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EFFECT OF FEED ADDITIVES ON ECONOMIC AND PRODUCTIVE EFFICIENCY OF FISH PRODUCTION FARMS

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ABSTRACT

The presnt work was carried-out to study the effect of dietary supplementation of some feed additives (probiotics, antibiotic and vitamins) used under Egyptian condition as yeast, oxytetracycline, vitamin C and E on fresh water fish especially Tilapia niloticus (Oreochromis niloticus) and Common carp fingerlings through study the effect of these additives on productive efficiency parameters of Tilapia nilotica (Oreochromis niloticus) and Common carp (Cyprinus carpio) which include: growth performance (body weight and body weight gain). And the economic efficiency parameters which include Costs, returns and net profit.

Two fish species were involved Oreochromis niloticus (Nile tilapia) and Cyprinus carpio (Common carp) which are one of the most widely cultured fish in Egypt for its biological and economic importance.

The used feed additives in the present study include Probiotic (Yeast max; National Development Company NADEC, 10th of Ramadan, third industrial area, Egypt), each 1gm contains 0.25 gm Saccharomyces cerevisiae was added to the basal diet at a rate of 3g / kg diet. Antibiotic (Oxytetracycline. 20 %. Unipharma, Universal Industrial Pharmaceutical Co. El obour City, Cairo, Egypt) was added to the basal diet at a rate of 0.6 g . / Kg diet. Vitamins (Vitamin C and Vitamin E), Vitamin C (Coated vitamin C ethyl cellulose, CEC), which is a white to slightly yellowish powder, consisting of ascorbic acid coated with ethyl cellulose.Its maximum losses on drying are 0.1%. Ascorbic acid content at minimum is about 97.5% on dry matter. And slightly soluble in water. It was added to the basal diet at a rate of

400mg / kg diet. Vitamin E: Vitamin E adsorbate 50%, which is a fine powder consisting of Dl-α-tocopherol acetate adsorbed on salicylic acid was used. It is a white to slightly yellowish powder. Its maximum losses on drying are 0.05%. It is fairly stable to air and heat but somewhat sensitive to light, added to the basal diet at rate of 300mg / kg diet.

From the present study it was concluded that the addition of yeast, oxyteteracycline and vitamin C and E to Tilapia nilotica and Common carp diet improve the body weight, total returns and net profit as the best feed additives used was vitamin C & E, followed by Oxytetracycline and both of them improve the net profit than the control group. In general, the average net profit of Nile tilapia(Oreochromis niloticus) was higher than that of the common carp (Cyprinus carpio).

INTRODUCTION

For facing the great demand for protein sources, the fish cultures are intensified. Fish is an important source of animal protein for human as it is not only easily digestible but also rich in essential amino acids, vitamins, minerals and good source for essential fatty acids especially omega-3 fatty acids. So, the fish culture becomes the hope for solving a part of protein shortage problem all-over the world. Further development of fish culture requires more knowledge about nutrition and feed additives that improve yields with minimum costs and with no harmful effects. ***(El-Sayed, 2007).***

In Egypt, the production of aquaculture fish represented about 60% of total fish production sources ***(GAFRD, 2007)*** and Tilapia represents 36% of the Egyptian production from fish culture ***(Sadek, 2000).*** In 2002, the total fish production in Africa was 7.5 million Mt, which was 5.6% of world production and the Total aquaculture production in Egypt represents 81% of that in Africa. ***(Suloma and Ogata, 2006).***

Aqua-feed production is currently one of the fastest expanding agricultural industries of the world, with annual growth rates in excess of 30% per year ***(FAO, 1997).*** Aquaculture is responsible for the increase of over 20 million tones in production over the last decade, fish produced from farming activities currently accounts for over a quarter of all fish consumed by humans ***(Ozorio, 2001)***. The total production of aqua-feeds has been projected to be 46 million tonnes (MT) in the year 2010 and it is likely to increase to 69 MT in 2025. If an average feed conversion factor of 1.5 is considered, this increase in aqua-feed production

could support an increase in culture fish production of the order of approximately 35 MT by the year 2025 ***(Hasan, 2001).***

Feed additives are intended to improve feed quality, nutritional aspects and livestock health and performance. Improvement of fish feeding and veterinary management for disease prevention will improve returns and economic and prodeuctive efficiency of fish farms. ***Shafey (1993) and El-telbany and Atallah (2000).***

Therefore, the present study was to evaluate the effect of dietary supplementation of yeast, oxytetracycline, vitamin C and E on Tilapia nilotica and Common carp on **productive efficiency parameters** (body weight and body weight gain) and some immune response parameters (differential leucocytic count and phagocytic index) of Tilapia nilotica and common carp. Also, the **economic efficiency parameters (**Costs, returns and net profit) were evaluated.

MATERIALS AND METHODS

I. The feed additives used: The used feed additives in this study include:

Probiotic: Yeast max (National Development Company NADEC, 10th of Ramadan, third industrial area, Egypt), each 1gm contains 0.25gm Saccharomyces cerevisiae was added to the basal diet at a rate of 3 g / kg diet.

Antibiotic: Oxytetracycline. 20 %. (Unipharma, Universal Industrial Pharmaceutical Co. El obour City, Cairo, Egypt) was added to the basal diet at a rate of 0.6g / Kg diet.

Vitamins (Vitamin C and Vitamin E).

-Vitamin C: Coated vitamin C ethyl cellulose (CEC), which is a white to slightly yellowish "powder, consisting of ascorbic acid coated with ethyl cellulose was used. Its maximum losses on drying are 0.1%. Ascorbic acid content at minimum is about 97.5% on dry matter. It is slightly soluble in water. Was added to the basal diet at a rate of 400mg / Kg diet.

-Vitamin E: Vitamin E adsorbate 50%, which is a fine powder consisting of Dl-α-tocopherol acetate adsorbed on salicylic acid was used. It is a white to slightly yellowish powder. Its maximum losses on drying are 0.05%. It is fairly stable to air and heat but somewhat sensitive to light. was added to the basal diet at a rate of 300mg / Kg diet.

2. Fish used: Two species were involved: *Oreochromis niloticus* (Nile tilapia) and *Cyprinus carpio* (Common carp) which are the most widely cultured fish in Egypt for its biological and economic importance.

3. Basal diet.

Isocaloric, isonitrogenous basal diet was formulated.

Table (1): Composition of the basal diet used in the experiment:

Ingredients	**%**
Yellow corn	25.00
Wheat flour	9.00
Soybean meal	20.70
Fish meal	20.70
Poultry by-product meal	18.00
Vegetable oil	6.00
Vitamin mixture	0.5
Mineral mixture	0.1

4. Acclimatization: The fish were stocked in clean concrete ponds (3 X 1 X 1 m). Each pond had four net partitions which divided it into 4 equal parts. They were supplied with underground water and air supplied with large air compressor. At the beginning of the adaptation period (which extended for two weeks), Tilapia and common carp were stocked in each net partition (nearly 30 fishes / partition) and left in a potassium permanganate bath (20 ppm) for 3 hours. During the adaptation period, all fishes were daily fed on the basal diet at a rate of approximately 3% of their body weight to be gradually adapted to pelleted feeds and environmental condition. After the adaptation period, the experiment was started. The number of fish per partition was 25 and the average initial body weight was (9.9 gm.) per fish for each group was recorded according to methods applied by ***(Shewita, 2003 and EL-Sayed, 2007).***

Table (2): The experiment I design for selected feed additive used for Tilapia nilotica.

Groups	Diet received
Group 1	Received basal diet without any supplementation of feed additive (control group).
Group 2	Received basal diet supplemented with Yeast at 3.0 gm / kg diet.
Group 3	Received basal diet supplemented with oxytetracycline 20 % at 0.6 gm oxytetracycline/ kg diet.
Group 4	Received basal diet supplemented with Vitamin C at 400 mg/kg diet and vitamin E at 300 mg / kg diet.
Experimental period extended for 10 weeks	
Water quality	
Temperature	26 – 35°c ± 2 °c
PH value	8.1

3-Measurments:

a- Body weight: The fish of each group were weighed at the zero day of the experiment to obtain initial body weight then, they were weighted biweekly as follows: the fishes were lifted from water, allowed to drain for 30 seconds interval and directly transferred into container containing sufficient amount of water to eliminate environmental stress. Individual fish weight was recorded and the fish was immediately returned to the original water environment.

b. Costs parameters:- Costs parameters are classified according to the methods implied by ***(Selvatore, 1974).***

c. 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.

d.Total fixed costs (TFC): It includes fuel, labour, veterinary, the costs of land and equipment depreciation it was estimated per piaster due to the fixed value for each fish. The depreciation of building and equipment calculated according to ***El-Tahawy (2004) and Aly (2006)*** in which the depreciation of building in 25 year and equipment in 5 years.

The straight line method implied by ***Sankhyan (1993)*** and ***El-Telbany and Atallah (2000)*** was used according the following equation:

$$\text{Depreciation rate} = \frac{\text{Value of Asset}}{\text{Age of Asset (year)}}$$

Age of pond = 25 years. Age of a pumping machine = 5 years

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

2. Returns parameters:- The return item was calculated according to ***(Selvatore, 1974)***. The most important item is body weight, weight gain value.

a. Total returns (TR):- Expressed per piaster. Total return = Fingerling sale

c. Net profit = Net income: It was calculated by using the following equation is: Net profit = Total return - Total cost.

4. Statistical method:-

Data was collected, arranged, summarized and then analyzed using the computer program ***SPSS/PC+(2001)*** the statistical method was two way ANOVA test (Factorial design), LSD (Least significant difference) to estimate the effect of different treated groups and species on productive and economic efficiency parameters of in Tilapia nilotica and Common carp fingerlings. Data were presented as mean ± SE and significance was declared at ($P < 0.05$).

RESULTS AND DISCUSSION

From the obtained data, it can be concluded that, the Nile tilapia fingerlings had higher body weight than common carp fingerlings. All the dietary treated groups of both species had a significant ($P < 0.05$) increase in average body weight when compared with control groups of both species. 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 yeast treated group. (Table 3).

These results could be attributed to action of vitamin C as metabolic antioxidant, detoxifying numerous peroxide metabolities, thus protecting cell membranes and other intracellular components and processes that are sensitive to oxidation**.** These results agreed with those reported by ***(Masumato et al., 1991).*** Meanwhile, Vitamin E protects cell membranes against lipid peroxidation. Its deficiency produces reductions in survival time and erythrocyte membrane deformations, increased in vitro hemolysis, reduction in the amount of peritoneal macrophages and activity of T and B lymphocytes in rainbow trout challenged with *Yersinia ruckeri*. These results agreed with ***Sau et al. (2004*)*.*** Also, vitamin E may play an important role in the modulation of the plasma cortisol concentration under stress conditions, which in agree with those of ***Montero et al. (1998) and Belo et al. (2005)***. On the contrary, other authors (***Dabrowska et al., 1991 and Ortuño et al., 2003***) indicated that the stress-related cortisol response is not influenced by vitamins E and/or C supplementation.

Combination of vitamin (C & E) improve body weight 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, hematology, and lipid oxidation in the liver demonstrated that the vitamin C protected fish against vitamin E deficiency. These vitamins could act synergistically in increasing body weight. These results in agree with those reported by ***Tappel, (1988), Hamre et al. (1997) Shiau and Hsu, (2002), Shewita, (2003)***, ***Belo et al. (2005), Xie et al. (2006)***, ***Abd El-Ghny, (2009) and Moein, (2012).*** And disagree with ***Fabiana et al. (2011).***

Oxytetracycline improve body weight in comparison with yeast and control group, this result may be due to reduction or elimination of the activity of pathogenic bacteria which may cause subclinical infection, thus allowing the host to achieve maximum production, elimination of those bacteria which produce toxins that reduce the growth of the host animal, stimulation of the growth of microorganisms that synthesize unidentified nutrients, reduction of the growth of microorganisms that compete with the host animal, increase absorptive capacity of small intestine through a decrease in the thickness of the intestinal wall and the addition of antibiotics (OTC) that, resulted in a five-fold increase in survival, better growth and less intestinal grey-gut, indicating that bacterial disease was a major source of mortality. These finding are in harmony with those obtained by ***El-Aidy, (2003)***, ***Battaglene et al., (2006) and El-Sayed, (2007)***. Yeast improve body weight in comparison with control group which may be due to the action of probiotic on intestinal microflora and increasing the digestability, absorbability and utilizability of different nutrients in gastrointestinal tract, the

probiotics antagonizes the potential pathogen by the production of the inhibitory compound or by competition for nutrients, space (adhesion sites in the digestive tract) or oxygen, probiotics also, have bactericidal activity similar to that noticed by ***Fuller (1992)***, and Probiotics decreased cortisol levels of treated animals and affected the transcription of two genes involved in the regulation of body growth, IGF-I and MSTN. In particular, IGF-I transcription was increased and MSTN transcription was inhibited in treated groups cleared by ***Carnevali, et al. (2006)***. This result in agree with ***Gatesoupe, (2007), Essa, et al. (2011) and Rodrigo, et al. (2012).***

a. Effect of Feed Additives on Total Variable Costs (TVC piaster) of Nile Tilapia and Common Carp Fingerlings

Table (4) showed that, the effect of feed additives on TVC (piaster) of Nile tilapia and common carp fingerlings. The analysis of variance of the obtained data showed that, there was a significant ($P < 0.05$) difference among TVC of experimental groups for both species. The TVC ranged from the lowest value 59.21 for common carp control group to 93.34 for Nile tilapia vitamin (C & E) treated group, respectively. Followed by Nile tilapia Oxytetracycline treated group 91.10, and Nile tilapia yeast treated group 88.93 then Nile tilapia control group 86.92.for common carp the highest TVC value 63.61 for common carp vitamin C and E treated group, followed by common carp Oxytetracycline treated group 62.30, and common carp yeast treated group 61.30 then common carp control group 59.21.

From the obtained data, we can conclud that, the Nile tilapia fingerlings of higher TVC than common carp fingerlings. All the dietary treated groups of both species had increase in average TVC when compared with control groups of both species. The vitamin C and E showed higher TVC than other treatments for both species followed by oxytetracycline treated group and finally yeast treated group.

The obtained results attributed to the total variable cost include purchased fry cost, feed costs and feed additive cost ***Shang, 1981*** who reported that the operating costs of fish farms can be classified as variable costs (are those varying with level of production such as fry, feed, fertilizers, labor and fuel supplies). In addition to ***Shafey (1993)*** and ***El-Telbany and Atallah (2000)*** reported that, 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). As the Nile tilapia showed the highest

purchased fry cost, feed cost and feed additive cost so it showed the highest TVC cost. Our result confirmed with that obtained by ***Aly, (2006)*** who 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.

The total fixed costs included value of pond (0.68 piaster) and equipement (0.78 piaster). In our experiment the total fixed cost (1.46 piaster) ***Shang, 1981*** reported that, fixed costs (costs that don't change with the level of production as pond and net costs and also ***Shafey (1993)*** and ***El-Telbany and Atallah (2000)*** reported that, the costs of fish farms could be classified into fixed and variable costs. Fixed ones include costs of buildings, equipment and dicks.

The value of total fixed costs of all groups was 1.46 piaster/ fish and it was a constant cost (fixed cost). These results seem to be similar to those reported by ***Green et al. (1995)*** showed that, fixed costs per feddan were 500.25 L.E. Also ***EL-Tahawy, (2004)*** reported that the fixed costs per feddan were 300.17 and 201.85 L.E for governmental and private sectors. While, ***Aly, (2006)*** who stated that the fixed costs ranged from 77.14 to 317.96 L.E per 1000 fish for Tilapia species and Carp fish, respectively.

Table (4) showed the effect of feed additives on TC (piaster) of Nile tilapia and common carp fingerlings.

The analysis of variance of the obtained data showed that, there was a significant ($P < 0.05$) difference among TC of experimental groups for both species. TC ranged from 60.67 to 94.80 for common carp control group and Nile tilapia vitamin (C & E) treated group, respectively.

From the obtained data, we can conclude that, the Nile tilapia fingerlings of higher TC than common carp fingerlings. All the dietary treated groups of both species had increase in average TC when compared with control groups of both species. The vitamin (C & E) showed higher TC than other treatments for both species followed by oxytetracycline treated group and finally yeast treated group.

The obtained results due to the total cost include total fixed costs and total variable costs ***Selvatore, (1974)*** who reported that the total cost include total fixed costs and total variable costs. In addition to the results of ***Green et al. (1995)*** who concluded that, the total costs as 2.3 L.E / kg. Our result confirmed with that obtained by ***Aly, (2006)*** who reported that 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.

2. Return Parameters.

a. Effect of Feed Additives on Return (piaster) of Nile Tilapia and Common Carp Fingerlings: The significant differences ($P < 0.05$) between fish species in different treatments for biweekly return were cleared in Table (4).The Nile tilapia vitamin (C & E) treated group showed a higher significant ($P < 0.05$) value (167) in return among other treated groups followed by Nile tilapia oxytetracycline treated group (154.14) then Nile tilapia yeast treated group (147.48) followed by Nile tilapia control group (128.37). For the common carp fingerlings there is a significant difference ($P < 0.05$) between treated groups in comparison with each other, vitamin (C & E) treated group showed a higher significant ($P < 0.05$) value (92.84) followed by common carp Oxytetracycline treated group (85.27) then common carp yeast treated group (79.58), the common carp control group showed the lowest value (72.88) than other treated groups. In general, average return of Nile tilapia fingerlings was higher than that of common carp. From the obtained data, we concluded that, the Nile tilapia fingerlings of higher return than common carp fingerlings. All the dietary treated groups of both species had a significant ($P < 0.05$) increase in average return when compared with control groups of both species. The vitamin (C & E) improved return higher than other treatments for both species followed by oxytetracycline treated group and finally yeast 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 the higher price. Also, vitamin C and E had a highest body weight in comparison with other treated group followed by oxytetracycline and yeast treated group in comparison with control group so it is of higher return than other groups.

Regarding vitamin C and E corresponding results were denoted by ***Soliman et al. (1994)*** positive correlation between vitamin C, body weight, body weight gain and economic returns. Also the results in agree with those of ***Moein, (2012).*** But disagree with ***Fabiana et al. (2011)*** who mentioned that Fish fed diet vitamins C&E free increased feed intake, but no improvement on growth performance was detected.

Similar finding were obtained by ***Thorarinsson et al. (1994)*** fed groups of Juvenile Spring Chinook salmon naturally infected with *Renibacterium salmoniarum* different levels of vitamin E and/or selenium, the weight gain, economic returns and hematocrit values were significantly ($P<0.05$) greater in those fish fed vitamin E diet compared with vitamin E

deficient diet. Meanwhile, ***Abd El-Hamid et al. (1995 a)*** and ***Abd El-Hamid et al. (1995 b)*** reported that, there is a decrease in muscular fat content by raising dietary ascorbic acid for tilapia fish and increase in body weight, gain and economic returns and ***Hamre and Lie (1995)*** indicated that there are higher growth rate and economic returns of Atlantic salmon, (*Salmo salar L*) in supplemented α-tocopherol group (300 mg/kg diet) than unsupplemented group while, ***Baker and Davies (1996)*** reported that supplemental α-tocopherol acetate in diet of Catfish would increase growth with improvement of economic returns above the levels associated with unsupplemented diets.

These results verified what was reported by ***Abd El-Ghany (1998)*** reported that inclusion of vitamin C in Nile tilapia diets, elevated nutrients retention in the body as protein, fat and energy which resulted in improvement body weight, body weight gain and economic returns. While, ***Henrique et al., (1998)*** found that PER, body weight and returns increased with increasing levels of A.A supplementation. Also***, Lee et al. (1998)*** showed that, the high levels of dietary vitamin C (150-1500 ppm) represented significantly better feed conversion ratio (FCR), PER, protein productive value (PPV), higher condition factor (CF) and economic returns than recorded at the lower vitamin C levels (0 - 75) by Juvenile Korean rockfish. Finally, ***Sayed and Abd El-Ghaffar (1999)*** where they observed that, the fish groups fed on the diet supplemented with higher levels of A.A with increase body weight, gain with reflected as improvement of economic return.

The obtained results confirmed by ***Cuesta et al. (2000)*** they found that fish fed diet of E1200 had improved growth rate and economic returns than others, although not to a statistically significant degree while, ***Montero et al. (2001)*** they demonstrated that sea bream fed vitamin E deficient diet under chronic stress, showed reduction in growth and survival rate with lower economic returns other than other fish fed the control diet (150 mg/kg diet) meanwhile, ***Ortuno et al. (2001)*** observed that supplementation of vitamin E at 1.2 g/kg diet for Gilthead for 45 day, have increased complement and phagocytic activities, body weight, gain and economic returns than those fish fed commercial diet. Also, ***Cuesta et al. (2002)*** fed sea bream diet containing vitamin C at 2.9g/kg. They noticed that improvement of body weight, gain and return. ***Khadr (2002)*** He found that the total hemoglobin, feed conversion and economic returns was significantly ($P<0.05$) reduced in the fish group fed deficient in A.A than others fed supplemented diet. ***Sahoo and Mukherjee (2002)*** studied the effect of vitamin E supplementation on an Indian major carp subjected to Aflatoxin. They noticed that vitamin E is capable of significantly ($P<0.05$) increasing specific immunity and reducing

mortality in immunocompromised fish also, they noticed that improved economic return from the fish and ***Sobhana et al. (2002)*** Also the infiltration of phagocytic cells was quicker in the vitamin C supplemented fish group than those in unsupplemented group with increase body weight, gain and economic return. While, ***Wang et al. (2003)*** studied the effect of feeding parrot fish A.A in the form of L-ascorbyl-2-monophosphate (AMP) at levels of (0, 50, 100, 205, 426, 1869 mg/kg diet) and L. ascorbic acid (A.A) at levels of (36 and 149 mg/kg diet) for 11 weeks. They found that the weight gain and return of fish fed AMP_{50}, $A.A_{36}$ diets were significantly ($P<0.05$) lower than those of the other groups.

Regarding oxytetracycline our results are in accordance with the reports of ***Ismail et al. (1990)*** studied that; the oxytetracycline and chloramphenicol improve weight gain, fish yield and economic returns of fish. At the same line ***Battaglene et al. (2006)*** stated that the addition of antibiotics (oxytetracycline) resulted in a five-fold increase in survival, better growth and less intestinal grey-gut in striped trumpeter larvae, indicating that bacterial disease was a major source of mortality. So, (OTC) improve economic returns from fish larvae via improving its weight and survivability while ***Refstie et al., (2006)*** concluded that OTC did not modify the digestive responses to dietary soybean meal (SBM) and inulin but it improves its digestibility and so their economic returns. Our results confirmed by ***El-Sayed, (2007)*** stated that additions of sub-therapeutic levels of antibiotics are added to the feed to enhance the rate of growth and economic returns. The various groups of antibiotics act in different ways to reduce the numbers of specific bacteria in the gut and there by increase the efficiency of nutrient utilization, improve weight gain and so increase economic returns

b. Effect of Feed Additives on Net Profit (piaster) of Nile Tilapia and Common Carp Fingerlings; Means summarized in Table (4) demonstrated a significant difference ($P < 0.05$) between fish species in different treatments for net profit.

The net profit ranged from (12.21) for common carp control group to (72.19) for Nile tilapia vitamin (C & E) treated group. For the Nile tilapia fingerlings the Nile tilapia vitamin (C & E) treated group showed a higher significant ($P < 0.05$) value (72.19) in net profit among other treated groups followed by Nile tilapia oxytetracycline treated group (61.58) which followed by Nile tilapia yeast treated group (57.09) then Nile tilapia control group (39.99). For the common carp fingerlings there is a significant difference ($P < 0.05$) among different groups. The common carp control group showed the lowest value (12.21) than other treated groups while common carp vitamin (C & E) treated group showed the highest value

(27.77). In general, average net profit of Nile tilapia fingerlings was higher than that of common carp.

From the obtained data, we concluded that, the Nile tilapia fingerlings of higher net profit than common carp fingerlings. All the dietary treated groups of both species had a significant ($P < 0.05$) increase in average net profit when compared with control groups of both species. The vitamin (C & E) improved net profit higher than other treatments for both species followed by oxytetracycline treated group and finally yeast treated group. This may be due to the net profit depending on fingerling return and total costs, the Nile tilapia fingerlings showed the highest return (higher price than common carp) and the highest net profit. Although, vitamin (C & E) had a highest total costs but also, it had the highest return in comparison with other treated group followed by oxytetracycline and yeast treated group in comparison with control group so it is of higher net profit than other groups.

These results agreed with those obtained by ***Shahat (2001)*** observed that values of FCR, net protein utilization (NPU), energy utilization (EU) and net profit were higher for fish fed diet supplemented with vitamin C. While, ***Green et al. (1995)*** showed that, the net income / Feddan were 4422.45 L.E. Meanwhile, ***El-Tahawy, (2004)*** reported that the net income per feddan for Tilapia species were 3193.09 and 3205.63 L.E for governmental and private sectors, respectively. Our result confirmed by those of *Aly, (2006)* who reported that 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.

This study concluded that, the addition of feed additives to the fish diet of feed additives to the fish diet improve the body weight of the fish, total returns and net profit as the best feed additives used was vitamin (C & E),followed by Oxytetracycline and both of them improve the net profit than the control group. In general, the average net profit of Nile tilapia fingerlings was higher than that of the common carp.

Table (3): Effect of feed additives on body weight (gm) of Nile tilapia and Common carp (Fingerlings) (Mean±S.E).

species	Groups	N	Body weight	Feed Additive cost	Feed cost	Veterinary management
			Mean±Std. Error	Mean±Std. Error	Mean±Std. Error	Mean±Std. Error
Tilapia	Control	25	f. 18.34±0.08	b. 0.00±0.00	c. 9.52±0.05	a. 6.53±0.01
	Yeast	25	d. 21.07±0.13	a. 0.19±0.001	b. 10.59±0.04	a. 6.53±0.01
	Oxytetracycline	25	c. 22.02±0.21	a. 0.17±0.001	b. 11.08±0.04	a. 6.53±0.01
	Vitamin (C and E)	25	a. 23.86±0.15	a. 0.20±0.001	a. 11.79±0.05	a. 6.53±0.01
	Total	100	A 21.32±0.29	A 0.14±0.001	A 10.74±0.12	A 6.53±0.01
Common carp	Control	25	f. 18.22±0.18	b. 0.00±0.001	c. 9.65±0.05	a. 6.53±0.01
	Yeast	25	e. 19.89±0.20	a. 0.18±0.001	b. 10.34±0.10	a. 6.53±0.01
	Oxytetracycline	25	d. 21.32±0.24	a. 0.17±0.001	b. 10.88±0.06	a. 6.53±0.01
	Vitamin (C and E)	25	b. 23.21±0.25	a. 0.20±0.001	a. 11.62±0.09	a. 6.53±0.01
	Total	100	B 20.66±0.28	A 0.14±0.01	A 10.62±0.11	A 6.53±0.01

-Small litters indicated that: Means within the same column of different litters are significantly different at ($P < 0.01$)

-Capital litters indicated that: Means within the same column of different litters are significantly different at ($P < 0.01$)

Table (4): Effect of feed additives on body weight (gm) of Nile tilapia and Common carp (Fingerlings) (Mean±S.E).

species	Groups	N	TVC	TFC	TR	TC	Net.profit
			Mean±Std. Error	Mean±Std. Error	Mean±Std. Error	Mean±Std. Error	Mean±Std. Error
Tilapia	Control	25	d. 86.92±1.70	a. 1.46±0.01	d. 128.37±0.59	d. 88.38±1.70	d. 39.99±1.84
	Yeast	25	c. 88.93±1.68	a. 1.46±0.01	c. 147.48±0.88	c. 90.39±1.68	c. 57.09±1.99
	Oxytetracycline	25	b. 91.10±1.60	a. 1.46±0.01	b. 154.14±1.44	b. 92.56±1.60	b. 61.58±2.28
	Vitamin (C and E)	25	a. 93.34±1.61	a. 1.46±0.01	a. 167.00±1.08	a. 94.80±1.61	a. 72.19±2.09
	Total	100	A 90.07±0.87	A 1.46±0.001	A 149.25±2.10	A 91.53±0.87	A 57.72±1.96
Common carp	Control	25	g. 59.21±0.98	a. 1.46±0.01	h. 72.88±0.72	g. 60.67±0.98	h. 12.21±1.36
	Yeast	25	f. 61.30±0.99	a. 1.46±0.01	g. 79.58±0.80	f. 62.76±0.99	g. 16.82±1.28
	Oxytetracycline	25	f. 62.30±0.98	a. 1.46±0.01	f. 85.27±0.96	e. 63.76±0.98	f. 21.51±1.63
	Vitamin (C and E)	25	e. 63.61±0.93	a. 1.46±0.01	e. 92.84±1.02	e. 65.07±0.93	e. 27.77±1.51
	Total	100	B 61.61±0.52	A 1.46±0.001	B 82.64±1.15	B 63.07±0.52	B 19.58±1.10

- Small litters indicated that: Means within the same column of different litters are significantly different at ($P < 0.01$)
- Capital litters indicated that: Means within the same column of different litters are significantly different at ($P < 0.01$)

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الملخص العربى

تأثير إضافات الأعلاف علي الكفاءة الإقتصادية والإنتاجية لإنتاج مزارع الأسماك

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أجريت هذه الدراسة لمعرفة تأثير المكملات الغذائية من بعض إضافات الأعلاف (البروبيوتيك ،المضادات الحيوية والفيتامينات) المستخدمة تحت الظروف المصرية مثل (الخميرة ، أكسي تتراسكلين ، وفيتامين ج و هـ) على أسماك المياه العذبة خاصة إصبعيات البلطي النيلي و المبروك العادى من خلال دراسة تأثير هذه الإضافات على الكفاءة الإنتاجية للبلطي النيلي واسماك المبروك العادى والتي تشمل أداء النمو (وزن الجسم و الزيادة في وزن الجسم). أيضا دراسة الكفاءة الاقتصادية للبلطي النيلي واسماك المبروك العادى والتي تشمل التكاليف والعائد وصافي الربح.

الدراسة تشتمل على نوعين من الأسماك وهما: أسماك البلطي النيلي والمبروك العادي والتي تعتبر واحدة من أكثر الأسماك المستزرعة على نطاق واسع في مصر للأهمية البيولوجية والإقتصادية.

إضافات الأعلاف المستخدمة في هذه الدراسة ما يلي: بروبيوتيك مثل الخميرة (الشركة الوطنية للتنمية نادك، العاشر من رمضان، المنطقة الصناعية الثالثة، مصر)، كل جرام يحتوي على ٠,٢٥ جم خميرة و يضاف إلى العليقة الأساسية بمعدل ٣ جرام / كيلوجرام من العليقة . المضادات الحيوية مثل الأكسي تتراسكلين ٢٠ ٪ (يونيفارما الشركة العالمية للصناعات الدوائية مدينة العبور ، القاهرة ، مصر) ويضاف إلى العليقة الأساسية بمعدل ٠,٦ جم / كجم. والفيتامينات مثل (فيتامين ج و هـ) فيتامين ج: تم استخدام فيتامين ج المغلف بإيثيل سليلوز وهو عبارة عن مسحوق أبيض يميل الى الاصفرار قليلا والتي تتكون من حمض الاسكوربيك المغلفة مع الإيثيل سليلوز .أقصى نسبة فاقد عند التجفيف هي ٠,١٪ و محتوي حمض الاسكوربيك نحو ٩٧,٥ ٪ من المواد الجافة. وهو قابل للذوبان في الماء قليلا ويضاف إلي العليقة الأساسية بمعدل ٤٠٠ ملليجم/كيلوجرام من العليقة. وفيتامين هـ : فيتامين هـ ٥٠ ٪ ، وهو عبارة عن مسحوق أبيض يميل الى الاصفرار قليلا. أقصى نسبة فاقد عند التجفيف هي ٠,٠٥ ٪. و مستقر إلى حد ما في الهواء والحرارة ولكن حساس للضوء. ويضاف إلي العليقة الأساسية بمعدل ٣٠٠ ملليجم/كيلوجرام من العليقة.

ومن هذه الدراسة تم إستنتاج أن إضافة إضافات الأعلاف إلى عليقة الأسماك تعمل علي تحسين وزن الجسم للأسماك ، العائد الكلي وصافي الأرباح كما كان أفضل إضافات الأعلاف المستخدمة فيتامين (ج و هـ) ، تليها أكسي تتراسكلين وكلاهما يزيد صافي الربح عن المجموعة الضابطة. بشكل عام كان متوسط صافي الربح من إصبعيات البلطي النيلي أعلى من المبروك العادي.