LUPINE PUBLISHERS
Open Access

Concepts of Dairy & Veterinary Sciences

DOI: 10.32474/CDVS.2018.02.000128

ISSN: 2637-4749

Opinion

Effects of Turmeric Powder (Curcuma Longa) in Broiler Nutrition: Coccidiosis and Antioxidative Status

Nikola Puvača[1]*, Dragana Ljubojević[2], Ivana Čabarkapa[3], Olivera Đuragić[3], Sanja Popović[3], Radivoj Prodanović[1] and Jelana Bošković[1]

[1]*Department of Engineering Management in Biotechnology, University Business Academy, Serbia*

[2]*Scientific Veterinary Institute "Novi Sad", Serbia*

[3]*Scientific Institute for Food Technology in Novi Sad, Serbia*

Received: October 01, 2018; **Published:** October 05, 2018

***Corresponding author:** Nikola Puvača, Faculty of Economics and Engineering Management, Department of Engineering Management in Biotechnology, University Business Academy, Novi Sad, Serbia

Opinion

Usage of antibiotics concerning animal nutrition and as antimicrobial growth promoters is undoubtedly beneficial for the improvement of zootechnical performance parameters and prevention of disease. Nevertheless, because of the bio-security threats for human and animal health which come from escalating resistance of pathogens to antibiotics and the accumulation of antibiotic residues in animal products and the environment, there is a global need to remove antimicrobial growth promoters from animal diets. The intensive broiler production sector of the poultry industry is keen to optimise performance and minimise economic losses as a result of antimicrobial growth promoter removal, as well as ensuring the safety of broiler meat via the control or elimination of foodborne pathogens. The beneficial potential of various microbes and bioactive compounds have been highlighted in enhancing animal performance and health [1]. Compared with synthetic antibiotics or inorganic chemicals, plant-derived products have proven to be less toxic, residue free and are thought to be ideal feed additives in food animal production [2]. Advances in chemistry and identification of plant compounds which are effective in the treatment of certain diseases have renewed interest in herbal medicines. Turmeric (Curcuma longa) is a rhizomatous herbaceous perennial plant of the ginger family, Zingiberaceae. The tumeric extract is a yellow-orange poly-phenol and its usual form is a dry yellow powder that is oil-soluble in its natural state. The active ingredients are tetrahydrocurcuminoids, curcumin, demethoxycurcumin and bisdemethoxycutcumin [3]. Curcumin (diferuloyl methane) the natural yellow pigment in the roots of turmeric, is a poly-phenolic compound that is isolated from the rhizomes of tumeric. It represents about 4% of the dry weight of the extract. Curcumin, which gives yellow colour to turmeric rhizomes, is one of the most active ingredients, responsible for the biological activity.

Anti-Coccidial Effects of Tumeric

Avian coccidiosis is an intestinal disease caused by several species of Eimeria protozoa and represents an economically important parasitic infection for the poultry industry worldwide. Coccidiosis is one of the most detrimental and lethal management diseases of poultry. It causes high mortality in affected flocks. Researches [4] found maximum coccidiostatic effect with turmeric added at 3% levels in the diet as compared to other infected groups receiving turmeric containing rations, which were comparable with using a standard coccidiostat. In the same study, the peak excretion of oocysts was delayed about 1 or 2 days relative to the control infected group. Reports [5] showed that faecal oocyst shedding from birds experimentally infected with E. acervulina was significantly decreased when broiler chickens were fed with a diet containing tumeric, while others [6] reported that curcumin at concentrations of 25, 50, 100, 200 and 400 μM showed considerable effects on Emeria tenella sporozoite morphology and viability in a dose dependent manner after incubation over 3, 6, 18 and 24 hours. In the same experiment, in comparison to the untreated control, sporozoite infectivity was reduced at curcumin concentrations of 100 and 200 μM by 41.6% and 72.8%, respectively. Results of trials reported that midsmall intestinal lesion scores induced by Emeria maxima were reduced in broilers fed with 1% dietary turmeric during infection [7]. Diferent resersh have suggested [6] that the ability of curcumin (diferuloylmethane) to kill extra cellular stages of E. tenella could be due to its cytotoxic damage affecting parasite

viability, morphology and hence activity. Studies [7] have proposed the anticoccidial activity of turmeric is due to its antioxidant properties.

Antioxidant Effects of Tumeric in Poultry

Free radicals induce oxidative damage to macromolecules, cells and tissues that consequently leads to increased morbidity and mortality rates, with substantial economical losses. Reports suggested that turmeric neutralises superoxide radicals. Investigation [8] reported that catalase (CAT) and superoxide dismutase (SOD) concentration increased significantly when basal feed of broilers chicks was supplemented with 0.3 and 0.6g/kg turmeric powder. In the same experiment, the concentration of melanodealdehyde (MDA), an indicator of oxidative stress, decreased significantly when turmeric was added into the feed at the rate of 0.3g/kg. Aloso some researchers [9] showed that total antioxidant activity and SOD concentrations improved by addition of 0.5% turmeric powder in the diet. Several studies have shown that curcumin has a strong capability for scavenging superoxide radicals, hydrogen peroxide and nitric oxide (NO) from activated macrophages, reducing iron complex and inhibiting lipid peroxidation [10, 11]. Curcumin is known to augment antioxidant status especially through SOD which could be due to the increased expression of SOD gene in the chickens fed turmeric. Antioxidant enzymes, such as CAT within the peroxisomes and cytosolic GPx, are involved in the conversion of hydrogen peroxide, a powerful and potentially harmful oxidizing agent, into water and molecular oxygen [12]. Curcumin has a unique conjugated structure including two methoxylated phenols and an enol form of ß-diketone and the structure shows a typical radical trapping activity as a chain-breaking antioxidant. Investigations suggested that dietary turmeric lowers lipid peroxidation by enhancing the activities of antioxidant enzymes, also it has been reported that tumeric may help to prevent antioxidant deficiency with resulting protection of mitochondria against premature oxidative damage with loss of ATP synthesis and specialized cellular functions.

Acknowledgement

The paper is a part of the research work on the project III 46012 financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

References

1. Puvača N, Stanaćev V, Glamočić D, Lević J, Perić L, et al. (2013) Beneficial effects of phytoadditives in broiler nutrition. Worlds Poult Sci J 69: 27-34.
2. Puvača N, Kostadinović Lj, Ljubojević D, Lukač D, Lević J, et al. (2015) Effect of garlic, black pepper and hot red pepper on productive performances and blood lipid profile of broiler chickens. Europ Poult Sci 79: 1-13.
3. Al-sultan SI (2003) The effect of Curcuma longa (turmeric) on overall performance of broiler chickens. Int J Poult Sci 2: 351-353.
4. Abbas RZ, Iqbal Z, Khan MN, Zafar MA, Zia MA (2010) Anticoccidial activity of Curcuma longa L. in broilers. Braz Arch Biol Technol 53: 63-67.
5. Lee SH, Lillehoj HS, Jang SI, Kim DK, Ionescu C (2010) Effect of dietary Curcuma, capsicum and Lentinus on enhancing local immunity against Eimeria acervulina infection. J Poult Sci 47: 89-95.
6. Khalafalla RE, Müller U, Shahiduzzaman M, Dyachenko V, Desouky AY, et al. (2011) Effects of curcumin (diferuloylmethane) on Eimeria tenella sporozoites in vitro. Parasitol Res 108: 879-886.
7. Allen PC, Danforth HD, Augustine PC (1998) Dietary modulation of avian coccidiosis. Int J Parasitol 28: 1131-1140.
8. Ahmadi F (2010) Effect of Turmeric (Curcumin longa) powder on performance, oxidative stress state and some of blood parameters in broilers fed on diets containing aflatoxin. Glob Vet 5: 312-317.
9. Gowda NKS, Ledoux DR, Rottinghaus GE, Bermudez AJ, Chen YC (2008) Efficacy of Turmeric (Curcuma longa), containing a known level of curcumin, and a hydrated sodium calcium aluminosilicate to ameliorate the adverse effects of aflatoxin in broiler chicks. Poult Sci 87: 1125–1130.
10. Ali HB, Marrif H, Noureldayem SA, Bakheit AO, Blunden G (2006) Some biological properties of curcumin: a review. Nat Prod Commun 1: 509-521.
11. Yarru LP, Settivari RS, Gowda NKS, Antoniou E, Ledoux DR, Rottinghaus GE (2009) Effects of Turmeric (Curcuma longa) on the expression of hepatic genes associated with biotransformation, antioxidant, and immune systems in broiler chicks fed aflatoxin. Poult Sci 88(12): 2620-2627.
12. Kostadinović Lj, Puvača N, Popović S, Lević J (2015) Botanical supplements as anti-coccidial alternatives in poultry nutrition. Worlds Poult Sci J 71: 27-35.

Submission Link: Submit Article

DOI: 10.32474/CDVS.2018.02.000128.