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Role of Nutraceuticals in Pet Animals

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Abstract

The pet animals are kept in house in security and decorative purpose. The pet animal includes dog, cat, etc., these animals susceptible to many nutritional diseases. The nutraceuticals are combination of nutritional as well as pharmaceutical substance supplemented in feed to fight against nutritional diseases. Nutraceuticals contains wide range of vitamin, lipoic acid, prebiotic and probiotic etc.

Introduction

Supplements for healthy and nutritious foods, often referred to as nutraceuticals as a combination of nutritional and pharmaceutical principles, have continued to grow into a multibillion-dollar industry since the advent of the veterinary market in the 1990's. This practice reflects a shift in the thinking of breeders, veterinarians and animal owners: rather than relying solely on medical products for the prevention and treatment of disease, alternative healthy food systems for disease management and health promotion are readily available in all animal diets.

Definition

The American Veterinary Medical Association (AVMA) describes nutraceuticals as "micronutrients, macronutrients and other healthy food additives" used as medicinal substances.

The term Nutraceutical is defined as a 'nondrug substance that is produced in a purified or extracted form, administered orally to provide agents required for normal body structure and function, with the intent of improving the health and well-being of animals'.

The United States National Research Council (NRC): "An oral diet by horses, dogs, or cats, whether fed/ fed separately, intended for nutritional, therapeutic, or other benefits to an animal other than the provision of known nutrients or by providing essential nutrients with the intended effect on the animal other than the general requirements for healthy eating, but does not include prescription drugs."

Nutraceuticals are the novel products that incorporate food extracts or bioactive agents from a food having health benefits. It is used as alternative to medicines for prevention as well as treatment of disease and enhances lifespan. The biological activity of nutraceuticals has been well established but there are concerns regarding bioavailability, dosage, metabolism and tissue distribution.

Anti-Oxidants

Anti-oxidants refer to a complex group of substances that prevent the free damage of cell membranes, proteins, and DNA. They can help with inflammatory

Table 1: Some Important Nutraceuticals and Their Sources

Nutraceuticals	Sources
Eicosapentaenoic acid, docosa-hexaenoic acid, alpha-linoleic	Lipids
Fish, algae, krill, flaxseed, cala-mari, canola	genetically modified plants and seeds
Conjugated linolenic Acid	Milk fat
Lactobacillus, Bifidobacterium Bacteria	Probiotics
curcuminoids, catechins, flavonols, flavanols, flavones Tea, grapeseed, grapes, olives, pomegranates, vegetables, seeds, wine, cocoa	Phenolic compounds and polyphenols Phenolic acids
β -carotene, lycopene, lutein, astaxanthin Carrots, tomatoes, marigolds, green leafy vegetables, microalgae	Carotenoids

diseases, aging, and certain cancers. Anti-oxidant treatment has improved cardiac output in dogs with chronic valvular disease, reduced cataract formation when ingested, increased immune response to vaccination in young dogs, increased sensitivity in adult larvae, increased immune response to healthy dogs, reduced oxidative stress. Acetaminophen in feline, with improved joint function and pain in dogs with arthritis; however, they have failed to develop muscle damage in thickened dogs. Common antioxidants used as supplements in diets or direct oral foods include vitamins E and C, bioflavonoids, thistle milk, S-adenosyl methionine (SAME), lipoic acid. While everything is available in supplement form, many are included in the diet or in the manufacture of certain antimicrobials.

It is used in hepato-biliary disease due to its anti-oxidant activity, increases protein synthesis, strengthens the hepatocellular membrane, searches for iron, and alters cholesterol metabolism. Recommended doses are 50-250 mg/day or 20-50 mg/kg/day. Carotenoids have been long back recognized to be beneficial against age related macular degeneration and maintaining normal vision (Cooper, 2004).

Vitamin C (Ascorbic Acid)

Vitamin C carries two important properties as an antioxidant for the body of the body dissolved in water and as an important coenzyme in collagen synthesis. Vitamin C eliminates free radicals, inhibits lipid oxidation, and helps regenerate other anti-oxidants. It is a component of the many enzyme systems involved in activities such as adenosine triphosphate (ATP) synthesis within mitochondria and hormone biosynthesis. Although many animals are able to produce their own vitamin C supplement, the supplement

has benefits such as helping to maintain cardiovascular health by supporting adrenal function and vascular wall integrity, helping protect the liver from environmental toxicity and drug overdose and producing carnitine, interferon, and prostaglandin E₁. Helping healthy immune systems, it is involved in reducing free intra-articular radicals and supporting hepatic function.

Vitamin E

An important anti-oxidant of soluble lipid, especially in the cell membrane, vitamin E provides hepatic support and has the potential to increase blood flow and oxygen utilization. It improves the immune response by opening up cells that make up the immune system. Vitamin E may help to regulate the inflammatory stage of osteoarthritis mainly by reducing the production of free radicals.

Lipoic Acid

Lipoic acid is a powerful mitochondrial antioxidant found as a dietary supplement and in other animal foods designed to improve or maintain cognition. In dogs doses of 1-5 mg/kg/day it seems safe, but toxic symptoms have been observed in cats at this level.

Dietary Lipids

Dietary lipids are beneficial in reducing incidences of atherosclerosis which further improves cardiovascular health, cognition, brain health and reduces susceptibility of several cancers (Lane and Derbyshire, 2014). The essential fatty acids like linolenic acid might be useful in reducing risk of atherosclerosis, besides possessing anticarcinogenic and anti-inflammatory properties.

Omega-3 Fatty Acids

They are found in marine life and contain anti-inflammatory and anti-plastic properties. Omega-3 fatty acids have been shown to be beneficial in dogs with atopic dermatitis, pruritis, lymphoma, arthritis, and chronic valvular disease. The fatty acid supplements eicosapentaenoic (EPA) and docosahexaenoic (DHA) – from fish oils like salmon and anchovy, for example – are well documented and used extensively in pet food. Omega-3 fatty acids are believed to antagonize catabolic changes in the body and effectively help in improving the individual's ability to fight the disease.

Silymarin

Silymarin is a beneficial component of milk thistle useful for treating hepatobiliary disease due to its antioxidant, anti-inflammatory and antifibrotic properties. Silymarin preferentially accumulates in liver and is excreted in bile. Besides having a short plasma half-life, there are concerns of erratic and unpredictable bioavailability of silymarin. The dose required to achieve a therapeutic effect in companion animals

is unknown, therefore doses are generally extrapolated from human studies. Therapeutic formulations should contain 70 to 80% silymarin, but extract purity varies widely. Siliphos, a formulation of silibin complexed with phosphatidylcholine, is a relatively new product that has been shown to be three to five times more bioavailable than silymarin.

SAME S-Adenosyl Methionine

It is an important nucleotide component of 3 major liver pathways: transsulfuration, aminopropylation, and transmethylation. S-adenosyl methionine (SAM-e) most cell damage occurs due to oxidative stress and the liver is the main organ that fights it. The liver has many complex antioxidant systems, and glutathione plays a major role. Glutathione concentrations are steadily maintained in the body by a biochemical pathway involving conversion of methionine to cysteine. In addition to this antioxidant function, SAM-e also plays a role in preventing apoptosis in normal cells, modulating cytokine expression and stabilizing membrane functions. Some double-blinded, placebo-controlled studies support the clinical benefits of SAM-e in humans and a number of trials on experimental models in animals, including dogs and cats have been conducted. SAME has a short half-life and poor bioavailability. Therefore, tablets are enteric coated and administered on an empty stomach. Side effects include nausea and poor appetite.

Supplementation at 20 mg/kg/day orally in dogs and cats appears safe.

Glucosamine

Glucosamine is an amino sugar which is an important precursor in the biosynthesis of cartilage. It is a building block of proteoglycans which is one of the two main components of the cartilage matrix, the other being collagen. Proteoglycans are essential for healthy cartilage as they bind to fluid that binds and binds to the joints. Glucosamine plays a role in regulating cartilage formation and normalizing cartilage metabolism by promoting higher production of collagen and proteoglycans. It further stimulates the synovial production of hyaluronic acid, which is also responsible for compounding. All of these properties make it extremely useful in the treatment of osteoarthritis, both in reducing the amount of Non-periodic anti-inflammatory drug (NSAID) required and slowing the progression of the disease. Various types are available e.g. Glucosamine sulphate, N-acetyl-D-glucosamine. The latter has been shown to add a layer of mucin to protect the inner wall of the bladder which protects urinary toxins that cause the regeneration of type C pain fibers and helps prevent the emergence of feline idiopathic cystitis. Glucosamine and combinations N-acetyl glucosamine (NAG), digestive enzymes, *Lactobacillus acidophilus* & alfalfa helps strengthen the protective layers of the GI tract, aids digestion and eases food allergic reactions.

Methylsulfonylmethane (MSM)

A compound of living sulfur in a class of chemicals called sulfones. It occurs naturally in some ancient plants and is found in small amounts in many foods and beverages. MSM is widely used (usually combined with glucosamine and/ or chondroitin) to help treat or prevent osteoarthritis.

Prebiotics

The starch and fiber that can withstand the digestion of mammalian gut enzymes and select the invading bacteria that you can use as primary fermentation substrates. Various fibers and starch resistant can have different effects on people with gastrointestinal infections. Fructooligosaccharide (FOS) is a selective microbial substrate for *Lactobacillus* spp., *Bifidobacter* spp. and *Enterococcus* spp. Manan oligosaccharide (MOS) is a yeast extract that mimics bacterial binding sites. The supplements have been shown to increase biological benefits of healthy intestines while reducing wild-type bacteria including *E. coli* and *Clostridium* sp. and *Salmonella* sp. In addition, immunomodulatory and ammonia trapping activities have led to the use of dietary supplements that promote physical health and kidney function.

Probiotics

Probiotics refer to living microbial cultures, usually *Lactobacillus* spp., *Bifidobacter* spp. or *Enterococcus* spp. It is recommended to 'activate' the intestinal tract in patients with diarrhea, inflammatory bowel disease, and food allergies, but is also recommended for use with atopic dermatitis, recurrent bacterial infections, and chronic antimicrobial administration. The reduction in diarrhea time and the improvement in canine inflammation goals compared to placebo appear to be less consistent. Recently, probiotic (Azodyl) has been identified for compatible animals with chronic kidney failure and is marketed as 'enteric dialysis'.

The advantages of including probiotics in the normal diet are numerous which include maintaining intestinal flora and immune health. Growing health care costs are placing a burden on pet owners and foods that contain a combination of nutraceutical ingredients are emerging in the market strongly because of their possible synergistic health effects (Shahidi, 2012). Lysine: It is an essential amino acid and is beneficial in maintaining vascular integrity.

Taurine

It is necessary for cardiac system as it modulates cardiac activity by stabilizing cell membrane transport. It has an ionotropic effect. Extracts of plants like *vaccinium myrtillus* (European blueberry), *curcuma longa* (turmeric), *echinacea angustifolia* (echinacea) and *silybum marianum* (milk thistle) contain many compounds with pharmacological

and nutraceutical properties. Not only do they represent a challenge for effective dose determination, but also for standardization.

Propolis (resinous mixture) honeybees collect from various botanical sources. It has a complex chemical composition with more than 300 active components identified (essential oils, polyphenols, flavonoids, esters, etc.). Polychlorinated biphenyls (PCBs) are present in trace amount in many nutraceutical preparations. Herbal products may be contaminated with pesticides and herbicides.

Conclusion

Nutraceuticals can be an excellent adjunct to conventional medications as no one form of medicine has all the answers, which involves using the best of

conventional veterinary medicine along with complementary therapies, nutraceuticals can be considered as an integral part of this approach. Advances in nutrigenomics and improved understanding of the impact of diet and lifestyle on pet health.

References

- Cooper, D.A., 2004. Carotenoids in health and disease: recent scientific evaluations, research recommendations and the consumer. *J. Nutr.* 134, 221.
- Lane, K.E., Derbyshire, E., 2014. Systematic review of omega-3 enriched foods and health. *Br. J. Nutr.* 116, 165–79.
- Shahidi, F., 2012. Nutraceuticals, functional foods and dietary supplements in health and disease. *J. Food Drug Anal.* 20, 226–30.