

Physiological Responses of American Lobster (*Homarus americanus*) to Pork vs. Fish-Based Bait Diets

Danny Lee, Class of 2025

Last fall, I had the incredible opportunity to conduct an independent research project through the Bowdoin Coastal Studies Semester (BCSS), comparing the physiological impacts of pork versus fish bait diets on the American lobster (*Homarus americanus*). Over a six-week feeding period, I evaluated escape behavior, metabolic rates, claw strength, and righting reflex in 30 juvenile lobsters. The results revealed significantly negative impacts of a pork diet on lobster health and performance. Many lobsters in the pork diet group exhibited lethargy or moribund behavior and showed poorer performance in the assays. Notably, several chose to starve rather than consume the pork feed, and one died. In contrast, lobsters fed a fish diet displayed no apparent impairments by the end of the study.

This summer, I collaborated with my current advisor, Jaret Reblin, to further investigate these issues and their potential implications for lobster health, ecology, and the lobster industry. Our 8-week study involved 99 lobsters with carapace sizes ranging from 46 mm to 92.6 mm, divided into three diet groups: fish, pork, or mixed (both diets). We assessed claw strength, righting response, total blood protein concentration, heart rate, molt stage and aggression. Preliminary observations suggest that the pork-fed lobsters continue to exhibit similar trends to those from my pilot study. Seven lobsters died during this study: three pork fed, two mixed fed, and two fish fed. While data collection and analysis are ongoing, I plan to continue this research as an honors project during the upcoming school year to further explore the impact of bait diets on lobster health.

Addressing bait type and its use in the lobster industry is crucial for ensuring sustainability and future viability. Although pork hide is cheaper, more durable, and more convenient compared to highly regulated and expensive fish bait like herring, my studies strongly suggest it may pose serious health risks to lobsters. Studies indicate that lobsters' gut contents can consist of approximately 80% bait, and isotope analysis shows that 70% of their tissue derives from bait. Additionally, sub-legal lobsters consume about 25% of all bait while spending significantly more time in traps than adults. This is concerning because juvenile lobsters, which take about 7 years to reach legal harvesting sizes, are at risk of developing health issues or even dying. Future lobster stocks could be at risk, potentially leading to significant economic losses for the lobster industry. Given these findings, it is essential to re-evaluate the use of pork hide as bait and assess its potential negative effects on lobster health, ecology, and the broader impact on Maine's iconic industry. Further research and replication are needed to fully understand the underlying causes of these health issues and their physiological impacts.

This case study serves as a preliminary exploration into making the lobster industry more sustainable. It underscores the urgent need to scrutinize and potentially adapt current practices for long-term ecological and economic viability. Beyond the scientific curiosity driving this research, its significance extends to practical implications for the lobster fishing industry. By comparing the outcomes of lobsters fed pork hide and fish diets, the study aims to provide a deeper understanding of the potential risks associated with this alternative bait source.

The ultimate goal is to contribute to the development of sustainable and responsible practices within the industry, navigating uncertainty and filling gaps in our understanding. These insights, grounded in empirical evidence, aim to safeguard the long-term health of lobster populations and secure the economic viability of this vital sector in Maine. My research aspires to be a catalyst for a more informed and sustainable future for lobster fishing.

Faculty Mentor: Jaret Reblin

Funded by: Henry L. and Grace Doherty Charitable Foundation Coastal Studies Research Fellowship



