

EVALUATION OF THE NEWLY-DEVELOPED, LEAST-COST EXPERIMENTAL DIET FOR BLUEGILL AT COMMERCIAL DENSITIES IN PONDS AT TWO OR MORE FACILITIES IN THE NORTH CENTRAL REGION⁴

Project *Termination Report* for the Period
September 1, 2010 to August 31, 2012

NCRAC FUNDING LEVEL: \$124,400 (September 1, 2010 to August 31, 2012)

PARTICIPANTS:

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REASON FOR TERMINATION

Project objectives completed and funds have been terminated.

PROJECT OBJECTIVES

- (1) Using as consistent protocols as possible across locations, evaluate/determine performance of recently-developed NCRAC least-cost juvenile (3" minimum total length) bluegill diet versus an "industry standard" diet at two distinct latitude locations at standard pond stocking densities for one growing season. Stocking densities to be determined by the investigator(s) and producer(s).
- (2) Coordinate dissemination of project results with the NCRAC Technical Committee/Extension Subcommittee.

⁴NCRAC has funded four Nutrition/Diets projects. The Termination Report for the first project is contained in the 1997-98 Annual Progress Report; the Termination Report for the second Nutrition/Diets project is contained in the 2008-09 Annual Progress Report; and the Progress Report for the third project is contained elsewhere in this Annual Report. This Progress Report is for the fourth project. It is a 2-year project that began September 1, 2010.

PROGRESS ACCOMPLISHMENTS

OBJECTIVE 1

Prior to the initiation of the funded project, Lincoln University (LU) staff conditioned monosex groups of adult northern bluegill and selected brood fish. In late May 2010 half of the brood fish were sent to Iowa State University (ISU) and half were retained by LU for propagation phase of this project. All stocked age-1 fish originated from the same parental stock source.

In October 2010, age-0 fingerlings were harvested from ponds located at both locations with ISU fish being held in the campus facility until the following spring. LU staff over-wintered fish in ponds.

In April-May 2011 ponds located at ISU, LU, and Purdue University (Purdue) were stocked at 19,772 fish/ha (8,000 fish/acre) with ISU ponds stocked with a combination of ISU and LU fish, and Purdue ponds stocked with LU fish while LU ponds were stocked with LU fish only. Fish were initially graded to minimize the the number of fish smaller than the 76-mm (3-in) length required for this test. Starting the first week of May 2011 fish at all locations were fed either the standard diet (SilverCup Extruded Trout; 40% protein and 12% fat) or the open formula diet to satiation using feeding rings to limit waste. Initial analysis of the fish sampled in late June indicated no significant differences in fish sizes between the two diets at LU and ISU but at Purdue fish, fed the standard diet were significantly larger. At the end of the approximate 180-d culture period, fish were harvested at all sites. Production data and proximate composition analysis on filets were completed and summarized and reported at the 2012 Aquaculture American Conference.

Production Data. — Fish fed the standard diet at Purdue were significantly larger (weight and length) than those fed the open formula diet. However, similar results were not obtained from the field trials at ISU and LU. Survival and fillet yield were greatest for fish fed the standard diet at LU; no significant differences were noted at the other two field sites. Food conversion ratio (FCR) was significantly larger for fish fed the open formula diet in the LU ponds; no differences were noted in the ISU or Purdue locations.

In ponds at both Purdue and LU, fish that were fed the open formula diet had significantly larger livers; data for the ISU ponds noted similar relationship although not significant. Proximate analyses indicate fish fed the standard diet had significantly higher percentage of crude fat in fish cultured at Purdue and LU.

At the completion of this study in fall 2011 it became obvious that the final fish size obtained at the three sites were reflective of the different growing conditions among the three sites. Regardless of the diet fed, fish cultured at ISU were smaller than fish cultured at Purdue which were then smaller than fish cultured at LU; relationship related to the number of growing days at each location. In addition, a high percentage of fish did not reach the desired market size 113-150 g (0.25-.033 lb) in the 1-year culture period in this project. The role of genetics should have been minimized in this project since the brood fish were from the same brood source.

In addition to the previously described concerns about fish sizes, the amount of age- 0 fish in the ponds upon fish harvests did cause a substantial cost in terms of time and efficiency. Given the submarketable sized fish at harvest, use of the open formula is questionable at best without an additional field season to enable fish reaching market size.

OBJECTIVE 2

Information garnered from this project as well as other regional research projects will be used to develop additional extension materials for bluegill culture. For instance, the ability of these fish to spawn earlier and later in the culture period has been noted as a production concern for this fish in food- fish operations. Additional concerns related to the effect of growing days for the different culture sites are now recognized as important production considerations.

IMPACTS

Results garnered from this research provided the aquaculture industry with relevant field- tested information related to the culture of bluegills using recently developed experimental diet formulated specifically for bluegill.

Results garnered from this project supported the earlier findings noted by Rob Hayward (University of Missouri-Columbia) in a final NRAC report that described laboratory- reared fish fed the open formula diet as having 25-33% less whole-body lipid deposition compared to the standard diet. However, in this study livers were still larger in fish fed the open formula diet. Implications of these findings include the least diet provides an available nutrient profile that is possibly inferior for bluegill resulting in fish having larger livers and fillets with more moisture.

RECOMMENDED FOLLOW-UP ACTIVITIES

A lack of difference in the growth of the bluegill fed the two diets during their first year could be indicative of similar levels of nutritional completeness provided by both diets or could be an artifact of slow but consistent growth by young-aged bluegill.

A continuation of this project into a second culture period will help to extend the growth cycle and provide clarity as to the effectiveness of the least-cost diet to provide better growth and survival of market-sized bluegill.

SUPPORT

NCRAC- has provided \$124,400 which is the entire amount allocated for this 2-year project.

PUBLICATIONS, MANUSCRIPTS, WORKSHOPS, AND CONFERENCES

See the Appendix for a cumulative output for all NCRAC-funded Nutrition/Diets activities.