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Zebrafish Feeding and Breeding: Adapting Best Practices for Zebrafish Husbandry

Abbigale Sullins

Ouachita Baptist University

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• Zebrafish Feeding and Breeding

Adapting Best Practices for Zebrafish Husbandry

Abbigale Sullins



4 Points of Husbandry in the Lab

01

Source

Where is the best place to buy our materials?

02

Amount

How much to feed the fish?

03

Regularity

What will our daily tasks be? Weekly?

04

Scheduling

What is the best schedule for feeding and breeding in our lab?



01
Background

02
Feeding

03
Breeding

04
Future Outlook



01

Background

Important preliminary information
about our topic

01 Background

Zebrafish are a tropical, freshwater fish that serve as a key research model for human health and disease

- Share 70% of genes with humans
- All major organ systems except for lungs
- Much more affordable research model compared to rodents
- Small laboratory footprint●

01 Background

- Emerged as a research model in the 1970s
- Optimal breeding age: 3-12 months
- Average Lifespan: 2 years
- Light Cycle: 14 hours light; 10 hours dark
- Sex Differences:
- Females: more rounded abdomen for egg storage
- Males: more vibrantly colored

01 Background

- Prefer large groups
- Tank is supplied with RO water
- UV light and filter for additional sanitation
- Consistent Temperature



01 Background

Daily Tasks

- Overall wellness check on fish
- Ensure all parts of tank are functioning properly
 - Temp, UV Light, Water Flow
- Test water levels
 - pH, Ammonia, Nitrate, Nitrite
- Exchange 5-10% of tank water volume
 - Roughly 5 gallons



02

Feeding

Source, amount, regularity, and scheduling of the Zebrafish diet

02 Feeding

Live Prey vs. Dry Food

- Nutritional value
- Cost efficiency
- Availability
- Scheduling
- Storage



02 Feeding

Dry Food

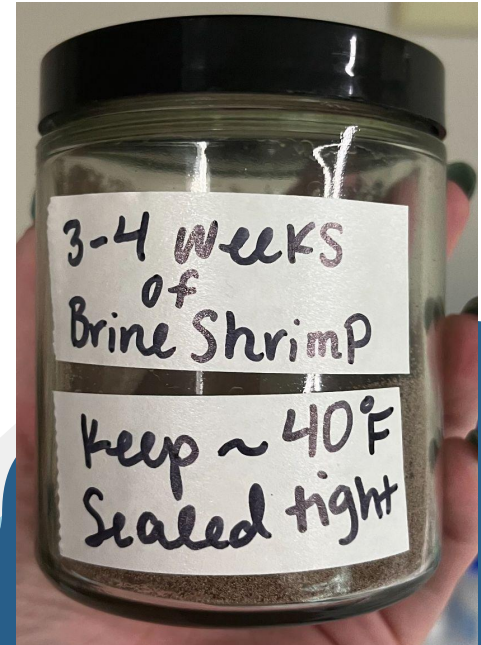
- Lower nutritional value
- Higher cost efficiency
- Much more readily availability
- Easier scheduling
- Stored on lab bench



02 Feeding

Live Prey

- Higher nutritional value
- Lower cost efficiency
- More difficult to find suppliers
- Large time commitment
- Careful Storage



02 Feeding

Brine Shrimp Hatching Protocol

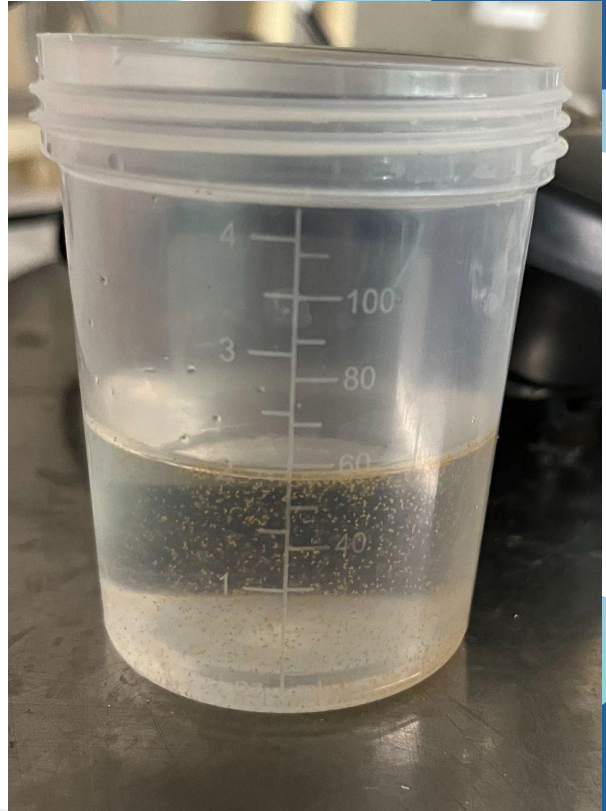
- High Salinity
- Water Directly from the Tank System
- Proper Aeration
- 24 Hour Time Window



02 Feeding

Brine Shrimp Feeding Protocol

- Drain off the bottom layer of water
 - Roughly 25-35 mLs
 - Opened shells of hatched shrimp eggs
- Drain into a separate container the next 20-40 mL of water
- This contains the hatched brine shrimp that will be best for feeding the fish.







03

Breeding

Maintaining Fish Population
in the Lab

03 Breeding

Preparation for Breeding

- The afternoon before breeding is to take place, place females and males in a divided tank with stagnant water
- At this point, you can add in plastic plant life if you like
- Later in the evening, ensure fish in breeding tanks are covered by a dark covering
- After covering the fish, leave the lights to the animal room off overnight



03 Breeding

- 10 hours later, remove the covering from the tanks and turn on the lights to the room
- Immediately after turning the lights on, remove the divider and tilt the grated tank insert
- Leave the breeding tank this way for 2-3 hours



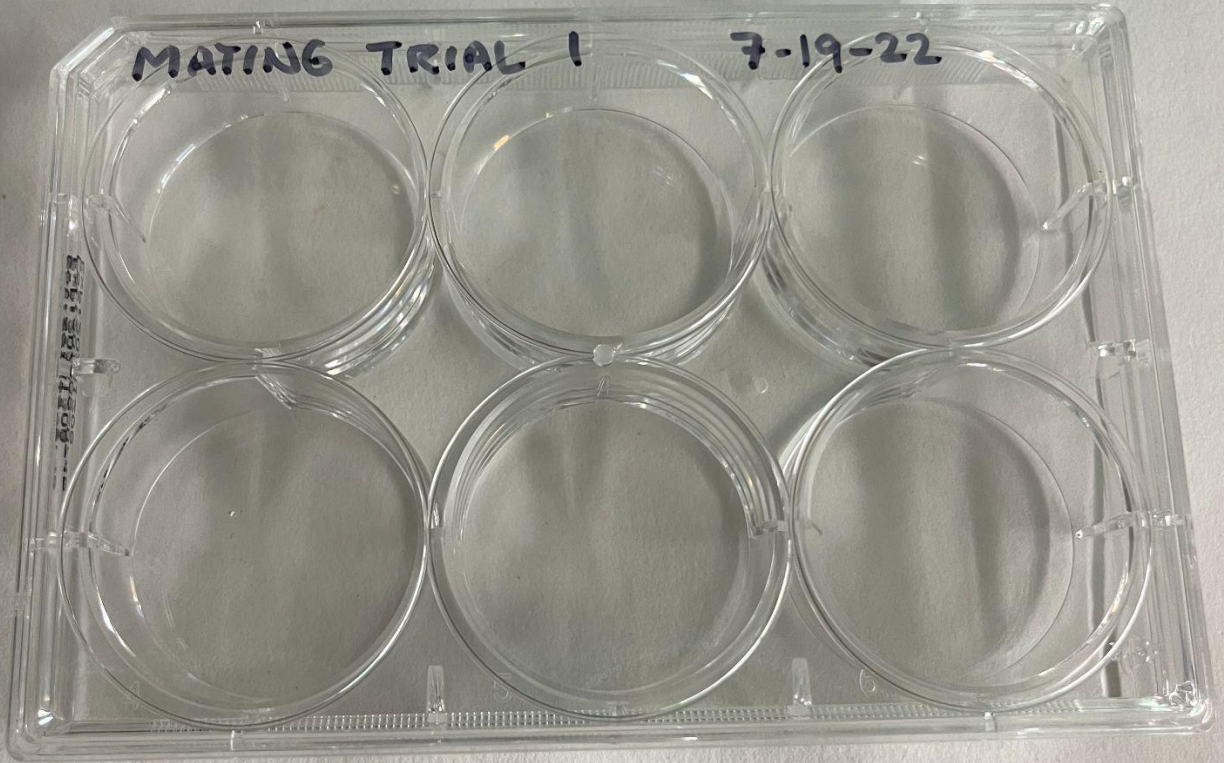
03 Breeding

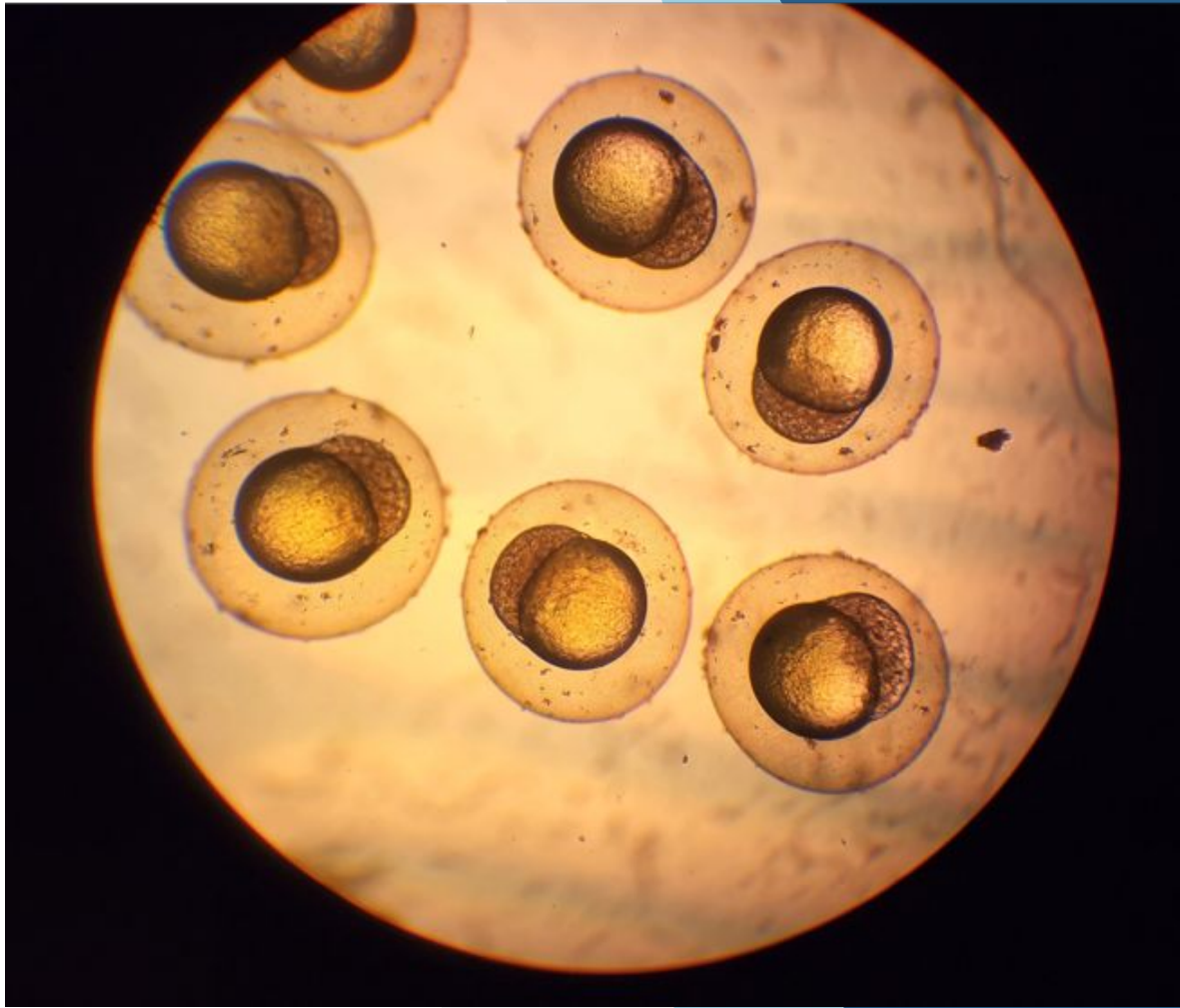
Final Steps of Breeding

- After breeding is complete, place all fish into a new tank on the rack
- Pour out 80% of the water in the breeding tank
- Use a plastic pipette to pull the eggs off the bottom of the tank and place them into a well plate

MATING TRIAL 1

7-19-22







04

Future Outlook

04 Future Outlook



- Histological sectioning and staining can be used to examine zebrafish tissue at a microscopic level
- Sex determination in zebrafish is not well characterized and is subject to both genetic and environmental factors

Summary

- The key to zebrafish husbandry is **consistency** and avoiding rapid adjustments
- Increasing the enrichment of fish affects their growth and reproductive capabilities
- Solidifying the groundwork of proper animal husbandry is key for rapid adoption of this model for research and coursework here at Ouachita Baptist University

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