Abbassa Int. J. Aqua., V0l.8 No.(2) 2015. *317-332*

EFFECT OF INITIAL WEIGHT VARIATION ON GROWTH PERFORMANCE OF MONOSEX NILE TILAPIA FINGERLINGS

Mohamed M. Said

Aquaculture Department, Faculty of Fish Resources, Suez University, Suez, Egypt.

msaid226@yahoo.com

Received 6/ 1/ 2015 *Accepted 15/ 2/ 2015*

Abstract

Nile tilapia fingerlings of 6 weeks old after hatching were individually weighed and manually graded into three experimental groups; small fish (Group S), large fish (Group L), and unsorted fish (Group U). Each experimental group were stocked in three different 2 cubic meter hapas installed in a 2000 m^2 pond at a stocking density of 50 fish / m^2 for further 14 weeks rearing period. At the end of the experiment, the final body weight and final total length were highest in L group (24.79 g; 10.73 cm) then U group (21.3 g; 10.2 cm) which didn't differ significantly from S group (20.2 g; 10.16 cm). Final coefficient of variation (CV_f) was significantly higher (46.46%) in the U group fish than in the L group which in turn was significantly greater than S group (32.9 & 21.51% respectively). The slope of the growth curve (weight *vs.* time) in the L group (1.56) was significantly higher than growth curve slopes in both S and U groups (1.33 and 1.39 respectively). Specific growth rate (SGR) was significantly higher in the S group (2.86%) than the (SGR) in the U group (2.46%) which in turn was significantly higher than L group (2.23%).The S group was the best in terms of biomass gain (1788%) and feed conversion ratio (1.77). The Final condition index in L group fish was significantly higher (1.93) than that observed in both S and U groups. Hepatosomatic index (HIS), spleenosomatic index (SSI), and viscerosomtic index (VSI) were all significantly higher in the L group (2.00, 0.13, and 9.2 respectively) than those for S and U groups (1.64, 0.11, and 8.2) and (1.6, 0.09, and 8.10) respectively.

Key words: Nile tilapia, size sorting, growth performance, condition based stress indices.

INTRODUCTION

Egyptian fish production showed a significant development from 865,029 ton in 2004 to 1,454,401 ton in 2013. Such production increment mainly depends on aquaculture which provides about 75% from the total production (about~1.1 million ton). Nile tilapia ranked first over all cultured species with about 57% from the total Egyptian aquaculture production. Such featured tilapia production associated with a notable increment in tilapia hatcheries production which reaches to 289.9 million fry from the licensed hatcheries at 2013 (GAFRD, 2013). In order to keep such tilapia production singularity, most culturing practices should be optimized.

Size grading practice has been reported to optimize production in cultured freshwater fishes with several benefits such as reducing cannibalism and minimizing harvesting size variability, and accurate determination of stocking size and number (Saoud *et al*., 2005; Kelly and Heikes, 2013). Furthermore, stocking of unsorted fingerlings may lead to a hierarchical social structure which is noted in fish and formed from aggressive interactions and resulting in the winner becoming dominant (Peters and Schwarzer, 1985 and Cubitt *et al*., 2008), whereas, fish of low status suffer higher stress levels than those of high status (Sloman *et al*., 2000; Sapolsky, 2005). Condition index (CI) and ratios of the mass of particular organs relative to total body mass including, gonadosomatic index (GSI); viscerosomatic index (VSI); and splenosomatic index (SSI) can be used as stress indices (Goede and Barton 1990; Barton *et al.*, 2002).

The aim of the current investigation was to evaluate the effect of pre-stocking sorting of Nile tilapia fingerlings on their growth performance, following grow-out characteristics, and to investigate the stress that may be caused from stocking unsorted seeds through different condition based stress indices.

MATERIALS AND METHODS

The experiment was conducted during the period from May to September 2014 at a private tilapia hatchery in San-El-Hagar, Sharkia, Egypt. Nile tilapia *Oreochromius niloticus* monosex fingerlings (6 weeks old after hatching) were individually weighed and manually graded into three experimental groups small fish (group S) (1.1g ±0.03); large fish (group L) (2.6g ±0.17), and unsorted fish (group U) (1.75g ±0.21). Three treatments with three replicates were established. Fish from each experimental group were stocked in three different 2 cubic meter hapas which installed in a 2000 m^2 pond at a stocking density of 50 fish / m^2 for further 14 weeks rearing period.

Hatchery ponds supplied with filtered water from Al-Salam canal. Water temperature ranged between 23 and 29 °C, pH value ranged between 7.2-7.8, and water salinity ranged between 2500 - 2800 mg / L. Fish were fed at 8% (6 weeks) and 5% (8 weeks) of their body weight with a commercial diet (1mm pellets) containing 35% crude protein. All fish were weighed individually every 2 weeks and amount of feed were adjusted accordingly.

After the completion of the experiment, all fish were individually weighed and the total body length was measured. The following indexes were calculated: The specific growth rate (SGR) for each hapa was calculated as: SGR = $100 \times (\ln W\mathrm{f} - \ln W\mathrm{i})\, t^{-1}$, where Wf is the final weight, Wi is the initial weight in grams, and t is the time in days (Hopkins, 1992). Coefficient of variation% (CV %) for weight of individual fish within each hapa was compared among treatments. The Fulton condition index (CI) of the fish was estimated using the formula CI = $(W/L^3) \times X$, where W is the fish weight (g), L is the total length (mm), and X is a constant equal to 100,000 (Anderson and Gutreuter, 1983). A growth curve (weight *vs*. time) for each replicate tank was developed, and slopes were compared among treatments. Feed conversion ratio (FCR) was calculated as: FCR = $F/(W\mathrm{f} - W\mathrm{i})$, where F is the dry weight of feed offered to the fish, Wf is the final weight of the fish, and Wi is the initial weight of the fish at stocking (Hopkins, 1992). The survival rate % = number of fish harvested at the end of the experiment/ number of fish stocked at the beginning of the experiment.

Different organo-somatic indices were calculated for all experimental groups that include: Hepatosomatic index (HSI, liver weight / bodyweight), gonadosomatic index (GSI, gonads weight/ body weight), viscerosomatic index (VSI, entire viscera weight / body weight), and splenosomatic index (SSI, spleen weight/ body weight) (Goede and Barton, 1990 and Barton *et al.,* 2002).

The data were statistically analyzed using SPSS (2013) according to the following model: $Yijk = \mu + G_i + e_{ij}$, where, μ is the overall mean, G_i is the fixed effect of experimental groups (i = 1 …3), and eij is random error. Means were tested for significant differences using (Duncun, 1955) test.

RESULTS

Initial body weights (W_i) and initial total lengths (TL_i) differed significantly among the three groups; small (S), large (L), and the unsorted group (U) (Table 1). Initial weights coefficient of variation (CV_i %) differed significantly between the three groups with a higher initial CV_i % in U (55%), while it was decreased for L and S groups (31.03 & 15.6%, respectively) (Table 1). The initial condition index CI_i in the L treatment fish was significantly higher (2.13) than those in the U group (1.81) which in turn was significantly greater than S group (1.65) (Table 1). After 14 weeks the average final body weights (W_f) and final total lengths (TL_f) differed significantly among the three groups; the L group was higher in both weight and length (24.79 g; 10.73 cm) than U group (21.3 g; 10.2 cm) which didn't differ significantly from the weight and length of fish in the S group (20.2 g; 10.16 cm) (Table 1 and Fig. 1). The final coefficient of variation (CV_f) remained significantly higher (46.46%) in the U group fish than the L group which in turn was significantly higher than S group (32.9 & 21.51%, respectively) (Table 1). It was observed that FCR for U group (2.20) didn't differ significantly from that in the treatment L group (2.11) while it was decreased significantly (1.77) in the S group (Table 1). SGR was significantly higher in the S group (2.86%) than the SGR in the U group

(2.46%) which in turn was significantly higher than SGR for L group (2.23%) (Table 1 and Fig. 2). Regarding the increase in biomass it was significantly higher in the S group (1788.3%) than that in the U group (1172%) which was significantly higher than the biomass gain for L group (930.03%) (Table 1). No significant difference was found in the survival rates (SR %) when fish in the three groups. The slope of the growth curve (weight *vs.* time) in the L group (1.56) was significantly higher than growth curve slopes in both S and U groups (1.33 and 1.39 respectively) (Table 2). The final condition index CI_f in L group fish remained significantly higher (1.93) than those in the U group (1.90) which was significantly higher than S group (1.86) (Table 3). The gonadosomatic index GSI didn’t differ significantly between the three groups. Hepatosomatic index HSI, spleenosomatic index SSI, and viscerosomtic index VSI were all significantly higher in the L group (2.00, 0.13, and 9.2, respectively) than those for S group (1.64, 0.11, and 8.2, respectively) and U group (1.6, 0.09, and 8.10 respectively) (Table 3). The comparison between the three experimental groups for final condition index CI_f, gonadosomatic index GSI, hpatosomatic index HSI, splenosomatic index SSI, and viscerosomatic index VSI within different size classes were showed in figure 3.

DISCUSSION

Results revealed that for both final body weight and the final total length the relative position of the small, large, and unsorted groups did not change after 14 weeks. Tilapia fingerlings that are larger than their siblings at an age of 6 weeks remain larger and even after 14 weeks. This provides a further indication that grading does not improve growth of Nile tilapia. Similar results have been found for Arctic charr (Wallace and Kolbeinshavn, 1988; Baardvik and Jobling, 1990), eel, (Kamstra, 1993), Nile tilatpia (Saoud *et al.,* 2005), Spinefoot Rabbitfish (Ghanawi *et al.,* 2010), Pikeperch (Szczpkowski *et al.*, 2011). These results led to suggest that discarding smaller fish after the nursery phase of Nile tilapia allowing a relatively more efficient tilapia culture.

On the other hand, the results indicated that the final body weight and final total body length of the S group didn’t differ significantly when compared with the U group in spite of the significant differences between the initial weight and length of both experimental groups. This indicates a lower growth in the unsorted group which may be explained as there was greater size variability in the unsorted group, with negative effects of social interactions (Corrêa *et al*., 2003; Sapolsky, 2005 and Cubitt *et al*., 2008). The presence of large fish effects on the growth performance of small fish that indicates a social hierarchy is present and affecting growth dispensation of Nile tilapia. Such improvement in the small group growth as a result of size grading was agreement with similar findings in Redbelly tilapia (Koebele, 1985), Gilthead Seabream, (Popper *et al*., 1992), and Nile tilapia, (Brzeski and Doyle, 1995). Those findings were in opposite with previous studies which reported that social hierarchies, if present, are not the main factor affecting growth dispensation in Yellow Perch, (Wallat *et al.*, 2005), Nile tilapia, (Saoud *et al.*, 2005) and Spinefoot Rabbitfish (Ghanawi *et al.*, 2010).

It was observed that small group had higher *SGR* and increase in the biomass as a percentage from the initial weight than the large group. These differences may be explained on the basis of size-specific growth. Corrections for initial body size indicate that small group grows equally with large group.

Results of size variation which expressed as CV showed that size variability increase with increased size of fish in the small and large groups whereas CV decreased in the unsorted group. Some previous studies have reported that size distributions of graded groups increased to the same level as in ungraded groups as time progressed, such findings reported for Turbot (Purdom *et al*., 1972), Cod (Folkvord and Otterå, 1993), Channel catfish (Carmichael, 1994), Turbot (Sunde *et al*., 1998), Spinefoot Rabbitfish (Ghanawi *et al.*, 2010), and Pikeperch (Szczpkowski *et al*., 2011). The increase in size variation which observed amongst the sorted group might suggest competition or hierarchical effects might be responsible for the suppression in growth of certain individuals (Jobling, 1982); (Sapolsky, 2005), and (Cubitt *et al*., 2008). Nevertheless, size grading still decreases size variability at harvest of

Nile tilapia, size variability in the unsorted group is much greater than those of small and large groups.

It was observed that FCR of the unsorted group and the large group were both significantly higher than that of small group. Many studies reported that feed conversion efficiency is improved by size grading. Such results were observed in warm water fishes (Huner *et al.*, 1984), channel catfish (Lazur 1996) and African catfish (Martins *et al*., 2005).

Stress has been defined as "the nonspecific response of the body to any demand made upon it" (Selye 1973). Long-term stress usually accompanied with possible detrimental effects on important fish performance including metabolism, growth, disease resistance, reproductive capacity, and condition (Barton *et al.*, 2002). Response to the social stress has been studied in some cultured fishes such as Salmonid (Gilmour *et al*., 2005 and Doyon *et al*., 2003) and Tilapia (Barreto and volpato, 2006). Condition factors are often used in stress assessment studies (Anderson and Neumann, 1996); declines in condition factor indicate a change in nutritional or energy status, which may be caused by external stressors (Goede and Barton, 1990). The results indicate that the CI of the small group increased relatively from 1.65 to 1.86 (Tables 1 & 3) as a result of separation from the larger individuals which may cause a social stressor on those small individuals which were in agreement with (Jobling and Reinsnes, 1986). Furthermore, the large group showed a significantly higher CI which indicates that size grading allows culture of fish with high condition indices in Nile tilapia.

Organo-somatic indices such as HSI, GSI, SSI, and VSI are also used in a number of stress studies. Lower values of such indices than normal values indicate a diversion of energy away from organ or tissue growth in order to combat a stressor of some type (Anderson and Gutreuter, 1983; Goede and Barton, 1990 and Barton *et al.*, 2002).The results showed that the sorted large group has a significantly higher HSI, SSI, and VSI than those of the small sorted group while the unsorted group showed the lowest values which may indicate a deviation on the energy away from such organs as a result of the social interaction stress such as direct competition and dominance relationships between different size individuals.

Table 1. Growth performance and feed utilization for pre-stocking weight graded monosex Nile tilapia fingerlings reared in hapas.

Treatment	S	L	U	PSE
Initial weight (g)	1.10^c	2.60^a	1.75^b	±0.03
Initial length (cm)	4.04^c	4.93^a	4.44^b	±0.02
Initial coefficient of variation%	15.66^c	30.13^b	55.43^a	±1.24
Initial condition index CI_i	1.655^c	2.13^a	1.81^b	±0.02
Final weight (g)	20.02^b	24.79^a	21.30^b	0.88
Final length (cm)	10.16^b	10.73^a	10.20^b	±0.14
Final coefficient of variation%	21.51^c	32.9^b	46.46^a	±2.65
Feed conversion ratio	1.77^a	2.11^b	2.20^b	±0.01
Specific growth rate (% day$^{-1)}$	2.86^a	2.23^c	2.46^b	±0.03
Fish biomass gain (%)	1788^a	930.03^c	1172^b	±62.26
Survival (%)	98.33^a	96.66^a	95.83^a	±0.83

S = small sorted fish L= large sorted fish U= unsorted fish SE= standard error.
Values in the same row sharing the same letter are not significantly different from each other ($p \leq 0.05$).

Table 2. Slope, intercept, and coefficient of determination (R^2) of the linear relationship between weight and time for Nile tilapia that were weight graded before stocking.

Treatment	S	L	U
Slope (a)	1.33^b	1.56^a	1.39^b
Intercept (b)	0.36	1.81	1.57
R^2	0.99	0.99	0.99

W= a.T + b where W = weight T= time in weeks.
Values in the same row sharing the same letter are not significantly different from each other ($p \leq 0.05$).

Table 3. Body organo-somatic indices for pre-stocking weight graded monosex Nile tilapia fingerlings reared in hapas.

Treatment	S	L	U	PSE
CI_f (%)	1.86c	1.93a	1.90b	±0.006
GSI (%)	0.85a	0.93a	0.80a	±0.1
HSI (%)	1.64b	2.00a	1.60b	±0.07
SSI (%)	0.11b	0.13a	0.09c	±0.008
VSI (%)	8.20b	9.23a	8.10b	±0.31

S = small sorted fish L= large sorted fish U= unsorted fish SE= standard error.
Values in the same row sharing the same letter are not significantly different from each other ($p \leq 0.05$).

Figure 1. Specific growth rate (% day^{-1}) over 14 weeks for monosex Nile tilapia fingerlings that were weight graded before stocking.

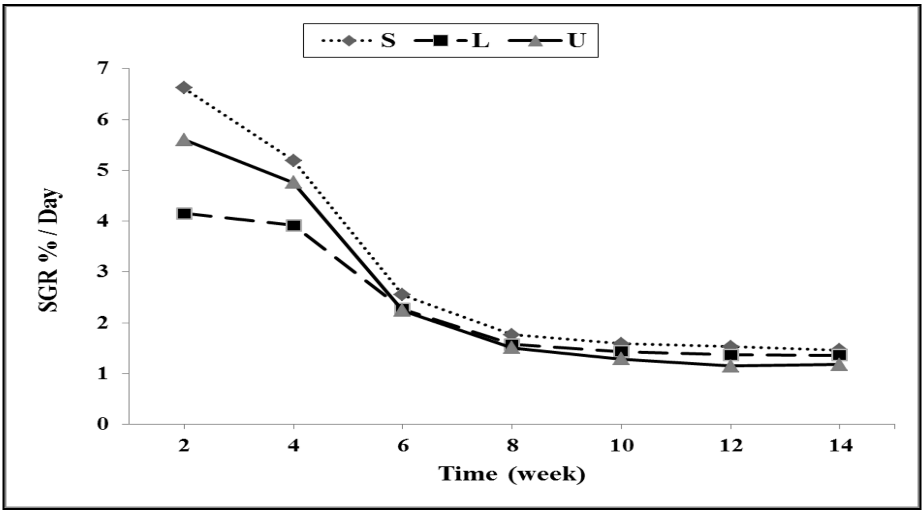


Figure 2. Body weight (g) over 14 weeks for monosex Nile tilapia fingerlings that were weight graded before stocking.

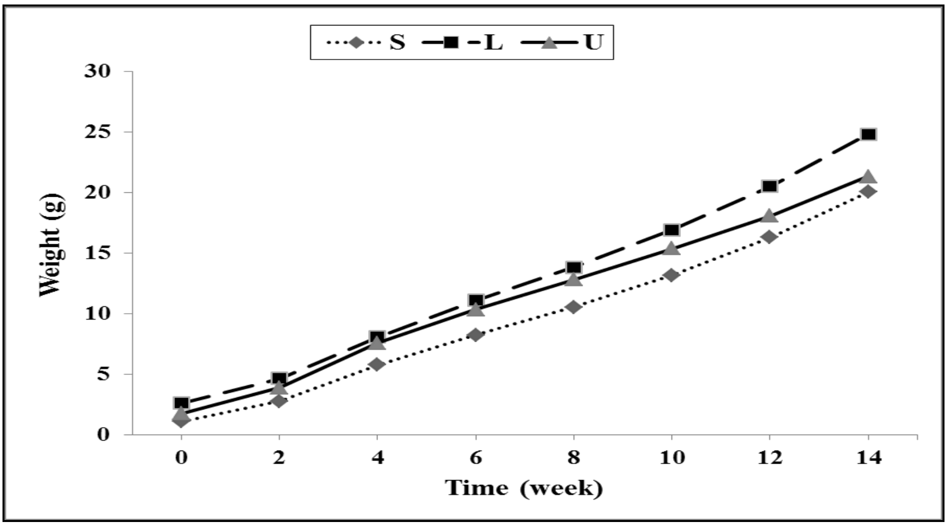
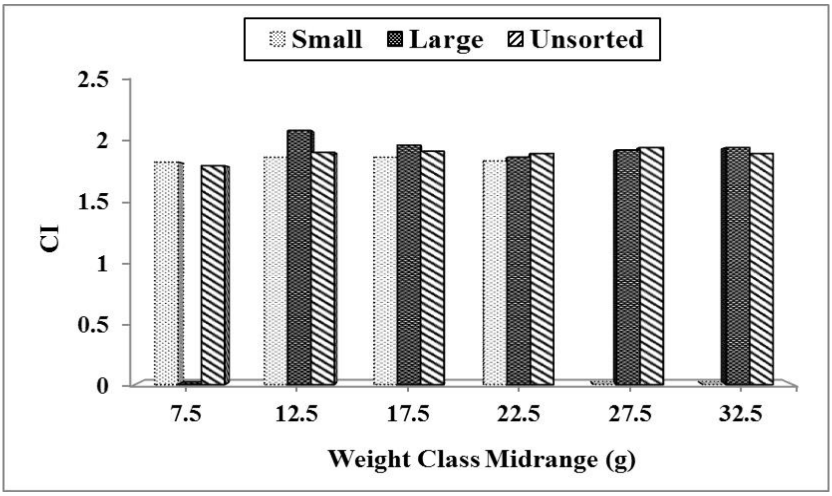
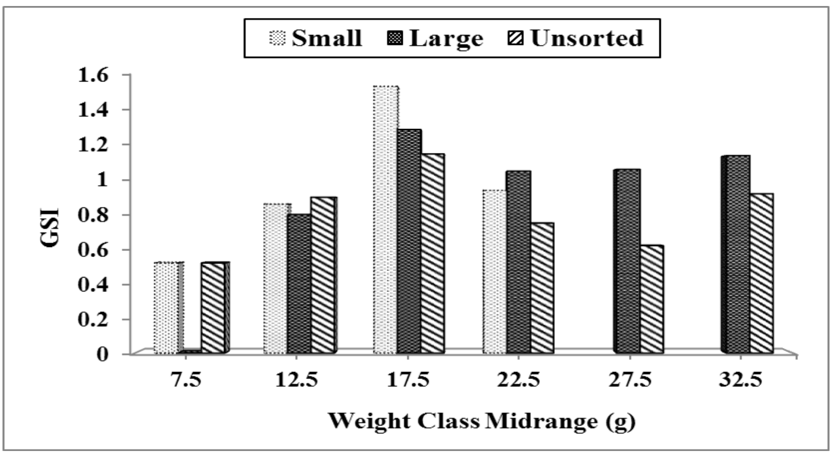
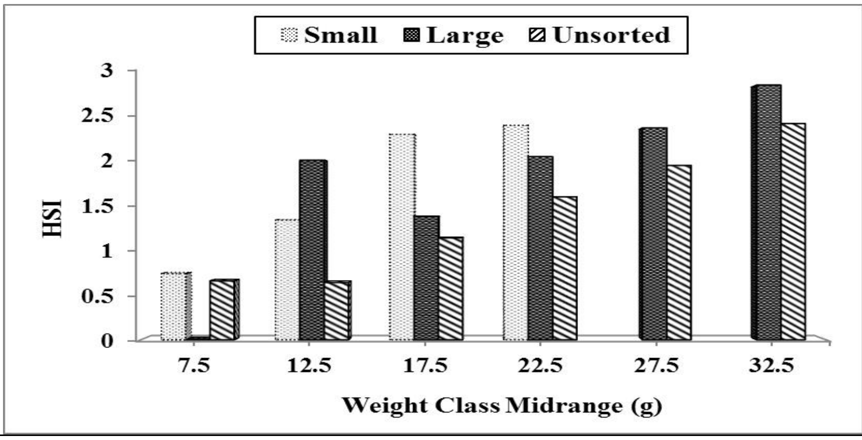
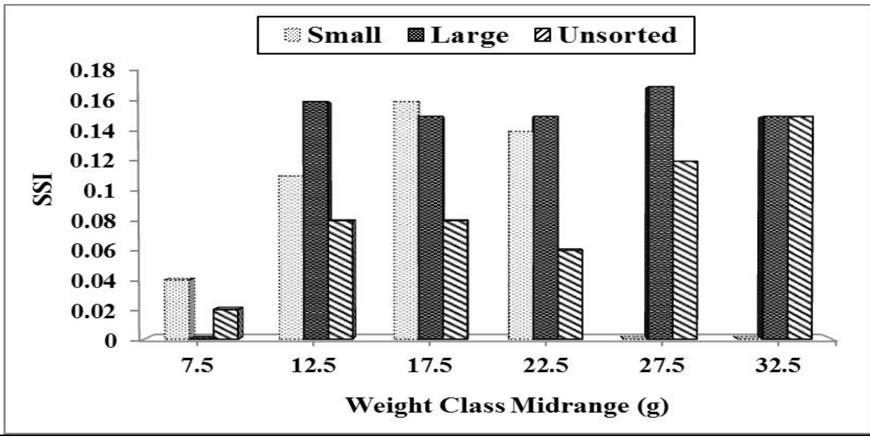


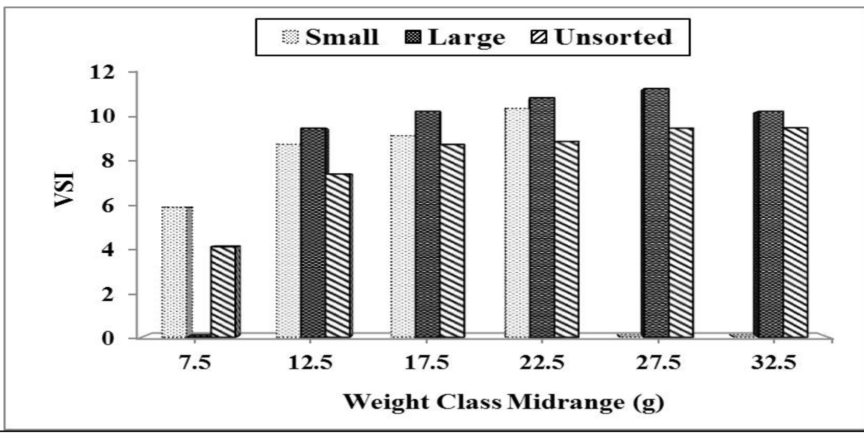
Figure 3. Condition index (CI), gonadosomatic index (GSI), hpatosomatic index (HSI), splenosomatic index (SSI), and viscerosomatic index (VSI) in the final different size classes of Nile tilapia that were weight graded before stocking.






Small
Large
Unsorted
3
2.5
2
1.5
1
0.5
0
HSI
7.5
12.5
17.5
22.5
27.5
32.5
Weight Class Midrange (g)


Small
Large
Unsorted
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
SSI
7.5
12.5
17.5
22.5
27.5
32.5
Weight Class Midrange (g)


Small
Large
Unsorted
12
10
8
6
4
2
0
VSI
7.5
12.5
17.5
22.5
27.5
32.5
Weight Class Midrange (g)

REFERENCES

Anderson, R.O. and S.J. Gutreuter, 1983. Length, weight, and associated structural indices. Pages 283–300 in L. A. Nielsen and D. L. Johnson, editors. Fisheries techniques. American Fisheries Society, Bethesda, Maryland, USA.

Anderson, R.0. and R.M. Neumann, 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Baardvik, B.M. and M. Jobling, 1990. Effect of sizesorting on biomass gain and individual growth rates in Arctic charr, *Salvelinus alpinus* L. Aquaculture, 90:11–16.

Barreto, R.E. and G.L. Volpato, 2006. Stress responses of the fish Nile tilapia subjected to electroshock and social stressors. Brazilian Journal of Medical and Biological Research, 39: 1605-1612

Barton, B.A.; J.D. Morgan and M.M. Vijayan, 2002. Physiological and condition-related indicators of environmental stress in fish. Chapter 4 in. Biological indicators of aquatic ecosystem stress. American Fisheries Society, Bethesda, Maryland.

Brzeski, V.J. and R.W. Doyle, 1995. A test of an on-farm selection procedure for tilapia growth in Indonesia. Aquaculture, 137: 219–230.

Carmichael, G.J., 1994. Effects of size-grading on variation and growth in channel catfish reared at similar densities. Journal of the World Aquaculture Society, 25: 101–108.

Corrêa1, S.A.; M.O. Fernandes; K.K. Iseki and J.A. Negrão1, 2003. Effect of the establishment of dominance relationships on cortisol and other metabolic parameters in Nile tilapia (*Oreochromis niloticus*).

Cubitt, K.F., S. Winberg; F.A. Huntingford; S. Kadn; V.O. Crampton and Ø. Øverli, 2008. Social hierarchies, growth and brain serotonin in Atlantic salmon (Salmo salar) kept under commercial rearing conditions. *Physiol. Behav.,* 94: 529-535.

Doyon, C.; K.M. Gilmour; V.L. Trudeau and T.W. Moon, 2003. Corticotropin-releasing factor and neuropeptide Y mRNA levels are elevated in the preoptic area of socially subordinate rainbow trout. General comparative endocrinology, 133: 260-271.

Duncan, D.B., 1955. Multiple range and multiple F test. Biometrics, 11:1-42.

Folkvord, A. and H. Otterå, 1993. Effects of initial size distribution, day length, and feeding frequency on growth, survival, and cannibalism in juvenile Atlantic cod (*Gadus morhua* L.). Aquaculture, 114: 243–260.

GAFRD, 2013. General Authority for Fish Resources Development. Annual fishery statistics report, Cairo, Egypt. 96 p.

Ghanawi, J.; I.P. Saoud and S.M. Shalapy, 2010. Effect of Size Sorting on Growth Performance of Juvenile Spinefoot Rabbitfish, *Siganus rivulatus*. Journal of the world aquaculture society, 41 (4): 565-573.

Gilomur, K.M.; J.D. DiBatista and J.B. Thomas, 2005. Physiological causes and consequences of social status in salmonid fish. Integrative and comparative biology, 45: 263-273.

Goede, R.W. and B.A. Barton, 1990. Organismic indices and an autopsy-based assessment as indicators of health and condition in fish. Pages 93-108 in S. M. Adams, editor. Biological indicators of stress in fish. American Fisheries Society, Symposium 8, Bethesda, Maryland.

Hopkins, K.D., 1992. Reporting fish growth: a review of the basics. Journal of the World Aquaculture Society, 23: 173–179.

Huner, J.; V. Dupree and D.C. Greenland, 1984. Harvesting, grading and holding fishes. Pages 158–164 in H. K. Dupree and J. V. Huner, editors. Third report to the fish farmers: the status of warmwater fish farmers and progress in fish farming research. US Fish and Wildlife Service, Washington, DC, USA.

Jobling, M., 1982. Some observations on the effects of feeding frequency on the food intake and growth of plaice, Pleuronectes platessa L. Journal of Fish Biology, 20: 431–444.

Jobling, M. and T.G. Reinsnes, 1986. Physiological and social constraints on growth of Arctic charr, Salvelinus alpinus L.: An investigation of factors leading to stunting. Journal of Fish Biology, 28: 379-384.

Kamstra, A., 1993. The effect of size grading on individual growth in eel, *Anguilla anguilla*, measured by individual marking. Aquaculture, 112: 67–77.

Kelly, A.M. and D. Heikes, 2013. Sorting and Grading Warmwater Fish, Southern Regional Aquaculture Center, Publication, No. 391, University of Akansas, Pine Bluff, pp 1-8.

Koebele, B.P., 1985. Growth and the size hierarchy effect: An experimental assessment of three proposed mechanisms; activity differences, disproportional food acquisition, physiological stress. Environmental Biology of Fish, 12 (3): 181-188.

Lazur, A.M., 1996. The effects of periodic grading on production of channel catfish cultured in cages. Journal of Applied Aquaculture, 6: 17–24.

Martins, C.I.M.; A. Margaret; J.W. Schrama and J.A.J. Verreth, 2005. Size distribution in African catfish (Clarias gariepinus) affects feeding behavior but not growth. Aquaculture, 250: 300–307.

Peters, G. and R. Schwarzer, 1985 Changes in hemopoietic tissue of rainbow trout under the influence of stress. Dis. Aquat. Org., 1: 1-10.

Popper, D.M.; O. Golden and Y. Shezifi, 1992. Size distribution of juvenile gilthead sea bream (Sparus aurata) practical aspects. Israeli Journal of Aquaculture Bamidgeh, 44: 147–148.

Purdom, C.E.; A. Jones and R.F. Lincoln, 1972. Cultivation trials with turbot (*Scophthalmus maximus*). Aquaculture, 1: 213–230.

Purdom, C.E. (1974). Variation in fish. Pages 347–355 in F. R. Harden Jones, editor. Sea fisheries research. Elek Science, London, UK.

Saoud, I.P.; D.A. Davis; L.A. Roy and R. Phelps, 2005. Evaluating the benefits of size sorting tilapia fry before stocking. Journal of Applied Aquaculture, 17: 73–85.

Sapolsky, R.M., 2005. The influence of social hierarchy of Primate Health. *Science*., 308: 648-652.

Selye, H., 1973. The evolution of the stress concept. American Scientist, 61: 692-699.

Sloman, K.A.; N.B. Metcalfe; A.C. Taylor; K.M. Gilmour, 2000. Plasma cortisol concentrations before and after social stress in Rainbow trout and Brown trout. Physiol. Biochem. Zool., 74: 383-389

SPSS, 2013. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

Sunde L.M.; A.K. Imsland; A. Folkvord and S.O. Stefansson, 1998. Effects of size grading on growth and survival of juvenile turbot at two temperatures. Aquaculture International, 6: 19–32.

Szczepkowski, M.; Z. Zakęś; B. Szczepkowska and I. Piotrowska, 2011. Effect of size sorting on the survival, growth and cannibalism in pikeperch (Sander lucioperca L.) larvae during intensive culture in RAS. Czech J. Anim. Sci., 56 (11): 483–489.

Wallace, J.C. and A.G. Kolbeinshavn, 1988. The effect of size grading on subsequent growth in fingerling Arctic charr, Salvelinus alpines (L.). Aquaculture, 73: 97–100.

Wallat G.K; L.G. Tiu; H.P. Wang; D. Rapp and C. Leighfield, 2005. The effects of size grading on production efficiency and growth performance of yellow perch in earthen ponds. North American Journal of Aquaculture, 67 (1): 34–41.

تأثير تباين الوزن الإبتدائى على اداء النمو لأصبعيات أسماك البلطى النيلى وحيد الجنس

محمد محمد سعيد

قسم الاستزراع المائى– كلية الثروة السمكية – جامعة السويس– السويس– مصر

الملخص العربى

وزنت فرديا اصبعيات أسماك بلطى نيلى وحيد الجنس على عمر ٦ اسابيع بعد الفقس وتم تدريجها يدويا الى ثلاثة مجموعات تجريبية: أسماك صغيرة (مجموعة أ)، أسماك كبيرة (مجموعة ب) وأسماك غير مدرجة (مجموعة ج). كل مجموعة تجريبية تم وضعها فى ثلاثة هابات مختلفة كل منها ٢ متر مربع مثبتين فى حوض ترابى ٢٠٠٠ متر مربع وذلك بكثافة تخزين ٥٠ يرقة/ متر المربع وذلك لمدة نمو تالية ١٤ اسبوع.

فى نهاية التجربة كان وزن الجسم النهائى وكذلك طول الجسم النهائى أعلى فى مجموعة "ب" (٢٤.٧٩ جرام– ١٠.٧٣ سم) عن مجموعة "ج" (٢١.٣ جرام– ١٠.٢ سم) والتى لم تختلف معنويا عن مجموعة "أ" (٢٠.٢ جرام– ١٠.١٦ سم). معامل الاختلاف كان أعلى معنويا (٤٦.٤٦%) فى مجموعة "ج" عنة فى مجموعة "ب" والتى كان بها أعلى معنويا من مجموعة "أ" (٣٢.٩– ٢١.٥١% على الترتيب). ميل منحى النمو (الوزن مع الزمن) فى مجموعة "ب" كان اعلى معنويا ١.٥٦ عنة فى كلا من المجموعات "أ" و " ج" (١.٣٣– ١.٣٩ على الترتيب). .معدل النمو النوعى كان أعلى معنويا فى مجموعة "أ" (٢.٨٦%) عنة فى مجموعة "ج" (٢.٤٦%) والتى كان بها أعلى معنويا عن مجموعة "ب" ٢.٢٣%. المجموعة "أ" كانت الافضل من ناحية النسبة المئوية للزيادة فى الكتلة الحية (١٧٨٨%) و كذلك معامل التحويل الغذائى (١.٧٧). معامل الحالة النهائى فى أسماك مجموعة "ب" كان أعلى معنويا (١.٩٣) عن معامل الحالة الملاحظ فى كلا من المجموعات "أ" و "ج" . دليل (وزن الكبد:وزن الجسم) و دليل (وزن الطحال:وزن الجسم) و دليل (وزن الاحشاء:وزن الجسم) كانوا جميعا أعلى معنويا فى مجموعة " ب" (٢–٠.١٣–٩.٢ على الترتيب) عنهم فى المجموعات "أ" و "ج" (١.٦٤–٠.١١–٨.٢) و (١.٦–٠.٠٩– ٨.١) على الترتيب.