

Infectious bursal disease and significance of *aloe vera*, *moringa oleifera*, ginger and garlic extracts supplementation in poultry birds

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ABSTRACT

In Pakistan poultry industry is one of the major sectors of agriculture. It has a major contribution of 1.3% to the national GDP. In Pakistan, poultry production started in 1960 at the commercial level. Poultry is a significant source of daily protein for the population. It plays a valuable role in filling the gap between the demand and supply of protein. The poultry industry is the source of employment for approximately 1.5 million people with an investment of 200 billion rupees.

Introduction:

In Pakistan poultry industry is one of the major sectors of agriculture. It has a major contribution of 1.3% to the national GDP. In Pakistan, poultry production started in 1960 at the commercial level. Poultry is a significant source of daily protein for the population. It plays a valuable role in filling the gap between the demand and supply of protein. The poultry industry is the source of employment for approximately 1.5 million people with an investment of 200 billion rupees. Pakistan is ranked as the 11th largest country in poultry production all around the world. This industry in Pakistan has been flourishing continuously for the past 40 years. It has benefited from government promotional programs throughout its development, but it is also facing different problems like disease outbreaks and fluctuating retail prices. Therefore, alternative solutions such as anti-viral feed additives could be used to decrease the harmful consequences of viral diseases such as infectious bursal disease (IBD), infectious bronchitis (IB), avian influenza (AI), and Newcastle disease (ND). The poultry industry faces significant risks from numerous contagious and noncontagious diseases, leading to substantial economic losses (1). Within this spectrum, Infectious Bursal Disease (IBD) emerges as a critical ailment, resulting in significant economic and health challenges within the poultry sector. The IBD virus (IBDV) of chickens causes a highly contagious immune-suppressive disease known as Gumboro, which has resulted in major financial losses for the global poultry industry. In young chicks, the manifestation of the illness can vary between clinical or subclinical conditions, depending on the specific strain of Infectious Bursal Disease Virus (IBDV) and the presence of maternal immunity. Both clinical and subclinical forms of the disease caused by pathogenic IBDVs result in lesions in the bursa of Fabricius, from swelling with yellowish discharge on its surface. Occasional bleeding can be observed on the serosal and mucosal surfaces. Approximately 7 to 10 days after infection, bursal atrophy occurs, leading to the loss of B cells. IBD has been prevented by vaccination programs using inactivated and live attenuated viruses together with strict sanitary management of poultry farms. Live vaccinations exhibit varying degrees of attenuation; many of them may result in bursal atrophy and immunosuppression, impairing the immune system's ability to respond to vaccination against other pathogens and potentially increasing susceptibility to other illnesses. It is necessary to establish active immunity to the virus as soon as possible after hatching since hens are most vulnerable to IBDV during the first few weeks. A range of infectious and non-infectious diseases have been successfully treated with medicinal plants. To find a viable replacement for Antibiotic growth Promotors, researchers are currently examining several alternatives including probiotics, prebiotics, and herbs. One such additive being studied is *aloe vera*, a semi-tropical plant that is a member of the *Asphodelaceae* family and is well-known for its numerous health advantages. It is a widely used medicinal herb with numerous qualities that have been demonstrated, including anti-viral, anti-bacterial, anti-parasitic, anti-inflammatory, anti-cancerous, antioxidant, and excellent immune-modulating potential. The therapeutic potential of aloe vera against poultry diseases such as IBD, coccidiosis, fowl typhoid, and Newcastle disease has been investigated. Certain immune modulatory substances, including alocin-A and acemannan, are found in the gel of some Aloe species. Infiltration of white blood cells at the injury site, which activates macrophages to release nitric oxide and stimulates the production of IL-1, and IL-2, boosts Th1/Th2 immune response and other cytokines, is primarily responsible for aloe vera's

immune modulatory potential. According to several studies, it can also boost chicken immunity.

Ginger (*Zingiber officinale Roscoe*) and **garlic** (*Allium sativum*) are used worldwide as potent medicinal plants. The compounds present in ginger that are also known as "active compounds" include kamfen, atsiri oil, limonene, gíngibrol, numulen, bormoool, gíngierdiol, gíngierdione, and gíngierol. Ginger rhizome aqueous extract mixed with water helps by improving immunity against IBD, ND, IB, and coccidiosis. Ginger is beneficial to both human and animal health; examples of ginger effects include anti-viral, anti-bloating, anti-microbial, anti-vomiting, and anti-spasm. The active compounds present in ginger show pharmacological effects which increase the resistance in poultry birds against various infectious diseases by changing immune mechanisms (2). Although a lot of research has been done still information about ginger's effects on serum metabolites, antioxidant status, and animal performance is still lacking. It has been shown by many studies, that it is very important to add plants of medicinal value in poultry feed due to the diversity of their beneficial effects. Bioactive compounds present in garlic include alicine, aalicin, alliin, and diallyl sulfides, which possess antiviral, antioxidant, antibacterial, antifungal, and antiparasitic characteristics. Alicine has several beneficial effects; it lowers LDL and cholesterol levels and has immunostimulatory effects in poultry infectious diseases. Polysaccharides derived from garlic can improve mucosal barriers. It has been shown by researchers that adding garlic powder to feed animals can enhance meat quality, and productivity, increase antioxidant activities, improve health status, modulate the immune system, and decrease mortality.

Moringa oleifera is rich in minerals vitamins and amino acids. Amino acids i.e., lysine, arginine, valine, phenylalanine, histidine, leucine, methionine, isoleucine, threonine, and tryptophan are present in it. Furthermore, MO's antibacterial characteristics are due to lipophilic substances that could adhere to the membrane of the cytoplasm. Similar to this, MO leaf extracts contain small peptides that might be crucial to the plant's antimicrobial defense mechanism. *Moringa oleifera* contains flavonoids like kaempferol and quercetin as antioxidants thus it assists in the stabilization of myofibrils. MO anthocyanin, thiocarbamates tannins, and glycosides activate antioxidant enzymes remove free radicals, and inhibit oxidases. It contains protein and phytochemicals including carotenoids, flavonoids, phenolics, alkaloids, saponins, sterols, terpenes, glucosinolates, isothiocyanates, thiocarbamate, and tannins which are beneficial for the health of birds and production of eggs. Pods, leaves, seeds, bark, fruit, and flowers of MO are used for the prevention of nearly three hundred ailments and cures of many diseases including skin infection, hepatic fibrosis, hypercholesterolemia, malaria, and tuberculosis. It possesses the qualities of antifungal, anti-toxin, antibacterial, antiviral, antitumor, antioxidant, anti-inflammatory, antidiabetic, anticancer and immunomodulation. When compounds of MO like polyphenol and tannins were soluble in acetone, they exhibited antibacterial activity MO was used against viruses like smallpox, NDV, HIV, and FMDV (3).

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