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Growth Performance of Clariasgariepinus Fingerlings Fed Plantain Peel Meal as Partial Replacement for Maize Meal

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Abstract:- One hundred and sixty fingerlings with mean body weight 2.4g were fed 4 diets with crude protein (CP 40%) in which plantain peel meal (PPM) replaced maize meal at different treatment levels - 0%(T1), 10%(T2), 20%(T3) and 30%(T4) respectively in a Completely Randomize Design. The fish were fed 5% body weight daily for 56 days. Mean weight gained and length increase ranged between 2.31±0.08- 2.48±0.08 and 3.95cm and 4.41cm respectively. Highest and least survival rates were 995% (T1) and 87.5%(T4) while the fish fed diet T3 recorded better condition factor (1.12) in comparison to the others.There was no significant difference (P>0.05) between treatments with respect to all growth parameters. The relative feed cost recorded for respective treatment where, N180/kg (T1), N175.00/kg (T2), N160.00/kg T3 and N155.00/kg (T4). Thus the study has proven that plantain peel meal could serve as dietary supplement in *Clariasgarieoinus* feeding essentially at 20 % replacement level for maize meal.

I. INTRODUCTION

Fish a vital nutritional resources (FAO,1997) with high quality protein and health benefitsessentially as they provide quality Omega -3 fatty acids, minerals like Zinc, Iron, Iodine required for children's growth (Karigid, 2021). As the world most traded food commodity, about 3 billion people rely on fish as primary source of protein (FAO, 2006; World Wild Fund, 2021. The FAO (1996) reported that majority of fish supply was derived from Captured Fisheries. The trend seems to have deepened as fish catches from the wild had reached its maximum potentials and already on the decline (FAO, 2004; Gebiel*et al.*, 2007). There is a paradigm shift in terms of fish production source from Captured Fisheries to Aquaculture (Akinrotimi, 2007; Aghoghoviwa*et al.*, 2018a). The need to substitute fish feeding stuffs like maize which has high demand arising from their wide usage from both humans and several livestocks with cheaper alternatives,had been advocated by several workers (Bekibele, 2015;Aghoghvwia*et al*. (2018a). Feed management is one of a blue prints to actualizing aquaculture viability since it occupies sizeable quantum (60%) of the cost of fish production (Falaye, 1988; Jamiu and Ajinla, 2003; Akinrotimi*et al.*, 2007).

To this end, all previous researchers recommended the use of non-conventional plant and animal materials to replace ingredients like maize and fish meals in fish feed ration (Fagbenro, 1992;Barugh*et al, 2003;* Aghoghovwia*et al.*, 2018b). Maize is no doubt readily digestible and major source of meterbolizible energy in fish feed diet, but the increasing and prohibbitive cost has necessitated the need to source for alternative so energy sources (Fasakin*et al.*, 2011). If profitability must be ensured, then, plantain (*Musa paradisiaca*) peel whichl is notable or predominant in terms of wastes generated in Southern Nigeria from processing of plantain into plantain chips commonly known as dodo. Other forms of preparation of plantain for consumption in the Niger Delta includes roasting (boleh) by road sides by food vendors, or as portage -kekfia (KKF)-a special delicacy in Bayelsa State. Both the production and consumption of plantain is considerably huge - put at about5 2.103 million tonnes annually (Agbabiaka*et al.,* 2013) all through the seasons in Southern Nigeria. The quantity of plantain peels is therefore correspondently very high. This therefore constitutes nuisance to the environment in terms of pollution build up and generation of obnoxious smell and poor sense of sight since they are not put into meaningful use. The use of PPM in compounding fish diet will definitely scale down the cost of feed while the issue of avoiding of pollution arising therefrom would be taken care of in the process. Agbabiaka*et al.,* (2013) reported the best feed conservation ratio in African catfish at 0% inclusion of PPM while the least was in 75% inclusion level.

This study aimed to investigate the performance level of *Clariasgariepinus* fingerlings fed plantain peel meal at 4 respective replacement levels with maize meal in diet of cat fish - fingerlings and to determ.ine the best inclusion levels.

II. MATERIALS AND METHODS

A. *Experimental site*

The experiment was carried out in the Hatchery Building of Niger Delta University Teaching and Research Farm, Wilberforce Island, Bayelsa State, Nigeria.

B. *Experimental Design and Fish*

The experiment utilized 16 transparent rectangular plastic containers measuring 60x40x40 cm. Each plastic container was impounded with water up, to$^2/_3$ capacity with unchlorinated water. The Completely Randomize Design (CRD) was used for thheused for the treatment. each with four replicates.

C. *Feed Formulation*

Clariasgariepinus fingerlings numbering 160 with average weight of 2.40g were purchased from a reputable Commercial Fish Farm. They were transported to the Hatchery Unit of the NDU Teaching and Research Farm and acclimatized for one week.

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D. Experimental Diet.

Four diets (with 40% crude protein) were formulated to contain the plantain peel meal PPM at 0% control (T1) 10% PPM (T2), 0% PPM (T3) and 30% PPM (T4) as replacement for maize in the experimental diet. The plantain peels were obtained from local restaurants, washed and sun dried until they became crispy to avoid moulds and to enable pulverization. Respective treatments were mixed with hammer mill and passed through pelletizing machine of 2mm die. The pellets of respective treatments were sun dried and packaged with labels and stored in air tight container prior commencement of feeding.

E. Experimental Procedure

The acclimatizatized fish were randomly stocked in the 16 plastic tanks 10 each per bowl. The study lasted for 8 weeks whilst the fish were fed experimental diets twice daily at 5% body weight between the hours of 08:00 am and 04:00 pm.

F. Data collection and statistical Analysis

Water was changed daily using Siphon to remove uneaten food and faecesto avoid stressing the fish. Growth parameters were obtained weekly to the nearest (g) and (cm) using weighing balance and metre rule.

Data on mean weight gained, feed intake, food conversion ratio, survival rate, mean length increase, condition factor and proximate analysis were computed according to Fasakin*etal(* 2018a) methods. All data obtained were subjected to one-way analysis of variance (ANOVA). Duncan's multiple range test was used to separate the means for individual diet at 5% (0.05) significance level. Water quality parameters such as temperature, Dissolved oxygen and pH were monitored during the experiment.

III. RESULT

The values of all growth parameters measured in the study proved that there was some levels of growth in the fish fed all treatments. The T3 (20% PPM inclusion) recorded the highest mean weight gain 1.48±0.08g and length increase (2.47±0.03cm), while the least in both cases were obtained in T1 1.3±0.03g and 1.80±0.15cm. There was no significant difference (P>0.05)in growth parameters between fish fed the treatments - T1, T2, T4 and T4. Fish fed diet T3 was better condition (1.12) whilst T2 had the least (1.31).Mean weight gain and length increase were in the order 20% >30%>10% and 0% PPM inclusion rate.

Ingredient	Crude protein	Fat (%)	Crude fibre (%)	Ash (%)	Moisture (%)
Soybean	44.00	2.59	5.00	4.60	5.70
Fish meal	72.00	11.17	1.31	14.80	9.02
Maize	10.00	2.69	1.40	1.40	8.52
Groundnut cake	45.00	5.94	4.31	13.80	6.31

Table 1: Proximate Composition of Feed Ingredient

Ingredients	RPPM1	RPPM2	RPPM3	RPPM4
Maize	48.0	43.2	38.4	33.6
Plantain peel	0.0	4.8	9.6	14.4
Soybean meal	15.0	15.0	15.0	15.0
Fish meal	26.0	26.0	26.0	26.0
Groundnut cake	6.0	6.0	6.0	6.0
Vitamin premix	2.0	2.0	2.0	2.0
Starch	1.0	1.0	1.0	1.0
Salt	0.5	0.5	0.5	0.5
Bone meal	1.5	1.5	1.5	1.5
Total	100	100	100	100

Table 2: Percentage Composition of the Experimental Diet

Parameter	Plantain peel
Moisture	8.17
Ash	14.77
Crude fibre	18.75
Crude protein	9.86
Fat	7.47
NFE	40.98
Total Energy (Kcal)	2705.90

Table 3: Proximate Composition of Ripe Plantain Peel

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Parameters	0%	10%	20%	30%
Initial Mean Weight (g)	2.32	2.39	2.40	2.37
Mean Weight Gain (g)	1.30±0.08	1.35±0.08	1.48±0.08	1.39±0.08
Mean Final Weight(g)	3.63±0.03	3.74±0.03	3.87±0.03	3.75±0.03
Mean Total Length (Cm)	6.57±0.06	6.60±0.06	7.02±0.06	6.65±0.06
Mean Length Increase (cm)	1.80±0.15	2.05±0.15	2.47±0.15	2.10±0.15
Food Conversion Ratio (g)	3.69	3.56	3.24	3.45
Survival Rate (%)	95	87.5	95	92.5
Condition Factor (K)	1.28	1.31	1.12	1.28
Cost Of Feed (N1/Kg)	180	175	160	155

Table 4: Growth Response of *Clariasgariepinus* Fingerlings fed various lecel of ripe plantain peel meal based diet

Parameters	0%	10%	20%	30%
Moisture (%)	9.94	9.98	9.85	9.89
Lipid (%)	3.79	3.14	3.84	3.87
Ash	11.28	11.44	12.38	12.41
Crude fibre	3.71	3.83	3.69	3.87
Crude protein (%)	34.67	34.79	35.25	34.88
NFE (%)	36.59	36.82	34.99	35.08

Table 5: Proximate composition of experimental diet NFE (Nitrogen Free Extract)

IV. DISCUSSION

The experimental fish accepted the PPM inclusion in the diet and therefore further affirms that plantain peel meal can constitute diet of cat fish (Agbabiaka*et al.,* 2013) without impairing growth in any way. Ajaqsin*et al. (*2004*) recommended similar report for w*eaned rabbits.

The results of this study showed that PPM fed to fish at 20% inclusion rate recorded that highest growth in weight (g) and length (cm) increase and least in the control. This is however in sharp contrast to the work of Agabiaka*et al.* (2013) which documented highest weight gain and length increase in the control (0% PPM). However the reduction in growth raterecorded at 30% PPM inclusion in fish diet may proven that feed intake and utilization have been hampered due to change in taste of diet (Omole*et al.*, 2008; Adesolu *et al*., 2016). The acceptance of diet by the fish with PPM inclusion level up to 30% shows it has favourable nutrient utilisation that resulted to fish growth and survival (Aghoghovwia et al., , 2018c).

Treatment 3 (20%PPM) inclusion level to diet recorded best condition factorwhile the physicochemical characteristics of the all the tank water used during the experiment were within confine of quality that can support cat fish rearing (Boyd, 1979;, Aghoghovwia*et al.*,2018b). The close proximity of average temperature computed during the study could be attributed to the fact that the experimental setup were al indoors (Adekoya*et al.*, 2004).

V. CONCLUSION

Facts that emanate dated from this study showed that incorporation of plantain peel meal into diet of *Clariasgariepinus* supported their growth.

All 3 inclusion levels recorded higher weight and length increase when compared to the control. This observation therefore favours the inclusion of plantain peel meal up to 30%-a finding which has 2 fold advantages of reducing cost of production of feeding as well as decongesting the heavy garbage generated by indiscriminate dump of the plantain peels in and around the southern part of Nigeria where it is massively produced. The best growth was however recorded at 20% inclusion rate.

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