EFFECT OF FEEDING RATES AND FREQUENCIES ON GROWTH PERFORMANCE, FEED EFFICIENCY AND BODY COMPOSITION OF AFRICAN CATFISH, *CLARIAS GARIEPINUS* (BURCHELL)

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Abstract

African catfish *Clarias gariepinus* (average initial weight 3.46 ± 0.08g) were fed a diet containing 32% crude protein (284.61 kcal DE/100g) and raised in 18 aquariums (75 litters each) at stoking density of 25 fish per aquarium with three replications per treatment for 90 days using a 3×2 factorial experiment design. The two factors evaluated were: daily feeding rates (2%, 3% and 4% body weight /day) and feeding frequencies once per day at 900 or Twice per day divided into two equal parts at 900 &1500 hr.

The results indicated that fish at the feeding rate 4% BW/day, twice per day showed significantly ($P < 0.05$) increase in body weight gain, survival rate, hepato somatic index and carcass composition of dry matter, ether extract and gross energy. Fish fed at a rate 2% BW/day once and twice per day were significantly decreased most response variable but fed intake, fed conversion and PER were improved as comparison with another treatments.

Regardless of feeding frequencies increasing daily feeding rate from 2 to 4% BW/day significantly ($P < 0.05$) improved body weight gain, survival rate, HSI and carcass composition of dry matter, ether extract and gross energy; however, there were no significant differences in specific growth rate, fed conversion, PER and carcass composition of crude protein between fish fed 3 and 4% BW/day. Also, fish fed twice per day had significantly better body weight gain, SGR, survival rate, fed conversion, PER and carcass composition of dry matter & ash.

The present study revealed that optimum feeding rates and feeding frequencies for African catfish (an initial weight of 3.64 ± 0.08 g) were 4% BW/day offered twice daily.

Keywords: African catfish, feeding rates, feeding frequencies, growth performance, feed efficiency, body composition.

INTRODUCTION

More than 100 species of the genus *Clarias* have been described in Africa, species of *C. gariepinus* (Burchell, 1822), synonymous with *C. lazera*, is the most important for aquaculture. It has an almost pan-African distribution, from the Nile to West Africa and from Algeria to Southern Africa (Teugels 1984). African catfish can survive in extremely poor conditions from fingerling stage after development of accessory respiratory organ; this high tolerance of African species makes it possible to stock it at significantly higher stocking densities than any other fish species. High environmental tolerance and wide food spectrum are the main reasons why African catfish is excellent for tropical and subtropical pond fish culture (Haylor, 1989). Channel catfish can be raised in still waters, floating water raceways, tanks, troughs, pens or cages. These fish can utilize wet or dry feeds as meals, sinking pellets, floating pellets, blocks or crumbles (Brown, 1977).

Since diet cost represents 30-70% of the total operating cost of an aquaculture enterprise (Webster, *et al.* 2001), determination of the appropriate daily feeding rate and frequency required to give optimal growth and feed efficiency could reduce the amount of diet fed, decrease the amount of time involved in feeding, and may increase profits. Results of feeding studies with channel catfish suggest feeding rate or frequency my significant influence growth rate and body composition. Hogendoorn (1981) and Hogendoorn, *et al.* (1983) reported that a daily ratio of 10% BW/d was optimum for juvenile channel catfish, *C. gariepinus* (average body weight 0.5 g). Also, Anderson and Fast (1991) reported that, optimum growth of *C. fuscus* with 6% feeding rate at 25°C. Al-Hafedh and Ali (2003) compared different feeding rates (2, 4, 6, 8 and 10% BW/day) for juvenile *C. gariepinus* (average weight 0.64–65.4 g), for 112 days, how reported that, although a feeding rate of 10% BW/day gave the highest yield, fish should be fed at the rate of 6% BW/day, taking growth, feed conversion efficiency, survival rate and minimum cannibalism into account. Robinson and Li (2007) revealed that, feeding channel catfish every other day to satiation improves

feed efficiency and reduces aeration time, but weight, carcass yield, and fillet yield are reduced compared with fish fed daily to satiation. In addition Lovell (1989) noted that, channel catfish fed twice daily had higher 20% of feed consumption and a comparably faster rate of growth than fish fed once daily. Li, *et al.* (2005) found that, channel catfish fed twice daily had higher carcass and fillet yields than fish fed once daily.

However, Overfeeding is wasteful financially and could adversely affect water quality. As the African catfish industry expands, there is a need to know what feeding rate and frequency is optimal, both body quality and in terms of production. This study was conducted to evaluate the influence of feeding rates and frequencies on the growth performance, feed efficiency and body composition of African catfish fry (3.46g).

MATERIALS AND METHODS

(This study was conducted at the Central Laboratory for Aquaculture Research (CLAR), Abbassa, Sharkia Governorate, Egypt)

Experimental design

The experimental facility consisted of 18 glass Aquaria (75 – 60 – 45cm in diameters). Each aquarium was supplied with aerated and dechlorinated tap water, which was stored in tanks for 24 hours and aerated by air pump (Model-Rina 301) during the experimental period. The water rate was maintained to a fixed rate by the addition of new well-aerated dechlorinated fresh water. Six treatments (daily feeding rates × daily feeding frequencies) 3×2 factorial experimental design were evaluated. The two factors evaluated were: daily feeding rates (2%, 3% and 4% BW/day of total biomass) and feeding frequencies once per day at 900 or twice per day divided into two equal parts at 900 &1500 hr.

Fish and feeding regime

African catfish *Clarias gariepinus* fry with an average initial weight 3.46 ± 0.08gm, were transferred from Hatchery (CLAR), to the wet lab of (CLAR) and acclimatized

in fiberglass tanks for three weeks before to be used in the experiment Fish were randomly allocated into the aquaria (25 fish / aquarium). Each treatment was represented in three aquariums (3 replicates).

Fish were fed diet containing 32% crude protein and 284.61 kcal DE/100g, particle sizes of 0.8 mm in diameter for 90 days. The amount of feed was calculated and readjusted every 15 days according to change in the body weight. Composition and proximate analysis of the experimental diet are shown in Table (1). At the end of the experiment, fish in each aquarium were counted and weighed, growth parameter and feed utilization were calculated .Also, analysis of diet and fish fore moisture, crude protein, fat and ash were determined by standard methods according to AOAC (1990), while nitrogen free extract was calculated by difference, nitrogen free extract = 100 — (moisture + protein + lipid + fiber +ash) . Also the gross energy (kcal/kg diet) was calculated using factor 5.64, 9.44 and 4.11 for crude protein, fat and carbohydrate, respectively according to NRC (1993).

Data calculation

Daily weight gain = $(W_1 - W_0) \div T$

Specific growth rate (%) = $[(Ln_{w1} - Ln_{w0}) \div T] \times 100$.

Where: Ln = natural log, W_0= Initial body weight (g), W_1= Final body weight (g) and T= Time (day)

Protein efficiency ration (%) = Body weight gain ÷ protein intake

Feed intake = Total feed intake during the whole experimental period

Feed conversion ratio = Feed consumed (g) / Total weight gain (g).

Hepato somatic index (HSI) = [liver weight ÷ fish weight] × 100

Survival rate (%) = (Fish No. at the end ÷ Fish No. stocked at the beginning)/100

Statistical analysis

Statistical analysis was performed using the Analysis of variance (ANOVA) tow way classification and Duncan's multiple Range Test, Duncan (1955) to

determine differences between treatments means at significance rate of $P < 0.05$. The standard errors of treatment means were also estimated. All statistics were carried out using Statistical Analysis System (SAS) program (SAS, 2000).

RESULTS AND DISCUSSION

Growth performance

The average value of growth performance of African catfish as affected by the interaction due to daily feeding rate and frequency are presented in Table (2). Results obtained indicated that fish feeding rate 4% divided into two equal parts twice per day had significantly ($P < 0.05$) increased final body weight (38.24), bodyweight gain (34.67gm), survival rate (98.96%), hepato somatic index (3.05%) and differences were not significant ($P < 0.05$) in SGR from those fish feeding 3% twice per day. In general; the lower significant value ($P < 0.05$) of final body weight, body weight gain, SGR survival rate, HSI were obtained by fish feeding rate 2% once or twice per day. These data are in supported by Robinson, (1994); Robinson and Li (1999); Robinson, *et al.* (2004) and Li, *et al.* (2004, 2006) in that the production tends to be highest significantly when channel catfish are fed daily to apparent satiation than those fish fed once every other day and restricted feeding. In pervious another fish species, Schnaittacher, *et al.* (2005) found that, juvenile Atlantic Halibut displayed improved growth rates when fed to satiation 5 times/d, compared with 1/d. Giberson and Litvak (2003) established that Shortnose Sturgeon grew significantly better when offered a food ration at a rate of 3% of the tank biomass divided into 4 or 8 feedings/d. On other hand Guen, *et al.* (2004) suggested that feeding to satiation once a day resulted in optimum growth performance when compared with 1 meal every 2 d or 2 meals/d by Black Rockfish. This difference my be due to the variation in culture and fish size.

The average value of growth performance of African catfish as affected different daily feeding rate is given in table (3). Results obtained showed that, increasing daily feeding rate from 2 to 4% significant increased live body weight,

body weight gain, survival rate, HIS except SGR which was not significant differed among those fish feeding rat 4 and 3%. These results showed the same trend of those obtained by Jackson, *et al.* (2003), how showed that in two strains catfish, feeding to satiation increased significantly weight gain and SGR, than restricted feeding (2/3 satiation rate) and not significantly affect survival rate. Al-Hafedh and Ali (2004) stated that, the best growth performance was recorded for the fish fed at 8–10% of body weight, followed by the fish fed at 4–6% in African catfish (average weight 0.64–65.4 g); poorest growth was found for those fed at the 2% feeding rate. Also survival was significantly higher in fish fed at 6–10% of body weight than those fed at 2–4%.

The average values of growth performance of African catfish as affected by two daily feeding frequencies (once or twice per day) are presented in table (4). Results obtained indicated that, fish fed twice per day showed significant increase in all growth performance parameters; however HSI was not significantly differed from those fish fed once per day. These results are in agreement with Robinson and Li (2007), who reported that, net production of channel catfish was reduced by 16% when the fish were fed every other day compared with fish fed daily. On the other hand Jarboe and Grant (1997) found that, no significant differences were observed between smaller channel catfish fed once or twice per day in weight gain, SGR and survival rate, whereas the mean weight gain of the larger channel catfish in the treatments receiving two daily feeding frequencies was 10 to 15% greater than channel catfish in multipass system fed once daily additional improve significantly SGR. Li, *et al.* (2005) revealed that, gain per fish and estimated survival of Channel catfish fingerlings (initial weight 22 g/fish) not influenced by feeding frequencies once or twice per day.

Feed efficiency

In general feed intake, feed conversion and PER were improvement significant ($P < 0.05$) as feeding rate was decreased from 4% to 2% at two feeding frequency as showed in table (2). Whoever, the best significant ($P < 0.05$) value of feed conversion (1.11) and PER (2.81) were recorded for fish feeding

rate 2% twice per day. These data are partly supported by those of Li, *et al* (2004, 2006) in that feed conversion ratio (FCR) is improved when channel catfish are fed less than daily. Robinson and Li (1999) and Robinson, *et al.* (2004) found that, lower feeding rate was improved significantly feed conversion ratio of channel catfish are fed daily. On other hand Guen, *et al.* (2004) suggested that Black Rockfish feeding to satiation once a day resulted in optimum food utilization when compared with fish fed 1 meal every 2 day or 2 meals/day.

The average value of feed efficiency African catfish as affected different daily feeding rate are revealed in table (3). It was observed that, feed intake was decreased significant by decreased feeding rate from 4 to 2% but no significant deference in feed conversion and PER were obtained by fish feeding rate 4 and 3%. These results are agreement with Jackson, *et al.* (2003) how showed that, food conversion was increased significantly in two strain catfish fed restricted (2/3 satiation). In this concern how added that, the lower feed efficiency by satiation group was likely due to wasted feed of insatiate group rather than an actual reduction in feed utilization, at the same study catfish strain 1 and 2 fed restricted ration consumed 59 and 50% of the diet consumed by satiation respectively. Al-Hafedh and Ali (2004) revealed that, FCR of African catfish significantly increased from 1.14 to 2.98 by increasing feeding rate from 2 to 10 % BW/d respectively. In addition Feed conversion of channel catfish fed to satiation was higher than that of fish under restricted feeding (Li and Lovell. 1992).

The average values of feed efficiency African catfish as affected by different daily feeding frequency are revealed in table (4). Fish feeding twice per day showed the best significant value of feed conversion (1.31) and PER (2.45), and there were no significant differences from fish fed once per day in feed intake. These results are completely agreement with those obtained by Jarboe and Grant (1997) who found that, the mean food conversion of channel catfish feeding frequency twice per day was lower significantly 15% than fish fed once per day. Also Robinson and Li (2007) found that, Channel catfish fed every other day converted feed more efficiently (11%) than those fish fed daily. On other hand Li,

et al. (2005) found that, Feed conversion ratio decreased in fish fed once daily in the morning compared to fish fed once daily in the afternoon or twice daily by catfish.

Carcass composition

The average values of carcass composition of African catfish as affected by the interaction due to daily feeding rate and frequency at the end of the experimental period are presented in Table (5). The obtained results revealed that, an increase in the feeding rate at the two feeding frequencies (once or twice per day) resulted in a significant increase in carcass dry matter, crude protein, ether extract and gross energy content, however it had adverse effect in carcass ash. Fish feeding rate 4% twice per day resulted the higher significantly of dry mater content (24.88), crude protein (66.2), ether extract (16.46) and gross energy (524.94) also in lower content of ash (16.9). These results are in a partial agreement with Li, *et al.* (2004, 2006) how reported that Catfish fed to satiation on a daily basis tend to contain more fillet fat and dry matter than fish fed every other day, also fillet yield was reduced in fish fed every other day as compared with those fed daily while no significant differences were found in fillet protein. Results obtained by Robinson (1994) and Robinson, *et al.* (2004), were take the same trend for channel catfish fed daily in different feeding rates.

Results presented in table (6) showed that, fish feeding rate 4% had significant higher dry matter, crude protein, ether extract and gross energy body contents, however it had significant lower of ash body content, and there were no significant differences from fish fed at a rate of 3% in crude protein. In this concern Jackson, *et al.* (2003) stated that, fillet dry matter, ash and crude protein were not influenced by feeding rate in two strains catfish, whereas fat was increased significantly by fish fed to satiation than restricted group, also how noted that, generally the slower growth resulting from reduced feed and energy consumption for restricted group would reduce body fat deposition. Li and Lovell (1992) reported that, fat content of channel catfish fed to satiation was higher than that of fish fed at the restricted rate.

Data illustrated in table (7) showed that, fish fed twice per day was significant higher body content of dry mater (22.75), however it had lower significant body content of ash (17.90), and there no significant differences from fish fed once per day in body content crude protein, ether extract and gross energy. These results are in a partial agreement with that of Robinson and Li 2007, who reported that, body composition of channel catfish, was similar when the fish were fed every other day compared with fish fed daiiy, while carcass, fillet, and nugget yields were reduced in fish fed every other day compared with fish fed daily. Jarboe and Grant (1997) reported that, the body composition of channel catfish in multipass system was unaltered by feeding frequencies. (Li, *et al.* 2005) found that, fillet proximate composition of channel catfish was unaltered significantly in fed once daily in the morning compared to fish fed once daily in the afternoon or twice daily.

In conclusion, the results of this study suggest that the optimum feeding rate of African catfish fry with an average initial weight of about 3.64 g ± 0.08 is at 4% of body weight divided into two equal parts per day.

Table 1. Composition and chemical analysis of the experimental diet.

Composition	% dry weight
Fish meal	8
Soybean meal	30
Corn ground	41.3
Wheat bran	15.65
Dicalcium phosphate	1
Caboxy methyl cellulous	2
Fat	1.5
*Mineral mix	0.25
*Vitamin mix	0.25
Vitamin C	0.05
Total	100.00
Chemical analysis (on dry matter basis)	
Crude protein	32
Ether extract	6.73
Crude fiber	6.69
Ash	7.34
Nitrogen free extract	47.24
**Gross energy kcal/100g	438.17
***Digestibility energy kcal/100g	284.61

*Each 100 gram of vitamin and mineral contained:
Mineral : Zn, 2.50 mg; Mn, 16.00 mg; Fe, 31.50 mg; Cu, 5.50; I, 0.55 mg; Ca, 1.15 gm and P, 450 mg. Vitamins : A, 7500000 Iu; Bi, 100 mg; B3, 500 mg; B6, 150 mg; B12, 2.5 mg; E, 100 mg; K, 100 mg; Pantothnic acid, 275 mg; Folic acid, 100 mg and vit. D3, 7500 Iu.
**(kcal/100g diet); based on 5.64 kcal/g protein, 9.44 kcal/g lipid, and 4.11 kcal/g carbohydrate. NRC (1993)
***(kcal/100g diet); based on 3.5 kcal/g protein, 8.1 kcal/g lipid, and 2.5 kcal/g carbohydrate. NRC (1977)

Table 2. Growth performance and feeding efficiency for African catfish as affected by the interaction due to different daily feeding rates and frequencies during the whole experimental period (90 days).

Treatments		Items								
Feeding rates	Feeding frequencies	Initial body weight	Final body weight	Body weight gain	SGR	Survival rate	HSI	Feed intake	Feed conversion	PER
2%	Once	3.64 ± 0.25^{a}	21.59 ± 0.65^{e}	17.95 ± 0.42^{e}	1.98 ± 0.05^{d}	93.55 ± 0.51^{c}	2.01 ± 0.05^{d}	21.24 ± 0.10^{c}	1.18 ± 0.02^{c}	2.64 ± 0.03^{a}
	Twice	3.25 ± 0.13^{a}	23.91 ± 0.48^{e}	20.66 ± 0.61^{de}	2.22 ± 0.07^{cd}	94.12 ± 0.31^{c}	2.22 ± 0.06^{c}	22.93 ± 0.23^{c}	1.11 ± 0.01^{c}	2.81 ± 0.06^{a}
3%	Once	3.50 ± 0.21^{a}	27.02 ± 0.28^{d}	23.52 ± 0.23^{d}	2.27 ± 0.06^{bc}	96.14 ± 0.72^{b}	2.30 ± 0.08b^{c}	36.45 ± 0.63^{b}	1.55 ± 0.11^{a}	2.02 ± 0.02^{c}
	Twice	3.19 ± 0.05^{a}	30.94 ± 0.62^{c}	27.75 ± 0.67^{c}	2.52 ± 0.04^{ab}	97.15 ± 0.39^{b}	2.40 ± 0.03^{b}	38.57 ± 0.57^{b}	1.39 ± 0.02^{b}	2.25 ± 0.02^{b}
4%	Once	3.43 ± 0.28^{a}	34.71 ± 0.93^{b}	31.28 ± 1.17^{b}	2.57 ± 0.11^{a}	97.22 ± 0.41^{b}	2.43 ± 0.07^{b}	47.47 ± 1.21^{a}	1.52 ± 0. 04^{a}	2.06 ± 0.12b^{c}
	Twice	3.75 ± 0.11^{a}	38.42 ± 0.85^{a}	34.67 ± 0.78^{a}	2.59 ± 0.02^{a}	98.96 ± 0.20^{a}	3.05 ± 0.06^{a}	48.06 ± 1.11^{a}	1.39 ± 0.02^{b}	2.25 ± 0.01^{b}

Means with different superscript letters within a column are significantly different ($P<0.05$).

Table 3. Growth performance and feeding efficiency for African catfish as affected by different daily feeding rates during the whole experimental period (90 days).

Treatments	Items								
Feeding rates	Initial body weight	Final body weight	Body weight gain	SGR	Survival rate	HSI	Feed intake	Feed conversion	PER
2%	3.45 ± 0.15^{a}	22.75 ± 0.63^{c}	19.30 ± 0.69^{c}	2.10 ± 0.06^{b}	93.84 ± 0.30^{c}	2.12 ± 0.06^{c}	22.08 ± 0.39^{c}	1.14 ± 0.03^{b}	2.73 ± 0.06^{a}
3%	3.35 ± 0.12^{a}	29.48 ± 0.72^{b}	26.13 ± 1.00^{b}	2.42 ± 0.06^{a}	96.68 ± 0.44^{b}	2.35 ± 0.04^{b}	37.51 ± 0.61^{b}	1.44 ± 0.04^{a}	2.18 ± 0.08^{b}
4%	3.59 ± 0.15^{a}	36.57 ± 1.00^{a}	32.98 ± 0.98^{a}	2.58 ± 0.05^{a}	98.06 ± 0.45^{a}	2.74 ± 0.14^{a}	47.77 ± 0.75^{a}	1.45 ± 0.09^{a}	2.16 ± 0.05^{b}

Means with different superscript letters within a column are significantly different ($P<0.05$).

Table 4. Growth performance and feeding efficiency for African catfish as affected by different daily feeding frequencies during the whole experimental period (90 days).

Treatments	Items								
Feeding frequencies	Initial body weight	Final body weight	Body weight gain	SGR	Survival rate	HSI	Feed intake	Feed conversion	PER
Once	3.52 ± 0.13^{a}	28.11 ± 1.92^{b}	24.59 ± 1.97^{b}	2.29 ± 0.09^{b}	95.61 ± 0.60^{b}	2.25 ± 0.07^{a}	35.25 ± 3.9^{a}	1.43 ± 0.08^{a}	2.22 ± 0.10^{b}
Twice	3.40 ± 0.10^{a}	31.09 ± 2.12^{a}	27.69 ± 2.05^{a}	2.44 ± 0.06^{a}	96.77 ± 0.73^{a}	2.56 ± 0.13^{a}	36.32 ± 3.6^{a}	1.31 ± 0.05^{b}	2.45 ± 0.09^{a}

Means with different superscript letters within a column are significantly different ($P<0.05$).

Table 5. Carcass composition for African catfish as affected by the interaction due to different daily feeding rates and frequencies at the end of the experimental period (90 days).

Treatments		Items				
Feeding rates	Feeding frequencies	Dry matter	Crude protein	Ether extract	Ash	Gross energy
2%	Once	20.21 ± 0.26^{d}	63.66 ± 0.32^{c}	14.5 ± 0.10^{c}	19.05 ± 0.10^{a}	495.92 ± 2.79^{c}
	Twice	20.71 ± 0.12^{c}	63.81 ± 0.33^{c}	14.56 ± 0.20^{c}	19.00 ± 0.08^{a}	497.33 ± 3.08^{c}
3%	Once	22.65 ± 0.10^{b}	65.02 ± 0.26^{b}	15.12 ± 0.27^{b}	18.22 ± 0.05^{b}	509.45 ± 2.6^{b}
	Twice	22.88 ± 0.15^{b}	65.81 ± 0.49^{ab}	15.37 ± 0.12^{b}	17.81 ± 0.07^{c}	516.26 ± 2.64^{b}
4%	Once	23.00 ± 0.07^{b}	66.01 ± 0.31^{a}	16.17 ± 0.38^{a}	17.18 ± 0.14^{d}	524.94 ± 4.9^{a}
	Twice	24.88 ± 0.08^{a}	66.2 ± 0.50^{a}	16.46 ± 0.14^{a}	16.9 ± 0.04^{d}	528.75 ± 4.15^{a}

Means with different superscript letters within a column are significantly different (P<0.05).

Table 6. Carcass composition for African catfish as affected by different daily feeding rates at the end of the experimental period (90 days).

Treatments	Items				
Feeding rate	Dry matter	Crude protein	Ether extract	Ash	Gross energy
2%	20.46 ± 0.17^{c}	63.74 ± 0.21^{b}	14.53 ± 0.10^{c}	19.03 ± 0.06^{a}	496.63 ± 1.88^{c}
3%	22.77 ± 0.10^{b}	65.42 ± 0.30^{a}	15.25 ± 0.14^{b}	18.02 ± 0.10^{b}	512.85 ± 2.25^{b}
4%	23.94 ± 0.42^{a}	66.11 ± 0.27^{a}	16.32 ± 0.19^{a}	17.04 ± 0.09^{c}	526.85 ± 3.00^{a}

Means with different superscript letters within a column are significantly different (P<0.05).

Table 7. Carcass composition for African catfish as affected by different daily feeding frequencies at the end of the experimental period (90 days).

Treatments	Items				
Feeding frequencies	Dry matter	Crude protein	Ether extract	Ash	Gross energy
Once	22.03 ± 0.46b	64.90 ± 0.37a	15.26 ± 0.28a	18.15 ± 0.28a	510.10 ± 4.56a
Twice	22.75 ± 0.60a	65.27 ± 0.43a	15.46 ± 0.29a	17.90 ± 0.31b	514.12 ± 4.86a

Means with different superscript letters within a column are significantly different (P<0.05).

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تأثير المعدلات المختلفة من التغذية وتكراراتها على صفات النمو والكفاءة الغذائية وتركيب الجسم لأسماك القراميط الأفريقية

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المعمل المركزي لبحوث الثروة السمكية بالعباسة

اسماك القراميط الأفريقية (متوسط وزن ابتدائي ٣،٤٥ ± ٠،٠٨جم) غذيت بعليقه تحتوى ٣٢% بروتين خام (طاقة مهضومة ٢٨٤،٦١ كيلو كالورى/١٠٠جم علف) وزعت على ١٨ حوض زجاجي سعة الحوض ٧٥ لترفى كل حوض ٢٥ سمكة في ثلاثة مكررات باستخدام التحليل العاملى ٣×٢ لمدة ٩٠ يوم. تم تقييم عاملين: معدل التغذية اليومي بمعدلات ٢% و٣% و٤% من وزن الجسم كل يوم، و تكرار التغذية، حيث غذيت كمية العلف كلها مرة واحدة الساعة ٩٠٠ أو وزعت على أجزاء متساوية مرتين الساعة ٩٠٠والساعة ١٣٠٠

أشارت النتائج أن الأسماك المغذاة ٤% من وزن الجسم موزعة على مرتين في اليوم أعطت زيادة معنوية في عائد وزن الجسم ومعدل بقاء ودليل الكبد ومحتوى الجسم من المادة الجافة ومستخلص الدهن والطاقة الكلية . الأسماك المغذاة ٢% من وزن الجسم مع تكرار التغذية سواء مرة أو مرتين أعطت انخفاض معنوي في اغلب العوامل المقدرة ولكنها حسنت معنويا معدل استهلاك الغذاء ومعدل التحويل الغذائي و كفائه تحويل البروتين مقارنا مع باقي المعاملات.

بغض النظر عن تكرار التغذية فان زيادة معدل التغذية من ٢وحتى ٤% من وزن الجسم حسنت معنويا عائد وزن الجسم ومعدل البقاء ودليل الكبد ومحتوى الجسم من المادة الجافة ومستخلص الدهن والطاقة الكلية، ولم يوجد فروق معنوية في معدل النمو النوعي ومعدل التحويل الغذائي ونسبة كفائه البروتين ومحتوى الجسم من البروتين بين معدل التغذية ٣ و ٤% من وزن الجسم . أيضا الأسماك المغذة مرتين في اليوم زادت معنويا عائد وزن الجسم ومعدل النمو النوعي ومعدل البقاء ومعدل التحويل الغذائي ونسبة كفائه البروتين ومحتوى الجسم من المادة الجافة والرماد.

تقترح هذه الدراسة إن المعدل الغذائي الأمثل لأسماك القرموط الافريقى متوسط وزن ٣،٦٤ جم يكون ٤% توزع في جزئين متساويين في اليوم.