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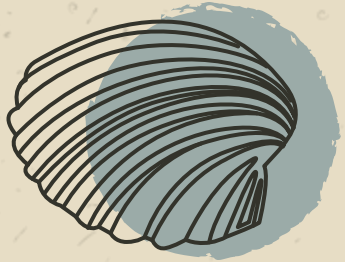

From Spat to Spectacular:

Egg Quality Assessment and Probiotic Intervention in Oyster Larvae

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Overview

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% Survivorship
Growth

04

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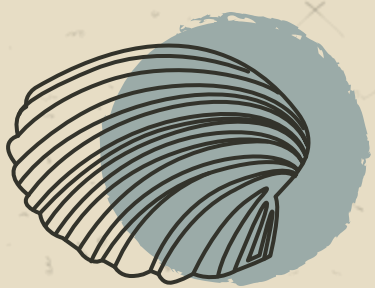


01

Background Information

Oyster Aquaculture in the US

1600s–1800s: Wild oyster harvesting was common along the East Coast

1840s: First commercial oyster farms established in New York

Late 1800s: Oyster Industry boomed, especially in the Chesapeake Bay

Early 1900s: Overharvesting and pollution led to a decline in wild oyster populations

1920s–1950s: Development of hatchery techniques and off-bottom culture methods

Oyster Aquaculture in the Chesapeake

1960s: Dramatic decline in wild oyster populations due to overharvesting and diseases

1980s: Introduction of aquaculture to supplement wild harvest

2000s: Streamlining of permitting process to encourage oyster farming

2010s: Significant growth in oyster aquaculture production

Hatchery Seed Production

Importance

- Provides consistent and reliable source of larvae
- Allows for selective breeding and genetic improvements
- Enables year-round production
- Production of triploid (sterile) oysters for faster growth

Process and Benefits

- Controlled spawning of broodstock
- Larval rearing in optimal conditions
- Setting of larvae on micro cultch
- Nursery phase for juvenile growth
- Increased survival compared to wild-caught seed
- Ability to produce specific strains

Challenges in hatchery production

Water Quality

Fluctuations in dissolved oxygen, pH, and nutrients

Presence of contaminants or pollutants

Environmental Conditions

Temperature control (climate change)

Salinity management for optimal growth

Food Quality

Maintaining algal cultures

Ensuring nutritional adequacy for different life stages

Biotic Challenges

Microbial Community

Balancing beneficial and harmful bacteria
Controlling biofilm in rearing systems

Pathogen Control

Prevention and management of disease

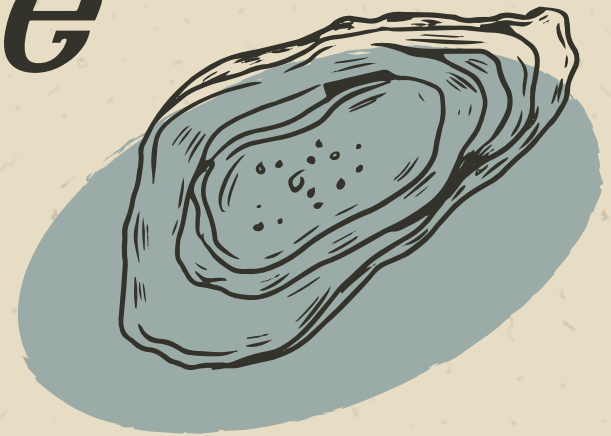
Egg Quality

Maintaining healthy and diverse broodstock
Optimizing conditioning and spawning protocols

Other

Managing predators or competitors in nursery systems
Optimizing larval settlement

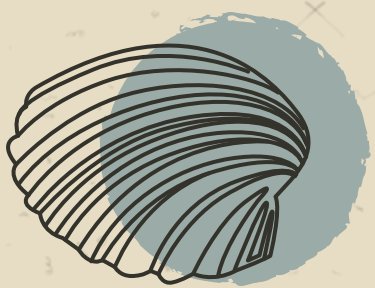
Goals of the Study



Investigating two factors that impact breeding success

1) Broodstock female Egg quality, including egg grade, and egg numbers

2) If adding probiotics can enhance larval yield or larval growth



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Methods

Strip Spawning

Oyster 292 (Randy)

Objective 1 - egg quality

Strip Spawning Broodstock Oysters

80 oysters were shucked and their gametes checked for health and sex

Grading Eggs

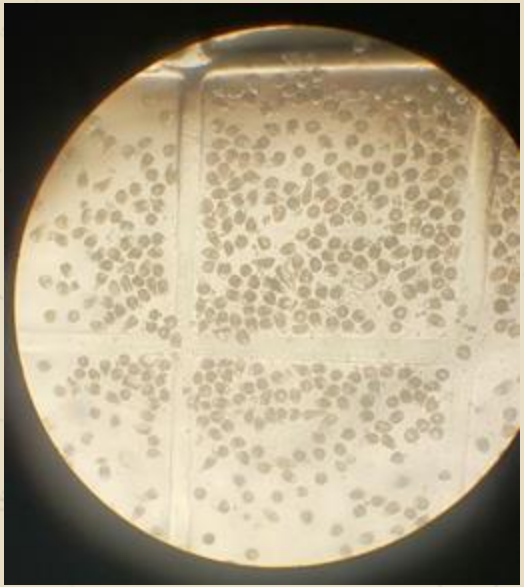
Females are given a number (1–3) for their egg quantity and their egg quality
Only the top scores will be selected

Final Groupings

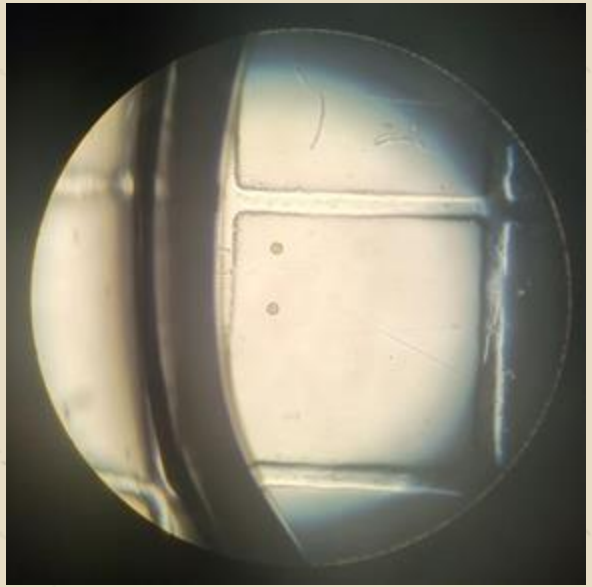
12 Females and 12 Males were selected for this study

Good Quantity vs. Good Quality

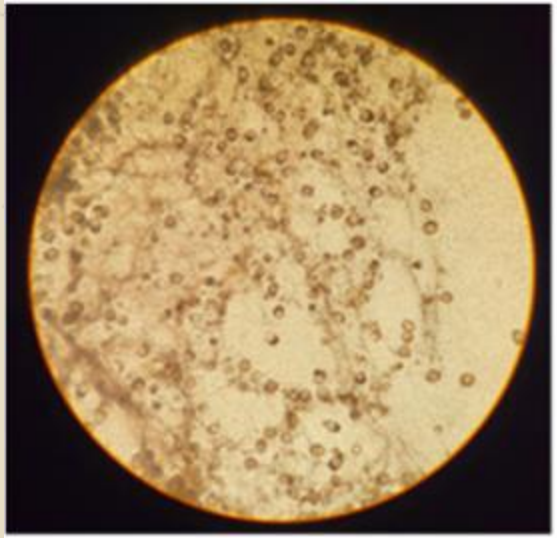
1) Female 28 (25.5M) – Good Quantity



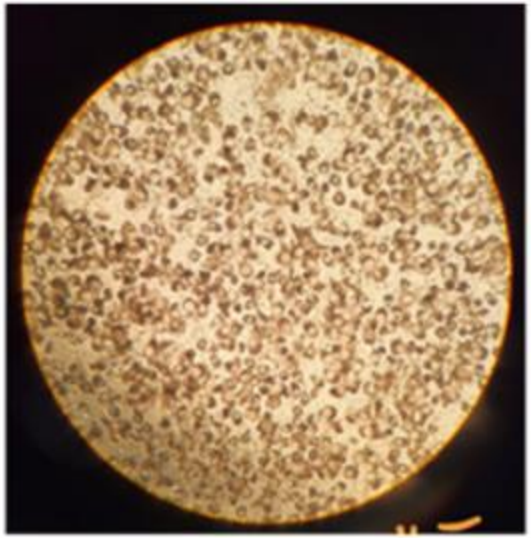
2) Female 63 (48K) – Good Quality



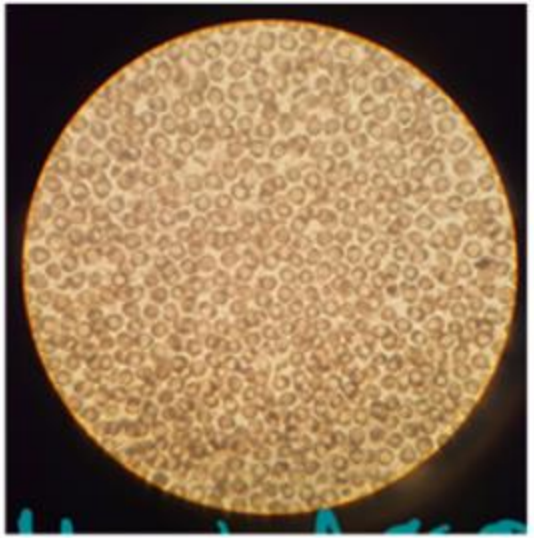
Egg Quality Grading cont.



Grade 1



Grade 2



Grade 3

Creating Lines

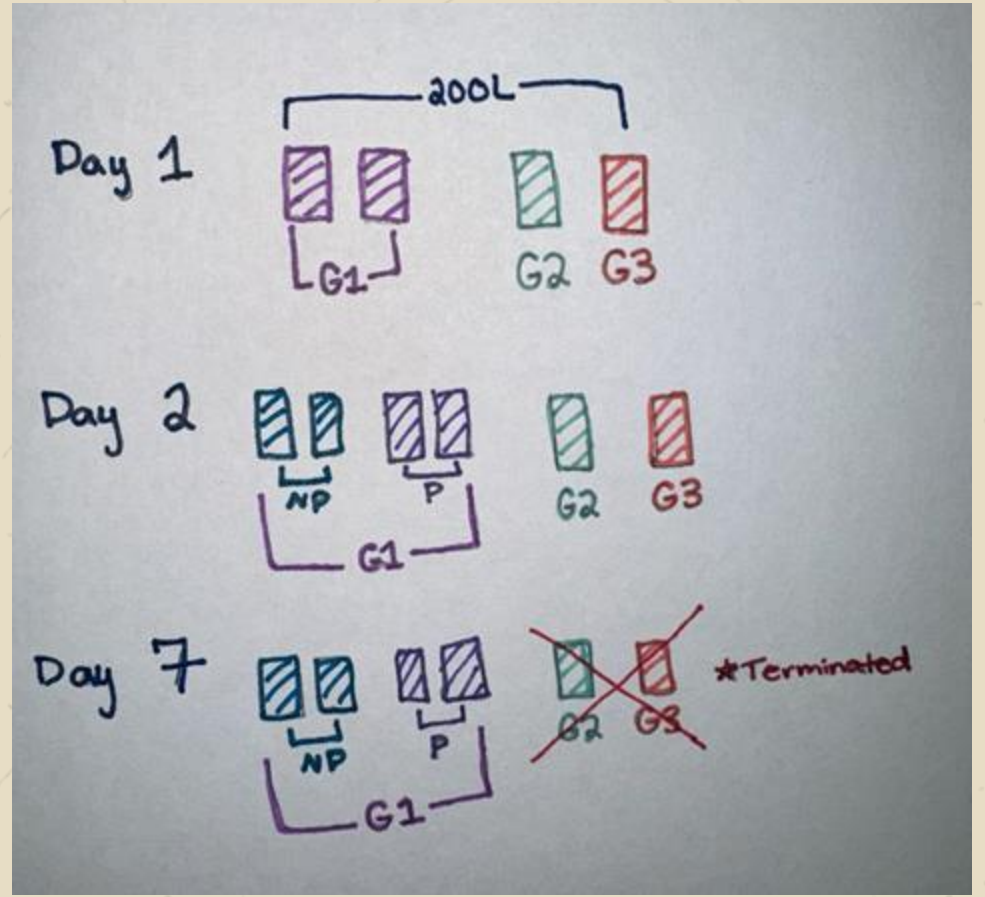
Female #	Egg Quantity	Egg Quality	Group #
28	25.53 M	1.5	1
31	109 K	2.5	2
38	413 K	2.5	2
41	183 K	2	2
47	760 K	2.5	2
51	121 K	2	2
53	50 K	2	2
63	48 K	3	2
76	82 K	1	3
78	2500	1	3
23	2.49 M	1	3
59	170 K	1	3

Group 1 – one female, highest egg quantity

Group 2 – seven females, highest quality

Group 3 – four females, lowest quality

Experimental Design



Objective 2 - Probiotic intervention

Control vs. Replicate Groups

Probiotic Utilized

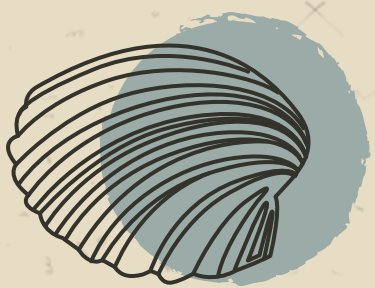
100 ml added after water change
Hatchery Prime Tablets Claims:

- Reduces vibrio populations
- Eliminates toxic ammonia
- Increases overall yield
- Enhances water quality

“Using Hatchery Prime results in an 11.12% increase in survival”

Overall Methods

- Larvae Fed daily
- Larval Drops – MWF
    - Siphon larvae onto corresponding sieves
    - Counting for density
    - Size them for feeding



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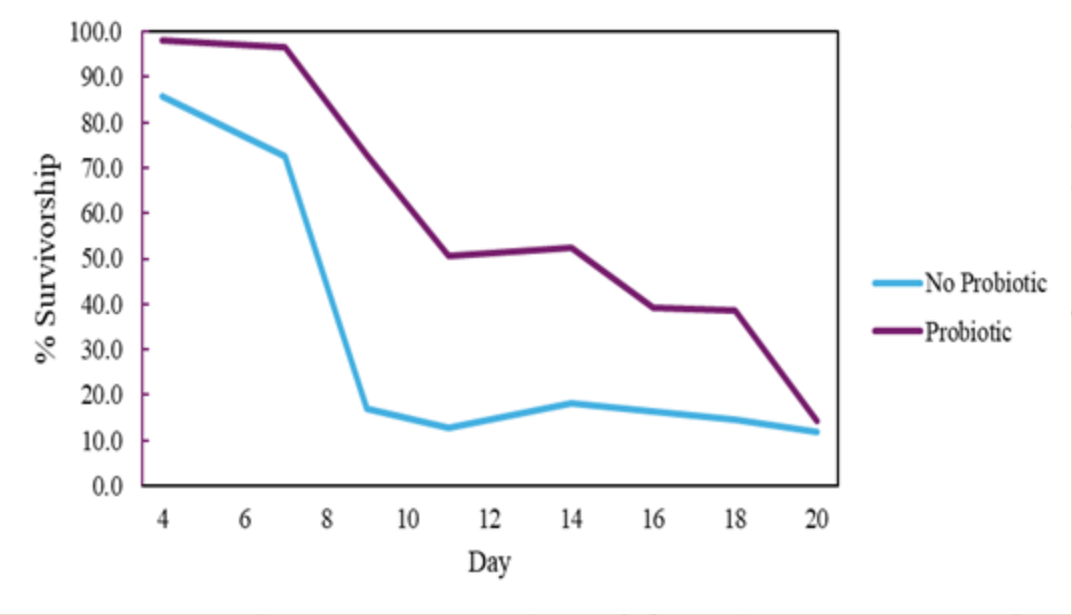
Results

Percent Survival



-Initial Survival both groups: high

-Probiotic group maintains higher survival throughout the entire study

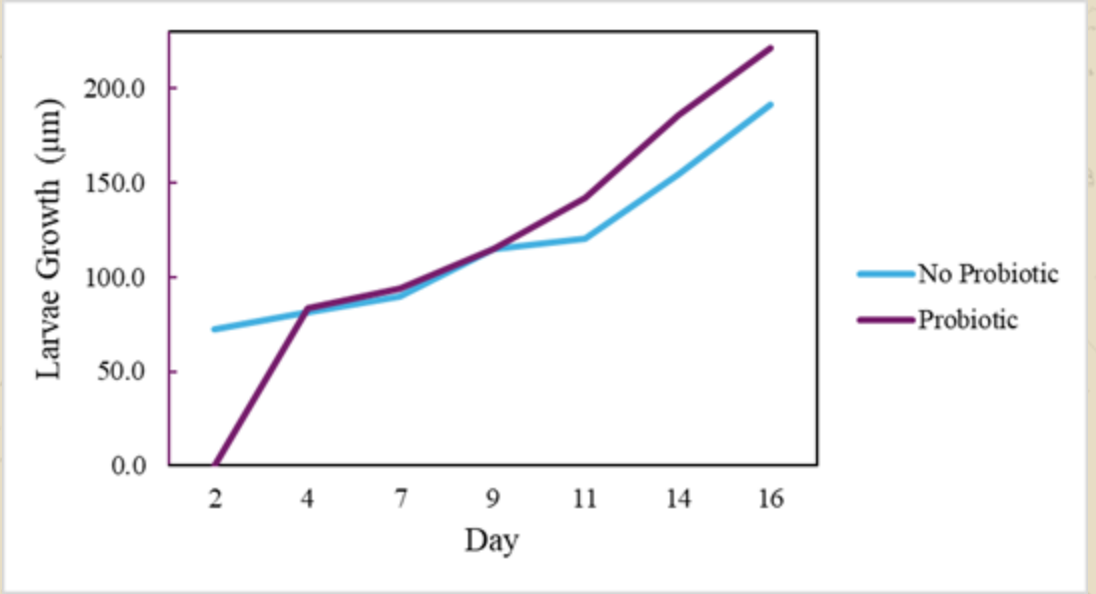
-Day 20: probiotic group has a survival rate ~1.5x higher than the non-probiotic group

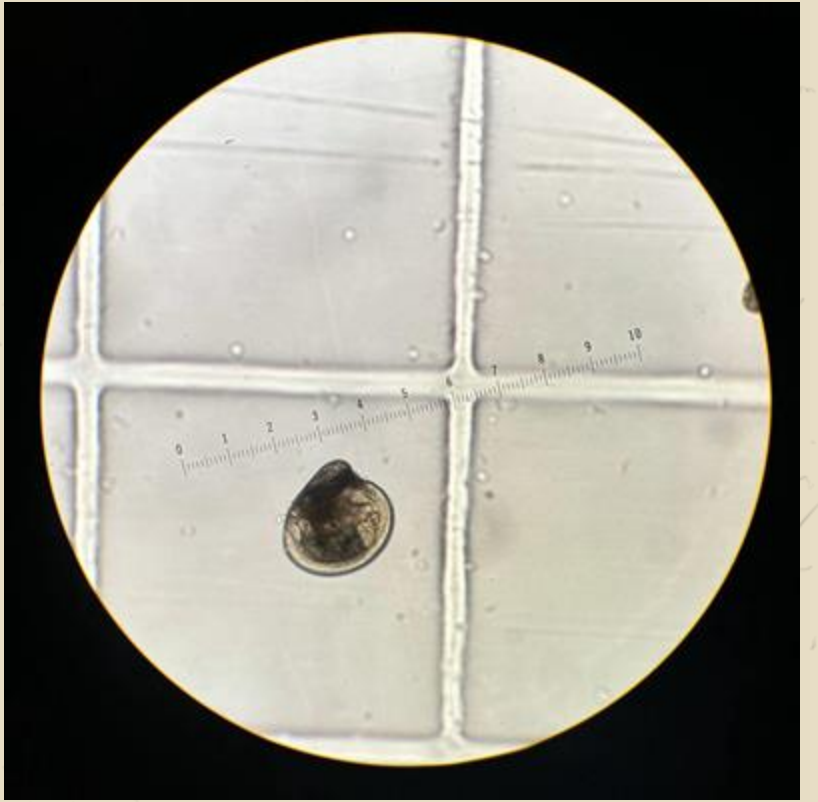
Growth Rate

-Probiotic group starts lower but catches up by day 4

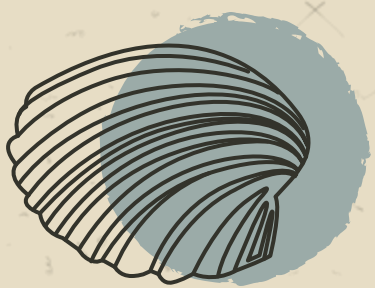
-Day 11, probiotic group shows faster growth

-Able to harvest probiotic group at day 16





Harvest Size



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Discussion

Conclusion

Addressing Larval Crashes

Reduce crashes and increase larval survival to setting stage

Importance of shortening days to harvest

Probiotic Effects

Survival: increased survivorship

Growth: accelerated development in probiotic group

Egg Quantity vs. Egg Quality

Egg Quantity over Egg Quality in this study (go female 28!)

Group 2 and 3 did not make it to harvest

Future work required to truly determine those results

Only one female scored a 3

Broodstock – naturally conditioned

- Did not control feed amounts or temperature
- Prime spawning is at the end of May and early June
- Experiment ran through the end of July

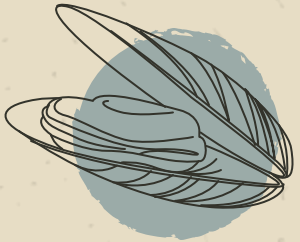
Environmental Adaptations

Oyster larvae struggle below 10 ppt salinity

Chesapeake Bay is having a low salinity year

Solution: Added salt to water (12ppt)

Result: increased oyster production in low salinity conditions



Key Takeaways and Future Directions

1. Probiotics show promise for improving survival and growth

1. Egg quantity over quality in this case

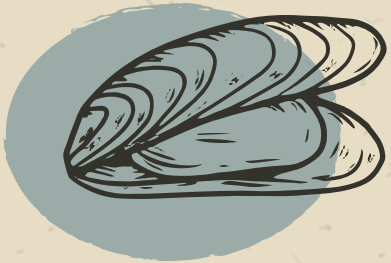
1. Potential for salinity management in oyster aquaculture

35,377

Individual larvae counted

124

White Boards cleared



Tetraselmis

Favorite Algae

Citations

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THANK YOU!