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Effect of Substituting Soyabean Meal with Fluted Pumpkin Seed Cake on the *carcass Quality* and Nutrient Utilization of *Heteroclarias* (hybrid) Fingerlings in Bali, Taraba State

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Abstract: **A study was conducted to determine the effect of substituting soyabean meal with fluted pumpkin seed cake on carcass parameters of hybrid catfish (*Heteroclarias)* fed five iso-nitrogenous (40% CP) diets at varying inclusion levels of *Telfairia occidentalis* (fluted pumpkin) seed cake (FPS). Five diets in triplicate was compounded with same ingredients; fish meal, yellow maize, vitamin /mineral premix, vegetable oil, and starch with varying inclusion levels of *Telfairia occidentalis* (fluted pumpkin) seed cake and soya bean meal (SBM). Diets was designated as D1 (FPC 0% - SBM 100%), D2 (FPC 25% - SBM 75%), D3 (FPC 50% - SBM 50%), D4 (FPC 75% - SBM 25%), D5 (FPC 100% - SBM 0%). The proximate analyses of experimental feeds and fluted pumpkin seed cake were carried out to show any variation present in all parameters. One hundred and twenty *Heteroclarias* fingerlings (mean weight 4.26±0.26 g) were reared in concrete tanks of 2m×2m size. Fish were fed at 5% of their body weight for a period of 90 days and some samples were slaughtered in each treatments and the head, flesh and wastes were also weight to know the weight gain, proximate analysis 0f the fish was also carried out. Culture water was monitored and changed every two days while quality parameters (temperature, dissolved oxygen, and pH) was measured fortnightly using standard methods.**

Keywords: **Heteroclarias, fluted pumpkin seed cake, soyabean meal, diets.**

I. INTRODUCTION

Fish is a high- quality food containing first- class protein and nutrients, important for human health and growth [1]. Different fish species have been used as foods by humans from ancient times and form an important part of the diet in many countries [2]. They are generally low in cholesterol compared to meat from terrestrial animals because they contain a wide range of lipids high in polyunsaturated fatty acids [3]. The expansion of aquaculture and increase in livestock production strongly indicates that a “feed crises” will be inevitable in the nearest future if possible solutions are not proffered. Increasing competition in the feed industry plus rising cost of traditional feed ingredients in recent years are forcing feed manufacturers to find alternatives to conventional feed stuffs and cost of feeding constitutes 60% of the total production cost. There are numerous raw materials of plant origin with low cost when compared to that of animal origin, as such, are potential replacements to the former. Cereal and oilseed proteins play prominent roles in the diets of omnivorous fish species such as catfishes, carps, and tilapias.

The major limitations associated with plant feedstuffs is the presence of ant nutrients and less palatability. *Telfairia occidentalis* (fluted pumpkin) seeds have high nutritive values such as protein, fats and oils, and minerals (potassium, iron) but their utilization could be affected by the presence of ant nutritional factors such as lectins and trypsin inhibitor that are present in the seeds [4]. Several researchers at different times have evaluated the importance of various parts of the plant. The plant is important for its edible seeds which are rich in protein and fat

[5]; the leaves constitute an important component of the diet of many people in West African Countries [6] and are rich sources of protein, oil, vitamins, minerals, which nourishes, protects and heals the body [7]. The young shoot and leaves of the plants are also used as soup because of the pleasant taste [8] and due to the richness of the leaves in iron, it is used to cure anemia [9]. Growth of fish depends largely on good nutrition which is more pronounced with fish raised in intensive aquaculture system. In fish culture, supplementary feeding plays major roles in determining the nutritional and economic success of the aquaculture venture. Hybrid catfish (*Heteroclarias)* is a good experimental fish in aquaculture due to its relative fast growth rate, better feed conversion efficiency, resistance to diseases, ability to tolerate harsh environmental conditions, and wide acceptance by the populace. The objective of this study was to evaluate the effect of substituting soyabean meal with *Telfairia occidentalis* on Carcass quality of *Heteroclarias* fingerlings (catfish). Evaluate the efficiency of fluted pumpkin seed cake in respect to fish farming.

II. LITERATURE REVIEW

Matured *Clarias gariepinus* does not grow as big and rapidly as *Heterobranchus bidorsalis.* On the other hand, the *Heterobranchus spp* does not possess the high survival rates of *Clarias gariepinus* [10] The hybrid *Heteroclarias* has been adjudged the most widely spread and accepted fish in Nigeria, for r\reasons including its relative faster growth rate, better feed conversion efficiency compared with either of its parental stock i.e *Clarias gariepinus* and *Heterobranchus bidorsalis* [11] Other characteristics of the species include its voraciousness, ability to inter breed, resistance to diseases which is attributed to its improved hybrid vigor [12].

Catfish diet and feed substitution

In fish culture, substituting feeding plays major roles in determining the nutritional and economic success of aquaculture. Fish is a high quality food containing first class protein and nutrients, important for human health and growt[1]. Fluted pumpkin seed cake is chosen for this experimental study as replacement for soya bean meal because of its amino acids and mineral contents, which makes it to contribute to the diet of the fish.

Fluted pumpkin seed is an excellent source of potassium and iron, oil, fats and proteins. Hybrid catfish (*Heteroclarias*) is selected as the experimental fish due to its culturable traits such as; relative faster growth rate, better feed conversion efficiency, compared to its parental stock. It has also gained popularity as the species interest of farmers. Interest is based on weight gain of fish and carcass composition. This is due to the fact that, the fish farmer is interested in making profit and also the composition of the fish to meet nutrient needs of the farmer and expected -nutrient quality needed by the consumers. Therefore, the study is aimed at including *T. occidentalis* at varying levels in the diets of hybrid catfish (Heteroclarias*)*

III. MATERIALS AND METHODS

Study area

The research was carried out at The Teaching and Research Farm of the Department of Animal Health and production Technology. Federal Polytechnic Bali, Bali, Taraba State.

Collection and preparation of *T. Occidentalis* (fluted pumpkin) seed cake

Telfairia occidentalis (Fluted pumpkins) was purchased from Jalingo main market, Taraba State, Nigeria. The fluted gourds were dissected to remove the coated seed pods, the pods was broken and the seeds were removed. The seeds were spread in trays of flat surfaces and sun-dried to the minimal

Moisture level. The dried seeds were taken to the laboratory for the extraction of oil; the seed cake were then grinded and mixed with other feed ingredients to make a complete feed.

Diet formulation and preparation

Diets were formulated to contain 40% crude protein using the Pearson's square method. The fluted pumpkin seed cake was incorporated into each of the diets at 0%, 25%, 50%, 75%, and 100% to replace soya bean meal (SBM) in the diets. Diets were designated as D1-D5 depending on the level of inclusion of fluted pumpkin seed cake (FPSC). The diet containing 0% FPSC served as the control. Feed ingredients were weighed according to the percentage composition.

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The feed ingredients were milled using a grinding machine and mixed manually (hand mixing). The vitamin and mineral premix added and oil also added to the ingredients and mixed thoroughly. Warm water was added to the premixed ingredients and homogenized before passing it through the pelletized machine. The pelletized feeds was sun dried to a constant weight and kept in an air-tight container prior to use.

Table 1: GROSS COMPOSITION OF EXPERIMENTAL DIETS (%)

Feed Ingredients	Diets D1	D2	D3	D4	D5
FM (72 %)	27.0	27.0	27.0	27.0	27.0
SBM (48%)	27.0	20.25	13.5	6.75	0.0
YM (10 %)	36.0	36.0	36.0	36.0	36.0
FPS (25.2 %)	0.0	6.75	13.5	20.25	27.0
VEG. OIL	3.0	3.0	3.0	3.0	3.0
VITAMIN AND MIN PREMIX	4.0	4.0	4.0	4.0	4.0
STARCH	3.0	3.0	3.0	3.0	3.0
% TOTAL	100.0	100.0	100.0	100.0	100.0

*****Each 5kg of premix contains: vit. A= 20,000,000IU, vit. D3= 2,000,000IU, vi.t E= 200,000mg, vit. K3= 10,000mg, folic acid= 2,000mg, Niacin= 80,000mg, calpan= 25,000mg, vi.t B2= 12,000mg, vit. B12= 9mg, vit. B1= 6,000mg, vit B6= 11,000mg, Biotin= 100mg, Vit. C= 50,000mg, selenium= 100mg, Iodine= 1,000mg, Iron= 30,000mg, Manganese= 50,000mg, copper= 5,000mg, zinc= 30,000mg, antioxidant= 125,000mg.

Experimental design and feeding trials

Hybrid catfish *(Heteroclarias)* fingerlings was purchased from SEBORE FARMS Adamawa State, Nigeria. The fish was acclimatized for 14days, during this period; they were fed the control diet. Prior to the commencement of the experiment, all fish were starved for 24 hours. This practice is to increase the appetite of the fish. The feeding trial was conducted in concrete tanks of 2m×2m. The fingerlings were randomly allotted at the rate of 100 fingerlings per tank into five dietary groups designated as D1-D5 with each groups in triplicate. Fish were fed at 5% of their body weight. Feeding was done in the morning between 8:00-09:00 hours and in the evening between 4:00-5:00hours. The experimental period was 90 days.

Weighing of experimental fish

Experimental fish were weighed after acclimatization using an electronic meter machine (Model PB-3002). The weight of fish per tank were recorded. Weighing of experimental fish was done fortnightly throughout the period of experiment. On weighing days, experimental fish were fed after weighing and weighing was done early in the morning (07:00am-09:00am).

Table 2: Proximate analysis of Fish (%) Heteroclarias

S/N	M	A	P	F	L	C
1.	6.89	12.30	57.54	4.02	7.10	12.23
2.	5.38	17.03	60.63	3.05	7.28	6.30
3.	4.01	14.40	64.00	3.12	7.76	6.15
4.	5.74	16.44	63.15	1.30	8.00	5.32
5.	5.92	16.99	63.13	1.18	8.69	2.01

M-Moisture Content, A-Ash content, P-Crude Protein, F-Crude Fibre, L-Crude Lipid, C- Carbohydrate

Table 3: effect of substituting soyabean meal with pumpkin seed cake on carcass parameters.

Treatment- Diets					
Parameters%	**D1**	**D2**	**D3**	**D4**	**D5**
Flesh	158.48^{c}	184.6o^{a}	149.52^{d}	162.96^{b}	138.12^{e}
Head	96.24^{c}	112.08^{a}	90.55^{d}	98.95^{b}	83.88^{e}
Gut (Waste)	30.12^{a}	12.49^{b}	23.69^{ab}	33.1o^{a}	29.05^{a}

IV. RESULTS AND DISCUSSION

The results in table two above showed the effect of substituting soyabean meal with pumpkin seed cake on carcass parameter of Heteroclarias (catfish). The results revealed that, D2 gave the higher (184.60g) flesh weight. This was followed by those in D1, D3, D4 and D5 respectively. Similarly compared head weights, D2 was significantly ($P<0.05$) higher (112.08g) than those in the remained treatments (D1, D3, D4 and D5). However, D5 give the lowest output in both flesh and head weight. While D1, D3, D4 and D5 did not differ significantly from each other, but D2 gave the lowest (12.49g) Gut waste.

V. CONCLUSION

This study revealed that pumpkin seed cake in the diet of Heteroclarias actually led to higher protein, lipid, and ash contents in muscle performance in their growth. The result of this experiment showed that T. occidentalis seed meal cake can replace soya bean meal in the diet of Heteroclarias at a minimal level of 36%. Theoretically, the ideal source of protein for an organism is a protein containing same amino acid content and amino acid proportions of the organism itself. Furthermore, if properly processed, T. occidentalis (fluted pumpkin) seed meal cake could replace soybean meal in fish diets to reduce competition between man and animals. T. occidentalis was defatted to remove oil during feed composition in other to reduce its effect on water contamination there is need for regular daily change of water to avoid the high turbidity and improve dissolve oxygen which fish feeds well and grow faster.

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