

8-4-2020

# STANDARD OPERATING PROCEDURE (Brine Management Plan)

Cheese Brine Creation, Storage and Maintenance

(Plant Logo)



AUTHORED BY:

Supersedes:

EFFECTIVE DATE: Date of Approval

APPROVED BY: \_\_\_\_\_

The following individual is responsible for implementation of this SSOP and has overall authority on-site:

Name: \_\_\_\_\_ Title:

\_\_\_\_\_

Date: \_\_\_\_\_

## **SECTION 1: OVERVIEW**

### **1.1 Purpose**

To provide information on proper brine makeup, storage and maintenance for use in brined cheese production to mitigate potential Food Safety and Quality concerns.

### **1.2 Scope**

This SOP applies to any cheeses produced that require brining using a **static** system. Creating a brine that is properly balanced for the cheese, and well maintained to avoid quality or environmental contamination is critical as this is a zone 1 (product contact area).

### **1.3 Other Applicable References**

1. Sanitary Design of Equipment Plus Hygienic Practices and Hygienic zoning. *Reference 1* "Controlling Pathogen in Dairy Processing Environment" Guidance for the US Dairy Industry (Innovation Center for US Dairy) See link under reference materials. This document provides good reference material to GMP's, barrier controls etc.
2. General Cleaning and Sanitation Standard Operating Procedures

## **SECTION 2: MATERIALS**

### **2.1 Supplies**

Potable water, food grade salt; Calcium Chloride; Acetic acid (vinegar) and or citric acid solution.

A clean, sanitized, non-porous, food grade vessel to hold the brine, plus a sanitized stainless-steel stirring tool, sanitary skimming device

Equipment: pH meter; salinity testing, thermometer, micro swabs, applicable testing strips

## **SECTION 3: SAFETY/ENVIRONMENTAL CONCERNS**

### **3.1 Safety Considerations**

Use care with the salt and Calcium Chloride needed to create brine. Use appropriate personal protection equipment (PPE) such as gloves, apron and face shield to avoid coming into contact with harsh brine water or chemicals.

## **SECTION 4: FREQUENCY**

### **4.1 Creation of Brine/Testing of Brine**

Brine will be first made when a cheese is produced at the plant that requires brining. Cleaning (skimming of solids) and maintaining brine should be done after each batch of cheese is removed from the brine, and anytime it is deemed necessary. Salinity testing should be performed weekly to ensure salt content is consistent along with monitoring of brine temperature and pH level. Each brine vessel shall be sampled for microbiological indicator organism such yeast/mold and Enterobacteriaceae and or coliform monthly or whenever a problem is suspected.

## **SECTION 5: RESPONSIBILITY**

### **5.1 Task**

Creating, maintaining and sampling brine are performed by the designated trained individual responsible for the brined cheese.

### **5.2 VERIFICATION**

Assistance including training will be provided by the Plant management to ensure deployment of brine management practices.

### **5.3 PAPERWORK REVIEW**

Records will be kept of brine testing and any corrective actions necessary. These will be used for review when required by regulatory agencies, or for quality/food safety purposes as needed. **It is difficult to define a physical break with a static brine system so detailed and complete record maintenance is essential to verify the effectiveness of the monitoring of the brine system.**

## **SECTION 6: PROCEDURE**

### **6.1 Brine Creation**

Making a new brine requires adding the right amount of salt to potable water to dissolve the salt, as well as adding Calcium Chloride and acid to properly balance the pH

### **6.2 Brine Recipe**

TBD based upon cheese style to be brined. A brine with 19% NaCl salt concentration has shown to provide a faster decrease in *Listeria monocytogenes* than other trial brines at lower NaCl salt levels. *Reference 2* “*The Effects of Cheese Brine Concentration on Survival of Listeria Monocytogenes*” See link under reference materials

### **6.3 Brine Storage**

Store brine in a cool room, ideally between 10-14°C (50-60°F) in a hygienically controlled environment with barrier controls to mitigate potential for cross contamination.

### **6.4 Brine Use/Cleaning and Solids Removal**

Stir brine before use with stainless steel paddle.

Once cheese is placed in brine, sprinkle exposed surfaces with salt. When ready to remove cheese, dip the cheese below the surface of the brine, to allow excess dry salt to dissolve back into the brine. This helps replace the salt that is taken up by the cheese. Follow Good Manufacturing Practices.

After use, use sanitary skimming device to strain out any pieces of curd that were left behind after brining. Wipe down the exposed sides and top edges of the brine vessel with Sani-wipes. When finished, the brine should be clear to having a slight yellowish tint and there should be no pieces of curd

or soil on the walls or top of the brine vessel. Other solids removal methods may include filters, fine saver (these will however require circulation capabilities)

### 6.5 Brine replacement

Brine that is clean and well-maintained can be used for an extended period of time. (It is properly balanced for pH/minerals and shouldn't be discarded unless a problem is noted). Note: Brine replacement and or pasteurization along with deep clean of the brine vessel are recommended at minimum on an annual basis.

Treatments to reduce microbial loads may include one of the following steps:

- Discard-Clean-Replace
- Pasteurization and clean
- Microfiltration/Ultrafiltration
- Alternate Method using Oxidizing agent i.e. Chlorine (10-100ppm), Ozone *Reference 3* "The Survival of *Listeria monocytogenes* in Commercial Cheese Brines" See link under reference materials

Ensure the new brine is carefully pH balanced so that the cheese entering the brine is the same pH as the brine itself. Exterior surface problems will occur if pH isn't balanced.

### 6.6 Environmental Monitoring

Develop and employ a robust environmental monitoring plan to verify the effectiveness of your hygienic and sanitation practices. Pull weekly swabs from zone 2 and 3 areas monitoring for *Listeria* spp.

**Remember the brine will only become contaminated thru poor operating and make practices.**

### Reference Material

**1** "Controlling Pathogen in Dairy Processing Environment" Guidance for the US Dairy Industry (Innovation Center for US Dairy)

<https://www.usdairy.com/science-and-research/food-safety#{87FFFE0F-D183-437C-AA5E-A5647688B16C}>

**2** "The Effects of Cheese Brine Concentration on Survival of *Listeria Monocytogenes*"

[https://www.researchgate.net/publication/303459065\\_The\\_effect\\_of\\_cheese\\_brine\\_concentrations\\_on\\_survival\\_of\\_Listeria\\_monocytogenes\\_WFL\\_Publisher\\_Science\\_and\\_Technology](https://www.researchgate.net/publication/303459065_The_effect_of_cheese_brine_concentrations_on_survival_of_Listeria_monocytogenes_WFL_Publisher_Science_and_Technology)

**3** "Survival of *Listeria monocytogenes* in Commercial Cheese Brines

<https://www.sciencedirect.com/science/article/pii/S0022030299754196>

"The use of good management practices, especially proper sanitation of the cheese plant environment would seem to be key to preventing brine contamination".