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Effects of adding turmeric powder (*Curcuma longa*) to pig's diet on blood biochemistry metrics

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Abstract
In this study, twenty four Hampshire (cross bred) pigs were used to examine the effects of food supplementation with different concentrations of turmeric powder on blood components. One control group and three dietary groups were randomly assigned to the pigs. The groups received varying amounts of turmeric powder (0.5%, 1.0% and 1.5%). Six replicates, each with 6 pigs, were included in each group. The findings demonstrated that the serum of pigs treated with turmeric powder had significantly lower levels of serum glucose and serum cholesterol. Nevertheless, an increase in serum glucose and albumin were observed in turmeric treated group. Based on these findings, it can be said that dietary turmeric powder improved the blood biochemistry parameters of cross bred pigs.

Keywords: Pigs, turmeric powder, cross bred pigs, serum glucose, blood biochemistry metrics

Introduction
Antibiotics were once used in animal feed as growth promoters which helped in improvement in gut health and lower production costs, thus optimizing feed conversion efficiency. Since in poultry feed accounts for 65% to 70% of total poultry production costs, feed utilization in broilers should be improved (Abd Al-Jaleel *et al*., 2012) [1]. However, these antibiotics had indirect adverse effects on human health because of residues in chicken meat (Yang *et al*., 2009) [22], and the increased resistance of certain microbes (Denli *et al*., 2003) [9]. Therefore, researchers have tended to use various types of medicinal plants as alternatives to antibiotics in the diet of broilers (Zhang *et al*., 2009) [22]. (Suppl.) A significant medicinal herb, turmeric is added to animal feed as a dietary supplement. Turmeric rhizomes, both fresh and powdered, have been widely utilized in Southeast Asian traditional medicine and human food preparation (Ammon & Wahl, 1991; Akbarian *et al*., 2012) [4, 2]. The most bioactive component of turmeric is curcumin, also known as diferuloylmethane. It is a potent phenolic antioxidant and makes up 3% to 5% of the curcuminoids in turmeric rhizomes (Osawa *et al*., 1995; Stankovic, 2004; Jagg Lal, 2012) [20, 21, 17]. Numerous studies have detailed the biological characteristics of the turmeric plant and its extracts (Akram *et al*., 2010; Khan *et al*., 2012; Eevuri & Putturu, 2013; Nirisha *et al*., 2015) [3, 15, 11, 19]. Enhancing broiler performance metrics and endogenous digestive enzyme secretion, as well as triggering immunological responses and antibacterial and antioxidant activities, are some of its advantages in chicken nutrition (Dorman & Deans, 2000; Burt, 2004; Khan *et al*., 2012) [10, 6, 15].
Recent research has assessed the effects of turmeric powder on blood biochemistry parameters and antioxidant capacity in broiler chickens (Emadi *et al*., 2007; Gowda *et al*., 2009; Daneshyar, 2012; Hussein, 2013) [12, 13, 8, 14]. Oxidant activity and blood biochemistry parameters are significant biomarkers of health status and nutritional metabolism in an organism's body (Lokesh *et al*., 2012) [18]. The outcomes, nevertheless, haven't proven reliable. So, the current study set out to find out how different dosages of turmeric powder affected the biochemical blood parameters of pigs.

Materials and Methods
The turmeric was processed into a fine powder and stored in airtight packets after being bought locally from the market. According to the treatment specifics, the turmeric powder was administered in powdered form to the groups @ the rate of 0.5%, 1.0% and 1.5%.

Twenty-four Hampshire (cross-bred) male pigs, were assigned at random into four groups: control (standard grower ration without any turmeric supplementation), E_1 (standard grower ration with 0.5% turmeric powder), E_2 (standard grower ration with 1% turmeric powder), or E_3 (standard grower ration with 1.5% turmeric powder). Each group consisted of six animals. Following BIS's (1994) advice, the experiment was conducted. The experimental animals were restrained in ventrodorsal position and the blood samples were collected directly from anterior venacava under aseptic condition and immediately transferred to a dry clean test tube and kept in slanting position for separation of serum. Estimation of serum protein, cholesterol, and albumin was done following the methods described in commercial kits manufactured by Crest Biosystem. Blood was collected at the beginning, mid and at the end of the experiment from all the animals of each group to estimate the serum protein, glucose, serum cholesterol and albumin.

Results and Discussion

The overall mean of the blood protein level, glucose, cholesterol, albumin in the serum is given in Table 1. Significant difference was observed between the control and E_2 where 1% turmeric powder was incorporated. Elevated serum protein level may be due to better ability of the hepatocytes of treated group to synthesize more protein due to turmeric powder supplementation. In case of serum glucose statistically E_1 (0.5%) and E_2 (1%) was significantly different from control but there was no significant difference between E_1 and E_3 groups. Korniewicz *et al*. (2007a) [16] reported higher serum glucose concentration following supplementation of plant extracts in pigs. The increased in serum glucose following turmeric supplementation indicated that the plant preparation profitably affects the energy balance of fatteners All the experimental groups i.e. E_1 (0.5%), E_2 (1%) and E_3 (1.5%) differed significantly from the control in case of serum cholesterol. The reduced cholesterol level was found in serum of treatment groups which might be due to inhibition of the active enzyme hepatic 3-hydroxyl-3 methylglutaryl coenzyme A (HMG-CoA) and cholesterol 7a-hydroxylase which is responsible or cholesterol metabolism in the liver (Crowell, 1999) [7]. Statistical analyses revealed that there was significant difference among the treatment groups in case of serum albumin.

Table 1: Blood Biochemical Parameters

Group	Average Serum Protein (g/dl)	Average Serum Glucose (mg/dl)	Average Serum Cholesterol (mg/dl)	Average Serum albumin (g/dl)
Control	8.22 ± 0.05^{a}	88.92 ± 0.43^{a}	46.09 ± 0.6^{a}	2.28 ± 0.05^{a}
E_1	8.13 ± 0.03^{bd}	90.43 ± 0.5^{b}	39.12 ± 1.26^{b}	2.46 ± 0.09^{bd}
E_2	8.34 ± 0.1^{c}	90.38 ± 0.57^{bc}	36.01 ± 1.3^{c}	2.63 ± 0.14^{c}
E_3	8.19 ± 0.05^{ad}	89.65 ± 0.56^{ac}	41.16 ± 1.15^{d}	2.34 ± 0.08^{ad}

Conclusion

It is possible to draw the conclusion that adding turmeric powder to the broiler chickens' feed had a good impact on the biochemical components of their blood under the circumstances of this experiment. Antioxidant activity, however, did not increase. Therefore, additional research is required to clarify the impact of turmeric powder on broiler chicken metabolism.

Conflict of Interest

Not available

Financial Support

Not available

Reference

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