Effect Of Some Feed Additives On Economic And Productive Efficiency Of Tilapia Nilotica (*Oreochromis Niloticus*) And Common Carp Fish (*Cyprinus Carpio*)

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ABSTRACT

This work was carried out to study the effect of supplementation of some feed additives (probiotics (bactocell), antibiotic (oxytetracycline) and vitamins (C&E) that commonly used under Egyptian conditions in the diet of Tilapia nilotica and Common carp fingerlings through study the effect of these additives on productive and economic efficiency parameters.

The design of this study include four groups of fingerlings of *Oreochromis niloticus* and Common carp , the groups included in this study classified to group 1, which fed on basal diet without any supplementation of feed additive (control group), group 2, which fed on basal diet with supplementation with bactocell (*Pediococcus acidilactici*) at 1gm Bactocell/ kg, group 3 which fed on basal diet with supplementation with oxytetracycline at 0.6 gm oxytetracycline/ kg and group 4 that fed on basal diet with supplementation with Vitamin C at 400 mg/kg diet and vitamin E at 300 mg / kg diet.

From this study we can conclude that, the Nile tilapia fingerlings is of higher costs, returns and net profit than common carp fingerlings. The vitamin C & E improved body weight, body weight gain, return and net profit higher than other treatments for both species followed by oxytetracycline and finally bactocell. Also this study indicated that, although, Nile tilapia vitamin C & E treated group had the highest total costs but also, it had the highest return in comparison with oxytetracycline and bactocell treated group, so it is the highest net profit than other groups.

INTRODUCTION

The feed accounts for more than 50 % of the total production costs in modern intensive aquaculture. Increasing feed efficiency, especially by improving the metabolic assimilation of dietary nutrients, is of high priority in contemporary animal production. Any reduction in feed costs would have a direct positive effect on profitability of aquaculture. *(1).*

Aquaculture continues to grow more rapidly than all other animal food-producing sectors, with an average annual growth rate for the world of 8.8 percent per year since 1970, compared with only 1.2 percent for capture fisheries and 2.8 percent for farmed meat production systems *(2).* In 2002, the total fish production in Africa was 7.5 million Mt, which was 5.6% of world production. Four countries, Egypt, Morocco, South Africa, and Nigeria contributed 41% of the African total production in 2002. Total aquaculture production in Egypt in 2002 was 376 × 103 Mt, which supplied 81% of that in Africa *(3).* With the expanding population in Egypt there is an increasing of food demand especially for protein sources. For facing the great demand for protein sources, the fish cultures are intensified. *(4).* In Egypt, the production of fish coming from aquaculture represented about 60% of total fish production sources *(5).* The main problem in fish farming is getting good healthy fingerlings with high body weight and lower costs.

This study was aimed to investigate the production of high quality fingerlings (healthy, high body weight and lower costs) through the effect of dietary supplementation of some feed

4-Experimental Design: The design of the experiment is shown in Table 2.

Table 2. Experimental design for selected feed additive used for Tilapia nilotica and Common carp.

Groups	Received diet
Group 1	Fed on basal diet without any supplementation of feed additive (control group).
Group 2	Fed on basal diet with supplementation with bactocell (*Pediococcus acidilactici*) at 1gm Bactocell/ kg.
Group 3	Fed on basal diet with supplementation with oxytetracycline at 0.6 gm oxytetracycline/ kg.
Group 4	Fed on d basal diet with supplementation with Vitamin C at 400 mg/kg diet and vitamin E at 300 mg / kg.
Experimental period extended for 12 weeks	
Water quality	
Temperature	26 – 34°c ± 2 °c
DO (ppm)	5.5 mg / L
PH value	8.2
Nitrite(NO2)	0.15 mg / L.
Nitrate(NO3)	23 mg / L.
Ammonium (NH4)	0.425 mg / L.
Phosphate(PO4)	0.85 mg / L .
Water hardness	190.44 mg / L.

II. A. Productive efficiency measurements

a- Body weight: The fish of each group were weighed at the beginning of the experiment to obtain initial body weight then weighted biweekly. *(7).*

b- Body weight gain (BWG)

Body weight gain of fish (grams) was calculated as the difference between two successive weights each two weeks. *(8).*

c- Weight gain percent

Weight gain percent was determined according to the previously recorded method *(9).* Using the following equation:

$$\text{Weight gain percent} = \frac{\text{Final average body weight - Initial average body weight}}{\text{Initial average body weight}} \text{X } 100$$

d- Specific growth rate (SGR) was determined using the following formula (*9*).

$$SGR = \frac{\text{Log}_e W_2 - \text{Log}_e W_1}{T_2 - T_1} \text{ X } 100$$

e- Body length: The whole body length (Cm) of each fish was measured from the anterior part of fish to the end of its tail.

f- Condition factor: Was computed for fishes as follows*(10)*:

2 - Evaluation of feed utilization

a- Feed intake: Was calculated as the total weight diet offered in a given period (every two weeks) divided by the number of survival fish *(11).*

$$\textbf{FCR} = \frac{\textbf{Feed intake (g)}}{\textbf{Weight gain (g)}}$$

b- Feed conversion ratio (FCR):

It indicates the weight of feed that required for producing a unit weight of fish *(12).*

c- Feed Efficiency (FE): Was carried out as calculated in previous study *(8).*

c. Survivability and mortality percentage:

A survival rate was expressed as follow *(13)*:

$$SR = \frac{N_F}{N_i} X \ 100$$

Where: N_F = Final number and N_i = Initial number.

$$\textbf{C.F} = \frac{\textbf{Body weight (gm)}}{\textbf{(Total length cm)}^3} \textbf{X100}$$

II. B. Economic efficiency measurements:-

1. **Costs parameters:-** Costs parameters are classified according to the implied methods (***14***).

a. **Total variable costs (TVC):** It includes price of purchased fingerlings, the selected feed additives used and feed costs. It was estimated per piaster during the cycle of the experiment.

b. **Total fixed costs (TFC):** It includes fuel, labour, veterinarian, the costs of land and equipment depreciation it was estimated per piaster.

c. **Total costs (TC):** It was calculated from the summation of total fixed cost and total variable cost.

2. **Returns parameters**:- The return item was calculated ***(14).***

a. **Total returns (TR):-** Expressed per piaster from fingerling sale.

b. **Net profit = Net income**: It was calculated using the following equation: Net profit = Total return - Total cost.

b.**Statistical method**: Data collected, arranged, summarized and analyzed using the computer program ***(15).*** The statistical method was two way ANOVA, LSD to estimate the effect treated groups and species on productive and economic efficiency parameters ***(16)***. Data were presented as mean ± SE and significance declared at ($P < 0.05$).

RESULTS AND DISCUSSION

The results in Table 3 indicated that, there is a significant ($P < 0.05$) difference among different treated groups on final body weight of all dietary treatment groups and on growth parameters of both species compared with control groups. A highly significant increase in body weight appeared in Nile tilapia fingerlings vitamin (C & E) treated group followed by Common carp fingerlings vitamin (C & E) treated group, then Nile tilapia fingerlings Oxytetracycline treated group, followed by Common carp Oxytetracycline treated group and the lowest value of final body weight was in control group of common carp fingerlings. This result indicated that, the vitamin C & E improved body weight higher than other treatments for both species followed by oxytetracycline treated group and finally bactocell treated group. This result could be attributed to action of vitamin C as a metabolic antioxidant, detoxifying numerous peroxide metabolities, thus protecting cell membranes and other intracellular components and processes that are sensitive to oxidation. Similar results were reported in different studies (***17 and 18***). Also vitamin C acts as a cofactor in the hydroxylation of praline and lysine in the synthesis of collagen which are a component of connective tissues resulting in an increase in body weight ***(19)***.

Also, Combination of vitamin C & E improves body weight and this may be due to a synergistic simultaneous protection effect of the lipid and aqueous phases against oxidation, and the action of vitamin C on vitamin E regeneration in the tissues. Data on growth, mortality, have indicated that vitamin C protected fish against vitamin E deficiency. These vitamins could act synergistically in increasing body weight as showed in several studies ***(20 - 24).***

The weight gain showed a significant differences ($P < 0.05$) among the treated groups. Nile tilapia vitamin (C & E) treated group showed significant higher value among all other groups followed by common carp vitamin (C & E) treated group then, Nile tilapia Oxytetracycline treated group which showed no significant with Nile tilapia bactocell treated group followed by Common carp Oxytetracycline treated group. Meanwhile, the lowest value is showed by Common carp control group followed by Common carp bactocell treated group then, Nile tilapia control group. The body weight gain (%) ranged from 14.05 to 15.33 for Nile tilapia vitamin (C & E) treated group and Nile tilapia bactocell treated group, respectively. These results agreed with those recorded by previous authors ***(21-24).***

SGR showed a significant difference ($P < 0.05$) among the treated groups, Nile tilapia bactocell treated group showed significant higher value among all other groups and Common carp oxytetracycline treated group, followed by Nile tilapia control group. Meanwhile, the lowest value showed by Nile tilapia vitamin (C & E) treated group followed by Common carp control group, bactocell treated group and vitamin (C & E) treated group. Using probiotics (*Streptococcus faecium* M74) showed the highest average individual specific growth rate ***(25)***. Also, it has been found that feeding a bioencapsulated Artemia had significantly higher ($P<0.01$) specific growth rate by 1.41 % ***(26)***.

Table 3. Effect of feed additives on body weight (gm), weight gain (gm), weight gain (%), specific growth rate (SGR), body length (cm), condition factor (K), feed intake (g/fish), feed conversion ratio (FCR) and feed efficiency (FE) of common carp and Nile tilapia fingerlings (mean ± SE).

Species	Groups	Initial Body weight	Final Body weight	weight gain (gm)	weight gain (%)	Specific Growth Rate (SGR)	Body length (cm)	Condition Factor (K)	Feed Intake (g/fish)	Feed Conversion Ratio (FCR)	Feed Efficiency (FE)
Common Carp	Control	5.92 ± 0.25^{a}	16.66 ± 0.28^{g}	2.09 ± 0.03^{g}	14.41 ± 0.24^{cd}	0.42 ± 0.04^{bc}	9.02 ± 0.31^{f}	1.65 ± 0.05^{c}	7.00 ± 0.12^{g}	3.35 ± 0.04^{ab}	0.30 ± 0.02^{bc}
	Bactocell	6.22 ± 0.25^{a}	18.36 ± 0.29^{f}	2.33 ± 0.03^{f}	14.55 ± 0.24^{bcd}	0.42 ± 0.01^{bc}	9.35 ± 0.21^{cd}	1.64 ± 0.07^{c}	7.71 ± 0.12^{f}	3.32 ± 0.03^{ab}	0.30 ± 0.03^{bc}
	Oxytetracycline	6.03 ± 0.33^{a}	19.92 ± 0.36^{de}	2.62 ± 0.03^{d}	15.21 ± 0.29^{ab}	0.44 ± 0.03^{a}	9.22 ± 0.12^{de}	1.88 ± 0.11^{b}	8.37 ± 0.15^{de}	3.19 ± 0.06^{cd}	0.31 ± 0.01^{ab}
	Vitamin (C & E)	6.52 ± 0.30^{a}	22.43 ± 0.31^{b}	2.86 ± 0.03^{b}	14.63 ± 0.25^{abcd}	0.42 ± 0.01^{bc}	9.42 ± 0.23^{bc}	1.97 ± 0.10^{a}	9.42 ± 0.13^{b}	3.30 ± 0.05^{abc}	0.30 ± 0.02^{bc}
Nile Tilapia	Control	6.05 ± 0.33^{a}	19.16 ± 0.40^{ef}	2.49 ± 0.03^{e}	15.00 ± 0.33^{abc}	0.43 ± 0.02^{ab}	9.04 ± 0.23^{ef}	1.89 ± 0.11^{b}	8.05 ± 0.17^{ef}	3.24 ± 0.06^{bcd}	0.31 ± 0.01^{ab}
	Bactocell	6.16 ± 0.36^{a}	20.77 ± 0.42^{cd}	2.75 ± 0.03^{c}	15.33 ± 0.29^{a}	0.44 ± 0.01^{a}	9.19 ± 0.25^{def}	1.98 ± 0.12^{a}	8.72 ± 0.18^{cd}	3.17 ± 0.02^{d}	0.32 ± 0.01^{a}
	Oxytetracycline	6.83 ± 0.27^{a}	21.68 ± 0.30^{bc}	2.76 ± 0.02^{c}	14.66 ± 0.25^{abcd}	0.42 ± 0.01^{bc}	9.55 ± 0.10^{ab}	1.85 ± 0.13^{b}	9.11 ± 0.13^{bc}	3.30 ± 0.07^{abc}	0.30 ± 0.01^{bc}
	Vitamin (C & E)	7.11 ± 0.26^{a}	23.98 ± 0.29^{a}	2.95 ± 0.01^{a}	14.05 ± 0.20^{d}	0.41 ± 0.05^{c}	9.72 ± 0.32^{a}	1.99 ± 0.15^{a}	10.07 ± 0.12^{a}	3.42 ± 0.04^{a}	0.29 ± 0.02^{c}
LSD value		N.S.	0.93	0.08	0.74	0.02	0.19	0.08	0.39	0.12	0.01

Means within the same column in each category carrying different litters are significant at $P \leq 0.05$.

From the obtained data, we can conclude that, the Nile tilapia fingerlings of higher body length and condition factor (K) than Common carp fingerlings. All the dietary treated groups of both species had a significant ($P < 0.05$) increase in average body length when compared with control groups. The vitamin (C & E) improved body length and condition factor (K) for both species followed by oxytetracycline treated group and finally bactocell treated group. The high condition factor is an indicator of the good nutritional (healthy) state of fish ***(10)***.-The high level of dietary vitamin C (150-1500 ppm) presented significantly ($P < 0.01$) better higher condition factor (CF) and economic returns than recorded at the lower vitamin C levels (0 - 75) by Juvenile Korean Rockfish ***(27)***. In the same line ***(4)*** noticed the highest length and condition factor were obtained in group (2) which fed on diet contained REE, but lowest

in group (3) fed on diet contained oxytetracycline (antibiotics) and group (4) which fed on diet contained Bactocell (probiotics).

At the end of experiment, there was also a significant ($P < 0.05$) increase in final feed intake of all dietary treatment groups of both species compared with those of control groups and a highly significant increase in feed intake appeared in Nile tilapia fingerlings vitamin (C & E) treated group followed by Common carp fingerlings vitamin (C & E) treated group then Nile tilapia fingerlings Oxytetracycline treated group followed by Nile tilapia bactocell treated group and the lowest value of final feed intake was in control group of Common carp.

The FCR showed a significant differences ($P < 0.05$) among the treated groups, Nile tilapia vitamin (C & E) treated group showed significant higher value among all other groups which showed no significant ($P > 0.05$) with common carp control group, common carp vitamin (C & E) treated group, Common carp bactocell treated group and Nile tilapia Oxytetracycline treated group which showed no significant ($P > 0.05$) with Nile tilapia control group. Meanwhile, the lowest value showed by Nile tilapia bactocell treated group followed by Common carp Oxytetracycline treated group. The Feed efficiency value (FE) ranged from 0.29 to 0.32, for Nile tilapia vitamin (C & E) treated group and Nile tilapia bactocell treated group, respectively. Carp that subjected to two experimental diets containing 1 gram probiotics / 100 kg feed from 1 July to 14 August, 1996, had better feed conversion by (17.37%) ***(25)***. Fed a bio-encapsulated Artemia, had significantly ($P < 0.01$) higher feed efficiency ratio by 0.45 units, compared to control group which fed probiotics free diet ***(26)***. Our results confirmed by the study which showed that, the probiotics improved utilization of feed which may be achieved by increased efficiency of existing digestive processes or by promoting the digestion of previously indigestible substances ***(4)***.

χ^2 (Chi square) showed a significant differences among the two species and different treatments for mortality and survivability %. The highest survivability and lowest mortality % recorded for Nile tilapia vitamin (C & E) treated group was 96 % and 4 %, respectively. Vitamin C non-supplemented group showed significantly ($P < 0.01$) higher mortality rates compared to vitamin C supplemented group ***(28)***. AMP-Na/Ca is an effective AsA source and higher level in the diet improved blood chemistry and non-specific immune function of Japanese eel which improve survivability ***(29)***.

The result in table 4 indicated that, total fixed costs included value of fuel (0.56 piaster/ group), labor (3.00 piaster/ group), veterinary management (0.38 piaster/ group), transportation (1.5 piaster/ group), land (12.50 piaster/ group) and equipment (0.38 piaster/ group). In our experiment the total fixed cost was 18.31 piaster/ group. These results seem to be similar to those which showed that, fixed costs per faddan were 500.25 L.E ***(30)***. In other study the fixed costs per faddan were 300.17 and 201.85 L.E for governmental and private sectors ***(31)***. The fixed costs ranged from 77.14 to 317.96 L.E per 1000 fish for Tilapia species and carp fish, respectively ***(32)***.

From the obtained data, we can conclude that, the Nile tilapia fingerlings of higher feed costs than Common carp fingerlings. All the dietary treated groups of both species had a significant ($P < 0.05$) increase in average feed costs when compared with those of control groups of both species. The vitamin (C & E) had the highest feed costs than other treatments for both species followed by oxytetracycline treated groups and finally bactocell treated group. Those which reported that variable one which includes feed costs (that constitutes about 70-80% of total production costs) ***(33)*** and ***(34)***, while feeding inputs usually represents over 50% of operating costs ***(35)***. Also, feed accounts for about half the cost in current high-volume fed mono-species aquaculture ***(36)***.

Table 4. Effect of Feed Additives on Total fixed costs, Cost of purchased fry, Feed costs, Feed additives cost, Total Variable Costs, Total Costs, Return and Net Profit (piaster) of Common Carp and Nile Tilapia Fingerlings (mean ± SE).

Species	Groups	Total fixed costs	Cost of purchased fry (piaster)	Feed costs (piaster)	Feed additives cost (piasters)	Total Variable Costs (TVC piaster)	Total Costs (Piaster)	Return (piaster)	Net Profit (piaster)
Common Carp	Control	18.31	11.83 ± 0.49^{e}	2.10 ± 0.03^{f}	0.00000 ± 0.000000^{d}	13.93 ± 0.33^{e}	32.24 ± 0.33^{e}	49.98 ± 0.83^{h}	17.73 ± 0.51^{g}
	Bactocell	18.31	12.43 ± 0.49^{e}	2.35 ± 0.04^{e}	0.03855 ± 0.000611^{c}	14.79 ± 0.46^{e}	33.10 ± 0.46^{e}	55.08 ± 0.87^{g}	21.98 ± 0.54^{f}
	Oxytetracycline	18.31	12.06 ± 0.66^{e}	2.55 ± 0.05^{d}	0.04015 ± 0.000722^{c}	14.61 ± 0.62^{e}	32.92 ± 0.62^{e}	59.75 ± 1.07^{f}	26.83 ± 0.51^{e}
	Vitamin (C & E)	18.31	13.05 ± 0.60^{e}	2.87 ± 0.04^{b}	0.04484 ± 0.000612^{b}	15.92 ± 0.52^{e}	34.23 ± 0.52^{e}	67.28 ± 0.92^{e}	33.05 ± 0.54^{d}
Nile Tilapia	Control	18.31	36.30 ± 1.97^{b}	2.41 ± 0.05^{e}	0.00000 ± 0.000000^{d}	38.71 ± 1.86^{b}	57.03 ± 1.86^{b}	114.97 ± 2.43^{d}	57.94 ± 1.44^{c}
	Bactocell	18.31	36.95 ± 2.14^{b}	2.66 ± 0.05^{c}	0.04362 ± 0.000883^{b}	39.61 ± 1.90^{b}	57.92 ± 1.90^{b}	124.63 ± 2.52^{c}	66.71 ± 1.00^{b}
	Oxytetracycline	18.31	40.99 ± 1.62^{a}	2.78 ± 0.04^{bc}	0.04371 ± 0.000611^{b}	43.77 ± 1.47^{a}	62.08 ± 1.47^{a}	130.08 ± 1.82^{b}	68.00 ± 0.94^{b}
	Vitamin (C & E)	18.31	42.68 ± 1.54^{a}	3.07 ± 0.04^{a}	0.04794 ± 0.000571^{a}	45.75 ± 1.41^{a}	64.06 ± 1.41^{a}	143.88 ± 1.71^{a}	79.83 ± 0.80^{a}
LSD value			3.80	0.12	0.00163	3.896	3.896	4.641	2.362

Means within the same column carrying different litters are significant at ($P \leq 0.05$).

The feed additive cost, along all the experimental period indicated that there is a significant difference ($P < 0.05$) between the treated groups in comparison with control one for both species. The highest feed additive cost showed for Nile tilapia vitamin (C & E) treated group followed by common carp vitamin (C & E) treated group, then Nile tilapia oxytetracycline treated group, Nile tilapia bactocell treated group and finally common carp oxytetracycline and bactocell group.

There was an increase in final TVC of all dietary treatment groups of both species compared with those of control groups, a highly significant increase ($P < 0.05$) in TVC appeared in Nile tilapia fingerlings vitamin (C & E) treated group which showed no significant differences ($P > 0.05$) with oxytetracyline treated group followed by Nile tilapia bactocell treated group which showed no significant differences ($P > 0.05$) in comparison with Nile tilapia control group. Common carp fingerlings showed no significant differences ($P > 0.05$) between all treated groups and Common carp vitamin (C & E) treated group that, showed highest value while the Common carp control group showed the lowest value. The obtained results due to total variable costs that included purchased fry cost, feed costs and feed additive cost. The operating costs of fish farms can be classified as variable costs *(37)* which are varying with level of production such as fry, feed, fertilizers, labor, electricity and fuel supplies. Variable costs include feed costs (that constitutes about 70-80% of total production costs), labor costs, costs of fry purchasing, in addition to veterinary management (which includes costs of drugs, vaccines, disinfectants in addition to costs of disease prevention, diagnosis, and water analysis) *(33,34)*. The Nile tilapia showed highest purchased fry cost, feed cost and feed additive cost so it showed the highest TVC cost. Variable costs per faddan in Egypt were 10230 L.E *(30)*. Our result confirmed with previous study which

reported that the variable costs ranged from 1200.62 to 2802.02 L.E per 1000 fish for Tilapia species in Ismalia governorate and Carp fish in Ismalia governorate, respectively *(32)*.

From the obtained data, we can conclude that, the Nile tilapia fingerlings is of higher total costs than Common carp fingerlings. All the dietary treated groups of both species had increase in average total costs when compared with those of control groups of both species. The vitamin (C & E) showed higher total costs than other treatments for both species followed by oxytetracycline treated group and finally bactocell treated group. The total cost includes total fixed costs and total variable costs (***14***). The total costs reached to 2.3 L.E / kg *(30)* and the total costs of each kilogram of fish were 200 piaster/kg *(38)*, while, the total costs of each pound of fish reached to 11.76 L.E *(39)*. Our result confirmed the study which reported that, the total costs ranged from 1305.13 to 3119.98 L.E per 1000 fish for Tilapia species in Kafr El-Sheikh governorate and Carp fish in Ismalia governorate, respectively *(32)*.

The Nile tilapia fingerlings showed higher return than Common carp fingerlings. The vitamin (C & E) improved return higher than other treatments for both species followed by oxytetracycline treated group and finally bactocell treated group. This may be due to the return depending on fingerling sale weight and its price, the Nile tilapia fingerlings showed the highest weight and also higher price. Also, vitamin (C & E) had a highest body weight in comparison with other treated group followed by oxytetracycline and bactocell treated group in comparison with control group so it is of higher economic and productive efficiency than other groups.

Regarding vitamin C & E, Trout fed diet containing 1200 mg A.A/kg diet which cause higher body weight, body weight gain and economic returns *(40)* and it is of higher value than normal level of ascorbic acid enhanced resistance to bacterial infection in Channel Catfish, (*Ictalurus punctatu*) with improvement body weight and economic efficiency *(41)*. Meanwhile, increasing level of vitamin E in the diet above the minimal requirement level for growth leads to stimulating effect on the immune response of Salmonids with improving body weight, gain and economic returns *(42)*. Also, the addition of 150 ppm vitamin E in Indian major carp diets gave significant ($P<0.05$) highest body weight gain and economic returns compared with the other dietary levels of the vitamin (0-250 ppm) *(43)*. Moreover, positive correlation has been proved between vitamin C, body weight, body weight gain and economic returns *(44)* and increasing level of vitamin C in the diet above the minimal requirement level for growth led to a stimulating effect on the immune response of Salmonids which reflected as increasing in economic returns *(45)*.

The net profit ranged from 17.73 for Common carp control group to 79.83 for Nile tilapia vitamin (C & E) treated group. The Nile tilapia fingerlings vitamin (C & E) treated groups showed higher significant ($P < 0.05$) value in net profit among other treated groups followed by Nile tilapia oxytetracycline treated group which showed no significant differences ($P > 0.05$) with Nile tilapia bactocell treated group than Nile tilapia control group. For Common carp fingerlings there is a significant difference ($P < 0.05$) between control and bactocell and oxytetracyline treated group in comparison with vitamin C & E treated groups and significant differences ($P < 0.05$) between control, bactocell and oxytetracyline treated group in comparison with each other. The Common carp control group showed the lowest value than other treated groups while Common carp vitamin (C & E) treated group showed the highest value. In general, at this week average net profit of Nile tilapia fingerlings was higher than that of Common carp. These results agreed with the study which showed that, the net income / faddan were 4422.45 L.E *(30)*. While, the net profit was higher for fish fed diet supplemented with vitamin C *(46)*. Meanwhile, net income per faddan for Tilapia species was 3193.09 and 3205.63 L.E for governmental and private

sectors, respectively *(31)*. The net income ranged from 89.03 to 518.85 L.E per 1000 fish for Carp species stocked in governmental sector and *Mugil Cephalus* fish stocked in governmental sector, respectively *(32)* confirmed by our results.

From the previous results, we can concluded that, Nile tilapia fingerlings are of higher costs, returns and net profit than Common carp fingerlings and addition of vitamin C & E improved economic and productive efficiency parameters of both species followed by oxytetracycline and finally bactocell. Although, Nile tilapia vitamin C & E treated group had a highest total costs but also, it had the highest return in comparison with other treated groups followed by oxytetracycline and bactocell treated groups in comparison with those of control group so it is of higher productive and economic efficiency than other groups.

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الملخص العربى

تأثير بعض إضافات الاعلاف على الكفاءة الاقتصادية والانتاجية لاسماك البلطى النيلى والمبروك العادى

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أجريت هذه الدراسة بقسم تنمية الثروة الحيوانية – كلية الطب البيطرى – جامعة الزقازيق فى الفترة من أغسطس ٢٠٠٨ حتى نوفمبر ٢٠٠٨.

إجريت هذه التجربة لدراسة تأثير إضافة الأعلاف المستخدمة فى مزارع الاسماك المصرية (البروبيوتك (الباكتوسيل)، المضادات الحيوية (الاوكسى تتراسيكلين) والفيتامينات (فيتامين ج ، هـ) فى علف سمك زريعة أسماك البلطى النيلى والمبروك العادى على تحسن الكفاءة الاقتصادية والانتاجية للزريعة من حيث (إنتاجية الزريعة، صحية ، ذات وزن عالى وجيد وبتكاليف أقل).

تم تقسيم الاسماك المستخدمة لكل نوع من الاسماك (البلطى النيلى والمبروك) إلى اربعة مجاميع بالتساوى لكل نوع (٣٠ زريعة لكل مجموعة):

المجموعة الاولى (لكل من البلطى والمبروك) غذيت على العليقة الاساسية بدون أية إضافات أعلاف ،غعتبرت كمجموعة ضابطة ، بينما المجموعة الثانية لكل نوع غذيت العليقة الاساسية مضافا اليها الباكتوسيل بمعدل ١جرام / كجم ، بينما المجموعة الثالثة غذيت على العليقة الاساسية مضافا اليها الاوكسى تتراسيكلين بمعدل ٠,٦ جرام / كجم من متوسط وزن الجسم للاسماك بينما المجموعة الرابعة غذيت على فيتامين ج بمعدل ٤٠٠ مجم / كجم و فيتامين هـ بمعدل ٣٠٠ مجم / كجم من متوسط وزن الجسم.

تم حساب متوسط وزن الجسم ، ومعدل الزيادة الاسبوعية للاسماك ، ونسبة النفوق ، ومعمل التجانس والوزن النهائى للاسماك كمعايير للكفاءة الانتاجية ، بينما تم تقدير التكاليف الثابتة و المتغيرة ، وصافى العائد لكل مجموعة ،إعتبرت معايير للكفاءة الاقتصادية لكل مجموعة على حدة.

وخلصت هذه الرسالة أن زريعة البلطى النيلى تتميز بأنه عالية التكاليف ، والايرادات و صافى العائد أكثر من زريعة المبروك العادى ولكنها تحقق صافى عائد أعلى من زريعة المبروك العادى كما خلصت الرسالة أن فيتامين (ج ، هـ) هما أفضل إضافات الاعلاف كفاءة إقتصادية وإنتاجية يليها الاوكسى تتراسيكلين ثم الباكتوسيل و أن كل إضافات الاعلاف تحسن الكفاءة الاقتصادية والانتاجية لزريعة الاسماك أفضل من المجموعة الضابطة.