

Moisture Content in Walnuts

Fedora Farms

Kristen James & Emily Shea

Original Project Outline

Title: Validation of Walnut Moisture Content through Improved Measurement Method

Client Information:

Fedora Walnut Farms is a mid-sized walnut company located in Sutter County

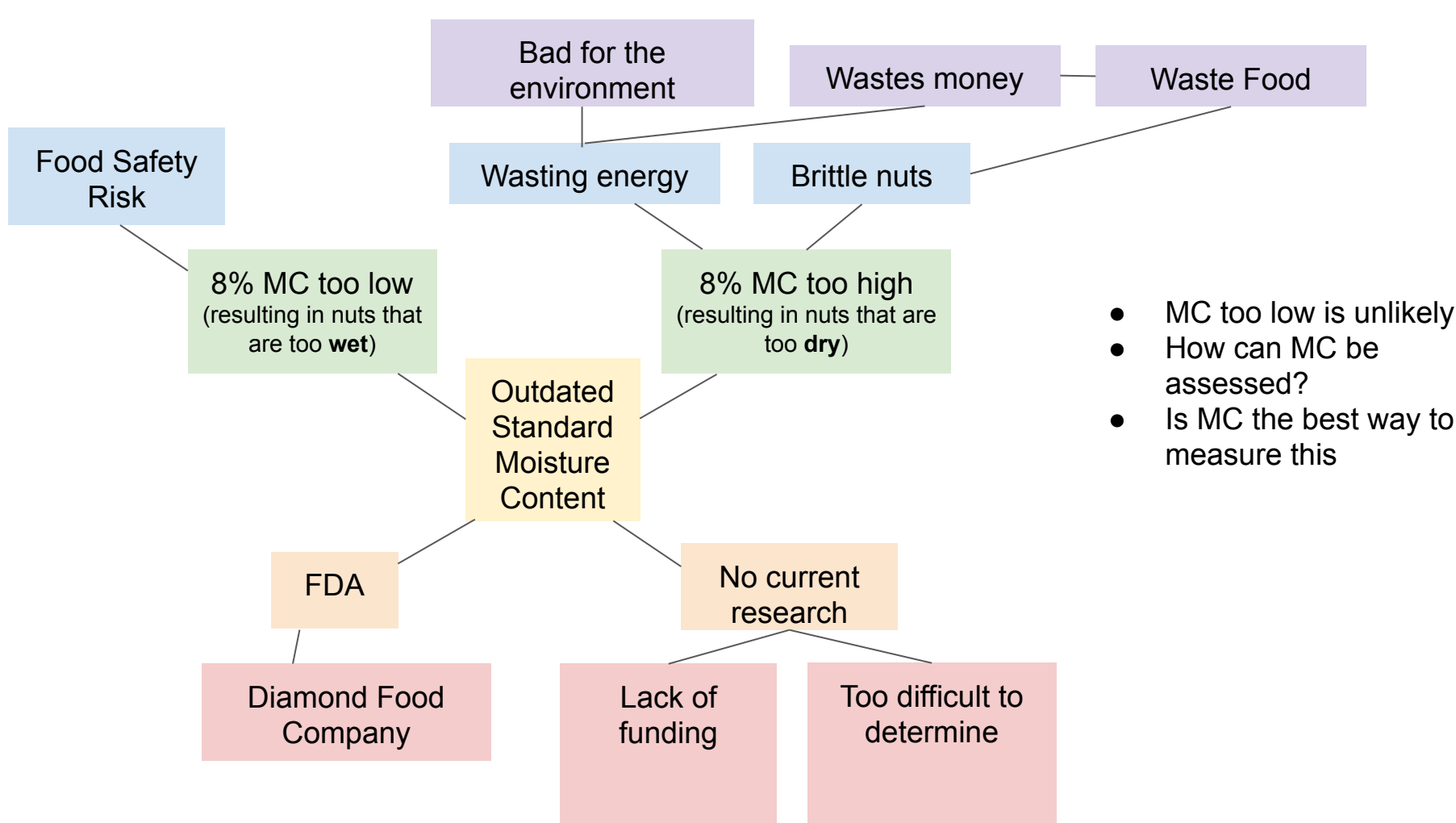
Problem Statement:

Industry standard for walnut moisture content has established as 8% - 11, there is more rigorous study to establish this number? Fedora believes the number to be original established by Diamond Food Company in 1970's through power over the FDA. No Study has validated this number since that time. Now that technology in measuring walnut moisture content along the pipeline has improved, Fedora is interested in understanding how to harness that data to verify or establish a new number.

Student Activities Requested

- Validation study of 8% since the original 1970's study
- Research methodology development
- Technology research to understand what can be used to verify moisture content value

Why 8% Moisture Content???

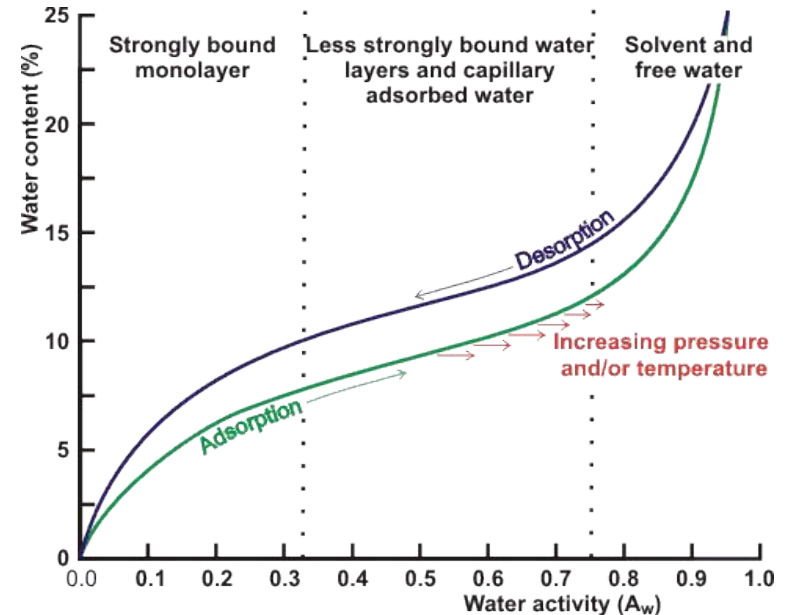


Prior Art - How is walnut moisture quantified?

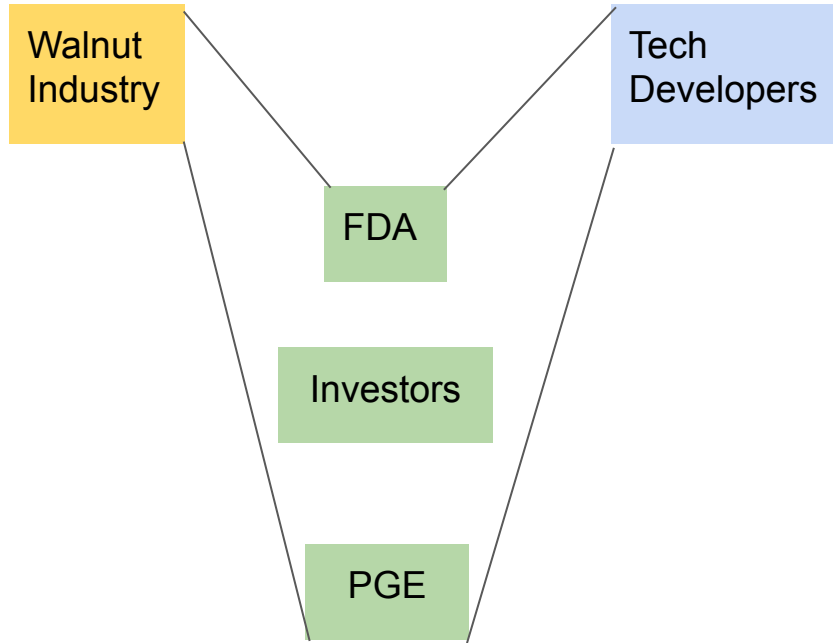
Moisture Content- ratio of water mass in a material to total mass. Measured through weight loss during drying

Water Activity- partial pressure of water in a material divided by the standard state partial pressure of water. Measured through relative humidity of a container of material. Directly applicable to bio-availability of water (think microbes!)

Isotherms- Relate moisture content and water activity. No walnut isotherms exist yet.



Stakeholder Analysis



From moisture content to water activity... changing technology

- Improvement in cost and energy efficiency, product storage
- New potential outlets for tech development and research involvement

Policy ID

No specific policies for moisture content OR water activity in walnuts.

- [California Walnut Board](#)- provides industry (not policy) guidelines
 - **Safe Food Alliance** guidelines - ensure uniformity of and safety of California almonds. No quantitative guideline on moisture.
- [USDA](#)- grades dictate almond value based on qualitative “dry-ness”, but no quantitative guideline exists
- [FDA](#)- regulates water activity used in canned foods. Water activity has not been used as a standard for walnuts.

New Policy- Creating a water activity standard based on optimum food safety and energy efficiency.

Recommendation

Determine the standard water activity for optimal walnut quality

Strengths

- More accurate than moisture content; Reduces food waste.
- Simple and nondestructive measurement

Weaknesses

- New method development will come with challenges.
- Upfront cost of installing new measurement tools.

Opportunities

- Isotherms are a current focus of UC Davis researchers!
- Can use current collaboration with tech developers.

Threats

- Must combat industry standards. Clients may not agree.
- No current policy exists

Final Problem Statement and Takeaways

Started with moisture content...

- Why is 8% moisture content should the industry standard?
- Found there is no scientific evidence or policy confirming 8% is an ideal moisture content.

... Ended with water activity

- Would a standard water activity be accurate and cost effective method for assessing walnut moisture?

Questions?