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An Alternative Bait Package for the Lobster Fishery – Award #04-816

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Herbert Hodgkins of Lobster Products, Inc. and Manildra Milling Company were collaborators in early stages, but left the project before completion.

Abstract

The Lobster Institute, in conjunction with Lobster Products, Inc. developed an effective formula for a soy-based bait. Initial studies using polymer carriers for the bait revealed that this type of carrier was too costly and cumbersome to be market-friendly. Our next step was to convert the bait from its then mealy paste-like consistence to a pellet form, striving to achieve the appropriate leaching and longevity characteristics needed for successful lobster bait. We then recruit licensed commercial lobstermen to boat test these pellet prototypes in order to observe their efficacy under commercial fishing conditions. We were not able to reproduce the efficacy of the bait in its paste-like form.

The Lobster Institute then partnered with Saltwater Marketing and Blue Seal Feeds and essentially started over in looking for the appropriate binder- attractant combination. Work began with funding from a Maine Technology Institute grant ($82,000) received by Saltwater . The research and development staff of Blue Seal Feeds also worked on this project. Fishermen were recruited from Beals Island to Kittery to test the product as it evolved. As a result of this project, a commercial bait product, Clawdia's Secret, was launched in October 2007 and is currently being sold by Blue Seal Feeds. The bait extender lasts 12-14 days and is used in combination with fresh bait.

Introduction

The American lobster (*Homarus americanus*) is one of the most valuable and highly prized species harvested in the Gulf of Maine. U.S. landings for the American lobster in recent years are in the 66,000,000 – 88,000,000 pound range annually, with a value in the $423 million range. In Maine alone, a state that accounts for over 70% of the lobster landed in the U.S., landings for 2007 were estimated at 56 million pounds with a dollar value of $248,000,000(Maine Department of Marine Resources).

Currently, the lobster industry relies on harvesting of natural populations in a large-scale operation with over a million trap hauls per day, using fish for bait. Presently, the most effective and widely used bait for trapping lobsters is herring (*Clupea harengus*). Estimates are that between 700-800 million pounds of herring are used as bait in the United States and Canada alone, with herring sales near the $219 million mark. Price-per-pound of herring in Maine has risen from $0.02 in 1966, to $0.06 in 1986, to $0.09 in 2006. The decreasing supply of bait at a reasonable cost will have an obvious impact on Gulf of Maine lobster fisheries. The price in Maine for baiting lobster traps with herring can fluctuate between approximately 30 cents to 90 cents or more per trap – depending on availability.

Obtaining a sufficient supply of bait is a challenge constantly being faced by lobstermen in the Gulf of Maine. Lobstermen rely heavily on herring for bait. As we have shown, prices are rising and supplies are often "just in time". The herring stocks are being stretched and landings have been in decline. The need to secure an alternate bait or extend the bait supply has never been more pressing.

There are three primary issues that support the development of alternative baits or bait extenders for lobster.

- Increasing costs and limited supplies of herring
- Limited shelf life of the herring. Lobster fishermen observe that herring lasts in the traps for a period of only 2-3 days. When the fishermen cannot pull their traps for prolonged periods due to bad weather, fish bait becomes inactive after the first 2-3 days and the traps become non-functional. In addition, diseases presumably associated with the use of herring as bait have been detected in Australia (J. Fitzhardinge[*], personal communication).
- Herring that is being used for bait could be marketed for consumption by people, adding value to the herring catch. [In Maine it is estimated that 60% of the herring harvest is used for bait (Maine Department of Marine Resources).]

Formulating effective alternative baits would alleviate these key problems currently experienced with fish baits. Included in this process could be the development of a suitable means for packaging the bait that would dispense the attractant at appropriate levels over an extended period of time.

The primary end-users of this alternative bait would naturally be lobstermen in the Gulf of Maine and other areas that fish for the American lobster. In addition, with formula re-adjustments in the future this bait could be adapted for other lobster as well as crab fisheries, thus making it a significant export product from this area.

According to the 2005-2006 State of the Fisheries Report, landings for the Western rock lobster for the period average approximately 24.3 million pounds annually; generating around $259 million, primarily in export income (Government of Western Australia, Department of Fisheries - HP). In Australia, the herring used for bait is imported from Europe, which is more inclined than the United States to use herring for human consumption. As in the United States, satisfactory fish bait is often in short supply and is increasingly expensive.

As crustaceans, crab and lobster and have many similarities. While the attractants for lobster and crab are somewhat different, it is likely that only slight modifications in our bait formula should be required to make it effective for the crab fishery. In New England, the primary crab species fished is the Rock crab (*Cancer irroratus*), and in Atlantic Canada the snow crab (*Chionoecetes angulatus*). Again, herring is the primary bait for these fisheries (squid is also used as bait for the snow crab). The Atlantic snow crab fishery is predominantly found in Newfoundland, and generates approximately a half billion dollars annually there. According to the Canadian Department of Fisheries & Oceans, in 2006 the crab fishery in Atlantic Canada saw landings of 216 million pounds, with a Canadian dollar value of $222 million. Bait sales for this fishery alone top $15 - $20 million (Philip Walsh, personal communication).

It should also be noted that other alternative baits can be found on the market. Until recently animal hide-based products were one of the few on the market. They originally met with some commercial success, but have fallen out of favor due to environmental concerns. Some fishermen cited questions about potential health impacts and consumer dissatisfaction due to finding undigested cow hair in lobsters as reasons to avoid using hide baits. In fact, in Australia the use of any bovine (cattle) derivative, animal hide or hair covered bait product is prohibited in both the commercial and recreational rock lobster fisheries. (Government of Western Australia, Department of Fisheries)

Project objectives:

The goal of the project was to reduce the reliance on herring as the primary bait for lobster. The hypothesis that was tested by fishermen was that an alternative lobster bait could be used in place of or in addition to herring as an extender. To test this hypothesis, lobstermen fished with various formulations of test baits along side herring in a commercial fishing setting. The fishermen were paid to test the bait.

Creating a long-lasting product, and one with an effective attractant were prime objectives. In developing commercial partnerships with Saltwater Marketing and Blue

Seal Feeds, additional financial support for the project was obtained that equaled the funding from the Northeast Consortium.

Methods:

Several rounds of prototypes were produced during the early stages of this project. These prototypes were first tested in the laboratory for durability in a saltwater tank and then field-tested by lobstermen in a limited number of traps. Lobstermen documented data on both the product's attributes related to attracting lobsters and its durability in traps. This took some time due to weather conditions and a lull in fishing during winter months. As it become available, this information provided important feedback for project participants to continue refining formulas and improving upon them.

A test trap was also placed off of a dock in Portland where a series of durability tests were conducted. Five different binding formulations were tested.

Work continued primarily on finalizing the binder system used. Water temperatures/ depth seemed to affect field-testing results. Two of our testers field-tested two prototypes both made with the same basic attractant ingredients but two different binding approaches. Based on these results, it was decided to zero in on one binding approach that would be field tested by four testers spread out across the Maine coast. Three different levels of binding materials were used with the same level of attractant ingredients in each prototype sample. These samples were sent to the field testers.

Results & Future Research:

Initially, based our preliminary bait testing, a soy-based product was planned. Commercial scale up of this product was not successful. The ingredients used in our new bait product, fish protein and marine plant products, are readily available and reasonably priced. As noted, the product is now available commercially, and is currently fishing at about a 70% rate of effectiveness as compared to herring. Continued research is planned by Blue Seal Feeds to improve this rate.

The primary advantages to fishing with herring are that it works well – it is a proven commodity that the fishermen are comfortable with and have come to rely on – and it can be inexpensive when supplies are good. Though, as noted before, the trend is toward rising prices and fluctuating supplies. Initially our alternative bait will not be a total replacement for herring. As long as herring is available and the cost is not prohibitive it will continue to be used. Rather, our alternative bait can be used as an extender in combination with herring to help stretch out the supply, and can be used during periods when prolonged soak-time is desired. It will also be positioned as a substitute for herring during times when herring is not available. Our alternative bait is strategically poised to fill the void should herring supplies become too scarce or too costly.

Student participation:

In the early stages of this project, two University of Maine undergraduates developed an underwater video system to study how lobsters respond to various bait formulations. One was a student in Marine Sciences the other was an Animal and Veterinary Sciences major.

Also, a graduate student assisted in compiling the list of fishermen (with their contact information) who were recruited as bait testers.

Published reports:

www.clawdiassecret.com

Images: