According to the National Research Council (NRC) an *Animal Dietary Supplement* is a substance for oral consumption by horses, dogs, or cats, whether in/on feed or offered separately, intended for specific benefit to the animal by means other than provision of nutrients recognized as essential, or provision of essential nutrients for intended effect on the animal beyond normal nutritional needs, but not including legally defined drugs.¹ The term *Nutraceutical* has no official definition but has been defined as a dietary supplement that is intended for health benefits beyond prevention of essential nutrient deficiencies.

The use of animal dietary supplements is widespread. Surveys show that 10% - 33% of US dogs, cats, and horses receive a daily supplement and 90% of US vets dispense supplements.¹⁻³ I will limit this presentation to non-herbal, nutritional supplements.

**Animal Supplement Oversight**

Human and animal supplements are not subject to the same regulations or regulators. At the federal level, animal supplements are regulated by the Food & Drug Administration, Center for Veterinary Medicine (CVM). The CVM may recognize them as either foods or as drugs depending on the intended use of the product as established by the labeling claims. The difference in CVM status is determined by how the supplement company presents the product.⁴

If the animal supplement is bought to the market as a food, there are no registration or pre-market clearance requirements by the CVM, provided the product contains ingredients recognized for the approved nutritional purpose. In this scenario, suspicious ingredients must be brought to the attention of the CVM for approval. At the state level these supplements are usually overseen by the state’s agriculture department (often adopting AAFCO standards). Interpretation and enforcement of regulations differs by state. Such a supplement must be registered with the state, or the company licensed in the state, prior to product distribution. This usually involves the submission of labels to the state (every state) or registration of the company.⁴

Alternatively, an animal supplement, for a health purpose, may be labeled similarly to an animal drug. Such supplements are still subject to CVM oversight and also that of states with animal remedy laws. These supplements that cannot meet the FDA drug approval requirements may be allowed to be marketed as “unapproved drugs of low regulatory priority” by the CVM. [The CVM has enforcement discretion to allow marketing of products for which there are reasonable assurances that the company is acting responsibly. This discretionary enforcement may also apply to topical meds, those equivalent to OTC human drugs, and petroleum-containing cat laxatives.] These supplements must conform to CVM labeling requirements. Furthermore, the
company should register as a drug manufacturer with the FDA, “drug list” the product, and follow GMPs.4

Given all of this official oversight of supplements you would think that those available must be safe and effective, right? The truth is that the regulations for pet products are not well defined; thus, it is easy for poor quality manufacturers to sell their pet products. Furthermore, the lack of federal and state resources results in ineffective monitoring and control of what is on the market, leaving the impression that supplements are unregulated.

Supplement Security

We all want to be sure to dispense safe and effective therapeutics. Unfortunately, with little regulatory enforcement there is a high potential for ineffective, or even unsafe, supplements making fraudulent claims to be readily available to our clients. When you add to this the recent, vast proliferation of nutritional supplements coupled with their promotion and availability on the internet, the veterinarian is left in a difficult position. How do we choose supplements that we can trust and dispense?

The first thing to do is to evaluate the supplement company. We need to ask such questions as:

1. How long have they been in business? (Generally, the longer the better)
2. What is the company’s track record/reputation? (Colleagues/VIN Alt Med message board)
3. Contact the company with questions. (How responsive are they?)
4. Who is involved with formulating the products? (Nutritional experts/veterinarians are best)
5. What kinds of claims are being made? (If unbelievable, don’t believe it)
6. Is there specific safety/efficacy research on this product?
7. Is there a guaranteed analysis?
8. Is there a lot # and expiration date?
9. National Animal Supplement Council (NASC) - www.NASC.cc

Prescribing Supplements

The next step in prescribing a supplement is to assess the need for it. This requires an accurate diagnosis of the pet’s condition. Then, research on the proposed supplement itself is needed. Looking at research provided by the manufacturer is a place to start. Additionally, a literature search may be helpful. Check out pubmed, google scholar, and National Institutes of Health Office of Dietary Supplements (ODS) - https://ods.od.nih.gov/Research/resourcesforresearchers.sec.aspx

Ultimately, the final step in prescribing a supplement is to assess outcomes. This requires keeping searchable records and periodically evaluating the supplement’s effectiveness.

Supplements for Healthy Pets
Commercial Pet Diet Processing - Destroys Nutrients

Cooking (112°F – 117°F) reduces potency of almost all nutrients and completely destroys others including Thiamine, Folic Acid, Vitamin C, Vitamin A, Niacin, and Pantothetic Acid.5-11 While pet food manufacturers add back nutrients to balance the diets, they proceed based on incomplete knowledge. Even the experts agree that the AAFCO standards are lacking.

According to Dr. David A. Dzanis, “The formulation method does not account for … availability of nutrients. Yet a feeding trial can miss some chronic deficiencies or toxicities.”12 Dr. Quinton Rogers stated, “Although the AAFCO profiles are better than nothing, they provide a false security... Some foods that pass the feeding trials still won’t support animals over the long term.”12 Finally, from Dr. Tony Buffington, “The recommendation to feed one food for the life of an animal gives nutritionists more credit than we deserve.”12 Dr. Richard Hill said that it is a myth to think that “The minimum and maximum amount of essential nutrients that should be included in the diet is known for most nutrients in normal dogs and cats.”13

Besides the 40 or so nutrients that AAFCO recognizes, research shows that there are over 8,000 phytochemicals present in whole (unprocessed) foods and that these nutrients work together synergistically to create health.14 Furthermore, many of these natural compounds have biological effects that make them equally essential for life as vitamins.15

The bottom line is that healthy pets that are eating a “complete and balanced” diet may benefit from nutritional supplements.

Supplements for Sick Pets

No matter what the etiology, disease leads to compromised cells. Damaged cells require increased metabolic activity to remove debris and rebuild cell structures. Up-regulation of metabolic pathways leads to an increased nutrient demand. Without proper nutritional support, healing can be delayed or incomplete. So, every case has a nutritional component and may benefit from nutritional supplements.

Specific Supplements

Whole-Food Multivitamin – As described above, processed pet foods lack the thousands of micro-nutrients found in whole foods. Compounding this is the fact that most pet caregivers feed less food than the label calls for because the high energy-density causes weight gain. (The pet food’s nutrient profile is based on the pet getting the prescribed volume of food.) In my opinion, every pet benefits from a whole-food multivitamin.

Probiotics/Prebiotics – Probiotics are supplements that provide the gut with the beneficial bacteria needed for health. Prebiotics are the nutrients the probiotics need to survive in the intestines. Dogs and cats did not evolve eating sterile diets. The freshly killed and not-so-freshly
killed animals they consumed were teeming with bacteria. Is it any wonder that so much research demonstrates the benefits of probiotic supplementation for pets?

There are more bacterial cells in the body than body cells themselves. From a cellular standpoint, we are more bacterial than we are human. The complex internal ecology within the body and the associated genetic fingerprint is called the intestinal microbiome –micro for microscopic and biome for a naturally occurring community of flora occupying a large habitat. We interact with the bacteria and their genes. The gut microbiome may be considered an organ just as vital to health as the liver, heart, or brain.

The beneficial bacteria in the intestine help to further break down foods to liberate the nutrients. They also manufacture several vitamins. Probiotic bacteria competitively inhibit pathogenic bacteria. They nourish the enterocytes with short-chain fatty acids and help to maintain the integrity of the intestinal lining, protecting the entire body from the inflammation caused by leaky gut syndrome.

Furthermore, the Gut Associated Lymphoid Tissue (GALT) makes up 70% - 80% of the immune system. Research shows that the balance of intestinal bacteria affects the systemic immune system. In fact, probiotic supplements have a profound effect on immune function.

In one study,16 puppies given a probiotic supplement produced higher titers to vaccines. Another study17 showed that puppies that were given a probiotic supplement before six months of age were less likely to develop immune system changes associated with atopic dermatitis.

There is also a close link between the intestinal microbiome and the brain. Seventy to eighty percent of the body’s serotonin is made by the GI neurons. The intestinal nervous system is considered by some to be the body’s second brain. There is bidirectional communication between the intestinal microbiome and the brain via the vagal nerve.

One study18 showed that chronic administration of probiotics to mice reduced levels of anxiety and depression-like behavior and induced changes in GABAergic system in regions of the brain known to involve these behaviors. Vagotomy prevented the effects of the probiotic.

**Omega-Three Fatty Acids** – Another nutrient group that is vital for pet health is omega-three fatty acids. The meats used in most pet foods are lower in omega-three fatty acids than the ancestral diet of pets. Most farm animals are fed grains which are high in omega-six fatty acids. This leads to meat high in omega-sixes and low in omega-threes. The wild prey of ancient dogs and cats ate mostly grasses which are high in omega-three fatty acids, which increases the omega-three to omega-six ratio. Omega-six fatty acids are pro-inflammatory while omega-three fatty acids are anti-inflammatory. It is important to balance the body’s system toward less inflammation.
Omega-three fatty acids, specifically docosahexaenoic acid (DHA), are also very important in proper neurological development and function. That is not surprising when you consider that DHA makes up 50% of the weight of a neuron’s membrane. I previously mentioned the 2003 study\textsuperscript{19} that indicated that a high DHA diet fed to pregnant bitches and their puppies led to an improvement in trainability. Another study\textsuperscript{20} found that aggressive dogs had lower serum DHA levels than non-aggressive dogs, indicating the possible beneficial effect on temperament of DHA supplementation.

Supplementation of omega-3 fatty acids has been shown to improve survival times of dogs with lymphoma.\textsuperscript{21} Such supplementation also helps dogs with atopic dermatitis.\textsuperscript{22, 23} Omega-threes help dogs with hyperlipidemia.\textsuperscript{24, 25} They have been shown to help with cardiomyopathy and chronic valvular disease.\textsuperscript{26, 27} Supplementation with omega-three fatty acids also aids the treatment of chronic kidney disease\textsuperscript{28, 29} and osteoarthritis in dogs,\textsuperscript{30-33} as well as IBD\textsuperscript{34} and asthma\textsuperscript{35} in cats.

**Glucosamine/Chondroitin –** Joint supplements such as glucosamine and chondroitin provide nutrients that improve the health of the body’s articulations. Many studies\textsuperscript{36-39} have been published that show that the supplementation of glucosamine and chondroitin, especially in the form of perna mussel, can decrease pain and improve mobility for dogs with osteoarthritis.

Recent research\textsuperscript{40} demonstrated that a supplement containing glucosamine and chondroitin actually prevented the development of osteoarthritis in dogs. In the study, 105 healthy Labrador Retrievers were randomly divided into treatment and control groups. In the control group, 33.3% of the dogs developed radiographic evidence of elbow dysplasia compared to 18.5% in the treated group. Symptoms of dysplasia at 12 months differed between the treated (12.5%) and control (61.5%) animals.

**Conclusion**
The use of supplements is becoming more and more popular. In fact, more than half of millennials, who make up one-third of all pet owners, will try natural remedies before conventional treatments and they have a broader sense of health than simply “not sick.”\textsuperscript{41-43} Whether you know it or not, many of your clients give supplements. Supplement sales reached $580 million in 2016, up 3.5% from 2015. Sixty-nine percent of dog owners and sixty-eight percent of cat owners rely on their vet for supplement advice. And still, thirty-one percent of dog owners and twenty-four percent of cat owners purchased pet supplements online.\textsuperscript{44} Where do you think it is best for your clients to get their pets’ supplements, from Dr. Google or from you?

Both diseased and healthy animals benefit from certain nutritional supplements. In my opinion, the fact that supplementation with these nutrients can help with so many problems indicates that our current diets are deficient and thus predispose pets to these diseases.

**References**


