



Economic Leadership

Sea Grant research leads to big improvements in oyster production

RESearchers financed by Oregon Sea Grant were looking for ways to add value to Northwest shellfish operations and create new products for them to bring to market. What they found was the “holy grail” for oyster producers.

High hydrostatic pressure (HHP) preserves and cleans the oysters, making it possible to store raw oysters longer without damaging their flavor or texture—and apparently eradicating a bacteria sometimes associated with raw shellfish. But the biggest benefit was a big surprise.

The HHP system researched at Oregon State University’s Seafood Lab in Astoria also shucks the oyster cleanly from the shell, eliminating the need to pry the shell open and scrape the meat out with a knife.

“That is probably the holy grail for oyster processors,” said Dave Nisbet, owner of Nisbet Oyster Co. in Willapa Bay, Wash., who worked with the seafood lab on the project.

HHP processing of oysters was pioneered in Louisiana and tested in Astoria. Michael Morrissey, director of the seafood lab, called it, “the most significant development in the oyster industry in the last 100 years.”

Nisbet had been working with Morrissey to develop new products that might expand the base of regular oyster consumers. When he heard about the possibilities of

HHP, he jumped at the chance to become involved.

“I was interested in shucking oyster meats mechanically . . . and from a West Coast perspective, I was looking for a way to add value to shellfish,” he said.

Morrissey’s research built on the pioneering work of food scientist Daniel Farkus, the retired head of OSU’s Department of Food Science and Technology, whom Morrissey called the godfather of high-pressure processing. Farkus had shown food could be kept fresher longer if processed under high pressure, and had worked with the U.S. Army to develop field rations with a long shelf-life. Pressure destroys naturally occurring bacteria in food that leads to spoilage.

In 2000, Morrissey and Nisbet drove a pickup load of oysters to campus in Corvallis to test them in Farkus’ equipment. The oysters were loaded into vessels, which were then sealed and brought up to pressure. Afterwards



Lynn Kerchum, OSU Extension and Experiment Station Communications

David Morrison, at the Nisbet oyster processing plant near Willapa Bay, maneuvers a stainless steel canister full of raw oysters and water into a high-pressure chamber. The oysters will be exposed to 45,000 pounds per square inch of pressure, killing bacteria and automatically shucking the oysters in the shell.

they were to be tested for the presence of pathogens and the quality of the meat. But before the researchers could test whether pathogens within the oysters had been killed, they got a surprise.

“Our jaws dropped,” Morrissey said. “All of the oysters had been perfectly shucked. It was like the holy grail of the oyster industry—a self-shucking oyster processing method.”

“It’s all done with one process,” Morrissey said. “It’s two birds with one stone.”

Morrissey had been interested in HHP since an outbreak of *Vibrio parahaemolyticus* in 1997. While Nisbet said *Vibrio* is a much bigger problem for oystermen in the Gulf of Mexico than it is in the Northwest, it is not unknown here. The 1997 outbreak caused 209 confirmed illnesses from British Columbia to California in July and August. One man in British Columbia died. Health officials linked all the cases to consumption of raw shellfish, mostly oysters.

So using the HHP system should allow oyster producers to avoid the possible stigma of the ailment. Once it is certified by the USDA (tests are ongoing at the Hatfield Marine Science Center in Newport) oyster producers will be able to advertise their product as *Vibrio* free.

Heat can also be used to kill parasites, pathogens, and bacteria, but it also cooks the meat. After testing with a range of pressures and times, Morrissey and his team discovered the optimum formula for treating the oysters while leaving the meat virtually unchanged.

“What high pressure does is really cause minimal alteration of the meat. It surprises people . . . because pressure is equalized throughout the whole organism, it kills off the bacteria but does little damage to the meat itself,” Morrissey said.

It takes about 90 seconds of high pressure to shuck the oyster, separating the meat from the shell cleanly. In three minutes, all the parasites have been killed.

It takes about 90 seconds of high pressure to shuck the oyster, separating the meat from the shell cleanly. In three minutes, all the parasites have been killed, Morrissey said.

“Getting the timing and pressure right was worked out at the lab with funding from Oregon Sea Grant. We did all of that at the seafood lab,” Morrissey said. Validation work for USDA approval of the process as an effective treatment for *Vibrio* is ongoing, with Paul Reno, an OSU associate professor of microbiology, performing the studies.

In the meantime, the first two benefits of the process were enough for Nisbet to go ahead commercially. He bought pressurization equipment for his plant with money from the Shorebank Enterprise Pacific Bank of Ilwaco, Washington, a non-profit economic development bank that funds ventures designed to improve the social and environmental conditions in rural coastal communities.

Nisbet’s equipment allows processing of small and extra-small oysters. The fresh, live shellfish are loaded into the stainless steel pressure vessels, which are then filled with water and brought quickly up to high pressure—42,000 pounds per square inch—in a matter of about 10 seconds.

People expect there might be danger of explosion at that pressure, but Morrissey said that’s not the case. Water is much denser than air and doesn’t compact as much, so at worst there would be a cracked vessel, but no catastrophic explosion.

Nisbet bands the oysters before pressurizing them. The thin blue bands keep the shell closed and give him a distinctive product to sell. His Goose Point blue-banded oysters can be used the same as raw oysters and have a longer shelf life. They can be stored up to a week with no loss in quality.

The banded oysters can be used just as fresh raw oysters are, Morrissey said. Goose Point also sells oyster meat in 10-ounce jars. Pressure-treated oysters are sold in half-gallon containers to the restaurant market. Quality and ease of use are its two main selling points.

“After the pressure treatment shucks the oyster in the shell,” he said, “all the consumer has to do is cut the band to have a dozen oysters on the half-shell for a Saturday night dinner party. These have become very popular in California.”

OREGON STATE
U n i v e r s i t y