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EFFECT OF VIRGINIAMYCIN OR LACTO-SACC ON THE GROWTH PERFORMANCE OF NILE TILAPIA FISH DURING THE NURSING PERIOD

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ABSTRACT:

This study was conducted to evaluate the effect of virginiamycin (nutritive antibiotic) or lacto- sacc (probiotic) on survival rate, growth performance, feed utilization and economical efficiencies of Nile tilapia fry during the nursing period (50 days). Fries with initial weight of 0.2 g were stocked at a rate of 50000 fry/pond in 10 nursing earthen ponds. Each pond of 0.5 feddan, 2100 m^2, area, the water level was 110 cm and its quality was good. Fries were fed on isonitrogenus (35% CP) isocaloric (4.599 kcal/g GE) diets at a rate of 8% from their body mass. Diets were supplemented with virginiamycin or lacto-sacc at a rate of 0, 0.05 and 0.1% to form five tested diets (without supplementation, control (T_1), 0.05% Virginiamycin (T_2), 0.1% virginiamycin (T_3), 0.05% lacto-sacc (T_4) and 0.1% lacto- sacc (T_5). Each tested diet was represented in two ponds.

The results showed that diets supplemented with virginiamycin or lacto- sacc significantly improved ($P \leq 0.01$) growth performance, survival rates of fries and their feed utilization efficiency. The best results were obtained with T_3 followed by T_5, T_2, T_4 and T_1 (control), respectively. Body chemical composition of fish not affected significantly. Diets supplemented with virginiamycin or lacto- sacc had positive effect on economical efficiency of fries production. Comparing supplementation levels, the T_3 and T_5 were the best.

Under the experimental condition 0.1% virginiamycin or 0.1 % lacto- sacc could be recommended as a feed additive in diets of Nile tilapia during the nursing period.

Key words: *Nile tilapia, feed additives, virginiamycin, lacto-sacc, growth performance, feed utilization and economic efficiency.*

INTRODUCTION:

Actually, in Egypt at this decade, fish farming permit great progress. Continual of this progress must need improving of seed production and feed utilization of fish. Feed additives are used in animal, poultry and fish nutrition to improve their growth performance, feed utilization and the economic return. Several workers studied the effects of antibiotics as feed additives in poultry diets (***Waldroup et al., 1990; Gropp and Hashish, 1992; Rath et al., 1998; Elwinger et al., 1998 and Abdelrahim et al., 1999***), some of them found significant positive effects, while the others found insignificant effects. These contrary results may be due to the type and the dose of antibiotic and the environmental conditions in which they were used. Verginiamycin

(nutritive antibiotic) has been found to improve growth and feed efficiency in broiler (***Miles et al., 1984*** and ***Abd El-Rahman et al., 1994***); in turkey poults ***(Harms and Miles, 1983***); in Japanese quail (***Zeweil et al., 1993, 1996***). Also, verginiamycin has been used as a feed additive in common carp, *Cyprinus carpio*, diets (***Ahmed and Matty, 1989; Viola et al., 1990; Keshavanath et al., 1991***) and rainbow trout, *Oncorhynchus mykiss*, diets (***Cravedi et al., 1991, 1993***). They found that its effects varied according to its dose and the environmental conditions.

Recently, probiotics (natural promoters) have been used as alternative promoters due to its advantages. They improve digestion and absorption of food, they cause better balance of intestinal microflora, they improve the immune status and/or eliminate pathogenic microbes (***Treves-Brown, 2000***). Lacto-sacc as a probiotic was used as feed additive in diets of buffalo calves (***Khatab et al., 1997***), Friesian calves (***Abdel-Khalek et al., 2000***) and laying hens (***Attia et al., 1997***). They found that it had positive effects on their productive and reproductive performances, respectively.

Therefore, it seems that more knowledge is needed on the utilization of antibiotics and probiotics in Nile tilapia diets. Accordingly the present study was conducted to evaluate virginiamycin or lacto- sacc as feed additives in the diets of Nile tilapia fries during the nursing period.

MATERIALS AND METHODS:

A feeding experiment, 50 days, started on 10/7/2002 was conducted at commercial fish hatchery at Kafr El-Sheikh Governorate, which produces mono sex Nile tilapia seeds. The analytical work was conducted at Anim. Prod. Dept. Lab., Fac. Agric. El-Fayoum, Cairo Univ. Mono sex fries with initial weight of 0.2 g were stocked in 10 nursing earthen ponds (0.5 feddan, 2100 m^2/pond with 110 cm water highet) at a rate of 50000 fry/pond. One third of water in each pond was replaced daily. Water quality parameters during the study are shown in Table 1.

Table (1). Water quality parameters recorded through the trial.

Date	Temperature, °C (1)		O_2, mg/L (2)		pH (3)	
	Range	Average	Range	Average	Range	Average
10/7	25-27	26.0	5.5-6.5	6.00	8.0-8.3	8.15
17/7	26-28	27.0	4.5-6.0	5.25	8.0-8.5	8.25
24/7	26-28	27.0	5.0-6.3	5.65	8.0-8.4	8.20
31/7	27-28	27.5	4.5-6.0	5.25	8.3-8.4	8.35
4/8	26-27	26.5	4.0-5.5	4.75	8.4-8.6	8.50
11/8	26-27	26.5	4.5-6.0	5.25	8.3-8.6	8.45
18/8	27-28	27.5	5.0-6.4	5.70	8.3-8.5	8.40
25/8	27-28	27.5	5.0-6.3	5.65	8.4-8.6	8.50

(1) Water temperature, were measured in the morning and at noon by centigrade thermometer.
(2) Dissolved oxygen were measured by oxygen meter, Cole Parmer model 5946.
(3) pH were measured by Orion digital pH meter model 201.

Fries were fed on isonitrogenus (35% CP) isocaloric (4.599 kcal/g GE) diets at a rate of 8% from their body mass (***Ali, 2001***). Diets were supplemented with virginiamycin (Stafac®) or lacto-sacc, virginiamycin is a classical antibiotic that produced by selected strain of *Streptocmyces virginia* and is primarily active against only gram-positive bacteria including *Clostridia, Bacillus subtilis* and *Micriococcus aureus* and considered as growth promoter. The recommended level by its producing company (Apic, Amon company for drugs industry, El-Salam, Cairo, Egypt) is from 0.05 to 0.1% and its price is 20 LE/kg. Lacto-sacc, is a biological feed additive which combines high strength cultured yeast (YEA-SACC strain 1026) with beneficial lactic acid producing microencapsulated bacteria (*Lactobacillus* acidophilus and *Streptococcus faecium*) and digestive enzymes (protease, cellulase and amylase). The producing company (Altech, INC., Biotechnology, Nicholasville, KY 40356, USA) recommended 0.10%, its price is 30 LE/kg, at a rate of 0, 0.05 and 0.1% to form five tested diets (without supplementation, control (T_1), 0.05% Virginiamycin (T_2), 0.1% virginiamycin (T_3), 0.05% lacto- sacc (T_4) and 0.1% lacto-sacc (T_5). The ingredients of diets and its chemical composition are presented in Table 2. Each tested diet was represented in two ponds.

Table (2). The composition and chemical analysis of the experimental diet.

Ingredients, %		Chemical analysis	
Fish meal	22.00	DM, %	89.25
Soybean meal	31.00	OM, %	80.69
Yellow corn	13.00	CP, %	35.19
Rice bran	12.00	EE, %	5.16
Wheat bran	18.00	CF, %	5.61
Molasses	2.75	NFE,** %	34.72
Dicalcium phosphate	1.00	Ash, %	8.56
Vit.&Min. mixture *	0.25	GE, ***kcal/g	4.60

* Each kg contains;Vitamin A 15,250,000 IU, Vitamin D_3 4,500,000 IU, Vitamin E 1,335 IU, Vitamin K 4,500 mg, Vitamin B_2 4,500 mg, Vitamin B_6 2,350 mg, Vitamin B_{12} 11,500 mcg, Vitamin C 1,000 mg, Niacin 16,750 mg, Pantothenic acid 5,375 mg, Methionine 10,200 mg, Lysine 15,250 mg, Zinc sulphate 12,250 mg, Cupper sulphate 12,250 mg, Manganese sulphate 12,250 mg, Magnessium sulphate 12,250 mg, Sodium chloride 50,000 mg, Sodium sulphate 210,000 mg, Potassium chloride 88,000 mg, Plus lactic acid bacteria cfu/g .

** Calculated by difference.

*** Measured with a ballistic Bomb calorimeters CBB-330-0101 Gallenkamp.

At the start random groups of fish per each pond were weighted to determine their initial weight, then 5 random groups of fish were weighed every 10 days to correct the feeding rate according to the new biomass.

Growth, mortality rate and feed utilization parameters were determined. Samples of 200 fish were killed at the start and at the end of the experiment samples of 20 fish per pond, weighed, minced, mixed well and kept at –20 °C until sub-samples were taken for chemical analysis. Diet and whole body fish samples were analyzed according to methods of ***AOAC (1984)***. The caloric value of feeds and whole body of fish were determined by using Gallenkamp Ballistic bomb calorimeter model CBB-330 (***Miller and Payne, 1959***). Simple economical evaluation was conducted.

Statistical analysis was conducted by ***SPSS (1997)*** using one way analysis of variance and Duncan multiple range. The statistical model is $Y_{ij} = \mu + t_i + e_{ij}$ where μ is the overall mean, t_i is the fixed effect of i th (dietary level of any supplementation), e_{ij} is the random error.

RESULTS AND DISCUSSIONS:

Diets and rate of feeding:

Composition and chemical analysis of the diet used in the experiment are shown in Table 2. As clear its CP% and GE, kcal/g were 35.19, 4.599. These levels are proper for fries nutrition as indicated by ***Viola and Arieli, (1983)***. The levels of additives were 0.05 and 0.1% from the diet. These levels are recommended by the producers companies. Fries were fed the diet at a rate of 8% according to ***Ali, 2001***. Since the feed intake increases with small fish and decreases as fish increase in their weight.

Growth performance of fries:

Growth performance and survival rate of fries as affected by virginiamycin or lacto- sacc supplementation are shown in Table 3.

Table (3). Effect of virginiamycin and lacto- sacc as feed additive on growth performance and survival rate of Nile tilapia during the nursing period.

Item	Control	Virginiamycin		Lacto sacc		SED
		0.05	0.1	0.05	0.1	
Initial weight, g.	0.20	0.20	0.20	0.20	0.20	
Final weight, g.	14.21^{E}	18.62^{C}	20.61^{A}	18.41^{D}	19.82^{B}	0.044
Weight gain[1], g.	14.01^{E}	18.42^{C}	20.41^{A}	18.21^{D}	19.62^{B}	0.044
Daily gain[2], g.	0.28^{E}	0.37^{C}	0.41^{A}	0.36^{D}	0.39^{B}	0.001
SGR[3], %.	8.53^{E}	9.07^{C}	9.27^{A}	9.04^{D}	9.19^{B}	0.005
Survival rate[4], %.	81.58^{D}	88.34^{B}	90.10^{A}	86.87^{C}	89.58^{AB}	0.617

Averages in the same row having different superscripts are significantly different ($P \leq 0.01$). SED, standard error of differences.

1, Final weight – initial weight 2, weight gain/period, day 3, $\{(\ln W_2 - \ln W_1) \times 100/\text{days}\}$ 4, (number at end – number at start)/number at start × 100

The results show that the diet supplemented with virginiamycin or lacto- sacc had a positive effect on growth performance and survival rates of Nile tilapia fries. The highest body weight, body weight gain, specific growth rate and survival rates were

obtained with T_3 followed by T_5, T_2, T_4 and T_1 (control), respectively. The superiority of T_3 and T_5 in improving growth parameters and survival rates may lead us to believe that this treatments provide fish with the proper concentration of tested substances.

These results are in agreement with those obtained by ***Ahmed and Matty (1989); Keshavanath et al. (1991); Viola and Arieli (1987); Viola et al. (1990)*** who suggested that virginiamycin have sparing effect on the dietary protein when they used as growth promoter in common carp diets and those of ***Cravedi et al. (1991& 1993)*** with rainbow trout. The positive effects of the tested substances may be due to their improvement of food digestion or absorption and metabolism, their improvement of immune status and/or eliminate pathogenic microbes as mentioned by ***Zeweil, et al., 1996*** in their study on quail and ***Treves-Brown* (*2000*)**. Also, ***Attia et al. (1997)*** found the same trend when they used virginiamycin or lacto- sacc in Bandarah chicks diets.

Body chemical composition of Nile tilapia fries:

Body chemical composition of Nile tilapia fries at the start and the end of the experiment (Table 4) were determined to measure the efficiency of feed utilization and to detect the effect of treatments.

Table (4). Body chemical composition of Nile tilapia fries as affected by virginiamycin and lacto- sacc as a feed additives on DM basis.

Item	At the start	At the end					SED
		Control	Virginiamycin, %		Lacto sacc, %		
			0.05	0.1	0.05	0.1	
DM, %.	24.82	26.21	25.35	26.20	26.33	25.21	0.632
CP, %.	57.88	57.02	58.63	58.49	57.72	59.40	1.401
EE, %	25.18	25.8	23.70	23.95	25.23	23.73	0.872
Ash, %.	16.94	17.18	17.67	17.56	17.05	16.87	1.110
GE, kcal/g.	5.576	5.587	5.476	5.492	5.571	5.521	0.097

SED, standard error of differences.

Data show insignificant differences in body chemical composition between the tested diets. The differences did not take obvious trend. These results may lead us to believe that the effect of tested substances on fish body composition through metabolism processes is differed according to their concentrations in the diets. In this connection ***Gravedi et al. (1993)*** found that the differences in body composition of rainbow trout were not consistent as a result to addition of virginiamycin in their diets.

Feed utilization of Nile tilapia fries:

Data of feed utilization (Table 5) show that the virginiamycin or lacto- sacc had a positive significant effect on feed intake, feed conversion ratio, protein and energy utilization. The supplemented with 0.1% virginiamycin (T_3) showed the highest feed

intake followed by T_5, T_4, T_2 and T_1 (control), respectively. The best feed conversion ratio was obtained with T_3 followed by T_5, T_2, T_4 and T_1, respectively. The improvement of feed conversion ratio were 10, 15, 8 and 14% for T_2, T_3, T_4 and T_5 as compared with T_1 (control).

Regarding protein utilization T_3 and T_5 showed the best PPV and PER followed by T_4 and T_2 and then T_1 (control). Also, energy utilization efficiency took the same trend, where T_3 was the best followed by T_5, T_4, T_2 and T_1, respectively. The superiority of T_3 and T_5 improving feed utilization may lead us to believe that these treatments provide fish with the proper concentration of tested substances which may improve digestibility, absorption and metabolism of feed as mentioned above.

Table (5). Effect of virginiamycin and lacto- sacc as a feed additives on feed utilization of Nile tilapia during the nursing period.

Item	Control	Virginiamycin		Lacto sacc		SED
		0.05	0.1	0.05	0.1	
Feed intake, g.	26.97^{D}	31.70^{C}	33.30^{A}	32.23^{B}	32.37^{B}	0.076
FCR[1].	1.92^{A}	1.72^{C}	1.63^{E}	1.77^{B}	1.65^{D}	0.002
Protein utilization.						
PPV[2], %	22.08^{C}	24.55^{B}	26.71^{A}	24.41^{B}	25.80^{A}	0.207
PER[3].	1.48^{E}	1.65^{C}	1.74^{A}	1.61^{D}	1.72^{B}	0.002
Energy utilization.						
EPV[4], %.	16.56^{C}	17.54^{BC}	19.19^{A}	18.03^{B}	18.34^{AB}	0.443
EER[5]	0.11	0.13	0.13	0.12	0.13	0.0001

Averages in the same row having different superscripts are different ($P \leq 0.01$).
SED, standard error of differences.
1, = Feed intake (g)/ Weight gain (g).
2, = 100 (Retained protein (g)/ Protein intake (g))
3, = Weight gain (g)/ Protein intake (g).
4, = 100 (Retained energy (kcal)/ Energy intake (kcal))
5, = Weight gain (g)/ Energy intake (kcal).

Economical efficiency:

Data of economical efficiency (Table 6) show that the diet supplemented with virginiamycin or lacto- sacc has positive significant ($P \leq 0.01$) effect, the best returns were obtained with T_5 and T_3 followed by T_2, T_4 and T_1 (control), respectively. These results reflect the positive effect of the tested substances and the proper concentartions from them in fish diets on their growth performance, efficiency of feed utilization and survival rates.

Table (6). Effect of virginiamycin and lacto- sacc as a feed additives on economical evaluation of Nile tilapia during the nursing period.

Item	Control	Virginiamycin, %		Lacto sacc, %		SED
		0.05	0.1	0.05	0.1	
Feed, kg/pond.	1100	1400	1500	1400	1450	--
Price of fry at start[1].	4500	4500	4500	4500	4500	--
Price of feed, L.E./pond[2].	1595	2044	2205	2051	2146	--
Other costs, LE/pond [3]	50	50	50	50	50	--
Total cost, L.E./pond.[4]	6145	6594	6759	6601	6696	--
No. of fingerlings produced.[5]	40790	44170	45050	43435	44790	--
Price of selling fingerlings,[6] L.E.	6934.3	7950.6	8109	7818.3	8062.2	--
Net return, L.E./pond.[7]	789.3^{c}	1356.6^{a}	1354^{a}	1217.3^{b}	1366.2^{a}	39.135
Net return, L.E./1000 fry[8]	19.35^{c}	30.71^{a}	30.06^{a}	28.03^{b}	30.50^{a}	0.699

-Averages in the same row having different superscripts are different ($P \leq 0.01$).
-SED, standard error of differences.
-Price of one ton of control diet = 1450 L.E.
- Price of 1000 fry after sex reversal = 90 L.E.
-Price of 1 kg from virginiamycin and lacto- sacc were 20 and 30 L.E., respectively.

1, Price of one thousand × 50000
2, Price of one ton × feed/pond/period.
3, Include the cost of labour, irrigation and rent of land.
4, Include step 2 and 3.
5, 50000 × survival rate/treatment.
6, The price of 1000 fingerling × No of fingerlings produced/pond
7, 6- 4.
8, $(7 \div 5) \times 1000$

-Price of selling 1000 fingerlings 14, 18, 20 g was 170, 180 and 180 L.E., respectively.

From the previous results, under the experimental conditions, 0.1% virginiamycin or 0.1% lacto-sacc levels could be recommended as a feed additive in diets of Nile tilapia fish during the nursing period.

REFERENCES:

A.O.A.C, (1984) Official Methods of Analysis. S. Williams (Ed). Association of Official Analytical Chemists, Lnc. Arlington, Virg. U.S.A.

Abd El-Rahman, S.A., A.M. Abou Ashour and H.S. Zeweil (1994). Effect of probiotic and virginiamycin supplementation on performance of broiler chicks. Menofiya J. Agric. Res., 19: 241-256.

Abdel-Khalek, A.E., A.F. Mehrez and E.A. omar (2000). Effect of yeast culture (Lacto-sacc) on rumen activity, blood constituents and growth of suckling Friesian calves. Proc. Conf. Anim. Prod. In the 21th century, Sakha, 18-20 April: 201-210.

Abdelrahim, S.M, M.S. Haddadin, N.H. Odetallah and R.K. Robinson (1999). Effect of lactobacillus acidophilus and zinc bacitracin as dietary additions for broiler chichens. Br. Poult. Sci, 40: 91-104.

Ahmad, T.S. and A.J. Matty (1989). The effect of feeding antibiotics on growth and body composition of carp (*Cyprinus carpio*). Aquaculture. 77: 211-220.

Ali, A.A.A. (2001). The effect of some nutritional treatments on fecundity, sex reversal and productive performance of Nile tilapia. Ph.D thesis, Fac. Agric., Fayoum, Cairo Univ.

Attia, Y.A., A.I. abd El-Ghani, E.H. El-Ganzory and S.B. Abd El-Hady (1997). Responses of bandarah local breed to some pronutrient addition. Egypt. Poult. Sci., 17: 1-22.

Cravedi, J.P., M. Baradat and G. Choubert (1991). Digestibility, tissue distribution an depletion kinetics of (super(14)C)-virginiamycin and related factors fed to rainbow trout. Aquaculture. 97: 73-83.

Cravedi, J.P. D. Blanc, P.Y. Lebail and S.J. Kaushik (1993). Effect of virginiamycin and related factors on the growth, body composition and plasma growth hormone levels of rainbow trout Fish Nutrition In Practice. Kanshik, S.J.; Luquet, P. eds. Paris France Institut National De La Recherche Agronomique. 61: 433-436.

Elwinger, K., E. Berndton, O.P. Engstr, O. Fossum and L. Waldenstadt (1998). Effect of antibiotic growth promoters and anticoccidials on growth of clostridium perfringens in the caeca and on performance of broiler chickens. Acta. Vet. Scand., 39: 433-441.

Gropp, J.M. and Samia M.A. Hashish (1992). Effects of carbohydrate splitting enzyme preparation and growth permitter on growth and feed efficiency of broilers fed a diet containing 30% rye seed. Egypt. Poult. Sci., 12: 377-397.

Harms, R.H. and R.D. Miles (1983). The response of turkey poults to virginiamycin in diets containing various levels of supplemental methionine. Poult. Sci., 62: 1896-1898.

Keshavanath, P., S. Shyama, M.C. Nandeesha and T.J. Varghese (1991). Influence of virginiamycin on growth and body composition of rohu (Labeo rohita) and common carp (*Cyprinus carpio*). Fish Nutrition Research in Asia. Proceedings of the fourth-Asian-fish-nutrition workshop. 5: 193-200.

Khatab, H.M., A.M. Fayed and A.A. Ragheb (1997). Effect of using non-hormonal growth promoters on the productive performance of buffalo calves. Egypt. J. Nutrition and Feeds Special Issue: 81-89.

Miles, R.D., D.M. Janky and R.H. Harms (1984). Virginiamycin and broiler performance. Poult. Sci., 63: 1218-1221.

Miller, D.S. and P.R. Payne (1959). A ballistic bomb calorimeter. Br. J. Nutr. 13: 501.

Rath, N.C., H.D. Caphpman, S.H. Fitz-Coy, T.M. Balag, G.R. Huff and W.E. Huff (1998). Effects of roxarsone and monensin on digital flexoral tendous of broiler chickens. Poult. Sci., 77: 523-528.

SPSS. (1997). Statistical Package For Social Science (for Windows). Release 8.0 Copyright (C), SPSS Inc., Chicago, USA.

Treves-Brown, K.M. (2000). Applied fish pharmacology. Kluwer Academic Publishers, London.

Viola, S. and Y. Arieli (1983). Nutrition studies with tilapia (*Sarotherodon*) 1- Replacement of fish meal by soybean in feed for intensive tilapia culture. Bamidgeh, 35: 9 - 17

Viola, S. and Y. Arieli (1987). Non hormonal growth promoters for tilapia and carp. 1. Screening tests in cages. Bamidgeh. 39: 31-38.

Viola, S. Y. Arieli and E. Lahav (1990). Nonhormonal growth promoters for carp. 2. Feeding trials in ponds. Isr. J. Aquacult. Bamidgeh. 42: 91-94.

Waldroup, P.W., A.L. Izat, R.A. Primo, P.F. Twining, J.A. Herbert, J.H. Trammell, R.V. Fell and J.S. Crowford (1990). The effcet of zinc bacitracin and roxarsone on performance of broiler chickens when fed in combination with narasin. Poult. Sci., 69: 898-901.

Zeweil, H.S., A.A. El-Fiky, and M.A. Kalamah (1996). Effect of fermacto-500 vs virginiamycin on the performance of growing Japanese quail. Egypt. Poult. Sci., 16: 201-220.

Zeweil, H.S., N.S. Isshak, S.A. Abd El-Fatah and M.E. Abd El-Aziz (1993). Effects of virginiamycin on performance of Japanese quail fed optimal and sub-optimal protein levels. Egypt. Poult. Sci., 13: 429-450.

تأثير الفرجينياميسين أو اللاكتوساك على مظاهر النمو لأسماك البلطى النيلى أثناء فترة الحضانة

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أجريت هذه التجربة لدراسة تأثير الفرجينياميسين او اللاكتوساك كإضافة علفية على معدل الإعاشة، مظاهر النمو، كفاءة الاستفادة من الغذاء و الكفاءة الاقتصادية لزريعة البلطى النيلى أثناء فترة الحضانة (50 يوم).

وزعت الزريعة التى متوسط وزنها 0.2 جم بمعدل 50 ألف وحدة/حوض على عشرة أحواض ترابية، مساحة الحوض 0.5 فدان، ارتفاع الماء ذو المواصفات الجيدة به 110 سم، وكان يتم استبدال ثلث الماء يوميا. وغذيت الزريعة على علائق متشابهة فى محتواها من البروتين (35%) والطاقة (4.599 كيلوكالورى/جم) بمعدل 8% من وزن الجسم وذلك بعد إضافة الفرجينياميسين أو اللاكتوساك لها بمعدل صفر، 0.05% و 0.1% ليتكون خمس علائق مختبرة (العليقة الأولى :بدون إضافات (كنترول)، العليقة الثانية: 0.05% فرجينياميسين، العليقة الثالثة: 0.1% فرجينياميسين، العليقة الرابعة 0.05 % لاكتوساك، العليقة الخامسة: 0.1% لاكتوساك) واستخدمت كل عليقة فى حوضين وقد أظهرت النتائج ما يلى:

تحسنت مظاهر النمو ومعدل الإعاشة، كفاءة الاستفادة من الغذاء والكفاءة الاقتصادية معنويا على مستوى 0.01 وذلك للعلائق التى أضيف إليها كل من الفرجينياميسين أو اللاكتوساك وتم الحصول على أحسن النتائج مع العليقة الثالثة تلاها العليقة الخامسة فالثانية فالرابعة و أخيرا الكنترول على التوالى، وكان تأثير إضافة الفرجينياميسين او الاكتوساك على مكونات الجسم الكيماوية غير معنوى بينما كان له تأثير إيجابى على الكفاءة الاقتصادية. مما سبق فانه تحت ظروف التجربة يمكن ان يوصى باستخدام 0.1% فرجينياميسين أو 0.1% لاكتوساك كإضافة علفية فى علائق اسماك البلطى النيلى أثناء فترة الحضانة