Egg Quality Preserved After Exposure to Egg Crack Detection Technology

Microcracks in the shells of eggs pose a major food safety concern to consumers. Research has shown that cracked eggs are more likely to harbor bacteria, including foodborne pathogens. A new technology—called the "modified-pressure imaging system"—combines negative pressure with imaging and can accurately detect almost 100 percent of cracked eggs.

The device, developed by Agricultural Research Service scientists in Athens, Georgia, was discussed in detail in "A Better Way To Spot Eggshell Cracks," *Agricultural Research,* February 2009. It uses a negative-pressure chamber to essentially pull the eggshell outward very gently to clearly show any microcracks present in the shell.

The next step was to see whether quality suffered after eggs were subjected to the device.

Food technologist Deana Jones, research leader Kurt Lawrence, engineer Seung-Chul Yoon, and hyperspectral image specialist Gerald Heitschmidt, in the Egg Safety and Quality Research Unit, conducted a study to determine whether exposure to the modified-pressure imaging system had any effect on egg quality during storage.

"After 5 weeks of refrigerated storage, only a slight difference in the amount of water in the whole egg was noted between imaged and nonimaged eggs," says Jones. "All other quality attributes were the same for imaged and nonimaged eggs."

These other quality attributes include the egg's weight, albumen (egg white) height, shell strength, vitelline (yolk) membrane strength, and Haugh unit. A Haugh unit—considered by the egg industry as the "gold standard" of interior egg quality—is a mathematical formula that takes into account the egg's weight and the height of the albumen.

"This information lets us know that the use of the modified-pressure imaging system to detect cracked eggs does not affect egg quality, making it an important tool for enhancing the safety of shell eggs for U.S. retail sale," says Jones.—By **Sharon Durham,** ARS.

Deana Jones is in the USDA-ARS Egg Safety and Quality Research Unit, Richard B. Russell Research Center, 950 College Station Rd., Athens, GA 30605; (706) 546-3486, deana.jones@ars.usda.gov. ✻

New Primer Helps Identify More DNA Markers

DNA markers are important tools for identifying genes that control traits of interest to plant breeders, such as disease resistance or fruit quality. DNA markers are usually generated using "primers," short segments of DNA that are used by geneticists to look for genes that control specific traits. In general, geneticists use random primers in their search for DNA markers, but that process is often long and arbitrary, and it can result in researchers spending a lot of time and money to identify just one DNA marker.

To streamline the process, Agricultural Research Service geneticist Amnon Levi and plant pathologist Pat Wechter have developed a new method for identifying DNA markers. They used genomic data to search for small pieces of DNA, called "oligonucleotides," that are prevalent in watermelon genes and could be used as primers. Levi and Wechter believed that these new primers would generate a larger number of markers because they are more targeted than random primers.

Zhangjun Fei, an ARS-funded bioinformatics researcher at the Boyce Thompson Institute for Plant Research in Ithaca, New York, collaborated with Levi and Wechter and wrote a computer script to identify oligonucleotides that exist in high numbers in genes of watermelon. They named the new primers "high-frequency oligonucleotides targeting active genes," or HFO-TAG for short.

Working from the U.S. Vegetable Laboratory in Charleston, South Carolina, the scientists and fellow ARS and university colleagues tested their theory on 12 closely related watermelon cultivars. The researchers found that the HFO-TAG primers identified more DNA fragments than random primers did. Finding more fragments means researchers have a greater chance of finding DNA markers for genes that control desirable traits. And they don't have to invest as much time and money to identify the markers.

Levi and Wechter are currently using the HFO-TAG primers to look for watermelon genes that control disease or pest resistance and fruit quality. The primers will also be useful in genetic studies and genetic mapping of watermelon.

According to the scientists, this simple and straightforward method can be applied to genetic studies of other plants as well as animals. A full description of this study has been published in the *Journal of the American Society for Horticultural Science*.—By **Stephanie Yao,** formerly with ARS.

Amnon Levi and Pat Wechter are with the USDA-ARS U.S. Vegetable Laboratory, 2700 Savannah Hwy., Charleston, SC 29414; (843) 402-5326 [Levi], (843) 402-5318 [Wechter], amnon.levi@ars.usda.gov, pat.wechter@ars.usda.gov. ✻