

Fresh, Local is Preferred

Ensuring the Quality of Wild-Caught Shrimp

A new university study validates what many North Carolina coastal residents already know — fresh, wild-caught shrimp are more appealing and appetizing than their frozen, imported cousins.

When asked for a preference, 60 percent of consumers surveyed significantly preferred the wild-caught shrimp over the farm-raised shrimp.

In 2007, scientists at the Sensory Service Center at North Carolina State University conducted a comparative evaluation of perceived differences and preferences by consumers of two kinds of shrimp:

- 36 to 40 count per pound, farm-raised, frozen, white shrimp (*Penaeus vannamei*) from Ecuador, and
- 36 to 40 count per pound, fresh, on-ice, wild-caught shrimp (*Litopenaeus setiferus*) harvested from overnight trawlers in Carteret County.

Study panelists were not told what type of shrimp they were eating. Yet 60 percent expressed a preference for the wild-caught shrimp over the farm-raised imports. Many commented on the sweetness and full flavor of the wild-caught shrimp.

This suggests there is room in local and high-end niche markets for wild-caught shrimp, in part, because of its distinctive flavor. Such a possibility could provide a boost for North Carolina shrimpers in a market where prices for domestic, wild-caught shrimp have declined significantly during the last decade, as lower-cost, farm-raised imports gained a greater share of the American market.

Farm-raised shrimp now set the standard

for quality in the United States and around the world. To maintain freshness, farm-raised shrimp are moved directly from ponds to vats of slush ice to achieve a rapid “chill-kill.” Within hours, the shrimp are individually quick-frozen or are frozen in blocks before being distributed to international markets.

Although consumers find the wild-caught shrimp more appealing, its sensory appeal depends a great deal on how product is handled aboard harvest vessels.



Domestic, wild-caught shrimp are harvested on some fishing vessels that may trawl for three hours or more and collect hundreds of pounds of wild shrimp in their nets. The weight of a very large harvest can break or crush shrimp at or near the net's center. And the longer a catch remains in warm water, the more susceptible it is to bacterial spoilage, which can compromise the texture and flavor of shrimp. Researchers addressed these problems in the following studies.

To enhance the quality of wild-caught shrimp from fishing trawlers making multi-day trips in the Gulf of Mexico, seafood technologists at Texas A&M University developed batch-handling techniques to process shrimp in more manageable batch sizes. The new handling practices included

North Carolina Shrimp

North Carolina's commercial shrimp fleet is composed of primarily overnight trawlers that fish internal waters in the state's southern coastal region and in the tributaries of larger water bodies in the state's central and northern coastal regions. Both overnight and multi-day trawlers fish the Pamlico Sound, Core Sound, Atlantic Ocean as well as the Neuse, Pamlico, Pungo and Bay Rivers.

Unlike other South Atlantic coastal states that typically harvest only one or two species, North Carolina watermen are fortunate to catch three species of shrimp. Pink shrimp, called "spotted" (*Farfantepenaeus duorarum*), are generally harvested from April to June. White shrimp (*Litopenaeus setiferus*), commonly called "green tailed," are generally available for harvest from August to November. Brown shrimp (*Farfantepenaeus aztecus*) are typically harvested in the late summer and fall and account for two-thirds of the shrimp landed in North Carolina.

Approximately 51 percent of North Carolina's annual harvest comes from the Pamlico Sound, 24 percent comes from the Atlantic Ocean and 10 percent is caught in Core Sound. The remaining 15 percent of shrimp landings come from the Atlantic Intracoastal Waterway and other inland waters.

shortening tow times to minimize physical damage and adequate icing or on-board quick freezing, to minimize bacterial spoilage. Research showed that harvesting and processing shrimp on board boats in small batches produced a visual and textural quality consumers recognized.

North Carolina Sea Grant extension specialists conducted a 2006 study to test batch-handling techniques developed in Texas. Tests on overnight shrimp boats in Core Sound, N.C., helped determine if such handling methods might protect the texture and visual appeal of shrimp caught during shorter trips. Trained panelists found no significant differences in sensory attributes of shrimp caught on control vessels versus vessels using experimental techniques. These results suggest that North Carolina overnight trawlers may already be producing a high quality product that is comparable to farm-raised shrimp.

Two North Carolina studies are discussed in more detail here.

Fresh from the Wild Versus Farm-Raised: A Preference Evaluation

Methods

Fifty consumers were recruited for an evaluation by the Sensory Service Center in the Department of Food, Bioprocessing and Nutrition Services at NC State's Raleigh campus. Panelists included university students and staff. The personal data collected on each panelist showed 80 percent ate seafood two or more times per month, and 54 percent consumed shrimp two or more times a month.

Raw domestic and thawed, raw, farm-raised shrimp were boiled separately in 2- to 2.5-pound batches. Batches were placed in rapidly boiling water and removed once the water returned to a boil and shrimp turned pink. After the shrimp drained on paper for 15 minutes, panelists were served two samples side by side in randomly numbered 4-ounce portion cups with lids. One sample contained three wild-caught shrimp and the other contained three farm-raised shrimp.



Scott Baker

Shrimp were served headless, shell-on, with a glass of water on the side for rinsing the mouth in between samples.

The panelists' scores were statistically analyzed for overall impression, flavor, texture, tenderness and moistness. On a 9-point scale, 9 equaled "Like Extremely," and 1 equaled "Dislike Extremely." A preference question was posed and panelists were encouraged to comment on each sample if they desired.

Results

Wild-caught shrimp scored significantly higher in tenderness and moistness (60 percent preferred). Although the flavor scores between the two samples were not significantly different, more panelists commented favorably on the flavor and sweetness of the wild-caught shrimp (18 percent) than the imported product (10 percent). In fact, 10 percent of the panelists noted that the imported shrimp lacked flavor.

The Influence of Batch-Handling on the Flavor, Texture and Appearance of Wild Shrimp

Methods

For the North Carolina study of onboard handling of shrimp, two boats of similar size and equivalent harvest gear trawled overnight for wild shrimp in a predetermined area of Core Sound. The crew of the experimental boat trawled for no more than one hour at a time, while the crew of the control boat trawled for two hours at a time. On both boats, shrimp were separated from by-catch before being packed for cold storage.

Using fish baskets as totes, the crew of the experimental boat layered shrimp in flaked ice and

placed the filled baskets in a hold underneath the culling table. The control boat packed its shrimp in 10-pound capacity onion sacks and immersed the sacks in slush ice in the hold. Shrimp from

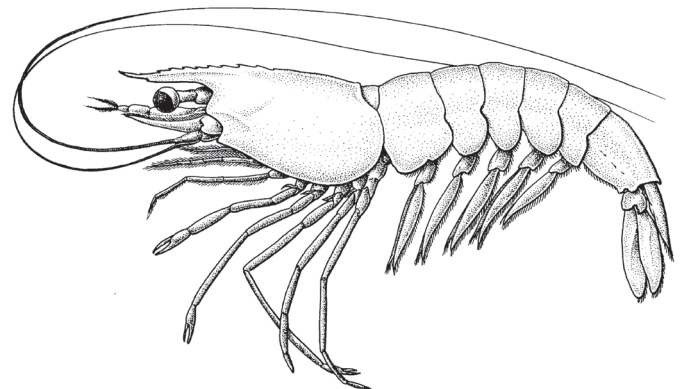
both boats were transported to shore where product was mechanically graded, manually headed, packed in 5-pound

plastic bags and covered in ice for distribution to local customers. Ten pounds of shrimp from each boat were held aside for a sensory evaluation. Four consecutive harvest trials and sensory examinations were conducted.

The Sensory Service Center at NC State conducted the comparative sensory evaluation. The objectives were:

- (1) to establish detailed texture and flavor profiles of wild-caught, Core Sound shrimp; and
- (2) to determine noticeable differences in the flavor or texture between shrimp harvested by the control and experimental boats according to the descriptive profiles.

When shrimpers employ handling practices to protect shrimp quality during harvest, the domestic product compares favorably to farm-raised shrimp. - B. Nash



A White Shrimp/John Norton

Six trained individuals comprised the descriptive analysis panel. Each analysis was based on a 15-point universal intensity scale for aroma and flavor and a 15-point product specific scale for texture.

Raw shrimp from both vessels were cooked separately, in rapidly boiling water. When the water came to a second rolling boil, the shrimp were drained, removed to a large baking sheet and allowed to cool for 20 minutes. Four shrimp per panelist were placed in 4-ounce portion cups with lids. Data from each panelist were statistically summarized.

Results

Using a comprehensive analysis of the detailed flavor, texture and other features of the Core Sound shrimp that they developed, the panelists compared and found no significant

differences in the flavor or texture between the two harvest methods. A visual examination of the shrimp revealed only the smallest degree of broken shells or tails, and there were no crushed shrimp.

Conclusion

Overall, the tow duration of one to two hours and the method of cooling did not impair the visual, textural or flavor attributes of wild shrimp harvested by overnight trawlers in Core Sound, N.C. The results indicate that the harvest and post-harvest handling practices already employed on board North Carolina's overnight trawlers adequately protect the desirable characteristics of wild-caught shrimp that commercial markets prize in farm-raised shrimp.

— Barry Nash, Scott Baker & Bob Hines

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Nash, B., Hines, B. and Baker, S. Enhancing the Quality of Wild Caught Shrimp with Batch Processing Handling (R/MG-0514).

For more information on this and other Sea Grant Studies, visit www.ncseagrant.org and follow links to research.

Sensory Analyses by Sensory Service Center, Dept. of Food Science, NC State University

Consumer Sensory Analysis of Fresh Sound Versus Frozen Farm-Raised 36-40 Shrimp, conducted Sept. 28, 2007; testing and report conducted by MaryAnne Drake and Michele Yates, for the NC State Seafood Laboratory.

Descriptive Sensory Analysis of North Carolina Shrimp, conducted July 25 to Aug. 2, 2006; testing and report conducted by MaryAnne Drake and Michele Yates, for the NC State Seafood Laboratory.

Texas A&M Study Reference

The Marks of Quality Necessary to Produce Premium-Quality, Wild, Domestic Shrimp. Prepared by R.J. Miget and M.G. Haby. 2005. Excerpted from R.J. Miget and M.G. Haby, "Maximizing Revenues by Producing Top-quality Shrimp for the U.S. Market" in *Wild-Harvested Shrimp Technical Assistance Curriculum*. Pp 47-64.