

An Inclusion Effect of Amino-acid (Histidine) in the Carcass quality and mineral Profile of African Catfish *Clarias gariepinus* (Burchell 1822)

ABSTRACTS

150 fingerlings of African catfish (*C. gariepinus*) with initial mean weight of 5.1g was stocked in an aquaria and were fed to satiation for 156 days. Histidine was used as a supplement to determine its mineral, also to examine carcass quality of African Catfish fingerlings at varying levels (0, 0.2%, 0.4%, 0.6% and 0.8%), these diets were formulated to have 40% crude protein tagged D1-D5.

The carcass proximate composition and minerals were significantly improved by histidine supplementation but showed no definite pattern of inclination while moisture decreases significantly with increased histidine level up to diet 5. There are significant differences ($P < 0.05$) in the calcium composition and the values range between 41.0 and 87.6 mg/gDM. The results of the carcass analysis showed that there were no significant differences ($P > 0.05$) in the lipid and protein composition. The highest lipid was in fish fed diet 2 (27.33). The highest moisture contents were recorded in fish fed diet 5 (10.76) while the least value was in fish fed diet 1. Fish fed diet 2 had the highest protein content with the least in fish fed diet 4. There are no significant differences ($P > 0.05$) in the ash content of the fish fed in all the treatments and values.

Keywords: African Catfish, Histidine, mineral composition, Carcass quality.

INTRODUCTION

Aquaculture continues to increase, with a gradual movement from traditional, low cost semi-intensive systems to more costly and high yielding intensive systems, where processed feed is a major cost aspect. Sequel to this, industrial aquaculture feed manufacturing has increased from 7.6 million tonnes in 1995 to 35 million tons in 2010, with an average yearly increase rate of about 11 percent. The aquaculture feed sector consumed over 73 percent of the total global fishmeal production and 80 percent of the global fish oil production in 2010 (Tacon, 2013).

In Nigeria, fish being as the cheapest source of animal protein, represents about 50% of the total protein intake (Ayinla, 2007). The input needed to increase growth in the aquaculture sector is feeding which represents about 60% - 70% of the total cost of fish production (Nwanna 2002).

Emerging evidence from studies with both aquatic and terrestrial animals shows that many Essential amino acids regulate key metabolic pathways that are crucial to maintenance, growth, reproduction and immune responses. In reality, the role of diets supplemented with histidine in the nutrition, growth, minerals and carcass quality of *Clarias gariepinus* is much more complex and is closely interlinked to the dynamic in the pond system.

The target of feed production is to mix proteins of assorted qualities to obtain the needed Essential Amino Acid (EAA) pattern of the fish. Since protein must be supplied to the fish with sufficient amount of essential amino acids, the lower the protein content in the diet, the higher must be the concentration of these amino acids in the protein (Palavesan and Immanuel

2008). Histidine has long been identified as one of the essential amino acids ranking among methionine, lysine, threonine, valine, leucine, tryptophan, etc. while lipids has been established as esters of fatty acids and glycerol and are principal forms of energy storage, (Gupa and Gupta, 2006).

2.0 MATERIALS AND METHODS

2.1 Sample Collection

The fishes used in this experiment was purchased from YMR farms Housing Estate, Oba-Ile, Akure, Ondo State. Feed ingredients such as include Fish meal, Soyabean, Groundnut Cake, Yellow maize, Vitamin premix, Vegetable oil and starch were obtained at Garl feed mill, Akure.

2.2 Experimental Diets

Five levels diets of dietary histidine supplementation were prepared by the (0, 0.2, 0.4, 0.6 and 0.8%), these diets were formulated to have 40% crude protein. The diets are tagged as D1-D5. The numerous ingredients were ground with hammer mill, weighed, mixed to homogeneity and pelleted using a pelleting machine with a 2mm die holes. Warm water at 70°C of 300ml volume was added to the premixed ingredients and homogenized until a dough-like paste was formed. The dough was passed through Hobart pelleting machine (Model A200T). The moist pellets were dried under the suns to a constant moisture level (< 10 percent) for 5 days, packed in air-tight containers and prior to use and stored in a cool dry place.

2.3 Feeding trials

The experiment which was conducted at the Federal polytechnic Ile-Oluji (FEDPOLEL) Teaching and research farm comprises of five dietary treatments replicated thrice. A dissolved oxygen level at 7.5-8.35 was maintained throughout the experimental period while the pH ranged between 6.5 and 8.5. The fish was cultured in fifteen aquaria altogether filled with 5 litres of fresh water and cultured for the period of 56 days.

They were acclimatized for 7 days in order to increase the fish appetite, make them adapt to the new culture medium and also to give room for fish stability. 150 fingerlings with initial mean weight of 5.1g was randomly allotted at the rate of 10 fingerlings per glass tank into five dietary groups tagged as D1 – D5 with each group in triplicate. Fish was fed *ad-libitum* i.e. to apparent satiation twice daily between 7 am – 8 am and 4 pm – 5 pm for fifty-six days.

Table1: Gross Composition of Experimental Diets (40% CP)

Ingredients	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Fishmeal	30.8	30.8	30.8	30.8	30.8
Soya bean meal	10.3	10.3	10.3	10.3	10.3
Groundnut cake	23.6	23.6	23.6	23.6	23.6
Cotton seed Meal	9.89	9.89	9.89	9.89	9.89
Yellow maize	14.9	14.9	14.9	14.9	14.9
Vitamin Premix	2.50	2.50	2.50	2.50	2.50
Vegetable	6.00	6.00	6.00	6.00	6.00

oil					
Methionine	0.40	0.40	0.40	0.40	0.40
Lysine	0.20	0.20	0.20	0.20	0.20
Starch	1.41	1.41	1.41	1.41	1.41
Histidine	0.0	0.2	0.4	0.6	0.8

3.0 RESULTS & DISCUSSION

Table 2: Proximate Composition of Experimental Diets

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Moisture	5.67	3.38	3.00	2.67	2.68
Lipid	22.0	22.0	20.0	19.0	20.0
Crude Protein	41.8	41.2	41.2	41.0	41.6
Ash	10.0	9.0	10.0	9.00	9.00
Crude Fibre	4.84	6.64	6.11	5.43	5.99
NFE	15.7	17.8	19.7	22.9	20.8

NFE- Nitrogen Free Extracts

Table 3: proximate composition of *C. gariepinus* Fed with Experimental Diets.

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Moisture	2.32±0.34 ^b	4.43±1.91 ^{ab}	8.09±2.54 ^{ab}	5.66±4.09 ^{ab}	10.8±5.33 ^a
Ash	12.0±2.00 ^{ab}	12.0±2.00 ^{ab}	11.3±1.15 ^b	16.7±4.16 ^a	12.0±2.00 ^a
Lipid	26.0±1.73 ^a	27.3±1.16 ^a	25.0±6.25 ^a	27.3±3.22 ^a	25.7±1.53 ^a
Crude protein	53.2±1.04 ^a	53.9±3.54 ^a	52.8±4.53 ^a	49.4±2.56 ^a	52.1±6.00 ^a

Mean in the same column with different superscripts are significantly different. (P<0.05).

Table 4: Mineral composition of *Clarias gariepinus* fed with Experimental Diets (mg/gDM)

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Ca	87.6±0.49 ^a	41.0±1.01 ^e	70.3±0.30 ^c	79.4±0.28 ^b	67.2±0.16 ^d
Phosphorus	76.6±0.73 ^a	51.5±1.60 ^b	43.7±0.29 ^c	72.9±6.21 ^a	55.4±0.59 ^b
Magnesium	5.09±0.52 ^a	4.12±0.21 ^b	2.62±0.45 ^c	5.08±0.16 ^a	4.02±0.54 ^b
Manganese	0.81±0.03 ^a	0.59±0.10 ^c	0.51±0.02 ^c	0.74±0.04 ^{ab}	0.71±0.02 ^b

Zinc	1.35±0.38 ^a	0.98±0.45 ^a	0.94±0.04 ^a	1.00±0.31 ^a	1.11±0.16 ^a
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Mean in the same column with different superscripts are significantly different. (P<0.05).

Nwanna *et al.*, (2016) indicated that calcium and phosphorus contents of the fish made up about 80-90% of the total minerals making them the most dominant inorganic component in the fish. In this experiment calcium and phosphorus constituted a high proportion in the fish carcass. Other minerals such as zinc, manganese were also present but in minute's quantity. According to NRC, (2011) dietary histidine requirements has been estimated for several fish species and values vary from 1% to 3.5% of dietary protein which was discovered to be higher than the optimum histidine requirements of *C. gariepinus* in this study recorded to be 0.30g/100g of protein.

Histidine requirement of different fish species exhibits wide variation, histidine requirement for grass carp was determined to be 1.21g 100g⁻¹ of diet, corresponding to 3.2g 100g⁻¹ of dietary protein. The values are similar to the species of *Heteropneustes fossilis* 3.51 – 3.63g 100g⁻¹ dietary protein (Khan and Abidi, 2014), higher than *L. rohita* 2.25g 100g⁻¹ dietary protein (Murthy and Varghese, 1995), *C. carpio var. Jian* 2.38g 100g⁻¹ dietary protein (Zhao *et al.*, 2012), *Clarias gariepinus* 1.0g 100g⁻¹ dietary protein (Khan and Abidi, 2009) and *Catla catla* 1.91 – 2.06% protein (Zehra and Khan, 2014). However, the optimum histidine requirements from the present study is about 0.83% of the dietary protein and 0.33g/100g protein.

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