

THE VOICE OF THE INC FOUNDATION



# NUTFRUIT

FOR THE NUT AND DRIED FRUIT WORLD

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XXXV INC CONGRESS

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# FUTURE TRENDS FOR SAFE NUTS

*Even as the consumption of nuts is boosted by demonstrated health and nutritional benefits, the industry is bracing for regulatory action and growing customer demand to insure the microbiological safety of these popular snacks.*

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is the Scientific Director of Napasol AG in Switzerland, where she is involved in the risk assessment and mitigation of the microbiological risks in nuts and dried fruits and runs the validation program of their pasteurization installations. She joined the Scientific and Government Affairs Committee of the INC in 2005. In addition to contributing to the committee's ongoing activities, she has been directly involved in the Green Corridor project in Iran, the SafeNut project in Brazil, and the Nuts and Seeds Consortium in the UK.

Scientific research shows that the consumption of nuts has a host of nutritional and health related benefits. Marketing efforts have targeted the increasingly health conscious consumer, and nuts, in addition to being nutritious and tasting great, are practical snacks as they are easy to carry around. Nuts, which can be consumed raw, blanched, or roasted, nevertheless can present a food borne illness risk.

### Appraising Microbiological Risks in Nuts

Like all raw agricultural products, nuts are exposed to environmental contaminants including spoilage and pathogenic microorganisms. Once harvested, dried down, and safely stored, the microorganisms present cannot grow, however, they are not eliminated by the drying process. In particular pathogens such as *Salmonella* survive well<sup>1</sup> and represent a very real health risk. This fact explains the number of food borne illness outbreaks related to the consumption of nuts. The presence and persistence of the contaminants is also reflected in the increasing frequency of nut related product recalls in the market, and the detention and disposal of foreign shipments which affects international trade.

A food borne illness outbreak is identified when a cluster of patients exhibit symptoms of a food related microbiological infection that is common to all of them. In the US, the Center for Disease Control coordinates the efforts of a network of laboratories, PulseNet, that compares the DNA fingerprint of outbreak strains to a fingerprint database.

**Table summarizing outbreaks of food borne illness associated with the consumption of tree nuts and peanuts in North America.**

Nut	Product	Year	Pathogen
Cashew, Almond, Hazelnut	Nut butter	2015	<i>Salmonella java</i>
Cashew	Peanut/cashew mix	2010	<i>Salmonella typhimurium</i>
	Raw cashew cheese	2013	<i>Salmonella stanley</i>
Pine nut	Whole, bulk	2011	<i>Salmonella enteritidis</i>
Hazelnut	In-shell	2010-11	<i>E. coli</i> O157:H7
Pistachio	Roasted	2011	<i>Salmonella senftenberg</i>
Walnut	Raw shelled	2011	<i>E. coli</i> O157:H7
Peanut	Nuts and pastes	2009	<i>Salmonella typhimurium</i>
	Peanut butter	2006-07	<i>Salmonella tennessee</i>
Almond	Raw whole	2000-01	<i>Salmonella enteritidis</i>
	Raw whole	2004	<i>Salmonella enteritidis</i>
	Raw whole	2005-06	<i>Salmonella enteritidis</i>
	Raw whole	2012	<i>Salmonella typhimurium</i>
	Almond butter	2014	<i>Salmonella braenderup</i>

Adapted from<sup>2</sup> Harris, L. J., M. Palumbo, L. R. Beuchat, and M. D. Danyluk. 2015.

### FDA's Ongoing Risk Assessment on Tree nuts

Although the frequency of occurrence and level of pathogens such as *Salmonella* is low in nuts, the symptoms of infection are serious and the outcome can be deadly. In 2007, following several food borne illness outbreaks, the almond industry decided to mandate the pasteurization of all almonds in North America. Because of their sparse distribution and low infectious levels, these pathogens are difficult to find and the sampling programs in place did not prevent those outbreaks from occurring. The only measure that would insure that the almonds were safe was to mandate their pasteurization.

The trend to pasteurize other tree nuts has been growing fueled by more food borne illness outbreaks, regulatory measures, and pressure from the market for delivering safe foods. In this context, the FDA is conducting a risk assessment on tree nuts, including a sampling program at retail and processors level, which has triggered a total of 27 recalls in 2015 with macadamias (11), walnuts (7) and cashews (4) being the most frequent.<sup>3</sup> The frequency of these *Salmonella* positive findings is surprising since there is an increasing volume of safe pasteurized product on the market. It shows that the sampling programs in place for unpasteurized product are inadequate to prevent contaminated product from reaching store shelves. It is widely anticipated that once the ongoing FDA risk assessment is completed, preventative measures will require an adequate microbiological kill step.

### Pasteurization of Tree Nuts

Options for pasteurization include chemical treatments with fumigants as well as natural thermal treatments. Propylene oxide or PPO, which is widely used for pasteurizing almonds and other nuts in the USA, is a chemical that is mutagenic and causes irreversible damage to the DNA of the microorganism. Thermal treatments on the other hand physically modify the protein structure of enzymes thus interfering with the metabolism of the microorganisms.

The experience of the almond industry with FDA regulatory measures is instructive. A kill step with a 100'000 fold reduction in pathogen performance (5log) is required for labeling almonds as pasteurized. Following an extensive risk assessment, the Almond Board of California subsequently obtained the approval from FDA for a 10'000 fold (4log) reduction as being sufficient for insuring a suitable level of safety for consumers in the USA. It is unlikely that FDA would extend this approval to

other tree nuts without the scientific research necessary to demonstrate that a 4log reduction would be adequate to insure consumer safety for them as well.

Any microbiological reduction process seeking FDA approval will have to pass the same hurdles as those the almond industry went through for their mandatory pasteurization rule. All processes and all installations will be required to be validated. Validation is a documented program that provides a high level of scientific assurance that a manufacturing process will reliably produce a product which is not injurious to health.<sup>4</sup> Since 2007, the almond industry has registered 170 validated installations and established process standards through validation guidelines with defined critical parameters for PPO treatment, oil roasting, and blanching for a 5log reduction.<sup>5</sup> For dry roasting, at typical industry parameters, reaching a 4log reduction is difficult, but can be achieved at relatively high temperatures and long exposure times.

### Thermal Treatments Suitable for Raw Nuts

None of the thermal processes described in the above guidelines are suitable for addressing microbial reduction when the raw qualities of the nuts are to be preserved. For raw nuts a variety of steam pasteurization processes have been developed but mainly two types are currently on the market: continuous systems working at ambient pressure and batch processes working in pressurized autoclaves. The higher microbial reduction performance is obtained in the batch processes where saturated steam conditions are controlled. Saturated steam offers the highest heat transfer capability to the surface of the nuts without wetting them.

The control of pressure also allows pasteurizing in a partial vacuum at relatively low temperatures.

### Expectations and Global Repercussions


Unlike other food safety risk commodities such as leafy greens, the FDA considers that for tree nuts there are technologies on the market capable of delivering an appropriate kill step to insure their safety. With the evolving US regulatory landscape and as the Food Safety Modernization Act enters into effect, tree nut shipments to the US will also have to comply with the same regulations as US operators. This means that the outcome of the risk assessment currently underway on tree nuts will have a global impact on trade with the US.

Although regulators outside the US have until now not considered tree nuts as a high risk product category, *Salmonella* positive shipments are recurrently identified at border controls and at retail level. In the EU, recalls have a profound impact on the food industry and demand for pasteurized tree nuts is growing.

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*The industry does well to take into consideration that the consumer confidence inspired by the health and nutritional benefits of tree nuts, must not be compromised by a food safety risk.*

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Future trends may well hinge on the outcome of the ongoing FDA risk assessment but ultimately it will be the market that will drive the industry towards pasteurization of tree nuts. 

**References:** 1. Uesugi AR, Danyluk MD and Harris LJ. Survival of Salmonella Enteritidis Phase Type 30 on inoculated Almonds stored at -20, 4, 23, and 35°C. J Food Prot. 2006 Aug;69(8):1851-7. 2. Outbreaks of foodborne illness associated with the consumption of tree nuts, peanuts, and sesame seeds. Harris, L. J., M. Palumbo, L. R. Beuchat, and M. D. Danyluk, 2015. <http://ucfoodsafety.ucdavis.edu/files/169530.pdf>. 3. Recalls of tree nuts and peanuts in the U.S., 2001 to present. Palumbo, M. L. R., Beuchat, M. D., Danyluk and L. J. Harris, 2015. <http://ucfoodsafety.ucdavis.edu/files/162415.pdf>. 4. Improving the safety and quality of nuts, Editor Linda Harris, Woodhead Publishing Limited, 2013 ISBN-13: 978-085792663, 7. Validation processes for reducing the microbial load on nuts 148-169. 5. Validation Guidelines, Almond Board of California: <http://www.almonds.com/processors/processing-safe-product#pasteurization>



#### WORLDWIDE ACTIVITIES AS:

- importers / distributors of tree nuts (kernel and in-shell)
- processors of ingredients and oils



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