PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
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Pakistan Journal of Nutrition 7 (5): 686-688, 2008
ISSN 1680-5194

The Effect of Lyophilized Goat Testes Meal as First Feed on the Growth of '*Wesafu*': An Ecotype Cichlid of Epe-Lagoon, in Lagos State, Nigeria

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Abstract: A study was conducted to determine the possible sex inversion effect of lyophilized goat testes meal on hatchlings of '*Wesafu*'. Eighty-five fish and a control group were treated with the meal for forty days in an indoor facility and subsequently transferred into outdoor cages and monitored for growth, the result of manual sex ratio was not conclusive and gonad examination for sex ratio determination has been suspended until fish are big enough. Some mortalities (35%) were recorded during the treatment periods while the control group was intact (100%). The chemical composition of goat testes meal revealed a useful 47% protein and 1.23% oil and a good complement of mineral elements. After the initial 25day exposure of fish to GTM, there was no noticeable length difference (2.9cm) as compared to the control group (3.5cm). The lengths were also similar at 6.03cm and 6.07cm for GTM and the control group respectively after 25 days in outdoor green water culture. There were some non statistical differences in both weight and length of fish in the two groups with the test group clearly showing improvements in terms of length and weight indicating the influence of male hormone (testosterone in GTM) in maleness of the test group.

Key words: Lyophilize, goat testis meal, first feed, sex inversion, phenotypic male

Introduction

It still remains worrisome and sad that Nigeria with immense water resource and expertise does not have a thriving *Tilapia* industry. Also sad is the fact the academia seem to have given up on the *Tilapia* as a commercial culture species in Nigeria. The tilapias are well suited for our environment and low level of technological development. The ease of hypophysation of the African Mud Catfish and the inability of institutions to develop suitable commercial and improved strain of tilapias that will grow to table size in good time are few of the problems militating against a viable *Tilapia* industry in Nigeria.

The problem of precocious sexual maturity and unwanted reproduction has long been accepted as a major constraint to further development and expansion of *Tilapia* culture in Nigeria. The ease of reproduction, actually, represents the principal problem in the optimization of yield in*Tilapia* culture. Energy is diverted from growth, into the behavioral and physiological interactions between the sexes and into the production of eggs. Furthermore, unwanted reproduction leads to excessive recruitment (overpopulation), particularly in ponds, resulting in competition for available food and space resources.

Different techniques including manual sexing (Guerrero, 1982), stock manipulation (Swingle, 1960), polyculture of *Tilapia* with predatory fish (Lovshen, 1975), Hybridization (Hickling, 1960) prevention of breeding in cages and monosex culture (Shell, 1968) have been adapted to culture systems for *Tilapia*.

All-male tilapias have been produced by hybridization or by direct sex reversal (feeding of androgen hormones to sexually sex undifferentiated fry). Sex reversal is more successful and has been adopted in many commercial hatcheries but has yet to be widely adopted in developing countries.

When natural androgens are used the results have been variable. Haylor and Pascual (1991) prepared a diet for *O. niloticus*, which was 57% ram testes. They examined 27 fish and found 23 males and 4 intersex fish. Phelps *et al.* (1996) obtained a 65% male population using a diet, half of which was freeze dried bull testes. This present method used complete freeze-dried sample as food and immersion medium of androgen.

The objectives of this research were to determine; the efficacy of goat testes meal in *Tilapia* sex reversal, secondly, to also determine the utilization of the Goat testes as a feed source in comparison to commercial starter diet (coppers), using weight and length relationship.

Materials and Methods

Experimental Setup: The study was carried out at a private farm, located at Abia village in Badagry Local Government Area of Lagos State. One hundred and seventy five newly hatched ecotype Cichlid of Epe Lagoon "*Wesafu*" were collected from the buccal cavity of the brooding parent (female fish) on the 2nd of Aug 2005. The fish were divided into two-eighty five frys treatments in rectangular glass troughs of (42X24X6) cm. The study was conducted indoor to prevent the proliferation of algae and additional source of food during the initial 40 day treatment with GTM.

Table 1: Proximate and Mineral Composition of Goat testes

% Protein	% Fat	% Ash	% Fiber	Moisture Content
47.33	1.23	1.02	0.582	10.33
% Calcium (Ca)	% Magnesium (Mg)	% Potassium (k)	ppm Sodium (Na)	ppm Manganese (Mn)
1.74	0.29	2.972	6.11	0.67
Ppm Iron (Fe)	ppm Zinc (Zn)	ppm Copper (Cu)		
0.34	0.27	0.13		

NFE 29.54%

Table 2: Chemical Composition of Control Commercial (Coppers) Starter Fish Feed

% Protein	% Fat	% Ash	% Fiber	Vitamin C
56	15.5	9.0	0.4	300mg/kg
% Calcium (Ca)	% Phosphorus	% Lysine	Vitamin A	Vitamin D
18	1.5	3.7	22500lu (IE) /kg	2500lu (IE)/kg
Vitamin E	Copper ($CuSO_4$)	Selenium		
200mg/kg	500mg/kg	0.4mg/kg		

Source: ISO-9001 Certified Coppers label

Table 3: Days and Length Relationship of Sample Treatments

Days of treatment with Goat testes and their corresponding average length		Days of treatment with Coppers and their corresponding average length	
0 day	0.9	0 day	0.9
7 days	2.0	7 days	2.4
14 days	2.1	14 days	2.5
21 days	2.7	21 days	2.9
40 days	2.9	40 days	3.5

*Number of survival at the end of the 40 days of treatment was 55 (65%) for GTM while Coppers starter diet group had no mortality

Table 4: Length of Samples after 25 days of Feeding in Outdoor Tanks

	Goat Testes Meal	Coppers Starter Diet
Wk.1	6.5	6.1
Wk.2	5.8	6.3
Wk.3	5.5	6.1
Wk.4	6.4	5.9
Wk.5	6.2	6.0
Wk.6	5.8	6.0
Wk.7	6.1	6.0
Wk.8	6.0	5.8
Wk.9	6.0	6.3
Wk.10	6.0	6.2
Av.	6.03	6.07

Sample Collection and Diet preparation: Fresh goat testes were obtained from restaurants in the Lagos State University, Ojo. The fresh testes were immediately taken to the Fisheries laboratory where the Individual testis were skinned, sliced and completely homogenized without dilution.

The homogenized samples were then lyophilized in the Biochemistry laboratory after freezing the samples for a minimum of 24 hours. The extract was completely lyophilized within 48 hours and maintained the creamy colour of the homogenized sample. The resultant crumbs were used to feed the *Tilapia* frys exclusively for forty days.

Feeding Regime: The fries were fed ad libitum, a minimum of six times daily with the extract for forty days,

Table 5: Average Weight Range of the Sample Test and Control per Week

Week	Test Diet	Control
1	45.20	40.40
2	48.50	46.40
3	64.30	48.25
4	67.65	52.15
5	72.05	54.15
6	73.55	57.60
7	75.50	63.75
8	77.25	65.85
9	81.35	69.70
10	82.80	67.55
11	83.80	60.60
12	77.75	66.80
13	92.45	73.95
Total Average	72.47	59.01

and after the six weeks of indoor feeding; they are transferred into cages in the outdoor tank where they were fed with a commercial catfish feed [Coppers (0.5-0.8) mm].

Chemical Analysis: The proximate composition of the goat testes meal was determined at IITA (international institute of tropical agriculture) Ibadan, Oyo state. The sample meal was analyzed for moisture, crude protein, crude fiber, lipid, ash content and also for mineral composition; calcium, iron magnesium. The determination was carried out using standard methods of the association of official analytical chemist (AOAC, 1990).

Results

Table 1 and 2 show the chemical compositions of the goat testis meal (GTM) and the control (coppers) starter diet respectively. Table 3 shows the day-length relationships of the test and control diets in indoor facility while Table 4 shows the day-length relationships of the two groups in outdoor facility post indoor treatment.

The average body weight and total length of the specimen of *Wasafu* pick at random from the tank per week were calculated and presentation (Table 5 and 6).

Table 6: Average Total Length of Test and Control Sample

Wk1	Wk2	W3	Wk4	Wk5	Wk6	Wk7	Wk8	Wk9	Wk10	Wk11	Wk12
Sample	6.56	7.21	7.11	7.27	7.41	7.52	7.73	7.81	18.02	8.01	7.80
Control	6.51	6.61	6.85	6.79	6.81	7.05	7.47	7.14	7.27	7.35	7.80

Table 5 shows the growth responses of frys earlier fed with/without goat test meal for forty days and later raised on commercial diets for 13 weeks while Table 6 shows the average total length per week for the sample test and the control.

Discussion

The goat testes meal exposure (GTM) period was completed and the nursery-rearing phase initiated during the first week of September. Nursery rearing and gonadal sex determination was completed December 2005.

After the 40-d Goat testes treatment period, fry total length ranged from 2.5-2.9cm for the group fed with goat testes meal, and 3.0-3.5 cm for the control group, which were fed with coppers starter diet (Table 3).

Fry survival in the treatment sample group was 65%, while in the control group (group fed with coppers) it was 100%, that is, no mortality was recorded. With the 70% survival rate it shows that with Goat testes meal a desirable level of survival can be achieved in the indoor culture, contrary, to the opinion of Popma (1987) who reported a survival of 40% and concluded that higher level of survival might not be visible in the indoor culture. Table 1 and 2 show the Chemical Composition of the trial diets.

Also, after the 40 days treatment, it was clear that a better performance was recorded for the group fed with coppers. This should be expected, because of the lower protein composition of the goat testes meal and the coppers in Table 2 and Table 3 respectively, it seem that the coppers is of a better quality as starter diet. For fish to grow, in their early stages of development they require a lot of crude protein, which must be readily available. Coppen starter diet had 56% in terms of it crude proteins content while the goat testes meal was 47.33% CP. However to be able to use GTM as starter meal, some level of supplementation is required to boost its composition. Supplemented GTM would hold a lot of promise for the hatchery business with the difficulty being experienced with live fish foods in Nigeria.

Data collected after 25 days of feeding on similar diet in outdoor tanks indicated some level of success in achieving phenotypic maleness of the fish. The fish fed with the goat testes meal (GTM) grew faster, almost equal in length with the control group fed with coppers starter diet. This could be an indication of an all male fish emanating from the GTM starter group.

This is in agreement with the findings of Haylor and Pascual who fed ram testis meal and found it to support fish growth and phenotypic male in fish fed diets rich in ram testis meal for forty days.

The same group of fish were further fed indoors on commercial diet for additional 13 weeks. Table 5 and 6 show the weight and length relationships of the control and test feed trial and affirmed the earlier position of influence of male hormone in GTM in the outcome of the study. Lyophilized goat testes meal therefore hold lots of promise in Nigerias' aquaculture industry, however some quantification of the level of testosterone in the goat meal need be established.

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