

BAY SCALLOP AQUACULTURE AND MARKET DEVELOPMENT PROJECT

The goal was to develop, test, and compare two packaging systems for live bay scallops in terms of maintaining product quality and safety, introduce the live product in the selected packaging system to restaurants on Martha's Vineyard and Nantucket, and evaluate its acceptance and effectiveness. The project demonstrated that live bay scallops can be packaged to provide restaurants a high quality product with a shelf life of 4 to 5 days. The product was well received by restaurants and by restaurant patrons who appreciated the educational and promotional information provided on 'doggie bags' used to carry the scallop shells home. Bay scallop aquaculture is very site specific and although the project site was eventually deemed unacceptable for growing bay scallops, the site can be used to produce seed up to one inch for sale to other growers.

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FEDERAL-STATE MARKET IMPROVEMENT GRANT PROGRAM

Project: BAY SCALLOP AQUACULTURE AND MARKET DEVELOPMENT

Final Report

The overall goal of this project was to develop the market and appropriate packaging/shipping technology for live bay scallops to expand and diversify the Massachusetts and East Coast aquaculture industry.

SUMMARY

This project demonstrated the feasibility of marketing cultured live bay scallops to white tablecloth restaurants. Live bay scallops can be packaged to provide a high quality product with a shelf life of 4-5 days requiring twice-weekly deliveries to restaurants. The product was well received and restaurant personnel were easily trained to handle the product to maximize quality and shelf life. Educational materials promoting scallop aquaculture were developed and most restaurants distributed these materials to customers that requested a “doggie bag”. The concept of printed doggie bags to distribute information should be expanded by the industry.

Bay scallop aquaculture is extremely site specific, requiring a site with minimum biofouling. After three years of bay scallop culture, our project site has been determined to be unacceptable for growing bay scallops to market due to high biofouling. The site can be used to produce seed up to one inch.

Several shellfish growers have requested bay scallop seed from our facility. We are optimistic that live bay scallop culture and marketing can be expanded. Urban areas with a year round restaurant business should be targeted for marketing this product. Marketing to seasonal tourist restaurants may be difficult due to the seasonality of this product.

WORK COMPLETED

Task 4.i. Produce 100,000 bay scallop seed in hatchery facility

Approximately 100,000 bay scallops were produced in the hatchery in June. The scallops were transferred to our nursery raceways on June 16. A second spawn took place June 21 and provided additional scallops as a backup to the first spawn.

Task 4.j. Prepare growout gear

Approximately 200 strings of six pearl nets per string were prepared during the month of June. Preparation involved tying the pearl nets into strings of six, tying a weight on the bottom and preparing closures made of 300lb monofilament.

Task 4.k. Stock bay scallop seed (using barge) into pearl nets and/or oyster bags

On June 24 the (approximately) 1mm scallops were placed in a bin with handi-wipes on the bottom as attachment substrate. On June 25 the bay scallops were stocked in pearl nets at a density of approximately 200 per net by cutting the Handiwipes into approximately 2” squares and placing these squares (with attached scallops) into the pearl nets.

Task 5.g. Maintain appropriate stocking densities for scallops in growout system (using barge)

In September the scallops were thinned into appropriate stocking densities for final growout. Stocking density for scallops that were 20mm or greater was reduced to approximately 33 scallops per pearl net. Severe weather damaged many of the scallops in the culture system and extreme fouling rendered many of the scallops inappropriate for growout to market. However, over 5,000 scallops were thinned out for growout to market size.

Task 5.h. Monitor scallops for growth, survival, etc. (using barge)

Scallops initially stocked in pearl nets exhibited 70-95% survival (other than losses from weather related damage to culture gear) and the majority had reached one inch in size by mid-September. The scallops thinned out for growout to market also exhibited very good survival.

Task 6.a. Purchase packaging materials (of the better packaging system) for scallop sales (from Task 2, d and e)

Samples from several packaging companies were requested in an effort to locate a correctly sized plastic tray. These products are made for the fruit and vegetable industry and, did not match the size requirements for a scallop. All trays had depressions deeper than the thickness of a scallop and were inappropriate for packaging the scallop to increase shelf life. Since the 2003 shelf life trials showed equal shelf life from the layered pack with absorbent pads in one gallon buckets, this system of packaging was chosen for the marketing test.

Task 6.b. Harvest bay scallops (using barge)

In November 2004 scallops were harvested from the pearl nets for introductory presentations to restaurants. Harvesting was done using the barge to lift up the longlines and individual scallops were removed from the pearl nets by hand. Harvesting was done only on a demand basis. After an order was placed scallops were harvested, immediately packed and delivered the same day to the restaurant.

Task 6.c. Introduce live bay scallop product and educational materials to 20 restaurants on Martha’s Vineyard and Nantucket (requires travel, truck use, telephone)

By November, many of the white tablecloth restaurants on Martha’s Vineyard and Nantucket had closed for the season. Five white tablecloth restaurants (Zephyrus, Park Corner Bistro, Alchemy, L’Etoile and the Coach House) remained open on Martha’s Vineyard and these were selected for the marketing test. We did not include Nantucket restaurants due to the number of market scallops available. We calculated 5000 scallops would provide product to five restaurants for approximately 6 weeks. Limiting a restaurant to less than 1000 scallops would

negatively affect the acceptance of the product. The scallops were packed in a gallon bucket and personally introduced to the Chef of each restaurant. Every restaurant expressed an immediate interest in purchasing the scallops. In addition, each restaurant agreed to use the educational doggie bags. Two of the restaurants were very interested in using the doggie bags, saying that they would be a definite improvement over the generic product they currently used. It was difficult to determine exactly how many doggie bags were distributed to customers. Although conversations with restaurant personnel indicated that perhaps half of the customers ordering scallops received the educational materials.

Task 6.d. Train restaurant personnel during first delivery of live bay scallops product

Deliveries to the restaurants commenced the week following initial introduction. During the first delivery the method of handling and storing the product for quality and shelf life was explained to the Chef and usually his sous chef or assistant. These were the only two people at each restaurant that handled the scallops. We found the restaurant personnel at these restaurants to be very knowledgeable and very interested in maintaining a quality product. They instantly understood the reason for special handling and had no problem with following the necessary procedures to maintain shelf life of the scallops. They were also very interested in the culture methods and systems used to grow the scallops.

Task 6.e. Sell live bay scallops with educational materials (requires travel, truck use, shipping, telephone, office supplies, invoice/postage)

Sales began the week following initial introduction and were mostly limited to weekends. At this time of year, the majority of the restaurants were only open two or three nights a week during the weekend. All of the restaurants ran the live bay scallops as a special when they purchased them. The restaurants had finalized their fall menu before they were introduced to the product and were unwilling to change their menus. However, they did enjoy selling them when their business allowed them to purchase the scallops. Some weekends (early December) their business was slow and they did not purchase any scallops. Most of the restaurants remain open until Christmas or New Year's and then close until late Spring.

PROBLEMS ENCOUNTERED

Severe Weather

We experienced very high winds (in excess of 60 mph) late in the summer that caused damage to the scallop culture gear. Typically, only hurricane force winds will damage gear, but the extreme biofouling of the pearl nets experienced at our site exacerbated the effect of the wind. The extra weight of the biofouling compromised the structural integrity of the pearl nets and the wire frames were damaged by the wind.

Biofouling

For the past two years we have experienced extreme biofouling at this site, mostly from tunicates commonly called "sea grapes". The tunicates build up on the outside of the nets restricting water flow and food availability to the scallops. During the first two months of culture, the scallops grow to one inch in size. Although the fouling builds up on the nets, the scallop shells remain clean. The scallops are then thinned out and transferred to clean culture gear. In previous years we transferred the scallops to a larger mesh bag placed in a cage. However, the large mesh allowed the tunicates to grow on the shells of the scallops thus

rendering them unsuitable for market. (The colorful scallop shells are a major attribute of this product and shells with tunicates growing on them are undesirable.) This year we tried thinning the scallops out for final growout in to the small mesh pearl nets to see if the small mesh prevented biofouling on the shells. Although this reduced fouling on the shells slightly, the small mesh also reduced the growth rate of the scallops. We have concluded that our leased site is unsuitable for growout of scallops over one inch due to the biofouling problem.

Seasonal Martha's Vineyard Market

The scallops were very well received by the restaurants that remain open in the fall here on Martha's Vineyard. Unfortunately, the tourist season is ending during this period and the restaurants that do remain open are mostly open only on the weekends and are relatively slow at this time of year. While this reduced potential sales initially, we think that once a restaurant has used the product, the following year the restaurant will anticipate its availability and commit to scheduled weekly purchases.

RESULTS

The overall goal of the project was to develop the market and appropriate packaging/shipping technology for live bay scallops to expand and diversify the Massachusetts and East Coast aquaculture industry.

The project goal was achieved. The project proved: that a packaging system using layered absorbent sheets will maintain quality product for four days when the product is handled correctly; that restaurants readily accept the product; and that it is likely that other growers could produce bay scallops for sale to white tablecloth restaurants. It must be emphasized that site selection to reduce biofouling is critical to the success of an operation that wishes to grow and sell live bay scallops.

Objectives

1. Produce 100,000 bay scallops

The Wampanoag Aquinnah Shellfish Hatchery produced over 100,000 bay scallops for growout to market size. The number produced for market was much less due to weather damage and biofouling.

2. Develop packaging/shipping methods for increased shelf life

See 2003 Report

3. Develop local market for live bay scallops

- a. Personal demonstration to local restaurants/chefs was accomplished
- b. Restaurant personnel training was accomplished at the restaurants purchasing scallops.

- c. Twice weekly deliveries were offered to the restaurants, but the seasonal hours of most of the restaurants determined that once weekly orders for use over the weekend were desired.

- d. Education/marketing materials for end customers. Take home “doggie bags” with information about the product and shellfish aquaculture were provided to the restaurants. It appeared that at least two of the restaurants used the bags, but actual quantification of the number of bags used was difficult to determine.

Use of Project Results by Massachusetts Industry

Interest in culturing bay scallops in Massachusetts is high according to the number of inquiries we have received for bay scallop seed since we first presented the project results last year at aquaculture meeting(s). WASH plans to provide bay scallop seed to interested growers and we have already discussed the biofouling issues with potential culturists. We plan to continue this information transfer with any interested bay scallop culturists.

In addition, the educational “doggie bag” has elicited much attention. WASH plans to present this idea to industry associations to see if a large volume of educational “doggie bags” could be printed by an industry association and provided to members for distribution to their customers, perhaps with generic shellfish aquaculture educational material.

Economic Impact

This project had a slightly negative economic impact on our business, solely due to the damage caused by severe weather and loss of marketable product due to biofouling. However, we feel that the culture and sale of live bay scallops holds much promise for the Massachusetts industry if the culturists is careful in their site selection and provides personal attention to marketing and restaurant personnel training. In addition, WASH plans to produce bay scallop seed for sale to interested culturists in Massachusetts and other New England states.

Outreach/Education

The educational material produced for this project was very effective in educating the customer. The restaurants were pleased with the doggie bag and most committed to using them for their scallop customers. The presentation(s) at aquaculture meetings relating our 2003 results elicited a great deal of interest and resulted in many inquiries for bay scallop seed. As a direct result of our presentation at the 2003 annual World Aquaculture Association meeting, two aquaculture publications have requested articles on this project. We hope to have these articles published in 2005.

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Progress Report II

Task 1.d. Stock bay scallop seed (using barge) into pearl nets and/or oyster bags

This activity (delayed during Period I due to permitting issues) was accomplished in mid-July. 100,000 seed bay scallops were stocked using pearl nets and/or cages. Stocking density in pearl nets was 100 2mm scallops per net. Stocking density for the cages (10 oyster bags per cage) ranged from 100 to 500 scallops per bag.

Task 2.a. Maintain appropriate stocking densities for scallops in growout system (using barge)

In mid-September, approximately two months after initial stocking, the scallops in pearl nets were graded with the shellfish grader and transferred to cages at a density of 100 (one inch) scallops per oyster bag for final growout.

Task 2.b. Monitor scallops for growth, survival, etc. (using barge)

Scallops initially stocked in pearl nets exhibited near 100% survival and the majority had reached one inch in size by mid-September. Scallops initially stocked in cages had grown well, but were extremely fouled with tunicates. The extreme fouling prevented an accurate estimate of survival or growth rate.

Task 2.c. Purchase initial packaging materials, cold storage unit

Packaging materials were ordered the third week of October after the first FSMIP payment was received. As of this writing we have received some of the packaging materials and await shipment for the balance of the materials. In lieu of purchasing a cold storage unit, we secured an entire facility that included a cold storage unit, stainless steel counters, three stainless steel sinks, cement floor with drain, and walls of an impervious surface. In short, everything necessary for an inspected wholesale facility was included in the negotiated rental agreement. The facility was inspected by State Department of Public Health and we are fully permitted to pack and ship shellfish from the facility. We are requesting a line item change of the funds allocated to the cold storage unit (\$5,000) to go towards rental of the packing facility.

Task 2.d. Develop two packaging materials

As soon as the balance of the materials (see 2.c.) is received, the packaging systems will be completed. We were successful in the most difficult sourcing activity – finding a cardboard insert for an insulated box with depressions for the scallops. In fact, we have located all materials necessary for the packaging systems and only await shipment to complete this activity.

Task 2.e. Compare scallop shelf life in each packaging system.

As the two previous activities were delayed due to late payment of FSMIP funds, this activity will be undertaken when Tasks 2.c. and 2.d. are completed.

Task 2.f. Design and produce educational materials (doggie bags)

1000 doggie bags were purchased and educational text and logos were developed using Adobe Photoshop. The doggie bags are at the printers and should be printed within two weeks of this writing.

Planned Activity for the Next Period

Once all packaging materials are received the two systems will be compared and the better system will be used for sales of the live bay scallops. The bay scallops will be harvested and introduced to restaurants on Nantucket and Martha's Vineyard. Although later in the season than planned, many fine restaurants remain open through the Christmas season which will give us over a month for the initial test marketing of the scallops and training of restaurant personnel. Although the number of restaurants may be reduced after the Christmas season, remaining scallops that cannot be sold on either island will be introduced to off island restaurants purchasing our cultured oysters.

Arrowhead Scallops



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We hope you enjoyed these cultured scallops, grown in the clear waters of Menemsha Pond on the Island of Martha's Vineyard. The Wampanoag Tribe produces the tiny scallop seed in their shellfish hatchery. They are carefully nurtured from microscopic larvae until they reach the size of a pearl. They are then placed in nets or cages in the open water to grow. We take special care to ensure you get a fresh, clean, delicious, scallop as we have enjoyed for centuries, here on Martha's Vineyard.



Shellfish Aquaculture is good for the environment. As shellfish graze on their diet of natural microscopic plant life, filter feeding shellfish, like the scallop, play a crucial role in maintaining a balanced marine environment and help keep our coastal waters sparkling clean. As nature's own water filtration system, scallops reduce algal blooms, clean turbid water, remove nitrogen, enhance water clarity, promote eel-grass survival and provide habitat for other sea life.



Have fun with your scallop shells! After cleaning (in the dishwasher), varnish the shells and hot glue around white Christmas tree lights to provide an exciting addition to your home. Or use the shells to make necklaces, adorn picture frames, or create beautiful wreaths.

Please contact us to learn more and find out where you can purchase our aquaculturally raised live Arrowhead scallops.

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***Wampanog Aquinnah Shellfish Hatchery:
New Life For Environment, People, and Economy***

Wampanoag Aquinnah Aquaculture Enterprise

The Wampanoag Tribe of Gay Head Aquinnah (WTGHA) has cultural and historical roots closely tied to shellfish. Located on the western end of the island of Martha's Vineyard in the town of Aquinnah, the Wampanoag tribe has approximately 990 members, roughly 350 of which reside on or near their homelands on the island. Surrounded by water and a complex matrix of watersheds, the relationship with our community and our environment is paramount. Shell middens on Tribal Land surrounding Menemsha Pond dating back thousands of years attest to the long-standing importance of shellfish to the Tribe. Shellfish are traditional foods of the Wampanoag people and an important resource for all residents of Martha's Vineyard. As an island with a large tourist-based seasonal economy, Martha's Vineyard residents depend on shellfisheries as a source of income for the off-season winter months.

The Tribe is embarking on a program to restore shellfisheries in Menemsha Pond for the economic and environmental benefit of Tribal and island fishermen and the surrounding community. This program includes habitat restoration, water quality monitoring and remediation, and aquaculture. A major activity is the recent construction of the Wampanoag Aquinnah Shellfish Hatchery (WASH) and procurement of two shellfish growing sites in Menemsha Pond.

The purpose of the Wampanoag Aquinnah Shellfish Hatchery is to produce oyster (*C. virginica*), hard clam (*M. mercenaria*), and bay scallop (*A. irradians*) shellfish seed for commercial growout by the Wampanoag Aquinnah Shellfish Hatchery Corp at its two sites in Menemsha Pond, for enhancement of native shellfish populations in Menemsha Pond, and for sale to Towns or private growers. The hatchery is able to produce other mollusc species, such as sea scallops, soft shell clams, etc.; as required.

The Hatchery works with Martha's Vineyard Towns, non-profits and private aquaculturists to advance aquaculture and protect water quality. We provide employment opportunities to Tribal and community members and conduct research towards our goals of commercial aquaculture and shellfish enhancement.

Primary efforts are focused on commercial oyster culture. In July 2003 the Wampanoag Tribe of Gay Head Aquinnah began commercial oyster culture operations with seed purchased from a hatchery in Maine. One million 1.5mm seed oysters were stocked into tidal upwellers constructed on site and deployed in Menemsha Channel. This channel is the outlet to Vineyard Sound for Menemsha Pond and experiences 4 knots of tidal flow. This extreme current provides excellent growing conditions for seed shellfish and we experience a doubling in seed volume each week.

As the oyster seed grows it is removed and placed into 1/4", 3/8", or 3/4" floating oyster bags. With the growth rates experienced in the tidal upweller we are able to move approximately 500,000 oysters into 1/4" bags, 400,000 oysters into 3/8" bags and 100,000 oysters directly into 3/4" mesh size bags. These bags are deployed on a 6-acre shallow water site in Menemsha Pond.

In April of 2003 (once the permitting issues were resolved) the Wampanoag Aquinnah Shellfish Hatchery (WASH) began operations and produced several million seed oysters, hard clams and bay scallops. We placed 1.5 million oysters in the tidal upwellers and provided oyster and hard clam seed to other growers on Martha's

Vineyard. We also began bay scallop culture experiments on our 2-acre deep-water site using pearl nets and a cage system.

The oysters are routinely tumbled, graded mechanically and restocked at appropriate densities in the appropriate mesh bags. Currently we have well over 2 million oysters growing and are beginning sales of our Tomahawk Oysters. We are fortunate to have excellent water quality in Menemsha Pond. Local conservation groups and zoning laws have controlled development in the watershed and the Tribe has implemented projects to reduce harmful runoff effects from adjacent roads.

Our certified Wampanoag Environmental Laboratory conducts routine water quality monitoring, shellfish tissue sampling, and drinking water analysis.

Our next effort will focus on the bay scallop, a traditional fishery for Tribal members and the community. Towards this effort, the Tribe has already conducted a bathymetric survey and circulation study of Menemsha Pond. As funding allows, we plan to next conduct a benthic survey and then begin seeding hatchery reared bay scallops in different areas of the Pond, at different sizes, and at different times of the year combined with a comprehensive monitoring program to determine the best methods for maximizing survival and eventual population enhancement. Scallop seed will also be produced for other Town restoration efforts and for a demonstration bay scallop aquaculture project to sell live bay scallops to local restaurants.

All of our activities serve as a learning platform for Tribal and community students. A work-learn summer program has provided young members with training in marine biology, water quality monitoring, and aquaculture. Local students have assisted in advanced technology projects such as set-up and installation of a computerized weather monitoring station and development of new aquaculture systems. Future programs will provide opportunities in operation of state of the art laboratory equipment like our Atomic Absorption Spectrophotometer or Ion Chromatograph. The hatchery and laboratory are also open to the public for tours and special school projects.