

PROJECT TITLE: Evaluation of Protein and Lipid Concentrations in Commercially Available Tilapia Feeds and Their Effect in Intensive Production Systems

PROJECT DURATION: 2 years

FUNDING REQUESTED: \$200,000

<u>Institution</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Total</u>
Virginia Tech David Kuhn Daniel Kauffman Michael Schwarz	\$45,945	\$44,055	\$90,000
Texas A&M University Delbert Gatlin	\$14,841	\$15,159	\$30,000
Astor Farms Rob Ellis	\$13,333	\$13,334	\$26,667
Brock Farms Clip Brock	\$13,333	\$13,333	\$26,666
TOTAL	\$87,452	\$85,881	\$173,333

OBJECTIVES

- 1) Evaluate typical commercial diet formulations with different levels of protein and lipid in commercial intensive tilapia recirculating aquaculture systems (RAS)
 - a) Assess dietary effects on fish production and water quality parameters (i.e., total suspended solids, biochemical oxygen demand, and production of organic matter).
 - b) Test new diets with fine-tuned protein and lipid levels to see if gross operating income can be increased.
- 2) Conduct economic analyses to determine the most cost-effective commercial formulations under RAS conditions

PROJECT TIMETABLE:

Year 1

- Work with the tilapia farmers to establish agreements on baseline commercially available feeds to be used in year one
- Begin and complete year one feed studies
- Collect and analyze the feed data with respect to fish production, water quality and effect on costs and revenue
- Develop gross income statements based on the data collected during year so that the effect of the direct or variable costs incurred under the different feeding regimens can be analyzed

Year 2

- Hold a meeting with farmers, university scientists and feed mill representatives for the purpose of deciding how to optimize custom diets given the results of the year one feed studies. Do this with improved growth rates in mind while considering advice on ingredient costs.

- Begin and complete year two feed studies
- Collect and analyze year two results Compare them with year one results
- Using the variable coefficients developed in the study and the gross income statement from the first year, construct an on-line tool that farmers can use to analyze whether going to “higher” quality feeds is likely to be of benefit.
- Expand the above on-line tool so that farmer can further analyze how diet selection might affect their return on investment given different farm capital structures.
- Begin working on the other deliverables, publications and outreach activities

Year 3

- Continue and complete deliverables, publication and outreach activities

ANTICIPATED BENEFITS

In the Southern region of the U.S. we have farmers that use for intense production of tilapia. Even though we have some understanding of general tilapia nutrition (e.g., in ponds with natural productivity), there is limited information regarding tilapia nutrition in production RAS (e.g., relatively sterile environment) under intense commercial grow out conditions. Furthermore, there is no consensus in the industry that exists whether farmers should use a low protein/lipid (e.g. 36/6) and or high protein/lipid (e.g. 40/10) feed. Both low and high protein/lipid commercial feeds are being used by various farmers. Understanding how these different diets impact fish production, water quality and waste management, and the overall economics will help farmers in the Southern region of the U.S. to be successful.

PROGRESS AND PRINCIPAL ACCOMPLISHMENTS

The project start date has been delayed due to some industry side constraints. The project team needed to make some new arrangements to satisfy the industry participants on the project. The project is ready to begin on the feed manufacturer side. Since one of the tilapia farms has recently installed a new production system we continued to wait during this reporting period until the filtration systems achieve steady state (mature filters). Once the system achieves steady state we will be able to commence with *Objective One*. Due to logistics these large feed deliveries will be coordinated for the same time for both tilapia farm participants.

To get things started team members have held several conference calls, have met in person with all industry partners, and performed site visits at the tilapia RAS farms. We have also begun collecting baseline data to enter into our economic software and our water quality model. After the site visits we realized that some adjustments need to be made to the economic model. Those adjustments were completed.

Objective 1: Evaluate typical commercial diet formulations with different levels of protein and lipid in commercial intensive tilapia recirculating aquaculture systems (RAS)

***Sub-Objective 1a:** Assess dietary effects on fish production and water quality parameters (i.e., total suspended solids, biochemical oxygen demand, and production of organic matter).*

Even though the study has not yet commenced. The team was able to collect daily fish production data and water quality data (e.g. alkalinity, ammonia, nitrite, pH, temperature and water use) from 2017-2018 to enter as baseline data for our data analysis and models. This will serve as the foundation for future fish production and water quality data comparisons once objective one activities commence.

***Objective One:** Evaluate typical commercial diet formulations with different levels of protein and lipid in commercial intensive tilapia recirculating aquaculture systems (RAS)*

***Sub-Objective 1b:** Test new diets with fine-tuned protein and lipid levels to see if gross operating income can be increased.*

No activity to report yet.

***Objective 2:** Conduct economic analyses to determine the most cost-effective commercial formulations under RAS conditions*

The economic portion of this project is tasked with the analysis of diets utilized in the study, both to assess the cost effectiveness of diet formulations used in the first phase of this project and to assess the economic performance of using the optimized diets in the second phase of this project. In order to be able to perform this work, it was first necessary to establish a baseline understanding of the production strategies and economics of the farms participating in this study. Site visits were performed and after meeting with the farms, the following baseline tables have been developed for each respective farm. See the supplemental file that includes template baseline Tables 1-5.

Impacts

None to report.

Publications, Manuscripts, or Papers Presented

None to report.

Results at a Glance

None to report.