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Proximate Composition and Amino Acid Profile of *Agama Agama* Meal: Implications for Fish Nutrition

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ABSTRACT

Proximate composition and Amino acid content of lizard (*Agama agama*) were determined in this study. Result reveals crude protein of *Agama agama* to be higher than most un-conventional feed sources but found comparable or superior to some frequently used conventional feed stuff. Seventeen amino acids excluding tryptophan, asparagines and glutamine were observed. Leucine-isoleucine ratio was found to be higher and similar to those found in fish meal, lysine and methionine were also observed to be higher compared to other feeds. Studies on feeding trials with fish and possible artificial propagation to increase availability should be intensified.

INTRODUCTION

Several feed have been investigated in an attempt to find substitute for fish meal in the formulation of fish diet. These include animal protein sources such as the fishery by-product, shrimp meal and terrestrial animal by-product (such as hydrolyzed feather, bone meal and blood meal) and several un-conventional protein sources (Maggot meal, earth worm meal etc.). Plant protein sources including soybean meal, cotton seed meal, groundnut meal, sunflower, rapeseed, sesame seed copra, macadamia, palm kernel etc. were also evaluated along with aquatic plant (Ogunji 2004).

These feeds are not only considered cheaper than fish meal but also enjoy high availability and accessibility in certain regions of the world, unfortunately attempts to use these ingredients to replace the fish meal component in fish feeds have met with variable success as a result of factors such as the protein composition and amino acid profile of the alternative feeds, phosphorus content and anti nutritional factors in these feeds (Ogunji 2004). While emphasis are laid on anti nutritional factor of plant protein source, worries on animal source of protein are basically on their protein composition, the protein composition and amino acid profile of feed ingredient are of great importance because they form the bases of growth and energy transformation in fish development (Lovel, 1989), also a deficiency in one or more of these essential nutrients result in reduced growth rate, depressed appetite, disease or even death, hence, the more closely the dietary protein meets the quantitative requirements of the indispensable amino acids, the greater it's utilization (NRC 1977).

Agama agama is mostly found in sub Saharan Africa. Its biology have been earlier studied (Harris, 1964). The nutritional information available on *Agama agama* is that of Abulude et al (2007) who reported protein content of 54.05-57.69%. This study therefore attempt to evaluate the amino acid profile of *Agama agama* with an aim of providing nutritive information to enhance it utilization in fish nutrition.

MATERIALS AND METHODS

Male and female Lizard (*Agama agama*) samples were obtained at the Federal University of Agriculture Makurdi, campus using catapults. They were dissected, weighed then oven dried at 65^{0}C for six hours and stored prior to analyses. to AOAC (1990) at the Fisheries department Nutrition Laboratory University of Agriculture makurdi.

Amino acid analysis of the Agama agama wascarried out at the Biotech Advance Laboratory of the Sheda Science and Technology Complex Abuja using the methods described by Spackman et al (1958). Data generated from the experiment were subjected to students t-test using Genstat discovery edition 3 software from Lawes Agricultural Experimental Station- Rothamsted (P=0.05).

RESULTS AND DISCUSSION

The result obtain in the present study reveals that life weight and total length in male was higher than that of the female (Table 1), similar finding was reported by Abulude et al; (2007), this observed differences among sex could be due to their age and feed intake characteristics which may differ among sex. Moisture content in this study is higher than those reported by Abulude et al., (2007) and may be because of differences in processing and drying method, however crude protein of 59-60 % recorded in the present study (Table 2) was similar to those reported for both sex by Abulude et al., (2007) but higher than those recorded for non-conventional sources such as maggot meal (39-55%) (Ogunji et al., 2008), earth worm meal (45-47%) (Sogbesn and Ugwumbe, 2008) and conventional plant sources such as soybean meal (48.21) and groundnut cake (40.2%) (Eyo, 2001), this was however lesser than protein content of blood meal (77-80%) and Fish meal (63-65%) (Eyo, 2001). This value shows that Agama agama meal could be a good replacement for some of the above listed conventional feed stuffs. The high fat content of the present study indicates that Agama agama meal is likely a rich source of energy and have potential to reduce dustiness in feeds, Njike, (1979) states that fat is included into feed of animal especially monogastric animals to boost their energy status, this is likely to influence better utilization of protein for growth rather than been used for energy supply. Fat content of agama lizard in the present study is higher than those in the report of Abulude et al; (2007) for both sex, and also higher than value reported for conventional feed such as fish meal and soybeans by Eyo, (2001).

Table 1: Morphometric of *Agama agama* Lizard

Parameters	Male	Female
Life weight (g)	48.02 ± 1.94^{a}	29.79 ± 3.33^{b}
Tail length(cm)	15.58 ± 1.49	13.16 ± 1.75
Total length(cm)	29.99 ± 1.79^{a}	23.18 ± 1.90^{b}
Left leg length(cm)	7.37 ± 0.38	6.98 ± 0.44
Right leg length(cm)	7.53 ± 0.38	7.06 ± 0.35
Head length(cm)	3.84 ± 0.29	4.10 ± 0.27
Liver wt (g)	1.48 ± 0.23	1.46 ± 0.33

Mean value in the same row with the same superscripts are not significantly different (P>0.05)

Table 2: Proximate composition of *Agama agama* meal

Parameter	Male	Female
Moisture	7.40 ± 0.58	8.20 ± 0.58
Crude protein	59.06 ± 1.15	60.16 ± 0.58
Crude fibre	15.35 ± 1.73	14.55 ± 1.73
Ether Extract	8.40 ± 1.16	8.75 ± 1.16
Ash	7.90 ± 1.16	7.50 ± 1.16
Nitrogen Free Extract	7.29 ± 1.16	9.40 ± 1.16

No significant difference in means (P>0.05)

Table 3: Amino acid profile of *Agama agama* (g/100g protein)

Amino acids	Male	Female
Lysine	4.10 ± 0.87	4.31 ± 0.87
Threonine	3.81 ± 0.58	3.88 ± 0.56
Cysteine	0.47 ± 0.23	1.09 ± 0.29
Valine	4.92 ± 1.56	4.36 ± 0.93
Methionine	1.00 ± 0.58	0.98 ± 0.54
Isoleusine	3.63 ± 0.58	3.10 ± 0.58
Leusine	9.64 ± 1.97	7.23 ± 1.16
Tyrosine	3.45 ± 0.58	3.36 ± 0.58
Phenylalanine	5.45 ± 1.16	4.50 ± 1.16
Histidine	2.31 ± 0.29	2.43 ± 0.29
Arginine	4.68 ± 0.58	4.40 ± 0.58
Aspartic Acid	8.30 ± 1.16	8.86 ± 1.16
Serine	2.02 ± 0.29	2.89 ± 0.29
Glutamic acid	10.02 ± 1.73	10.80 ± 1.73
Proline	2.86 ± 0.29	1.95 ± 0.29
Glycine	3.25 ± 0.29	3.65 ± 0.29
Alanine	4.11 ± 0.58	5.80 ± 0.58
Trptophan	ND	ND
Asparagine	ND	ND
Glutamine	ND	ND

No significant difference in means (P>0.05) of both sex. ND= Not detected.

Seventeen Amino acids were observed (Table 3) for both male and female *Agama agama*. Amino acid such as lysine and methionine were higher than reported values for blood meal and soybeans meal (NRC 1977) and similar to the levels recorded for fish meal but lower than that in maggot meal (NRC 1977). The ratio of leucine and isoleucine for both male and female was found to be higher and similar to those found in fish meal (4.45:2.97) (NRC 1977). Leucine/isoleucine ratio has been a limitation in the inclusion of blood meal at higher levels in feeds despite its high protein content, blood meal is high in leucine but low in methionine and isoleucine and so the antagonism between leusine and isoleusine results in fish suffering from isoleusine deficiency (Crawshaw, 1994). The arginine content recorded in this study meet the requirement of several species of fish which has been established to range from as low as 1.0g/100g diet for channel catfish (Wilson and Robinson 1982) to as high as 2.8g/100g in the diet of rainbow trout (Ketola, 1983), The absence of tryptophan, asparagines and glutamine could be as a result of hydrolysis procedure in the determination of the amino acids as described by AOAC (1990), Wilson and Walker, (2002) reported that the hydrolysis procedure destroys or chemically modifies asparagines, glutamine and tryptophan residues in protein. While asparagines and glutamines are converted to their corresponding acids (aspartic and glutamic acids) and are quantified with them, tryptophan is completely destroyed. Therefore for best use of the *Agama agama* meal in the diet of fish, they should be combined with other feed stuffs higher in tryptophan.

CONCLUSION

This study has demonstrated the superiority of Lizard meal nutritionally over most unconventional feed stuff (such as maggot meal and earthworm meal) and some conventional protein sources (Soybeans meal). Therefore, studies on feeding trials at different levels with fish should be carried out to determine the actual acceptability of these feed stuff, more so, the possibility of artificial propagation of lizard to increase availability should be another focus of research.

REFERENCES

1. Abulude, F.O., Adesanya, W.O, Ogunkoya, M.O, Onibon, V.O., Ajayi, E. 2007. Compositional Studies on tropical Species of *Agama agama* Lizards. *International Journal of Zoological Research* 3(4) 218-222.
2. AOAC (Association of official Analytic Chemist) (1990). Official methods of analysis, 15th edition (ed by Helrich) AOAC, Arlington, V.A.
3. Crawshaw R. (1994). Blood meal; A review of nutritional qualities for pigs, poultry and ruminant animals. National Renderers Association, London U.K pp1-6.
4. Eyo, A.A. (2001). Fish Processing Technology in the tropics, Published by Nationl Institute for fresh water Fisheries Research, University of Ilorin Press 403pp.
5. Harris, V. (1964). The life of the Rainbow Lizard. London, England. Hutchinson Tropical monographs. Pp 6-7

6. Hilgris, R. (2000). "Agama agama" (On-line), Animal Diversity Web. Accessed March 15, 2009 at http://animaldiversity.ummz.umich.edu/site/accounts/information/Agama_agama.html.
7. Ketola, H.G.(1993). Requirement for dietary Lysine and Arginine by fry of rainbow trout. *Journal of Animal Science*. . 56: 101-107
8. Lovell R.T. (1989). Nutrition and feeding of fish. Van Nostrand Reinhold publication, NY. USA 240pp
9. Njike, M.C. (1979). Alternative Energy and protein sources for poultry feed in Nigeria. In Olumu J.N. Offiong, S.A Buvanedrom, A., Osinowo, D. A (Edo). Poultry production held at ABU Zaria 11-13th December, 1979 Nation Animal production institute Zaria publication pp. 28.
10. NRC (1977). Nutritional requirement of warm water fishes. National Academy of Science; Washington D.C. p.46
11. Ogunji J.R., Ui-Ain S.T., Scholz C., Kloas W. (2008). Growth performance, nutrient ultilization of Nile Tilapia Oreochromis niloticus fed housefly maggot meal, *Turkish Journal of Fisheries and Aquatic Sciences* 8: 141-147.
12. Ogunji, J.O. (2004). Alternative protein sourses in diets for farmed tilapia. Animal science. Com reviews2004 No. 13, *Nutrition Abstracts and reviews*, 74 (8); 23-32
13. Sogbesan, A.O., Ugwumba, A.A.A. (2008). Nutritional values of some non-conventional animal protein feed stuffs used as fish supplement in aquaculture practice in Nigeria. *Turkish Journal of Fisheries and Aquatic Sciences*, 8: 159-164.
14. Spackman, D.H., Stein, E.H., Moore S. (1958). Automatic recording apparatus for use in chromatography of amino acid .*Anal. Chem*. 30; 119.
15. Wilson, K., Walker, J. (2000). Principles and techniques of practical Biochemistry, Cambridge University Press, 5th Edition UK.
16. Wilson, R.P., Robinson E.H. (1982). Protein and Amino acid Nutrition for chemical Catfish, *MAFES information BUL*L 25.