~~An Inclusion Effect of Amino-acid~~(Histidine: an amino-acid)in theCarcass quality and mineral ~~P~~profile of African Catfish *Clarias gariepinus* (Burchell 1822)

ABSTRACT~~S~~

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 ~~it~~ the mineral~~, also to examine~~ and carcass quality of African Catfish fingerlings at varying inclusion levels (0, 0.2%, 0.4%, 0.6% and 0.8%) representing D1 – D5 in a ~~, these diets were~~ formulated diet of ~~to have~~ 40% crude protein. ~~tagged D1-D5.~~
The carcass proximate ~~composition~~ and mineral compositions were significantly improved by histidine supplementation but,~~showed~~exhibited no definite pattern of inclination while, moisture decrease~~s~~d significantly with increased histidine level up to diet D5. ~~There are significant difference (P<0.05) in~~The calcium composition were significant different (P<0.05) with ~~and the~~ values ranginge~~s~~ 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%)**.** Thehighest moisture contents were recorded in fish fed diet5 (10.76) while the least value was in fish fed diet1. Fish fed diet 2 had the highest protein content with the least in fish fed diet4. There are no significant different (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~~s~~ semi-intensive systems to a 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 are a ~~being as the~~cheap~~est~~ source of animal protein, representing~~s~~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 ~~regulates~~ regulate key metabolic pathways that are crucial to the 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 dynamics 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

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methionine, lysine, threonine, valine, leucine, tryptophan, etc. while lipids has been established as estersof fatty acids and glycerol and are principal forms of energy storage, (Gupa and Gupta, 2006).

2.0MATERIALS AND METHODS

2.1 Sample Collection

The fishesused 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 ~~ofdietary histidine supplementation were~~was prepared by addingthe (0, 0.2, 0.4, 0.6 and 0.8%) ofdietary histidine supplementation~~, these~~ in diets ~~were~~ formulated to containing~~have~~ 40% crude protein. The diets are tagged as D1-D5. The numerous ingredients were powdered using~~groundwith~~ hammer mill~~;,~~ weighed, mixed to homogeneity and pelleted using a pelleting machine with a 2mm die holes. 300ml of ~~W~~warm water at 70℃~~°C of300mlvolume~~ was added to the premixed ingredients and mixed~~homogenized~~ until a dough-like paste was formed. The dough was passed through Hobart pelleting machine (Model A200T). The moist pellets were sun dried~~ under the suns~~ to a constant moisture level (< 10 percent) for 5days, 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 ~~r~~Research farm~~. comprises of f~~Five dietary treatmentswere 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 5litres of fresh water and cultured for a~~the~~ period of 56 days.

They were acclimatized for 7days 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

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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}

Means 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}

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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]

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

Nwanna *et al*., (2016) indicatedthat 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, and manganese were also presents 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 a wide variation; histidine requirement for grass carp was determined to be 1.21g $100g^{-1}$ of diet, corresponding to 3.2g 100 g^{-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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