





# All About Sushi

**AFDO June 2018**  
**Cathy Feeney**

# Sushi Definition



Sushi is ready-to-eat cooked rice that has been acidified with a vinegar solution and formed with other ingredients that may include: raw or cooked seafood, vegetables, eggs, etc.



# Main Food Safety Concerns



Time Temperature Control for Safety Food (potentially hazardous)

Raw or undercooked seafood – parasites

- Anisakinae
- Diphyllbothrium

Rice held at room temperature for sushi preparation

- Bacillus cereus

# Other Food Safety Issues



- Scombroid Poisoning from temperature abused fish
- Staphylococcus aureus from bare Hand Contact while handling sushi
- Cross Contamination
  - Raw seafood
  - Bamboo Mats that are not easily cleanable

# Fish from Unsafe Sources



Not purchased from an approved source, may not have been properly acquired or handled prior to shipping

Toxins may be present including:

- Ciguatera
- Scombroid



[This Photo](#) by Unknown Author is licensed under [CC BY-NC](#)

# Improper Holding Temperature of Fish



Scombroid Toxin associated with temperature abuse of certain fish

- Mackerel
- Tuna
- Mahi-Mahi
- Blue Fish

Bacteria produces enzyme that converts histidine → histamine

Allergic reactions such as itching, rashes, shortness of breath

With few exceptions (large tuna, aquacultured), fish must be frozen for parasite destruction

## 3-402.11 Parasite Destruction

- (1) Frozen and stored at a temperature of  $\leq 4^{\circ}\text{F}$  for  $\geq 7$  days
- (2) Frozen at  $\leq -31^{\circ}\text{F}$  for  $\geq 15$  hours; or
- (3) Frozen at  $\leq -31^{\circ}\text{F}$  until solid and stored at  $\leq 4^{\circ}\text{F}$  for a minimum of 24 hours.



## Fish Frozen by Supplier

- Establishment needs to have a record from the vendor ensuring that the product meets the parasite reduction freezing requirements.

## Fish Frozen by Establishment

- Records demonstrating that fish was frozen correctly for parasite destruction

Letter of guarantee must be kept for 90 days

# Exemptions from freezing



3-402.11

*(1) MOLLUSCAN SHELLFISH;*

*(2) A scallop product consisting only of the shucked adductor muscle;*

*(3) Tuna of the species *Thunnus alalunga*, *Thunnus albacares* (Yellowfin tuna), *Thunnus atlanticus*, *Thunnus maccoyii* (Bluefin tuna, Southern), *Thunnus obesus* (Bigeye tuna), or *Thunnus thynnus* (Bluefin tuna, Northern); or*

*(4) Aquacultured FISH, such as salmon, that:*

*(a) If raised in open water, are raised in net-pens, or*

*(b) Are raised in land-based operations such as ponds or tanks, and*

*(c) Are fed formulated feed, such as pellets, that contains no live parasites infective to the aquacultured FISH.*

*(5) FISH eggs that have been removed from the skein and rinsed.*

# Temperature Abuse of Rice



Cooked rice may not be properly cooled and/or held during sushi preparation

Spores can germinate and produce heat stable toxin

pH < 4.2 is inhibitory

Acidify rice with vinegar



## Acidification

- Need variance and HACCP plan
- pH meter that is regularly calibrated
- Buffer solutions that are not expires

## Time as a Public Health Control

- Rice held for maximum of 4 hours
- Time out of temperature control and time used or discarded

# Other Food Safety Issues



Bare hand contact with ready to eat food

- A lot of food handling during preparation
- Staphylococcus aureus from skin, throat, and nasal passages

Sanitation of Equipment & Utensils (bamboo mats, knives, cutting boards)

Proper Cooling and Cold Holding

# Best Practices



Approved Source – harvested from safe water and handled correctly

Parasite Destruction Guaranteed – frozen at the correct temperature for the correct amount of time

Proper cooling of cooked rice 135 F – 70 F in 2 hours

No bare hand contact with ready to eat fish – gloves worn

# Best Practices



Rice ph of  $< 4.2$  or Time as a Public Health Control (max 4 hr)

Temperature of finished sushi rolls are  $\leq 41$  F (acidification controls rice but not fish or other ingredients that are time temperature control for safety food)

Changing food grade plastic wrap on bamboo mats every 4 hrs or as needed between types of product

Consumer Advisory on Menu

## RAW FISH/PARASITES

- **Establishment buys frozen fish**
  - **If Yes, check written documentation from supplier that fish was frozen for parasite destruction**
  - **In No, ask for written documentation showing that the facility froze fish for the correct amount of time at the correct temperature**
    - **If no documentation, fish cannot be used for raw**



# Sushi Checklist



## RICE

- **Establishment uses time as a public health control**
  - **If Yes, check logs**
- **Establishment acidifies rice**
  - **If Yes, check for variance**
  - **Check HACCP plan records for CCP < 4.2**
  - **Employee shows how pH is measured**

# Sushi Checklist



## BARE HAND CONTACT

- Are gloves worn in sushi preparation?

## CONSUMER ADVISORY ON MENU

- Does the menu have a consumer advisory
- Does the menu indicate what items the consumer advisory is for

## COOLING AND COLD HOLDING

- Are sushi rolls cooled to  $\leq 41$  F before being put into cold holding
- Are sushi rolls held at  $\leq 41$  F

# Sushi Checklist



## SEPARATION OF ACTIVITIES

- **Is cross contamination prevented by keeping raw animal from other items that are not going to be cooked**

## SANITATION

- **Is the bamboo mat properly covered and replaced every 4 hours or as needed (between different types of sushi preparation)**
- **Are knives and cutting board washed, rinsed, and sanitized as needed**

# RI RRT Outbreak Response



# Detection of Outbreak



Wednesday afternoon- an illness complaint was received by CFP and cases were interviewed:

- Two individuals who shared various sushi rolls became ill approx. 1 hour after eating at Restaurant A on Tuesday. Both were admitted to the hospital. This restaurant was their only shared exposure.
- Symptoms: flushed face, hives, tongue numbness, tingling, throat swelling



# Investigation Activities



An investigation was conducted at Restaurant A:

- Found evidence of refrigeration at 51 degrees F
- Embargoed fresh and frozen tuna
- Collected fresh and frozen tuna samples



Laboratory testing:

- Determined that 2 out of 6 samples had elevated histamine levels (>500 ppm).
- These were found in unopened, frozen product and strongly suggested that the supplier was the source of illness.

# Investigation Activities



- Identified supplier in CT (sourced from Indonesia) and informed CT/FDA
- Obtained distribution list of restaurants that received contaminated lot
  - **Determined that this product was going to be served at a large festival in RI. Product was pulled from service.**
- FDA conducted testing at the CT facility
  - Found high histamine levels in the sampled ground tuna
  - Found serious violations of HACCP regulation
- FDA initiated a recall of all ground yellow fin tuna from the implicated lot



# Wrapping Up the Investigation



- Hotwash/After Action Review
  - **Main success:** additional illnesses were likely prevented both in Rhode Island and Connecticut, due to quickly identifying the affected restaurants and supplier of the ground tuna so it could be pulled from sale.
  - **Lesson Learned:** it is important to verify how the restaurant prepares the product by talking with several staff members. The restaurant initially stated whole tuna was being used and ground on-site instead of using pre-ground tuna. Verifying the correct product used could limit the samples submitted to the lab and ensure a quicker response.

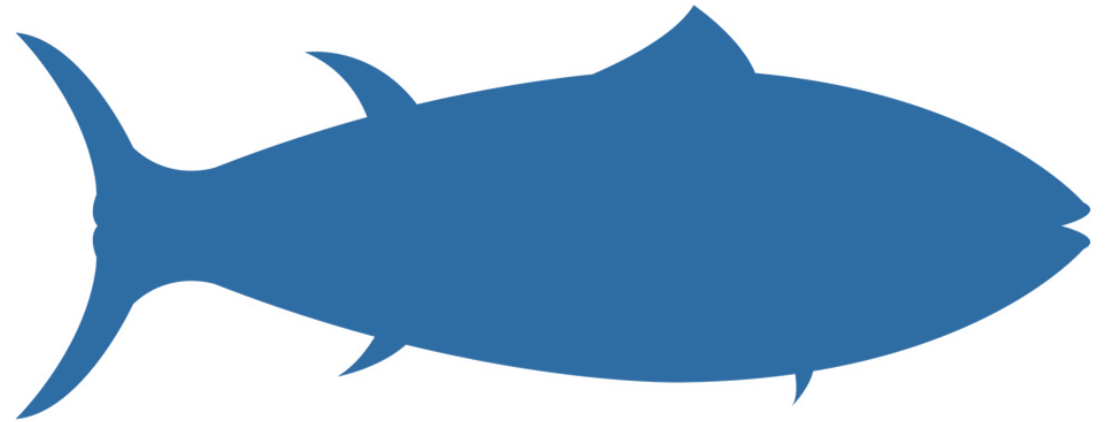




# Conclusions



The epidemiological, laboratory and environmental investigations led to the conclusion that this outbreak was caused by contaminated raw tuna product, served at Restaurant A, due to temperature abuse from the supplier.



# Sushi Norovirus Outbreak



- 23 people ill from 11 different parties
- Confirmed for Noro
- 3 Food Handlers and baby in kitchen all positive



# Violations



- Temperature Abuse
  - Rice
  - Cold Holding
- Bare Hand Contact
- Not Following HACCP Plan
  - Not keeping Records for Acidification or Time
  - Not Calibrating or using pH meter correctly





Cathy Feeney  
Catherine.Feeney@health.ri.gov