

COMMERCIAL BULLETIN

# ALOE VERA IN CHICKEN AND BROILER NUTRITION FOR ENHANCED MEAT PRODUCTION



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## Aloe Vera in chicken and broiler nutrition for enhanced meat production

In poultry industry, birds are maintained in confinement systems and large flocks in order to achieve higher economic returns. In such a situation, birds are exposed to stress and inducing factors such as high population, vaccination and temperature changes. Intestinal microflora is influenced, and sometimes imbalanced, by these factors, leading to deteriorated health conditions for chickens. Therefore, the imbalance in intestinal microflora may result in weakened immune system and failure of growth performance in chickens. Additives, such as antibiotics, may assist in dealing with such problems. Furthermore, long-term inclusion of antibiotics in animals and poultry diets can result in increased microorganism resistance to such groups in human body. Thus, antibiotics are banned from being added to feed in EU and some other countries.

Antibiotics at curative doses have been widely used in animal feed as growth promoters to enhance animal growth performance and production. In the presence of low levels of antibiotics, resistant cells survive and grow producing an antibiotic resistant population in the final products. Therefore, the application of antibiotics as growth promoters in the animal feed has been banned in the European Union since January 2006.

As a result of this ban in EU and growing pressure on livestock producers in other parts of the world, alternative substances and strategies for animal growth promotion and disease prevention are being investigated, among which phytogetic and herbal products have received increased attention since they have acquired more acceptability among consumers as natural additives. Beneficial effects of bioactive plant substances in animal nutrition may include the stimulation of appetite and feed intake, the improvement of endogenous digestive enzyme secretion, activation of immune responses and antibacterial, antiviral and antioxidant actions.



This has led researchers to attempt finding alternatives to antibiotics. They have found different replacements for growth-stimulating antibiotics such as probiotics, prebiotics, organic acids and herbal medicines during recent years. Depending on the composition of mixtures, herbal medicines have a variety of properties. The active compounds of herbs can be found in the form of glycosides, alkaloids, volatile oils and organic acids, and more importantly in polysaccharides.



Aloe Vera, known as one of the oldest herbs with a history that dates back to traditional medicine thousands years ago, is found in tropical and subtropical climates and many countries have proper geographic features required for growing Aloe Vera. The gel contained in Aloe Vera leaves is composed of about 98.5% to 99.5% water, and the remaining dry matter contains more than 75 biologically active ingredients which have medicinal effects that are useful in treating diseases. Major ingredients of Aloe Vera include vitamins, enzymes, saccharides and low molecular-weight compounds (Choi and Chung, 2003) which give Aloe Vera its anti-inflammatory, woundhealing, anti-viral, antifungal, anti-tumor, anti-diabetic, and antioxidant effects.



Polysaccharides act as immunomodulators and even perform antimicrobial activities. It has been reported that polysaccharides can be used as feed supplements or as booster in vaccination. Antibacterial, antiviral and antiparasitic effects of polysaccharides on broilers have also been reported.

Antimicrobial properties of herbs, therefore, have significant effects on improvement of immune response and growth performance through increasing the number of useful bacteria.

Feed is a major component, affecting net return from the poultry business, because 80% of the total expenditure in terms of cash is spent on feed purchase. To ensure more net return and to minimize high expenditure on feed are the main challenges, for which many research strategies have been practiced such as introducing feed supplements and feed additives.



### Formulate Aloe Vera with other natural ingredients to obtain maximum results

In the past the major growth promoters were antibiotics. However, the current research is looking for natural alternative to antibiotics because of their residue and subsequent resistance to bacteria. One of the major challenges faced by the poultry industry in the developing world is about improving efficiency of production. To meet this challenge and maintain the efficiency of feed utilization, series of attempts have been made by researchers. These include incorporation of antimicrobials and other natural products, such as Yeasts and Aloe Vera to animals and poultry feeds. It is well documented that antibiotics have a beneficial effect on animal growth, performance and health. However, increasing concerns regarding overuse of antibiotics has promoted extensive investigation into alternatives to use the sub-therapeutic antibiotics in production yeast.

**Mix equal parts of Aloe Vera and Yeast (0.50% of water content each) to obtain better feed and water absorption, and increased weight in breast, thigh and leg.**



Aloe Vera and yeast are the two medicinal plants found in tropical regions of India and are commonly incorporated in most of the poultry herbal medicines like liver tonics, anti-stress, antioxidants, antitoxic and growth promoting preparations. Apart from these benefits, these two herbs are used for various functions like antibacterial, antiseptic, anti-inflammatory, nematocidal and immunomodulatory properties. Besides, usage of these herbs for medicinal preparations, it can also be included in the poultry diet as feed additive to utilize their benefits to the maximum extent.



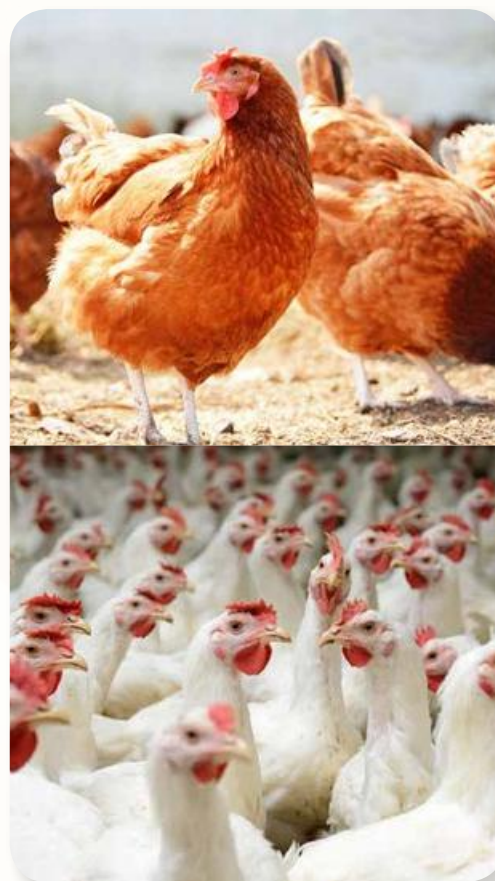
## CHICKEN AND BROILER NUTRITION

Mixing Aloe Vera powder and Yeast in your existing chicken water to increase the weight in breast, thigh and leg. This supplement may not increase the water and feed intake, however, there are studies that prove that adding Aloe Vera + Yeast into the animal nutrition leads to better water absorption, making the meat bigger and healthier while retaining more nutrients as well.

***Combine the versatility of Aloe Vera (1.50% of water content) with the effectiveness of Garlic to improve feed intake, final body weight and feed conversion ratio.***

Garlic (*Allium sativum*) is the most important specie of the onion genus, *Allium* belonging to the family Alliaceae. It is readily available and widely used around the world as it can be grown year-round. It is the second most widely consumed spice in the world and its popularity has been boosted by the growing awareness of its health benefits. Garlic is well known for its dietary and medicinal applications. Many studies have indicated that allicin is the most potentially active component of garlic that is responsible for its characteristic odour, flavour as well as most of its biological properties.

Particular attention must be paid to anti-bacterial activities and improvement in immune response as these two factors may contribute to better growth performance in broilers, and previous studies confirm these two properties (anti-bacterial effect and improvement in immune response) for Aloe Vera. In fact, antibacterial properties of Aloe Vera improve intestinal micro flora and reduce pathogens, thereby changing intestinal morphology and improving growth performance. On the other hand, by improving immune response in broilers and increasing body resistance, Aloe Vera indirectly affects growth performance. The improvement in weight gain of the birds using garlic in their rations may probably be due to the fact that allicin (an antibiotic substance found in garlic), inhibits growth of intestinal bacteria such as *S. aureus* and *E. coli* and inhibit aflatoxins producing fungi. Better feed conversion ratio of the broilers may be attributed to the antibacterial properties of this supplement, which resulted in better absorption of the nutrients present in the gut and finely leading to improvement in feed conversion ratio.



***Improve the immune response of your chickens and broilers by adding 2.5% of Aloe Vera in the water and 100 mg/Kg of Vitamin E in the feed***

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## CHICKEN AND BROILER NUTRITION

Nowadays, profitability in poultry production largely depends on the flock health status and enhanced resistance to pathogens as healthy flocks have improved performance, consistency, and lower mortality. The use of medicinal herbs as feed supplements is a strategy that has been adopted in the past few years by researchers and feed producers to improve broiler immunity against pathogens. Among these herbs, Aloe Vera has been identified as a promoter of immune system. Aloe Vera, which grows widely in tropical and sub-tropical areas, has a wide range of applications in traditional medicine. Its main part consists of Aloe vera gel, containing 98.5 - 99.5% water (Femenia et al., 1999), and the remaining dry matter contains biologically active substances with antibacterial, antiviral, antifungal, immunomodulatory, antitumor, antioxidant, antidiabetic, and other healing properties (Choi and Chung, 2003).

Broilers supplemented with Aloe Vera Gel exhibit improved antibody titers against SRBC and NDV, compared to broilers without any supplement. Broilers receiving feed supplemented with either 1.5, 2, or 2.5% Aloe Vera Gel have increased antibody titers against SRBC and NDV in comparison to non-supplemented broilers. The improvement in the immune system performance may be attributed to Acemannan, a polysaccharide contained in Aloe Vera.

Acemannan is a  $\beta$  (1-4)-linked acetylated mannan, which can activate macrophages in addition to increase cytokines production, release of nitric oxide, or expression of surface molecule. Similarly, polysaccharides in Aloe Vera increased interleukin 2, interleukin 4, and interferon gamma in broilers.



Vitamin E, a fat-soluble vitamin, has also immunostimulant effects as well as antioxidant properties. Studies have shown that broiler feed supplemented with vitamin E can prevent losses due to infections by *Escherichia coli*, enhance phagocytosis activities of macrophages, and improve cellular and humoral immune responses.

***Add 2.5% Aloe Vera to the water of your chicken as a replacement for virginiamycin and other antibiotics***

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The increase in Aloe Vera gel contained in the feed results in significant linear reduction in number of *E. coli* colonies as well as significant linear increase in number of *Lactobacillus* colonies compared to chicken fed with antibiotics or without any supplements. The increase in the number of *Lactobacillus* bacteria in Aloe Vera gel confirms antibacterial effects of Aloe vera, which stimulates the growth of useful intestinal flora and reduces the presence of gram-negative bacteria.

Polysaccharides contained in Aloe Vera (particularly Acemannan) have effects similar to those of prebiotics; that is, they increase the number of *Lactobacillus* colonies and reduce gram-negative bacteria. Acemannan added to the broiler diet decreases the number of intestinal *E. coli* colonies. In fact, short-chain fatty acids, as the final product of *Lactobacillus* fermentation, can lower intestinal pH and make the environment unfavourable for gram-negative bacteria.



Enhanced humoral immunity can be attributed to polysaccharides (Acemannan) contained in Aloe Vera gel. Several studies confirm the role of polysaccharides contained in herbs and mushrooms in stimulation of immune system. Polysaccharides can increase cytokines and antibodies, and enhance the performance of natural killers and B- and T- lymphocytes. In general, polysaccharides can affect the humoral immune response and cellular immunity.

### **Protect your chicken against coccidiosis by incorporating Aloe Vera Polysaccharides to your chickens' diet**

Coccidiosis is one of the most important protozoal infections of poultry industry, inflicting heavy economic losses in the form of high morbidity and mortality in affected flocks. It is caused by different species of genus *Eimeria*, belonging to family Eimeriidae. Poor management such as damp litter, contaminated drinkers and feeders, high stock density and poor ventilation are the most important predisposing factors of this disease in intensive poultry production. According to an estimate, it causes economic losses up to three billion US dollars annually worldwide.

Coccidiosis is an important protozoal infection of poultry of high economic importance having a negative impact on the production performance and thus farm profitability. Conventionally, disease is controlled through medication and vaccination strategies but each with certain limitations. As an alternative approach, modern trends are molding towards the use of native biomolecules from different medicinal plants for the treatment of various ailments in both animals and human beings. In this regard, Aloe Vera has significant immunoregulatory and immunostimulatory activities, mainly antioxidant effects; stimulation of phagocytes and humoral immunity in different animal models.

Maximum protection (70%) in polysaccharides administered chickens might be correlated immunostimulatory activity of Aloe polysaccharides like Acemannan which had been reported to reduce the opportunistic infections and stimulate wound healing. Further, previous studies reported that carbohydrate polymers (glucomannans) present in Aloe Vera play a role in the healing process and inhibit cyclooxygenase pathway, resulting in decreased prostaglandin production from arachidonic acids.

Aloe Vera polysaccharides lead to stimulate cellular and humoral immune responses by increased synthesis and release of T-lymphocytes and cytokines, which might be speculated to neutralize the pathogenic organisms like Eimeria species. Aloe Vera extracts administered at different dose rates promote significantly elevated macrophages and white blood cell counts in chicken.

Further, Aloe Vera polysaccharides boost the activity of intestinal macrophages and T-lymphocytes up to 50 percent to prevent the penetration of pathogenic viruses, bacteria and tumor cells.





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