



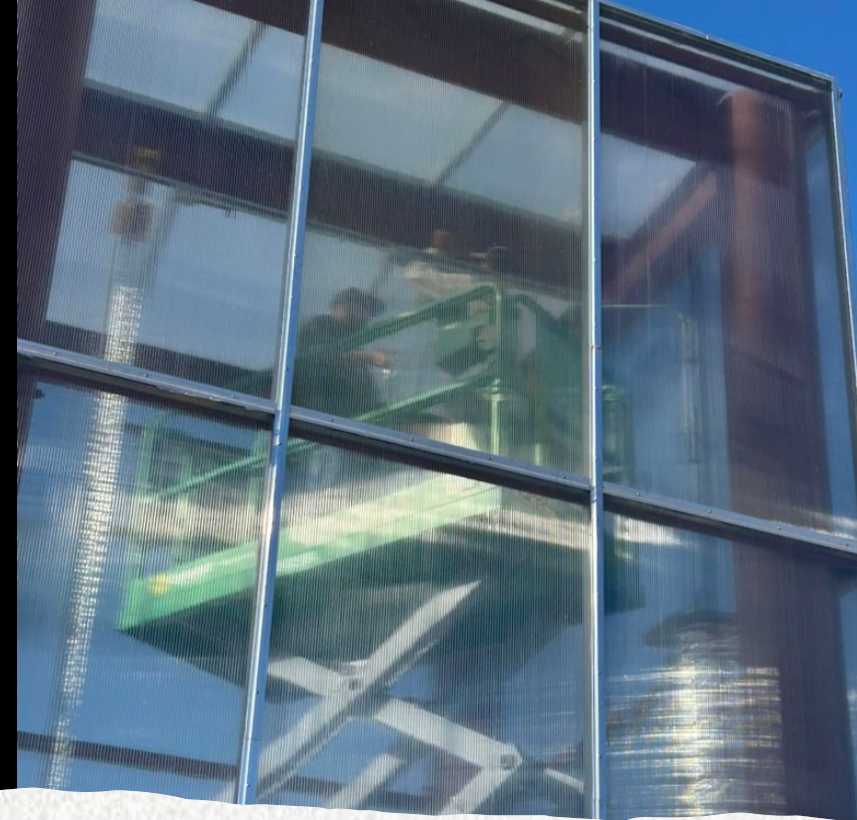
Solar Drying of Alaskan Seaweed and Use as a
Sustainably Sourced Layer Hen Feed Ingredient

Phase I: University of Arizona
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University of Arizona

- **University of Arizona work has involved five main steps**
- 1. Sign contract with Seagrove
- 2. Upgrade solar drying tower to accommodate project
- 3. Develop efficient thawing process
- 4. Develop efficient drying process in solar tower
- 5. Develop efficient grinding process of dried seaweed

Student Staff

- The University of Arizona hired one graduate student (Hunter Clark) and one undergraduate (Joseph La Mattina) to support the project, using JIP Funds.
- Hunter has strong Alaskan roots, having lived in Soldotna, AK for about 15 years and on St. Lawrence Island in Savoonga, AK for a year.



2. Upgrade solar drying tower to accommodate project

- We upgraded the winch system to a four-ton capacity

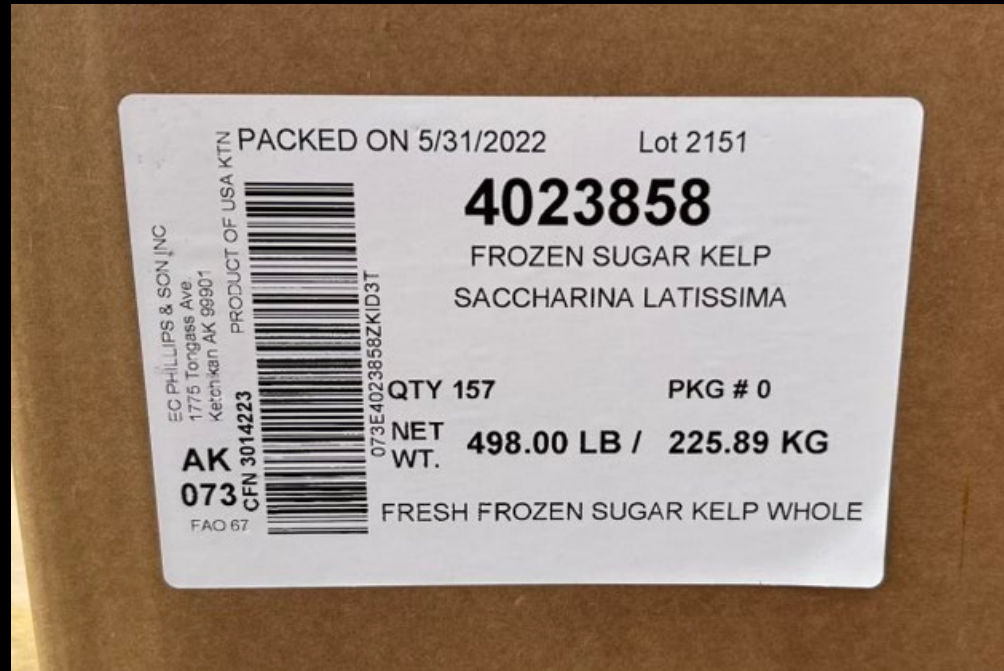


We designed and fabricated a seaweed drying system with 40 drying beds



52 totes, each weighing about 500 lbs (225 kg) were shipped to Tucson Frozen Storage.

We have so far processed 12 totes





3. Develop efficient thawing process

- By far, the biggest hurdle and most amount of time is spent thawing the seaweed.
- We have spent most of our time to date, developing an efficient thawing process.



We developed a 3-hour 7-step process to thaw the seaweed.



- It requires another hour to load the seaweed into the tower

4. Develop efficient drying process in solar tower

Wet before



Dry after



Sugar kelp contains high levels of mannitol- a sugar alcohol

Mannitol has evolved in brown algae to prevent desiccation making it harder to dry



By comparison:

Sugar kelp about 6-8 hours to dry
high mannitol



Ribbon kelp about 1.5 hours to dry
low mannitol





A full tote reduces to half a 45-gallon garbage can of dried kelp

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- Drying reduces the weight of kelp to 5.1% of wet kelp
 - Ten totes worth of unshredded dried kelp fit in one tote
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- Water content below 10% is considered shelf stable
- Solar drying reduces water content to $< 3\%$
- Water activity below 0.6 is considered shelf stable
- Solar drying reduces water activity to < 0.2



5. Develop efficient grinding process of dried seaweed

Using a cement mixer, we can reduce volume by 75% after 1 hour

Next stage

Starting the week of July 21, we will test a rotating system which should allow us to dry 3-4 totes per week