PECAN SAFETY
Hot Water Conditioning to Mitigate Microbial Hazards

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What are the potential food safety risks associated with pecans?

Pecans have not been associated with any foodborne disease outbreaks, but orchard conditions before and after the harvest indicate there are potential food safety risks. Contamination on in-shell pecans and nutmeats can occur preharvest, at harvest and during postharvest handling and processing. During rainfall, the shucks surrounding pecans get wet along with the nut. The nutrient-rich shucks provide a suitable environment for microbial growth. *Salmonella* can survive for several weeks, making it one of the favored routes for contamination.

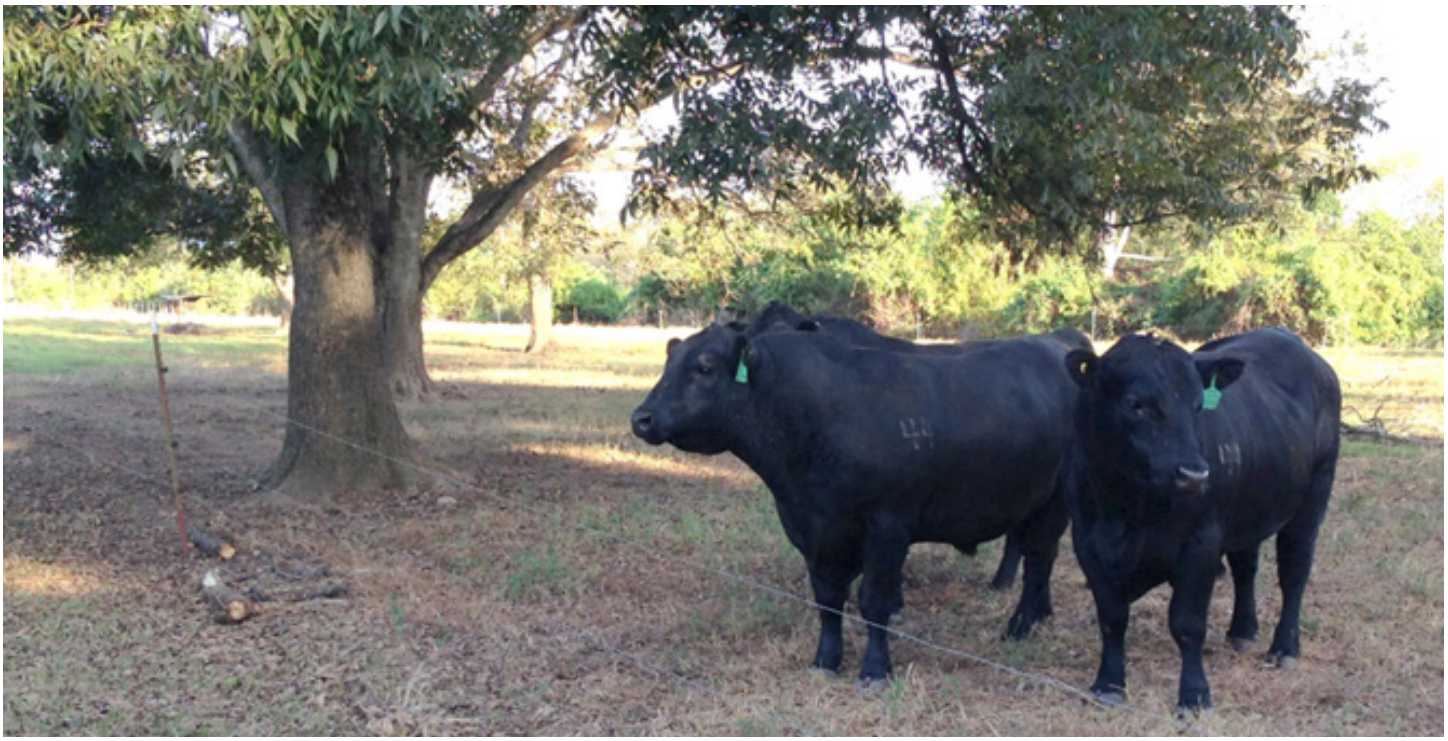
During harvesting, pecan tree nuts are shaken off, or the nuts are naturally allowed to drop on the ground. They can remain there for several days until collected. The nut absorbs moisture from soil that can be potentially contaminated with bacteria from wild and domestic animal feces, inadequately composted manure, irrigation or runoff water from land grazed by livestock. Additionally, worker health and hygiene in orchards and processing areas also play an important role in maintaining the safety of pecans.

How can cattle grazing on the orchards affect pecan safety?

Cattle grazing is practiced in several orchards in Louisiana. It is one of the most common forms of ground cover management in native pecan groves. Cattle grazing in orchards provides a second source of income from the same parcel of land. It also results in a significant reduction in orchard mowing costs. However, cattle manure has been found to be the main source of health-hazardous bacteria that can survive up to several months and may increase the risk of contamination.

How to mitigate the potential risk?

Conditioning prior to cracking is an essential step in pecan processing to reduce kernel breakage and improve shelling efficiency. However, it can also eliminate microorganisms that may be on the shell. Following scientifically validated practices during pecan shelling will help pecan growers produce safe, high-quality pecans.



Cattle grazing in a pecan orchard.

What are different ways of conditioning?

Before shelling, pecans are moistened by water or steam, which is absorbed by the kernel. The kernel moisture increases from 4 to 8 percent, which makes it more flexible and reduces kernel breakage while cracking the nut. Some of the conditioning methods currently used by industries are:

- Soaking in hot water at least 81 degrees Celsius for one to eight minutes or steam processing for six to eight minutes.
- Immersing in cold, usually chlorinated, water for eight hours and then draining for 16 to 24 hours or soaking in chlorinated water with a minimum free chlorine concentration of 200 parts per million at 15 to 30 degrees Celsius for two minutes.
- Moisture equilibration in a humidity-controlled storage room.

In-shell pecans being treated with hot water during the study at LSU AgCenter.

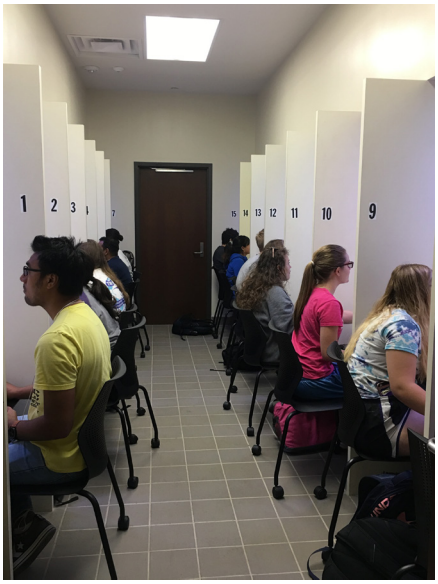
Why is hot water conditioning of pecans an effective way to remove the bacteria?

The Food Drug and Administration (FDA) recommends that a treatment process must achieve a 5-log reduction of bacteria to be regarded as a "kill step." Food products processed with a kill step will ensure food safety in the final product, minimizing public health concerns. Most of the conditioning methods currently used remove a maximum of 3-log colony-forming units per gram (CFU/g) bacteria from the pecan shell. To increase the efficiency, those conditioning methods must be paired with other techniques.

However, research at the LSU AgCenter demonstrated hot water treatment alone on in-shell pecans was effective in removing the bacteria by more than 5-log CFU/g. Growers and processors could use hot water either at 70 degrees Celsius for 8.6 minutes, 80 degrees for 6.6 minutes or 90 degrees for 4.6 minutes. These time-temperature combinations were found to be effective against hazardous bacteria. Also, for scientific validation of your equipment or hot water treatment process, *Enterococcus faecium* can be used in your processing area to evaluate the efficacy of the system.

How do consumers feel about the hot water-conditioned pecans?

A study was conducted at the LSU AgCenter to evaluate the effect of hot water pretreatment of in-shell pecans on physicochemical properties, consumer acceptance and purchase intent of dehulled and roasted pecans. A total of 112 consumers were presented with the validated hot water-treated pecans. Consumer acceptance was higher for hot water-treated pecans with higher ratings on color/appearance and aroma. No effect of hot water pretreatment was observed by consumers on other sensory properties, such as texture and flavor.



Consumers testing the hot water-conditioned pecans at the LSU AgCenter.

Benefits

- Hot water conditioning has the potential to be regarded as a kill step to ensure the safety of pecans.
- The treatment will also enhance the color and aroma of the pecan without affecting its texture and flavor.
- Hot water conditioning is already in practice by most of the shellers. Therefore, no additional cost is needed for setting up the system.

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