FEEDING TRAILS AND PROXIMATE COMPOSITION OF *PARAOPHIOCEPHALUS obscurus* FED WITH THREE TYPES OF COMPOUNDED FEEDS PRODUCED FROM LOCAL RAW MATERIALS

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ABSTRACT

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Studies were carried out in the laboratory to determine suitable protein levels in compounded feeds for Parophiocephalus obscurus fingerlings feed for 40 days. The three compounded feeds contained each 32%,28% and 18% protein respectively with major protein sources derived from blood meal, fish meal and palm kernel cake. Animals increased in size by adding 0.22gm., 0.19gm., and 0.15 gm on the three compounded diets, giving the growth rates of 0.0055gm.dy^{-1}.0.0047gm.dy^{-1} and 0.0037gm.dy^{-1} respectively. These growth rates were significantly different from each other (P<0.01) and was associated with high mortality rates (75%,87.5% and 62%) in the tanks These result are discussed in the light of the feeding of species in culture enclosures.

***Keywords**: compounded feeds, proximate composition, Ophiocephalidae.*

INTRODUCTION

The ultimate goal of feeding in fish farming is to obtain a fast turnover of fish biomass within a short time by feeding the cultured animals with balanced food (Parker, 1979). A fish growth rate therefore indirectly reflects the amount and quantity of food available to the fish either as natural or supplemental. (Schroeder, 1974., Piper *et a*l. 1982). Growth response of fish to a particular food and the cost of the food unit are the two most crucial factors in assessing the economy of the fish farming operation (Malik and Clughtar, 1979)).Farmed animals must be provided with feeds capable of providing essential nutrients in quantities sufficient enough to sustain normal growth and reproduction (Fish Farmer International Mfile, vol.10.No. 14, 1996). On nutritional basis the best feed ingredient for any fish species are those whose biochemical compositions approximates that of the animal body composition (Coartes, 1983).Different species of shrimp and fishes have different nutritional requirement, both in terms of type of raw materials used and the proportion of each of the components ingredient (Ciolings and Deimondo, 1976).The requirement varies because the characteristics of the species being cultured has varied too.
The sole aim of farming on fish is to maximize profits and enhanced availability of protein for the healthy growth of the consumers (Fish Famers International file Vol. 10No.14, 1996).Although natural food available in the system cuts down cost of compounded feeds, there are other limitations which are compensated by the use of the latter (Andereson,*et al* 1987,Bombeo *et al*,1983) which includes availability of food for the cultured fish at all times.
The preparation of complete diets in accordance with known nutritional requirements is clearly essential to the success of intensive aquatic animal husbandry (Collins and Delmondo, 1976).However, the physical nature and form of the dietary is also critical The ration must be provided in the form, size, texture and condition and in the amount and on a schedule appropriate to the feeding behavior and needs of the crop fed animal (Tacon, 1993).
Many environmental parameters and certain technical and economic demands of the total husbandry system also have powerful influence on the choice of the feed, feeding rate and feeding schedule (Green-field,1969).Feed and feeding represent about half of the operating cost in a wide variety of aqua-farming situations(Hugenei and Husni,1977).For example in a projected large scale intensive water recycling culture system, feeding related activities are a dominant but somewhat smaller cost components (Shewer *et al* 1974).This research results provide information on efforts directed to determine suitable compounded feeds for *P.obcurus* reared in earthen ponds. The fish is chosen for cultivation in ponds in Nigeria, yet challenges related to its food under captivity has to be overcome .This work is one among the several efforts aimed at providing reliable data on the feeding of the species in ponds.

MATERIALS AND METHODS

Sample collection, handling and stocking

The *Parophiocephalus obscurus* fingerlings used in this experiment were obtained from fishermen at Itu swamp .Itu swamp is located………) The juvenile fish were transported in oxygenated bags to the hatchery at the Institute of Oceanography, University of Calabar, Calabar, Nigeria, fish farm complex for acclimation for 48 hours. They were later stocked in the culture system at a rate of 8 individuals./aquarium (or 44 ind.m^{-2}).The initial mean weight of the specimens in each of the rearing medium was 1.06gm, 1.07gm and 1.08gm respectively. The following water quality parameters of the system; pH, oxygen, and temperature were measured at the commencement and end of the study.

Feed composition and feeding

The experimental aquaria were fed each with the already prepared three compounded feeds of M_1 M_2 and M_3 produced from blood meal, fish meal and Palm kernel cake respectively. (Table II). Other ingredients including soya bean, bone meal, starch, vitamin premix, and fat of the feeds were in equal proportion in the three meals. The proximate composition of the Meals were determined with standard methods: crude protein by Micro- kjeldahl method, fat by Soxhlet extraction, ash by furnace ashing (AOAC, 2000).The dietary protein level of each set of meal were 28%,32% and 18% respectively. All leftover foods and feacal matter were siphoned from the aquaria the next day to avoid contamination. At the end of the 40 days of study the weights of the fishes and water quality parameters were measured.

To determine the daily changes in body weight of the specimen, the following formula was used (Brown, 1957):

$$GR = W1 - W0 \,/\, t \qquad \text{.............................1}$$

Where GR was the average daily gain in weight (gm,d^{-1});W_t the final weight at end of study and W_o the initial weight of specimen .t = length of the experimental period.

The specific growth rates (%) of the animals were calculated using the following formulae (Viola *et al* 1988):

$$SGR\ (\%) = InW1 - InW0x100 \,/\, t \qquad \text{..............................2}$$

ln W_t = log of final weight
ln W_o = log of initial weight
t= Duration of study.

Table II: Composition of experimental diets for *Paraophiocephalus obscurus* (Onyenuga,1968)

Ingredient	Quantity (gm.,)	% inclusion	% crude protein	Feed Protein (%)
Meal (M_1)				
Fish meal	400	40	66.5	
Soya bean	300	30	52.8	
Bone meal	200	20	0.05	28
Starch	60	5	16.9	
Vit.premix	30	3	-	
Fat	20	2	1.81	
Meal (M_2)				
Blood meal	400	40	88.5	
Soya bean	300	30	52.8	
Bone meal	200	20	0.05	32
Starch	50	5	16.9	
Vit.premix	30	3	-	
Fat	20	2	1.81	
Meal (M_3)				
PKC	400	40	16.9	
Soya bean	300	30	52.8	
Bone meal	200	20	0.05	18
Starch	50	5	16.9	
Vit.premix	30	3	-	
Fat	20	2	1.81	

The formula applied for the calculation of Production Efficiency (PE) by Sandifer and Smiths,(1979) was adopted in this study as follows: Production efficiency (PE) = Weight of Fish stocked (gm) / Weight of fish produced (gm).

The efficiency of the feeds (Food conversion ratio) was determined using the following formula after Leopold,(1981):

$$FCR = \textit{Weight of food fed (gm)} \,/\, weight\ of\ animal\ produced\ (gm.)$$

One way analysis of variance (ANOVA) was applied in establishing the difference in all tested parameters for each feeding trails (Sandifer and Smith, 1969)

RESULTS

The proximate compositions of the meals were similar except for the proteins (Tables II ,III) I. Carbohydrate was 16, 9 ± 2.33%, Fat 7.02±0.18%, ash = 4.2 ± 0.14% with and energy value of 232 ± 28.0 kj/kg. for the three meals The food conversion ratio (FCR's) from M_1 were lower and significantly different from those calculated for meals M_2 and M_3 respectively (P>0.05) .However there was no significant difference in the growth rates obtained from M_1 and M_2 (P>0.05)

Table III: Growth records of *P.obscurus* fed with compounded feeds derived from three protein sources

Parameters	M_1	M_2	M_3
Initial weight of fish (gm.)	1.06	1.07	1.08
Final weight of fish (gm)	1.28	1.26	1.23
Growth rate (gm.d-^{1})	0.006	0.005	0.004
No. of animals stocked	8	8	8
No. of animals harvested	2	1	3
Area of culture tank ((cm^2)	450	450	450
SGR (%)	0.47	0.41	0.33
PE	0.83	0.84	0.88
FCR	0.45	0.61	0.68
Mortality (%)	75.0.	87.5	62.0

Analysis of variance (ANOVA) showed that the growth rates were significantly different (P<0.05) from each other. T-statistic showed that growths measured from M_1 was significantly difference from M_3 (P>0.001) as well as from M_2 . Water quality of pH 6.80,6.80mgl^{-1} and 24^{0}C were measured at beginning of the study while pH and DO was 8.0 and 5.90mgl^{-1} with temperature at 26.2^{o}C.

DISCUSSION

Literature evidence indicate that channel catfish reared under similar environmental conditions as those of this study (Table III) exhibited a higher weight increase of 1.01 in 50 days (Kaneko, 1960, Steffens .1966). Allison *et al.* (1976), revealed that ground meal is more conducive to production and growth of young *Channa styriata* (Bloch). The results obtained from this study showed that the growth of *P, obscurus* with M_1 compared to those reported by Allison *et al.* (1976) showed great difference with the result presented by Tan *et al.*, (1993) who demonstrated that growth and survival rates of *Channa straita*(Bloch) reared in rice farm was better compared to this results. Parameswaram (1976) reported that Ophiocephalidae which are reared and allowed to feed on natural food showed good response to growth than those fed with formulated feeds. The growth rates measured for the specimen of this study are lower compared with those reported for *Hetero-clarias* that were fed with natural food which contained 50 – 60% protein (Shilo and Viola,1989) ;and those measured from *Heterobrachus longifilis* which accepted formulated feed and grew from 1.80 gm. to 2.60 gm, body in 62 days(Huisman,1976).However, statistics indicate that M_1 was the best feed for the fish considering the fact that it produced highest growth rate in this study(Table III). In tank 2 in which M_2 was saved the growth rate was 0.0047 gm.d$^{-1.}$ The protein content of M_2 was 28%. (Table III). The minimal dietary protein level giving optimal weight gain in fish was first studied in Chinook salmon *Onchorhynchus* sp. and was reported to be the closet to the proximate protein level of the fed fish(Delong *et al* 1978) Maximum growth rate appears to have been achieved with crude protein level in diet varying between 220 – 440 gm/kg (Garking and Wilson, 1976).Although analytic report for the fish meal was not reported, Zeitoum *et al* 1976) obtained a value of 440 protein / kg diet as the economic requirement for rainbow trout fed with fish meal and Kaushik (1977) used fish meal too to define the food requirement of trout. Andrew *et al* (1977) used fish meal diet to feed Channel catfish and obtained 11 to 17 gm/kg of protein with a significant increase in growth in 148 days.

Animals grown on M_3 exhibited the growth rate of 0.0037 gm.d^{-1}(Table III) Palm kernel cake being the protein base for the feed is not a good protein source especially as its amino acid spectrum (invertebrate/plant) is not synchronous to that of fish(vertebrate/aquatic animal). Cerking(1971)reported that increase in the scope for activity due to high food conversion rate corresponded with the increase in body size from as in this study .ADCP(1987) reported that the higher FCR values the less efficient the feed and vice versa It could therefore be concluded that diet M_1 was the best feed for the *P.obscurus* of this study due to it low FCR. Smith *at al.* (1981) and Browser and Rosemark, 1981 asserted that mortality/survival rates in cultured animals are used in assessing the negative or positive performance of aquatics in captivity in relation to their environment. This animals of this study showed high mortality rates (Table III) indicating that the *P. obscurus* of this study responded negatively to all the feeds.

Accordint and Karzinkin(1952) using the increase in the weight of pikes from 0.13 to 1.37 gms. stated that it food ratio decreased from 99.3% to 40.4% of the body calority. The Food Conversion Ratio (FCR) of species depend mostly on the age and weight of the examined fish (Castell, 1972); younger organisms need more food (measured) as the percent of body calority than the olds ones (Halven and Tiuews, 1978). However, the high mortality rates recorded in this study could have resulted from three sources: low oxygen level in the tanks due to frequent power outages; food was probably unacceptable to fish resulting in low weight over time and finally specimens were probably overstocked in the rearing tanks. Literature show that high stocking rate can lead to high mortalities in fishes(Bower and Roosemark,1111981) and Willis & Berrigan(1972) showed that channel catfish stocked at a density range of between 5 – 20 ind.m^2 exhibited mortality of between 8% and 62%. The production efficiency (PE) of *P. obscurus* in this study for each tank was 0.82, 0.84, and 0.88 which were high. Smith *et al* (1981) discovered that the production structure of fish affects their final production level.(Stopped here)

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