

HAEMATOLOGICAL RESPONSE OF *HETERBROANCHUS LONGIFILIS* FED VARYING DIETARY PROTEIN LEVELS

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ABSTRACT

Hematological effects of feeding varying dietary crude proteins levels to one hundred and fifty (150) *H. longifilis* fingerlings was examined on biweekly basis. The fingerlings of mean weights $1.26g \pm 0.24g$ were stocked in eight hapa nets (1m x 1m x 1m) at 15 fingerlings per hapa. Four experimental diets with crude protein; 35%, 40%, 45%, and 50% coded diet 1-4 respectively were fed to the fish for 8 weeks. The blood sample was taken and examined for packed cell volume (PCV), total protein (TP), Hemoglobin (Hb), Serum albumin, Erythrocyte count (RBC), white blood cell (WBC), mean corpuscle volume (MCV) and mean corpuscle hemoglobin concentration (MCHC). There was an increase in the values of the hematological indices studied with increase in protein inclusion levels. A higher positive correlation with no significant difference ($P \geq 0.05$) exists between the treatments RBC, WBC, Hb and TP. The best RBC (2.10×10^6 count/l), WBC (7.65×10^4 count/l), PCV (35.4%) and Hb (5.79mg/l) were presented in fingerlings fed 40% crude protein followed by 45% crude protein. The dietary crude protein of 40% is recommended for *H. longifilis* for sound and healthy condition.

INTRODUCTION

There is a geometrical increase in the population of fish farming in Nigeria as culturable fish have been itemized (Ezenwa, 1984; Ugumba 1996). To buttress this development, fish nutritionist has worked on the nutrient requirements of these culturable species to ascertain proper tissue development and healthy being. Proteins are complex organic compounds, which are made up of various repeated units of amino acids linked together by peptide bonds and have molecular weights of 6000 to several millions. Dietary proteins has been appraised as the body block building nutrients and given the most prominent consideration in the formulation of fish feeds.

Heterobranchus longifilis is a catfish with remarkable fast growth rate and commands a very good commercial value in Nigeria market (Ayinla *et al* 1994). The protein requirement of this fish have been reported as 45% (Olufeagba, 1999) while Dada (1999) reported 42.5% as optimum dietary crude protein requirement for *H. bidorsalis*. The health of fish has often been reported in terms of the relationship between the weight and length increase. However, there is a need to understand the physiological concept of fish healthy being in relation to blood and the quality of dietary protein fed. Faturoti (1989) observed no significant celebration between protein intake and blood serum protein and packed cell volume (PCV) of *Clarias gariepinus* fed supplementary feed and organic manure. These feeds have different protein components and quality.

Any changes in the constituent component of blood sample when compared to the normal values could be used to interpret the metabolic state of animal and the state of health

(Babatunde *et al* 1982). Low hematological indices are indications of anemic conditions (Haruna and Achkwu, 2001).

This paper among other things is aimed at assessing the effect of varying dietary protein intake on some haematological indices in *H longifilis* and justifies the effect of such on the fish health.

MATERIALS AND METHODS

One hundred and fifty fingerlings (means weight $1.86 \pm 0.024g$) were obtained from FCFPT, hatchery complex New Bussa, Niger States and acclimatized for one week during which they were fed 30% C.P. crushed pelleted feed.

Five (5) experimental diets with varying crude protein levels namely 35%, 40%, 45%, 50% were prepared based on proximate composition of the various feedstuffs. The feeds were pelleted and crushed into smaller sizes. Percentage composition of the five experimental diets is shown in Table I.

H. longifilis fingerlings were randomly assigned to eight hapa net. (1m x 1m x 1m) suspended in earthen ponds with a stocking density of fifteen (15) fingerlings per net consisting of four treatments replicated. Hematological indices of the experimental fish were determined before commencement and at the end of the eight weeks (8) of feeding trials.

The blood of live specimens of *H. longifilis* was collected from each treatment by laying the fingerlings on its back and wiping the ventral side. The cardiac muscle was then exposed and needle inserted and pushed gently down into the muscle. Blood was extracted under gentle aspiration, needle removed and stored in hyperinised sterile bottle marked with the crude protein levels fed.

Blood parameters examined were packed cell volume, Hemoglobin Erythrocyte count, white blood cell, Total protein count, serum albumin count, mean corpuscles volume and mean corpuscles hemoglobin concentration.

Duncan multiple test and Analysis of variance (ANNA) (using Spss 10.0 window 2002) were used to test for the significant difference in the analysed and computed haematological indices.

TABLE 1: PERCENTAGE COMPOSITION OF THE EXPERIMENTAL DIETS (% DRY MATTER)

COMPONENTS	DIETARY % CRUDE PROTEIN LEVELS			
	DIET 1 35% CP	DIET 2 40% CP	DIET 3 45% CP	DIET 4 50% CP
Fish meal	29.6	35.1	40.7	46.3
Yellow maize	27.80	22.1	16.40	10.6
Soya beans (toasted)	20.19	24.0	27.7	31.5
Rice bran	17.40	13.80	10.2	6.60
Vitamin/Mineral premix	2.0	2.0	2.0	2.0
Groundnut Oil	1.0	1.0	1.0	1.0
Starch	2.0	2.0	2.0	2.0
Total	100%	100%	100%	100%

RESULT AND DISCUSSION

TABLE 2: INITIAL AND FINAL MEAN VALUES OF THE HAEMATOLOGICAL INDICES IN *H. longifilis* FED VARYING DIETARY PROTEIN LEVELS

HAEMATOLOGICAL INDICES	INITIAL	FINAL			
		Diet 1 35% cp	Diet 2 40% cp	Diet 3 45% cp	Diet 4 50% cp
Erythrocyte count (x106/mm ³)	1.02 ^b	1.88 ^a	2.10 ^a	2.22 ^a	2.50 ^a
Leucocyte (x104/mm ³)	6.85 ^c	4.96 ^d	7.65 ^c	8.09 ^b	9.11 ^a
Packed cell volume (PCV) %	31.20 ^c	34.20 ^b	35.40 ^b	37.80 ^a	38.86 ^a
Haemoglobin g/mm ³	3.78 ^b	5.13 ^a	5.79 ^a	6.06 ^a	6.82 ^a
Mean corpuscle volume (MCV)	2.12x10 ^{-4a}	1.82x10 ^{-4a}	1.69x10 ^{-4a}	1.7x10 ^{-4a}	1.55x10 ^{-4a}
Mean corpuscle Haemoglobin cell (MCVHC)%	10.9 ^d	15.0 ^c	16.36 ^b	16.03 ^b	17.56 ^a
Total protein (gm/100ml)	2.84 ^b	4.82 ^b	6.80 ^a	6.83 ^a	6.80 ^a
Serum albumin (gm/100ml)	0.62 ^c	0.82 ^b	0.98 ^a	1.01 ^a	1.04 ^a

Dissimilar superscript along the rows show significant difference $p \leq 0.05$

Table 2: shows the initial and final mean values of the hematological indices in *H. longifilis* fingerlings fed varying dietary protein levels for duration of eight (8) weeks.

The result showed no significant difference ($p \geq 0.05$) in Erythrocyte count, Hemoglobin, Total protein and serum albumin as the dietary protein increase. Although the final value reported from this study are highly significant in comparison to the initial, this signifies that at any dietary protein feeding level, there is a positive influence on the hematological indices. Since Haruna and Adikwu (2001) have earlier reported among other workers, that hematological indices is a function of the state of health of the fish, this study is in line with this phenomenon and general believe on protein molecules as being both muscle blocks and blood cells builder. The PCV show no significant difference ($p \geq 0.05$) and ranges between 34.24% - 38.86%. Fagbenro *et al.* (1991) has reported a mean value of 34.7% for healthy *H. bidorsalis*. The result obtained from the study especially for diet 2 fingerlings is not significantly different to this result (Table 2). On the other hand, this result is almost similar to that obtained by Salami *et al.* (1992) for *C. gariepinus* (30% - 42%). The PCV of 37.85% for *H. longifilis* fed 405 CP has a positive correlation and not significant different ($p \geq 0.05$) to 38.00% documented by Salami *et al.* (1992) for *C. gariepinus*. Feeding fish with Diet 2 (40% CP) is more economical than either Diet 3 or Diet 4. Although, from studies documented by indigenous nutritionist, *H. longifilis* respond better to higher protein feed (Eyo, 1999); However for economical sustainable proper feeding management and more output,

feeding *H. longifilis* with 40% CP is of a better economic value to the healthy being of the fish as government thinks of alleviating poverty and starvation in Nigeria.

Leucocytes count of fish or any animal is a function of the immunity and the animals resistance to some vulnerable unless or disease. The Leucocytes count of $7.65 \times 10^4/\text{mm}^3$ presented from this study is not significantly different $p \geq 0.05$ and highly correlate ($r = 0.998\%$) to $7.25 \times 10^4/\text{mm}^3$ documented by Fagbenro *et al.* (1991) for *H. bidorsalis* which is a related genus. Erythrocyte is a function of oxygen absorption and transportation within a living cell, and a depletion in the count may weaken and lead to death in fish. *H. longifilis* fingerlings fed Diet 2 (40% cp) from this study, has Erythrocyte count of $2.10 \times 10^6/\text{mm}^3$, which is higher but not significantly different to $1.99 \times 10^6/\text{mm}^3$ presented by Fagbenro *et al.* (1991) for *H bidorsalis*.

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