpreting ingredient labels, assessing the quality of diets, and understanding pet food regulations. As a result, members of the veterinary healthcare team may be reluctant to make specific recommendations.

Veterinary healthcare teams are familiar with recommending veterinary therapeutic diets (VTD) for management of chronic disease states, but many of these diets are suitable for adult maintenance and growth. VTD have accessible information on caloric and nutrient profiles, may address inflammation with specific nutrients, and have higher digestibility and less contamination than over-the-counter (OTC) diets.

DIFFERENCES BETWEEN OTC DIETS AND VTD

The term "therapeutic diet" has no legal definition; however, the Food and Drug Administration has guidelines for the labeling and marketing of canine and feline diets intended to diagnose, cure, mitigate, treat, or prevent diseases **(BOX 1)**. These



CONSTANT CRAVING
Calories consumed per day is the best common measure across all diets.

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ABOUT THE AUTHORS

Donna Raditic, DVM, DACVN

Dr. Raditic received a BS in Animal Science at Cornell University and her DVM at Cornell's College of Veterinary Medicine. She has been a professor of nutrition and integrative medicine at the University of Tennessee College of Veterinary Medicine. Dr. Raditic is an author and coauthor of textbooks and research in nutrition and integrative therapies. Her interests are nutritional therapies in small animal diseases, supplements, integrative therapies in disease states, metabolomics, translational research, and One Health. Based in Athens, Georgia, she currently does consulting on nutrition and integrative veterinary medicine.

Joe Bartges, DVM, PhD, DACVN, DACVIM

Dr. Bartges earned his DVM at the University of Georgia College of Veterinary Medicine and PhD at the University of Minnesota. He has served as an interim department head at the University of Tennessee as well as an internist and nutritionist at Cornell University Veterinary Specialists. Currently, Dr. Bartges is Professor of Medicine and Nutrition at the University of Georgia College of Veterinary Medicine. He is on the editorial boards of 5 journals, a consultant for the Urinary and Nutrition boards with Veterinary Information Network, and a member of the Blue Buffalo Veterinary Advisory Board.

BOX 1

Online Resources

- American College of Veterinary Nutrition (acvn.org)
- Food and Drug Administration: FDA's Regulation of Pet Food (fda.gov/animalveterinary/resourcesforyou/ucm047111.htm)

guidelines came about because such diets were historically distributed only through veterinarians; however, some of these diets are now available to consumers through Internet or store purchase with a veterinary prescription.

VTD are usually considered for managing specific medical conditions, such as kidney disease or osteoarthritis.[1,2] Their ingredients and/or composition differ from OTC pet foods for a specific purpose, but this does not always preclude recommending these diets for healthy patients. Additionally, the quality control of their manufacture is often more stringent than that of OTC diets. Although some may carry statement reading "use under supervision of a veterinarian," many VTD have AAFCO nutritional adequacy statements for adult and sometimes growth life stages **(TABLE 1)**. For these reasons, we often recommend VTD for healthy pets to provide better nutrition and to aid in prevention of common disease states.

TABLE 1

AAFCO Statements for VTD

	AAFCO ADULT MAINTENANCE*	AAFCO GROWTH*
CANINE DRY VTD		
Hill's i/d	Yes	Yes
Purina EN	Yes	Yes
Purina DRM	Yes	Yes
Purina HA Vegetarian	Yes	Yes
Purina JM	Yes	Yes
Royal Canin GI Puppy	No	Yes
Royal Canin HP	Yes	Yes
Royal Canin Select Protein PV	Yes	Yes
Blue Buffalo GI	Yes	Yes
FELINE DRY VTD		
Hill's i/d	Yes	Yes
Purina EN	Yes	Yes
Purina HA	Yes	Yes
Royal Canin High Energy GI	Yes	Yes
Royal Canin Select Protein PV	Yes	Yes

**According to current product guides.*

BENEFITS OF VTD

VTD are formulated to assist in managing medical conditions based on known physiologic and nutritional differences between healthy individuals and those with a disease, or to contain nutrients that may have a functional role in managing a particular medical condition. For instance, VTD used for gastrointestinal (GI) disease

The Food and Drug Administration has guidelines for the labeling and marketing of canine and feline diets intended to diagnose, cure, mitigate, treat, or prevent diseases.

TABLE 2

Select Nutritional Profiles for Select Canine VTD and OTC Diets*

	CRUDE PROTEIN	CRUDE FAT	CRUDE FIBER	CALCIUM	PHOSPHORUS	CA:P RATIO
CANINE GI VTD						
Hill's i/d	26.5	14.8	2.3	1.18	0.9	1.3:1
Blue Buffalo Natural GI	27.17	15.22	2.72	1.52	1.2	1.3:1
Royal Canin Mod Calorie GI	23.3	10	3.8	0.8	0.68	1.2:1
Purina EN	27.67	13.09	1.02	1.45	1	1.5:1
CANINE OTC DIETS						
Orijen	43	20.4	4.5	2.16	1.23	1.8:1
Nature's Variety	42	22	4.4	2.56	0.91	2.8:1
Wellness	37.8	17.8	4.4	2.22	1.59	1.4:1
Ziwi	44	34	2	2.41	1.56	1.5:1
Solid Gold	45.6	22.2	4.4	NA	1.4	NA
Taste of the Wild	32	16.7	5	NA	1.2	NA
AVERAGES						
VTD	26.16	13.28	2.46	1.24	0.95	1.3:1
OTC Diet	40.73	22.18	4.12	2.34	1.32	1.8:1

**All amounts are given on a percentage dry matter basis.*

PREVENTING OBESITY
Caloric density is important in determining accurate feeding plans for pets at risk for becoming overweight/obese.

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Prescribing VTD with known kcal/kg density along with exact feeding plans can be used to help prevent excess weight gain in at-risk pets.

are moderate in fat, calcium, and phosphorus. OTC diets often have more variable nutrient profiles and higher calcium:phosphorus ratios **(TABLE 2)**.

VTD may also contain anti-inflammatory nutrients, as inflammation is a component of many disease states. Formulated with omega-3 fatty acids,[3] antioxidants,[4] and other special nutrients, these diets attempt to modulate inflammation in GI, dermatologic, orthopedic, and urologic disease states. Digestibility of VTD has also been reported to be higher than that of OTC diets, and according to ELISA testing, VTD are not contaminated with soy or with a protein source not listed on the label.[5–7]

When choosing diets to recommend for their patients, practitioners can access the complete nutrient profiles of VTD more easily than for many OTC diets. Caloric density in kcals/kg, kcals/cup, and kcals/can[3] is available on websites and product guides; beginning in 2017, this information is required on all pet food labels. Caloric density is important in determining accurate feeding plans for pets at risk for becoming overweight/obese. Information regarding the use of VTD is also available from manufacturers and Diplomates of the American College of Veterinary Nutrition (ACVN), who routinely use VTD.

THE PRICING DIFFERENCE

VTD are often perceived as expensive compared to OTC diets. **TABLE 3** shows average costs of therapeutic and OTC diets, based on information obtained via the Internet. Compared with human food packaging, pet food bag and can sizes vary greatly. This variability makes it difficult to

TABLE 3
Average Cost of Select VTD and OTC Diets

DIET	COST (USD/100 KCAL)	
	CANINE	FELINE
GI VTD	0.19	0.27
Hydrolyzed VTD	0.21	0.38
OTC Grocery Brands	0.08	0.08
OTC Pet Store	0.31	0.40

compare costs on a "per bag or can" basis. We determined the costs of both VTD and OTC diets on a per 100 kcal basis for comparison, because calories consumed per day is the best common measure across all diets. VTD can be competitively priced when compared per 100 kcal. We suggest, however, that comparisons be simplified across the pet food industry by employing common bag and can sizes.

PREVENTION, NOT JUST TREATMENT

It has been reported that >50% of the US pet population is overweight.[8] Prescribing VTD with known kcal/kg density along with exact feeding plans can be used to help prevent excess weight gain in at-risk pets. We recommend owners use a gram scale for weighing canned and dry foods, similar to human weight management plans, to deliver exact daily caloric intake. This also allows precise intake adjustments as the pet grows, is neutered, and ages **(BOX 2)**.

We also use VTD, especially those formulated for GI disease, orthopedic disease, and adverse food reactions, for patients who are "at risk" for chronic disease states. For instance, we have used VTD in breeds of dogs at risk for developmental orthopedic disease, obesity, and immunologic adverse food reactions. We use VTD in cats at risk for obesity and urinary tract disease because of neutering and environmental conditions (eg, indoor versus outdoor, single cat versus multicat household).

As VTD have more similar, moderate, and complete and known nutrient profiles along with company support, we encourage practitioners to recommend these diets for adult maintenance and growth. In our opinion, better quality control, fatty acid balance, and reported higher digestibility of VTD make these diets better nutrition for pets. ■

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BOX 2

Example of Lifetime Change in Nutritional Requirements

Puppy (4.5 kg)

- **Resting energy requirement (RER)[9]:** 218 kcal × 1.6 (growth) = 349 kcal/day
- **Diet:** Dry GI VTD containing 3594 kcal/kg (3.6 kcal/g)
- **Amount to feed:** 349 kcal/3.6 kcal/g = 97 g/day
- **Feeding plan:** Feed 32 g of dry GI VTD 3 times/day

Neutered adult (11 kg)*

- **RER:** 423 kcal × 1.2 (adult maintenance) = 508 kcal/day
- **Diet:** Dry GI VTD containing 3594 kcal/kg (3.6 kcal/g)
- **Amount to feed:** 508 kcal/3.6 kcal/g = 141 g/day
- **Feeding plan:** Feed 70 g of dry GI VTD 2 times/day

Overweight (BCS 6/9) neutered adult (13 kg) maintained on dry GI VTD**

- **RER:** 479 kcal × 1 = 479 kcal/day
- **Diet:** Dry GI VTD containing 3594 kcal/kg (3.6 kcal/g)
- **Amount to feed:** 479 kcal/3.6 kcal/g = 133 g/day
- **Feeding plan:** Feed 66 g of dry GI VTD 2 times/day

Overweight (BCS 8/9) neutered adult (13 kg) switched to dry weight-loss VTD**

- **RER:** 479 kcal × 0.8 = 383 kcal/day
- **Diet:** Dry weight-loss VTD containing 3000 kcal/kg (3.0 kcal/g)
- **Amount to feed:** 479 kcal/3.0 kcal/day = 127 g/day
- **Feeding plan:** Feed 64 g of dry weight-loss VTD 2 times/day

**Caloric intake will need to be adjusted with growth and then again when a pet is neutered.*[10,11]
***Weight increase may be related to breed risk or individual inactivity.*[12,13]

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