

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****EFFECTS OF RAW PIGEON PEA (*Cajanuscajan*) SEED MEAL DIETS ON THE
HAEMATOLOGICAL INDICES OF BROILER STARTER CHICKS****¹Odukwu, C. N., ²Amaduruonye, W. and ¹Amaefule, K. U.**¹Dept. of Animal Nutrition and Forage Science; ²Dept. of Animal Breeding and Physiology,
College of Animal Science and Animal Production, Michael Okpara University of Agriculture,
Umudike, Abia State, Nigeria

Corresponding Author's Email: odukwukate@gmail.com

ABSTRACT

*The study was conducted to evaluate the effect of raw Pigeon Pea (*Cajanuscajan*) seed meal (PSM) diet on the haematological indices of broilers chicks. A total of ninety unsexed day old broilers chicks were assigned to a two inclusion levels of raw PSM (30 and 40%) in the diets and four levels of amino acid supplementation (lysine, methionine, Lysine + methionine and no supplementation). All in a 2x4 factorial in a completely randomized design (CRD). Each treatment had three replications. There were 30 birds per treatment and 10 birds per replicate. Data was recorded for haemoglobin content (HBC), packed cell volume (PCV), red blood cell (RBC) and white blood cell (WBC). The organ characteristics measured were heart, liver, empty gizzard, small intestine, large intestine, caeca, proventriculum and spleen. Results showed that raw PSM diets included at 30 or 40% of the diets of starter broilers significantly ($P < 0.05$) reduced the WBC (6.61 or 6.36 g/l) of broilers compared to WBC (8.13g/l) of broilers fed control diet. Supplementation of the PSM diets with lysine and or methionine significantly ($P < 0.050$) affected all haematological indices.*

INTRODUCTION

The dearth of animal protein supply in Nigeria has led to mal-nutrition, mental retardation, infant mortality and stunted growth of most Nigerians. The animal protein deficit results from the scarcity and high cost of feed which the use of conventional feedstuffs in broiler and other poultry diets have presented. There is, therefore the need to understand the effect of raw Pigeon Pea seed Meal (PSM) diets and that of the diets supplemented with lysine and or methionine on the haematological parameters of broilers blood. Pigeon pea (*Cajanuscajan*) is an important legume with very low human food preference because of the availability of other beans that are easier to cook. According to Amaefule and Obioha (2001), it has been found a satisfactory protein ingredients up to 30% of the whole diet for broilers. This was also affirmed by available literature on Pigeon pea seeds to poultry which suggests that it is a satisfactory protein ingredient when incorporated up to 30% of the ration with growth depression resulting at 40% level. As with other legumes, the seeds contain anti-nutritional factors like trypsin inhibitors, which tend to limit their use in poultry feeding especially the raw seeds (Ologhobo, 1992; D'Mello, 1992).

MATERIALS AND METHODS

Experimental Site : The experiment was conducted at the poultry unit of the Teaching and Research farm of the Michael Okpara University of Agriculture, Umudike Abia State. Umudike is within latitude 5°29' North and longitude 7°32' East in the rain forest zone of Nigeria. The climate of the region is characterized by a mean daily temperature range of 27-35°C, all through the year. The average rainfall is about 2000mm per annum with double maximum pattern.

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS****THEME
SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES**

Procedure and Processing of Feed Ingredient : Pigeon pea seed meal in this study were purchased from AhiaOhuru market in Aba of Abia State. The seeds were milled to pass through a 2mm sieve at National Root Crop research Institute (NRCRI) Umudike feed mill.

Experimental Birds and Design : A total of 90 unsexed broiler chicks were used. The experiment was laid out in 3 experimental diets with 30 birds per treatment. Each treatment was replicated 3 times with 10 birds each.. The experimental design was a completely randomized design with model $y_{ij} = U + T_i + e_{ij}$.

Where

U = overall mean

T_i = is the treatment effect

e_{ij} = is the error effect

Management of Experimental Birds: The pens and all the equipments for keeping of the birds were cleaned, washed and disinfected 2 weeks before the arrival of the birds. Black polythene sheets and tarpouline were used to cover the sides of the pens to conserve heat and create conducive environment for the brooding. The floor of the pens was spread with wood shavings, kerosene stoves, lanterns and electric bulbs were provided to serve as heat and illumination sources for 24 hours before the arrival of the birds and throughout the brooding period. The chicks were mass brooded for one week, during this time, thereafter randomly selected and distributed into the various treatment and replicates. The chicks were reared for 8 weeks on deep litter and were fed and given water ad libitum. Health management practices include administration of Newcastle disease vaccine (1/0) on the 2nd day, infectious disease vaccine (Gomboro) at 10th week and 21st days. Newcastle disease vaccine (Lasota) at the 4th week, coccidiostat (Pluricocin and Amprol 200^R) at 3rd and 5th weeks, antibiotics, vitamin supplements and anti-stress medication were also given. Three diets were formulated with raw Pigeon pea seed to replace part of soybean meal and maize in the diets of starter broilers chicks.

Data Collection: Data on the initial and final life weight of the birds were obtained at the beginning and at the end respectively of each broiler growth phase. Blood samples were collected through the cardiac puncture at the end of the starter phase. The haematological measurement were determined. The liver, spleen, pancreas, gizzard, proventriculum, small intestine, large intestine and ceaca were weighed.

Chemical and Data Analysis: The data collected were subjected to analysis of variance (ANOVA) according to the procedures of Snedecor and Cochran (1978).

RESULTS AND DISCUSSION

Haematological Indices: The haematological indices obtained from broiler chicks fed graded levels of raw pigeon pea (*Cajanuscajan*) seed meal supplemented with lysine or methionine is shown on Table 2 below. However, there was no significant differences ($P > 0.05$) among the broilers fed the treatment diets. The low level of haemoglobin content (HB) in all the broilers fed the experimental diets suggests poor protein quality (Abu *et al.*, 1999) hence poor transportation of oxygen from the respiratory organs to the peripheral tissues (Bobert *et al.*, 2000). The inclusion level of the raw pigeon pea seed meal in the diets of the broilers significantly ($P < 0.05$) affected red blood cell (RBC), white blood cell (WBC) and haemoglobin content (HB) while packed cell volume (PVC) were not significant ($P > 0.05$) influenced and also falls under the normal range of chicken (25 – 45%). The results also showed that 30 and 40% of pigeon pea inclusion levels caused a decrease in PVC, HB, WBC and RBC at the starter phase

**NSAP****47th Annual
Conference
(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****Table 1: Percentage Composition of the Experimental Diets of Raw Pigeon Pea Seed Meal Supplemented with Lysine and or Methionine Fed to Starter Broilers Chicks**

Feed stuff	Control	R30	R40
Pigeon pea seed	0	30	40
White maize	45.85	27.00	20.70
Local fish meal	6.00	6.00	6.00
Soybean meal	26.65	15.30	11.80
Maize offal	18.00	18.00	18.00
Bone meal	3.00	3.00	3.00
Nacl	0.25	0.25	0.25
Vitamin premix*	0.25	0.25	0.25
Total (%)	100	100	100
Crude protein (%)	21.92	21.92	21.92
ME (Kcal/kg)	2952.73	2912.50	2898.95
ME: PC ratio	134.70	132.87	132.25

Premix supplied*Table 2: Haematological Indices of Broilers Fed Graded Levels of Pigeon Pea (*Cajanuscajan*) Seed Meal Diet at Starter Phase**

Parameters	Control	30%	40%	SEM
Haemoglobin content (%)	57.20	57.20	53.15	0.38
Packet cell volume (%)	25.00	24.42	23.67	0.39
Red blood cell (g/l)	2.60	1.98	1.83	0.56
White blood cell (g/l)	8.13 ^a	6.61 ^b	6.36 ^b	0.76

a, b, c, d: means in the same row followed by different superscripts are significantly ($P < 0.05$) different. SEM = Standard Error of Means.

Table 3: Haematological Indices of Broilers Fed Graded Level of Pigeon Pea (*Cajanuscajan*) Seed Meal Diet Supplemented with Amino Acid at Starter Phase.

Parameters	Control	Lysn.	Mmeth.	Lys + Meth.	NOAA	SEM
Haemoglobin content (%)	57.20 ^b	51.83 ^c	54.30 ^c	62.20	52.47 ^d	0.54
Packed cell volume (%)	25.00 ^b	23.33 ^b	23.17 ^b	26.00 ^a	23.67 ^b	0.57
Red blood cell (g/l)	2.60 ^a	1.73 ^c	1.87 ^b	1.83 ^b	2.18 ^b	0.81
White blood cell (g/l)	8.13 ^a	6.45 ^c	6.28 ^{ad}	6.08 ^b	7.12 ^b	0.11

a, b, c, d, e means in the same row by different superscripts are significantly ($P > 0.05$) different, Lys, Meth, lys + meth = lysine, methionine and Lysine + methionine, respectively. SEM = Standard Error of Means. NO AA = No Amino Acid.

CONCLUSION

Pigeon pea seed meal diets included either at 30 or 40% of the diets of starter broilers compared to WBC of broilers fed control diet. Also supplementation of the raw pigeon pea seed meal (PSM) diets with lysine and or methionine significantly ($P < 0.05$) affected all haematological indices. The interaction of the raw PSM in the amino acid supplemented did not produce significant effects with the starter broilers. The conclusion is that raw pigeon pea seed meal (PSM) could be included up to 40% in starter broiler diets. The diets should however be supplemented with lysine and methionine



Table 4: Comparative haematological Indices of starter Broilers fed two levels of raw Pigeon pea (*Cajanuscajan*) seed meal diets supplemented with lysine and or methionine.

Parameters	30%					40%				
	Control	Lysn.	Meth.	Lys + Meth.	NAA	Lys	Met	Lys + Meth	NAA	SEM
HBC (%)	57.20	50.27	58.53	63.13	57.07	54.40	50.70	61.27	49.87	0.76
PCV (%)	25.00	21.67	24.00	26.67	25.33	25.00	22.33	25.33	22.00	0.79
RBC (g/l)	2.60	1.67	1.90	1.53	2.23	1.80	1.83	2.13	2.13	0.11
WBC (g/l)	8.13	6.73	6.73	5.90	7.07	6.17	5.83	6.72	7.17	0.15

Parameter, Cont, Lys, Meth, Lys + Meth and NAA = parameter, Control, Lysine, methionine, lysine + Methionine and No Amino Acid respectively.

SEM = Standard Error of Menu, HBC, PCV, RBC and WBC = Haemoglobin content, Packed cell Volume, red blood cell and white blood cell respectively.

REFERENCES

- Abu, O. A., Rabo, J. S., Onifade, A. A. and Danny, C.B. (1999). Blood Composition and Histological Changes in the Gastro-Intestinal tract of rabbit fecuntreated rice husk based diets, NSAP Proc. Horin. Pp. 144 – 147.
- Amaefule, K.U. and Obioha, F.C. (1998). Substitution of Pigeon pea (*Cajanuscajan*) for groundnut cake (GNC) and maize in broiler finisher ration: *Nig. J. Anim. Prof.* 25(1): 9 – 12.
- Amaefule, K.U. and Obioha, F.C. (2001). Performance and nutrient utilization of Broiler Starters fed diets containing raw, boiled or dehulled pigeon pea seed (*Cajanuscajan*). *Nig. J. Anim. Prod.*, 28:31 – 39.
- Atteh, J.O. (2000). Principles of Livestock Feed Manufacturing Adiek printers. Kwara State Nigeria, pp. 13 – 17.
- D'mello, J.P.F. (1992). Chemical Constrains to the use of tropical legumes in Animal Nutrition. *Ani. Feed Sci. Tech.*, 38(2/3): 237 – 261.
- FAO (1982). Les adiment du betail sons les tropiques. Donneessommandes et valeurs nutritive, Rome.
- Grimaud, P. (1988). The pigeon pea (*Cajanuscajan*): A possible alternative for Traditional pig and poultry farming in New California. Reoue-de Elevage-et-dc-Medicine-veterinaria de Nouvelle, Coiledonie, M: 29 – 36.
- Heap, R. B. (1998). Animal and the human food chain. In: J.C. Water Low, D.G. Armstring, L. Fowden and R. Rilley (Eds) Feeding a wood population of more than eight billion people. Oxford University Press UK.
- Martin, A.M. (2001). The future of the world food system. Outlook on Agriculture. 30:11 – 19.
- Ologhbo, A.D. (1992). The Nutritive Value of Some tropical (West African) legumes for poultry. *J. of Applied Ani. Research*; 2(2): 93 – 104.
- Olomou, J. M. (1995). Monogastric Animal Nutrition Principles and practice. Jachom Pub. Benin. Nigeria.
- Oluyemi, J.A. and Robert, F.A. (2000). Poultry production in Warm Wet Climat 2nd Ed Macmillan press Ltd., London.
- Roberts, K. M., Daryl, K. G., Peter, A. M. and Victor, W. R. (2000). Mayer's Biochemistry. 25th edition, Mc. Grawhill, New York. 25:763 – 765.
- Snedecor G. W. and Cochran, W. G. (1978). Statistical methods. The IOWA State University Press. Ames Lowan 6th Ed.
- Springhall, J., Akintola, J.O. and Whiteman, P.C. (1974). Evaluation of Pigeon pea seed (*Cajanuscajan*) meal in chicken rations proceedings of Austr. Poult. Sci. Convention, Sydney, Australia.