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Potentials of Garlic as a Feed additive and Alternative to Antibiotics in poultry Production, A Review.

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Abstract

Medicinal plants are becoming best replacement option of antibiotic. Garlic has shown tremendous benefits in poultry production. As the world is turning into organic agriculture, the use of garlic has been seen to play many roles e.g improved immune system, antibacterial and antiviral properties among others. This article highlights some essentials of using garlic both as feed additives and alternatives to antibiotics.

Keywords: *Garlic, poultry, immune system*

Description of Problem

Garlic is a member of Allium family, it is classified as a vegetable although many people think of it as herb. It consists of a number of small 'cloves' bunched together into a 'bulb' or 'head' and covered with a thin, paper-like coating. Originating in Asia, it's been used medicinally for human being for centuries. In many parts of a country such as Italy, garlic has reportedly help to reduce the rate of heart disease and cancer. The use of antibiotics is discouraged by scientist because of the increasing resistance of existing strains to treatments alongside other side effects hence, the use of biological substitute. These Phytogenic substances have played a significant role by stimulating secretion of digestive enzymes, leading to enhanced digestion and absorption which has in general increased performance of birds (1,2). Furthermore, the presence of active ingredients and phenolic compounds can reduce numbers of intestinal pathogens, thus minimizing nutrient loss and improving performance. Both effects may result in better intestinal health and may lead to more protein deposition in body tissues (3). Herbs spices like garlic (*Allium sativum*) have been reported to possess useful pharmacological substances (3).

Some use of Garlic include the following: as flavoring agent in different dishes and medicament, antioxidant, antihypertensive, anti-ageing, hypo lipidaemic, anti-platelet and detoxify the heavy metal (4). Because of the antimicrobial properties of garlic, it tends to be one of the highly studied medicinal plant used as growth promoter in broiler chickens (5,6). consequently, many research and trials have evaluated garlic as an alternative of growth promoters in poultry and revealed its excellent effects on growth, digestibility and carcass characteristics (7).

The objective of this article is to put together sufficient amount of research literature into a refined summary so that it can be used as a guide for standard development of garlic use in poultry.

Poultry growth performance

Several studies investigated the effects of long term feeding of garlic and its' preparations on the performance of poultry. Most of these studies reported a statistically significant improvement in cumulative feed conversion ratio. Garlic increases growth and improves feed conversion ratio by increasing height of villus of small intestine, activation of absorption process (8). Another study by (9) has proven that dietary fermented garlic supplementation in poultry ration can increase the intestinal villus height, villus area, cell area, cell mitosis in the intestine and results in better feed efficiency.

Antimicrobial properties

The antimicrobial properties of Garlic have been observed when it's used for centuries in many countries to control infectious diseases. It has been used to prevent wound infection and food spoilage in India (10).

Antibacterial effects

Garlic has been reported to be effective against many acid-fast, gram-positive and gram-negative bacteria. These include *Escherichia coli* (E. Coli), Salmonella, Clostridium, *Staphylococcus aureus, Pseudomonas, Proteus*, *Klebsiella*, *Micrococcus, Bacillus subtulis* and Helicobacter (11,12). Therefore, garlic can be used to treat some bacterial diseases e.g Colibacillosis, Salmonellosis and Cholera in poultry. An inhibitory synergism of antimicrobial properties of garlic was also observed when it was used in combination with vancomycin (13)

Antiviral effects

Few researches are done on antiviral properties

of garlic compared to antibacteria. Nevertheless, Allicin and allicin-derived substances are active against viruses and no activity has been indicated with alliin or S-allyl cysteine. It has been proved that

garlic shows *in vitro* activity against influenza A and B viruses, rhinovirus, HIV, herpes simplex virus 1 and 2, cytomegalovirus, viral pneumonia and rotavirus (14,15).

Anti-protozoal affects

Studies shows that the use of garlic in poultry feed exhibits antiprotozoal effects in poultry but the exact mechanism of action remains to be explored. Several studies have shown that it is effective against a host of protozoa including *Opalina ranarum, Entamoeba histolytica, Balantidium entozoon, O. dimidicita, Trypanosomes, Leishmania,* and Leptomonas (16). Diallyl trisulfide a component of garlic is commercially available in many countries like China in commercial preparation named Dasuansu and has been prescribed for treatment of diseases caused by *Trichomonas vaginalis* and *Entamoeba histolytica* (17). Allicin, ajoene and organosulfides are the main components of garlic which have antiprotozoans properties.

Antifungal effects

Just like other antimicrobial properties antifungal activity of garlic has also been proven to be effective. Several Studies have suggested that garlic can prevent the growth of Aspergillus, Torulopsis, Trichophyton, Cryptococcus, Candida, Trichosporon and Rhodotorula (18,19). Garlic has oxygen scavenging molecules which decrease the oxygen uptake (reduce the growth of the organism, stops the synthesis of protein, lipids, and nucleic acids (20).

Other health benefits

Serum cholesterol

Garlic being an essential medicinal plant has imposes beneficial effects on body metabolites. Several clinical studies have supported this idea (21, 22). It has also been investigated that Allicin may reduce the levels of serum cholesterol, triglyceride and LDL (23) Diets comprising garlic powder has ability to lower down serum and egg cholesterol level in hens (24). An investigation has reported that supplementation of garlic powder at the levels of 0, 2, 6 and 8% does not affect the egg weight, egg mass, feed consumption and feed efficiency in the laying hens (25). However, lowering effect on the serum and egg yolk cholesterol concentrations was observed with dietary garlic (26).

Immune system

Although garlic kills viruses, bacteria and other microorganisms directly, it also excites the body's natural defenses against these antigens. Garlic's amazing and famous power against diseases is due to a combination of both properties mentioned above.

Garlic extracts have an immunomodulatory effect and lessens the age-related deterioration of the immune response (3). Garlic supplementation in chickens increase the relative weights of the spleen, bursa of Fabricius and thymus (27, 28). (29) also reported supplementing chickens with garlic exerted enhancing effect on the humoral immune responses against Newcastle disease virus and sheep red blood cell. It has been studied that supplementing poultry with aqueous extract of garlic, feed acidifier and microbial cell extract increase antibody production against Newcastle disease vaccine and infectious bursal disease vaccine (30).

Conclusion

There is no doubt that the inclusion of garlic into the diet of poultry is beneficial to chicken health and wellbeing, and assist in building their immune system among other benefits. Although garlic present many benefits to its uses, adequacy and proper dosage should be looked upon thereby establishing a standard on the use of garlic in poultry feed.

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