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# Role of Feed Additives in Animal Nutrition: Advancing Animal Performance and Productivity

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## ABSTRACT

Expression of good behavior and production requires an adequate supply of nutrients. Inadequate nutrition affects animal health, welfare, and production performance. Additives to feed improve the quality of feed, animal performance and health. Feed additives promote the growth of animals, minimize the risk of diseases, and fulfill the nutritional demands of animals. These are classified as technological, sensory, nutritional, zootechnical, coccidiostats, and histomonostats according to rules set out by the European Commission. Various categories of feed additives include minerals, vitamins, enzymes, antibiotics, probiotics, and prebiotics. The aim of writing this article is to give a thorough summary of role that adequate nutrients and feed additives play in preserving animal health and performance. This article highlights the relationship between nutrition, feed quality, and animal performance such as growth rate, production, reproduction, immune system function, and disease resistance.

**Keywords:** Natural feed additives, Enzymes, Antibiotics, Probiotics, Prebiotics

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**Introduction**

The European Commission defines feed additives as products used in animal nutrition to optimize the utilization of the feed, increase the palatability of the feed, or improve the animal performance and health [1]. Animals with high growth performance need to maintain a high health status. Feed additives have played an important role in animal nutrition for centuries. In the past, farmers and nutritionists primarily used natural substances such as plants, minerals, and waste products to supplement animal diets. However, advancements in technology and scientific knowledge have led to the development of a wider use of feed additives, such as growth promotors, probiotics, prebiotics, minerals, vitamins, and ionophores. These substances can enhance production performance and boost immunity in livestock and poultry [2,15].

**Types of Feed Additives:**

According to European Commission regulations, feed additives are classified into sensory, nutritional, zootechnical, technological, coccidiostats and histomonostats.

**Sensory Feed Additives:**

Sensory additives are defined as substances that improve or modify the organoleptic properties of feed such as taste, smell and appearance, as well as the visual characteristics of food derived from animals. The category "Sensory additives" is further classified into two main functional groups:

**(a) colourants:**

i. substances that add or restore colour in feedstuffs;
ii. substances which, when fed to animals, impart colours to food of animal origin;
iii. substances which positively influence the colour of ornamental fish or birds;

**(b) flavouring compounds**: substances that add to feed to increase its smell and palatability [3].

**Nutritional Feed Additives:**

Nutritional additives are those that provide specific nutrients to animals. An example would be vitamins, amino acids, and trace minerals [4]. Vitamins are essential organic compounds required in trace amounts for metabolism, growth, and health, as well as for effective utilization of other nutrients. For instance, vitamin C (ascorbic acid) and vitamin E (alpha-tocopherol) act as antioxidants to protect animals from oxidative stress and maintain the integrity of cellular membranes. Certain trace minerals including Se, Cu, Zn, and Mn, have a beneficial influence on the immune system of animals [1].

**Zootechnical Feed Additives:**

These additives are used to promote animal health and growth performance, contribute to environmental sustainability, enhance nutrient digestibility, and maintain a stable gut microflora [5]. Zootechnical additives also act as immunomodulators, one of the primary objectives of using phytogenic additives is to enhance immune system function [6].

**Technological Feed Additives:**

These additives are crucial to the nutrition of animals since they enhance the food's quality and boost the animal's health and performance and promote their overall wellbeing. Technological additives, including preservatives, antioxidants, emulsifiers, and acidity regulators are primarily used to improve the quality, stability, handling, and hygienic properties of feed rather than directly enhancing its nutritional value [7].

**Coccidiostats and Histomonostats:**

Coccidiostats are feed additives added to feed to break the life cycle of pathogenic coccidia or reduce the population of pathogenic coccidia. By reducing pathogenic population, they help minimize coccidiosis and allow animals to develop immunity against coccidiosis [8].

Histomonostats are used to prevent histomoniasis (blackhead disease), a protozoal disease caused by Histomonas meleagridis [9].

**Impact of Natural Feed Additives on Animal Performance:**

Natural feed additives have gained considerable attention in animal nutrition as sustainable alternatives for improving animal health and acting as a disease remedy source. Herbal feed additives also play an important role in mitigating environmental impacts associated with livestock production. Bioactive compounds such as tannins, essential oils, and saponins have been identified as a primary phytochemical for reducing methane emissions [10,14].

**Impact of Feed Additives on Animal Growth and Production:**

Enzymes, probiotics, prebiotics, and antibiotics play an important role in enhancing animal growth and production. Enzymes are biological catalysts that accelerate metabolic and digestive reactions without being consumed. They are composed mainly of amino acids and involved in digestion and utilization of nutrients. Probiotics are beneficial live microorganisms that help maintain a healthy balance of intestinal microbiota, and improve animal health, growth, and production efficiency. Prebiotics are indigestible non-starch feedstuffs that selectively stimulate the growth and activity of beneficial microorganisms in gastrointestinal tract and improve gut health and animal productivity. Antibiotics are antimicrobial compounds used for prevention or treatment of diseases in ruminants and non-ruminants to improve their health and production. Common antibiotics used as growth promotors include erythromycin, neomycin, oxytetracycline, and tylosin [11]. These feed additives enhance production, reproduction, and immune system function by increasing nutrient digestibility, enhancing feed efficiency, promoting faster growth, maintaining gastrointestinal health, and reducing the prevalence of infectious diseases [12,13].

**Conclusion:**

Feed additives play a crucial role in enhancing production efficiency by improving feed palatability, optimizing nutrient utilization, and strengthening the animal's resistance to infectious diseases.

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