ANTIOXIDANT STATUS OF TURKEY POULTS FED GINGER POWDER

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ABSTRACT
This study was carried out to investigate the effect of ginger (*Zingiber officinale)* on antioxidant status of turkey poults. A total number of ninety-six (96) two-weeks old American Bronze turkey poults were divided into four treatment groups in completely randomized design with a total of 12 experimental unit. The poults were assigned at the rate of 24 per treatment in 3 replicates of 8 poults per replicate. Ginger was washed, sliced, sundried and ground into fine particles. The test ingredient was used to compound the diets at different inclusion levels of 0, 0.2, 0.4 and 0.6%. A basal diet (turkey starter) was compounded for the period of the experiment (14day to 56day). Blood samples (3 turkey poults per treatments) were collected through the jugular veins at the termination of the experiment into heparinized bottle for antioxidant enzymes determination. The glutathione peroxidase (GPx) activity significantly ($p<0.05$) increased in the turkey poults fed diets supplemented with 0.2, 0.4 and 0.6% ginger. Significant ($p<0.05$) increased superoxide dismutase (SOD) activity was recorded at 0.2, 0.4 and 0.6% ginger when compared to 0% (control diet). Catalase (CAT) activity significantly ($p<0.05$) increased in turkey poults fed 0.6% ginger supplemented diets when compared to the other diets. It can be concluded that ginger when used as supplement in turkey poults diets at the rate of 0.6% can combat oxidative stress by enhancing the SOD, GPx and CAT activities.

Keywords: Ginger, Turkey poult, Antioxidant, Herbs, Growth promoters

INTRODUCTION
The use of antibiotic growth promoters in livestock and poultry production has been in vogue for many years due to the emergence of drug resistance microorganisms, side effects of antimicrobials and the harmful residual toxicity effect of drugs observed in food chain (Mahima *et al*., 2013). The valuable sources of medicines are currently in increasing demand and popularity on which about 80% of people in developing countries still rely for their primary health care (Verma and Singh, 2008).People are now aware of the limitations of synthetic drugs and chemicals in terms of higher cost, anticipated toxicity and adverse effects (Adu *et al*., 2009). On the other hand, the natural medicines are more suitable for animal health care with the benefits of total safety. In this era of food safety concern, emerging antibiotic resistance and residual effects in food products can play wonderful role for safeguarding health of humans and animals (Hashemi and Davoodi, 2012). Nowadays, there has been an increase in demand for natural antioxidants in food due to its health benefits against oxidative stress and several diseases. Plant derived antioxidants are gaining more demand in poultry nutrition because their meat has high content of polyunsaturated fatty acid and susceptible to lipid oxidation (Christaki, 2012). Spices like cinnamon, nut meg, ginger etc have been shown to have antioxidant properties as they contain the compounds such as polyphenolics, flavonoids and terpenoids (Botsoglou *et al.*, 2013). Studies showed that the active ingredients of herbs (ginger) have strong antioxidant effects including neutralization of superoxide, hydrogen peroxide and nitric oxide either by scavenging radicals or by increasing the production of glutathtion peroxidase (GPx), superoxide dismutase (SOD) and catalase (CAT) (Yarru *et al*., 2009). Ginger contains some important metabolites and alkaloids like gingerol, shogaol, gingerdione and other phenolic compounds which have antioxidant properties (Zhao *et al*., 2011). Ginger is the rhizome of the plant *Zingiber officinale* consumed as a delicacy, medicine or spice (Botsoglou *et al*., 2002). (Al-Amin *et al*.,2006) reported that a study conducted in-vitro tests show that the ginger extract might control the quantity of free radicals and the peroxidation of

lipids. The aim of the present study was to evaluate the role of ginger on the antioxidant enzyme status in turkey poults.

MATERIALS AND METHODS

The test ingredients ginger powder (*Zingiber officinale*) used for this study was purchased at the local market, Ado-Ekiti. The test ingredient was washed, sliced, sundried and ground into fine particles. It was used to formulate the diet at different inclusion levels of 0%, 0.2%, 0.4% and 0.6%. A basal diets (turkey starter) was formulated for the period of the experiment (14day to 56day) to meet the NRC (1994) requirements for turkey poults. Thereafter, the basal diet was divided into four (4) diets. Diet 1 contained 0% of ginger supplementation, diet 2 was supplemented with 0.2% of ginger, diet 3 was supplemented with 0.4% while diet 4 was supplemented with 0.6%. Ninety-six, two (2) weeks old American Bronze turkey poults breed were randomly distributed to four dietary treatments (8 turkey poults per replicate); 24 poults per treatments) in a completely randomized design (CRD).Eight (8) birds were housed in their respective pen, they were fed ad-libitum throughout the period of the experiment (42days). On the last day of experiment (42day), blood samples collection (3 turkey poults per treatments) was done in the morning after the birds were starved overnight into a heparinized tube which was kept in ice to provide hemolysate for determination of activity of antioxidant enzymes superoxide dismutase (SOD) (Misra and Fridovich, 1972), glutathione peroxidase (GPx) (Rotruck *et al*., 1973) and catalase (CAT) (Aebi, 1974). All data collected were subjected to analysis of variance using SPSS version 20. Duncan's Multiple Range Test of one way ANOVA was used to analyse the mean differences of the same parameters, significant differences were considered where necessary at a level of ($P<0.05$**).**

RESULTS AND DISCUSSION

The effect of dietary ginger on antioxidant parameters of turkey poults is presented in Table 1. The Glutathion peroxidase (GPx) value was significantly ($p<0.05$) higher in birds on diets 2,3,4 than the values recorded for birds on control diet suggesting that ginger supplementation at 0.2, 0.4 and 0.6% significantly increased the activities of GPx. There was a significant ($p<0.05$) increase in the values of superoxide dismutase (SOD) in birds fed the test ingredients (diets 2,3 and 4). The highest value of SOD was recorded for birds on diet 4 while the lowest value of SOD was recorded for birds on control diet. The catalase (CAT) values recorded for birds on diet 4 was significantly ($p<0.05$) higher than the values recorded for birds on other diets. Ginger contains some important metabolites and alkaloids like gingerol, shogaol, gingerdione and other phenolic compounds which have antioxidant properties (Zhao *et al.*, 2011). In addition, the positive effects of antioxidants properties of phytochemicals to poultry on oxidative status parameters was reported by Akbarian *et al*. (2016).

Table 1: Effect of ginger on antioxidant parameters of turkey poults fed experimental diets

	Diets				
	1	2	3	4	± SEM
	Ginger inclusion				
Parameters	Control diet				
GPx (µ/mol)	4.47^{c}	10.73^{b}	11.04^{b}	11.71^{a}	0.88
SOD (%)	40.50^{d}	44.88^{c}	55.66^{b}	60.21^{a}	0.05
CAT (mg/g)	225.31^{a}	257.02^{b}	261.24^{b}	285.18^{a}	0.62

GPx: glutathione peroxidase; SOD: superoxide dismutase; CAT: catalase.Means with different superscript on the same row differ significantly (P<0.05)

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