



Scientifically Speaking ...

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HEALTH BENEFITS OF HERBS AND SPICES IN POULTRY

In most European countries, the need for sustainable therapeutic aids in poultry production is driven by the ban on antibiotic use, threats of emerging pathogens, and ever-increasing demand for poultry products. Herbs and spices, in their various forms, offer multiple benefits for sustainable poultry health and production.

Sustainable poultry production is marked by responsible use of natural resources for feeding animals; the focus is on animal health and welfare, animal production, environmental impact, and consumer preferences. These are the focal points that represent the greater part of the poultry production value chain.

Why herbs and spices?

Herbs and spices can be provided to animal diets (in feed or water) in different forms and preparations, given whole or as extracts such as essential oils, phytonutrients etc. Several studies have indicated herbs, spices and their extracts are important in sustainable poultry production, as they are cost-effective, more readily available, and free from residual effects and threats of antibiotic resistance in human beings.

Consumer preferences

There are several reports of consumers preferring poultry products emanating from poultry fed natural ingredients as substitutes for antibiotics. A recent survey (2018) carried out in Thailand revealed high consumer preference on meat products raised with phytochemical feed additives. The survey showed that 90% of consumers when choosing a specific brand of meat consider the following:

- ✓ Meat products from poultry fed completely natural ingredients, without antibiotics.
- ✓ Products that reduce environmental impact.
- ✓ Want to know and choose meat from poultry raised with phytonutrients or similar herb extracts.
- ✓ Overall, it is important to them that food choices reflect their value for the environment, animal health/welfare, and natural ingredients.

Effect on poultry health

There is growing interest in herbal feed additives in livestock production due to development of microbial resistance to antibiotic drugs, and their consequences on human health. Herbs and spices offer several health beneficial properties including immune stimulation, anti-bacterial,

coccidiostatic, antiviral or anti-inflammatory activity, and antioxidant properties.

Anti-bacterial

Herbs and spices contain flavonoid components such as baicalin, baicalein, limonene, cinnamaldehyde, thymol, carvacrol or eugenol, among others, which exert antimicrobial effects. They act as antimicrobial agents by changing the characteristics of cell membranes, and causing ion leakage, ultimately making microbes less virulent. In bacteria, they act in the cell wall structure, denaturing and coagulating proteins.

Anti-parasitic and antioxidant

Several herbs such as sage, garlic, thyme, echinacea, and oregano, possess anti-coccidial properties against *Eimeria* species, which reduce oocyst excretions from infected birds. Most of these herbs' antioxidant activity coupled with their content of alkaloids (e.g. halofuginones), help to significantly reduce oocyst production in birds. Studies have shown that different herbs and spices can be used as prophylactic or therapeutic anti-coccidial agents. Another example, *Curcuma longa* through its phenolic compound, curcumin, exerts its anti-coccidial effect in birds through its anti-oxidant action on the immune system. Ecto-parasites such as lice and mites are also controlled by the use of herb extracts, for example, aqueous extract of garlic, and cinnamon oil, have been shown to be effective in decreasing lice and mite infestations in chickens (Jacob and Pescatore, 2011; Zenner et al., 2003).

Use of herbs reduces oxidative stress in chickens (Bharavi et al., 2010). Herbs and spices such as thyme, ginger, turmeric, marjoram, peppermint, nutmeg, have been shown to have antioxidant properties as they contain compounds such as polyphenolics, alkaloids, lignans, flavonoids and terpenoids. These compounds neutralise superoxide, hydrogen peroxide and nitric oxide by scavenging radicals or by increasing production of enzymes such as catalase, superoxide dismutase and glutathione peroxidase.

Anti-viral

Herb catechins, a type of natural phenol, decreases replication and excretion of the H9N2 virus from chickens in a dose-dependent manner (Lee et al., 2012). The anti-influenza activity of catechins is due to direct interaction with viral HA and inhibition of viral RNA synthesis. The saponins of ginseng significantly increase the serum antibody response to Newcastle disease; inactivates H5N1 and H9N2 vaccines in chickens.

Immunostimulant

Most herbs and spices are rich in flavonoids, vitamin C and carotenoids beneficial to the bird's immune system. Some of these plants include echinacea, liquorice, garlic and cat's claw. These plants improve the activity of lymphocytes, macrophages and natural killer cells; they increase phagocytosis or stimulate the interferon synthesis. In addition, several herbs have been reported to have immunomodulatory effects such as histamine release, modulation of cytokine, and immunoglobulin secretion.

Effect on production

Beneficial effects of herbs in poultry production centres on improvement in feed digestibility – effect being on digestive enzymes, resulting in overall improvement of performance parameters such as weight gain and feed conversion. Better utilisation of feed means less excretion, and thus help reduce environmental pressure, considering that these are natural ingredients. The following sections highlight trial results on the use of herbs and spices on production parameters in broiler chickens.

Growth performance

A study by Al-Maaty et al. (2014) (Tables 1 and 2) below shows the positive effects of cinnamon, turmeric and ginger, on growth performance and nutrient digestibility in broilers. Active compounds in these spices have been reported to positively influence feed consumption, feed utilisation and body weight gain. In a similar study, the supplementation of both black and red-hot pepper to broiler diets showed significant improvements in feed conversion and growth.

Besides antimicrobial effects, the stimulating effect of bioactive compounds on protein and fat metabolism is attributed to high growth rates. In addition, the antioxidant capacity of herbs and spices improves meat quality by lowering malondialdehyde concentration and increasing the activities of superoxide dismutase and catalase of muscles.

Table 1. Effect of different herbs on growth performance of broilers (2-6 weeks old)

Treatment	BW gain (g/bird)	FCR	Economic efficiency (%)
Control	1769	2.13	74.3
Cinnamon	2189	1.71	116.0
Turmeric	2138	1.75	111.7
Ginger	2139	1.75	111.0

Nutrient digestibility

Improved nutrient digestibility can be attributed to the properties of herbs. Antibacterial, anti-oxidant and anti-fungal properties which could improve the utilisation of dietary nutrients in the bird. Feeding of herbs was reported to stimulate the secretion of digestive enzymes, and thus improve nutrient digestibility – ultimately enhancing the performance of broilers (Nadia et al., 2008; Al-kassie et al 2011).

Table 2. Nutrient digestibility and ash retention of 5-week broilers fed herbal supplements

Treatment	Digestibility (%)			Ash retention (%)
	DM	CP	EE	
Control	77.82	76.09	75.78	79.86
Cinnamon	78.64	79.82	80.93	81.30
Turmeric	78.01	79.88	79.30	80.91
Ginger	78.29	79.95	79.07	80.85

Remarks

- The availability and economic efficiency of herbs and spices offer a sustainable therapeutic and performance aid to poultry health and production. Several studies (not shown in this report) show similar results.
- They stimulate the secretion of digestive enzymes, thereby, improving nutrient digestibility, and growth of birds, resulting in reduced secretions to the environment.

Herbs and spices have the potential to replace antibiotics since they possess several health promoting properties that include antimicrobial, anti-parasitic, antioxidant and immunomodulatory properties. However, more attention should be put on identification of the bioactive compounds, purification and extracting procedures, mechanisms of action, and standardisation of doses.