

Aquaponics

HORT 4601

Reducing External N-Inputs Through Alternative Tilapia Feed

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INTRODUCTION

- Aquaponic **organic matter** is typically harvested and removed from the system, creating an open nutrient loop (Figure 1).
- Diverting would-be plant waste **back into the system** increases the sustainability of the system.
- Insects and plants can provide supplemental or replacement feed for the proposed tilapia system

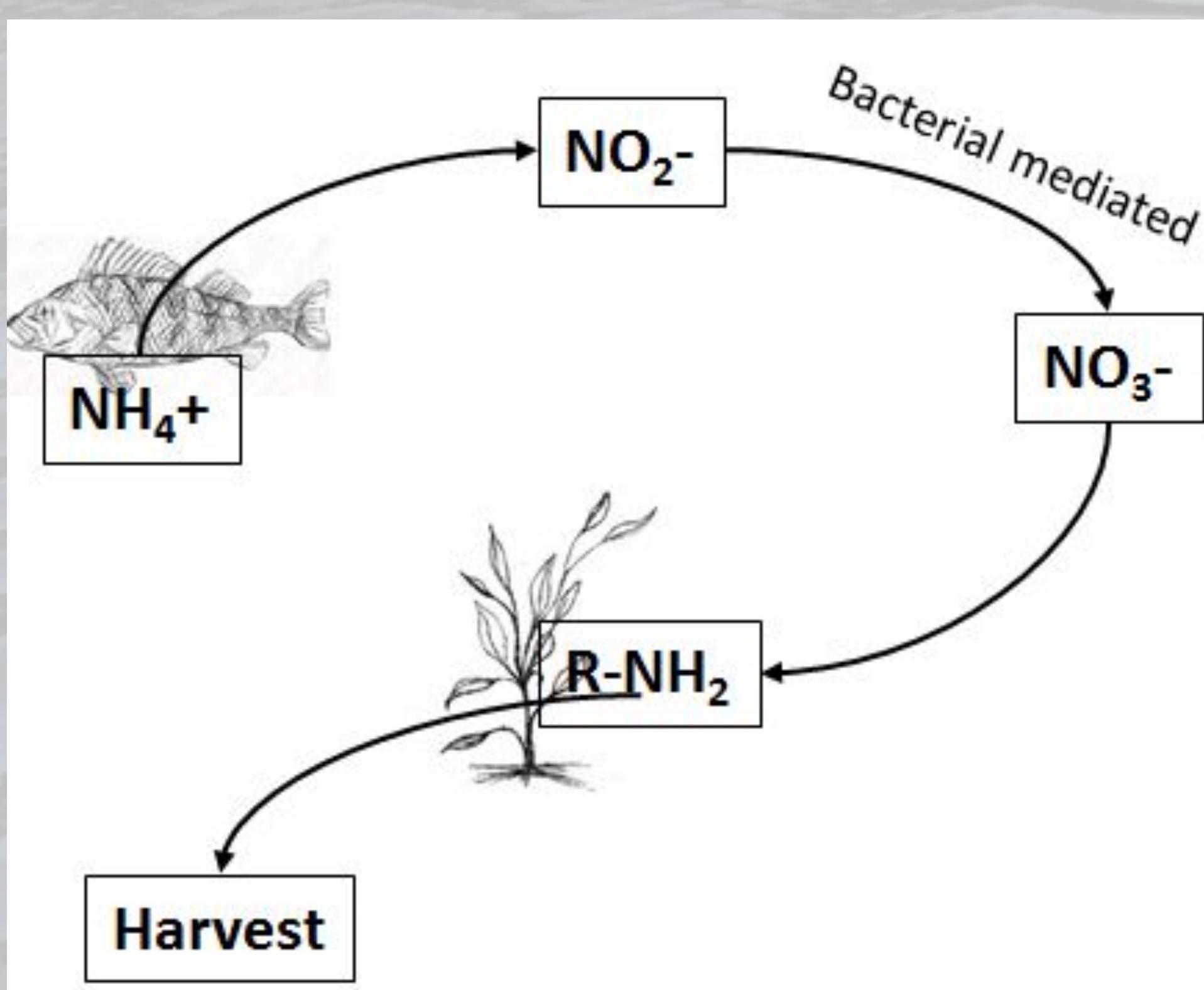


Figure 1: Open nutrient-loop aquaponics system

OBJECTIVES

- Through visual observation and biomass data collection **assess** ease of:
 - **Duckweed** production in a shelf unit grow bed
 - **Mealworm** production in wheat substrate in aquarium unit
- Determine **feed-conversion ratio** of blue tilapia given varying feed ratios of pellets, duckweed, and mealworms



Figure 2: Mealworms, Blue Tilapia, and Duckweed

METHODS

200 mature **Blue Tilapia** distributed evenly among 4 tanks

Phase 1

- Investigate feasibility of duckweed and mealworm production
- **Monitor growth** through weekly biomass samplings

Phase 2

- Record initial fish biomass
- Feed each tank of tilapia a different ratio of **pellets:duckweed:mealworms**
- Re-weigh fish biomass to determine **feed conversion ratios** for each type of supplemental feed.

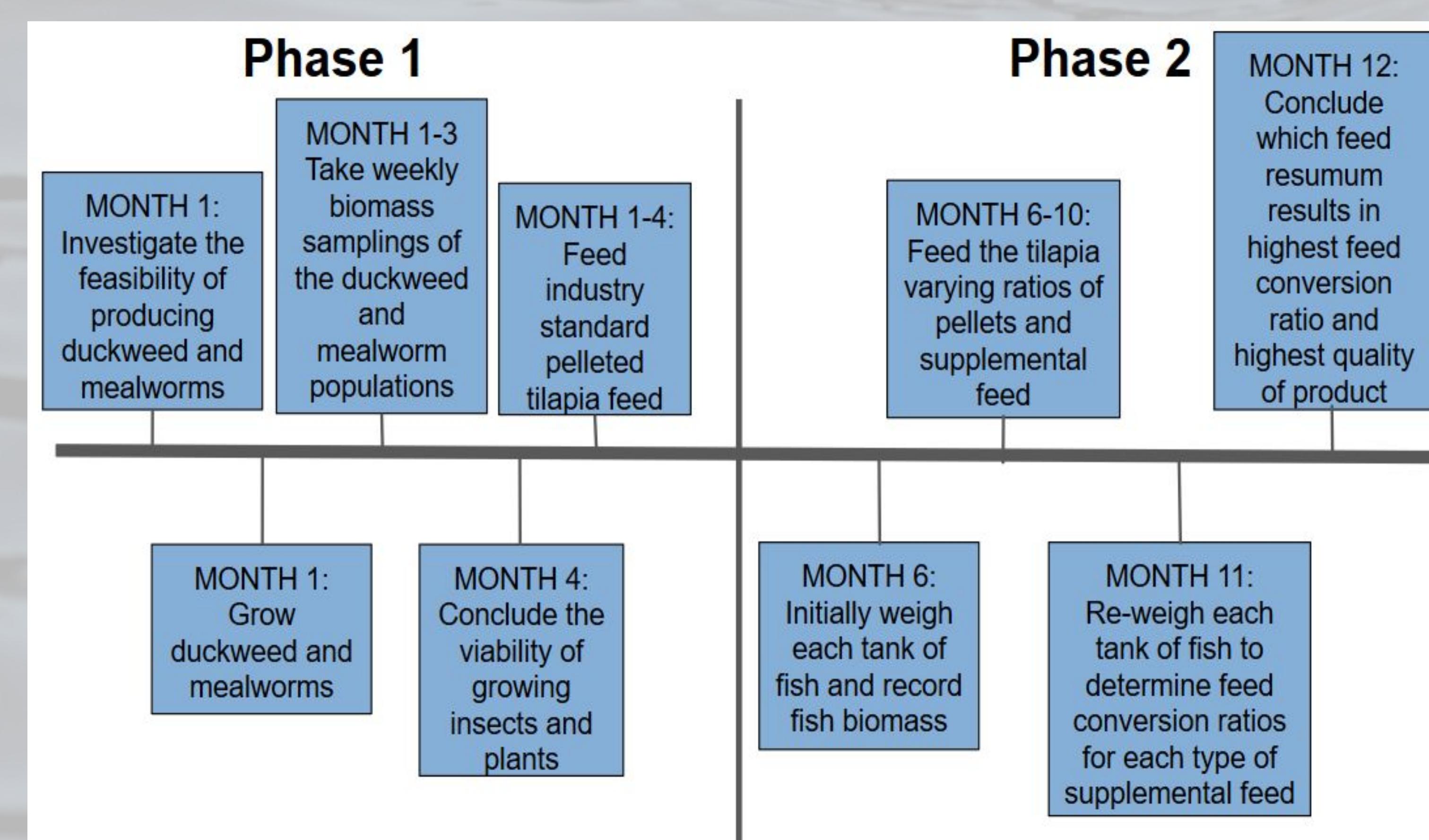


Figure 3: The proposed project timeline

Tank	Percent Pellet	Percent Duckweed	Percent Mealworm
1	100	0	0
2	50	50	0
3	50	0	50
4	0	50	50

Figure 4: Feed ratios for Tilapia Tanks

ANTICIPATED RESULTS

Tank 4, fed a diet of $\frac{1}{2}$ duckweed and $\frac{1}{2}$ mealworms will have the largest **feed conversion ratio** during Phase 2 because these alternative feeds fulfill the caloric, macro- and micronutrient requirements of aquaponically grown tilapia.

POTENTIAL PROBLEMS & SOLUTIONS

- | | |
|------------------|---|
| • Fish Death | Purchase additional fish during Phase 1, continue to collect data for Phase 2 |
| • System Failure | Use back-up generators, pumps, aerators |
| • Phase 1 Death | Continue with remaining material |

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- **REFERENCES**
<https://docs.google.com/document/d/e/2PACX-1vSGOzF7bjabCldP NJsnhdKfTu54c7eQg5fKNFn5YyI0vTaQLqe7O8SchJUJvGAiub-ab14pJSdD0L7v/pub>