

Review Article

Neutraceuticals: New Approaches in Veterinary Medicine

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Abstract

Nutraceuticals are the normal food substances which possess medicinal value in addition to their nutritive value. Usage of nutrients in the treatment of disease conditions is an age old practice. Due to the development of resistance to the antibiotics in therapy new approaches have been made to explore rich Indian flora to come up with alternatives to the modern medicine. Nutraceuticals are the one which in combination or alone can be used the treatment of various disorders in veterinary medicine. The commonly used neutraceuticals such as prebiotics, probiotics and antioxidants like curcumin are used generally to improve growth as well as health conditions of the animals. The application of the neutraceuticals as the therapeutic agents in modern medicine will reduce the amount of the antibiotic as well as the risk of development of side effects.

Keywords: Neutraceuticals; Curcumin; Prebiotics; Colostrum.

What are Neutraceuticals

The term "nutraceutical" consists of two words – "nutrient" (a nourishing food component) and "pharmaceutical" (a medical drug). The term Neutraceuticals was coined by *Stephen De Felice* in 1989, founder and chairman of the Foundation for Innovation in Medicine, an American organization located in Cranford, New Jersey.

The Greek physician Hippocrates (known as the father of medicine) said "let food be your medicine". The philosophy behind neutraceuticals is to focus on prevention of various diseases conditions.

The term Nutraceuticals is used to describe any product derived from food sources with extra health benefits in addition to the basic nutritional value found in foods. They can be considered non-specific biological therapies used to promote general well-being, control symptoms and prevent malignant processes.

India, China and Brazil are developing nations which show huge potential for the neutraceuticals market.

Classification of Neutraceuticals

The definition of neutraceuticals and related products generally depends on the source. They can be classified on the basis of their natural sources, pharmacological conditions, as well as chemical constitution of the products. Most often they are grouped in the following categories:

- a. Dietary supplements
- b. Functional foods
- c. Medicinal foods
- d. Farmaceuticals

Dietary Supplement

It represents a product that contains nutrients derived from food products, and is often concentrated in liquid, capsule, powder or pill form. Although dietary supplements are regulated by the FDA as foods, their regulation differs from drugs and other foods. Example: vitamins, minerals, herbs, or other

botanicals, amino acids, and substances such as enzymes, organ tissues, glandulars, and metabolites.

Functional Foods

It is a category which includes whole foods and fortified, enriched or enhanced dietary components that may reduce the risk of chronic disease and provide a health-benefit beyond the traditional nutrients it contains. Example: Fortified omega fatty acids, probiotics fortified foods, iodinated salts

Medicinal Foods

It is formulated to be consumed or administered internally, under the supervision of a qualified physician. Its intended use is a specific dietary management of a disease or condition for which distinctive nutritional requirements are established by the medical evaluation (on the basis of recognized scientific principle). Example: Pumpkin seeds, Papaya

Farmaceuticals

These are medically valuable components produced from modified agricultural crops or animals. The term is a combining of the words "farm" and "pharmaceuticals". Proponents of this concept are convinced that using crops (and possibly even animals) as pharmaceutical factories is much more cost effective than conventional methods, with higher revenue for agricultural producers. Example: Transgenic crops

Applications of Nutraceuticals

Nutraceuticals are becoming increasingly popular within the veterinary profession. They have been described by the North American Veterinary Nutraceutical Council as a "non-drug substance that is produced in a purified or extracted form and administered orally to provide agents required for normal body structure and function with the intent of improving the health and well-being of animals".

These products are widely available and can be purchased in many forms, including capsules, tablets and powders, and are often included in animal feeds. A number of nutraceuticals are currently being used in the prevention and treatment of common diseases in animals including cardiovascular disease, osteoarthritis, periodontal disease, cognitive dysfunction and cancer, with clinical trials providing evidence of their efficacy in a variety of animal species [1].

Some of the commonly used nutraceuticals are discussed below:

Curcumin

Curcumin, a polyphenol obtained from *Curcuma longa*, commonly called as turmeric, is one of nature's most potent anti-inflammatory agent. Turmeric and its derivatives have a great deal of pharmacological activity [2]. Curcumin is a powerful antioxidant and has greater effects in preventing free radical damage compared with vitamin C, vitamin E, and superoxide dismutase [3]. Numerous experimental studies have demonstrated that curcumin produces exceptional anti-inflammatory effects [3,4]. Curcumin's anti-inflammatory activity is comparable with potent anti-inflammatory drug like cortisone and phenylbutazone in models of acute inflammation [5]. The adverse effects of such as gastric ulceration, hepatotoxicity and nephrotoxicity produced by the steroidal and non-steroidal agents can be minimized with the usage of Curcumin. Animals can be fed with curcumin in their ration upto 3 g/kg body weight without any significant adverse effects [6].

Colostrum

Colostrum is the first lacteal secretion obtained from the mammary gland during the first 5-7 days after calving. It is rich in immunoglobulins, vitamins and growth factors. Colostrum is used as a nutraceutical for animals of all ages to increase resistance to infection and disease caused by a wide range of pathogens, including bacteria, viruses, parasites, and fungi. Colostrum obtained from one species can be safely used in another species especially bovine colostrum. The components of colostrum responsible for nutraceutical activity are similar in structure and function among different species [7-9]. It is used as a nutraceutical in various species such as horses [10], pigs [11], sheep [12], cats [13] etc. Research studies have shown that colostrum and its components are effective against a wide range of common pathogens, including rotavirus [14], *Cryptosporidium* spp. [15, 16], *Staphylococcus aureus* [17], *Candida* spp. [18], *Clostridium* spp. [19, 20], *Shigella* spp. [21], *Streptococcus* spp. [22], and *Escherichia coli* [23]. Feeding of colostrum reduces gastrointestinal tract infections and it also improves the absorption of iron. Colostrum should be fed to the animals immediately after birth or within 36-48 hours as the immunoglobulins in colostrum are not absorbed into the blood stream of animals older than 36-48 hours if given orally.

Silymarin

Silymarin is a complex mixture of polyphenolic molecules obtained from *Silybum marianum* (Milk thistle). Silymarin is having antioxidant, anti-inflammatory, antifibrotic and hepatoprotective properties.

In-vitro and in-vivo studies suggest silymarin can protect the liver from a wide variety of toxins, including acetaminophen, ethanol and aflatoxin, as well as from viral, ischaemic and radiation-induced injury.

The cows fed with silymarin (10 g per day) showed a quicker onset of the peak of milk production, which was one week sooner than in the control group, and with better overall milk yield [24]. Silymarin can be used in chickens to prevent the toxic effects of AFB1 originating from contaminated feed. Silymarin increased hatchability in chickens and turkeys. It also prevented excessive adiposis in birds. Hepatoprotective effects of silymarin were also proved by biochemical [25] and histopathological examinations [26, 27]. It is available commercially to UK veterinarians as a combined product with SAM-e.

Probiotics and Prebiotics

Probiotics are micro-organism which provides beneficial effects on health and condition of the animals. Example: Lactobacilli, Bifidobacterium families. Probiotics bacteria like *lactobacilli* are naturally found in fermented foods like sauerkraut and yogurt. Prebiotics are non-digestible foods that make their way through our digestive system and help good bacteria grow and flourish. Example: Fructo-oligosaccharide. The symbiotic fermented milk containing probiotics and a prebiotic may contribute to improve the intestinal health and may have a positive effect on the humoral and cell-mediated immunity of host animals [28].

Advantages of Nutraceuticals

Nutraceuticals have attracted considerable interest due to their potential nutritional, safety and therapeutic effects. They could have a role in a plethora of biological processes, including antioxidant defenses, cell proliferation, gene expression, and safeguarding of mitochondrial integrity. Therefore nutraceuticals may be used to improve health, prevent chronic diseases, postpone the aging process (and in turn increase life expectancy), or just support functions and integrity of the body. They are considered to be healthy sources for prevention of life threatening diseases such as

diabetes, renal and gastrointestinal disorders, as well as different infections.

A wide range of nutraceuticals have been shown to impose crucial roles in immune status and susceptibility to certain disease states. They also exhibit diseases modifying indications related to oxidative stress including allergy, Alzheimer's disease, cardiovascular diseases, cancer, eye conditions, Parkinson's diseases and obesity. Based on the research in veterinary science nutraceuticals can be used in treatment of various disease conditions. These nutraceuticals are readily available and easy to administer without any recognizable side effects.

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