

# Scientists helping keep in-demand smoked salmon safe to eat

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Scientists with the U.S. Department of Agriculture (USDA) are helping ensure that the smoked salmon that's always a hit at festive gatherings also is always safe to eat, including among their achievements the development of a first-of-its-kind mathematical model that food processors and others can use to select the optimal combination of temperature and concentrations of salt and smoke compounds to reduce or eliminate microbial contamination of the product.

The studies are led by food technologist Andy (Cheng-An) Hwang with the USDA Agricultural Research Service's (ARS) Eastern Regional Research Center in Wyndmoor, Pa. ARS is USDA's principal intramural scientific research agency.

A gourmet favorite, smoked salmon is typically sold in vacuum packages that have a refrigerator shelf life of about three to eight weeks, according to Hwang. Since [pathogenic microbes](#) such as *Listeria monocytogenes* can live at refrigerator temperatures, it is important to get rid of these microorganisms before those packages leave the processing plant.

In ongoing research begun in 2006, Hwang is investigating ways that processors can protect the pleasing flavor and texture of smoked salmon while reducing or eliminating [microbial contamination](#).

In one series of studies, Hwang and co-researchers added salt and smoke compounds to cooked salmon, then inoculated the fish with *Listeria*

monocytogenes. Next, the scientists exposed the salmon to a range of temperatures, from 104 degrees Fahrenheit to 131 degrees F to simulate commercial smokehouse processing.

Regarded as mid-range, these temps are higher than those used for cold-smoking, the most popular commercial salmon-smoking process, but are lower than those of the lesser-used commercial hot-smoking procedure.

The researchers determined that every 9 degree F increase in temperature resulted in a 10-fold increase in rates of inactivation of *Listeria*. They used this and other data from the study to create the mathematical model.

Hwang, food technologist Shiohshuh Sheen and microbiologist Vijay K. Juneja, also at Wyndmoor, have documented these and related findings in articles published in the *Journal of Food Science* in 2009. More recently, Hwang reviewed the study results with scientists and executives from the chilled-foods industry who participated in the 2010 Refrigerated Foods Association annual symposium.

**More information:** The smoked salmon research is highlighted in the October 2010 issue of *Agricultural Research* magazine, available online at: [www.ars.usda.gov/is/AR/archive/oct10/safe1010.htm](http://www.ars.usda.gov/is/AR/archive/oct10/safe1010.htm)

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