Recycling Spent Brewing Yeast as a Shrimp Feed Supplement

John Denvir

Faculty Advisor(s): Dr. Emily Ralston, Dept. of Ocean Engineering and Marine Sciences, Florida Institute of Technology

Introduction

The aquaculture industry relies heavily on commercial fish feed, which accounts for over 50% of production costs and limits farm profitability worldwide[1]. Breweries generate about 3 gallons of high-strength wastewater per gallon of beer produced, much of it discarded as an oxygen-depleting pollutant from spent yeast[2]. Therefore, this project tests recycling spent brewer's yeast into a sustainable fish feed supplement to cut aquaculture costs and divert brewery waste from waterways, promoting circular food systems.

Objectives

1. Processed spent brewer's yeast into a stable, nutrient-dense solid suitable as a feed ingredient or supplement for shrimp aquaculture.
2. Fed shrimp diets with varying concentrations of yeast and compared palatability and survival rates to those on 100% Zeigler SI commercial feed.

Methods

Processing Yeast

- Spread spent brewer's yeast thinly on silicon trays and dehydrated at 140°F (60°C) for 8 hours to yield a dry product for mixing with commercial feed.
- Ground the dry yeast and commercial feed and stored both in airtight containers.
- Weighed and mixed at 10%, 20%, and 30% yeast-to-feed ratios, and processed into pellets.

Feeding Experiment

- Tested four feed treatments (0%, 10%, 20%, 30%) with 3 randomized replicate tanks per treatment, each holding 4-5 shrimp of similar size and age.
- Controled salinity, temperature, light, and aeration.
- Fed ¼ teaspoon of the corresponding pellets for each treatment group up to 4 times a day.
- Monitored daily for behavior, palatability, feeding, illness, and regular water quality monitoring.
- Compared survival rates, observed behavior, and palatability among treatments.

Results

Processing Yeast

After collecting several gallons of spent yeast from Intracoastal Brewing Company, thin layers were spread on silicon trays before being put in a dehydrator set to 140°F (60°C) for 8 hours (Figure 1).

Figure 1: Spent yeast spread on trays before being dehydrated.

This dry product was mixed with commercial shrimp feed and pelletized, before being stored in jars.

Feeding Experiment

Initially, shrimp fed pellets with higher concentrations of yeast consumed more than those with standard feed. These results were consistent during the entire week of the trial. Table 1 outlines the overall observed behavior during feeding.

Table 1: Average observation in shrimp with each treatment.

Observation	0%	10%	20%	30%
Initial Excitement	Slow	Moderate	High	High
Feed Consumption	None	Moderate	Complete	Complete
Activity Level	Lethargic	Some Activity	Active	Active
Leftover Food	All	Moderate	None	None

Not only did the shrimp prefer the higher yeast content, they required it. The 0% control treatment tanks refused to eat the food, spitting it out or choosing to eat algae forming on rocks instead. They also actively avoided the food, moving to other areas of the tank. All of the 0% feed remained uneaten until manually removed from the tank. In the 10% tanks, there was slightly increased activity. The shrimp lacked excitement and while some of the food was consumed, about half was left uneaten.

Results (cont.)

Shrimp in tanks with 20% and 30% feed showed similar results. They quickly moved to any area with food introduced and ate it rapidly. Both were visually much more active than the 0% treatment, which grew lethargic over the trial, as shown in Figure 2.

Figure 2: 0% (left) and 30% (right) moments after being fed.

Conclusion

A massive limiting factor in sustainable aquaculture is the cost of feed for fish and shrimp. The initial results of this study have shown that spent brewers yeast is a free and effective supplement to help reduce costs. Due to the short nature of these trials, a longer study is suggested starting with a different commercial food. Based on the results, it may be feasible to increase yeast ratios for shrimp. Pompano, which were in a nearby tank, found yeast palatable and could be considered in future studies. Future trials will aim to reduce cost in aquaculture as much as possible.

References

1. Digested Organics, 2020. Modern Brewery Wastewater Treatment Solutions
2. SEAFDEC, 2024. Development of cost-efficient feeds

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