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Tilapia fry perform similarly under varied photoperiods

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1 March 2009 Juan Alvarez-Rosario Leidy Feliz-Carrasco Ruby Montoya-Ospina, Ph.D. Mario Velasco, Ph.D.

Studies point to energy savings

Tilapia fry were stocked in tanks and exposed to several different photoperiod regimes. No significant differences among survivals or final weights were detected.

As tilapia culture expands worldwide, more indoor hatcheries are being built to improve management and control environmental conditions during this early growth phase. Biosecurity is greatly increased in indoor hatcheries, but so is the energy cost associated with the operation of these facilities.

The authors recently carried out experiments to study the effects of photoperiod on the growth and survival of *Oreochromis* species red tilapia fry and evaluate if light energy costs could be decreased.

Three 30-day experiments were conducted under laboratory conditions simulating the hatchery phase. Fry were fed to satiation 9 times/day, every two hours from 6 a.m. to 10 p.m. in experiments 1 and 2, and six times/day, every three hours from 7 a.m. to 10 p.m. in experiment 3. A commercial feed containing 45 percent protein, 5 percent fat and 3 percent fiber was used. Values for water ammonia, nitrites, nitrates and pH where maintained within the appropriate ranges for the species by batch water exchange when needed.

Experiment 1

Three photoperiods with three replicates each were tested: 16 hours of constant light and eight hours dark (16L:8D); eight hours of constant light, eight hours with light turned on for 15 minutes at each feeding time and eight hours dark (8L:8I:8D); and eight hours light and 16 hours dark (8L:16D). The light source was 35-watt fluorescent tubes with an average intensity of 1,450 lux at the water surface.

Fry with an average initial weight of 0.011 grams were stocked in plastic tanks with 40 liters of freshwater at a density of 1.25 fry/L. The average water temperature was 26.3 degrees-C and average dissolved-oxygen concentration was 7.2 ppm. No significant differences among survivals or final weights were detected (Table 1).

Alvarez-Rosario, Performance of tilapia at three different photoperiods, Table 1

Treatment	Initial Weight (g)	Final Weight (g)	Survival (%)
16L:8D	0.011	0.584	87.3
8L:8I:8D	0.011	0.613	82.0
8L:16D	0.011	0.564	75.3

Table 1. Performance of tilapia at three different photoperiods. (L: light, D: dark, I: light on for 15 minutes at each feeding.)

Experiment 2

Three photoperiods with four replicates each were tested: 16 hours constant light and eight hours dark (16L:8D), 16 hours of light turned on for 15 minutes at each feeding time and eight hours dark (16I:8D); and eight hours light and 16 hours dark (8L:16D). More 35-watt fluorescent tubes were used than in experiment 1 to achieve an average intensity of 2,094 lux at the water surface.

Fry with an average initial weight of 0.016 grams were stocked in plastic tanks with 45 liters of freshwater at a density of 1.55 fry/L. Average water temperature and dissolved oxygen were 27.0 degrees-C and 6.9 ppm, respectively. No significant differences among survivals or final weights were detected (Table 2).

Alvarez-Rosario, Performance of tilapia at three different photoperiods, Table 2

Treatment	Initial Weight (g)	Final Weight (g)	Survival (%)
16L:8D	0.016	0.442	75.7
16I:8D	0.016	0.372	71.9
8L:16D	0.016	0.437	73.9

Table 2. Performance of tilapia at three different photoperiods. (L: light, D: dark, I: light on for 15 minutes at each feeding.)

Experiment 3

Five photoperiods with four replicates each were tested: 24 hours of constant light (24L), 15 hours constant light and nine hours dark (15L:9D), 15 hours of light turned on for 15 minutes at each feeding time and nine hours dark (15I:9D), nine hours of light provided for 15 minutes at each feeding time and 15 hours dark (9I:15D), and 24 hours of darkness (24D). As in experiment 2, fluorescent tubes delivered an average intensity of 2,094 lux at the water surface.

Fry with an average initial weight of 0.044 grams were stocked in plastic tanks with 50 liters of freshwater at a density of 1.10 fry/L. Average water temperature and dissolved-oxygen concentration were 27.7 degrees-C and 5.1 ppm, respectively. No significant differences among survivals or final weights were detected (Table 3).

Alverez-Rosario, Performance of tilapia at five different photoperiods, Table 3

Treatment	Initial Weight (g)	Final Weight (g)	Survival (%)
24L	0.044	1.152	95.9
15L:9D	0.044	1.185	92.7
15I:9D	0.044	1.394	93.6
9I:15D	0.044	1.388	95.0
24D	0.044	1.178	90.0

Table 3. Performance of tilapia at five different photoperiods. (L: light, D: dark, I: light on for 15 minutes at each feeding.)

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