J. Agric. Sci. Mansoura Univ., 31 (9): 5705 - 5711, 2006

A STUDY ON NILE TILAPIA FINGERLINGS DURING WINTERING USING DIETARY ADDITION OF BIO-BUDS-2X

Abdelhamid, A. M. and M. S. A. Elkatan
Animal Production Department, Faculty of Agriculture, Al-Mansourah University, Mansoura, Egypt

ABSTRACT

This study was carried out during 2004/2005 on Nile tilapia fish. Bio-Buds-2X was added in graded levels to the fingerlings' diet to overcome cold stress. This work was evaluated via fish weight, mortality and water quality parameters. From the obtained results, it could be concluded that for over wintering Nile tilapia fingerlings in in-door tanks, it could not recommend the dietary addition of Bio-Buds-2X (at the tested levels) for its negative effects on the fish. So, another levels and methods for over wintering must be experimented.
Key words: Nile tilapia fingerlings – Over wintering –Performance.

INTRODUCTION

Delgado *et al.* (2003) cited that fish are an important source of protein, especially in developing countries. Tilapia fish are favorable for their rapid growth, beneficial of a wide variety of natural and artificial foods, tolerance for a wide range of environmental conditions, resistance for diseases and stresses, and prolification in capture (El-Sayed and Teshima, 1991). Tilapias are the third largest group of farmed finfish species, only after carps and salmonids. However, 54% of the Egyptian fish production came from the fish culture (GAFRD, 2005). Many of the problems associated with tilapia farming arise from the difficulty of producing large numbers of fry (Bhujel, 2000). This is almost certainly true under the hot temperate climatic conditions that prevail in several tilapia producing countries such as Egypt, their homeland. Under these conditions, temperature drops during winter months below the range within which tilapia can be grown economically. Therefore, the present study was decided to try to overcome the over wintering problem in Nile tilapia fingerlings under the Egyptian conditions. It was carried out to improve tilapia fingerlings performance throughout the over wintering period via feed additives, namely a natural commercial product (Bio – Buds-2X) in a fingerlings trial for elevating the immunity to resist cold weather and consequently reducing mortality and improving performance of fish.

MATERIALS AND METHODS

This trial of over wintering Nile tilapia fingerlings continued from 20/10/2004 till 21/3/2005 (153 days), where 600 fish (20 g initial body weight) were obtained from the hatchery stock of the Integrated Fish Farm at Al-Manzalah. The fingerlings were stocked at 100 fish/tank, i.e. ca. 2 kg/1 m^3, using 6 fiberglass tanks (2 x 2 x 0.25 m), each was supported by water entry and exit openings and air stone. The fingerlings were fed Al-Manzalah

powdered aquafeed (25.0% crude protein, 6.7% crude fat, 7.7% crude fibers and 2567 Kcal gross energy/kg feed) as a basal ration. It consisted of soybean meal, decorticated cottonseed meal, yellow corn, fish meal, rice bran, and molasses at 15, 15, 27.5, 9.5, 31, and 2 %, respectively. The dietary ingredients as well as the dietary additive were purchased from the local market. The Bio-Buds–2 X is a natural growth promoter powder consists of live cell yeast: 200 million CFU/g, calcium carbonate: 49.1%, corn distillers with solubles: 49.4%, and *Saccharomyces cerevisiae*: 1.5%. It is a product from Brookside Agra, 2768 Troxler way, Highland, IL 62249 U.S.A. and imported by Tap Vet, Egypt, Registration No: 938 (15/5/2002). The fingerlings over wintering indoor trial consisted of 3 treatments (T), at duplicate (2 tanks) per treatment. The T_1 diet was supplemented with 25 g Bio-Buds-2 X/kg diet, T_2 diet was supplemented with 5 g Bio-Buds-2 X/kg diet, and T_3 was not supplemented (control). The over wintered fingerlings were offered their assigned diets (at 2 meals daily) at a daily feeding rate of 5% of their biomass and gradually decreased to 1%, thereafter stopped completely according to feed consumption and water temperature. Half of the tank's water was renewed daily and tank's water temperatures were recorded daily at sunset and sunrise to calculate the average. The fish were daily inspected, mortality was recorded and biweekly a random sample (10 fish/tank) was weighed to adjust feed quantity. Water parameters were measured one time throughout the entire experiment (except the temperature), since the hatching hall is working under complete control; therefore, the water quality criteria are approximately constant to great extent throughout the work. But these parameters were measured twice during the emergency of the main irrigation during November and the start of wintry block at the end of January. Since there were changes in the water quality criteria; therefore, it prevented to enter the hatching hall. Water temperatures were measured daily at sunrise and sunset using an alcoholic – mercuric thermometer, made in China. The pH values were measured using a pH meter, P 4000, USA. Salinity and turbidity were estimated by a salinometer model 115, USA. Dissolved oxygen concentration was estimated using an oxygen meter model 50 B, USA. Total ammonia level was determined according to the Nessler's method using DR 2010 spectrophotometer, USA. Toxic ammonia level was calculated from the level of total ammonia {Toxic ammonia (NH_3) = A x 1.2 x total ammonia/100}, where A = factor related to the temperature and pH values at the test time (Boyd, 1992).

RESULTS AND DISCUSSION

Water temperature decreased gradually from October (24.7°C) till January (where the lowest values, 14.2°C), thereafter increased gradually. However, it ranged between 11.5 and 26.0°C during this trial. The decreased water temperature was recorded during the wintry block {Table 1), during which the fingerlings stop eating for the wintering stress which affects the hormones and enzymes pool. In this respect, Abdelhamid *et al.* (2006) reported that cold (14 $\pm$ 2°C) water reduced significantly each of lysozyme

activity of serum, intestinal scrapping and skin mucus; lymphocytes %; monocytes %; basophiles %; hemolytic activity; hematocrite %; hemoglobin concentration; and serum total protein but significantly elevated blood glucose of Nile tilapia fish.

Table (1): Averages of water quality parameters used for over wintering tilapia fingerlings fed the Bio-Buds-2X.

Criteria / Treatments No.	1	2	3
Throughout the trial			
pH value	7.47	7.45	7.40
Dissolved oxygen, ppm	9.40	9.03	9.39
Total ammonia, ppm	0.896	1.120	1.34
Toxic ammonia, ppm	0.016	0.020	0.024
Salinity, ppt	0.9	0.9	0.9
Turbidity, ppm (TDS)	857	861	865
Temperature, °C	25.6	25.6	25.6
During the low level of water			
pH value	8.70	8.68	8.63
Dissolved oxygen, ppm	7.04	7.12	7.65
Total ammonia, ppm	3.40	3.35	3.24
Toxic ammonia, ppm	0.70	0.69	0.67
Temperature, °C	24	24	24
During the wintry block			
pH value	9.30	9.10	9.19
Dissolved oxygen, ppm	7.3	7.0	7.5
Total ammonia, ppm	1.12	1.20	1.13
Toxic ammonia, ppm	0.44	0.33	0.43
Salinity, ppt	1.8	1.8	1.8
Turbidity (TDS), ppm	1730	1765	1758
Temperature, °C	15	15	15

However, the high level (25 g/Kg) of the used feed additive (Bio – Buds – 2X) in T_1 improved, to some extent, rearing water quality. It lowered total and toxic (unionized) ammonia throughout the trial (Table 1). Yet, the same treatment (T_1) was better than the control (T_3) concerning live body gain. Although the low level of Bio – Buds – 2X (5 g/Kg) in T_2 was responsible for the highest live body gain of the fingerlings (Table 2).

This feed additive did not prevent mortality rate but even increased it, since the mortality was happened after 10 days of the feeding trial beginning in T_2 and 2 weeks later in T_1 but after one month in T_3 (control). The accumulative mortality rate throughout the entire over wintering period was 42, 35 and 29% in T_1, T_2 and T_3, respectively. This means that the used feed additive caused 20.7 and 44.8% more mortality by either its levels 5 (T_2) and 25 (T_1) g/Kg diet, respectively than in the control. Although the package of this product recommends 1.0 g/Kg diet of poultry and livestock; yet, its 5 and 25 times did not reduce the over wintering stress symptoms. But this product is recommended for swine, poultry and ruminant at 12.5 – 75 g/Kg as given in

its original prospectus. The gross pathological symptoms of the dead fish included stand out of one eye, heavy mucus on the skin and gills, scoliosis, standing on the mouth, opening the mouth, leanness, and skin discoloration (yellow – black). This means that no one of the advantages- of the additive used- given by the producer and the importer was realized. Among these suspected advantages are prevention of the bacterial invasion, enhancement of feed intake, help in maintaining appetite through stress condition, stimulating the non-specific immune system, and very useful in stress cases and disease prevention.

Table (2): Biweekly average live body weight (g) of over wintering tilapia fingerlings fed the Bio-Buds-2X.

	Treatments No.		
Date	**1**	**2**	**3**
20/10/2004	20.74	20.68	20.60
4/11/2004	27.41	34.03	26.15
19/11/2004	26.64	29.38	25.24
4/12/2004	26.71	28.36	26.30
19/12/2004	27.16	29.23	29.05
4/1/2005	29.69	28.78	25.82
19/1/2005	25.65	28.40	29.86
4/2/2005	27.59	28.01	26.37
19/2/2005	27.13	25.96	21.64
6/3/2005	25.16	27.74	23.54
21/3/2005	25.51	27.08	24.72
Gain	4.77	6.40	4.12

Fish stresses have become an important limiting factor in the fish farming industry; yet, the commercial products are very much but without real effects. This was confirmed from the present study as well as from the results of Abdelhamid and Mahmoud (1996) and Abdelhamid *et al.* (2002-a) using Fix-A-Tox and Anti Tox Plus, Lim *et al.* (2001) using Sorbatox$^{(TM)}$, Abdelhamid *et al.* (2002-b & 2004) and Abdelhamid and Ibrahim (2003) using Betafin$^{®}$. Confirming the present negative results of the Bio-Buds-2X which containing yeast with its mannan oligosaccharides (MOS), Zaghini (2005) reported similar conclusion. On the other hand, other researchers found some positive effects of dietary supplementation with live yeast (El-Ebiary and Zaki, 2003), beta –1,3 glucan (Sahoo and Mukherjee, 2001), Lacto-Sacc (Magouz *et al.*, 2002), and MOS (Kocher, 2005).

However, Karisa *et al.* (2004) reported that cold tolerance was significantly affected by genotype, size, aquarium, and condition factor, smaller fish were more vulnerable to cold stress. They added that diet and age did not significantly affect cold tolerance. They suggested that acclimatization to lower temperatures before cold stress can improve the cold tolerance ability of *O. niloticus.* Moreover, Ali (2005) concluded also that L-carnitine inclusion (0 – 1200 ppm) in the Nile tilapia diet reared in cold water (9.4 – 11.5°C) from the 1st December till the 1st March did not improve body

weight, but percentage of survival rate was higher in case of diets supplemented with L-carnitine, compared with the control.

The results of (Dan and Little, 2000) clearly indicated that hapas in ponds are useful for reducing the risk and improving the survival of tilapia fry in the cold season. The survival rate of large mono-sex tilapia fry was significantly ($P < 0.05$) higher than that of smaller fry. Additionally, another over wintering system is motionless and without feeding at the bottom, since undisturbed over wintering restricted the activity of fish to certain areas of the pond (Bauer and Schlott, 2004). Moreover, Bakeer *et al.* (2005 and 2006) recommended the over wintering of Nile tilapia fry in outdoor concrete ponds which covered to 75% of their surface with polyethylene sheet at stocking rate 50 fry/m^3 and feeding rate 1Ø – 2% of body weight daily. However, Fogle (2004) mentioned that seasonal feeding can lead to a build-up of toxic ammonia, which stresses fish and reduces their winter survivability.

REFERENCES

Abdelhamid, A.M. and Ibrahim, S.M. (2003). Effect of dietary protein levels and Betaine (Betafin®) supplementation on mono-sex Nile tilapia fry performance. Proc. 1st Inter. Con. "Fish wealth and food security in Arab and Islamic countries" 22 – 24 Oct., Al-Azhar Univ., 21 p.

Abdelhamid, A.M. and Mahmoud, K.I. (1996). Elimination or adsorption of aflatoxin from poultry feedstuffs. Proc. Conf. Foodborne Contamination & Egyptian's Health, Mansoura, 26 – 27 Nov., pp: 61 – 69.

Abdelhamid, A.M., Ahmed, A.M. and El-Melegy, Kh.M. (2002-a). Detoxification of aflatoxin contaminated diet by some physical and chemical means. J. Agric. Sci. Mansoura Univ., 27: 8213 – 8224.

Abdelhamid, A.M., Khalil, F.F.M., El-Barbary, M.I., Zaki, V.H. and Husien, H.S. (2002-b). Feeding Nile tilapia on Biogen® to detoxify aflatoxic diets. Proc. 1st Ann. Sc. Conf. Anim. & Fish Prod. Mansoura, 24 & 25 Sep., pp: 207 – 230.

Abdelhamid, A.M., Mehrim, A.I. and Khalil, F.F. (2004). Detoxification of aflatoxin-contaminated diet of tilapia fish using dietary supplementation with egg shell, Betafin®, clay or silica. J. Agric. Sci. Mansoura Univ., 29: 3163 – 3173.

Abdelhamid, A.M., Nemetallah, B.R., Abd Allah, M.A. and Mousa, T.A.E. (2006). Hemolytic activity in blood serum of Oreochromis niloticus under different types of stress. The 3rd Int. Conf. for Develop. And the Env. In the Arab World, March 21 – 23, Assiut Univ., pp: 153 – 169.

Ali, A.A. (2005). Studies on some productive traits in fish. Ph.D. Thesis, Fac. of Agric., Moshtohor, Banha Univ.

Bakeer, M.N., Mahmoud, A.A., Ismail, M.S. and Hassan, A.A. (2006). Over-wintering performance of Nile tilapia (Oreochromis niloticus L.) seed at ambient temperatures under different stocking rates in Delta River Nile. J. Agric. Sci. Mansoura Univ., 31: (in press).

Bakeer, M.N., Soltan, M.A., Tharwat, A.A. and Samra, I.M. (2005). Studies on over-wintering of Nile tilapia (Oreochromis niloticus) fry. Annals of Agric. Sci., Moshtohor, 43(3): 1067 – 1082.

Bauer, C. and Schlott, G. (2004). Overwintering of farmed common carp (Cyprinus carpio L.) in the ponds of a central European aquaculture facility-measurement of activity by radio telemetry. Aquaculture, 241: 301 – 317.

Bhujel, R.C. (2000). A review of strategies for the management of Nile tilapia Oreochromis niloticus broodfish in seed production systems, especially hapa-based systems. Aquaculture, 181: 37-59.

Boyd, C.E. (1992). Water Quality in Warm Water Fish. Alabama Agric. Experiment Station, Aubum Univ., Alabama.

Dan, N.C. and Little, D.C. (2000). Overwintering performance of Nile tilapia Oreochromis niloticus(L.) broodfish and seed at ambient temperature in Northern Vietnam. Aquaculture Research, 31(6): 485 – 493.

Delgado, C.L.; Wada, N.; Rosegrant, M.W.; Meijer, S. and Ahmed, M. (2003). Outlook for Fish to 2020. Meeting Global Demand: A 2020 Vision for Food, Agriculture, and the Environment Initiative. International Food Policy Research Institute Washington, D.C., U.S.A. and World Fish Center. Penang, Malaysia pp. 36. (ISBN 0-89629-647-4).

El-Ebiary, E.H. and Zaki, M.A. (2003). Effect of supplementing active yeast to the diets on growth performance, nutrient utilization, whole body composition and blood constituents of mono-sex tilapia (Oreochromis niloticus). Egypt. J. Aquat. Biol. & Fish., 7(1): 127 – 139.

El-Sayed, A.F.M. and Teshima, S.I. (1991). Tilapia nutrition in aquaculture. Reviews in Aquatic Sciences, 5: 247 – 265.

Fogle, B. (2004). Overwintering pond fish.Mc Arthur Water Gardens. Macarthurwatergardens. Com.

GAFRD, General Authority of Fish Resources and Development (2005). "Fish Production Report for the Year 2004" Agriculture Ministry Press, Cairo.

Karisa, H.C., Rezk, M.A., Bovenhuis, H. and Komen, H. (2004). Effects of rearing conditions on low-temperature tolerance of Nile tilapia, Oreochromis niloticus, juveniles.Proc. 6th Int. Sym. Tilapia in Aquaculture, Manila, Philippines, Sept. 12 – 16, 1:30.

Kocher, A. (2005). AGP alternative – Part IV – Poultry production without AGPs – challenges and solutions. World Poultry, 21(9): 32 – 33.

Lim, H., Ng, W., Lim, S. and Ibrahim, C.O. (2001). Contamination of palm kernel meal with Aspergillus flavus affects its nutritive value in pelleted feed for tilapia, Oreochromis mossambicus. Aquaculture Research, 32 (11): 895 – 905.

Magouz, F.I., Mohsen, M.K. and Gooda, A.H. (2002). Effect of including some biological feed additives in the diet on growth performance and feed efficiency of Nile tilapia (Oreochromis niloticus). Proc. 2nd Conf. Foodborne Contamination and Egyptians' Health, April 23 – 24, El-Mansoura Univ., pp: 329 – 339.

Sahoo, P.K. and Mukherjee, S.C. (2001). Effect of dietary beta –1,3 glucan on immune responses and disease resistance of healthy and aflatoxin B1 induced immunocompromised rohu (Labeo rohita Hamilton). Fish & Shellfish Immunology, 11(8): 683 – 695.

Zaghini, A. (2005). Effects of mannanoligosaccharides and aflatoxin B1 on egg quality and residues in layers. World Poultry, 21(7): 20.

دراسة على اصبعيات البلطى النيلى أثناء التشتية باستخدام إضافة غذائية من "البيوبدز"

عبد الحميد محمد عبد الحميد ، محمد شوقى أحمد القطان
قسم إنتاج الحيوان، كلية الزراعة، جامعة المنصورة، المنصورة، ج.م.ع.

أجريت هذه الدراسة خلال عامى ٢٠٠٤/٢٠٠٥م على اصبعيات البلطى النيلى بإضافة (البيوبدز) بتركيزات متدرجة فى علائق الإصبعيات لمقاومة مخاطر برد الشتاء. وتم تقييم النتائج على أساس وزن السمك، ونفوقه،وخواص جودة المياة. من النتائج المتحصل عليها يثبت أن لتشتية الإصبعيات من البلطى النيلى فى تانكات داخل المعمل فلا ينصح باستخدام البيوبدز-٢-إكس (بالتركيزات المختبرة)كإضافة فى علائقها لتأثيراته السلبية على الأسماك، وينصح بتجريب تركيزات و أساليب أخرى للتغلب على مشاكل تشتية الإصبعيات.