# HEAMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS OF JAPANESE QUAIL (*COTURNIX COTURNIX JAPONICA*) FED GRADED LEVELS OF TURMERIC (*CURCUMIN LONGA*) POWDER

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## ABSTRACT
This study was carried out to observe the haematological and biochemical indices of Japanese quails fed graded levels of turmeric powder. A total of 372 (three hundred and seventy-two) two weeks old Japanese quails of mixed sexes (*Coturnix coturnix japonica*). The birds were randomly allocated to four dietary treatments of ninety three (93) birds each, and were replicated three times in a completely randomized design with thirty one (31) birds per replicate. Four experimental diets containing 0, 250g, 500g and 750g turmeric powder were given. Feed and water were provided *ad libitum*. Blood samples were collected at six weeks old of growth phase into two sets of labelled sterile bottles and used for the analysis respectively. The results showed that dietary treatments had significant ($0.05<p$) effects of the packed cell volume, haemoglobin counts, red blood cells, white blood cell, lymphocyte, monocyte and eosinophil. However, it was observed that bids fed 500g turmeric had higher values for haematological parameters. Also, birds fed 500g turmeric powder had significantly higher ($p<0.05$) albumin, globulin, creatinine and urea but lower glucose and cholesterol level. For optimal productivity, 500g inclusion of turmeric powder is therefore recommended.
**Keywords**: Japanese quails, turmeric powder, haematological parameters, biochemical indices, graded levels

## INTRODUCTION
The use of antibiotics growth promoter at sub-therapeutic level (AGPs) has been practiced in the poultry industry since 1946, but recent research has proven that its continuous use can cause bacterial resistance and possible transmission of the antibiotic residues into the food chain (Kemmett. K. 2015). Due to food safety concerns, there has been a recent ban in the use of synthetic antibiotics in livestock by European countries. However, research is now been channeled on the use of medicinal plants as alternatives in animal production, because people are now informed on the dangers of the use of synthetic drugs: its toxicity, high cost and adverse effects in the human body (Adu, *et al*., 2009).).Turmeric is also one of the plants containing curcumin which is the active ingredient that possess anti- bacteria, anti-inflammatory and anti-oxidant properties. (Rachmawati, *et al*., 2015) stated that the curcumin anti-bacteria working mechanism is examined with a transmission electron micrograph (TEM) analysis, which reveals that these particles enter bacteria cell walls by completely damaging the cell walls resulting in cell death. The presence of this curcumin anti- bacteria characteristic is expected to have the same function as an antibiotic characteristic in inhibiting pathogenic bacteria in the small intestine, which will then result in better quail growth. It is also found to affect lipid metabolism and inhibit lipid peroxidation. Curcumin regulates chemical messengers that cause inflammation in the body, suggesting that curcumin may be particularly effective in treating autoimmune disorders such as rheumatoid arthritis.According to Togun and Oseni (2005), haematological indices: red blood cells, white blood cells, packed cell volume and haemoglobin have been found useful for disease prognosis and for therapeutic and feed stress monitoring. The use of biochemical indices as a pointer to conditions that may not be readily noticed by performance indices cannot be over emphasized. Plane of nutrition is known to affect these values (Agunbiade, *et al*.,

2007). The objective of this study was to determine the optimal level of inclusion of turmeric powder through haematological and biochemical indices.

## MATERIALS AND METHODS

### Experimental Site

The experiment was conducted at the Poultry Unit, Kabba College of Agriculture, Division of Agricultural Colleges, Ahmadu Bello University. Kabba is located in the Southern Guinea Savannah Ecological Zone of Nigeria on the Latitude 7°53' N, Longitude 6 °02 E with an average rainfall of about and 1500mm per annum with an average temperature ranges from 18°C -32°C .

### Source and Processing of Turmeric rhizome

Turmeric rhizome was purchased from a local market in Kabba, Kogi State. The turmeric rhizome were sliced, sundried for 7 days and milled before incorporated into the experimental diets.

### Source of Experimental Birds

A total of 372 (three hundred and seventy-two) two weeks old Japanese quails of mixed sexes (*Coturnix coturnix japonica*) were obtained from National Veterinary Research Institute, (NVRI) Ikire, Osun State.

### Experimental Diets

Four experimental diets were formulated for the experiment such that Treatment 1 had 0% inclusion of experimental diet (Control) Treatment 2 – 4 had 0.25%, 0.5% and 0.75% inclusion of turmeric powder respectively.

**Table 1: Composition of Experimental Diets for Japanese Quails Containing Different Inclusion levels of Turmeric powder (2- 6 weeks)**

| Ingredients | 0g | 250g | 500g | 750g |
|---|---|---|---|---|
| Maize | 51.70 | 51.45 | 51.20 | 50.95 |
| SBC | 30.00 | 30.00 | 30.00 | 30.00 |
| GNC | 15.00 | 15.00 | 15.00 | 15.00 |
| Bone meal | 0.70 | 0.70 | 0.70 | 0.70 |
| Limestone | 2.00 | 2.00 | 2.00 | 2.00 |
| Tumeric powder | 0.00 | 0.25 | 0.50 | 0.75 |
| Common salt | 0.15 | 0.15 | 0.15 | 0.15 |
| Lysine | 0.10 | 0.10 | 0.10 | 0.10 |
| Methionine | 0.10 | 0.10 | 0.10 | 0.10 |
| Vit. Premix | 0.25 | 0.25 | 0.25 | 0.25 |
| Total (%) | 100 | 100 | 100 | 100 |
| Calculated Analyses | | | | |
| ME (Kcal/kg) | 2847 | 2838 | 2829 | 2821 |
| CP (%) | 25.00 | 25.00 | 25.00 | 25.00 |
| MET+ CYS (%) | 0.83 | 0.82 | 0.82 | 0.82 |

SBC= Soya bean cake, GNC = Groundnut cake, ME = Metabolisable Energy, MET+CYS: Methionine +cycsteine (%) CP=Crude Protein, CF= Crude Fibre, EE = Ether Extract, Avail P = Available Phosphorus in percentage, Ca: P ratio = Calcium: Phosphorus ratio

### Haematological and Biochemical analysis

At the 6th week of the experiment, blood samples were collected from the brachial vein of ten randomly selected birds per group. The blood samples were analyzed for some hematological and serum biochemical parameters; blood samples for heamatology were collected into bottles containing Ethylene Diamine Tetra Acetate (EDTA) and the other set of bottles without anti-coagulant were used to determine the biochemical indices such asAlbumin, Globulin, Glucose, Cholesterol, Creatinine, Urea and Uric acid, according to Schamls *et al*. (1986). The heamatological parameters such as packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC), haemoglobin concentration (Hb), absolute counts of lymphocytes, monocytes and eosinophil were analysed.

**Statistical Analysis**

All data obtained from the two experiments were subjected to analysis of variance (ANOVA) using the General Linear Model Procedures (GLM) of the Statistical Analysis Software package. Significant difference between treatments means were separated using Duncan Multiple Range Test (SAS, 2002).

**RESULTS AND DISCUSSION**

The dietary composition of the experimental diet is shown in Table 1. Haematological indices of 6-week old Japanese quails fed graded levels of turmeric powder are presented in Table 2 while biochemical indices are shown in Table 3. Birds fed 500g dietary turmeric had the highest values for packed cell volume, haemoglobin count, red blood cell, white blood cell and lymphocyte compared to the control diet. The values of RBC obtained for quails fed 500g turmeric diet was significantly higher than that obtained for quails on diets 0g, 250g and 750g ($P < 0.05$). This showed that the birds fed 500g turmeric had better RBC and haemoglobin (Hb) and can be attributed to the antioxidant capacity of turmeric and its digestive enhancing effect that may improve iron absorption of the quails. This is buttressing the fact that turmeric powder has no detrimental effect on haematological parameters of the birds but exerts some modulatory effects on lipid metabolism in the quail as rightly reported by (Sadeghi *et al* 2012). The difference in albumin, globumin, creatinine and urea level were significantly higher ($P<0.05$) for birds fed 500g of turmeric compared to other treatments except for uric acid (Attia *et al*.2017) . However, the levels of these observed parameters fell within the recommended range for healthy quails (Sadeghi *et al*. 2012). Birds fed 500g showed lower cholesterol level as compared to the control group. This report is similar to the findings of Kermanshahi and Riasi, (2006) who reported that turmeric powder could be useful in the management of arteriosclerosis. Generally, it was observed that birds fed turmeric powder as an osmoregulatory agent for relief the adverse effect of heat stress and reduces the breakdown of body lipids in heat stress condition and lowers blood glucose and cholesterol, (Borges *et al.*, 2007).

**Table 2: Heamatological Parameters of Quails Fed Graded Dietary Levels of Turmeric Powder (2-6weeks)**

| PARAMETERS | INCLUSION LEVELS OF TURMERIC POWDER | | | | |
|---|---|---|---|---|---|
| | 0g | 250g | 500g | 750g | P Value |
| Packed Cell Volume (%) | $40.03^{d}$ | $42.81^{c}$ | $46.17^{a}$ | $44.07^{b}$ | 0.28 |
| Heamoglobin(g/dl) | $13.16^{d}$ | $15.09^{b}$ | $15.47^{a}$ | $14.20^{c}$ | 0.12 |
| Red Blood Cell ($10^6mm^3$) | $3.85^{c}$ | $4.71^{b}$ | $5.38^{a}$ | $4.79^{b}$ | 0.01 |
| White Blood Cell($10^6mm^3$) | $6.64^{c}$ | $6.91^{b}$ | $7.12^{a}$ | $6.63^{c}$ | 0.02 |
| Lymphocyte (%) | $26.67^{d}$ | $35.51^{ab}$ | $35.68^{a}$ | $34.17^{c}$ | 0.00 |
| Monocyte(%) | $0.33^{c}$ | $0.67^{b}$ | $1.00^{ab}$ | $1.33^{a}$ | 0.28 |
| Eosinophil (%) | $1.00^{b}$ | $1.00^{b}$ | $1.33^{ab}$ | $1.67^{a}$ | 0.23 |

a,b-means in the same row with different superscripts are significant ($P<0.05$).

**Table 3: Biochemical Parameters of Quails Fed Graded Dietary Levels Of Turmeric Powder (2 - 6 weeks)**

| PARAMETERS | INCLUSION LEVELS OF TURMERIC POWDER | | | | |
|---|---|---|---|---|---|
| | 0g | 250g | 500g | 750g | P Value |
| Albumin (g/dl) | $2.77^{c}$ | $2.85^{c}$ | $4.87^{a}$ | $3.08^{b}$ | 0.004 |
| Globumin (g/dl) | $2.30^{c}$ | $2.79^{b}$ | $3.10^{a}$ | $2.85^{b}$ | 0.008 |
| Glucose (g/mol) | $6.73^{a}$ | $5.36^{c}$ | $5.13^{d}$ | $5.74^{b}$ | 0.095 |
| Cholesterol (µ/mol) | $216.40^{a}$ | $214.86^{ab}$ | $168.52^{c}$ | $188.89^{b}$ | 0.185 |
| Creatinine (g/mol) | $42.81^{d}$ | $45.53^{c}$ | $57.53^{a}$ | $51.48^{b}$ | 0.151 |
| Urea (g/dl) | $1.87^{b}$ | $1.63^{c}$ | $2.05^{a}$ | $2.03^{a}$ | 0.008 |
| Uric acid (µ/mol) | $5.15^{d}$ | $7.52^{a}$ | $6.47^{c}$ | $6.66^{b}$ | 0.011 |

a,b- means with varying superscripts differ significantly, $P <0.05$).

## CONCLUSION AND APPLICATION

The addition of turmeric powder had significant effects on the blood parameters of quails. It is recommended that turmeric powder could be added up to 500g without any detrimental effect on the bird's health.

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