

Evaluation Tool for Acidified Rice HACCP Plans

(This guidance document is provided by the Minnesota Department of Agriculture and is adapted from guidelines provided by the Massachusetts Department of Public Health and the FDA)

Background: A HACCP plan is required for the acidification of rice under 4626.0415 of the Uniform Minnesota Food Code when acidification is intended to “preserve food rather than to enhance flavor”. Acidified rice is typically held at room temperature for 6-8 hours and then any remaining portion is discarded. If the acidification of rice is for the purpose of flavor enhancement only, and the product is held at refrigeration temperatures (41 degrees Fahrenheit or below), then a HACCP plan is NOT required under the Uniform Minnesota Food Code. The acidified rice handles best, however, at temperatures between 70 degrees and 80 degrees Fahrenheit which is a favorable temperature range for pathogen growth.

Hazard: The hazard analysis for any sushi products must recognize the potential for the growth of *Bacillus cereus*, and related toxin formation, in cooked rice products.

About pH: A change of one unit represents a change of 10 fold in acidity. That is, a pH of 4.0 is 10 times more acidic than a pH of 5.0. Therefore, a pH of 4.3 (minimum required to control *B. cereus*) is 3 times more acidic than a 4.6 (required to control *C. botulinum*, for example). Each change in pH of .1 is, therefore, very significant.

The FDA’s “Guide to Inspection of Acidified Food Manufacturers” 114.80 (a)(2) makes the following recommendations:

- Formulation control would have to include consideration of such things as raw material pH variability, buffering capacity of raw materials, and other variables which could affect the pH of the finished product.
- If the finished equilibrium pH of a food is above 4.0, the measurement of the finished equilibrium pH **must** be made by a potentiometric method (i.e. a pH meter). If the finished pH is 4.0 or below, any suitable method of measuring acidity may be used (i.e. pH paper is acceptable).

SOP (Standard Operating Procedures) for pH Measurement: It is imperative that you know the accuracy of the pH meter (+/- .1, for example). Temperature has an effect on pH and the accuracy of pH measurement. Some pH meters do an automatic adjustment for temperature, others require a manual adjustment. There is also often a specific time required for the pH meter to be held in solution or “until the reading stabilizes” prior to taking the pH reading. The specific procedures required for the proper operation of the pH meter must, therefore, be followed in testing for pH. These factors must be addressed in the HACCP plan if an accurate *finished* pH measurement is to be obtained.

- Manufacturer instructions and specifications for pH testing and calibration must be included as part of the HACCP plan.
- A 4.0 Buffer solution, which has not passed the expiration date, must be used for calibration unless otherwise specified by the manufacturer.

Recipe/Formulation Must Be Provided:

- Strength of the vinegar must be identified (% by volume).
- Product preparation steps must be identified.
- Ingredients, materials, and equipment used in the preparation of rice must be provided.
- Critical control points must be identified and critical limits provided.

SOP And Process Flow Diagram Must Be Provided:

- Ingredients, materials, and equipment used in product preparation must be identified in the SOP's.
- A Flow Diagram that identifies critical control points must be provided and critical limits must be provided on the flow diagram.

Hazard Analysis Must Be Included and Critical Limits Must Be Identified:

- Growth of *Bacillus cereus* and production of related toxins must be identified.
- Critical limit for the *finished* pH of acidified rice **must not exceed 4.3**
- Achievement of an equilibrium pH must be demonstrated through trial/laboratory testing procedures. Appropriate documentation must be provided (testing must be specific to product and processes used, i.e. ingredients and processes specific to this operation).
- The target pH must be adjusted to allow for the accuracy of the pH meter.
- The target pH must be adjusted to allow for any change in pH over time (as may be demonstrated through the above testing for an equilibrium pH).

Monitoring Procedures Must Be Identified:

- The pH of the acidified rice must be tested for each batch prior to use.
- Procedures for calibration of the pH meter and pH testing **must be provided in the SOP's**. These SOPs **must be consistent with the manufacturer's instructions** for operation of the pH meter.
- Trained person(s) should be identified for testing the pH of rice.
- Procedures for recording pH results must be identified and a pH log must be provided.

Corrective Actions and Documentation Procedures Must Be Identified:

- If the rice is not tested for pH, it must not be used until tested.
- If rice is above the critical limit, proper rework procedures must be provided.
- Processes and procedures which are “out-of-control”, and must result in destruction of the product, must be identified.

Verification:

- Monitoring/process records should be reviewed daily or as needed by the PIC.

- The pH meter should be calibrated daily (or per manufacture recommendations) and pH log/records reviewed.
- The HACCP plan should be signed and dated and should be reviewed at least annually by PIC/ HACCP team members or when the HACCP plan is modified.

Records To Be Maintained Must Be Identified:

- The pH log for acidified rice must be maintained and suggested to be held on file for at least 30 days.
- Corrective actions must be recorded in an appropriate log.
- A calibration log must be maintained for the pH meter.
- It is suggested that any on-going laboratory test results are maintained for at least one year.

Employee Training Plan should contain the following:

- Employee health and hygiene practices.
- Cleaning and sanitizing procedures.
- Cross-contamination prevention procedures.
- Monitoring procedures for acidified rice.
- The use of the pH meter and proper testing and calibration procedures.
- Corrective actions and related appropriate procedures.
- Recordkeeping requirements.

Other issues related to sushi operations:

- Raw fish used in the production of sushi is required to be held at minus 4 degrees Fahrenheit or lower for more than seven days to provide parasite control in compliance with Minnesota Food Code 3-402.11 (21 CFR part 123). (Written letter of guarantee or agreement from the supplier.)
- Freezing does NOT, however, destroy bacterial or viral pathogens. Therefore, when sushi containing raw fish is served or sold, the consumer must be advised that raw fish is being consumed (Minnesota Food Code 3-401.11A and 3-601.12 A).
- An increased risk of food borne illness can be associated with the consumption of raw fish and cross contamination can occur to other food products. It is recommended, therefore, that additional information be provided to the consumer in writing, upon request, regarding the potential hazards of eating raw or undercooked fish.
- Under Minnesota Food Code 4626.2010 a Certified Food Manager is required for an operation which prepares acidified rice.
- **Cooling to 41°F must be achieved w/in 4 hours when temperature is used as a control.** When cooked/warm rice is worked into a finished sushi product, a procedure must be in place to cool the finished product to 41°F. **Caution:** Sushi with rice is often moved directly to the refrigerated display. These units do **not** usually have the capacity to cool the product effectively.