



Thermocouples in aluminum almonds linked to a data logger were used to validate 5 log kill rates for a heat-resistant strain of salmonella that has created a demand for pasteurization of raw almonds. Source: FMC FoodTech.

Going nuts for pasteurization

While the resources of major equipment suppliers often are required to develop new technology, implementation of those innovations often depend on small, entrepreneurial food companies. FMC FoodTech's new almond pasteurizer is a case in point.

Salmonella incidents in 2001 and 2004 have undermined the raw almond business, forcing growers to either blanch or roast much of their crop. FMC FoodTech's JSP-1 surface pasteurizer has the potential to revive the raw almond market, and the company found a willing partner in Going Nuts, a family business located across town in Madera, CA. The company handles 300,000 lbs. of its own nuts but is targeting 5 million lbs. of throughput for the pasteurizer.

"We're doing this for profit, but it's also something I really believe needs to be done," says Bill Alquist, Going Nuts' owner. "With this process, the salmonella problem is eliminated, and the product looks like it's cleaned and polished."

Alquist and his son-in-law, Zeb Brown, are overseeing installation that includes the construction of a clean room, a horizontal f/f/s packaging line and a compact water-tube boiler that relies on a helical coiled heat exchanger to generate steam without a large pressure vessel. December start-up for the process was targeted.

While he estimates the capitalization and operating cost will be about a nickel per pound of finished goods, "it's going to be the way to go," Alquist predicts. "It's a heck of a piece of technology."

Three outbreaks involving Salmonella Enteritidis PT30 on raw almonds in recent years have threatened the premium segment of a crop worth close to \$3 billion. "Up to now, PT30 has been the most thermally resistant salmonella found," according to Jun Weng, research fellow at FMC FoodTech, Madera, CA. Roasting the

nuts would destroy germination and lower their value, but Weng reasoned impingement ovens produced by the company's Sandusky, OH, division could be modified to kill bacteria in crevices in a short-time process. The result is the JSP-1 pasteurizer, which has been validated to deliver a 5 log reduction in PT30 salmonella. Weng,

who developed FMC's NumeriCal and other model predictive controls, has dubbed the system's modeling software AlmondCal.

Raw nuts are lightly wetted in a chamber before being conveyed to a second chamber, where superheated steam meets saturated air (dew point is 201°F), triggering an evaporation-condensation cycle that is lethal to microbes on the almond's surface. The 99.999% kill rate is achieved in less than 40 seconds, according to Weng. Surface temperatures were validated by including thermocouple-equipped aluminum "almonds" with test batches.

"It's quite a sizable unit," he adds. The first installation, at a firm called Going Nuts in Madera, measures 36-ft. long and 11-ft. wide. More than 20,000 lbs. of almonds an hour can be processed. Weng estimates energy costs at 0.003 cents per pound of product. He sees potential applications for beef jerky, dry corn susceptible to mold and other dry meats and produce.