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Optimal Feeding Time and Duration of Hybrid Crappie Kept Indoors

Wiles N. Brandon

Gregory A. Dudenhoeffer

Thomas R. Omara-Alwala

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Wiles, N. Brandon, G.A. Dudenhoeffer, and R.T.Omara-Alwala, Department of Agriculture and Environmental Sciences, Lincoln University, Jefferson City, MO 65101.

Abstract

Wiles, N. Brandon, G. A. Dudenhoeffer, and R.T. Omara-Alwala. Department of Agriculture and Environmental Science, Lincoln University. DETERMINATION OF THE BEST FEEDING PRACTICE OF HYBRID CRAPPIE INDOORS. Crappie (*Pomoxis* spp.) is a popular sport fish with food fish potential. Feeding behavioral patterns should be considered prior to nutritional studies. The objective of this study was to determine the best feeding time and duration for hybrid crappie raised in indoor recirculating aquaculture systems. Three feeding treatments with three replicates consisted of two 12 hour feeding periods initiated at 0800 (12h-amLD) and 1700 (12h-pmLD) and a 24 hour feeding period started at 0800 (24h-amLD). Treatments in experimental tanks were arranged in a random block design and stocked with 14 hybrid fingerlings fed for 12 weeks. Fingerling fish were spawned in ponds using previously feed trained black crappie females (*P. nigromaculatus*) and white crappie males (*P. annularis*).Weight gain, feed conversion ratio (FCR), survival rate, consumption rate and proximate analysis of fish flesh and visceral were measured. Mean mass weight gains for 12h-amLD, 12h-pmLD and 24h-amLD were 153, 196 and 139 g. There were no significant differences ($p \geq 0.05$) among weight gains. Mean FCR were 1.69, 1.82 and 2.57 for 12h-amLD, 12h-pmLD and 24h-amLD, respectively. A significant difference in FCR occurred between 24h and the two 12 hour treatments. There were no significant differences in survival rate, feed consumption, or composition of fish flesh among treatments. The only significant difference in visceral was between 12h treatments for ash. This study indicated that feeding times or durations did not affect hybrid crappies body weight gain. However, there could be a FCR advantage with the 12 hour feedings schedules.

Introduction

White crappie (P. *annularis*) and black crappie (*P. nigromaculatus)* are popular sports fish in the United States. Crappie are the most sought after fish in some major lakes in Missouri (Colvin, 1991). These fish are one of the few fish that are caught more to eat than for the sport (Martin, 1988). A Missouri consumer survey listed crappie as a preferred fish if available (Missouri Fish and Seafood Study,1988). Success in culturing crappie in aquacultural settings have been limited. Nutritional requirements for crappie have not been defined. Feeding behavioral patterns of any fish should be considered prior to nutritional studies. The objective of this study was to determine the best feeding time/duration for hybrid crappie in an indoor recirculating aquaculture system.

Materials and Methods

➢Experiment Design, Data and Analysis:

- Treatments with three replicates each were:
  - 12 hour feeding period initiated at 0800 h -12h amLD
  - 12 hour feeding period initiated at 1700 h- 12h pmLD
  - 24 hour feeding period initiated at 0800 h- 24h pmLD
- Treatments were incorporated into a completely randomized block design.
- Experimental tanks were stocked with 14 hybrid crappie fingerlings 11-30 g (18.3 ± 4.1 g mean ± SD). Experimental fish were allowed to acclimate for a week.
- Commercial feed (Silver Cup Extruded 44-20, 3.5 mm) was fed using 12-hour or 24-hour belt feeders. Feed amounts were fed ad libitum with amounts adjusted based upon fish feeding behavior.
- Duration of the experiment was 12 weeks.
- Growth parameters measured were weight gain, Feed Conversion Ratio (FCR), and survival rate.
- Proximate compositions of feed, flesh, and visceral were measured using AOAC (2000) methods.
- Data was analyzed by one way ANOVA (SAS version 9.1). Means were separated by Fisher's (LSD) Least Significant Differences (Steele and Torrie, 1980)
- Gain was used to determine differences among treatments due to a significant difference ($p \leq 0.05$) in initial weights between 12h amLD and 24h pmLD treatments.

➢Culture System:

- Water recirculation aquaculture system was composed of flat bottom conical tanks (~151-L; 40-gal) with valve controlled inlet pipes and centrally located internal standpipes. Water resident time ranged from 30 to 45 minutes. Other components included, sump tank, bead filter and biofilter.

➢Experimental Fish:

- Hybrid crappie fingerlings (*P.nigromaculatus x P. annularis*) were spawned in ponds using previously feed trained black crappie females and white crappie males.
- Young of the year crappie were brought indoors and feed trained in October. Fish were trained on dry feed by feeding a combination of brine shrimp *Artemia* spp., freeze dried krill, and commercial feed. Brine shrimp and krill were slowly wean out of their diet.

Discussion

➢There were no difference ($p \geq 0.05$) in gain due to feeding initiation time or length of feeding period.

➢There was a significant difference ($p \leq 0.05$) in FCR between the 12h and the 24h treatments. A 12h feeding period may be more cost effective.

➢There were no significant differences in feeding time of day or length of feeding period ($p \geq 0.05$) in composition of tissues except in ash between the two 12h treatments.

➢ There were no mortalities

Conclusion

This study indicated that that there were no differences in weight gain or tissue composition based on time of day or length of feeding periods. However, the 12 hour feeding periods had a better FCR than the 24 hour feeding period. The improved FCR in the 12 hour feeding periods should reduce feed cost by increasing feed efficiency.

Results

Table 2. Water quality.

Measurement	Mean	Range
Temperature (C)[a]	25.7	23.3 - 28.6
Dissolved Oxygen (mg/L)[a]	7.3	6.6 - 8.0
pH [b]	8.1	7.9 - 8.4
NH_3-N (mg/L)[b]	0.016	0 - 0.040
NO_2-N (mg/L)[b]	0.006	0.004 - 0.018
NO_3-N (mg/L)[b]	0.9	0.1 - 2.2

[a] Recorded daily

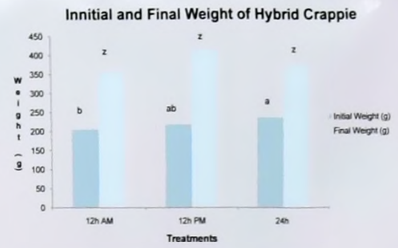
[b] Recorded weekly

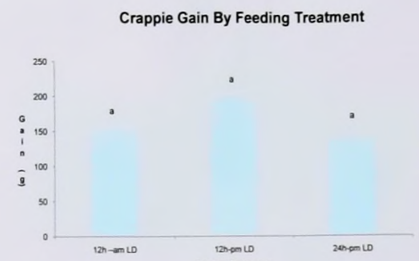
Table 2. Nutritional Composition of Feed, Flesh, and Visceral of hybrid crappie (mean ± SE)[a]

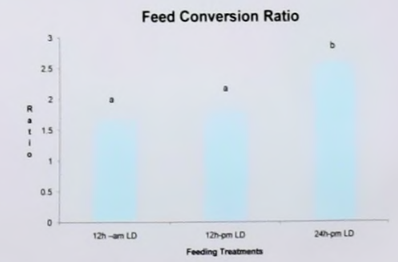
	Treatment	Moisture (%)	Crude Protein (%) [b]	Crude Lipid (%) [b]	Ash (%) [b]
Feed		6.8 ± 0.05	48.9 ± 0.22	15.1 ± 0.08	8.1 ± 0.02
Flesh	12h –am LD	74.6 ± 0.44 a	85.7 ± 0.73 a	5.1 ± 0.59 a	6.3 ± 0.26 a
	12h-pm LD	74.3 ± 0.42 a	86.0 ± 1.12 a	4.5 ± 0.58 a	6.2± 0.25 a
	24h-pm LD	74.4 ± 0.50 a	86.6 ± 0.52 a	4.7 ± 0.47 a	6.5 ± 0.08 a
Visceral	12h –am LD	48.0 ± 3.13 a	18.8 ± 1.95 a	63.3 ± 1.02 a	6.0 ± 0.55 a
	12h-pm LD	49.0 ± 1.89 a	16.6 ± 2.02 a	65.8 ± 1.92 a	4.1 ± 0.63 b
	24h-pm LD	53.7 ± 1.52 a	16.9 ± 0.29 a	63. 1± 1.21 a	5.5 ± 0.28 ab

[a] Values with the same letter in a column are not significantly different ($p \geq 0.05$) within tissue

[b] Dry Basis







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