Effect of oxytetracycline and florfenicol drugs on the physiological activities and its residues of *Oreochromis niloticus*

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ABSTRACT

The present study was carried out to study the effect of different doses (40, 80, 120mg/kg basal) diet of oxytetracycline, (OTC) and florfenicol, FF (7.5, 15, 22.5mg/kg basal diet) on growth performance, feed utilization, physiological activities and residues of *Oreochromis niloticus* (7±0.66g).

Fish fed the diet supplemented by 40mg OTC/kg basal diet showed the highest final body weight (BW), weight gain (WG), condition factor (K), specific growth rate (SGR), protein efficiency ratio (PER) and the best FCR, while the lowest final BW, WG, K values were achieved by fish fed the diet 120mg oxytetracycline/kg diet. Fish fed the diet supplemented by 22.5mg FF/kg diet showed the highest final BW, BL, K, feed intake (FI) and the lowest final BW, BL, WG and K values were fed the diet 7.5mg FF/kg diet compared with control group and other doses of FF, for fishes.

Liver transaminase enzymes, Alanine aminotransferase (ALT) and aspartate aminotransferase (AST) increased with increasing the doses OTC and FF. the fish fed the diet supplemented by 40mg OTC/kg recorded the highest value of ALT, AST and insignificant decrease in total protein (TP) and the fish fed the diet supplemented by 15mg FF/kg basal diet recorded the highest value in the ALT, AST and TP compared with control group and the other doses of FF.

The fish fed the diet 120mg OTC/kg diet recorded the highest value in the haemoglobin (Hb), white blood cells (WBCs) and significant increase in red blood cells (RBCs) while the fish fed the diet supplemented by 40mg OTC/kg basal diet recorded the lowest value of Hb, WBCs and RBCs compared with other OTC doses with insignificant increase in Hb, RBCs compared with control group.

Fish fed the diet supplemented by 7.5mg FF/kg diet recorded the highest value of Hb, RBCs and insignificant decrease in WBCs but the fish fed the diet 22.5mg FF/kg diet recorded the lowest value in Hb, WBCs and RBCs compared with control group and the other FF doses.

Residues of OTC and FF in fish tissues showed that all the doses of oxytetracycline and florfenicol after 21 days have no risidue in tissues while at the experimental end all samples were positive and the dose 40mg OTC/kg diet and the dose 7.5mg FF/kg diet caused the lowest values in fish tissues compared with other doses.

Keywords: Fishes, RBCs, WBCs, Hb, oxytetracycline, florfenicol.

INTRODUCTION

The bacterial disease of greatest concern in small fish are enteric septicemia and those caused by *pseudomonas* and *Aeromonas*, Romet and oxytetracyclin are the drugs of choice (MacMillian, 1985). The addition of antibiotics to hatchery waters or

immersion of egg in disinfectants like glutaraldehyde have been shown to reduce mortality in the developing eggs of several marine fish species.

The following antibiotics have been used in fish culture to control or treat bacterial infections in fish. Use of antibiotics for food fish must be done in accordance with regulations as outlined by the Food and Drug Administration and by the Environmental Protection Agency. Local and state agencies may also have regulations limiting use of chemicals or drugs (Shotts and Bullock, 1975).

Oxytetracycline HCl (OTC) is antibiotic commonly used for the treatment of fish diseases such as furunculosis, vibriosis, ichthylotherius, enteric med mouth disease and columnaris disease. Nusbaum and Shotts (1981) reported that (OTC) is very useful in controlling *Ameromonas hydrophila complex, A.salmonicida, flexibacter columnaris-like* organisms and *pseuaomnas fluorescens*. OTC, however, had been reported to be poorly absorbed by fish (Cravedi *et al.* 1987; Bjorklund and Bylund 1990; Rogstad *et al.* 1991 and Ueno *et al.* 1995), especially in sea water (Lunested and Goksoyr 1990 and Lunested 1991). Even though the efficacy of OTC had been known to be poor in sea water, fish farmers continue to use it to treat fish and prawns culture in brackish and sea water.

Florfenicol is the active ingredient in Aquadlor. It has proved to be effective and safe antibiotic in aquatic species, as well as in cattle and poultry. The unique compound is also found in NUFLOR® (florfenicol) been used successfully in the United States since 1996 to treat disease in beef and non-lactating dairy cattle. Unlike sulfa drugs are tetracyclines, florfenicol is used exclusively in farm-raised fish and It is not used in human medicine.

Therefore, the aim of the present study was investigated the effect of oxytetracycline and florfenicol on the growth performance of Nile tilapia, in addition the feed utilization, physiological activities and antibiotics residues were also examined.

MATERIALS AND METHODS

The experimental work of the present study was carried out at the laboratory of fish nutrition at Faculty of Agriculture, Benha University. *O. niloticus* weighting (7±0.66 g) were caught from El-Manzala hatchery Al-Dakahlya Governorate and transferred to harge well-aerated aquaria (100×40×50cm). The fishes were acclimatized to laboratory condition for 7 days befor the experiment. Water used in the aquaria contained dissolved oxygen (4.50 mg/L) at pH (8.02) was of a temperature of (29.17°C).

The experiment started on 1 May 2011 to 1 August of the same year (90 days); Fish were divided into 7 groups and each group was replicated in three aquarium and each aquarium was stoked with 30 fish. OTC and FF were added to the basal diet as follows:

Group (1): control group (kept without treatment)
Group (2): administered subtheraputic dose 40 mg OTC/kg basal diet.
Group (3): administered theraputic dose 80 mg OTC/kg basal diet.
Group (4): administered supertherputic 120 mg OTC/kg basal diet.
Group (5): administered subtheraputic dose 7.5mg FF/kg basal diet.
Group (6): administered theraputic dose 15 mg FF/kg basal diet.
Group (7): administered supertherputic dose 22.5mg FF/kg basal diet.

The diets were prepared by thoroughly mixing of the ingredients (Table 1). Water was added to the ingredients of each diet for mixing these ingredients and then

dried. After drying, the diets were broken up and sieved into the convenient pellet size. Fish were given the experimental diets 6 day/week at a daily rate of 3% of total biomass (twice daily at 9.00am and 3.00pm) till the end of experimental period. Every two weeks, fish were taken from each aquarium then weighted and the amount of feed was adjusted according to the changes in body weight throughout the experimental period.

Table 1: Composition and chemical analysis of basal diet.

Ingredient	%
Fish meal	20
Sobean meal	31
Yellow corn	32
Wheat bran	10.5
Corn oil	3
Vit & Min. Mix	3.5
Sum	100
Proximate analysis	
Dry matter	95.23
Protein	30.12
Lipid	5.32
Ash	8.45
ME(Kcal/kg diet)[2]	3019
P/E ratio	99.78

1. Vitamin & mineral mixture/kg premix: Vitamin D_3, 0.8 million IU; A, 4.8 million IU; E, 4g; K, 0.8g, BI. 0.4g; Riboflavin, 1.6g: B6, 0.6g, B_{12}, 4mg; Pantothenic acid, 4g; Nicotinic acid, 8g; Folic acid, 0.4g; Biotin, 20mg, Mn, 22g; Zn, 22g; Fc, 12g; Cu, 4g; I, 0.4g. Selenium, 0.4g and Co, 4.8 mg.
2. Based on Kilocaloric values of $4.50g^{-1}$ protein, $8.51g^{-1}$ lipid and $3.49g^{-1}$ NFE (Jauncey, 1982).

Growth performance and feed utilization parameters:

Every two weeks, the individual weight of 30 fish were recorded and immediately returned to the aquaria. The following equations were used to calculate growth performance and feed utilization parameters:

Weight gain = W2 (g) – W1 (g)

Specific growth rate (SGR): $\{LnW_2\text{-}LnW_1\}/t\times100$

Condition factor (K-Factor): $(W/L3)\times100$;

Where; Ln=the natural log, W_1=the intial weight, W_2= the final weight and t=period in days, W = weight of fish in "grams"; L = total length of fish in "cm".

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

Protein efficiency ratio (PER) = weight gain (g)/ protein ingested (g).

Survival rate = $(nt/n_0)\times100$; Where, nt = total number of fish survived in aquarium at the end of the experiment, n_0=Total number of fish in aquarium at the beginning of the experiment.

Determination of OCT and FF residue: Liquid chromatograph technique was used for the determination of OCT and FF. The methods of preparation, extraction and analysis were applied according to McNeil *et al.,* (1996).

Blood Samples: Blood samples were collected from caudal vein of non-anesthetized fish using plastic syring containing hebarin according to Duncan *et al.,* (1994). Blood elements (RBCs and WBCs) were counted according to Kanaev (1985) using haemocytometer. Haemoglobin was estimated spectrophotametrically according to Van Kampen and Zijlstra (1961) by kits. Anothor blood samples were collected in clean Eppendrof tubes and centrifuged at 3000 rpm for 5 minutes then take the separated into clean tubes and reading the total protein Clarke (1964) and ALT and AST spectrophotametrically according to Reitman and Frankel (1957).

Statistical analysis:-

Statistical analysis of the obtained data was analyzed according to SAS (1996). Differences between means were tested for significance according to Duncan's multiple rang test as described by Duncan (1955).

RESULTS AND DISCUSSION

Growth performance, feed intake and feed utilization:

The initial body weight (BW) and body length (BL) for fish received the different treatments ranged between 7.61 and 7.75 g and 7.55 to 7.71 cm, respectively. The differences in initial BW and BL among the different treatments were insignificant. At the end of the experiment (after 90 days) the final BW and final BL ranged between 19.83 and 21.40 g and 9.98 to 10.52 cm, respectively and the differences in BW and BL among the different treatments were significant ($P<0.05$). Results of (Tables 2&3) indicated that the dose 40 mg OTC/kg (group 2) released the highest values of BW (21.03g) and K (2.08), WG (13.38g) and SGR (1.13%) compared with the other OTC doses (group 3 and group 4) and control (group 1). However, the doses 22.5 mg FF/kg (group 7) released the highest BW (21.40gm) compared with the other FF doses (group 5 and group 6) and control group (group 1).

Table 2: Effect of different doses of oxytetracycline (OTC) and florfenicol (FF) on BW, BL and condition factor (K) for *O. niloticus*.

Treatments	BW/g		Bl/cm		K	
	Initial	Final	Initial	Final	Initial	Final
Group 1 (control)	7.66	20.42abc	7.66a	10.16bc	1.72bc	1.97abc
Group 2 (40mg OTC/kg diet)	7.66	21.03ab	7.69a	10.09bc	1.69c	2.08a
Group 3 (80mg OTC/kg diet)	7.65	20.10bc	7.71a	9.98c	1.68c	2.04ab
Group 4 (120mg OTC/kg diet)	7.75	19.83c	7.62ab	10.52a	1.75ab	1.71e
Group 5 (7.5mg FF/kg diet)	7.61	19.83c	7.55b	10.12bc	1.77ab	1.79de
Group 6 (15mg FF/kg diet)	7.67	20.43abc	7.64ab	10.31ab	1.73bc	1.87cd
Group 7 (22.5mg FF/kg diet)	7.66	21.40a	7.55b	10.32ab	1.80a	1.96bc
Standard error	±0.07	±0.37	±0.04	±0.09	±0.02	±0.04

Table 3: Effect of different doses of oxytetracycline (OTC) and florfenicol (FF) on weight gain (WG) and specific growth rate (SGR) of *O. niloticus*.

Treatments	WG (g)	SGR (%/day)
Group 1 (control)	12.77	1.09
Group 2 (40mg OTC/kg diet)	13.38	1.13
Group 3 (80mg OTC/kg diet)	12.44	1.07
Group 4 (120mg OTC/kg diet)	12.08	1.04
Group 5 (7.5mg FF/kg diet)	12.22	1.04
Group 6 (15mg FF/kg diet)	12.76	1.03
Group 7 (22.5mg FF/kg diet)	12.30	1.05
Standard error	±0.58	±0.03

With regard to the effect of OTC and FF on feed intake (F1), FCR and PER of *O. niloticus,* results of Table 4 indicated that, no significant effect on FI, FCR, PER. As shown in this table, the highest FI (29.02g/fish) was recorded for fish fed the diet supplemented by 22.5mg FF/kg basal diet compared with the control group and the best values of FCR (1.95) and PER (1.72) were recorded by fish fed diet supplemented by 40 mg OTC/kg (group 2).

Table 4: Effect of oxytetracycline (OTC) and florfenicol (FF) on feed intake (FI), feed conversion ratio (FCR) and protein efficiency ratio (RER) of *O. niloticus.*

Treatments	FI (g/fish)	FCR g feed/g gain	PER g gain/g CP intake
Group 1 (control)	26.44	2.07	1.61
Group 2 (40mg OTC/kg diet)	26.09	1.95	1.72
Group 3 (80mg OTC/kg diet)	27.35	2.21	1.54
Group 4 (120mg OTC/kg diet)	25.95	2.15	1.55
Group 5 (7.5mg FF/kg diet)	25.90	2.12	1.57
Group 6 (15mg FF/kg diet)	27.29	2.15	1.56
Group 7 (22.5mg FF/kg diet)	29.02	2.45	1.42
Standard error	±1.05	±0.16	±0.10

Means followed by different letters in each column are significantly ($P<0.05$) different.

The previous results are in agreement with that of previous studies of (Brocklebank *et al.,* 1993 and Spanggaard *et al*., 1993) which indicated that all fish grew were given oxytectracycline mixed in the feed at 100mg/kg for 21 days. Eid *et al.,* (2005) observed that the addition of OTC to *O. niloticus* diet enhanced growth performance. Also, Sanchez Martinez *et al.,* (2008) determined the prophylactic use of potassium permanganate and OTC and its effects on growth of channel catfish and they found that, potassium permanganate did not have a suppressive effect on growth, while OTC significantly enhanced growth on channel catfish (weight and length), as they heavier (12.5%) than $KMNO_4$-treated fish and control at the end of the trial, while, FI and FCR were not significantly different among the three groups of fish. As the same time, the condition factor (K) was significantly higher ($P<0.05$) in the OTC-treated fish. Conover and Sheenan (1999) found that relative performance of OTC markson juvenife black crappies and non significant difference in survival, length, weight, condition factor after 31 weeks.

Gaikowski *et al.,* (2003) found that, channel catfish fed a feed premix containing FF on the dose 10 mg/ kg BW/day, give feed consumption of 67-68% while the doses 30 mg/kg BW and 50mg FF/kg Bw were 24.6% and 34.9% and there were no mortalities and no differences in fish growth. However, Aquaflor-related decreased feed consumption was noted in the 30 and 50mg/kg BW/day groups, there were no differences in fish growth among the treatment groups.

Serum transaminases (ALT & AST) and total protein (TP):

Estimation of serum liver transaminase enzymes activities of ALT and AST were taken as an indication of the amount of liver damage, as the elevated serum enzyme levels might be related to the degree of liver injury. Liver disease causes an increase in some serum enzymes by blocking their elimination into the blood (Barraza *et al.,* 1991).

Table 5 showed that the highest value of ALT and AST (605µ/ml and 592.33 µ/ml, respectively) were recorded for fish fed diet 40mg OTC/kg basal diet (group 2) while the highest value of ALT & AST (531.0 µ/ml and 513.67 µ/ml, respectively) were recorded for fish fed diet 15mg FF/kg basal diet (group 6). Consequently, a decrease in serum total protein for fish fed diet supplemented by the doses 40mg OTC/kg basal diet (4.81 mg/dl), 80mg OTC/kg basal diet (3.37mg/dl) and 7.5mg FF/kg basal diet (4.39 mg/dl) while there was increase in serum total protein for the doses 120 mg OTC/kg (5.93 mg/dl), 15mg FF/kg (9.20mg/dl) and 22.5mg FF/kg (8.18 mg/dl) compared with different doses of OTC, FF and control group. The differences in total protein among treatments were significant ($P< 0.001$).

Table 5: Effect of oxytetracycline (OTC) and florfenicol (FF) on GPT, GOT and total protein of *O. niloticus* .

Treatments	ALT µ/ml	AST u/ml	Total protein (TP) mg/dl
Group 1 (control)	218.00c	206.33c	5.78b
Group 2 (40mg OTC/kg diet)	605.00a	592.33a	4.81bc
Group 3 (80mg OTC/kg diet)	417.00b	384.67b	3.37c
Group 4 (120mg OTC/kg diet)	486.67ab	478.00ab	5.93b
Group 5 (7.5mg FF/kg diet)	220.67c	209.33c	4.39bc
Group 6 (15mg FF/kg diet)	531.00ab	513.67ab	9.20a
Group 7 (22.5mg FF/kg diet)	436.33b	419.00b	8.18a
Standard error	±43.29	±40.97	±0.60

Means followed by different letters in each column are significantly (P<0.05) different.

KuHua *et al.,* (2009) notified that the doses 120, 60, 30mg FF/kg BW of sea bass were added to the feedstuff for 7d. The antibody levels of all groups decreased, especially in 120mg/kg. The contents of TP in 60mg/kg and 120mg/kg groups were decreased significantly in the activity of ALT was significantly increased in all drug added groups on the other hand, did not fined any differences in AST activity.

Haemoglubin, red blood cells and white blood cells:

During treatments of the fish diet supplementes with 7.5 mg FF/kg there was gradual increase (table 6) in the Hb value (3.85 g/dl). This elevation of the Hb value (2.09 g/dl) after diet supplemented with high dose of 22.5 mg FF/kg and the differences in Hb values between different treatments were significant (P<0.01), while recorded the highest value of RBCs (1.17 cell/µl) by dose 7.5mg FF/kg and the lowest value (0.61 cells/µl) with the dose 22.5mg FF/kg basal diet. The differences in RBCs value were significant (P<0.01).

The total WBCs count (1000.0 cells/µl) was recorede on fish fed the diet supplemented by 120mg OTC/kg basal diet compared with other doses and control group (Table 6). The lowest value (566.7 cells/µl) on fish fed the diet contained the dose 22.5mg FF/kg basal diet and the differences in WBC due to the effect of OTC and FF were non significant.

Table 6: Effect of oxytetracycline (OTC) and florfenicol (FF) on Haemoglubin (Hb), red blood cells (RBCs) and white blood cells (WBCs) of *O. niloticus*.

Treatments	Hb (g/dl)	RBCs cells/ul	WBCs cells/ul
Group 1 (control)	2.17b	0.65b	908.3ab
Group 2 (40mg OTC/kg diet)	2.83ab	0.87ab	466.7b
Group 3 (80mg OTC/kg diet)	3.35a	1.03a	933.3ab
Group 4 (120mg OTC/kg diet)	3.42a	1.03a	1000.0a
Group 5 (7.5mg FF/kg diet)	3.85a	1.17a	666.7ab
Group 6 (15mg FF/kg diet)	3.40a	1.04a	866.7ab
Group 7 (22.5mg FF/kg diet)	2.00b	0.61b	566.7ab
Standard error	±0.38	±0.11	±145.34

Means followed by different letters in each column are significantly (P<0.05) different.

Abdel Hamid *et al.,* (2009) observed that 30 and 60 µg OTC in the diet of African catfish showed the best growth and feed utilization parameters and increasing the RBCs, WBCs and platelets but decreased blood protein. Similar results were observed by Aydin *et al.,* (1997) after using 10mg/kg OTC every 3 days for rainbow trout, *oncorhychs mykiss* significantly increased the leucocytes, lymphocytes and granulocytes in blood. Other blood parameters including haemoglobin content

haematocrit value, thrombocyte and erythrocyte numbers were non significant different.

In contrast, Svobodova *et al.,* (2006) reported that the medicated feed applied for carp fish (15g OTC/kg BW) had no effects on histological changes, loss of haematopoietic tissue from the spleen and decreased in leukocyte, lymphocyte counts and total blood plasma protein concentrations. Also, Hasanabadizadeh *et al.,* (2008) found that the use 50mg OTC/kg/BW in the diet of common carp, *cyprinus carpio* caused non significant changes in hematocrit, total erythrocyte and leukocyte counts, there were also no histological differences among all treatments. On the other hand, Omoregie and Oyebanji (2002) reported the use of the OTC in fish diets in common aquaculture antibiotic caused significant reductions in leukocyte, erythrocyte, thrombocyte, haematocrit and haemoglobin values. Though the use of OTC in aquaculture can be interference with the blood chemistry of the fish at therapeutic dosage.

Karadeniz *et al,* (2007) observed that the use of 100 and 300mg FF/kg BW in common carp for 4 days induced a significant decrease in red blood cell (RBC) count, white blood cell (WBC), haemoglobin (Hb) value, packed cell volume (PCV) and neutrophil percentage from antibiotic chloramphenicol, thiamphenicol but not florfenicol induced a significant reduction in glutathione and glucose6-phosphate dehydrogenase and haematological analysis. Similar observation were reported by Mohammadi *et al,* (2004) who revealed that the use of 20mg FF/kg b.w in catfish caused insignificant differences in Haematological, total plasma protein, fibrinogen. Furthermore, Holmes *et al.,* (2012) found that after 40mg/kg injection of FF decreased the hematological parameter total protein, globulin, albumin, white blood cell count and hematocrit in African catfish.

OTC and FF residues in *O. niloticus* tissues:

OTC and FF residues in fish muscles were determined at the end of the experiment. Results in Table 7 showed that all samples revealed positive results. The results showed that the dose 22.5mg FF/kg (group 7) caused highest residue in fish tissue (38.86 µg/g) while the lowest concentration (15.61µg/g) was shown by fish treated by dose 40mg OTC/kg (group 2). As shown in table 7 the fish fed dietary supplemented by 120 mg OTC/kg diet was concentrate the antibiotic residue in tissue (22.81 µg/g) while the dose 80 mg OTC/kg diet was 18.91 µg/g and the fish treated with the dose 15mg FF/kg basal diet recorded 29.63 µg/g antibiotic residue in tissue, while the dose 7.5 florfenicol/kg basal diet, recorded 19.72 µg/g antibiotic residue in fish tissue. OTC and FF residues in *O. niloticus* muscles were measured after 10 days and 21 day of the experimentl end by High performance liquid chromatography (HPLC). Results showed that, all samples revealed negative results.

Table 7: Oxytetracycline and florfenicol residue in fish tissue at the end of the experiment after three months.

Fish treatment	Concentration of antibiotic residue µg/g
Group 1 (control)	0.00
Group 2 (40mg OTC/kg diet)	15.61
Group 3 (80mg OTC/kg diet)	18.91
Group 4 (120mg OTC/kg diet)	22.81
Group 5 (7.5mg FF/kg diet)	19.72
Group 6 (15mg FF/kg diet)	24.63
Group 7 (22.5mg FF/kg diet)	38.86

Similar finding was obtained by Jose Malvisi *et al.,* (1996) who found that after treatment the fish by 7.5g OTC/kg feed, the highest concentrations were recorded in skin and liver (7.70ug/g and 14.65ug/g, respectively) while OTC concentrations in muscle were lower than in all the tissues. Also Rawles *et al.,* (1997) indicated that residues of OTC of catfish increased residue concentration above the legal tolerance limite of 0.1mg/kg. Roberts, (1978) recorded that OTC was the drug of choice for vibriosis and ulcer diseases in fishes. The recommended doses are 7.5gm/kg/fish day for 5-15 days. Herman *et al.,* (1969) OTC feeding at a dose of 75mg/kg of fish/day for 40 days to rainbow, brook and brown trout fishes and observed the greatest concentration was detected in liver, muscles, plasma and kidney tissues in 6, 7, 9, 10 day while it was undetectable in muscles plasma and kidney in 10-14 days by Herman *et al*., (1969). Grondel *et al.,* (1985) stated that oxytetracycline require 21 days withdrawal time.

In this connection, Stoskopf (1993) mentioned that 50 to 75 mg OTC/kg fish for 10 days encouraged absorbtion of OTC through the intestine and accumation at highe concentration in the liver and muscles. Also, Eissa *et al.,* (1998) showed that, OTC residues disappeared from catfish muscle, kidney and liver after 12, 15, 18 days. Moheny *et al.,* (1992) reported that erythromycin and OTC had significally better overall minimum inhibitory concentration than chloramphenicol. Abe and Fuchino, (2001) showed that the highest level of OTC was 0.36 µg/g in skin of catfish and liver then muscle after 2 months. Williams *et al.,* (2002) found that OTC medicated feed (1% BW) for 10 days accumulated OTC fish muscle.

In this respect, Wang-Wayshyan *et al.,* (2001) treated tilapia by FF observed that the residues of tested drug in muscle, liver and kidneys were 81.5-100.2, 81.7-92 and 82.4-97.8% respectively. The detection limits of muscle, liver and kidney were 0.01, 0.025 and 0.05 µg/g.

On the other hand, Feng *et al.,* (2008) found that the dose 10 mg/kg BW the concentration of FF in tissues in fresh water tilapia (*O. niloticus* x *O. aureus*) were higher than those in sea water tilapia. Gaikowski *et al.,* (2010) found that also with hybrid tilapia (*O. niloticus* × *O. aureus*) 15mg FF/kg/BW offered feed medicated for 12days and 21 days. The FF rapidly eliminated from tilapia fellet after withdrawal from medication.

CONCLUSION

Using the doses 40mg of OTC/kg diet improved growth and feed utilization showed the lowest residues in fish muscles and the micronuclei erythrocytes compared with other doses of OTC and FF. The dose 7.5 mg FF/kg diet showed the lowest residues in fish muscles, micronuclei erythrocytes and total chromosomal aberration. It was found that all fishe treated by OTC or FF should have at least 21 days from the end of treatment to the consumption to safe guard the consumer from antibiotic residues.

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ARABIC SUMMARY

تأثير جرعات من الأوكسى تتراسيكلين والفلورفينكول على الأنشطة القسيولوجية وقياس المتبقيات فى أسماك البلطى النيلى

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أجرى هذا البحث بمعمل بحوث تغذية الأسماك قسم الإنتاج الحيوانى، كلية الزراعة، جامعة بنها. استهدف البحث دراسة تأثير إضافة جرعات مختلفة من الأوكسى تتراسيكلين (٤٠، ٨٠ ، ١٢٠ ملجم/كجم عليقة) والفلورفينكول (٧,٥، ١٥، ٢٢,٥ ملجم/كجم عليقة) إلى علائق أسماك البلطى على أداء النمو، الكفاءة الغذائية– والأنشطة الفسيولوجية بالإضافة إلى قياس تركيز المضاد الحيوى فى أنسجة الأسماك بعد الجرعة العلاجية وفترة السحب وبعد انتهاء فترة التجربة.

سجلت الأسماك التي تغذت علي ٤٠مجم أوكسي تتراسيكلين/كجم عليقة أعلي قيمة في وزن الجسم النهائي، الزيادة في الوزن، معامل الحالة، معدل النمو وأفضل معدل لتحويل بينما سجلت الأسماك التي تغذت علي العليقة ١٢٠ملجم أوكسي تتراسيكلين/كجم عليقة أقل القيم في وزن الجسم النهائي، الزيادة في وزن الجسم، معامل الحالة. كما سجلت الأسماك التي تغذت علي العليقة المحتوية على ٢٢,٥مجم فلورفينيكول/كجم عليقة أعلي قيمة في وزن الجسم النهائي، طول الجسم، معامل الحالة وأكبر كمية غذاء مأكول بينما سجلت الأسماك التي تغذت علي العليقة ٧,٥ملجم فلورفينيكول/كجم عليقة أقل القيم في وزن الجسم النهائي، طول الجسم، الزيادة في وزن الجسم، معامل الحالة مقارنة بالمجموعة الضابطة وجرعات الفلورفينيكول الأخري.

تم تقدير نشاط إنزيمات الكبد الناقلة لمجموعة الأمين في الدم وفحص مصل بروتين الدم وتبين زيادة الإنزيمات مع كل جرعات الأوكسي تتراسيكلين والفلورفينيكول وأن الأسماك التي تغذت علي العليقة ٤٠مجم اوكسي تتراسيكلين/كجم عليقة سجلت أعلي القيم في إنزيمات الكبد وتناقص غير معنوي في بروتين الدم مقارنة بالمجموعة الضابطة وجرعات الأوكسي تتراسيكلين والأسماك التي تغذت علي العليقة ١٥ملجم فلورفينيكول/كجم عليقة سجلت أعلي القيم في إنزيمات الكبد وبروتين الدم مقارنة بالمجموعة الضابطة وجرعات الفلورفينيكول. كما سجلت الأسماك التي تغذت علي العليقة المحتوية على ١٢٠مجم أوكسي تتراسيكلين/كجم عليقة أعلي القيم في الهيموجلوبين وكرات الدم البيضاء وزيادة معنوية في كرات الدم الحمراء مقارنة بالمجموعة الضابطة وجرعات الأوكسي تتراسيكلين الأخري بينما سجلت الجرعة ٤٠ملجم أوكسي تتراسيكلين/كجم عليقة أقل القيم في الهيموجلوبين وكرات الدم الحمراء والبيضاء مقارنة بالجرعات الأخري من الأوكسي تتراسيكلين مع حدوث زيادة غير معنوية في الهيموجلوبين وكرات الدم الحمراء مقارنة بالمجموعة الضابطة وبالنسبة لتأثير الفلورفينيكول فقد سجلت الأسماك التي تغذت علي العليقة ٧,٥ملجم فلورفينيكول/كجم عليقة أعلي القيم في الهيموجلوبين وكرات الدم الحمراء وتناقص غير معنوي في كرات الدم البيضاء والأسماك التي تغذت علي العليقة المحتوية على ٢٢,٥ مجم فلورفينيكول/كجم عليقة سجلت أقل القيم في الهيموجلوبين وكرات الدم الحمراء والبيضاء مقارنة بالمجموعة الضابطة والجرعات الأخري من الفلورفينيكول.

بالنسبة لمتبقيات المضادات الحيوى فقد أظهرت النتائج أن كل العينات بعد الجرعة العلاجية وكانت الجرعة ٤٠ ملجم أوكسى تتراسيكلين/كجم عليقة أقل نسبة بقايا مضاد حيوى مقارنة بالجرعات الأخرى من الأوكسى تتراسيكلين والفلورفينكول والجرعة ٧,٥ ملجم فلورفينكول/كجم عليقة بالنسبة لجرعات الفلورفينكول. وبعد إنتهاء فترة التجربة كانت محتوية على بقايا المضادات الحية بوعد مرور ٢١ يوم من إنتهاء المعاملة بالأوكسى تتراسيكلين والفلورفينكول فقد وجد أن العينات خالية من الأوكسى تتراسيكلين والفلورفينكول.