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Evaluation of the Newly-developed, Least-cost Experimental Diet for Bluegill at Commercial Densities in Ponds

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Abstract
A substantial need exists to reduce costs and develop more nutritionally adequate diets for established as well as emerging aquaculture species in the North Central Region (NCR). The study evaluated a diet for juvenile northern bluegill (Lepomis macrochirus) that is significantly less costly than currently available diets for sunfish, while yielding a growth rate that is at least equal to an industry standard sunfish diet. Such a diet formulation is now available to the NCR as the result of a recently funded North Central Regional Aquaculture Center (NCRAC) project.

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Introduction

A substantial need exists to reduce costs and develop more nutritionally adequate diets for established as well as emerging aquaculture species in the North Central Region (NCR). The study evaluated a diet for juvenile northern bluegill (*Lepomis macrochirus*) that is significantly less costly than currently available diets for sunfish, while yielding a growth rate that is at least equal to an industry standard sunfish diet. Such a diet formulation is now available to the NCR as the result of a recently funded North Central Regional Aquaculture Center (NCRAC) project.

This open formulation now needs to be evaluated by comparing its performance against an "industry standard" diet in a commercial production pond setting. The objectives of this project were to evaluate/determine performance of recently-developed North Central Regional Aquaculture Center (NCRAC) least-cost juvenile (3 in. minimum total length) bluegill diet versus an "industry standard" diet at two distinct latitude locations at standard pond stocking densities for one growing season, and to coordinate dissemination of project results with the North Central Regional Aquaculture Center NCRAC Technical Committee/Extension Subcommittee. Researchers from three NCR universities, Iowa State University (ISU), Lincoln University of Missouri (LU) and Purdue University (Purdue) sought to compare year old bluegill production at densities of 8,000/acre using two diets: the recently developed open formula versus an industry standard diet (40% crude protein and 10% lipid); both diets were produced by one common facility and distributed among the three locations.

Materials and Methods

A single cohort of stocker fingerlings was produced for the pond production phase using several single-mated northern bluegill pairs (local Missouri stock) as brood stock at two sites: LU and ISU in 2010. Ponds were managed for intensive sunfish fingerling production until October.

Bluegill fingerlings were then harvested from five ponds at the ISU Horticulture Station and transported to ISU campus, sorted and then cultured in the indoor facility until May 2011 when they were returned to the ponds for initiation of the feeding study.

On May 5, fish from both the campus facility and LU were stocked into ISU ponds. The six ponds were divided equally between the two treatments; treatment 1 was the standard industry diet and treatment 2 was the open formula bluegill diet. Feeding commenced the following day and continued until October 2011. Fish were fed to apparent satiation (amount they can consume in 15 min) using feeding rings to limit the loss of food on windy days; not all feed was placed in the rings. Feed applications were adjusted to at least 2 percent to the maximum of 4 percent of biomass daily using the estimated fish biomass based on monthly fish samples.

Results and Discussion

In the initial sample of the fish on June 29, fish fed the open formula diet were heavier than fish fed the standard diet, 22.5 vs. 18.4 g.

Although there were no significant differences between the treatments due to small sample sizes (n=3 ponds/treatment), this information is important to the commercial aquaculture industry in that it indicates that this new diet was accepted and utilized by the fish.

In October, fish were collected for health assessment that was needed prior to being transported to Wisconsin for a subsequent NCRAC study at the University of Wisconsin-Stevens Point. Although the fish were found to be in excellent health there was an observation made that larger fish from both treatments had a substantial amount of fatty deposits on the livers. This finding is important in that the lipid levels of both diets appear to exceed what is needed for fish metabolism and that efforts should be made to minimize the lipid content of future diets.

All fish were harvested during the last week of October. Initial data analysis indicates that percent survival differed between the two treatments. Fish in ponds that were fed the standard diet had 79 percent survival compared with the 71 percent survival in the ponds fed the open formula diet. Final assessment of the performance of both diets will be done using feed conversion rates, dress-out percentages, and growth rates once all of the data has been analyzed. In addition, fish fillets and livers have been sent to the University of Missouri-Columbia for proximate analysis.