Honey, Water, & Chemistry
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Overview

- Fermentation
- Percentage of Water In Your Honey
- Crystallization

You Should Check Your Honey’s Moisture Content
Doesn’t Honey Last Forever?

· It Depends
  - Will Not Spoil In Traditional Sense, But Can Begin to Ferment
  - All Honey Has A Few to A Lot of Yeast Spores
  - Yeast Spores Activate When There Is Enough Water To Sustain Them
    - Honey with less than 17.1 percent water will not ferment in less than a year, irrespective of the yeast count.
    - Between 17.1 and 18.6 percent moisture, honey with 1000 yeast spores or less per gram will be safe for at least a year.
    - When moisture is between 18.6 and 19 percent, not more than 10 yeast spores per gram can be present for safe storage.
    - Above 19 percent water, honey can be expected to ferment even with only one spore per gram of honey

· Honey Will Not Ferment Below 50 Degrees and Above 80 Degrees

· To Be Consider USDA Grade A, Honey Must Be 18.6% Water or Less

· Bottom Line: You Need To Know Your Honey’s Moisture Content
Don’t The Bees Only Cap When Ready?

• Well, They Try 😊

• Nectar
  - ~80% Water
  - Most of the Rest is Sucrose (Table Sugar) (A Complex Sugar)

• Honey
  - < 18.6% Water
  - Main Sugars Are Glucose And Fructose (Simple Sugars)
  - The Sugars Are Supersaturated In The Water

• Bees (Via Enzymes and Actions):
  - Break Down The Sugars
  - Remove Water
  - Facility Supersaturation (Without a Stove Top!)
  - Cap The Honey When Moisture Content is ~ 15% to 19%
So If It’s All Capped, I’m Good, Right?

• Traditional Rule Of Thumb
  - Only Extract From Frames At Least 75% Capped
  - Reasonable In Many Geographic Locations
  - Montgomery County – Not So Much.

• We Live In A Hot, Humid Area
  - Bees Struggle To Get Moisture Content Down
  - Capped Honey Is Probably Near The Upper Limit Of What They Will Accept
  - And, The Uncapped Cells Are Likely Higher

• Honey is Hydroscopic
  - Absorbs Water Easily
  - Extraction And/Or Exposure To Air When Relative Humidly Above 60%
  - Honey Is Pulling In More Water

• You Can Start Below 18.6% and End Above
So How Do I Know The Water Content?

- Measure Samples of Your Honey With A Refractometer
- Available For Many Uses
- Wineries, Brewers, Fruit Juice, Beekeepers, Etc.
- Get One For Honey Moisture Content
  - Will Have A Direct Scale for % Water
  - Others May Only Show “Brix”, Specific Gravity, or “Baume”
    - Conversion Required
- Measurement Changes With Temperature
  - Some Have Automatic Temperature Control (ATC)
  - Otherwise, Adjust Numerically According to Instructions
  - Most based on 68F – 20C
Using A Refractometer
Using A Refractometer

• Calibration
  - May Come With Calibration Liquid
    – Follow Directions
  - Many Use Extra Virgin Olive Oil
    – 71.5% on Brix Scale
  - Distilled Water Can Also Be A Calibration Source
    – Refractometer must allow Brix of 0 Reading – Many Will Not

• Clean Surface With Lent Free Cloth After Each Use

• Demonstration

• If No ATC, Must Numerically Adjust For Temperature (Follow Instructions)
It Is Too High, Now What?

• Many Methods / Ideas Available On the Internet
  - Dehumidifiers
  - Fans
  - Small Rooms
  - Surface Area
  - Stirring

• We Put Bucket in Electronic Closet With Filter Mesh On Top and Fan Blowing Across The Top & Stirred Several Times A Day
  - Went From 20% to 18% in ~ 8 Days

Be Mindful of Small Hive Beetles and Wax Moths
Crystallization

• It’s Good Thing
  - All Raw, Natural, Unfiltered Honey Will Crystallize
  - How Quickly Depends On Percent of Glucose
    – Higher Saturation Point, Starts on Solid Surfaces (Pollen, Wax, Propolis, etc.)
    – Fine Filtering and High Heat To Melt Impurities Will Prevent
  - Glucose Is Sweeter Than Fructose – Crystals Sweeter Than Remaining

• It’s A Bad Thing
  - If You Are On the Edge of Water Content Percentage
  - As Glucose Crystallizes and Becomes Solid, Percentage of Water In Remaining Honey Goes Up
  - Once Crystallization Starts, Monitor Closely For Fermentation
Conclusion

• Check Your Moisture Content

• Before Extraction If Reasonable

• But At Least After Extraction

• Do Not Sell Honey With Too High Of Moisture Content

• Best To Also Not Give It Away, But If You Do Make Sure They Know The Risks and Signs of Fermentation
  - Use Within Three Months
  - Store Below 50 Degrees
  - Be Mindful of Fermentation Once Honey Begins Crystalizing
QUESTIONS