



BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Fermented nut cheese ingredient safety

This document is supplemental to the original [fermented nut cheese document \(August 2017\)](#).

Request received from:	Various Health Authorities
Date of request:	June 2018
Issue (<i>brief description</i>):	Ingredients food safety during manufacture of fermented cashew nut cheese

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Recommendations for ingredient handling for “nut cheese”¹ (plant-based cheese-like) fermented foods

Please refer to the food issue notes from the field “*Fermented nut cheese*” dated August 2017 at this site: <http://www.bccdc.ca/health-info/food-your-health/food-safety/food-issue-notes>. The following are additional recommendations to this food issue note.

Note: these recommendations are written for fermented nut cheese and may not be applicable to other types of fermentations and fermented food substrates.

Definitions:

Nuts and nut milks: cashews, almonds, coconut or other tree nuts.

Fermentation ingredients (does not include starter cultures): starch, agar, yeast, vegetable rennet, cider vinegar, lemon juice, salt brine washes, or other components used in the fermentation recipe.

Other ingredients: oils, maple syrup, dried fruits, alcohols and other flavoring agents.

Spices: salt, pepper, paprika, poppy seeds etc. and herbs such as fresh or dried parsley, thyme, basil, etc.

Unless specifically stated, “ingredients” refer to all of the above: nuts, nut milks, fermentation ingredients, other ingredients, and spices.

¹ While these products are commonly referred to as nut-based or plant-based **cheeses** (made from nut-based or plant-based **milk**), the use of the word **cheese** and **milk** is not permitted under current regulations. Cheese has a standard of identity under the Food and Drug Regulations, see Division 8 as it defines cheese (section 08.033). http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c.870/page-44.html#docCont We are not aware of the use of the word ‘cheese’ being challenged to date. There is no official naming system for plant-based cheese.

I. Ingredients used during fermentation period must be certified pathogen-free, evaluated and shown to be controlled for pathogen risk, OR go through a kill step.

Rationale: fermentations often occur at temperatures above 4°C that are in the danger zone. Before and during the fermentation process, potential pathogens may be introduced on ingredients that could be amplified during the processing, and may survive even when the pH objective is achieved.

Ingredient	Associated biological hazards
Nuts (cashews, almonds, coconut)	<i>Salmonella</i>
Dried spices (pepper, thyme, parsley)	<i>E. coli</i> O157, <i>Salmonella</i>
Fresh herbs (parsley, chives, basil)	<i>E. coli</i> O157, <i>Salmonella</i> , <i>Listeria</i>
Fermentation ingredients (brine washes)	<i>Listeria</i>
Other ingredients (flavoured oils)	<i>Clostridium botulinum</i>

When ingredients are added to main food substrate before the primary fermentation begins, the food is considered potentially hazardous, and has not achieved a pH that will minimize pathogen growth (i.e. pH is not yet below 4.4).² Any ingredients added must be free of viable pathogens **and** all ingredients must be managed in the process to not increase the risk. An operator must present evidence that ingredients are pathogen free for the hazard(s) of concern listed in the table above. This can be achieved through one of several ways:

- (1) Supplier documentation that declares testing has occurred with absence of pathogen. This may also be achieved through documentation that a process used in the manufacture of the ingredient manages the risk (e.g., spices purchased are irradiated).
- (2) The other method is for the operator to control risk with a kill-step. A kill-step for ingredients in this context means that a chemical or thermal treatment for the ingredient is included in the process that will achieve a minimum 3-log reduction in potential pathogen (99.9% removal), except for nuts which should receive a minimum 5-log reduction (99.999% removal).
- (3) The product may be exempted if it is commercially canned and shelf-stable, for example, canned coconut milk. No further documentation would be required. If the operator is instead extracting nut milk from coconuts or almonds, these ingredients would be considered equivalent to nuts and require a kill-step with a minimum 5-log reduction.

² For further information about why a pH of 4.4 is required to mitigate the hazard of *Listeria* refer to the original FI note

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ALLOWED:

All nuts **must** be soaked or refrigerated in acidified water, even if they have an exemption because of cross-contamination risks arising and because the fermentation has not yet started. However, boiling water rehydration may be waived.

Ingredients process control options for all nuts (all recipes / food safety plans)

- nuts are soaked in potable water in refrigerator at $\leq 4^{\circ}\text{C}$, or
- nuts are soaked in acidified potable water at room temperature

Ingredients sourcing that exempts ingredients from process control

- dried spices from suppliers that indicate the spices have been treated (e.g., irradiated)
- nuts, dried or fresh spices and herbs come with acceptable supplier documentation indicating they are tested for and free from pathogens
- commercially canned nut milks

If the ingredients have no documentation that verifies they are low risk then they **must** undergo a process control to reduce risk.

Ingredients process control for nuts without supplier documentation

- nuts are rehydrated with boiling water (minimum of 90°C for contact time of 10 min)

Ingredients process control for spices, ferment and other ingredients

- dried or fresh spices are boiled before use (at least 30 minutes)
- dried or fresh spices and herbs are treated in some way to mitigate pathogen risk, e.g.,
 - (a) soaked in 200 ppm bleach for at least 2 min
 - (b) immersed in an approved food grade hydrogen peroxide according to manufacturer's specifications
- Fermentation ingredients are evaluated and shown to be controlled for risk through manufacturing process (e.g., vegetable rennet is sourced from a commercial supplier)
- Other ingredients are evaluated and shown to be controlled for risk through manufacturing process (e.g., dried fruits are at or below an a_w of 0.85)

NOT ALLOWED:

- ingredients with no documentation to show pathogen risk is managed
- ingredients that are mis-handled by not including a process or treatment to mitigate pathogen risk in the food safety plan.

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II. **Spices and ingredients that are added to the fermented food after the fermentation period is completed.**

Spices and ingredients are added to the fermented food after the fermentation period is completed. Spices may be mixed into the food, or applied to the outside of the food as a garnish. How spices and ingredients are handled depend on the temperature during aging, i.e. whether the aging occurs **above** or **below** 4°C.

Rationale: addition of spices to interior or exterior of fermented food may also introduce a microbial hazard, such as *Salmonella* or *C. botulinum*. Although the food may no longer fit the definition of potentially hazardous (i.e., the nut cheese pH is <4.4), the spices themselves may not equilibrate to the end pH of the fermented food. Particularly for fresh spices, this may create a space and place, in essence; create a microenvironment for favorable bacterial growth. During this stage of the process, the aging and storage of fermented nut cheese may or may not be under refrigeration temperatures at 4°C or less.

If the temperatures are above 4°C follow the guidance in section I (above) for handling of ingredients and spices.

If the temperatures are at or below 4°C:

- dried or fresh spices and herbs, and other ingredients should still be treated in some way to mitigate pathogen risk (e.g., immersed in boiling water or immersed in bleach or hydrogen peroxide as previously described),
- dried or fresh spices and herbs, and other ingredients come with a COA indicating they are tested for and free from pathogens,
- ingredients are evaluated and shown to be controlled for risk through manufacturing process (for e.g., addition of commercially canned fruit preserves or commercially purchased liqueurs)

Rind-washing and use of flavorings

Rind washing is the practice of washing the outside of the cheese during the aging period. This is often done with a salt water wash, but may also be done with wine, beer or flavored oils. Ingredients for rind washing should be commercially purchased to ensure safety, otherwise, each ingredient will need to be evaluated for safety and control of risk through the manufacturing process. During the rind washing stage, product pH should be evaluated to assess risk. Any nut-cheeses that are not yet at a pH of 4.4 or below are susceptible to *Listeria monocytogenes* contamination.

For example, in-house prepared garlic-in-oil or herbs-in-oil products used as rind washes would require further evaluation. These oils may not be acidified, spices used in them may not be dehydrated or otherwise treated to address microbial hazards, temperature abuse would all be reasons to consider for *C. botulinum* risk.

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Rind washing with sauerkraut liquid, kombucha liquid, or miso-flavoured washes would need to be evaluated based on their pH at time of use and source, alongside evaluation of the nut-cheese process. The operator should provide process data on pH of the ingredients and nut-cheese at this stage.

Aging and drying of nut cheeses

Aging of nut cheeses should be performed in a dedicated controlled environment, such as a small refrigerator, to prevent possible cross-contamination. Temperatures of refrigerators may be set above 4°C, which would be considered acceptable, as long as the pH of cheese is at or below a pH of 4.4. Similar to dairy milk cheeses, nut-based cheeses undergo variable lengths of drying periods during aging for flavor development.

Drying of nut cheeses should be done in a refrigerator as described. The use of dehydrators is not recommended for nut cheeses for extended periods, because the low dehydration temperature (37°C or 100°F) will support mold growth, even when nut cheeses are at a pH of 4.4. Some molds are capable of growth as low as a pH of 2. Further, mold spores are a likely hazard associated with all types of nuts. If a food dehydrator is used for drying, use only for short periods, no longer than two to four hours at a time. Cool and refrigerate the nut cheese after use of a dehydrator before continuing the aging process.

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