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EVALUATE OF SILKWORM WASTES ON PRODUCTIVE PERFORMANCE OF NILE TILAPIA (*O. niloticus*) FINGERLINGS.

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ABSTRACT

A thirteen week trial was conducted in ten cement ponds 3 m^3 each to investigate the effect of applied silkworm wastes on productive performance and economic efficiency of Nile tilapia (*Oreochromis niloticus*) fingerlings. In this experiment duplicated five treatments were applied; (T_1) applied weekly with Silkworm litter at rate of 50 g / m^3, (T_2) applied with waste mulberry leaf at rate of 50 g/ m^3 every week, (T_3) applied weekly with mixed of Silkworm litter and waste mulberry leaf at rate of 50 g / m^3 , (T_4) applied weekly with rigirs at rate of 50 g / m^3 and control (T_5) fed daily with diet 25% protein at a rate of 7% of fish body weight 5 days a week. The average initial weights of Nile tilapia fingerlings were 1.3 g. Results indicated that T_2 surpassed all treatments and recorded higher ($P< 0.05$) final body weight, total weight gain and ADG than the treatment T_4 and non significant higher ($P> 0.05$) thanT_1, T_3 and T_5. Followed by T_5 (control), T_1 and T_3, respectively. There were no significant differences between treatments in SGR. With regard to economic efficiency, T_5 recorded the highest total cost however; T_2 recorded the highest net return and economic efficiency.

In conclusion, the use of silkworm wastes especially waste mulberry leaf in fish pond culture could be recommended for Nile tilapia at a rate of 50g /m^3/ week (210 kg/ feddan / week) with fish stocking density 20 fish/ m^3 (84000 fingerlings/ feddan), especially with the high cost of fish diets and the problems found now for fresh poultry manure.

Key words: *Growth performance, Nile tilapia, Silkworm wastes; Silkworm litter ; Waste mulberry life; Rigir; cement ponds.*

INTRODUCTION

On a global basis, tilapia has become the second most commonly consumed farmed fish after the carps. Environmental concerns over pollution from cages and use of fish meal has slowed the growth of the salmonid industry while tilapia has continued to grow and surpass salmonid production on the basis of biomass produced, while still lagging in farm-gate value. (FAO 2006). Among all cultured tilapia species, Nile tilapia *O. niloticus* has emerged as the single most important species because they are suitable for their high growth rate, ability to efficiently convert organic and demotic wastes into high quality protein, and good taste (Pullin and Lowe-McConnell, 1982, and Yi *et al.*, 1996).

An integrated farming operation should be designed and operated as a demonstration site using well water or direct river water. The intent would be to collect the data and demonstrate the immense benefits that accrue to both the fish farmer, using high quality water and the field crop farmer, gaining the fertilizer in the effluent and having another entity share the cost of delivering water (Kevin Fitzsimmons, 2008). The close integration in mulberry cultivation, sericulture and fish farming is one models of integrated fish farming to fully exploit the production potentials of the ecosystem (Hu and Yng, 1984). One Hectare produce 30-37.5 tons mulberry leaves, 168- 210 kg of raw silk, 3000- 7500 kg of worm dregs, 1920-2100 kg of pupae and 3750 kg of factory effluent. Thus each Hectare of mulberry can provide the basic requirements of natural feeds and fertilizers needed for the fish pond to produce 3405-3585 kg fish in Pearl River Delta (Hu *et al.* 1994). In this connection Sayed and Mahmoud (1999) reported that there was a big potential for developing sericulture in Egypt. More than 90 % of sericulture in Egypt depends on the traditional practices which depend on the huge mulberry trees located along the canals and road sides mostly in the Delta area estimated by 146113 trees, only 7000 trees were used for rearing silkworm. They added that there was some new investor in sericulture adopting the recent technology using total area for mulberry field's by175 hectare. Thus if we use the silkworm dregs from this area only (175 hectare) we can produce 596- 628 ton fish. In the case of using all huge mulberry trees (146113 trees) we can produce 17875 kg of raw silk and 3726 ton of silkworm dregs which produce 466 ton fish.

Somanna and Reddy (1996), reported that silkworm [*Bombyx mori*] excreta can be used as a manure and as a poultry and fish feed, due to their high organic content. Being rich in nitrogen they can also be mixed with biomass for maximum biogas production and mushroom cultivation. Sivasankar and Ashoka (1997), studied that silkworm litter can be used effectively for freshwater prawn culture. Singh and Jayasomu, (2002), reported that extracted from silkworm faeces were used in the treatment of various diseases such as hepatitis, acute pancreatitis, chronic nephritis, stomach and gastric disorders, blood cholesterol, etc.

Swamy and Devaraj, (1995a), reveled that average daily growth of common carp fry was higher when fed on dried silkworm pupae-based (SF) 25 mg and almost the same with Lucerne leaf-based (LF) 21 mg and waste mulberry leaf-based (MF) 23 mg. The feed conversion ratios were 3.14 for LF, 2.93 for MF and 3.06 for SF. Cruz and Laudencia (1978), when they were fed Nile tilapia with different rations containing different ingredients they found that rations containing mulberry leaf meal gave promising results.

The present study aimed to evaluate the effect of Silkworm wastes (Silkworm litter, waste mulberry leaf and mixed of them) without artificial feeding comparing with poultry litter (rigirs) and artificial feeding on productive performance of Nile tilapia fingerlings and provide technical guidance about this integration system to the farmer to fully exploit the production potentials of the ecosystem.

MATERIALS AND METHODS

The present study was carried out at outdoor circular cement ponds in Central Laboratory for Aquaculture Research at Abassa, Sharkia Governorate, Egypt. Silkworm litter, waste mulberry leaf and mixed of them were obtained from Department of Sericulture, Plant Protection Institute, Agricultural Research Center. Rigirs consists of chicken manure but compressed and heat treated in order to be free from parasites, Salmonella, Shigella and *E. coli* produced by Misr El-Salam International Company for producing organic fertilizer, Alexandria Governorate. Chemical analysis of Silkworm litter, waste mulberry leaf, mixed of them and rigirs are shown in Tables 1.

Table 1: Chemical analysis of Silkworm litter, waste mulberry leaf, mixed of them and rigir on D.M basis.

Item	Silkworm litter	waste mulberry leaf	mixed of Silkworm litter and waste mulberry leaf	Rigir
Cubic meter weight (kg/ m3)	٥٦٠	224	310	730
Humidity %	٣	3	3	9.6
pH	6.48	٥,٧٥	6.02	8.01
Electric conductivity (dS/m)	4.92	4.14	3.74	4.2
Total nitrogen %	2.68	3.95	2.95	2.38
Protein %	16.75	24.69	18.44	14.88
Ammonia nitrogen ppm	1606	352	1502	1040
Organic matter %	83.79	87.2	85.83	59.68
Organic carbon %	48.59	50.57	49.78	29.58
Ash %	16.21	12.8	14.17	40.32
C:N ratio	18:1	13:1	17:1	13:1
Total phosphorus %	0.43	0.57	0.60	1.79
Total potassium %	1.01	1.08	1.07	1.91

Before starting the experiment all fish ponds were drained completely and then were refilled with fresh water coming from Ismailia Nile branch through a canal to the experimental station or occasionally from deep well. Nile tilapia (*Oreochromis niloticus* L.) fish with an average initial weight 1.3 g /fish were obtained at 26 April 2009 from Arabia Company Fish Hatchery, El-Abbassa, Sharkia governorate. Fish were transported in plastic bags and after arrival to the experimental station; fish were adapted to the new conditions for one hour, then distributed randomly into ten circular cement ponds. Total water area of each pond was 3 m^3each throughout the whole experimental period (91 days).

Five treatments were applied in the experimental cement ponds. These were, (T_1) applied weekly with Silkworm litter at rate of 50 g / m^3. (T_2) applied with waste mulberry leaf at rate of 50 g/ m^3 every week. (T_3) applied weekly with mixed of Silkworm litter and waste mulberry leaf at rate of 50 g / m^3. (T_4) applied weekly with rigirs at rate of 50 g / m^3 and (T_5) fed daily with diet 25% protein at a rate of 7% of fish body weight 5 days a week (control). Each treatment was performed in duplicate. All ponds were stocked with 60 tilapia fish / pond (20 fish/m^3).

Water temperature, dissolved oxygen and pH were measured daily at 6 a.m. and 12 p.m. using thermometer, dissolved oxygen meter (YSI model 57) and pH meter (model Corning 345), respectively. Determinations of the other water quality parameters (alkalinity and ammonia) were carried out every two weeks according to the methods of Boyd (1979). Phytoplankton and zooplankton communities in pond water were determined every month according to the methods described by Boyd (1990) and A.P.H.A (1985). Samples were collected from different sites of the experimental ponds randomly to represent the water of the whole pond. The chemical analyses of Silkworm litter, waste mulberry leaf, mixed of them and rigirs, on dry matter basis according to the methods of A.O.A.C. (1990) and phosphorus and potassium were determined using spectrophotometer (model LKB, Biochrom 4050 / uv / visble uttras pec Π) according to the methods of A.O.A.C. (1984) are illustrated in Tables (1).. Live body weight 50 fish at start and monthly thereafter were recorded till the termination of the experiment and at the end all fish in each pond were collected, weight and counted. Specific growth rate (SGR) was calculated by using the following equation:-

$$SGR\% = 100 (\text{Ln } W_2 - \text{Ln}W_1) / T$$

Where W_2 is the fish weight at the end (g), W_1 is the weight at the start (g), Ln is the natural log. and T is the period (d) as described by Bagenal and Tesch (1978).

Condition factor (K): K= weight (g) x 100 /length (cm^3) (Hopkins, 1992).

Statistical analysis

A statistical analysis for the experimental results was carried out by using SAS program (SAS Institute, 2006). Differences between averages were determined by using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

Water quality:

Data obtained alongside the study period concerning water temperature as represented in Table 2 showed that there were no significant differences ($P>0.05$) among different treatments. Average means of water temp. among different treatments were between 26.8 and 27.48 °C. which lies within the optimum range of tilapia tolerance (24 -32 °C) mentioned by El-Sayed and Kawanna (2008). The average mean of dissolved oxygen concentrations obtained alongside the present work were ranged between 3.11 and 4.62 mg/l. Davies *et al.* (2006) recorded levels of dissolved oxygen ranged between 3 and 5.9 mg/l which obtained after fertilization with different organic and inorganic fertilizers. They mentioned that these levels were desirable for phytoplankton growth and also for fish production. The average value of seechi disk readings were 52.5, 52.50, 66, 52.5 and 46 (cm) for T_1, T_2, T_3, T_4 and T_5, respectively. There were no significant differences between treatments ($P>0.05$). The average concentration of unionized ammonia (NH_3) was higher ($P<0.05$) for treatments T_2 and T_3 (0.80 and 0.70 mg/l) than T_1, T_4 and T_5 (0.45, 0.60 and 0.50 mg/l), respectively. Moussa, 2004 and Shaker, 2008 reported higher values of ammonia in fertilizer fish pond. The increase of NH_3 in T_2 and T_3 may be due to their high content of organic matter and total nitrogen (table 1) which decomposited and via the direct excretion of ammonia by the large biomass of fish (Shaker *et al.* 2008). pH ranged between 8.25 and 9.25 . Boyd (1998) reported that waters with a pH range of 6.5 – 9 are the most suitable for fish production. Electric conductivity values were significantly higher ($P<0.05$) in T_3 than in T_5. Generally all treatments which use silkworm wastes (T_3, T_2 and T_1) were higher than T_5 which fed on diet. This could be explained by the increased concentration of different ions associated with silkworm wastes application to ponds water as an organic fertilizer (Boyd, 1990). Santerio and Pinto-Coellho (2000) reported that applying organic fertilizers significantly increased water electric conductivity. There were no significant differences ($P>0.05$) between treatments in salinity values. It was ranged between 0.2 to 0.25 ppt. Stickney, (1986) mentioned the range 0-10‰ as an optimum salinity range for *O. niloticus*. However, the results of dissolved oxygen, Ammonia, pH and electric conductivity were significantly different ($P<0.05$) for all treatments, meanwhile, it were in the suitable and lesser than the lethal levels (Stickney, 1986; Boyd, 1990; Siddiqui *et al.,* 1992; Ali *et al.,* 1993 and Abdallah *et al.,* 1996).

Table 2: Some water quality parameters of cement ponds stocked with Nile tilapia (*Orechromis niloticus*) fingerlings and treated with different treatments for 91 days growing period.

.Parameter	Treatment				
	T_1	T_2	T_3	T_4	T_5
Temperature (°C)	27.15	27.48	27.05	27.3	26.8
Dissolved oxygen (mg/l)	3.11^{b} ± 0.238	3.16^{b} ± 0.238	3.15^{b} ± 0.238	4.36^{a} ± 0.238	4.62^{a} ± 0.238
Secchi disk (cm)	52.5^{a} ± 16.59	52.5^{a} ± 16.59	66^{a} ± 16.59	52.5^{a} ± 16.59	46^{a} ± 16.59
NH_3 (mg/l)	0.45^{c} ± 0.034	0.80^{a} ± 0.034	0.70^{a} ± 0.034	0.60^{b} ± 0.034	0.50^{c} ± 0.34
PH	8.25^{b} ± 0.127	8.50^{b} ± 0.127	8.63^{b} ± 0.127	9.25^{a} ± 0.127	9.20^{a} ± 0.127
Electric conductivity (µmhos/cm)	473.5^{ab} ±5.99	496.5^{ab} ± 45.99	508.5^{a} ± 45.99	423.8^{ab} ± 45.99	329.8^{b} ± 45.99
Salinity	0.20	0.20	0.25	0.20	0.20

Values followed by A, B, etc. at the same row are significantly (P<0.05) different.

Plankton

Table (3) showed that there were any significant differences (P>0.05) among treatments for all phytoplankton groups and their total's. The green algae group was the dominating group (its percentages ranged form 58% at T_3 and $\mathbf{T_5}$ to 68% at T_2) followed by the blue green algae at T_1, T_2 and T_4 but at T_3 and $\mathbf{T_5}$ Euglena was the second dominant group when compared with the other phytoplankton groups. These results agree with those of both Jensen *et al.*(1994) and Kamal *et al.* (2008, 2009) who found that green algae could be dominate in many shallow eutrophic lakes and ponds.

Table 3: Some phytoplankton groups which counted and identificated for water of cement ponds stocked with Nile tilapia (*Orechromis niloticus*) fingerlings and treated with different treatments for 91 days growing period.

Group	Treatment				
	T_1	T_2	T_3	T_4	T_5
Euglena (org./l)	630	1996	4622	2416	4300
Euglena %	2	8	21	4	20
Chlorophyta (org./l)	17647	16019	12238	32931	12380
Chlorophyta (%)	62	68	58	59	58
Cyanophyta (org./l)	6670	2941	1838	17385	2400
Cyanophyta (%)	23	12	9	31	11
Diatomms (org./l)	3571	2888	2484	3362	2220
Diatomms %	13	12	12	6	11
Total phyto. No. (org./l)	28518	23844	21181	56093	21300

It can be observed from the table (4), that there were no significant differences ($P < 0.05$) among treatments for all zooplankton groups with a considered fluctuations. These values (12902, 7935, 15800, 10130 and 10175 (org./l) for $\mathbf{T_1}$, $\mathbf{T_2}$, $\mathbf{T_3}$, $\mathbf{T_4}$ and $\mathbf{T_5}$, respectively) indicated that there were adequate numbers of zooplankton for fry growth at all treatments. Rotifers were the dominating group of the zooplankton for all treatments. Also, the percentages of rotifers/total zooplankton ranged from 67 to 87% with a general mean 77% for all treatments. These results were agreed with those of Kamal *et al.* (2003 and 2008). On the other hand Kamal *et al.* (2009) indicated that Copepods is the dominating group followed by Cladocerans and Rotifers in all ponds. Many fish and crustacean larvae require live food at the onset exogenous feeding (Shaker, *et al.*, 2008).

Table 4: Zooplankton groups which counted and identificated for water of cement ponds stocked with Nile tilapia (*O. niloticus*) fingerlings and treated with different treatments for 91 days growing period.

Parameter	Treatment				
	T_1	T_2	T_3	T_4	T_5
Copepods (org./l)	158	2219	1876	2886	2910
Copepods (%)	1	28	12	28	29
Cladocerans (org./l)	322	88	48	285	276
Cladocerans (%)	3	1	0.4	3	3
Rotifers (org./l)	10592	5596	13772	6785	6850
Rotifers (%)	82	70.7	87	67	67
Nauplii (org./l)	1806	21	96	152	122
Nauplii (%)	14	0.3	0.6	2	1
Others (org./l)	24	11	8	22	17
Total	12902	7935	15800	10130	10175

Growth performance and survival rate:

Data concerning final body weight (FBW), total weight gain (TWG), average daily gain (ADG), specific growth rate (SGR), and survival rate (SR) for the five experimental treatments for Nile tilapia fingerlings are presented in Table (5). Data indicated that, no significant differences (P>0.05) in the initial fish weight among different experimental groups were found which indicate that, there are homogeneity at the experimental start for all tested groups.

The growth responses of fish in all the treatments were generally satisfactory. As described in Table (5), the final body weight of Nile tilapia increased from 1.3 g to 16.76 g, 20.45 g, 16.80 g, 15.05 and 19.86 g for T_1, T_2, T_3, T_4 and T_5, respectively. It is obvious that T_2 (applied with waste mulberry leaf at rate of 50 g/ m^3 every week) surpassed all treatments and recorded higher (P< 0.05) final body weight than the treatments T_4 (applied weekly with rigirs at rate of 50 g / m^3) and non significant higher (P> 0.05) than,T_1, T_3 and T_5 respectively. Followed by T_5 (fed daily with diet 25% protein at a rate of 7% of fish body weight 5 days a week (control), T_1 (applied weekly with Silkworm litter at rate of 50 g / m^3) and T_3

(applied weekly with mixed of Silkworm litter and waste mulberry leaf at rate of 50 g / m^3). The same trend was obtained with regard to total weight gain and ADG but there were no significant differences between treatments in SGR. These results were in agreement with Swamy and Devaraj, (1994), who reveled that average daily growth of *Catla catla* (Ham.) fry was significantly higher when fed on diet containing waste mulberry leaf instead of fish meal than Lucerne leaf and dried silkworm pupae. This may be due to the high digestion, feed conversion and protein efficiency ratio for waste mulberry leaf (Swamy and Devaraj, 1995b and 1995a). Also the results showed that the growth responses of fish in T_1 (applied weekly with Silkworm litter at rate of 50 g / m^3) and T_3 (applied weekly with mixed of Silkworm litter and waste mulberry leaf at rate of 50 g / m^3) were generally satisfactory. These results were in agreement with Nandeesha *et al.* (1986) who postulated that Rohu, common carp and silver carp cultured in earthen ponds and fed diet containing silkworm faecal matter displayed growth equivalent to that obtained through fish meal based diet. In a field trial; Nandeesha and Murthy (1988) obtained good growth of carps employing silkworm faecal matter based diet. Wang J. *et al.* (2007), resulted that when F_1 hybrid pigs of Harbin White x Yorkshire in groups were given diets added with silkworm excrements at various doses of 7-20%, it gave a higher average daily gain, feed conversion rate and economic benefits at rate of 7% silkworm excrements. However, the silkworm excrements should not be more than 10%. With regard to survival rate the values were ranged between 72 to 82%. There were no significant differences between treatments in survival rate.

Table 5: Some growth parameters of Nile tilapia (*Orechromis niloticus*) fingerligs stocked at cement ponds with different treatment for 91 day growing period.

Item	Treatments				
	T_1	T_2	T_3	T_4	T_5
Initial body weight (g/fish)	1.30	1.30	1.30	1.30	1.3
Final body weight (g/fish)	$16.76^{ab} \pm 1.36$	$20.45^{a} \pm 1.36$	$16.80^{ab} \pm 1.36$	$15.05^{b} \pm 1.36$	$19.86^{ab} \pm 1.36$
Total weight gain (g/fish)	$15.46^{ab} \pm 1.36$	$19.15^{a} \pm 1.36$	$15.50^{ab} \pm 1.36$	$13.75^{b} \pm 1.36$	$18.56^{ab} \pm 1.36$
Average daily gain (mg/day/fish)	$169.90^{ab} \pm 14.97$	$210.45^{a} \pm 14.97$	$170.30^{ab} \pm 14.97$	$151.10^{b} \pm 14.97$	$203.95^{ab} \pm 14.97$
Specific growth rate (%)	$2.81^{a} \pm 0.096$	$3.02^{a} \pm 0.096$	$2.81^{a} \pm 0.096$	$2.68^{a} \pm 0.096$	$2.995^{a} \pm 0.096$
Survival rate (%)	$79^{a} \pm 5.26$	$72^{a} \pm 5.26$	$74^{a} \pm 5.26$	$73^{a} \pm 5.26$	$82^{a} \pm 5.26$

Values followed by A, B, etc. at the same row are significantly ($P<0.05$) different.

Economic efficiency

Table (6) shows the results of economical evaluation including the costs and returns for treatments applied in kg / feddan and income in (L.E) for 91 days. All of the treatments in this experiment generated a profit (Table 6). Total costs were 5819 L.E / feddan for T_1, T_2 and T_3 and 6843 and 10860 L.E / feddan for T_4 and T_5, respectively and net returns in L.E per feddan were 11435, 12325, 10343, 8487 and 9115 for T_1 T_2 T_3 T_4 and T_5, respectively. Percentages of net return to total cost were 196.5, 211.8, 177.7, 124 and 83.9 % for T_1 T_2 T_3, T_4 and T_5, respectively. These results revealed that the total cost of T_5 ((fed diet) was higher than manure treatments (T_1, T_2, T_3 and T_4), and a net return of T_2 (waste mulberry leaf) was the highest followed by T_1 (Silkworm litter), T_3 (mixed of Silkworm litter and waste mulberry leaf) and T_4 ((rigirs), and the lowest net return was T_1 (fed diet).

Table 6: Economic efficiency (%) of Nile tilapia (*Oreochromis niloticus*) fingerlings production as affected by the applied treatments during the experimental period for 91 days in L.E./feddan.

Item	T_1	T_2	T_3	T_4	T_5
Stocking data					
Stocking rate of tilapia (fish / feddan)	84000	84000	84000	84000	84000
Average size at stoking of tilapia (g)	1.3	1.3	1.3	1.3	1.3
Average size at harvesting (g) of tilapia (g)	16.76	20.45	16.80	15.05	19.86
Survival rate % of tilapia	79	72	74	73	82
Production, No./feddan of tilapia	66360	60480	62160	61320	68880
Operating costs (L.E)					
Tilapia fry	4200	4200	4200	4200	4200
Silkworm litter	819				
Waste mulberry leaf		819			
Mixed of Silkworm litter and waste mulberry leaf			819		
Rigirs				1843	
Commercial diet (25% protein)					5860
Labour (one / feddan)	450	450	450	450	450
Fixed costs, L.E/ Fedd.					
Depreciation (materials &others)	250	250	250	250	250
Taxes (one feddan)	100	100	100	100	100
Total costs/feddan (L.E)	5819	5819	5819	6843	10860
% of the smallest value of total costs	100	100	100	117.6	186.6
Returns					
Total Returns (L.E)	17254	18144	16162	15330	19975
Net returns (L.E.)	11435	12325	10343	8487	9115
% Net return to total cost	196.5	211.8	177.7	124	83.9

The economical evaluation of results was carried out according to market prices in 2009 in L.E. where:

1000 tilapia fry = 50 L.E.
1000 tilapia fingerlings (15-16 g each) = 250 L.E.
1000 tilapia fingerlings (16-17 g each) = 260 L.E.
1000 tilapia fingerlings (19- 20g each) = 290 L.E.
1000 tilapia fingerlings (20- 21g each) = 300 L.E.
Silkworm waste (ton) = 300 L.E.
Rigirs (ton) = 675 L.E.
Commercial diet 25% protein (ton) = 2850 L.E.

RECOMMENDATION:

Based on the obtained results and the high cost of fish diet now, it can say that, the use of silkworm waste in fish ponds culture could be recommended for producing Nile tilapia fingerlings at a rate of 50 g / squire meter every week especially waste mulberry leaf gave the best results.

Though the results of the present study indicated that silkworm wastes still hold promise as the Egyptian system of polyculture involves fertilization that supports natural food production. Further, their utilization as ingredients will not only help in recycling such wastes, but also would substantially bring down the cost of production.

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تقييم مخلفات دودة القز على الأداء الانتاجى لإصباعيات البلطى النيلى

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الملخص العربى

أجريت هذه الدراسة لمدة ١٣ أسبوع فى عشرة أحواض أسمنتية حجم كل منها ٣ م ٣ وكان الهدف منها دراسة تأثير مخلفات دودة القز على الأداء الأنتاجي و الكفاءة الاقتصادية لإصباعيات البلطي النيلي.

استخدم فى هذه التجربة خمس معاملات و تم تكرار كل معاملة مرتين. المعاملة الأولى (T_1) استخدم ذرق دودة القز بمعدل ٥٠جم/م٣ / أسبوع، المعاملة الثانية (T_2) استخدم مخلفات ورق التوت بمعدل ٥٠جم/م٣/ أسبوع، المعاملة الثالثة (T_3) استخدم خليط من ذرق دودة القز و مخلفات ورق التوت بمعدل ٥٠جم/م٣/ أسبوع، المعاملة الرابعة (T_4) استخدم فيها الريجرز بمعدل ٥٠جم/م٣/ أسبوع والمعاملة الخامسة (T_5) كنترول غذيت على عليقة تجارية ٢٥% بروتين بمعدل ٧% من وزن الجسم (٥ أيام / أسبوع). وكان متوسط وزن الأصباعيات من أسماك البلطى النيلى فى البداية ١،٣ جم. و كانت النتائج المتحصل عليها على النحو التالى:-

المعاملة الثانية (T_2) تفوقت على كل المعاملات فى وزن الجسم النهائى و الزيادة فى الوزن ومعدل النمو اليومى و كانت الفروق معنوية مع المعاملة الرابعة(T_4) ولكنها لم تكن معنوية مع باقى المعاملات، يليها المعاملة الخامسة (T_5) الكنترول ثم المعاملة الأولى (T_1) و المعاملة الثالثة (T_3) على التوالى. لم يكن هناك فروق معنوية بين المعاملات فى معدل النمو النسبى (SGR). أما بالنسبة للكفاءة الأقتصادية سجلت المعاملة الخامسة (T_5) كنترول أعلى تكاليف كلية بينما المعاملة الثانية (T_2) سجلت أعلى عائد صافى و كفاءة أقتصادية.

وتوصى الدراسة باستخدام مخلفات دودة القز وخاصة مخلفات ورق التوت بمعدل ٥٠ جم / للمتر المربع (٢١٠ كجم/فدان) و ذلك كل أسبوع وبكثافة تخزين ٢٠أصباعية / م٣ (٨٤ألف/فدان) من اسماك البلطي النيلي المرباة في الأحواض الخرسانية وذلك للحصول على أعلى إنتاجية و أعلى كفاءة اقتصادية خاصة مع ارتفاع أسعار العلف و المشاكل الموجودة الآن فى استخدام زرق الدواجن.