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Improved Production of Hybrid Striped Bass Fingerlings Through Better Feeding Practices

Most producers feed Phase II hybrid striped bass fingerlings three to four times per day in an effort to optimize growth and promote size uniformity of the population. However, fish farmers must consider the economic trade-off between the benefits of frequent feeding and the cost of labor, fuel, and wear on machinery such as tractors and feed blowers.

Fewer daily feedings would be desirable because time is a valuable resource on a fish farm. Time spent feeding is not available for other activities.

Extreme differences in size among hybrids are largely caused by the aggressive feeding behavior of a few fish that intimidate others in the competition for available food. Underfed fish grow slowly, eventually reaching a point when they cannot regain a normal weight even after their feed ration has been increased.

These "runts" are too small to be stocked into foodfish ponds unless they are stocked with fish of similar size. Difficult to sell, they have a negative impact on profitability of fingerling production.

Frequent feeding of fingerling ponds allows less-aggressive fish to feed after the dominant fish are full, leading to more uniform size distribution and a greater percentage of fingerlings suitable for stocking foodfish ponds.

To optimize production and improve the economics of Phase II fingerling production, producers need a thorough understanding of the effects of different feeding practices on size distribution and overall production of hybrid striped bass fingerlings.

Feeding Options

Time of Day

Fish feed by sight and are normally fed during daylight hours. Experienced fishers have observed that fish feed more actively during the early morning or late evening hours when the light intensity is lower. However, fish ponds experience daily fluctuations of dissolved oxygen (DO), with concentrations are lowest at dawn. Low DO concentrations may stress the fish, leading to reduced feeding activity. Fish respiration increases soon after feeding. DO concentrations begin to decline after sunset. Therefore, feeding during the late evening will increase the demand for oxygen at a time when the DO concentrations are falling.

Frequency

Feeding once per day is the least labor-intensive option, but such fish may not be able to eat enough each day for optimum growth. Excess feeding is wasteful, expensive and contributes to deterioration in water quality. As mentioned above, frequent feeding is thought to reduce size variation in hybrid ponds. However, frequent feedings are time-consuming and increase machinery costs such as fuel, and maintenance/repair of tractors and feed blowers.

Case Study with Phase II Fingerlings

To illustrate the effects of feeding on size distribution and overall production, let's look at the results from a controlled-feeding study done at the Tidewater Research Station in Plymouth, NC, where different feeding times and frequencies were studied.

Study Methods

Phase II hybrid striped bass (*Morone chrysops* x *M. saxatilis*), with an average weight of 1.5 g each, were stocked at a density of 16,000 fish/acre. Ponds were fed according to the following feeding regimes:

Table 1. Summary of production variables (means +/- SE) for Phase II hybrid striped bass fingerlings fed daily at different frequencies during a 120-day study. Means followed by the same letter are not statistically different.

Daily Feeding Frequency	Production (kg/ha)	Survival (percentage)	Average Weight (g)	Feed Conversion (wt feed applied / wt fish produced)
1 / day, dawn (within 1 hour of sunrise)	2528+/- 509 ab	82.0 +/- 9.6 a	78.5 +/-6.8 a	1.83 +/-0.31 a
1 / day dusk (within 1 hour of sunset)	2153 +/- 502 a	82.0 +/- 4.4 a	67.0 +/- 15.5 a	2.02 +/- 0.40 a
2 / day (sunrise and sunset)	3058 +/- 556 bc	73.7 +/- 6.3 a	109.0 +/-21.5 b	1.83 +/- 0.23 a
4 / day (Sunrise, 1000 h, 1400 h, sunset)	3638 +/- 441 c	81.3 +/- 9.1 a	112.7 +/- 3.2 b	1.57 +/- 0.19 a

* Once/day dawn (within 1-h of sunrise),
* Once/day dusk (within 1-h of sunset),
* Twice/day (dawn and dusk), and
* Four times/day (dawn, 10 am, 2 pm, dusk)

Daily feed ration was calculated as a percent of body weight and either given all at one feeding or divided equally between the different feeding times, depending on the treatment. Feeding stopped when researchers observed that fish were not actively eating. The amount already applied to the pond was recorded.

Ponds were harvested after five months and samples of 300 fish from each pond were selected. Individual lengths and weight were measured on each fish for a total of 900 fish per treatment.

Once per Day: Morning versus Evening

The smallest fish were those fed once daily in late evening. The morning feed treatment had a higher percentage of larger fish than the once per day/evening treatment — 46 percent versus 34 percent — so feeding once per day at late evening caused a narrower distribution of mostly smaller fish than the morning feeding treatment (Figure 1).

Based on these results, feeding in the morning is preferable to an evening feeding in hybrid striped bass fingerling ponds when ponds are fed only once per day.

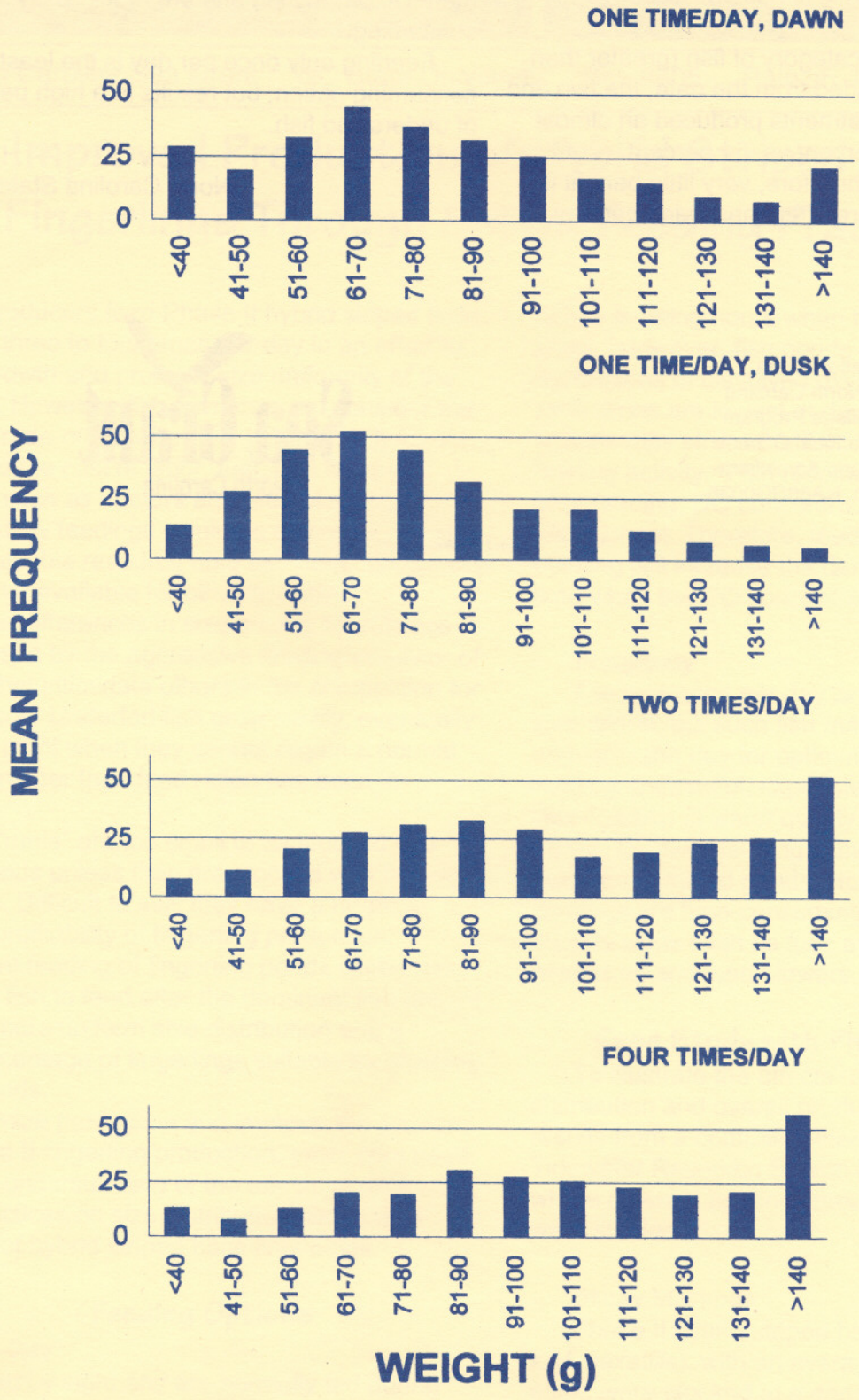
Feeding Frequency: Once versus Twice or More

Fish that were fed only once per day either in the early morning or late evening were significantly smaller than those that were fed at least two times per day (Table 1).

Fish fed two or more times per day had higher overall production and much greater average weights than those that received feed only once per day. Less than half the fish in the once/day treatments were larger than 80 g — or five to six fish per pound — at the end of the growing season. Meanwhile, more than two-thirds of the fish that were fed at least twice per day were larger than 80 g (Figure 1).

Clearly, there is a significant improvement in overall production — and a more favorable size distribution — when feeding frequency is increased from once per day to at least twice per day.

Figure 1: Comparison of weights of hybrid striped bass fed at various intervals.



Feeding Frequency: Twice versus Four Tmes

Although the percentage of fish larger than 80 g is higher in the four times/day treatment than the two times/day treatment — 74 percent versus 69 percent — this difference is not statistically significant.

When the largest category of fish (greater than 140 g each) are excluded from the data, the two and four times per day treatments produced an almost identical rate — 52 percent vs. 54 percent — of fish between 80-140 g. Therefore, very little benefit is gained by feeding more often than twice per day.

Conclusion

Phase II hybrid striped bass production is optimized by feeding twice per day.

More frequent feedings do not lead to improvements in production and are more costly and time consuming.

Feeding only once per day is the least time consuming option, but results in a high percentage of undersized fish.

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