



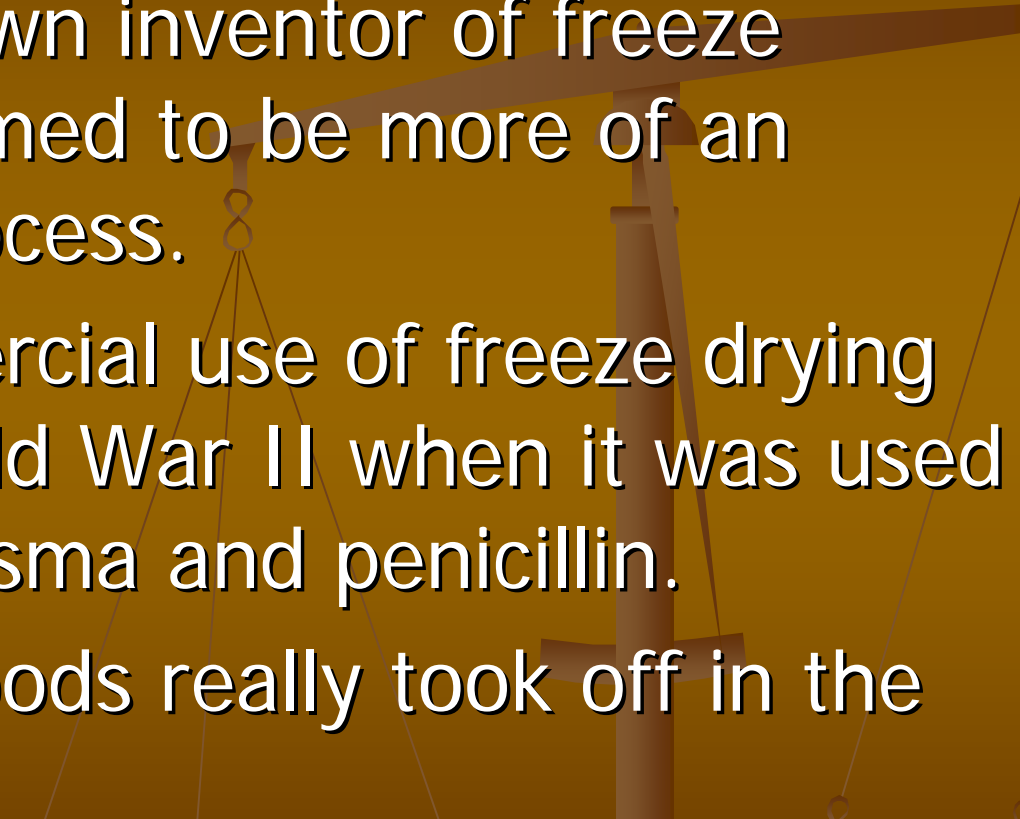
Freeze Drying & Freeze Dried Foods

Balancing Food Safety and Food
Quality

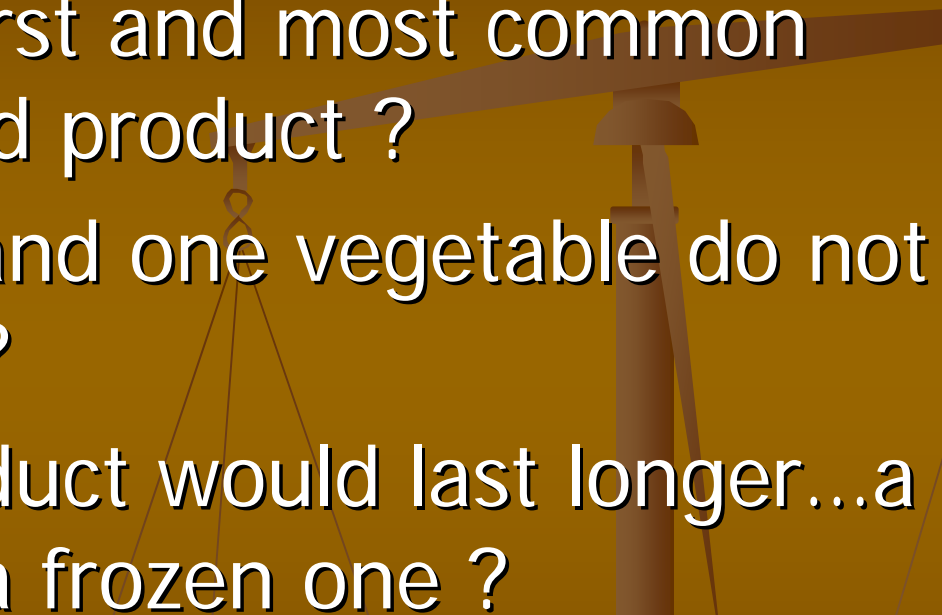
History of Freeze Drying

- Ancient Peruvian Incas were ahead of their time when it came to science.
 - They would place their potatoes and other crops above Machu Picchu where the produce would freeze. What they didn't know was that the low pressure of the high altitudes vaporized the water in the produce, essentially freeze drying it.

History Continued

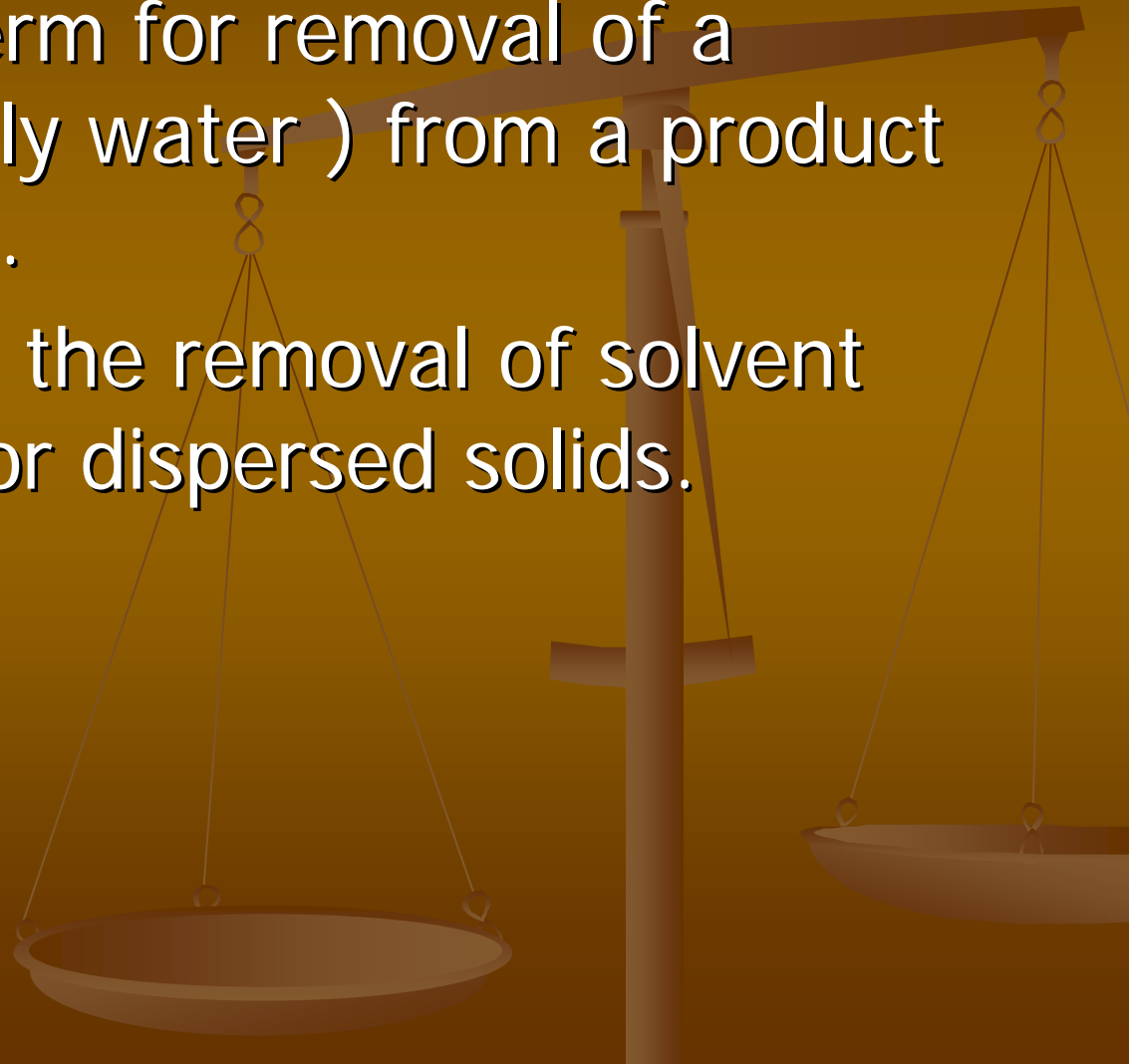
- There is no known inventor of freeze drying as it seemed to be more of an evolutionary process.
 - The first commercial use of freeze drying was during World War II when it was used to dry blood plasma and penicillin.
 - Freeze drying foods really took off in the 1960's.
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- A faint, stylized illustration of a balance scale is visible in the background of the slide. The scale is positioned on the right side, with its vertical post and horizontal beam extending across the middle of the frame. Two pans are suspended from the beam by thin lines. The scale is rendered in a light brown color, matching the overall theme of the slide.

Freeze Drying Trivia

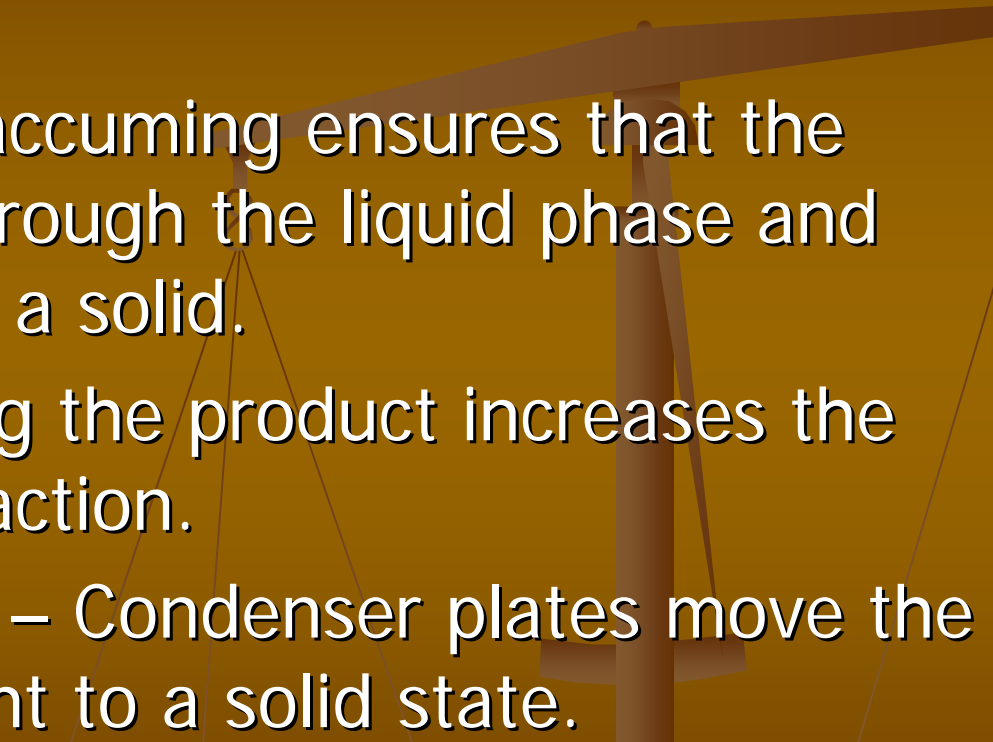
- What was the first and most common freeze dried food product ?
 - What one fruit and one vegetable do not freeze dry well ?
 - Which food product would last longer...a freeze dried or a frozen one ?
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How Freeze Drying Works

- The technical term for removal of a solvent (typically water) from a product is Lyophilization.
- Freeze drying is the removal of solvent from dissolved or dispersed solids.

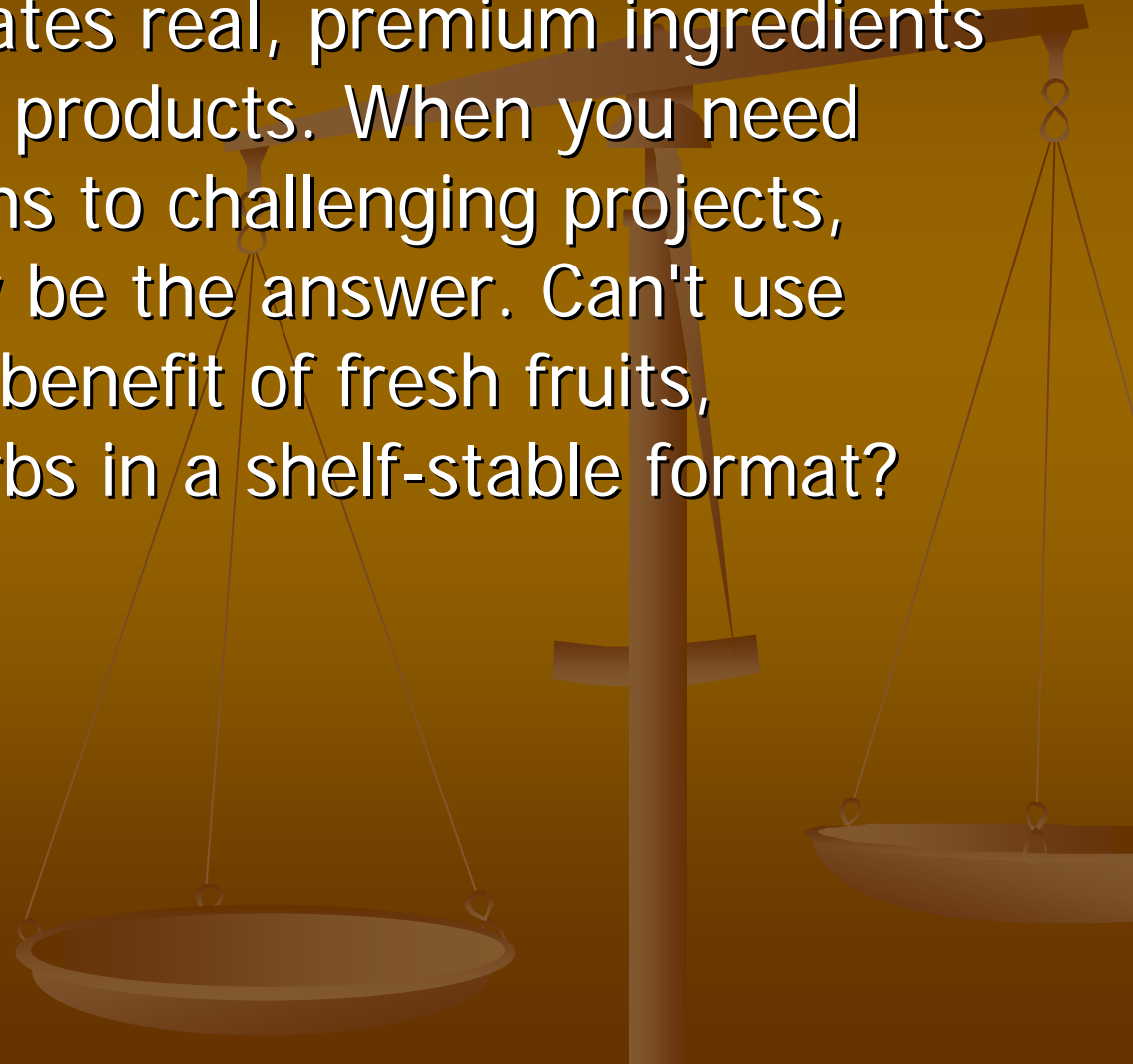


4 Steps of Freeze Drying

- 1 Freeze
 - 2 Vacuum – Vacuuming ensures that the water passes through the liquid phase and goes straight to a solid.
 - 3 Heat – Heating the product increases the speed of the reaction.
 - 4 Condensation – Condenser plates move the vaporized solvent to a solid state.
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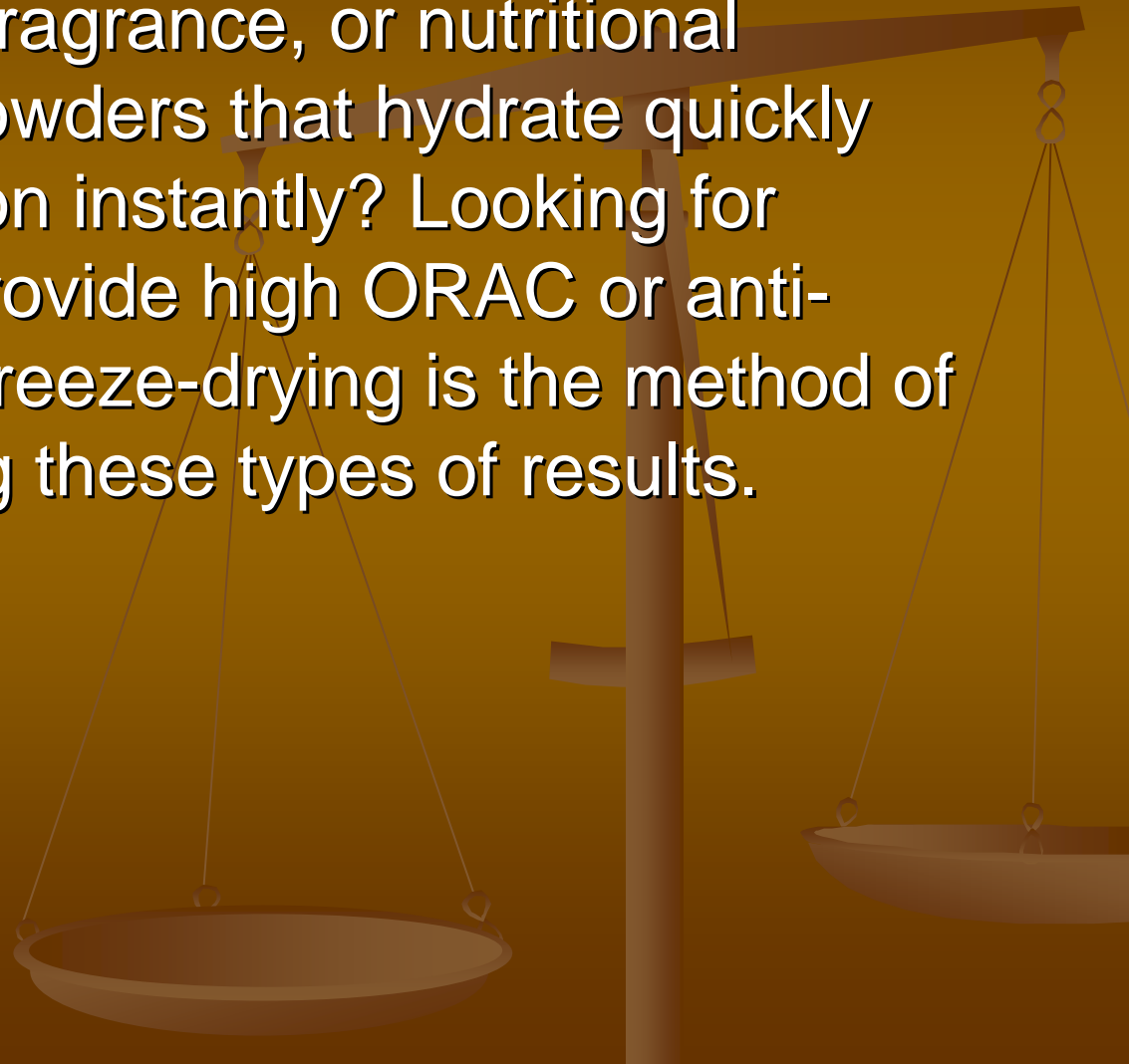
Freeze Drying Foods

- Freeze-drying creates real, premium ingredients for break-through products. When you need innovative solutions to challenging projects, freeze-drying may be the answer. Can't use liquids? Want the benefit of fresh fruits, vegetables, or herbs in a shelf-stable format?



Freeze Drying Foods – Cont'd

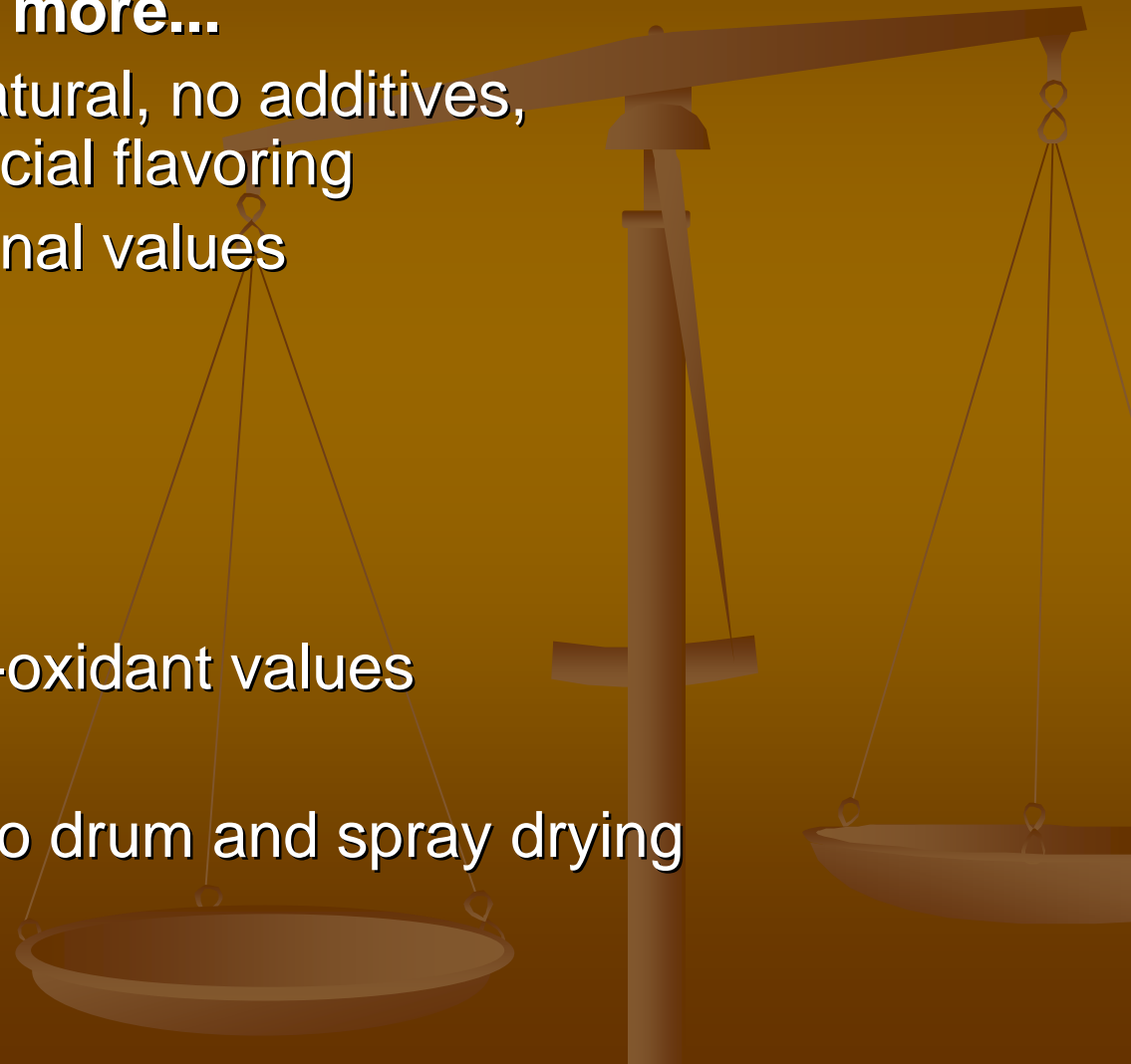
- Need real flavor, fragrance, or nutritional benefits? Need powders that hydrate quickly and go into solution instantly? Looking for ingredients that provide high ORAC or anti-oxidant values? Freeze-drying is the method of choice for creating these types of results.



Freeze Drying Foods – Cont'd

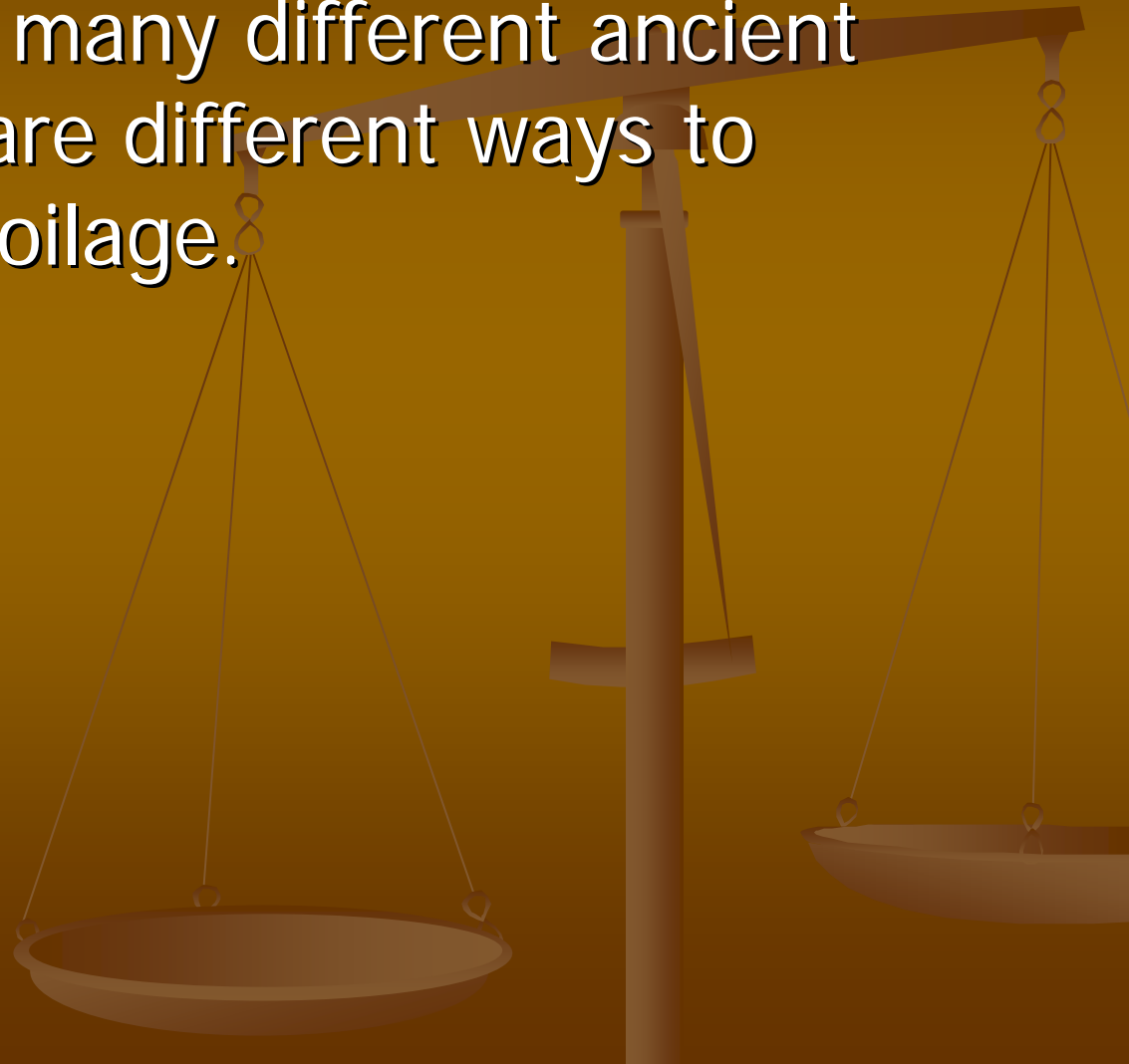
Fresh-like flavors and more...

- Label friendly....all natural, no additives, preservatives or artificial flavoring
- Concentrated nutritional values
- Shelf stable
- Enhanced texture
- Vibrant color
- Intense fragrance
- High ORAC and anti-oxidant values
- Organic compatible
- Superior alternative to drum and spray drying

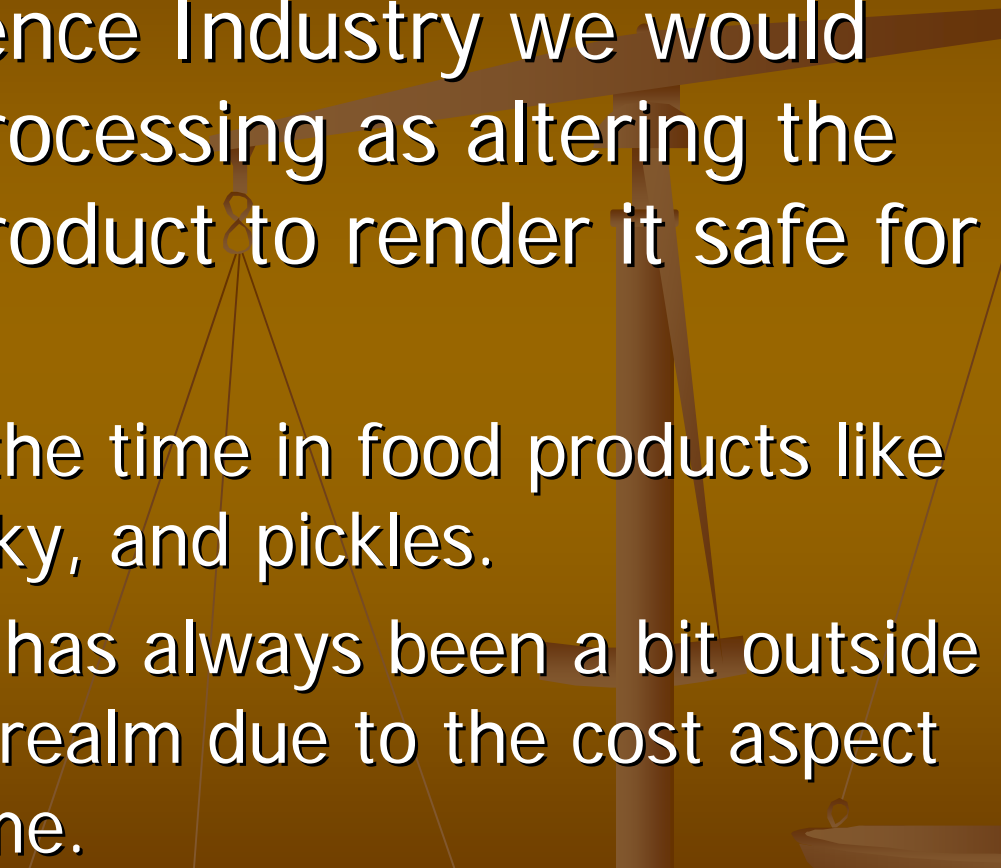


Freeze Drying Foods

- As we see from many different ancient cultures, there are different ways to prevent food spoilage.
 - Drying
 - Freezing
 - Acidifying
 - Sugar addition

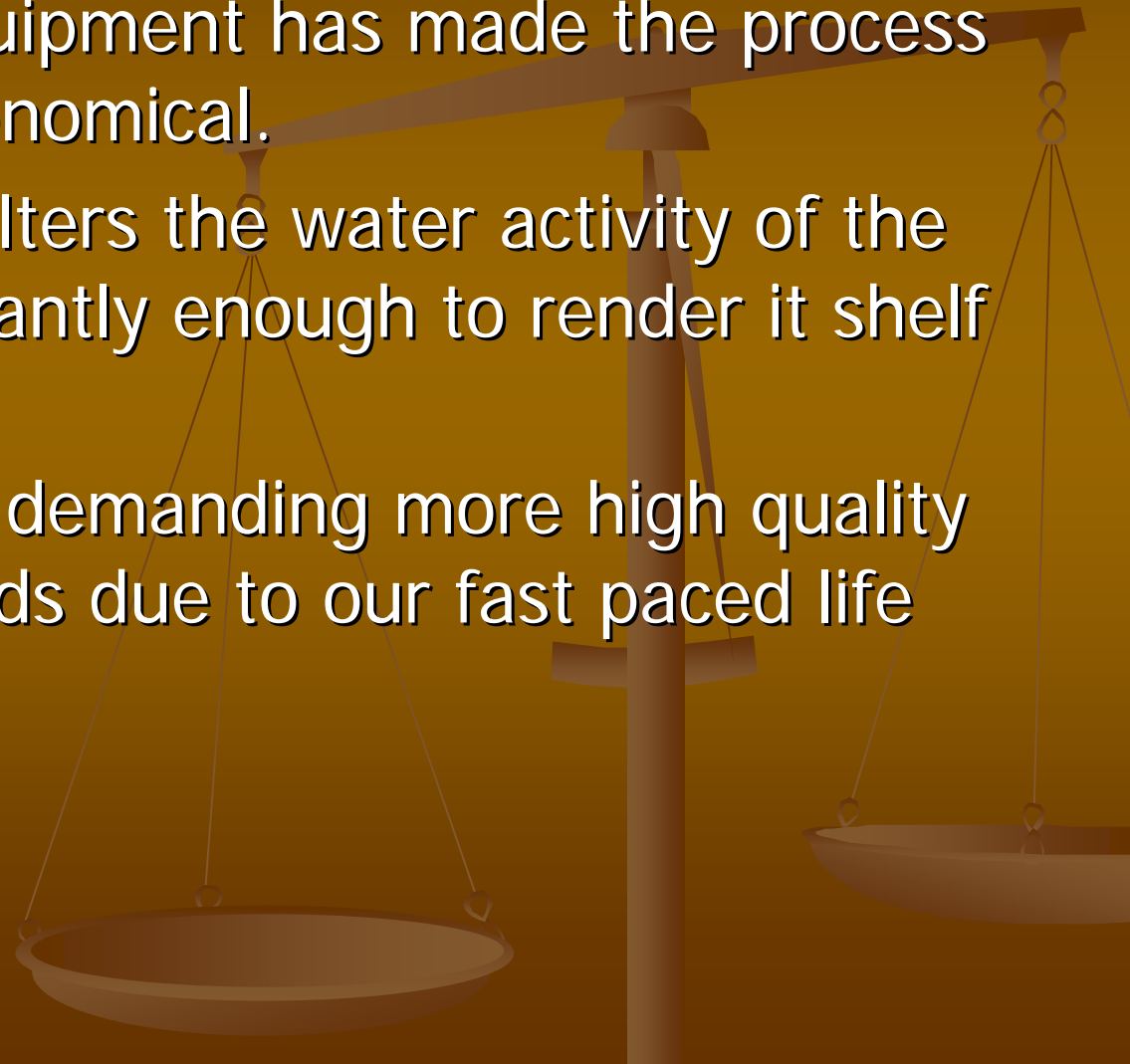


Freeze Drying Foods – Cont'd

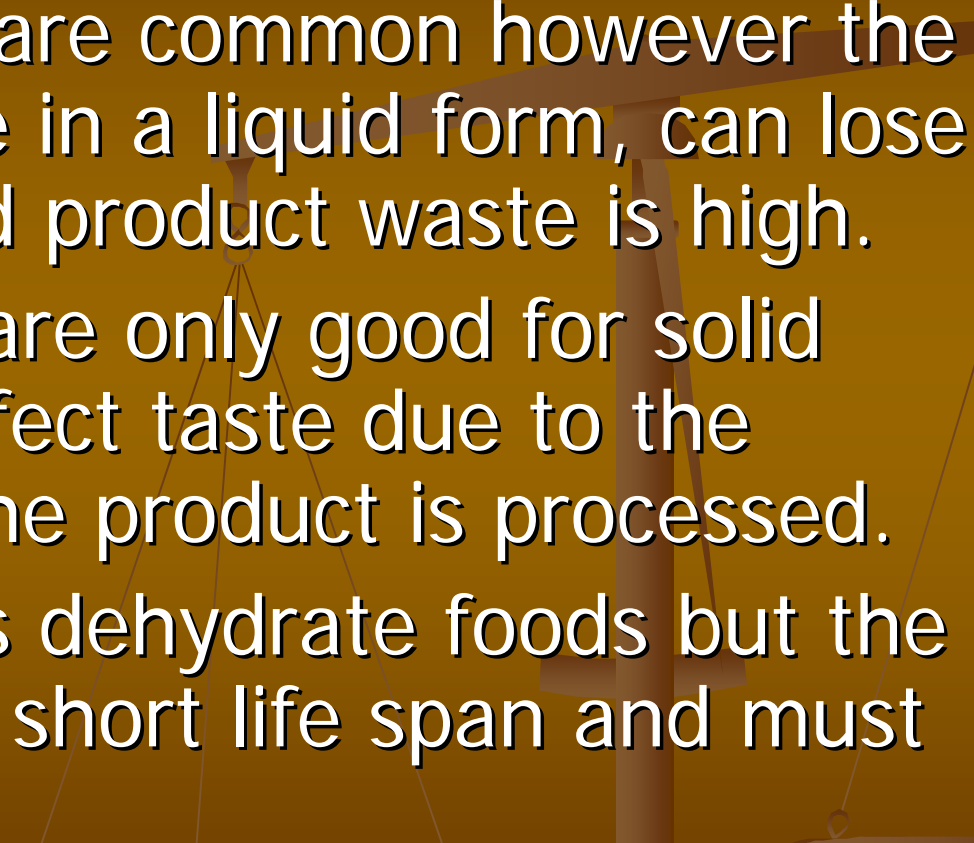
- In the Food Science Industry we would refer to these processing as altering the Ph or Aw of a product to render it safe for consumption.
 - We see this all the time in food products like yogurt, beef jerky, and pickles.
 - Drying of foods has always been a bit outside of the common realm due to the cost aspect of the drying time.
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Freeze Drying Food Cont'd

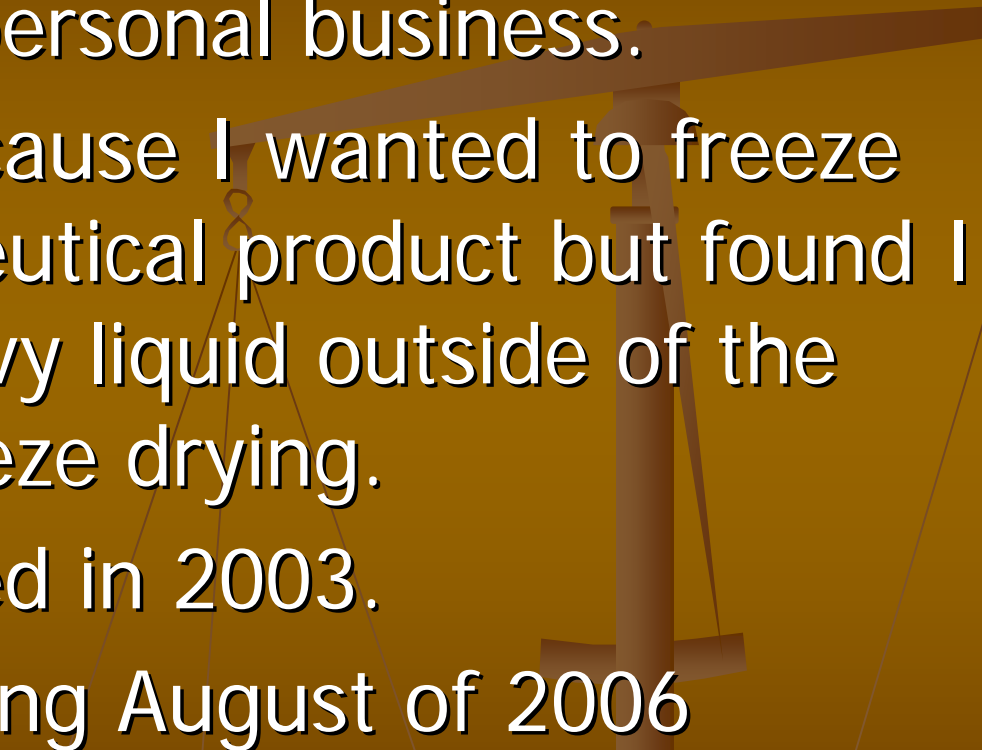
- Commercial equipment has made the process much more economical.
- Freeze drying alters the water activity of the product significantly enough to render it shelf stable.
- Consumers are demanding more high quality shelf stable foods due to our fast paced life styles.



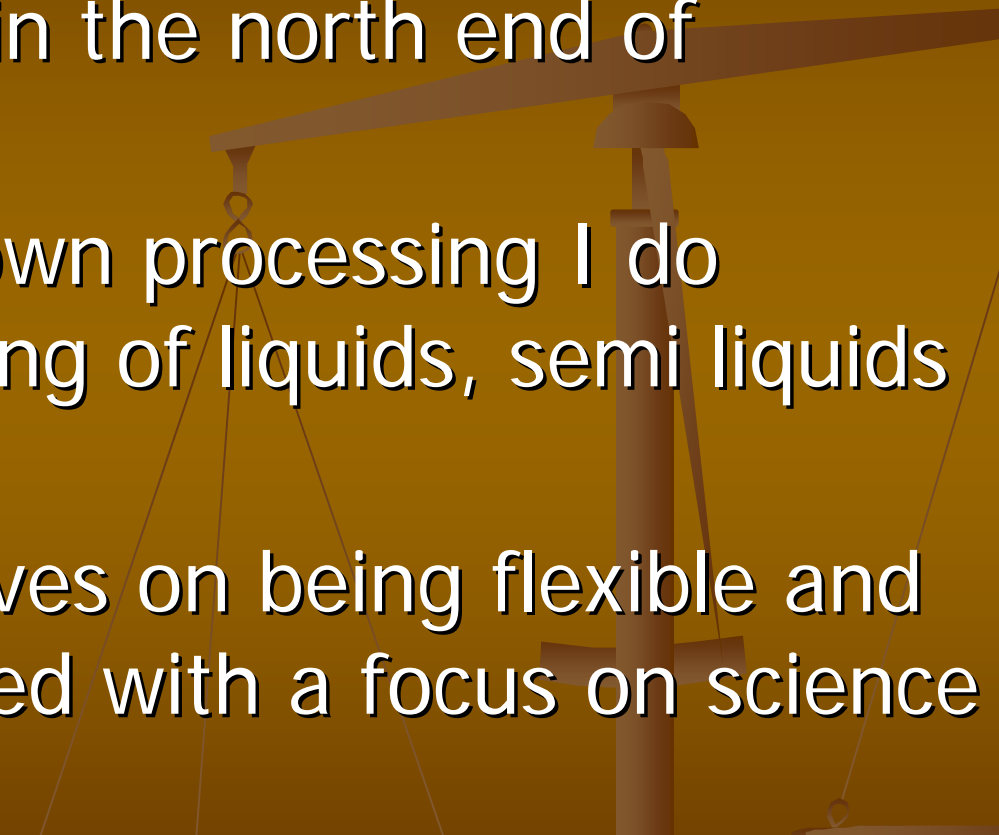
Other Types of Food Dehydrators

- 1. Spray dryers are common however the product must be in a liquid form, can lose color quality and product waste is high.
 - 2. Dehydrators are only good for solid food and can effect taste due to the length of time the product is processed.
 - 3. Freezing does dehydrate foods but the food will have a short life span and must remain at -18 C.
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- A faint, stylized illustration of a balance scale is visible in the background of the slide. The scale is positioned vertically, with a central pillar and two pans hanging from a horizontal beam. The pans are empty and the scale is slightly tilted to the right.

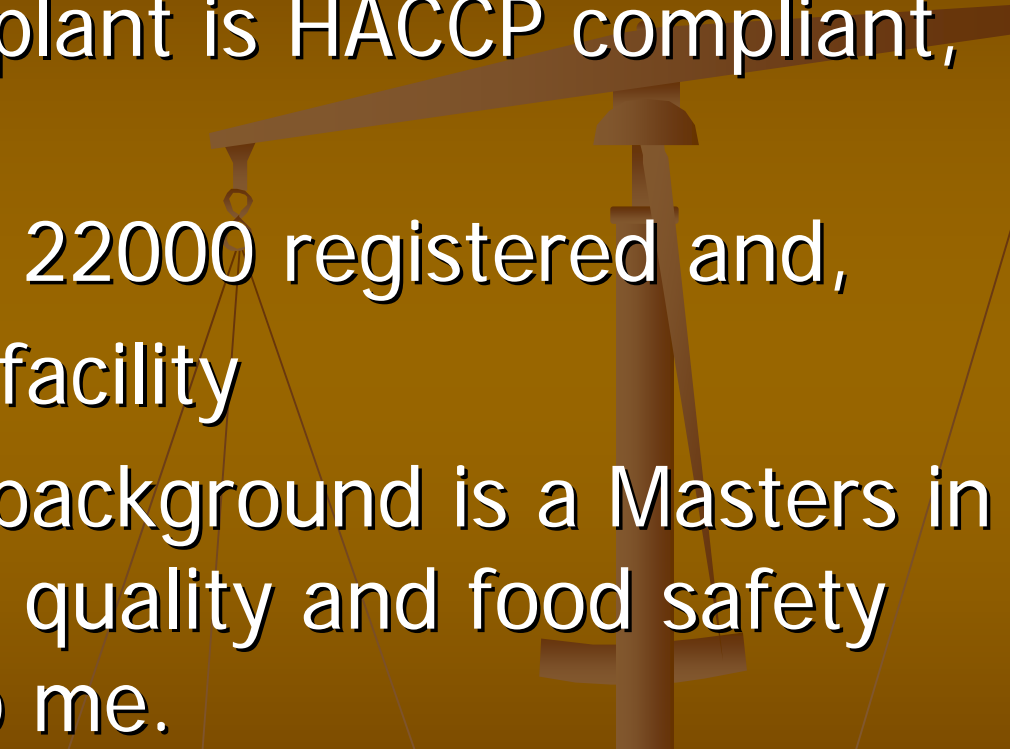
CANAGRA TECHNOLOGIES INC.

- Canagra is my personal business.
 - Came about because I wanted to freeze dry my nutraceutical product but found I had to ship heavy liquid outside of the province for freeze drying.
 - Was incorporated in 2003.
 - Started processing August of 2006
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CANAGRA TECHNOLOGIES INC.

- We are located in the north end of Saskatoon.
 - Along with my own processing I do custom processing of liquids, semi liquids and solids.
 - We pride ourselves on being flexible and customer oriented with a focus on science and quality.
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CANAGRA TECHNOLOGIES INC

- The processing plant is HACCP compliant, GMP compliant,
 - ISO 9000 & ISO 22000 registered and,
 - FDA Registered facility
 - My educational background is a Masters in Food Science so quality and food safety are important to me.
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QUESTIONS

