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EFFECT OF FLUMEQUINE ON REPRODUCTIVE TRAITS AND FRY PERFORMANCE OF NILE TILAPIA

By

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SUMMARY

The present experiment was carried out at the hatchery of Arab Fisheries Company at Abbassa. Two experiments were conducted in the present study. The first experiment aimed to study the effect of flumequine on reproductive performance of Nile tilapia fish (*Oreochromis niloticus*) broodstock while the second experiment aimed to study the effect of flumequine on growth performance and feed utilization of Nile tilapia fry. The first experiment extended from 1st July 2003 and lasted 25 September of the same year. Four concrete ponds (3 × 10 × 1 m) were used and represented four treatments and each pond was stocked with 30 females and 10 male. The basal diet of broodstock fed commercial diet contained 32% crude protein at a daily rate of 5% of the total biomass. The experimental diets enriched by 0, 10, 14 or 18 mg flumequine/kg of total biomass/day (0, 570, 805 and 1030 mg/kg diet). Fish fed the diets twice a day (9:00 am and 3:00 pm) for 5 days and then fed the basal diets (0-flumequine). For the second experiment, eight fiberglaas tanks (180 l for each) were stocked by 800 tilapia fry (100 fry for each tank) and fed 40% CP diet contained the same flumequine doses used for broddstock (0, 10, 14 or 18 mg flumequine/kg of total biomass/day i.e. 0, 570, 805 and 1030 mg/kg diet).at a feeding rate of 20% of the total biomass for 28 days and then decreased to 10% of the total biomass (6 days/week) to the end of the experiment (75 days). The obtained results could be summarized as follows:

First experiment

- Average total egg weight (g) per female (EW/F) and egg weight (g)/g of body weight (EW/GF) as affected by addition of flumequine to diets for Nile tilapia are found to be 10.82, 14.14, 14.70 and 11.27, and 0.03, 0.04, 0.04 and 0.03 g for EW/F and EW/GF for the different flumequine doses; 0, 10 mg, 14 mg and 18 mg flumequine, respectively. Number of eggs in one gram egg (NE/GE) are 102.33, 97.73, 94.5 and 104.57 for the different treatments, 0, 10 mg, 14 mg and 18 mg, respectively.
- Absolute fecundity found to be 1112.07, 1322.6, 1355.67 and 1177.03 and relative fecundity were 3.27, 3.63, 3.86 and 3.33 for the different flumequine doses, 0, 10, 14 and 18 mg flumequine, respectively. Hatchability percentage were found to be 89.81, 89.91, 93.27 and 89.74 for the flumequine doses, 0, 10, 14 and 18 mg flumequine, respectively and the differences among averages were not significant for relative fecundity and hatchability percentage.
- Fry number/fish (FN/F) and fry number/g of female body weight were 767.5, 960.03, 996.37 and 829.87 fry for the different doses, 0, 10 mg, 14 mg and 18 mg, respectively, and the averages treatments of (FN/G) were 2.25, 2.83, 2.84 and 2.36, respectively, for the different treatments, 0, 10 mg, 14 mg and 18 mg, respectively and the differences among the different flumequine doses 0, 10 mg, 14 mg and 18 mg, were significant for the two traits.

Second experiment:

- During the entire experimental period body weight (BW), weight gain (WG) and specific growth rate (SGR) for fry fed the diet contained 10 mg flumequine/kg of body weight were higher than that fed the other treatments, and the differences were significant ($p<0.001$).
- Addition of flumequine to diets improved feed conversion ratio (FCR) and protein efficiency ratio (PER) of tilapia fry.

Based on the obtained results, it is recommended to use flumequine at 10 or 14 mg/kg of fish biomass/day to improve reproductive performance of Nile tilapia broodstock and growth and feed utilization of tilapia fry.

INTRODUCTION

Flumequine is a "second generation" antibacterial quinolone derivative, structurally related to nalidixic acid and oxolinic acid, and is active against a wide range of Gram-negative bacteria (**Edelson et al., 1977; Neuman 1978 and Lemeland et al., 1981**). Quinolones also active against fungi, protozoan and helminthes (**Rogstad et al. 1993**). The use of antibacterial has been introduced into a fish farm both to treat and to prevent infectious diseases which considering the high stocking density of this kind of farming are steadily increasing (**Malvisi et al. 1994**). Moreover, the last decade quinolones have been administered routinely to cultured fish in many countries both as a prophylactic and as chemotherapeutic agent (**Austin et al. 1983; Rodgers and Austin 1983 and Austin, and Austin 1987**). However, **Heijden et al., (1995)** reported that flumequine possesses mitogenic properties in Europeans eels. Accordingly, the aim of this experiment was to investigate effect of flumequine doses on reproductive traits of Nile tilapia (*Oreochromis niloticus*) and evaluate the effect of flumequine on the growth performance and feed utilization of Nile tilapia fry when used as prophylactic and chemotherapeutic agent in aquaria.

MATERIALS AND METHODS

Two experiments were conducted in the present study. The practical work of the two experiments were carried out at hatchery of Arab Fisheries Company an affiliate of the Arab league at Abbassa village, Abu-Hammad district, Sharkia governorate, Egypt.

The first experiment was started on 1 July 2003 and lasted 25 September of the same year. Four concrete ponds (3 × 10 ×1 m) were used in this experiment. Therefore, the ponds represent 4 treatments and each pond was stocked with 30 females with an initial weight of

344.03, 356.97, 356.63 and 349.6 g. Also, 10 males with an initial weight 376 g, were stocked, therefore 40 males and females were stocked in each pond.

The tested diets were formulated to contain 32% crude protein (Table 1) flumequine was added to the experimental diets at different doses 0, 10, 14 and 18 mg/Kg body weight/day (0, 570, 805 and 1030 mg/kg diet). Males and females were fed on diets contained of flumequine doses for 5 days and then fed the basal diet (32% CP without flumequine). The Broodstok were fed at a daily rate of 5% of total biomass, 6 days / week (twice daily at 9:00 am and 3:00 pm).

Average egg weight (EW/F) spawned per female of Nile tilapia was determined. Number of eggs in one gram eggs weight (NE/G) was determined by weighting one gram of eggs and all eggs were counted. Egg weight/g/kg live body weight was calculated by dividing the weight of eggs spawned per female on its live body weight.

The absolute and relative fecundity was determined according to **Bhujel (2000)** as follows:
Absolute fecundity = total weight of eggs per female (g) ×number of eggs in one gram.
Relative fecundity = absolute fecundity/body weight (g).
Fertilization rate=[number of fertile eggs/total number of spawned eggs]×100
Hatchability =[number of eggs spawned per female/number of fry obtained per female]×100

For the second experiment fry diets were formulated to contain 40% CP (Table 1) flumequine was added to the experimental diets at different doses 0, 10, 14 and 18 mg / Kg body weight/day (0, 570, 805 and 1030 mg / kg diet). Eight circular fiberglass tanks (180 liter) were used in the experiment. The eight circular tank represented 4 treatments (with 2 replicates for each treatment), and each tank was stocked by 100 fry. Fry were fed on the prepared diet (40% CP) at a daily rate 20% of total biomass during the first 4 weeks and then decreased to 10% during the following 6 weeks. Fry were fed 6 days/week (three times 9:.00 am, 1:00 pm and 5:00 pm). Fifteen fry randomly obtained biweekly from each tank and weighted and the amount of feed was adjusted according to the changes in body weight throughout the experimental period.

Table (1): Composition of broodstock and fry diets used during the two experimental periods.

Ingredients %	Broodstock diet (32% CP)	Fry diet (40% CP)
Fishmeal	20	36
Soy bean meal	16.3	12.3
Yellow corn	23	12
wheat flour	9	8
Shrimp meal	9.9	9.9
corn oil	5	5
Wheat bran	14	14
Bone meal	2	2
Vitamins & minerals mixture*	0.5	0.5
Ascorbic acid	0.3	0.3
Sum	100	100
Protein %	32.06	40.06
Metabolizable energy ME/ Kg	3139.5	2748.5

* Each 40g contains vit A 200000 IU, vit D_3 30000 IU; vit E 250 mg ; vit K_3 50 mg; vit B_1 15 mg ; vit B_2 12mg; vit B_{12} 250 mg; Niacin 15 mg; Zn 1800 mg ; Folic Acid 2 mg; vit B_6 20 mg; Fe 1200mg; Bantothonic 80 mg; Mn. 2400 mg; Copper 200 mg; Biotin 100 mg; Selenium 10 mg; Sodium 100 mg; Phosphorus 1000 mg

Records of fry individual body weight (g) and body length (cm) were measured in 15 fish for each aquarium and bi-weekly registered. Growth performance parameters were measured by the following equations:

Specific Growth Rate (SGR): $= \frac{\text{LnW2} - \text{LnW1}}{\text{t}} \text{ x } 100$

Where:-

Ln=the natural log; W1=first fish weight; W2=the following fish weight in "grams" and t = period in days.

Weight gain (WG) = final weight (g) – initial weight (g)

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

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

3.3. Statistical analysis:

The statistical analysis of data carried out by applying the computer program **SAS (1996)**.

Differences among means were tested for significance according to **Duncan (1955).** The following model used for the statistical analysis.

By using the model; $Xij = \mu + \alpha i + eij$ where:

Xij=the k^{th}observation of the j^{th} fish fed the i^{th} diet; μ=overall mean; αi=effect of i^{th} diet and eij = random error.

RESULTS AND DISCUSSION

1. Effect of flumequine on reproductive performance of Nile tilapia broodstock:

Averages of total egg weight (g) per female (EW/F) and egg weight (g) per on gram of body weight (EW/GF) as affected by addition of flumequine in diets for Nile tilapia are presented in table (2). EW/F were 10.82, 14.14, 14.70 and 11.27 g, while the averages of EW/GF were 0.03, 0.04, 0.04 and 0.03 g for the different treatments, 0, 10, 14 and 18 mg flumequine, respectively and the differences among the different flumequine doses for the two traits were significant ($P<0.05$). These results indicate that, EW/F and EW/GF for diets contained 10mg and 14mg flumequine were higher than that obtained by 18mg or control (0 flumequine) and the differences between the averages of EW/F were significant ($p<0.001$). These results are in agreement with **Hansen *et al.*, (1992)**, who found that, using 12 mg flumequine dose in diets per kg body weight gave higher average of EW/F in Atlantic halibut.

The averages number of eggs in one gram egg (NE/GE) are 102.33, 97.73, 94.5 and 104.57 for the different treatments, 0, 10 mg, 14 mg and 18 mg flumequine. These results indicated that 18mg dose of flumequine increased the average of NE/GE. The differences between the averages were significant ($p<0.001$) and this result is in agreement with **Vanbelle *et al.*, (1990)** who found that, number of egg per gram egg increased by increasing doses of flumequine.

Absolute fecundity were found to be 1112.07, 1322.6, 1355.67 and 1177.03 and averages of relative fecundity were 3.27, 3.63, 3.86 and 3.33 for the different flumequine doses, 0, 10, 14 and 18 mg, respectively (Table 3). These results showed that absolute and relative fecundity were significantly increased by increasing flumequine doses from 0 to 14 mg and decreased by increasing flumequine dose (18 mg) and the differences among averages were significant for absolute fecundity ($p<0.001$) and relative fecundity ($p<0.05$).

Hatchability percentage were found to be 89.81, 89.91, 93.27 and 89.74 for the different flumequine doses, 0, 10mg, 14mg and 18mg, respectively and the differences among averages were not significant (Table 3).

Fry number per fish (FN/F) and fry number/g of female body weight were 767.5, 960.03, 996.37 and 829.87 fry and the averages fry number per one gram of female body weight (FN/GF) were 2.25, 2.83, 2.84 and 2.36 for the different doses, 0, 10 mg, 14 mg and 18 mg, respectively (Table 4). These results indicated that, fry number/fish (FN/F) and the number/g of body weight (FN/GF) for 10 and 14 mg flumequine in diets showed the best reproductive traits than that obtained for the other doses (0 and 18 mg). The differences among averages were significant ($p<0.001$). These results are in agreement with **Blaxter and Hunter (1988)** who reported that, addition of 10 mg flumequine/kg body weight/day leads to increase in reproductive traits in elupeoid fish. **HolmeFjord *et al.*, (1994)** reported that, addition of 10 mg flumequine/kg body weight/day leads to increase in reproductive traits in Atlantic halibut.

2. Effect of flumequine on growth performance and feed utilization of Nile tilapia fry:

As presented in Table (5), initial body weight of tilapia fry at 2 days after hatching was 0.02g in all treatments and this indicated the complete randomization of fry distribution among the four treatments. After fifteen days from the start of the experiment average body weights were 0.078, 0.090, 0.080 and 0.080g with significant differences among experimental diets. After 30 days, BW were found to be 0.34, 0.28, 0.51, 0.42 and 0.34 g for the different treatments, respectively and the differences among these averages were significant ($p<0.001$) and the same trend was also observed during the following experimental periods 45 and 60 days. After 75 days averages BW among treatments were 5.37, 7.82, 7.65 and 5.23 g for the four treatments, 0, 10 mg, 14 mg and 18 mg flumequine/kg of body weight/day, respectively. These results indicate that, BW of tilapia fry fed the diet contained 10 mg flumequine/kg of body weight were higher than that fed the other treatments, and the differences among averages BW were significant ($p<0.001$).

Results of the present study are in agreement with those of **Azab *et al.*, (2003)** who found that, (10 mg flumequine/kg of body weight/day) caused a significant increase in BW of Nile tilapia after 3, 6 and 9 weeks from the experimental start compared to control group. Also, **Mona Ahmed (2006)** found that 10 mg flumequine/kg of fish biomass/day in tilapia diets resulted in the highest BW compared to the basal (0-flumequine).

Results of WG as affected by flumequine doses are illustrated in Table (6). Averages WG during the period 2-15 days for fish fed the experimental diets were found to be 0.06, 0.07, 0.06 and 0.06 g with insignificant differences among averages. During the period 15-30

days WG averages were 0.26, 0.19, 0.43 and 0.34 g for the different treatments, 0, 10 mg, 14 mg and 18 mg flumequine/kg of body weight/day, respectively and the differences among WG affected by the different flumequine doses were significant ($p<0.001$) and the same results were also observed for the experimental periods, 30-45 and 45-60 days. During the period 60-75 days the averages WG among the different treatments were 3.65, 6.30, 5.18 and 3.12 g for the different treatments with significant ($p<0.01$) differences among WG averages. WG during the whole experimental period 2-75 days were 5.35, 7.80, 7.63 and 5.21 g for the different treatments, 0, 10 mg, 14 mg and 18 mg flumequine/kg of body weight/day, respectively and the differences were significant.

Table (2): Effect of flumequine doses in diets on egg weight/female EW/F), egg weight/g of female body weight and number of egg/gram of egg (NE/GE).

Flumequine doses	**No.**	**EW/F**	**EW/GF**	**NE/GE**
D_1 (0-control)	30	10.82±0.4 c	0.03±0.001 b	102.33±1.72 a
D_2 10mg	30	14.14±0.4 a	0.04±0.001 a	97.73±1.72 b
D_3 14mg	30	14.70±0.4 a	0.04±0.001 a	94.50±1.72 c
D_4 18mg	30	11.27±0.4 b	0.03±0.001 b	104.57±1.72 a

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Table (3): Effect of flumequine doses in diets on absolute and relative fecundity of Nile tilapia broodstock.

Flumequine doses	**No.**	**Absolute fecundity**	**Relative fecundity**
D_1 (0-control)	30	1112.07±42.6 d	3.27±0.15 b
D_2 10mg	30	1322.60±42.6 b	3.63±0.15 a
D_3 14mg	30	1355.67±42.6 a	3.86±0.15 a
D_4 18mg	30	1177.03±42.6 c	3.33±0.15 b

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Table (4): Effect flumequine doses in diets on hatchability, fry number/female (FN/F) and fry number per each gram of female body weight of Nile tilapia broodstock.

Flumequine doses	**No.**	**Hatchability %**	**FN/F**	**FN/GF**
D_1 (0-control)	30	89.81±2.82	767.50±31.98 c	2.25±0.11 c
D_2 10mg	30	89.91±2.82	960.03±31.98 a	2.83±0.11 a
D_3 14mg	30	93.27±2.82	996.37±31.98 a	2.84±0.11 a
D_4 18mg	30	89.74±2.82	829.87±31.98 b	2.36±0.11 b

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Generally, results of WG indicate that, the levels moderate doses of flumequine (10 mg or 14 mg/kg of BW) increased WG during all experimental period. **Mona Ahmed (2006)** indicated that the highest WG of Nile tilapia was recorded by fish group fed the diet

contained sub-therapeutic dose of flumequine (10 mg/kg of BW/day) compared to control group (0-flumequine dose) which showed the lowest WG.

Results of the present study are in agreement with those of **Azab *et al.* (2003)** who found that, the addition of 10 mg flumequine /kg of body weight /day for 5 successive days caused a significant ($p<0.05$) increase in WG at the experimental periods 3, 6 and 9 weeks, while 12 mg flumequine /kg of body weight/day caused insignificant increase in WG after 3 and 6 weeks from the experimental start, whereas after 9 weeks there was a insignificant decrease compared with control group.

As shown in Table (7) SGR for the period of (2-15 days) were 10.90, 11.20, 10.85 and 10.90% for the different treatments 0, 10 mg, 14 mg and 18 mg flumequine/kg of body weight/day respectively and the differences among these SGR averages were not significant. SGR for the period (15-30 days) averaged 11.72, 11.15, 9.7 and 8.64% for the different treatments and SGR of tilapia fry significantly ($P<0.001$) affected by flumequine doses. The same trend were also observed at the other experimental periods i.e., 60-75 and 0-75 days after experimental start.

Average SGR values during the whole period i.e, (2-75 days) were 7.72, 8.15, 8.13 and 7.73 % for the different treatments 0, 10 mg, 14 mg and 18 mg flumequine/kg of body weight/day respectively and the differences among SGR values were significant ($p<0.001$).

Results of the present study are in agreement with those of **Azab *et al.* (2003)** who found that, addition of 10 mg flumequine/kg of body weight/day caused insignificant increase in SGR compared to control group. **Mona Ahmed (2006)** indicated that, the highest SGR of Nile tilapia fingerlings was obtained with fish fed the diet contained 10 mg flumequine/kg of BW/day compared that recorded for fish group fed the basal diet (0-flumequine dose). Also, **Brader *et al.*, (1993) and Lutzhoft *et al.*, (1999)** found that, addition of flumequine to diets can be improved SGR.

On the other hand **Moutou *et al.*, (2001)** reported that, using flumequine as medicated diet in rainbow trout caused decrease in SGR.

Averages of FCR during the period 2-15 days were 0.8 for the different treatments with insignificant differences between averages. Averages of FCR for the period 15-30 days were 0.95, 0.73, 0.61 and 0.72 for the different treatments and the differences among FCR

values of the different treatments were significant ($p<0.001$). Results of Table (8) also indicate that, FCR during the period 30-45 days were 1.96, 1.45, 1.92, and 2.19 for the four treatments, respectively, and averages of FCR for the period 45-60 days were 1.79, 1.79, 1.71 and 1.82 for the different treatments. Also, averages of FCR for the period 60-75 days were 1.10, 1.52, 1.26, and 1.03 for the four treatments, respectively.

Averages FCR during the whole experimental period (2-75 days) for the different treatments were 1.16, 1.22, 1.28 and 1.11, respectively. Table (8) shows that, there were insignificant differences among FCR values due to the different flumequine doses. These results indicate that, the addition of flumequine in tilapia diets improved FCR. These results are in agreement with **Brader *et al.*, (1993)** who found that, addition of flumequine to diets improved FCR. **Azab *et al.* (2003)** indicated that, 10mg flumequine /kg of body weight/day caused are improvement in FCR. Similar results were obtained by **Mona Ahmed (2006)**. She indicated that flumequine dose 10 mg/kg of BW/day improved FCR of Nile tilapia fingerlings.

Results of protein efficiency ratio (PER) as affected by flumequine are illustrated in Table (9). Averages of PER during the period 2-15 days for fish fed the different experimental diets, were 2.97, 2.88, 2.97 and 3.03, respectively and the differences among PER averages due to the effect of the different flumequine doses were insignificant.

During the experimental period 15-30 days averages of PER were, 2.65, 2.11, 3.94 and 3.82 for the different treatments, respectively and the differences among PER values were significant ($P<0.001$).

PER during the period 30-45; 45-60 and 60-75 days from the experimental start were found to be 1.09, 1.20, 1.15 and 1.04; 1.04, 1.16 and 1.03 and 1.92, 1.90, 1.53 and 1.99 for the different treatments, 0, 10 mg, 14 mg and 18 mg flumequine/kg of BW/day respectively and the differences between PER values due to the effect of the different flumequine doses through the periods 30-45, 45-60 and 60-75 days were insignificant.

Table (5): Effect of flumequine doses in diets on body weight (BW) of Nile tilapia fry.

Flumequine doses	No.	2day	15day	30day	45day	60day	75day
D_1 (0-control)	30	0.02±0.001	0.078±0.01 c	0.34±0.01 c	0.76±0.06 c	1.72±0.10 c	5.37±0.30 b
D_2 10mg	30	0.02±0.001	0.090±0.01 a	0.28±0.01 d	0.66±0.06 d	1.52±0.10 d	7.82±0.30 a
D_3 14mg	30	0.02±0.001	0.080±0.01 b	0.51±0.01 a	1.19±0.06 a	2.47±0.10 a	7.65±0.30 a
D_4 18mg	30	0.02±0.001	0.080±0.01 b	0.42±0.01 b	0.95±0.06 b	2.11±0.10 b	5.23±0.30 b

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Table (6): Effect of addition flumequine doses in prepared diets on weight gain (WG) for Nile tilapia fry.

Flumequine doses	No.	2-15	15-30	30-45	45-60	60-75	2-75
D_1 (0-control)	2	0.06±0.01	0.26±0.01 c	0.42±0.01 c	0.96±0.01 ab	3.65±0.02 c	5.35±0.02 b
D_2 10mg	2	0.07±0.01	0.19±0.01 a	0.38±0.01 a	0.86±0.01 b	6.30±0.02 a	7.80±0.02 a
D_3 14mg	2	0.06±0.01	0.43±0.01 a	0.68±0.01 b	1.28±0.01 a	5.18±0.02 b	7.64±0.02 a
D_4 18mg	2	0.06±0.01	0.34±0.01 b	0.53±0.01 c	1.16±0.01 a	3.12±0.02 c	5.21±0.02 b

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Table (7): Effect of flumequine doses in diets on specific growth rate (SGR) for Nile tilapia fry.

Flumequine doses	No.	2-15	15-30	30-45	45-60	60-75	2-75
D_1 (0-control)	2	10.90±0.3	8.64±0.15 c	5.54±0.12	5.45±0.03	7.46±0.33 ab	7.72±0.06 b
D_2 10mg	2	11.20±0.3	11.72±0.15 a	5.94±0.12	5.44±0.07	7.89±0.33 ab	8.15±0.06 a
D_3 14mg	2	10.85±0.3	11.15±0.15 a	5.77±0.12	5.77±0.32	6.92±0.33 b	8.13±0.06 a
D_4 18mg	2	10.90±0.3	9.70±0.15 b	5.46±0.12	5.37±0.03	8.12±0.33 a	7.73±0.06 b

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Table (8): Effect of flumequine doses in diets on feed conversion ratio (FCR) for Nile tilapia fry

Flumequine doses	No.	2-15	15-30	30-45	45-60	60-75	2-75
D_1 (0-control)	30	0.80±0.001	0.95±0.002 a	1.96±0.006 ab	1.79±0.006	1.10±0.01	1.16±0.003
D_2 10 mg	30	0.80±0.001	0.73±0.002 b	1.45 ±0.006 b	1.79±0.006	1.52±0.01	1.22±0.003
D_3 14 mg	30	0.80±0.001	0.61±0.002 c	1.92±0.006 ab	1.71±0.006	1.26±0.01	1.28±0.003
D_4 18 mg	30	0.80±0.001	0.72±0.002 b	2.19±0.006 a	1.82±0.006	1.03±0.01	1.11±0.003

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Table (9): Effect of addition flumequine doses in prepared diets on protein efficiency ratio PER for Nile tilapia fry

Flumequine doses	No.	2-15	15-30	30-45	45-60	60-75	2-75
D_1 (0-control)	2	2.97±0.04	2.65±0.06 c	1.09±0.06 b	1.06±0.20	1.92±0.17 a	1.55±0.12 b
D_2 10 mg	2	2.88±0.04	2.11±0.06 d	1.20±0.06 a	1.04±0.20	1.90±0.17 a	1.67±0.12 a
D_3 14 mg	2	2.97±0.04	3.94±0.06 a	1.15±0.06 ab	1.16±0.20	1.53±0.17 b	1.64±0.12 a
D_4 18 mg	2	3.03±0.04	3.82±0.06 b	1.04±0.06 b	1.03±0.20	1.99±0.17 a	1.45±0.12 b

+ Means followed by the same letter in each column are not significantly differences ($P < 0.05$).

Averages of PER during the whole experimental period (2-75 days) were found to be 1.55, 1.67, 1.64 and 1.45, respectively and the differences between PER values due to the effect of the different treatments 0, 10 mg, 14 mg and 18 mg flumequine/kg of body weight/day respectively were significant. These results are in agreement with **Azab *et al.* (2003)** who reported that, flumequine at dose 10 mg/kg of body weight /day caused an insignificant improvement in protein efficiency ratio (PER). In the same respect, **Mona Ahmed (2006)** found that the highest PER value for Nile tilapia fingerlings fed the diet contained flumequine dose 10 mg/kg of BW/day.

Although not determined in the present trials, flumequine residues in muscle were determined after fish fed the diets contained flumequine. **Chomel et al., (1983)** in rainbow trout found no residues of flumequine 48 hours after stopping the treatment. **Liu-Chew-King (1992)** found no flumequine residues in gaint prawn ans kuruma prawn after stopping treatment of diet by flumequine. Also, **Mona Ahmed (2006)** found no flumequine residues in Nile tilapia muscles after treating fish diets for three months by increased flumequine doses 0, 6, 8 and 12 mg flumequine/kg of BW/day. On the other hand, **Azab et al., (2003)** detected flumequine residues in fish tissue until 10 and 20 days after last feeding in fish group administrated 10 mg/kg of BW whereas, fish administered 6 mg/kg of last feeding. Also, **Chevalier et al., (1981)** found that flumequine residues were detected in fish tissue until 48-72 hours after oral therapy with 6-12 mg/kg fish/day for days. **Steffenak et al., (1991)** found that residues of flumequine were present in the fish prolonged periods sfter the end of treatment.

CONCLUSION

The obtained results indicated that, using of the two flumequine doses (10 or 14 mg/kg of body weight/day) significantly improved reproductive performance of Nile tilapia broodstock and growth performance and feed utilization of Nile tilapia fry.

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تأثير الفلوموكوين على الصفات التناسلية وإداء زريعة البلطى النيلى

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أجريت هذه الدراسة في مفرخ الشركةِ العربية لمصائد الأسماك التابع لجامعة الدول العربية بقرية العباسة – أبو حمـــاد– شرقية. وقد أشتملت هذه الدراسة على تجربتين الأولى تم فيها دراسة تأثير المضاد الحيوى فلوموكوين على الأداء التناســلى لأمهات أسماك البلطى أما التجربة الثانية فكانت تهدف إلى دراسة تأثير الفلومو كوين على صفات النمـــو والكفـــاءة الغذائيـــة لزريعة البلطى.

بدأت التجربة الأولى في١ يوليو ٢٠٠٣ واستمرت حتى ٢٥ سبتمبر لنفس السنة. وأستخدمت فيها ٤ أحواض أسمنتيه (٣ × ١٠ × ١م) كما تم تخزين ٣٠ أنثى بوزن أولي ٣٤٤,٠٣، ٣٥٦,٩٧، ٣٥٦,٦٣ و٣٤٩,٦ جم و١٠ ذكور بمتوسط وزن ٣٧٦ جم بكل حوض. وقد استخدمت عليقة تحتوى على ٣٢ % بروتين خام للذكور والإناث وغذيت بنسبة ٥ % يوميـــا مـــن وزن الجسم. وأحتوت كل عليقه على أحد مستويات الفلوموكوين المختبره تبعا لوزن الجسم وهى صفر ، ١٠مجم/كجـــمِ مـــن وزن الجسمِ (٥٧٠ مجم /كجم عليقة) ،١٤مجم/كجمِ من وزن الجسمِ(٨٠٥ مجم /كجم عليقة) و١٨مجم/كجمِ من وزن الجسمِ (١٠٣٠ مجم /كجم عليقة) وتمت تغذية الأمهات مرتين يوميا في (٩,٠٠ صباحاً و٣,٠٠ مساءً) لمدة ٥ أيامٍ وبعد ذلك غذيت الأمهات على العليقة الكنترول ٣٢% بروتين خام والتى لاتحتوى على المضاد الحيوى حتى نهاية فترة التجربة.

وفى للتجربة الثانية تم توزيع زريعة البلطى على ثمانية أحواض فيبر جلاس دائريةِ (١٨٠ لتر) لتمثل هذه الأحـــواض ٤ معاملات (مكررين لكُل معاملة) وتم تسكين ١٠٠ زريعه/حوض وتم تغذيتها على عليقة تحتوى على ٤٠ % بروتين خام تحتوى كـــل منها على أحد مستويات الفلوموكوين المستخدمه فى علائق الأمهات وغذيت بمعدل تغذية يومية ٢٠ % من وزن الجسم الكليِ لمـــدة ٢٨ يوم ثم تم خفض معدل التغذية الى ١٠% من وزن الجسم حتى نهاية فترة التجربة (٧٥ يوم) وكان من أهم النتائج المتحصل عليها مايلى:

١- التجربة الأولى:

– متوسط وزن البيضِ الكلي لكل أنثى ١٠,٨٢ ، ١٤,١٤، ١٤,٧٠ و ١١,٢٧ جرام ومتوسط وزن بيضِ بالجرام لكل جـــرام من وزن الجسمِ ٠,٠٣ ، ٠,٠٤ ، ٠,٠٤ ، ٠,٠٣ جرام للمعاملات الأربعة (صفر ، ١٠ ، ١٤، ١٨ مجم فلوموكوين) علـــى التوالى . كما أشارت النتائج إلى أن وزن البيض الكلي لكل أنثى وكذلك وزن بيض بالجرام لكل جـــرام مِـــنْ وزن الجـــسمِ للمعاملات ١٠ و١٤مجم الفلوموكوين أفضل من المعاملة ١٨مجم الفلوموكوين وكذلك مجموعة الكنترول وكانت الإختلافـــات بين مستويات المضاد الحيوى الأربعة كانت معنوية.

– وجد ان عدد البيض/جرام واحد مِن البيض ١٠٢,٣٣ ، ٩٧,٧٣، ٩٤,٥ و ١٠٤,٥٧. كما كان عـــدد البـــيض النـــاتج مـــن كـــل انثى١١١٢,٠٧ ، ١٣٢٢,٦، ١٣٥٥,٦٧ و ١١٧٧,٠٣ وعدد البيض لكل جرام مـــن وزن الـــسمكة ٣,٢٧، ٣,٦٣ ، ٣,٨٦ و ٣,٣٣ للمعاملات المختلفة (صفر، ١٠؛ ١٤و١٨ مجم الفلوموكوين) علي الترتيب وكانت النسبة المئويـــة للفقـــس كانـــت٨٩,٨١، ٨٩,٩١، ٩٣,٢٧و ٨٩,٧٤ كما كان متوسط عدد الزريعة الناتجة لكل سمكةِ ٧٦٧,٥، ٩٦٠,٠٣، ٩٩٦,٣٧ و ٨٢٩,٨٧ ومتوسط عدد الزريعـــة الناتجة لكل حرامِ مِنْ وزنِ الجسمِ ٢,٨٣،٢,٢٥، ٢,٨٤ و ٢,٣٦ للمعاملات الأربعة (صفر ، ١٠ ، ١٤، ١٨ مجم فلوموكوين) على التوالى.

٢- التجربة الثانية:

– أظهرت نتائج التجربة الثانية أن متوسط وزن الجسم ومعدل النمو النوعى وكذلك الزيادة فى وزن الجسم لزريعـــة أســـماك البلطى المغذاه علىِ عليقة تحتوى على ١٠ و١٤ مجم فلوموكوين/كجم من وزن الجسمِ كانتا أعلى من باقى المعاملات الأخرى وكانت الإختلافاتَ بين هذه معاملات كانت معنوية .

– لم تؤثر مستويات المضاد الحيوى المستخدمة فى تحسن معدل التحويل الغذائى أثناء الفترة الكليـــة (٢-٧٥ أيـــام) للأربعـــة معاملات ١,١٦، ١,٢٢، ١,٢٨ و١,١١ لمستويات المضاد الحيوى صفر ، ١٠؛ ١٤ و١٨ مجم الفلوموكوين علـــى التـــوالي.

الإختلافات بين المعاملات المختلفةِ كَانتْ غير معنوية.أما بالنسبة لمعدل كفاءة بروتين أثناء الفترة الكلية (٢-٧٥ أيام) للأربعة معاملات صفر، ١٠ ؛ ١٤و١٨ مجم الفلوموكوين/كجم من وزن الجسمِ/يوم كانت ١,٥٥، ١,٦٧، ١,٦٤ و١,٤٥، على التوالي. الإختلافات بين المعاملات المختلفة كانت غير معنوية.

وإعتماداً على نتائج هذه الدراسة يُوصي باستخدام جرعات من المضاد الحيوى فلوموكـــوين١٠ أو ١٤مجـــم وذلـــك للحصول على نتائج افضل في الصفات التناسلية المختلفة لأمهات البلطى وكذلك نتائج جيدة لمعدلات النمو والكفاءة الغذائيـــة بالنسبة للزريعة.