

## Biochemical evaluation of *Delonix regia* (Flame of the forest) seed as protein source in broiler chicken diet

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In Nigeria, feed deficiencies in quality and quantity have constrained livestock production. This is as a result of some basic feedstuffs used for animal feed also being in high demand by man as food source. *Delonix regia* (flame of the forest) is a high yielding tropical legume identified as a plant protein source that may assist in meeting feed source requirements. The proximate composition reveals 45.2% crude protein, 39.5% carbohydrates and 44.1% ether extract with the most abundant fatty acid being linoleic acid (Bake *et al.*, 2013). We predict that there will be an acceptable level of tolerance by broiler chickens exposed to the test ingredient.

*Delonix regia* seed meal (DSM) was analysed using Gas Chromatography Mass Spectroscopy (GC-MS); proximate composition, anti-nutritional factors and minerals were evaluated using standard analytical techniques. Biological evaluation was carried out on two hundred and twenty-five Abor acre day-old broiler chickens (reared for 8 weeks) assigned (45 birds per treatment) to the diets at different replacement levels (0, 25, 50, 75 and 100%) in a Completely Randomized Design. Data were analysed according to experimental design and significant means separated using Duncan's multiple range test.

Average total feed intake (ATFI) for the birds increased ( $P < 0.05$ ; Table 1) significantly from 50% replacement level of DSM (*Delonix* seed meal). The increase in ATFI confirms the fact that the birds tolerated high levels of DSM. At 50% replacement level birds showed best performance ( $P < 0.05$ ) for average final live weight, average total body weight gain and average growth rate. Haematological indices (Table 2) values fell within the ranges given by Mitruka and Rawnsley (1977). This implies nutritional adequacy and safety of DSM by the birds with no negative implications in haemopoiesis. Significant ( $P < 0.05$ ) treatment effects were observed for mean corpuscular haemoglobin (MCH), neutrophils and lymphocytes. Birds fed 0, 25, 50, 75 and 100 % replacement levels of DSM recorded packed cell volume (PCV) of 30.64, 30.15, 28.22, 28.70 and 28.88%, respectively which were statistically similar. Packed cell volume results in this study indicated that there was no significant ( $P > 0.05$ ) increase in red cell mass neither a fall in plasma volume. The values were appropriate.

**Table 1. Growth performance characteristics of broiler chickens fed replacement levels of soybean meal for *Delonix regia* seed meal (finisher phase: 4 – 8 weeks)**

Parameters	Replacement levels					SEM
	0	25	50	75	100	
Av. Initial wt. (g)	885.50	880.05	880.60	885.00	885.50	2.47
Av. Final body wt. (g)	2205.00 <sup>c</sup>	2267.78 <sup>b</sup>	2394.44 <sup>a</sup>	2052.22 <sup>d</sup>	1865.56 <sup>e</sup>	182.69
Av. total body wt. gain (g)	1319.50 <sup>c</sup>	1387.73 <sup>b</sup>	1513.84 <sup>a</sup>	1167.22 <sup>d</sup>	980.06 <sup>e</sup>	184.57
Av. Growth rate (g/d)	47.13 <sup>c</sup>	49.56 <sup>b</sup>	54.07 <sup>a</sup>	41.69 <sup>d</sup>	35.00 <sup>e</sup>	6.59
Av. Total feed intake (g/d)	89.54 <sup>c</sup>	96.67 <sup>b</sup>	106.12 <sup>a</sup>	100.80 <sup>ab</sup>	102.67 <sup>ab</sup>	6.70
FCR	1.90 <sup>c</sup>	1.95 <sup>c</sup>	1.96 <sup>c</sup>	2.42 <sup>b</sup>	2.93 <sup>a</sup>	0.45

<sup>a,b,c,d,e</sup> means with different superscripts along the same row differ significantly ( $P < 0.05$ ); SEM: standard error mean

**Table 2. Effect of replacement levels of *Delonix regia* seed meal on haematological indices of broiler birds**

Parameters	Replacement levels					SEM	Ref. ranges
	0	25	50	75	100		
PCV (%)	30.64	30.15	28.22	28.70	28.88	0.92	24.9-45.2
RBC ( $\times 10^6/\text{mm}^2$ )	2.65	2.44	2.67	2.19	2.75	0.20	1.58-4.10
Hb (g/dl)	9.65	9.54	9.27	8.22	9.09	0.50	7.40-13.10
WBC ( $\times 10^3/\text{mm}^3$ )	13.87	13.59	13.39	12.03	13.07	0.64	9.20-31.0
MCV ( $\mu^3$ )	125.52 <sup>b</sup>	99.33 <sup>d</sup>	110.73 <sup>c</sup>	128.14 <sup>a</sup>	102.01 <sup>d</sup>	11.77	100-129
MCH ( $\mu\text{g}$ )	38.70 <sup>a</sup>	33.21 <sup>bc</sup>	35.52 <sup>b</sup>	38.38 <sup>a</sup>	32.78 <sup>c</sup>	2.49	25.4-129
MCHC (%)	32.42	33.53	32.62	32.20	32.76	0.49	25.3-33.9
Neutrophils (%)	26.50 <sup>b</sup>	29.50 <sup>a</sup>	26.50 <sup>b</sup>	24.00 <sup>c</sup>	26.00 <sup>b</sup>	1.76	15.6-43.9
Lymphocytes (%)	74.50 <sup>b</sup>	69.50 <sup>c</sup>	71.00 <sup>c</sup>	76.00 <sup>a</sup>	74.00 <sup>b</sup>	2.39	43.9-81.2

<sup>a,b,c,d</sup> Means with different superscripts along the same row are significantly different ( $P < 0.05$ ); SEM: standard error of mean; PCV-Packed cell volume; RBC-Red blood cell counts; Hb –Haemoglobin concentration; WBC – White blood cell counts; MCV – Mean corpuscular volume; MCH – Mean corpuscular haemoglobin; MCHC – Mean corpuscular haemoglobin concentration; Reference ranges from Mitruka and Rawnsley (1977).

## References

- Bake GG, Adejumo TM, and Sadiku SO (2013) *Continental Journal of Agricultural Science*. 7, 1-10.  
 Mitruka BM. and Rawnsley HM (1977) Clinical Biochemical and Haematological reference values in normal experimental animals, Masson publishing New York.