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UTILIZATION AND GROWTH RESPONSE OF *C. GARIEPINUS* FINGERLINGS TO VARYING INCLUSION LEVELS OF LIVESTOCK VITAMIN GROWER'S PREMIX

By

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Abstract

A 70 day experiment was conducted to determine the correct level of inclusion of livestock vitamin premix in the diet of *Clarias gariepinus* fingerlings and to monitor the utilization efficiency and growth performance of the test fish.

One hundred and eighty fingerlings of *C. gariepinus* were randomly distributed to six treatments, each weighing 0.76 ± 0.05g. Thirty fingerlings per treatment were used. Each treatment had varying levels of livestock vitamin premix except the control that had no additional vitamin premix. Weighings of fish were done weekly and feed adjusted accordingly. The data collected were subjected statistically to descriptive and analysis of variance.

All the treatments were significantly different from each other and also from the control at ($P < 0.05$). The highest mean weight gain was recorded in treatment 5 (0.910) which had 2% premix inclusion. The carcass analysis showed T_5 with the highest crude protein level (64.43%). The highest daily and weekly mean weight gain were recorded in treatment 5; 0.013g and 0.130g respectively. The feed conversion ratio (FCR) was lowest in T_1 (2.147). The FCR for T_5 (2.535) was insignificantly different ($P < 0.05$) from T_1. The fish feed control had the best FCR.

T_5 had the best utilization and growth performance when the average weight gain and the carcass crude protein composition and energy were compared. The fat deposited in fingerlings fed T_5 were moderately (5.63) lower than treatment 6 with 5.86. It can be concluded that the fish fed treatment 5 will be less fatty than fish fed treatment 6 but more fatty than the fish fed the controls.

Key Words: Feed utilization, growth performance, *Clarias gariepinus* fingerlings, inclusion levels, vitamins growers premix.

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water quality on its aquatic environment and availability of suitable food. A lot of research has been done by fish nutritionists such as Bamimore (1993), Olaiya (1991), Faturoti *et al.* (1998), Omitoyin (1995), Olukunle (2004) and a host of others. Recently, interest is shifting to micro-nutrients. Omobolanle unpublished (2000) worked on a recently introduced Bio-organics vitamin premix. However, this new product is not widely available in contrast to the livestock vitamin premix which has saturated the market, hence the present research to investigate.

(i) the correct inclusion level of the widely available livestock vitamins as a vitamin premix for *C. gariepinus*

(ii) to determine the growth performance of *C. gariepinus* on this vitamin premix.

(iii) To determine the survival level of *C. gariepinus* fed diets with varying levels of livestock vitamin premix inclusions.

(iv) To determine its economic value in relation to the new products (Bio-organics vitamin premix).

Materials and Methods

The feeding trials were designed to consist of six treatments with different inclusion levels of livestock (growers) vitamin premix ranging from 0.0% through 0.5%, 1.0%, 1.5%, 2.0% and 2.5% respectively. The premix was varied with respect to wheat offal.

Each treatment was in triplicates. The feed ingredients were purchased from a reputable neighbourhood feed mill. The diets were milled, compounded and weighed out as shown in Table 1. The different diets were thoroughly mixed and each made into a dough like paste with hot moisture. The dough was pelleted and sun-dried over a period of two days. The dried feeds were packed into six different air-tight containers and kept in a cool, dry place until used.

The experiment was conducted over a period of 70 days using eighteen plastic aquaria for the six treatments. Each treatment had 30 fingerlings of *C. gariepinus* distributed at the rate of 10 fingerlings per tank. Each tank had 10 litres of water changed on alternate days by siphoning the feed and excretory products and a complete change of water was done weekly.

Table 1: Experimental Feed Composition (%)

Ingredients	Treatments (g/100g)					
	T_1	T_2	T_3	T_4	T_5	T_6
Fishmeal	33.98	33.98	33.98	33.98	33.98	33.98
Soyabean Meal	16.99	16.99	16.99	16.99	16.99	16.99
Groundnut Cake	16.99	16.99	16.99	16.99	16.99	16.99
Maize	19.37	19.37	19.37	19.37	19.37	19.37
Wheat offal	9.68	9.18	8.68	8.18	7.68	9.18
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Oyster shell	0.50	0.50	0.50	0.50	0.50	0.50
Salt	0.50	0.50	0.50	0.50	0.50	0.50
Livestock Vitamin Premix	0.00	0.50	1.00	1.50	2.00	2.50
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 2.0: Composition of Agrited (Nigeria) Ltd growers vitamin Premix (2001)

Vitamin	Amount of dry complete ration per (2.5kg)	Amount of dry complete ration per 1.0kg.
Vitamin A	7,000,000i.μ	2,800,000i.μ
Vitamin D	1,400,000i.μ	1,400,000i.μ
Vitamin E	5,000i.μ	2,000i.μ
Vitamin K	2.2g	0.88g
Thiamine – B_1	1.5g	0.60g
Riboflavin – B_2	4.8g	1.92g
Pyridoxine – B_6	1.5g	0.6g
Vitamin – B_{12}	10mg	4mg
Biotin	20mg	8mg
Niacin	15mg	6mg
Panthothenic acid	5.0mg	2mg
Folic acid	0.5mg	0.2mg
Manganese	75g	30g
Zinc	45g	18g
Ion	20g	8g
Copper	5g	2g
Iodine	1g	0.4h
Selenium	100mg	40mg
Cobalt	200mg	80mg
B.H.T	120mg	48mg
Choline Chloride	100g	40g

Supplementary aeration was introduced through air pumps and the fish were prevented from jumping out by covering the experimental tanks with synthetic nets.

Results and Discussion

The proximate composition of the experimental feed is shown in Table 3.0. The experimental feed used for the six treatments had varying levels of livestock vitamin premix T_1 (0%), T_2 (0.50%), T_3 (1.00%), T_4 (1.50%), T_5 (2.00%), and T_6 (2.50%).

Results of the proximate composition of initial and final carcasses of the experimental fish samples are shown in Table 4.0. The results showed that all the treatments (1 – 6) improved on their protein content over the initial (57.20%). There was a general decrease in percentage moisture content which decreased inversely with increasing fat content of the fish carcasses. This is similar to observations of Jauncey (1982), Falaye (1988) and Olukunle (1996). The energy content of the experimental fish carcasses decreased from the initial (12.95) to sample T_6 (0.47) except in the control (T_1) where it increased slightly to (13.72).

In the other parameters CF, CL and ash there was a general increase in value over the initial except for treatment 1 that the ash content decreased insignificantly over the initial.

Table 5.0 shows the result of the growth performance and nutrient utilization of *C. gariepinus* fingerlings fed the graded livestock vitamin premix. The final weight, the daily mean weight gain, the mean weight gain, the total weight gain are significantly higher ($P < 0.05$) in all the treatments than the initial. However the FCR of the control is significantly lower ($P \leq 0.05$) than the other treatments while treatments 2 (2.49) 4 (2.52) and 5 (2.54) are insignificantly ($P \leq 0.05$) different from each other. The FCR of treatment 3 (3.94) and treatment 6 (3.42) were observed to be unusually high while their percentage survivals 3 (70.00), 6 (66.70) were significantly lower compared to other treatments which were 1(73.30), 2 (80.00), 4 (83.30), 5 (80.00) respectively. Final mean weight gain, Daily Mean Weight gain, total weight gain were the highest with better percentage survival in fish fed

treatment 5 (with premix addition of 2.0g/100g feed) than the control without vitamin premix addition.

Table 3: Proximate Composition of the Experimental feed (g)

Crude Protein	42.01
Crude fibre	12.32
Fat	3.56
Ash	8.41
Moisture Content	12.48
Nitrogen Free Extract	21.22
	100.00

Table 4.0: Proximate Composition of Initial and Final Carcass of Experimental Fish (%)

	Initial Samples	Final fish Samples in treatments					
		T_1	T_2	T_3	T_4	T_5	T_6
Crude Protein (CP)	57.20	61.44	62.58	63.01	63.82	64.43	64.23
Crude Fibre (CF)	4.73	5.39	6.46	7.13	8.62	8.91	9.09
Nitrogen Free Extract	12.95	13.72	9.82	6.92	3.92	1.00	0.47
Crude Lipid (CL)	4.18	4.23	4.83	5.03	5.30	5.63	5.86
Ash	7.35	7.15	7.76	8.18	8.59	9.17	9.42
Moisture Content	13.59	8.09	8.55	9.83	10.11	10.86	10.93

Table 5.0: Growth Performance and nutrient utilization of *Clarias gariepinus* fingerlings fed graded levels of livestock vitamin premix (g) and comparative costing (₦ : K)

	Treatments							
Parameters measured	1	2	3	4	5	6	Mean	S.E
% Livestock Vitamin Premix additions	0.00	0.50	1.00	1.50	2.00	2.5		
Experimental days	70	70	70	70	70	70	70	
No. of fish stocked	30	30	30	30	30	30	30	
% Survival	73.30^a	80.00^b	70.00^c	83.30^d	80.00^b	60.70^e	75.55	±0.48
Initial mean weight	0.60^a	0.47^b	0.90^c	0.53^d	0.82^e	1.21^f	0.76	±0.05
Final Mean Weight (g)	1.35^a	1.24^b	1.59^c	1.31^a	1.73^d	0.07^e	1.55	±0.07
Daily Mean Weight (g)	0.011^a	0.011^a	0.010^a	0.001^b	0.013^c	0.120^a	0.03	±0.01
Mean Weight Gain	0.75^a	0.79^a	0.69^a	0.78^a	0.91^c	0.86^b	0.79	±0.05
Total Weight Gain (g)	2.25^a	2.31^a	2.07^b	2.34^a	2.73^d	2.58^c	2.38	±0.09
Total Percent Wt. gain (g)	125.00^a	123.50^b	76.69^c	147.17^d	110.98^e	71.07^f	109.07	±0.58
Total Feed Intake (g)	4.83	4.43	5.63	4.59	6.30	7.59	5.56	±0.13
Feed Conversion Rate	2.15^a	2.49^b	3.94^d	2.52^b	2.54^b	3.42^c	2.84	±0.09
% Livestock Vitamin Premix	0.0	0.5	1.0	1.5	2.0	2.5		
Costing								
Bio-organics ₦100:00/kg	-	₦500	₦1000	₦1500	₦2000	₦2500		
Livestock Vitamin Premix ₦320:00/kg	-	₦160	₦320	₦480	₦640	₦300		

Recommendation

The result showed that livestock vitamin premix with the composition as shown in Table 2.0 can be added to diets of *Clarias gariepinus* fingerlings to improve the mean and the total weight gain. The optimum vitamin premix inclusion level was 2.0g/100g in the feed as shown by Diet 5 which gave the highest mean and total weight gain in *C. gariepinus* fingerlings.

Table 5 gives the costing of the livestock vitamin premix and a vitamin premix branded Biorganics newly introduced into the Nigerian aquaculture. The comparison of costing shows that using the livestock vitamin premix at 2.00g/100g of feed is cheaper than using the premix concentrate at 1.00g/100g feed. The recommended rate of 0.5g/100g on the label has to be subjected to feeding experiments to be compared and recommended. However, the livestock vitamin premix has one added advantage in that it is sold at most feedmills in most towns as well as in rural areas where agricultural chickens are sold in Nigeria.

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