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PROXIMATE AND AMINO ACID COMPOSITIONS OF SELECTED COMMERCIAL BROILER STARTER FEEDS IN IBADAN, NIGERIA

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Abstract

Seven different commercial broiler starter feeds were sourced from the market in Ibadan, Oyo state. The feeds were labelled A, B, C, D, E, F and G which constituted treatments 1, 2, 3, 4, 5, 6 and 7, respectively. Proximate and amino acids compositions were determined following standard procedures. Proximate values varied significantly ($p<0.05$). The proximate values were also at variance with the standard nutrient recommendations for the broiler starter chickens and the values on each feed sample labels. Methionine in treatments 3 (2.18%) and 6 (2.11%) were significantly higher ($p<0.05$) than 0.50 % recommended value of NRC 1994 while other values were below , except for 1 (0.66%) . Different nutritional values obtained from the different feed brands implied that the commercial feed brands do not conform to any standard for the broiler feeds in Nigeria as well as the nutrient requirements of broiler starter chickens. This may adversely affect poultry producers as most producers rely on proprietary feeds. Therefore, adequate cautions must be exercised in choice of feed for broilers by poultry farmers.

Keywords: Commercial feeds; Poultry; Proximate and amino acid composition, poultry producers.

Introduction

Maximum production performance of birds is the main objective of poultry nutrition, and this can be obtained by providing diets formulated to meet specific nutrient levels needed for optimum performance. The criteria of importance in poultry production are feed conversion ratio, health of the birds, growth rate and body conformation which are determined by the energy, amino acid and protein contents of the diets (Uchegbu *et al.,* 2009). If the amino acid supplies are not in the proper ratio in relation to the needs of the target birds, then, excess of the least limiting amino acid will be deaminated and used as a source of energy rather than towards body protein synthesis. This breakdown of amino acids will also result in higher nitrogenous excretions (Todd, 2008). Earlier documentations on proprietary feeds were on proximate compositions and cholesterol profiles of table eggs from hens fed different proprietary feeds in Ibadan, Nigeria (Ogunwole *et al*., 2018). Okosun *et al* (2018) reported the effects of different proprietary poultry feeds on performance, carcass characteristics and serum protein metabolites in broilers. The present study was aimed at determining the proximate and amino acid compositions of the different commercial broiler feeds in Nigeria with an aim to providing nutritive information to enhance its utilization in poultry nutrition.

Materials and methods

Experimental site

The experiment was carried out at Animal Nutrition Laboratory, Department of Animal Science, Faculty of Agriculture. University of Ibadan, Nigeria. The study area lies between longitude 7°23.05 north and 3°54.59 of the Greenwich Meridian east at an altitude 200m above sea level. Average temperature and relative humidity of the location is between 23-42 °C and 60-80%, respectively (SMUI, 2022).

Experimental diets

Seven different commercial broiler starter and finisher feeds were sourced from the market in Oyo state. The feed brands were labelled A, B, C, D, E, F, G which represented treatments 1, 2, 3, 4, 5, 6 and 7, respectively.

Proximate and amino acid determination

Samples were analysed in triplicates for proximate composition (AOAC, 2000) and amino acids using spectrophotometric determination of amino acids using improved ninhydrin chemical method (Schroeder et al., 1990). Metabolizable energies (kcal/kg) of the different feed samples were estimated according to the procedure of Pauzenga (1985).

$$ME = 37\ x\ \%CP + 81\ x\ \%EE + 35.5\ x\ \%\ NFE$$

Where CP = crude protein, EE = ether extract, NFE = nitrogen free extract

Statistical analysis

Data were subjected to descriptive statistics and analysis of variance using SPSS package (2011) and the means were separated using Duncan multiple range test of the same software at $\alpha_{0.05}$

Results and Discussion

The metabolisable energy and proximate composition of the seven commercial broiler starter feed brands in Nigeria are presented in Table 1. There were significant differences ($P<0.05$) in the proximate composition of the different commercial feeds. The percentage crude protein (%CP) observed in brand B (20.08), C (21.60), D (20.58), F (22.12) were in line with the recommended value of 20.00 by Nigeria industrial standard (NIS, 2018) while others were lower. Crude fibre content ranged from 6.13% (brand A) to 12.67% (brand C) and these were extremely above 5% recommended by NIS (2018). Although crude fibre is very beneficial during digestion, (Montagne *et al.,*2003), observed reduced performance in birds fed diets with increased crude fibre levels of up to 9% was observed by (Sklan *et al.,*2003).

Table 1: Energy and Proximate Composition of Seven Commercial broiler starter Feed Brands in Nigeria

BRAND	DM	ME	ASH	CP	CF	EE	NFE
A	10.32^{ab}	3269.17^{a}	6.03^{c}	19.36^{c}	6.13^{e}	2.63^{d}	65.84^{b}
B	10.02^{ab}	2993.99^{bc}	5.80^{c}	20.08^{bc}	12.97^{a}	1.73^{e}	59.42^{d}
C	12.00^{a}	2897.28^{c}	8.09^{b}	21.60^{a}	12.67^{a}	3.83^{b}	54.01^{f}
D	7.59^{b}	2995.01^{bc}	8.90^{a}	20.58^{b}	11.73^{b}	3.17^{c}	55.62^{e}

E	10.37^{ab}	3154.78^{ab}	5.97^{c}	17.62^{d}	7.73^{c}	1.40^{f}	67.28^{a}
F	11.33^{a}	3249.83^{a}	6.03^{c}	22.12^{a}	6.40^{de}	2.33^{d}	63.12^{c}
G	12.95^{ab}	3332.46^{a}	6.27^{c}	17.93^{d}	6.96^{d}	4.87^{a}	63.97^{c}
SEM±	0.47	21.81	0.09	0.09	0.09	0.04	0.16

Where= $^{abc...}$*means on the same column with different superscript are significantly different (p<0.05)* S.E.M= *Standard error of means* DM= *dry matter*, ME= *metabolisable energy*, CP= *crude protein*, CF= *crude fibre*, EE= *ether extract*; NFE= *nitrogen free extract*

Table 2: Amino acid composition of seven commercial broiler starter feed brands in Nigeria

Brand/ amino acid	ARG	ALA	VAL	GLU A	GLY	HIST	ISO	LEU	LYS	MET	PHEN	THRE	TRYP
A	3.74^{c}	0.17^{c}	0.045^{a}	1.14^{d}	3.27^{c}	0.29^{c}	0.13^{cd}	0.18^{c}	3.56^{c}	0.66^{b}	0.67^{b}	0.10^{de}	0.04^{e}
B	2.54^{e}	0.06^{c}	0.040^{b}	2.72^{a}	1.77^{e}	0.24^{c}	0.03^{d}	0.07^{c}	2.52^{d}	0.20^{cd}	0.23^{c}	0.04^{ef}	0.03^{e}
C	6.53^{a}	3.65^{a}	0.024^{cd}	2.38^{a}	4.29^{a}	4.81^{b}	3.85^{a}	2.53^{b}	6.39^{a}	2.18^{a}	2.51^{a}	1.36^{b}	2.37^{b}
D	0.24^{f}	0.08^{c}	0.018^{e}	0.13^{f}	0.13^{f}	0.25^{c}	0.25^{c}	0.13^{c}	0.35^{f}	0.15^{de}	0.12^{c}	0.13^{d}	0.15^{cd}
E	0.15^{f}	0.07^{c}	0.026^{c}	0.31^{e}	0.11^{f}	0.26^{c}	0.26^{c}	0.09^{c}	0.26^{f}	0.08^{e}	0.18^{c}	0.25^{c}	0.22^{c}
F	5.43^{b}	1.89^{b}	0.00^{f}	2.34^{b}	2.86^{d}	6.02^{a}	0.78^{b}	3.01^{a}	6.24^{b}	2.11^{a}	2.53^{a}	1.52^{a}	4.57^{a}
G	3.32^{d}	0.05^{c}	0.02^{d}	1.40^{c}	3.46^{b}	0.31^{c}	0.04^{d}	0.03^{c}	2.90^{d}	0.29^{c}	0.26^{c}	0.03^{f}	0.06^{de}
S.E.M	0.02	0.03	<0.001	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.01

Where= $^{abc...}$*means on the same column with different superscript are significantly different (p<0.05)* S.E.M= *standard error of means;* ARG= *Arginine*; ALA= *Alanine*; VAL= *Valine*; GLU A *Glutamic acid*; GLY= *Glycine*; HIST= *Histidine;* ISO= *Isoleucine*; LEU= *Leucine*; LYS= *Lysine;* METH= *Methionine;* PHEN= *Phenylalanine;* THRE= *Threonine*; TRYP= *Tryptophan;* A-G= *feed brands*

The amino acid compositions of the seven different commercial broiler starter feed brands in Nigeria is presented in Table 2. There were significant differences ($p<0.05$) in the amino acids' composition across the determined feed brands. Amino acids are the functional units of protein. The high values obtained for

methionine in C and F for the starter feed samples were above the recommended value of 0.50 % (NRC, 1994) while other indices were conversely below the recommended value. According to Kingori *et al* (2003), Methionine plays a critical role in vital functions of the body such as protein synthesis, cell division regulation, methyl donor and reduction of reactive oxygen species. Methionine deficiency will impact negatively on animal such as growth inhibition, induction of metabolic disorder and reduction in disease defensive potential. On the other hand, feeding excess dietary methionine has been reported to impair body weight gain (Wang *et al*., 2004). Values observed for lysine were all different from the recommended level of 1.10 % (NRC 1994**).** Cengiz *et al* (2008) observed that excess lysine in broiler diet causes severe reduction in body weight gain. Also, increasing lysine level in the diet without considering other amino acids may also limit performance if other essential amino acids are not in the right proportion.

Conclusion

The commercial starter feed brands in Ibadan, neither conform to any standard nor adhere to the nutrient requirements of the starter chickens. Therefore, adequate cautions must be exercised in choice of feed for broilers by poultry farmers. Also, concerned regulatory organization in Nigeria should also rise up to the challenge of ensuring adherence to the poultry industry rules.

References

AOAC (2000). Association of Official Analytical Chemists. Official Methods of Analysis, 15th Edition, Washington, DC.

Cengiz, O., Onol, A. G., Sevim, O., Ozturk, M., Sar, M. and Daskiran, M. (2008). Influence of excessive lysine and or methionine supplementation on growth performance and carcass traits in broiler chicks. *Revue Med Vet*., 159 (4): 230-236

Kingori, A. M., Tuitoek, J. K., Muiruri, H. K., and Wachira, A. M. (2003). Protein requirements of growing indigenous chickens during the 14-21 weeks growing period. *South African Journal of Animal Sciences*, 33: 78–82.

Montagne, L., Pluske, J. R., and Hampson, D. J.(2003). A review of interactions between dietary fiber and the intestinal mucosa, and their consequences on digestive health in young non-ruminant animals. *Animal Feed Science and Technology*, 108: 95–117

NRC (National Research Council) (1994). Nutrient Requirements of Poultry: Ninth Revised Edition. National Academy Press, Washington D.C

Ogunwole, O. A., Jemiseye, F. O., Oladimeji, S. O., Etop, S. C., Ola, O. A. and Adekiitan, O. A (2018). Proximate Composition and Cholesterol Profile of Table Eggs from Hens Fed Different Proprietary Feeds in Ibadan, Nigeria. *Ibadan Journal of Agricultural Research* 14(1) : 93-101

Okosun, S. E., Tewe, O. O. and Ehebha, E. T. E. (2018). Effect of Different Proprietary Poultry Feeds on Performance Carcass Characteristics and Serum Protein Metabolites in Broiler. *International journal of innovative research and development*. 7(7). 441-444

Pauzenga, U . 1985. Feeding parent stock. Zoo Technical International. 22-25

Schroeder, W. A., Kay, L. M. and Mills, R. S. (1990). Spectrophotometric analysis of amino acids using ninhydrin chemical reaction. Analytical Chemistry 22: 760

Sklan, D., Smirnov, A., and Plavnik, I. (2003). The effect of dietary fibre on the small intestines and apparent digestion in the turkey. *British Poultry Science*, 44: 735–740

SMUI. (2022). Satellite Map of University of Ibadan,https://latitude.to/articles-by country/ng/nigeria/15223/university-of Ibadan

Todd, J. (2008). Protein and Amino Acid Requirements for Poultry in Feed Management http://www.puyallup.wsu. edu/dairy/nutrient management/default.asp

Uchegbu, M. C., Irechukwu, N. M., Omede, A. A., Nwaodu, C. H., Anyanwu, G. A., Okoli, I. C. and Udedibie, A. B. I. (2009). Comparative Evaluation of Three Commercial feeds on the performance of Broilers. *Report and Opinion*, 1(4)

Wang, Y. Z., Xu, Y. Z, and Feng, J. (2004). The effect of betanin and DL methionine of growth performance, carcass and breast meat composition of heterozygous naked neck (Na/Na+) birds under spring and summer condition. *British Poultry Science*, 40: 668-694