ISSN: 2347-5129
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.352
IJFAS 2016; 4(3): 220-222

www.fisheriesjournal.com
Received: 20-03-2016
Accepted: 21-04-2016

Mogaji OY
National Institute for Freshwater Fisheries Research, PMB 6006, New-Bussa, Niger State, Nigeria

IBIYO LMO
National Institute for Freshwater Fisheries Research, PMB 6006, New-Bussa, Niger State, Nigeria

Correspondence
Mogaji OY
National Institute for Freshwater Fisheries Research, PMB 6006, New-Bussa, Niger State, Nigeria

Growth performance of *Oreochromis Niloticus* Fed Brewer's dry grain (BDG) base NIFFR feed supplemented with Xylanase enzyme

Mogaji OY, Ibiyo LMO

Abstract
A total of 240 *Oreochromis niloticus* fingerlings with weight range of 3.12 – 3.19g in a 3×4 factorial design with triplicate groups were used for the study after two weeks acclimation by substituting wheat offal with brewer's dry grain at 0, 10, 20, and 30% respectively, supplemented with three inclusion levels of xylanase enzyme at zero, recommended (1mg/kg) and above recommended (1.5mg/kg) levels in a 30% crude protein diet. Results showed treatment 8 recorded a significant weight gain compared to other treatment, though there was no significant difference (P>0.05) recorded in specific growth rate. Treatment three, six, and eight recorded the best result in all the parameters at an optimum inclusion level of 10% or 20% (with recommended enzyme ratio), and even at 30% (without enzyme inclusion) without any adverse effect. Treatment 10 recorded an overall poor result in all the parameters.

Keywords: Brewer's dry grain, Growth response, Xylanase enzyme, *Oreochromis niloticus*.

1. Introduction
There is need for tilapia as a herbivore to consume mostly plant origin feedstuff to enhance the performance in growth and digestibility of the feed in the fish. The trend in the growing interest relating to the consumption of scaly fish by man has prompted the need to develop feed of highly nutritional requirements for the sustenance of aquaculture growth. Fish has continued to be the source of hope towards solving global problem of malnutrition due to its richness in nutritive values above other animal sources of protein [1, 2] and as aquaculture production becomes more intensive in Nigeria, fish feed will be a significant factor in increasing the productivity and profitability of aquaculture [3]. Therefore, the need of non-conventional feedstuff so as to meet the ever increasing demand for fish has made it essential to develop quality diets to ensure that animals play a complementary, rather than a competitive role with man. There is need to exploit more cheaply non-conventional energy sources such as Brewers Dry Grain (BDG) to replace expensive ingredients in fish feed formulation and also provide greater performance in tilapia fish development. A recent study by the Resourcedat analyst conducted in 2012 shows beer turnover in Nigeria is growing faster than its economy. "At the moment, beer consumption is about 19.5 million hectolitres in 2012 and growing at about 8-9 percent per annum. Nigeria has the second largest beer market and is the second largest consumer of beer in Africa after South Africa with an average of 11.6 litres of beer per head of population, [4]. Which gives prospect to the availability of BDG. BDG derived from corn has a relatively high protein and fat content (approximately 29 and 10%, respectively) and does not contain anti-nutritional factors found in most plant protein sources [5]. At present, the use of BDG in aquaculture diets is limited. However, recent research has shown that BDG is a promising alternative feed ingredient for several fish species such as rainbow trout (*Oncorhynchus mykiss*), channel catfish (*Ictalurus punctatus*) and tilapia (*Oreochromis spp*.). This study consider the inclusion of Brewer's Dry Grain in NIFFR diet supplemented with xylanase enzyme for improving the performance, nutritional value, cost reduction, digestibility and nutrient utilization in *Oreochromis niloticus.* Therefore, evaluating the effect of Brewers Dry Grain on growth performance of *Oreochromis niloticus*.

2. Methodology

The experiment was conducted in indoor aquaria at the hatchery complex of National Institute for Freshwater Fisheries Research (NIFFR) New Bussa, Niger State for a period of 8 weeks. A total of 240 *Oreochromis niloticus* fingerlings in a 3×4 factorial design with triplicate groups were used for the study after two weeks acclimatization. The feed ingredients were ground to homogenous size with hammer mill and was produced based on formulation with graded levels of BDG (0, 10, 20, 30) % and xylanase enzyme supplemented at zero, recommended (1mg/kg) and above recommended (1.5mg/kg) levels in a 30% crude protein diet.

Table 1: Composition of 30% Crude Protein experimental diets (kg/100kg)

Feedstuff	TRM 1 (Control)	TRM 2	TRM 3	TRM 4	TRM 5	TRM 6	TRM 7	TRM 8	TRM 9	TRM 10
Wheat offal	46.85	36.85	36.84	36.84	26.85	26.84	26.84	16.85	16.84	16.84
Groundnut cake	24.83	24.83	24.83	24.83	24.83	24.83	24.83	24.83	24.83	24.83
Soybean meal	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Fish meal	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Starch	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Vegetable oil	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Methionine	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Premix**	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Vitamin B	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vitamin C	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Brewers dry grain	0.00	10.00	10.00	10.00	20.00	20.00	20.00	30.00	30.00	30.00
Enzyme*	0.00	0.00	0.010	0.015	0.00	0.010	0.015	0.00	0.010	0.015
Total	100	100	100	100	100	100	100	100	100	100
Analyzed proximate composition										
Moisture	9.35	7.90	7.65	8.05	6.75	6.90	5.65	4.15	7.45	7.90
Crude protein	26.92	28.60	28.94	25.24	31.07	35.07	29.11	29.61	32.75	40.38
Crude fat	8.56	10.89	10.87	9.54	9.88	10.52	9.98	10.00	12.99	12.51
Crude fibre	5.35	5.85	5.50	5.60	4.65	5.10	5.21	5.35	6.00	6.60
Ash	5.25	4.95	5.15	4.80	4.85	4.40	4.82	3.40	5.10	5.60
NFE	44.57	41.81	41.89	47.77	38.80	36.03	39.65	47.49	23.71	27.01

*****Enzyme (Nutrase Xyla: Endo-1, 4-Beta-Xylanase)

**Provides per Kg diet: Vitamin A 25,000 IU; Vitamin D_3 2,000 IU; Vitamin E 200 IU; Vitamin K 8mg;Vitamin B_2 20mg; Vitamin C 500mg; Niacin 150mg; Pantothenic Acid 50mg; Vitamin B_6 12mg; Vitamin B_{12} 0.05mg;Folic Acid 4mg; Biotin 0.8mg; Choline Chloride 600mg; Cobalt 2mg; Copper 4mg; Iodine 5mg, Iron 40mg; Manganese 50mg; Selenium 0.2mg; Zinc 40mg; Antioxidant 100mg, Lysine 100mg; Methionine 100mg.

Trm (Treatment)

The fish were fed twice daily at 5% body weight. It was mixed thoroughly in a bowl and hot water was added at interval to gelatinize starch and extruded. The moist pellets were spread and sundried for 24hours, packaged in tagged air tight polythene and stored in a dry place at room temperature. Samplings were done every two weeks to determine the growth response, survival rate and subsequently feed adjustment. Throughout the study, water profile analysis was carried out to ensure the quality of the water for the fish.

3. Results

The data of the composition of experimental diets and proximate value of Brewer's Dry Grain are presented in Tables 1 and 2 respectively, while table 3 showed the data for growth response of *Oreochromis niloticus* fingerlings fed graded level of brewer's dry grain with xylanase based diets and proximate composition of the fish respectively.

Table 2: Proximate Composition of Brewer's Dry Grain (g/100g Dry matter)

Parameter	Composition (%)
Dry matter	92.02
Crude Protein	23.20
Crude Fibre	19.76
Ether Extract	3.50
Ash	4.02
NFE	42.40
Gross Energy (kcal/kg)	2297

Table 3: Growth Response and Nutrient Utilization of *Oreochromis niloticus* Fingerlings fed graded Level of Brewer's Dry Grain with Xylanase Based Diets

Parameter	TRM 1	TRM 2	TRM 3	TRM 4	TRM 5	TRM 6	TRM 7	TRM 8	TRM 9	TRM 10
Mean initial weight	24.97± 0.92^{a}	24.98± 0.83^{a}	25.58± 0.30^{a}	25.34± 0.58^{a}	25.08± 0.34^{a}	25.54± 1.00^{a}	25.46± 0.98^{a}	25.49± 0.78^{a}	25.55± 0.76^{a}	25.59± 0.77^{a}
Mean final weight	64.45± 1.15^{a}	72.98± 0.29^{a}	75.77± 2.23^{a}	73.10± 0.44^{a}	70.35± 0.22^{a}	75.29± 3.94^{a}	74.58± 6.23^{a}	81.68± 1.15^{a}	73.13± 12.23^{a}	38.07± 22.58^{b}
Mean weight gain	43.84± 1.00^{b}	47.99± 0.82^{ab}	50.18± 2.35^{ab}	47.76± 0.16^{ab}	45.27± 0.15^{ab}	49.74± 3.13^{ab}	49.12± 7.19^{ab}	56.19± 1.20^{a}	47.58± 0.49^{ab}	17.08± 12.56^{c}
Growth rate	0.73± 0.02^{a}	0.80± 0.01^{a}	0.84± 0.04^{a}	0.55± 0.41^{ab}	0.76± 0.01^{a}	0.83± 0.05^{a}	0.82± 0.12^{a}	0.94± 0.02^{a}	0.59± 0.49^{ab}	0.28± 0.21^{c}
Specific growth rate	0.74± 0.03^{a}	0.77± 0.03^{a}	0.78± 0.02^{a}	0.77± 0.01^{a}	0.76± 0.01^{a}	0.78± 0.29^{a}	0.77± 0.08^{a}	0.84± 0.03^{a}	0.76± 0.14^{a}	0.14± 0.58^{b}
Feed conversion ratio	0.18±	0.18±	0.19±	0.19±	0.19±	0.18±	0.18±	0.16±	0.16±	0.54±

	0.00[a]	0.01[a]	0.01[a]	0.00[a]	0.01[a]	0.01[a]	0.02[a]	0.01[a]	0.02[a]	0.46[b]
Feed intake	7.98± 0.22[a]	8.83± 0.17[a]	9.19± 0.17[a]	8.90± 0.02[a]	8.55± 0.14[a]	8.80± 0.31[a]	8.88± 0.16[a]	9.14± 0.24[a]	7.80± 1.74[a]	5.25± 2.47[b]
Survival	100± 0.00[a]	100± 0.00[a]	100± 0.00[a]	100± 0.00[a]	100± 0.00[a]	100± 0.00[a]	91.67± 7.21[ab]	95.83± 7.21[ab]	87.50± 12.50[ab]	50.00± 33.07[b]

Means of same superscript in the same row are not significant

4. Discussion

It was observed in the study that there was no feed rejection during the experimental period, although the acceptability of the diets varied among the groups. There was no significant difference (P>0.05) in the initial weight of the fish, but at the end of the feeding trial, the final body weight and other parameters of the fish showed significant differences among the treatment. Treatment 8 recorded a slightly significant higher weight gain compared to treatment 2-7 and 9; though there was no significant difference (P>0.05) recorded in specific growth rate in most of the treatment except in treatment 4 and 9. Treatment 10 recorded an overall poor result in all the parameters. The feed intake and feed conversion ratio also recorded no significant (P>0.05) level in all the treatment except treatment 10. The survival of the fish fed experimental diets ranged from 87.50-100% in treatment 1-9, while treatment 10 recorded a 50% survival [6]. In a study to evaluate the growth performance of Nile tilapia fry fed all-plant protein diets reported that BDG resulted in good weight gain, and feed and protein efficiencies. Also, In juvenile hybrid tilapia (*O. niloticus x O. aureus*), lower weight gain, specific growth rate (SGR) and feed efficiency ratio (FER) in fish fed diets containing 30% BDG was obtained. [7]. Moreover, BDG contain substantial amount of yeast. It was estimated that 3.9% of total biomass of BDG was yeast, with 5.3% of the protein content of this product being contributed by yeast. Yeasts are also rich in protein, B-complex vitamins and β-glucan. β-glucan, either in purified form, as a yeast by-product or as live yeast have been reported to stimulate immune responses in human and animals, including fish. [8]

5. Conclusion

The study revealed that brewers' dry grain supplemented with recommended xylanase could be utilised to help in improving growth, nutrient utilization and cost of feed in the diet of *Oreochromis niloticus* fingerlings at an optimum inclusion level of 10% or 20% (with recommended enzyme ratio), and even at 30% (without enzyme inclusion) without any adverse effect.

6. References

1. Delgado CL. Outlook for fish to 2020, Meeting Global Demand, 2003, 28.
2. Fasakin EA. Fish as food yesterday, today and forever, Inaugural Lecture series 48, The Federal University of Technology, Akure, 2007, 52.
3. Akinrotimi OA. Influence of sex, acclimation methods and period on haematology of Sarotherodon melanotheron. Res. J. 2007b.
4. http://resourcedat.com/
5. http://www.businessdayonline.com/ng (2011)
6. Wu YV. Effect of diets containing various levels of protein and ethanol co-products from corn on growth of tilapia fry Journal of Agricultural Food Chemistry. 1996; 44:1491-1493.
7. Coyle SD. Evaluation of growth, feed utilization and economics of hybrid tilapia, Oreochromis niloticus x Oreochromis aureus, fed diets containing different protein sources in combination with distillers dried grains with solubles Aquaculture Research 2004; 35:1-6.
8. Ingledew WM. Under the microscope-Focal Points for the New Millennium-Biotechnology in the Feed industry. Proceedings of Alltech's 15th Annual Symposium. Nottingham University Press, Nottingham 1999, 27-47.