

SERUM BIOCHEMICAL INDICES OF BROILER CHICKENS AS INFLUENCED BY DIETARY GINGER SUPPLEMENTATION

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ABSTRACT

A study was designed to evaluate the influence of dietary ginger on serum biochemistry of broiler chickens. A total of three hundred (300) broiler chickens at four weeks of age were used for the study. The birds were randomly assigned to five treatment groups with four replications of fifteen (15) birds per replicate in a Complete Randomized Design. The experiment lasted for four weeks. Ginger replaced mineral/vitamin premix in the experimental diets (Table 1) as follows; T1 (Control 0% ginger), T2 (20% ginger), T3 (40% Ginger), T4 (60% Ginger) and T5 (80% Ginger). The serum biochemical indices measured were total protein, albumin, globulin, urea, glucose, cholesterol, sodium, potassium, calcium, bilirubin and creatinine. Total protein, albumin and globulin were higher in the control compared to the other treatments. Aspartate Aminotransferase was dose dependent with birds fed the highest level of ginger (T5) having the highest mean (82.75IU) while those in the control had the lowest means (43.25IU). Cholesterol was increased by the inclusion of ginger in the diet reaching a peak at T5. It was concluded that inclusion of ginger up to 0.4% had no adverse effect on serum biochemistry of finisher broiler chickens.

Key words: Cholesterol, Ginger, serum protein, Broiler chicks

INTRODUCTION

Various feed additives are used in poultry to maximize net returns and carcass quality of birds. In the past, growth-promoting antibiotics were used as feed additives; however, these were associated with storage of undesirable residues in the meat and eggs of poultry products which may be harmful to man when consumed, and have been banned or limited in many countries due to these suspected residual effects (Diarra *et al.*, 2011). As a result, natural alternatives to antibiotics such as herbs and medicinal plants have attracted attention due to their wide range of potential beneficial effects (Manesh, 2012). Thus the use of plants such as ginger, garlic, onion etc. as alternatives to antibiotic feed additives is becoming more and more popular (Joke and Susan, 2007).

Ginger is used worldwide as a cooking spice, condiment and herbal remedy. It is used extensively in Ayurveda, the traditional medicine of India, to block excessive clothing, reduce cholesterol and fight arthritis (Kemper, 1999). The use of ginger as a feed additive in poultry diet had received attention of poultry nutritionist (Kausar *et al.*, 1999; Al-Homidan, 2005; Rehman *et al.*, 2011). Saeid *et al.* (2010) found that serum glucose, total, cholesterol, LDL-cholesterol and VLDL-cholesterol decreased significantly in broilers fed with 0.4 and 06% aqueous ginger extract, however, HDL-cholesterol concentration increased in these birds. Onu (2010) reported that supplementation of ginger (0.25%) in the basal diet of broiler chicks did not result in any significant difference in terms of total protein, albumin, globulin, urea and creatinine. However, information on the influence of ginger on serum biochemistry of broiler chickens is not consistent. Therefore, this study was designed to evaluate the influence of dietary ginger on serum biochemistry of broiler chickens.

MATERIALS AND METHODS

The study was conducted at the Poultry Unit of the Teaching and Research Farm of the Department of Animal Science, University of Maiduguri, Borno state, Nigeria. Maiduguri is located between latitude 11° 15 and 12 ° North, longitude 30° 05 and 14° East and at an altitude of 345m above sea level (Ugherughe and Ekedolum, 1986).

A total of three hundred (300) broiler chickens at four weeks of age were used for the study. The birds were randomly assigned to five treatment groups with four replications of fifteen (15) birds per replicate.

The experiment lasted for four weeks. Ginger replaced mineral/vitamin premix in the experimental diets (Table 1) as follows; T1 (Control 0% ginger), T2 (20% ginger), T3 (40% Ginger), T4 (60% Ginger) and T5 (80% Ginger). At the end of the four weeks experimental period, one bird was randomly selected from each replicate and blood samples collected for serum biochemical analysis. Blood was collected via the jugular vein using a 23 gauge needle and the samples were analyzed according to the method described by Bush (1991). The serum biochemical indices measured were total protein, albumin, globulin, urea, glucose, cholesterol, sodium, potassium, calcium, bilirubin and creatinine using standard laboratory procedures.

All data collected were subjected to Analysis of Variance (ANOVA) (Steel and Torrie, 1980) in a Completely Randomized Design. Where means differed, Least Significant Difference was used to separate them.

RESULTS AND DISCUSSION

Table 2 shows the result of serum biochemical indices of broiler chickens fed dietary ginger. There were significant ($p < 0.05$) differences in all parameters measured except Alanine Aminotransferase and urea which were similar for all the treatments. Total protein, albumin and globulin were higher in the control compared to the other treatments. This is similar to the observation of Kausar *et al.* (1999). This is contrary to the findings of Rehman *et al.* (2011) who reported that serum protein increased significantly in ginger treated group. The difference between their observation and that of this study may be as a result of the route of administration as they offered their ginger via drinking water while the birds in this experiment were offered in the diet. The means for serum protein however, fall within the normal range (46 – 78g/dl) reported by Latrimer *et al.* (2003). Aspartate Aminotransferase was dose dependent with birds fed the highest level of ginger (T5) having the highest mean (82.75IU) while those in the control had the lowest means (43.25IU). Alkaline Phosphate also followed similar trend as Aminotransferase. Glucose was lowest in T3 but highest in T5. The control was however similar to both groups. Cholesterol was increased by the inclusion of ginger in the diet reaching a peak at T5. This is contrary to the report of Rehman *et al.* (2011) who reported a drop in cholesterol levels when broilers were given ginger in drinking water. Conjugated bilirubin and direct bilirubin were lowest in for birds in T4. All means observed however, fall within the range for healthy chickens reported by Rehman *et al.* (2011).

CONCLUSION

It was concluded that inclusion of ginger up to 0.4% had no adverse effect on serum biochemistry of finisher broiler chickens. Further studies are however required to have a better understanding of the influence of ginger powder on serum biochemistry of finisher broiler chickens.

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Table 1: Ingredient composition of experiment finisher broiler chicken diet containing graded levels of ginger

Ingredient	T1	T2	T3	T4	T5
Maize	58.82	58.82	58.82	58.82	58.82
Wheat offal	10.00	10.00	10.00	10.00	10.00
Groundnut cake	10.00	10.00	10.00	10.00	10.00
Soya Bean Meal	13.00	13.00	13.00	13.00	13.00
Fish Meal	5.00	5.00	5.00	5.00	5.00
Bone Meal	0.68	0.68	0.68	0.68	0.68
Premix	0.50	0.40	0.30	0.20	0.10
Ginger powder	0.00	0.10	0.20	0.30	0.40
Methionine	0.75	0.75	0.75	0.75	0.75
Lysine	0.50	0.50	0.50	0.50	0.50
Salt	0.75	0.75	0.75	0.75	0.75
Total	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
Dry matter (%)	93.70	93.31	92.87	91.46	92.98
Crude protein (%)	21.42	20.19	20.42	21.35	21.68
ME (kcal/kg)	3382.08	3130.48	3203.18	3076.68	3138.64

T1 - (Control 0% ginger), T2 - (20% ginger), T3 - (40% Ginger), T4 - (60% Ginger) and T5 - (80% Ginger); ME – Metabolizable energy

Table 2: Serum Biochemical indices of broiler chickens fed graded levels of ginger

Parameter	T1	T2	T3	T4	T5	SEM
Total protein (g/l)	67.25 ^a	41.25 ^c	43.50 ^c	45.75 ^c	55.75 ^b	2.71*
Albumin (g/l)	42.50 ^a	27.25 ^{cd}	24.25 ^d	30.75 ^{bc}	35.75 ^b	2.19*
Globulin (g/l)	24.75 ^a	14.00 ^b	19.25 ^{ab}	15.00 ^b	20.00 ^{ab}	2.04*
Aspartate Aminotransferase (IU/L)	43.25 ^c	45.75 ^{bc}	46.00 ^{bc}	77.50 ^{ab}	82.75 ^a	10.58*
Alanine Aminotransferase (IU/L)	37.50	47.00	57.50	68.25	73.50	9.06 ^{NS}
Alkaline Phosphate (IU/L)	43.50 ^c	4150 ^c	55.25 ^{ab}	47.25 ^{bc}	62.00 ^a	2.96*
Glucose (mmol/l)	4.75 ^{ab}	4.35 ^{ab}	3.85 ^b	4.93 ^{ab}	5.73 ^a	0.46*
Creatinine (mmol/l)	58.00 ^a	61.50 ^a	58.50 ^a	36.00 ^b	37.00 ^a	5.84*
Cholesterol (mg/dl)	178.75 ^c	187.75 ^b	199.00 ^a	199.00 ^a	205.00 ^a	2.52*
Urea (mmol/l)	7.80	4.35	6.80	5.53	3.65	1.48 ^{NS}
Conjugate Bilirubin (mmol/l)	3.20 ^b	4.13 ^a	3.95 ^{ab}	2.33 ^c	3.53 ^{ab}	0.27*
Direct Bilirubin (mmol/l)	2.13 ^{bc}	2.20 ^{bc}	3.13 ^a	1.50 ^c	2.33 ^b	0.23*

T1 - (Control 0% ginger), T2 - (20% ginger), T3 - (40% Ginger), T4 - (60% Ginger) and T5 - (80% Ginger); NS – non significant; SEM – Standard Error of Mean; ^{a,b,c,....} Means in same row bearing different superscript differ significantly (p<0.05).