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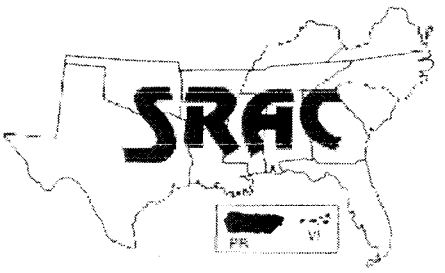

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Channel Catfish Production

Impacts of Diet Composition and Feeding Practices

Channel catfish require adequate protein in their diet for good growth and weight gain. Within certain limits, catfish grow faster as the protein content of their diet is increased. But when more protein is provided by the diet than fish can use for growth, the excess is used inefficiently as a source of energy or is lost through excretion.

Because protein is the most expensive component in commercial fish feeds, producers benefit by feeding diets that meet, but don't exceed, the protein requirements of growing fish. Today, most catfish producers feed 32 percent protein diets. Reducing the protein content further would reduce costs, but might also increase the body fat of fish. Because excess fat decreases dress-out yield and potential shelf-life of processed catfish, both researchers and producers want to know how little protein can be included in catfish diets without reducing product quality.

Past studies have indicated that optimal protein levels for channel catfish diets are between 25 and 45 percent. This high degree of variability may result from environmental factors or management decisions that affect the efficiency with which catfish use dietary protein. Such variables include the size or age of fish being fed, water temperature, stock density, water quality, feeding rate and feeding frequency.

The Southern Regional Aquaculture Center has supported research to help determine the impacts of diet composition on catfish growth and the quality of processed catfish products. These research projects focused on several types of production systems, but were not conducted on commercial installations. The results presented should help producers identify ways to modify-feeding management practices to improve production efficiency, This publication was compiled by James T. Davis, D.M. Gatlin, III and Max R. Alleger, based on research conducted at Auburn University and Kentucky State University. Details are available from the applicable publications listed.

Catfish grow-out in ponds

Feeding fingerlings to market size in intensively managed ponds is standard for the catfish industry. However, two distinct approaches to feeding have developed. Many producers feed their fish as much as they will eat every day. Researchers call this feeding to satiation. But some producers practice restricted feeding. They feed fish less than the maximum amount they would consume, especially late in the grow-out period. Restricted feeding requires less skilled management than feeding to satiation, and may help maintain water quality. Two studies compared the dietary require-

Large areas require machine feeding to reach all parts of the pond.

Diet effects are apparent at the processing plant.

ments of catfish produced under these different feeding methods.

At Kentucky State University, 5,434 fingerlings (13 per pound) per acre were stocked into research ponds. The fish were fed once or twice daily all they would consume in 20 minutes of commercial-type diets that contained either 34 or 38 percent protein. Aeration was provided when dissolved oxygen was predicted to fall below 4.0 ppm. At the end of 170 days the sampled fish weighed an average of 1 pound. Survival averaged 75 percent and food conversion ratio was 1.5:1. Results of this experiment indicated that neither feeding frequency nor the protein content of the diet affected any production-related factors.

Intramuscular fat can be measured in fillets.

Producers can save money and time by feeding pond-raised catfish to market-size on a 34 percent protein (or less) diet to satiation once daily.

Researchers at Auburn University measured the effects of feeding commercial-type diets containing 24, 28, 32, 36 or 40 percent protein to fingerlings in ponds. Fish were stocked at a density of 5,436 per acre and fed either on a restricted basis or to satiation. Fish fed to satiation gained more weight than those fed on a restricted basis. Differences in protein content did not significantly affect weight gain or feed consumption, although maximum weight gain was achieved by fish fed the 24 percent protein diet. Results indicate that fingerlings in intensively-managed ponds do as well on 24 percent protein diets as on higher protein feeds when fed to satiation. However, a higher protein diet was needed for maximum growth when feed was restricted to no more than 60 pounds per acre per day.

Let's talk economics. The feeding strategy that minimizes costs does not necessarily maximize fish growth. As a result, catfish producers need to adopt a feeding program that results in optimal economic returns for their operation.

Economic analyses of these Auburn University studies were conducted. Feeding the 26 percent protein diet to satiation produced

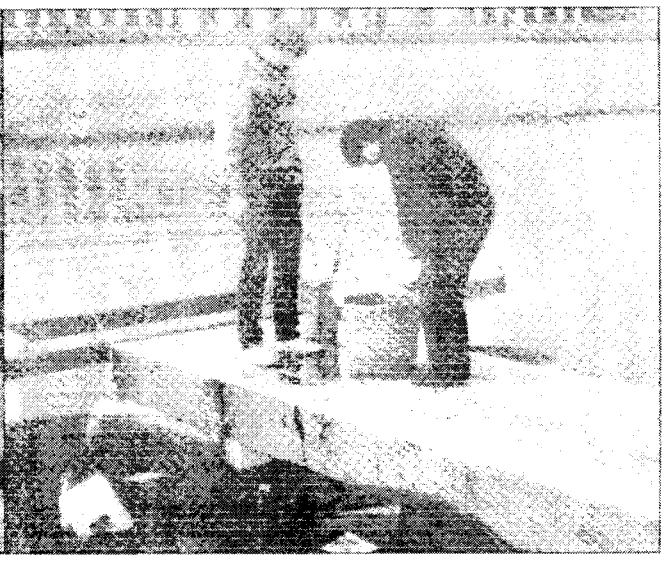
Commercially processed catfish show little fat on recommended diets.

the highest net return of any feeding program. Also, for fish fed to satiation, net returns decreased as the protein level of the diet was increased. Conversely, the 38 percent protein diet produced the highest net return for fish fed on a restricted basis. Finally, although ponds in which fish were fed to satiation with the 38 percent protein diet produced 400 more pounds of fish per acre than those fed the same protein level on a restricted basis, net returns were essentially the same.

Conclusions

Feeding to satiation has some advantages over restricted feeding. Producers can better match the amount fed to the amount needed by growing fish. These studies also suggest that fish fed to satiation require less protein in their diet, which means potentially lower feed costs. There are also some drawbacks to this feeding method. Increasing the amount of feed added to ponds increases the risk and frequency of severe water quality problems. Also, feeding to satiation requires more time and more skilled management than does restricted feeding. The economic tradeoffs between money saved by feeding a lower percentage protein diet and the need for increased management are not fully known.

Cage culture of catfish is often practiced in Kentucky ponds.



Sampling of cage-reared catfish.

Production of third-year fish in ponds

Although third-year fish are not raised commercially in many parts of the country, larger fish are preferred by some consumers as well as by operators of recreational put-and-take fisheries. However, little information regarding how diet affects the growth rate and feeding efficiency of third-year fish is available.

A study at Auburn University measured the effects of feeding commercial-type diets containing 24, 28, 32, 36 or 40 percent protein to third-year catfish in ponds. Fish were stocked at 1,977 per acre and went from an average size of 1.3 pounds to an average of 3.6 pounds in 141 days. They were fed to satiation once daily. Fish fed the 24 percent protein diet gained weight fastest. Increased protein actually reduced feed consumption and weight gain. These results indicate that third-year fish grow better on the lower protein diet when fed to satiation.

In a Kentucky State University study, 1,482 third-year catfish were stocked per acre into research ponds. The fish were fed commercial-type 32 or 38 percent protein diets to satiation either once or twice daily for 170 days. Neither the protein level of the diet nor feeding frequency affected the growth rate, survival, feed conversion ratio, specific growth rate or production per pond. These results indicate that third-year fish may perform equally well on a 32 percent protein diet, which means that spending extra money for higher protein diets may be unnecessary.

Conclusions

The results of these research studies indicate that producers growing out third-year channel catfish should consider feeding diets that contain 32 percent, or less, crude protein, especially if fed to satiation.

Catfish production in cages

Cage culture offers an opportunity to produce fish in ponds that may be poorly suited for conventional pond culture because of their size, depth or the presence of other fish. However, successful cage culture also provides unique management challenges to the producer.

A study at Kentucky State University focused on the nutritional needs of fingerling channel catfish stocked in cages. Researchers stocked 400 fingerlings in each of eight, 44-ft^3 cages in a 2.5-acre pond. The fish were fed to satiation once or twice daily for 105 days with complete, commercial-type feeds containing either 34 or 38 percent protein. Feeding frequency did not affect the growth or food conversion efficiency of the fingerlings. Producers who feed caged fish more than once daily may not benefit from the extra effort. However, the protein content of the feed was important. Fish fed the 38 percent protein diet grew faster, and cages receiving the higher protein feed produced more pounds of fish. Cage-reared catfish may require more protein than pond-reared fish because they do not have access to natural foods in the pond.

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