

## Impact of Feed Additives on Poultry and Dairy Nutrition

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### ABSTRACT

Feed additives play a crucial role in poultry and livestock nutrition that enhances animal health, growth, and productivity. This review explores various types of feed additives and their benefit. Probiotics and prebiotics may improve gut health by promoting beneficial bacteria and fighting harmful microbes. Enzymes help in digestion by breaking down complex molecules that aids in better nutrient absorption. Plant extracts including cinnamon, oregano, and garlic offer a natural approach to enhance performance, which improves weight gain, feed efficiency, and gut health. However, research results may be different due to dependency on animal health. Phyto-genic additives derived from plants have various beneficial effects on animal health. Furthermore, they also stimulate enzyme secretion, improve nutrient absorption, and enhance meat quality. The use of antibiotics as growth promoters is reducing due to the implementation of phyto-genic feed additives and instructions about resistance. Overall, feed additives play a crucial role in maintaining a sustainable and healthy animal production system along with fulfilling consumer demand for safe and high-quality animal products.

**Keywords:** Feed additives, Dairy nutrition, Poultry nutrition, Animal performance, Meat quality

### Introduction

Feed additives works as a special helper in poultry, cattle, and other animal feeds that perform various functions in the animal body which makes animals healthy and helps to grow better. In dairy cattle, feed additives aid in producing more milk from the same quantity of food and help cattle to digest food better. However, they also continue to make milk without any problem and perform a role to keep cattle healthy [1]

Furthermore, feed additives perform the role of little boosts that help to keep animals healthy and grow well. But, it's necessary to use them carefully to prevent the animal from harmful conditions. Stuffs are added to animal feed to make it better which helps the animals to grow and stay healthy. There are many reasons behind providing feed additives; one reason is to make food tasty and the other is to provide essential things that animal requires to grow well. Nowadays, people offer food from animals that is safe and better for them, and a big push to utilize more natural stuff instead of chemicals. This focuses on the food industry to find good alternatives [1].

Scientists have studied many natural options found in animal feed such as probiotics, prebiotics, enzymes, and herbs which are beneficial for them. These help the animals to fight diseases and act as medicine. Due to harmful effects and expensive costs, the use of antibiotics is becoming less common. Herbal additives are becoming more popular. Using different additives like vitamin C, probiotics, prebiotics, and herbal extracts provides benefits to the animal industry. They have special properties that aid animals to stay healthy and make good quality food [1].

### Additives stimulating growth and productivity

There are many additives added to animal feed for different purposes. The amount of these additives is to be added according to animal requirements. Probiotics are the living organisms that are beneficial for gut health. They modify how the gut works by fighting the bad germs and providing body defense. Prebiotics are responsible for providing nutrients to special bacteria in the gut that are produced by the host. Probably, they occur in two types fructans and galactans. The function is similar to provide a healthier gut and produce beneficial bacteria. Living organisms such as mold, bacteria, and green plants produce a special substance known as antibiotics that contain bacteriostatic or bactericidal properties. In the beginning they were developed to control specific pathogens. The growth rate in

young animals can be increased by adding some desirable antibiotics that enable the growth-promoting properties for testing [2].

### Function of Enzymes as Feed Additives

Enzymes are used as feed additives to enhance degradation reactions during feed digestion and they are natural biocatalysts that regulate various biochemical reactions in living things. A wide range of enzymes supplements used to improve feed consumption and promote growth especially in monogastric animals like poultry. Factors such as structural complexity, ruminal fluid and accessibility enable the rumen microbes to work interactively in carbohydrate digestion, although influence fermentation efficiency [3].

Rumen has a diverse microbial population that causes toxins in specific plants like cellulases, xylanases, amylases and phytases. Optimizing the feed efficiency degradation, nutritionists have focused to control increasing rumen carbohydrate and protein digestion in ruminant diets. Approximately four decades ago, there was a trend of using exogenous fibrolytic enzymes like cellulases and xylanases in ruminant diets. Xylanase enzyme degrades the Xylan which is the component of hemicellulose that helps in hemicellulose breakdown. Xylanase enhance nutrient extraction from feed fibrous materials that are employed as feed additives, especially in poultry. Phytase is produced due to the digestion by rumen microbes of phytate which is stored in plants of primary phosphorus. Phytate is indigestible in non-ruminants. The addition of phytase improves nutrient utilization as well as liberates inositol and phosphorus in the feed of small ruminants [4].

Various factors including feed type, enzyme application level, application method, and enzyme product type affect the ability of respective enzyme additives. Animal species and enzyme dosage can cause variations in the outcomes of controlled studies. The efficacy of ruminants' diets is influenced by the method of enzyme application [5].

### Plant extracts as feed additives in poultry nutrition

Natural solutions are attracting the farmers attention by playing a crucial role to boost bird health and performance. Research shows beneficial addition in poultry diets that extracts from various plants and herbs. Studies have found that weight gain and feed intake can be increased by these beneficial plants and improve feed conversion ratio. However, they create a healthier gut environment by

controlling harmful bacteria and aiding digestion. Furthermore, it stimulates hormone production and nutrient metabolism. Examples of plants with these properties include cinnamon, oregano, garlic, and black pepper [6].

**Table 1: Effects of various plant extracts on poultry performance [6]**

Plant Dose	Extract	Performance
0.5-1%		Better growth performance from 7 to 21 days
0.2%		Higher growth performance
0.1%		No effect on live performance or in orang morphometrics
3 and 6%		No improvement in the performance and carcass traits
0.2%		Improved growth performance
1%		Increased body weight, improved feed efficiency
0.1%		No effect on the body weight, feed efficiency was improved at 4.2%

**Phytogenic additives as growth promoters and meat quality enhancers in broiler chickens**

Consumers mostly demand affordable and high-quality poultry meat i.e., broiler chicken. Research is focusing on improving the nutritional value and functionality of broiler meat. Phytogenic additives derived from plants may improve growth performance, nutrient utilization, and meat quality [7].

**Table 2: Effects of Phytogenic Additives on Broiler Chickens [7]**

Additive	Effect
Turmeric, citrus, grape seed extract, cinnamon, Boldo leaves, fenugreek	Increased pancreatic and intestinal enzyme secretion, improved bile production and nutrient absorption
Thyme and star anise essential oils	Increased digestibility of protein, fat and minerals
Oregano, anise, and citrus peel essential oil	Increased survival rate, reduced cholesterol, improved tenderness and juiciness of meat
Nigella sativa	Increased breast muscle percentage
Echinacea purpurea	Increased crude protein content in meat
Agrimony extract	Decreased cholesterol, improved meat quality
Oregano, anise, and citrus essential oil blend	Improved growth performance, nutrient digestibility and caecal microflora composition (especially in finisher period)

**Impact of feed additives on dairy animal nutrition**

Farm managers, animal scientists, and nutritionists figure out the various challenges to formulate balanced ration for high-yielding animals. Moreover, it's estimated from animal husbandry practices that feed costs are a major component to comprise 35-50% of input costs and the fluctuating costs of meat, dairy, and animal by-products are also contended by them. Other than the common belief that animals naturally consume plants or grass as their food, modern livestock and poultry feeding practices are complex and contentious. The feed additives enhance the feed quality, improve food quality from animal sources, and enhanced feed digestibility that boost animal performance and health [3].

The potential benefits i.e., promoting animal growth, controlling infectious diseases, and improving feed digestibility, increased feed additives' value. The rising global demand for meat and dairy products influenced the market for animal feed additives to grow steadily [8]. North America and the Asia-Pacific region contain 60%

of global feed additives consumption and are considered as the largest consumers of feed additives. Asia-Pacific like India, Pakistan, China, and Brazil are changing in feed through the addition of feed additives due to rapid growth in demand and increasing income levels and per capita meat consumption [9].

**Conclusion**

Feed additives offer a powerful toolbox that can significantly impact animal health, growth performance, and product quality by optimizing poultry and dairy production. However, to understand the optimal use of various feed additives thoroughly, continued research is necessary. Feed additives can play a major role in promoting a sustainable and healthy animal production system by adopting a responsible and scientific approach that fulfills the consumer demands for safe and high-quality animal products.

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