

**Kodiak Archipelago Leadership Institute  
Alaska Ocean Farms and Alaska Sea Grant  
Joint Innovation Project:  
PILOT SCALE FORCED-AIR DRYING AND MILLING OF  
FARMED KELP**

**FOOD SAFETY AND MICROBIOLOGY**

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# What are the Potential Risks?



- Foodborne Pathogens
- Allergens
- Heavy metals
- Iodine

**HACCP PLANNING SAVES LIVES and MONEY!**  
<https://alaskaseagrant.org/our-work/seafood-processing/>

# *Foodborne Pathogens:*

- Fecal Coliforms: improper handling, residues, contaminated seawater
- Listeria: thrives in cold, wet, anoxic conditions
- Botulism: paralytic toxins, thrives in moist environments, spores can survive high temps
- Yeast and mold: product spoilage and health risks
- Clean Water, clean storage containers, proper handwashing and PPE
- Reduce moisture to <10% and WA of 4.5 or less, drying temps above 165°F, store with desiccates
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# Examples of Micro Test Results: Dried and Milled Kelp

Species	Aerobic					Staphylococcus	
	Bacteria	E. coli	Coliforms	yeast	Mold	Salmonella	aureus
Dragon Kelp	570	<10	<10	<10	<10	Negative	<10
Bull Kelp	<10	<10	<10	<10	<10	Negative	<10
Sugar Kelp	1620	<10	<10	<10	<10	Negative	<10
<b>Dried</b>							
<b>Almonds*</b>	<b>&lt;10,000</b>	<b>&lt;10</b>	<b>&lt;10</b>	<b>1000</b>	<b>1000</b>	<b>Negative</b>	<b>&lt;10</b>
<b>Dried Mango*</b>	<b>&lt;10,000</b>	<b>&lt;10</b>	<b>&lt;10</b>	<b>1000</b>	<b>1000</b>	<b>Negative</b>	<b>&lt;10</b>

\* Regulatory limits not measured values

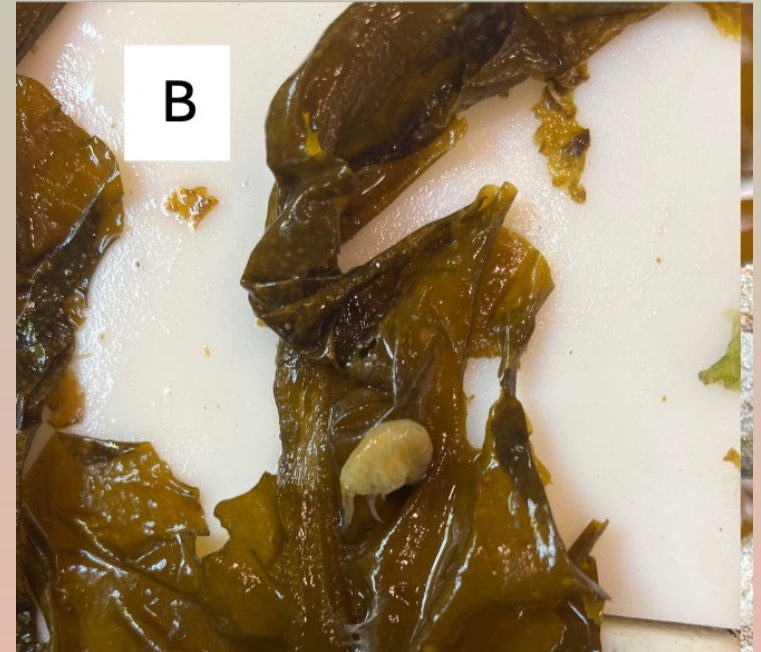
**Where else besides pre-packaging should testing be done in a theoretical processing line?**

# Allergens

- Shellfish and Fish are the most likely allergens in kelp, almost unavoidable.
- All crustaceans can trigger shellfish allergens, some insects too.
- Can be severe, 0.5%-2.5% of the adult population, common allergen.

\*Data from Mildenerger et. al., 2025

Labeling the only route: Product of the Sea, may contain fish and shellfish.



# Heavy Metals

High Arsenic could impact both the serving size and what products dried kelp can be in!

# Iodine

- Necessary element for proper thyroid function
- Can be toxic in high amounts
- Greatly impacts serving size
- Can be used purely as a dietary supplement
- Stains Equipment and Surfaces, even concrete
- Can be reduced by blanching

# How do these impact serving size?

PPM = mg/kg

Use this to determine the serving size based on the amount of iodine in sugar kelp.

PPM Iodine in Sugar Kelp = 3940 = 3940 mg/kg

Max serving is 150 PPM or 150 mg/kg

$(150 \text{ mg/kg}) / (3940 \text{ mg/kg}) = 0.038 \text{ mg}$  of sugar kelp or 38 micrograms of sugar kelp!



## Nutrition Facts

249 servings per container

Serving size 1/4 tsp (0.9g)

Amount per serving

**Calories** **0**

% Daily Value\*

Total Fat 0g 0%

Saturated Fat 0g 0%

Trans Fat 0g

Cholesterol 0mg 0%

Sodium 30mg 1%

Total Carbohydrate 0g 0%

Dietary Fiber 0g 0%

Total Sugars 0g

Includes 0g Added Sugars 0%

Protein 0g

Vitamin D 0mcg 0%

Calcium 10mg 0%

Iron 0.2mg 2%

Potassium 140mg 2%

Iodine 3595mcg 2400%

\*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.