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EVALUATION OF FEEDING SYSTEMS ON PERFORMANCE AND FEED UTILIZATION OF MEAGRE (*ARGYROSOMUS REGIUS* ASSO, 1801) UNDER EGYPTIAN CONDITIONS

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ABSTRACT

The present study was conducted to investigate the effect of feeding Meager artificial feed and trash fish in a private fish farm in Eldebba.. The fish were fed the experimental diets (artificial and trash fish) twice a day, 6 days a week. The trial was continued for 360 days (12 months). The growth performance of the tested fish cleared that there were a significant difference between the two feedings. The group of meager fed trash fish had a significantly ($P<0.05$) higher final body weight, weight gain, weight gain percent, SGR final length, length gain, length gain percent and SGR in length than the group of fish artificial feed. The group of fish fed artificial feed had a significantly lower survival rate than feeding trash fish.

There were no significant ($P\geq0.05$) differences among treatments for chemical composition of the fish body. The artificial feeds increased the costs of producing one kg of body weight gain of the fish 34.20 and 25 LE. The economic evaluation showed that Meager fed trash fish had the higher production 6165.89 Kg/feddan and net return (318353.4 LE) than Meager fed artificial feed 4779.30 Kg/feddan and net return 223445.42 LE. The retune/Cost return investment was higher in Meager fed trash fish 6.17 and 3.50 LE for Meager fed artificial feed. It could be concluded that feeding Meager trash fish was the best in terms of growth performance and economic evaluation under the present experimental condition.

Keywords: Meagre culture – Natural feed – Artificial feed – Growth – Nutrients utilization – Fish composition – Economic efficiency.

INTRODUCTION

Egypt is the most important producer of meager, which is cultured in brackish-water ponds, as a capture based aquaculture using fingerlings and juveniles from the Nile delta (Sadek *et al*., 2009). However, meager is a fast growing species with a good taste and has a tremendous potential for culture in brackish water ponds (FAO, 2002). The Egyptian Mediterranean coast, Port Said is considered as one of the most productive fishing ground. About 25% of the total fish production in the Egyptian Mediterranean sector comes from Port Said. Port Said derives its fish production from four main resources; Mediterranean Sea, Lake Manzala. Feed expenditure constitute 30-70% of total expenditure in fish culture and for this reason different methods have been essayed to gain benefit from every kind of feed source especially in the countries with developed aquaculture sector. The overall goal of the aquaculture is to reduce production costs, maximize production and increase profitability (Hossain *et al*., 2007). Low-value, or trash fish (i.e., as raw ingredients not reduced to fishmeal), is a term used to describe fish species with various characteristics, generally including fish that are small in size and have little or no direct commercial value (FAO, 2005). The (FAO, 2014) estimates that the total worldwide volume of low-value fish used as feed in aquaculture is approximately 9 million tons. The use of low-value fish as feed is a common husbandry practice in marine fish farms .The use of trash fish in marine aquaculture has always been associated with environmental degradation, over-exploitation of finite pelagic fish stock and issues with pathogen transmission (Xu *et al*., 2007). Economically productive aquaculture systems depend upon an adequate supply of low-cost feeds with high nutritional quality. Trash fish, as commonly defined is that portion of the catch that by virtue of their small size or low consumer preference has little or no value (Sugiyama *et al*., 2004).

(Xu *et al*., 2007) mentioned that trash fish, mainly from capture fisheries, are not consumed by human. Trash fish are often discarded as by-catch, with potential environmental and aesthetical problems (Li *et al*., 2004). In aquaculture, trash fish fed directly to carnivorous fish or as an ingredient of artificial feed are considered better alternatives (Xu *et al*., 2007). The present work tries to define the course of local trash fish and dry pellet diet as fed in Meagre (*Argyrosomus regius*) . This is considered in association to lowering the costs of feeding and the environmental risks.

MATERIALS AND METHODS

Study site and experimental units:

The experiment was done in collaboration with a private fish farm located at Port-Saied Governorate with an area of 1 feddans and a water depth of about 1.25 m during June, 2016 to June, 2017. The water in this farm is a brackish due to the mixing of Mediterranean Sea waters and waters from Lake Manzala. Productivity was based on the natural productivity of the ponds hence the experimental ponds were kept free from any shading throughout the day.

The experimental diets:

Two experimental feeding systems was tested in this study, mainly a natural diet (trash marine fish) and artificial (external feeds) diets (Table 1). The natural one consisted of minced marine fish. Proximate chemical analysis of the tested diets is presented in (Table 2) which shows that the actual CP contents of the artificial diets on dry matter (DM) basis were similar (40.50 %) in the natural feed (being 40.10).

Feeding regime:

All ponds were placed near aeration machine. The experimental diets consisted of one pelleted diet and one local trash fish. Daily ration were fed twice a day (equal meal at 9.00 am and 14.00 pm) 6 days a week to satiation. At the start of the experiment, 10 fish were taken and stored frozen for ponds were sampled and kept frozen in the same way for the chemical analyses.

At subsequent monthly intervals and at the end of the experiment, fish were weighed and measured. The trial was continued for (360 days) 12 months.

Diet formulation and trash fish preparation:

Local trash fish were collected from fishermen of Lake Manzala (belonging to Port Said Governorate, Northern Egypt). Local trash fish were frozen in a cold storage at – 10 °C respectively. Before feeding, carcasses of frozen fish were minced by meat grinder into pieces and thawed for two hour respectively before feeding. Ingredients diet (obtained from a local feed company) Proximate composition and formulation (Table 1 and 2). Proximate composition of the local trash fish and formulate diet are shown in Table (2). All ingredients were exposed to grinding, mixture and processed into a California pellet Meal machine (CPM) as dry pelleted diet.

Water quality:

Sampling for physico-chemical parameters was done once a week between 09.00 and 12:00 h from specific points of the pond at a depth of 20-30 cm below the surface. A mercury thermometer was used to measure water temperature (°C), while salinity (psu) was measured with a salinometer. Digital electronic meters (Model YSI-58, USA and Jenway Model-3020) were used to measure Dissolved Oxygen (DO) (mg-1) and pH on site, respectively, according to the standard procedures and methods as defined in APHA (1992). The average water quality parameters are presented in Table (3).

Fish stocking and sampling:

The fingerlings were obtained from the coastal area of Mediterranean Sea and Northern shores of Lake Manzala, during June, 2017 with an average initial body weight of 30.0 g/ fish and average initial lengths of 13.0 cm/ fish. The pond was stocked with the fingerlings of meager at the rate of 4000 fish/ feddan in a private fish farm located at eldebba port Saied Governorate. Twelve random samples of the fish were taken during the study period (12 samples/ year), where 500 fingerlings meagre were randomly sampled monthly. The samples were measured for weight and length to the nearest 0.01 g and 0.01 cm, respectively.

At the end of experiment, the pond was harvested and counted, weighted and length measurements taken. To ensure complete harvest, the meager were harvested initially by netting and any remaining individuals harvested by complete draining of the earthen ponds and hand picking any meager in the ponds.

Harvest Data and Body Composition:

Fish were over day fast before harvest, the total number and individually weight of all fish in each ponds were recorded at harvest. For body composition analysis, 5 fish from each pond at harvest were randomly sampled and stored at −20˚C for subsequent chemical analysis. Proximate analysis of the formulated diets (AOAC, 2005).

Growth performance parameters:

Growth trial was conducted for 360 days and every fourth weeks fish in each net pen were bulk-weight and counted to follow growth and feed intake. At the end of the growth study and after an overnight fast, all fish from each pond were individually weighed, total length measured and calculated to determine survival rate (%).

Table 1. Feed formulation and proximate composition of diets contained (HBP) feed to Meager (Argyrosomus regius).

Ingredients (%)	Diets
	AF
Fish meal (C.P70%)	36.0
Soybean meal (C.P.44%)	20.0
Yellow corn meal	24.0
Gluten	10.0
Fish oil	7.0
Vit. & Min premix[1]	1.0
Calcium diphosphate	2.0
Total	100
Proximate analyses (%)	
Crude protein	40.50
Crude fat	15.26
Ash	8.6
Crude fiber	1.60
NFE[2]	34.04
Gross energy Kcal/g[3]	5.04
P:E ratio (mg CP:kcal)[4]	93.0

1- Vitamin* 1.5 Mineral** 1.5 * Vitamin premix (local) supplied the diet (g/kg) the following: Vit.A,9000000. I.U.; D3, 1500000 IU; E, 24g; C, 6g; K3, 1-2 g; B1, 0.9g; B2, 1.5; B6, 1.2g; Folic acid, 0.12g Niacin, 6g; Pantothenic acid, 2.76g. (Carrier, cellulose, up to 1000g). ** Mineral premix (local) consisted of (mg/kg premix) the following: 4000mg KCL (52%); 1030 mg $ZnSO_4.7H_2O$; 33mgKI; 1.35mg $Na_2Se_2O_3$; 1319mg $MnSO_4.H_2O$; 50mg copper sulphate (25% Cu); 5mg cobalt sulphate; 4300mg sodium sulphate (32.37% Na). (Carrier up to 1000gm [1]Vitamin and mineral premixed according to (Madan, *et al.*, 2009).
2- Nitrogen free extract (NFE) = 100- (protein + lipid + ash + fiber)
3- Gross energy was calculated according to NRC (2011) as 5.65, 9.45, and 4.11 kcal/g for protein, lipid, and carbohydrates, respectively.
4- Protein efficiency ratio = Body weight gain (gm) / protein intake (DM) gm .

Chemical analysis:

Samples of feed ingredients diets and fish muscle were analyzed in triplicate using standard methods (AOAC, 2005). Dry matter was determined by drying in an oven at 105°C for 24 h. Nitrogen (N) was determined by the kjeldahl method and crude protein (CP) was calculated as NX 6.25. Crude fat (EE) content was analyzed using the soxhlet method with petroleum ether (bp 40 to 60 °C) crude fiber (CF) content was determined by standard method

(AOAC, 2005). Ash content was determined by incineration in a muffle furnace at 550 °C for 12 h.

Table 2. Chemical composition (dry matter basis) of the tested diets fed to Meager (*Argyrosomus regius*) fish during the experiment.

Treatments	Crude protein (%)	Ether extract (%)	Carbohydrate (%)	Ash (%)	Energy** content (kcal/100g
Natural feed	40.18	16.38	23.90	19.54	502.3
Artificial feed B	40.50	15.26	35.64	8.60	503.8

*Gross energy (GE) was calculated according to NRC, 1993; where one gram of crude protein, lipid, and carbohydrates contains 5.65, 9.45, 4.22 kcal, respectively.

Fish growth, expressed as daily increment in weight (g /fish) or the increase in body weight per day (%/ day) was calculated based the following formula:

DGR = (W2 –W1)/t

Where: W1 = the initial live body weight (g), W2 = the final live body weight (g), t = the time in days.

Total weight at stocking Kg/feddan = No of fish stocked X Average weight at stocked

Total weight at Harvest Kg/feddan = No of fish at harvest X Average weight at harvest

Net production = Total weight at Harvest Kg/feddan- Total weight at stocking Kg/feddan

FCR = Feed intake (g) / weight gain (g)

Feed Intake (FI):-Amount of consumed feed per period

Survival rates (%):

Survival rates (%) were estimated as: No. of fish harvested/No. of fish stockedx100. Net production (kg feddan-1) was calculated by deducting the biomass stocked from the biomass harvested.

The mean fish weight (g) was determined in terms of gain in weight:

GW = (W2-W1)/W1x100

Where: W1 = The initial live body weight (g), W2 = The final live body weight (g)

The condition factor (CF) is determined according to the equation:

CF = (W/L3) x 100

Where: W = The body weight (g), L = The length of the fish (cm).

Economical analysis:

Fingerlings source, costs and quantities- Feeding source, costs and quantities- Pond aeration- Labor-Fish production

Fingerlings cost = No X price of each

Feed cost = amount of feed X price

Total production (kg /feddan) = weight of fish No of fish at Harvest

Total income LE feddan = Total production (kg /feddan)X price of Kg

Net return LE feddan = Total income LE feddan- Total cost

A simple economic analysis was performed to estimate the profitability from this experiment. Total investment costs were calculated and the net revenue was determined by the difference between the gross revenue and the total investment costs. This analysis was based on farm gate prices of meager and current local market prices expressed in Egyptian LE.

Statistical analysis:

All data on fish growth performance, feed utilization and muscle traits were statistically analyzed by one-way analysis of variance (ANOVA), using tests performed by (Duncan 1955) for individual comparison (P< 0.05) level of significance). Statistical analysis were carried out using the (SAS, 2005).

Table 3. Water quality parameters for fish pond in Eldebba port said governorate (12 month) .

Month	DO mg/L	Salinity (ppt)	Temperature ° C	pH
June 2017	5.00	16.00	28..20	8.00
July	4.9	17.50	30.00	7.90
August	4.50	18.50	30.80	7.40
September	4.0	18.80	30.10	7.50
October	4.0	18.20	25.20	8.00
November	4.2	18.50	22.20	8.10
December	4.90	18.20	22.00	8.20
January 2018	4.9	18.20	22.00	8.9
February	4.20	18.5	21.00	8.00
March	4.10	18.00	21.80	8.20
April	4.20	18.50	25.70	8.10
May	4.10	18.00	27.00	8.10

RESULTS AND DISCUSSION

Water quality:

The average water quality parameters are presented in Table 3. Mean values of some water quality parameters such as temperature, pH, dissolved oxygen and salinity were calculated to provide an overview of changes in the meager culture earthen pond during the experimental period as shown in Table (3). Water temperature varied from 21.0 to 30.8°C with an average of 25.9°C during the study depending upon environmental variation. The water pH varied from 7.4 to 8.9 with an average of 8.15; Dissolved Oxygen (DO) content varied from 4.0 to 5.0 mg/ L with an average of 4.5mg/ L. and Water salinity ranged from 16.0 to 18.8 ppt with an average of 17.4 ppt depending upon the tide in the lake, drainage water discharged into the lake and the seasonal variations. The variations of pH and dissolved oxygen were more or less similar ($P<0.05$) among the months and within the productive range, although the variations in salinity was significantly ($p<0.05$) different. The variations of water temperatures are attributed to weather conditions and statistical tests showed significantly differences ($p<0.05$) in temperatures among the month during the study. The observed average temperatures were within the optimal ranges

(21.0-34.0°C) for fish production in tropical ponds (Hossain *et al.*, 2006 and Eid *et al.*, 2020).

However, the best temperature for the growth of meager is between 17-21°C and feeding activity is substantially reduced when water temperatures drop below 13-15°C (FAO, 2002 and FAO, 2014). Quemener (2002) also recorded the similar findings that the rapid growth of meager, A. regius was between 16 and 20°C. On the other hand, Boyd (1992) recommends optimal temperature for fish culture, in the range 26.06-31.97°C, if fish growth and consequently yields are to be optimized. It should also be indicated that temperature alone may not account for variations in plankton as well as fish production, other factors such as high pH, alkalinity, carbon dioxide and nutrients are also responsible for the organic production (Hossain *et al.*, 2007; Begum *et al.*, 2003 and Eid *et al*., 2020).

The variations in pH and dissolved oxygen were similar ($p>0.05$) and within the productive range (El-Shebly *et al.*, 2007 and Hossain *et al.*, 2007), although the variations of salinity were significantly ($p<0.05$) difference among the month. In this study, the fluctuation in water salinity was dependent on percentages of mixing of sea water and Lake Manzala water (El-Hehyawi, 1974). And also it was controlled by wind direction and tides. The present study is the first to propose that brackish water may be more appropriate for the culture of A. regius fingerlings than seawater. This information is relevant to the aquaculture industry as optimizing environmental salinities for this species could improve growth rates, resulting in economic advantages. Estuaries are associated with the life history of the meager, and meager juveniles are mostly found in brackish (Eid *et al*., 2020).

Growth and Production of Meager:

The growth performance of the *A. regius* in terms of initial weight, final weight, initial total length, final total length, stocking rate, survival rates, daily increment in weight and total production.

The group of meager fed trash fish had a significantly ($P<0.05$) higher final body weight, weight gain, weight gain percent, SGR final length, length gain, length gain percent and SGR in length than the group of fish artificial feed. In agreement with Abd elhamid *et al*., 2013 and Eid *et al*., 2020). The present results were better than the findings recorded by Risk and Hashem (1981) and Osman and Sadek (2002), the higher performance of Meager fed trash fish and diet containing 40% protein, indicated that meager of larger sizes exhibit lower protein requirements than fish at earlier life stages, as has been reported for other fish species (Wilson, 2002 and Eid *et al*., 2020).

Table 4. Growth performance of the meagre, *Argyrosomus regius* reared in brackish water fish farms at Eldebba , Egypt during June, 2017 to May, 2018.

Parameters	Artificial feed	Trash fish
Average Initial weight (g)	30.30	30.30
Total Initial weight (Kg) at stocking	151.500	151.50
Total Final weight (g)	1160.20	1370.20
Average Weight gain (g)	1129.90	1340.00
Average Weight gain/day	3.13	3.81
Weight gain (%)	37.29	44.20
SGR in weight	4.38	5.83
Average Initial length (cm)	12.00	12.10
Average Final length (cm)	38.00	39.10
Average gain length (cm)	12.00	27.00
SGR in length	2.94	2.97
Survival rate (%)	90.00	80.00
Rearing period (day)	360	360
Total weight at stocking ton/ Kg feddan	151.50	151.50
Total weight at Harvest Kg/feddan	4176.00	4384.64
Net production Kg /feddan	4175.94	4233.14
Condition factor (CF)	1.62	1.65

The highest daily gain of meager was recorded from the same area where other marine fishes such as Sea bream (*Sparus aurata*) attained a daily gain of 0.73 g/ fish (El-Shebly and Siliem, 2003) and Sea bass (*Dicentrarchus labrax*) attained a daily gain of 1.13 g/ fish (El-Shebly, 2005). Risk and Hashem (1981) recorded a length of 28 cm after the first year culture under the Egyptian conditions. Osman and Sadek (2002) recorded an individual weight of 724.5 g fish-1 in 300 days for meager. Indices of condition, such as condition factor (K) were often used to assess the nutritional status of fish because they can be determined easily and may provide an indication of physiological condition (Mihelakakis *et al*., 2002). In the current study at the end of the experiment, considering the result of condition factor, (Table 5) showed that meager (*Argyrosomus regius*) on artificial and trash fish feed 1.62 and 1.65. This result was an agreement with (Mihelakakis *et al*., 2002).

Feed utilization:

Data of the feed and nutrients utilization by the experimented meager (Argyrosomus regius) fish are presented in (Table 5) . The group of fish fed artificial feed had a significantly (P<0.05) lower food conversion (1.90) than group of fish fed trash fish (5). While Feed efficiency (0.53) and PER (1.32) was significantly (P<0.05) higher in Meager fed artificial feed. In agreement with Abdelhamid *et al*. (2013). During this study, it was recorded the food conversion ratio was 7:1which was higher to that reported by (Manomaitis and Cremer, 2007) with an FCR value of 1.84, and (Lan et al. 2008) from 2.51 to 2.59, Martínez-Llorens *et al*. (2008) with FCR value of 3.0 and (Cremer and Jian, 1999) with 2.13 and 2.23 with pompano This may be due different feeding trash fish and environmental condition or fish species. Moreover the artificial diet was the best, since it was responsible for lower FC (1.9), FE (0.53) and PER (1.32) comparing with the natural feed FCR (5), FE (0.14)and PER (0.36). FCR was higher compared to Chatzifotis *et al.* (2010), Estévez *et al.* (2011) which obtained, in the best treatment, 1.27 and 1.38, respectively, compared to the (5) and 1.9 in this study.

Protein efficiency ratio (PER) is an important measure to determine how efficiently protein is used (Gomez,Montes *et al.*, 2003). High PER levels are usually associated with high feed efficiency and high weight gain (Thoman *et al*., 1999). In the current study, PER was significantly different (P<0.05) in was approximately (0.37 and 1.31) for group of fish on trash fish feed and artificial diet) which is similar than the PER obtained by Awotide and Adejobi (2007) (1.3), Ribeiro *et al*. (2015) (1.3) and lower than Chatzifotis *et al.* (2010) (1.5) or) and lower than in Ribeiro *et al*. (2015) (1.9) and Costa *et al.* (2008) (2.3) all for meagre juveniles. This may be due to different environmental conditions or fish size. PER usually decreases when the content of protein in the diet increases because fish are not capable of synthesizing the excess of protein and use it instead as an energy source.

Table 5. Feed utilization of Meager fed trash fish and artificial feed.

Item	Food intake (ton / feddan)	Food Conversion	FE	PER
Trash fish	22.78	5	0.14	0.37
Artificial feed	32.704	1.9	0.53	1.32

This fish were fed on trash fish which contain a high content of protein. Earlier it was reported that meager primarily feed on schooling fish such as sardine (Abdalla *et al.*, 2007). Further, Quero and Vayne (1985) reported that in wild, the young Meagre (A. regius) feed on small crustaceans and the adults on pelagic fishes. The optimum growth and feed efficiency of marine fish can be achieved by providing large amounts of protein (40-60%) in the diet (Abdalla *et al.*, 2007). In general, marine fish require higher dietary protein diets than other fishes. Peres and Oliva-Teles (2003) recorded that the reduction of dietary protein level not only affect growth rate but also increased feed intake and decreased feed efficiency for marine fish.

The survival rate was significantly higher in group of meager fed artificial diet (90%) and 80% for meager fed trash fish this may be the favorable conditions and the good water quality were an agreement with El-Shebly *et al.* (2007) and Abdalla *et al*. (2007).

Effect of feeding regime on body composition:

Table 6 shows the data as means ± standard errors of the proximate chemical analysis of the whole fish body. Crude protein, ether extract ($P > 0.05$) in both treatments at the end of the experiment. There were no significant ($P \geq 0.05$) differences among treatments for each criterion. In agreement with Abdelhamed *et al*. (2013). Moreover, Chatzifotis *et al*. (2012) gave the chemical analysis (%) of the Meager as moisture 74.10-75.42, protein 21.09-20.89 and lipid 3.60- 2.41.

Table 6. Data (means ± standard errors) of effects of the dietary treatments on chemical composition (dry matter basis) of the tested Meager (*Argyrosomus regius*) fish.

Treatments	Miosture (%)	Crude protein (%)	Ether extract (%)	Ash (%)
At the beginning	72.30±1.20	21.39 ± 1.87	3.8 ± 1.23	2.50 ± 1.01
At the end of the experiment				
Natural feed	73.10±1.10	21.11 ± 0.41	4.30 ± 0.40	1.19 ± 0.70
Artificial feed	72.8±1.10	21.25 ± 04.81	3.84± 0.30	2.10 ± 0.49

Economical Evaluations:

To show the economic value of fish culture, some economic aspects has been taken into consideration: 1) The production, 2) The cost of culturing, 3) The quality and size of the fish for marketing. The economic evaluation date is presented (Table 7). The input used, cost, yield or output data generated from the farmers were used to undertake the cost and return analysis for assessing the profitability of fish production in the study area. The economic evaluation (Table 7) showed that Meager fed trash fish had lower total cost (51600 LE) than Meager fed artificial diet (63642.58 LE). The feed cost was 38642.58 LE (42.63% of total cost) for Meager fed artificial diet and 26800LE (51.93% of total cost) for Meager fed trash fish.

Table 7. Economic Analysis for Meager fed artificial and trash fish feed.

Items	Atificial feed	%	Trash fish	%
Costs feddan				
Fingerlings costs LE	2000	2.20	2000	3.87
Feed cost LE	38642.58	42.63	26800	51.93
Labour and other costs LE	3.000	5.48	2800	5.42
Rent	8.000	14.62	8000	15.50
Solar	12000	21.93	12000	23.25
Total costs LE feddan	63642.58		51600	
Income feddan LE				
Total production (Kg /feddan)	4779.30		6165.89	
Price (LE) of one kg fish	60		60	
Total income LE/ feddan	286758		369953.4	
Net return LE/ feddan	223445.42		318353.4	
Investmental return LE/ return LE cost	3.50		6.17	

The higher production was recorded for group of fish fed trash fish 6165.89Kg and 4779.30 Kg for group of Meager fed artificial diet. The net return was higher (318353.4 LE) for Meager fed trash feed and lower in Meager fed artificial feed 223445.42 LE. The retune/Cost return investment was higher in Meager fed trash fish 3.50 and 6.17 LE for Meager fed artificial and trash fish feed .This result is consistent with the finding of (Abdalla *et al*., 2007) from their studies on profitability on fish farming. The rate of return per capital invested is the ratio of profit to total cost of production. It indicates that is earned by the business by capital outlay (Awotide and Adejobi, 2007). This result is consistent with the finding of (Abdalla *et al*., 2007) from their studies on profitability on fish farming. The rate of return per capital invested is the ratio of profit to total cost of production. It indicates that is earned by the business by capital outlay (Awotide and Adejobi, 2007 and Eid *et al*., 2020) from this study It could be concluding that meager fed trash fish was the best in terms of growth performance, feed utilization and economic analysis under this experimental condition.

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تقييم نظام التغذية على اداء النمو والاستفادة الغذائية لسمك اللوت تحت الظروف المصرية

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الملخـــــــص العربـــــي

أجريت الدراسة لمعرفة أثر تغذية الأعلاف الصناعية والتغذيه علي اسماك الرابش (اسماك عديمة القيمه) في مزرعة أسماك خاصة في الديبة. وقد تم تغذية الأسماك بالعلائق التجريبية (الاعلاف الصناعية والرابش مرتين في اليوم، ٦ أيام في الأسبوع. استمرت االتجربة لمدة ٣٦٠ يومًا (١٢ شهرًا).

أظهرت النتائج أن الاسماك المغذاة على الرابش تسجل أعلى زيادة فى وزن الجسم، اعلى فى الطول الكلى واعلى معدل النمو النوعى SGR من مجموعة الأسماك التى تغذت علي العليقة الصناعية وكان معدل الاعاشة اعلى في مجموعة الأسماك المغذاه على العلف الاصطناعي وأقل فى مجموعة الاسماك المغذاه على سمك الرابش ولاتوجد هناك فروق معنوية ($P \geq 0.05$) بين المعاملات التجريبية فى التركيب الكيميائي لجسم الأسماك. كما زادت الأعلاف الصناعية من تكلفة إنتاج كيلوجرام واحد من وزن الجسم للأسماك ٣٤,٢٠ و ٢٥ جنيه. أوضح التقييم الاقتصادي أن أسماك المغذاه على اسماك عديمه القيمه أعلى إنتاجية ٦١٦٥,٨٩ كجم / فدان وصافي عائد (٣١٨٣٥٣,٤ جنيه) مقارنة الاسماك المغذاة على العليقة الصناعية ٤٧٧٩,٣٠ كجم/ فدان وصافي العائد ٢٢٣٤٤٥,٤٢ جنيه. كان العائد على الاستثمار أعلى في أسماك المغذاة على الرابش ٦,١٧ و ٣,٥٠ جنيهات مقارنة بالمجموعة المغذاه على العليقة الصناعية.

يمكن استنتاج أن تغذية أسماك اللوت على اسماك الرابش كانت الأفضل من حيث أداء النمو والتقييم الاقتصادي في ظل الظروف التجريبية الحالية.