# Practical High-Acidity Wine Making Strategies for the Midwest

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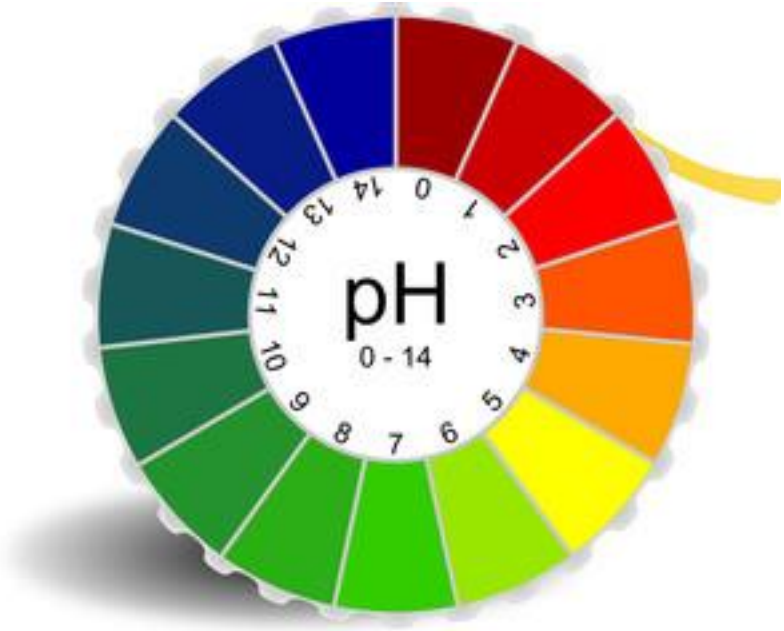
# Let’s review the basics, they are fundamental

- pH
- TA (TTA) Total Titratable Acidity
- Brix  (sugar)
- pH
  - Did I mention

pH?

# Getting started

- *A basic understanding of pH and Total Acidity is invaluable to practical wine making.*
- *pH is the KEY to winemaking*



# pH

- *"pH is the inverse log of Hydrogen ions in a solution"*


- pH is a **logarithmic** scale from 0 to 14
  - water is pH 7, (or neutral)
  - pH of 3.0 is TEN TIMES more acidic than a pH of 4.0

- **Typically, a pH between 3.1 and 3.65 is desirable for wine.**
  - **Whites 3.1-3.35, Reds 3.35-3.65**

- **pH** is about microbial stability, mouth feel, structure, color retention and age-ability

# pH vs. TA (total acidity)

- Related, but not the same
  - High pH (3.65) *usually* means lower acidity
  - Low pH (3.1) *usually* means higher acidity
  - But not a 1:1 correlation…

# TTA – Total Titrateable Acidity

- **TTA** is an empirical measurement of the acids in a solution in g/L
- The higher the total acidity, the more tart a wine will taste
- Wine Acids include ***tartaric, malic****, citric, lactic, acetic,* etc..

- **SO;**

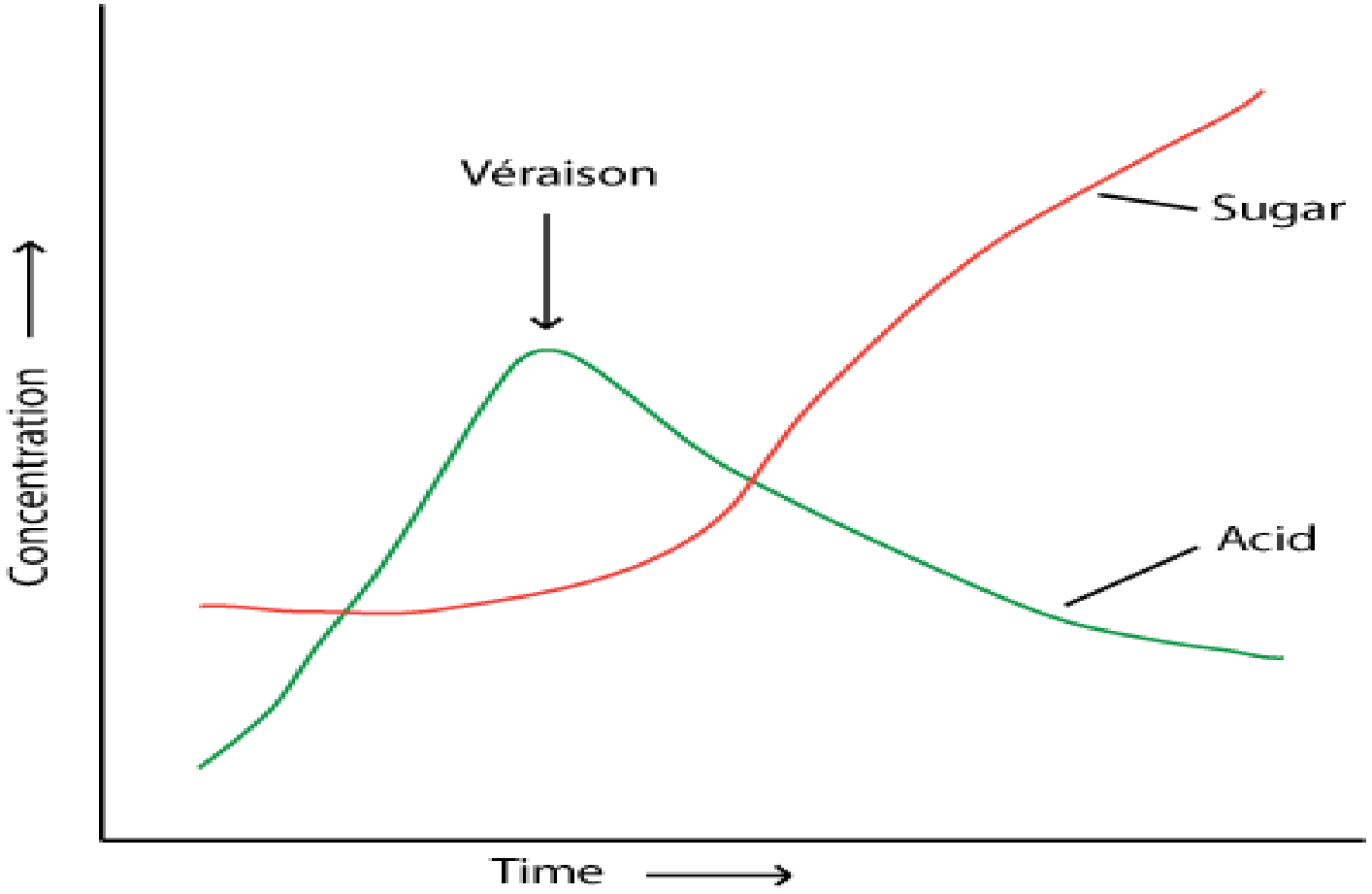
  **pH** is about the ***quality*** of acids, **TTA** is about the ***quantity*** of acids

“… the best thing for a vineyard are the footprints of the winemaker…”

# Wine is made in the Vineyard First!!!

- Winemaking starts in the vineyard.
- Viticultural practices and harvest timing have major effects on pH & TA
- Active collaboration between viticulturist and winemaker is essential,…Viticulture and Enology are really “two wings of the same bird”…
- Knowledge of ***all*** cold-climate varieties will help to make balanced wines from these challenging varieties.
- *Throughout ripening, Total Acidity decreases as sugars (Brix) and pH increase.*

# Post-véraison sugar/acid curve




Changes in sugar and acid levels as a grape berry grows

# DETERMINING RIPENESS, and when to pick?

**RIPENESS IS MORE THAN A NUMBER**

- Aroma and flavor
- Texture & Color
- In general, RIPER IS BETTER, pH rises while TA decreases…
- Condition of vineyard,
  - vine, stem, cluster, berry, skin and seed…
- Overall health, crop load, pest activity and diseases
- IMPENDING WEATHER and picking crew/machinery availability

**… look, smell, touch and taste in the vineyard……**

# The Midwest Winemaking "High Acidity" Blues,

## or, "…Houston, We Have an Acidity Problem !"

- There are ***many*** different techniques and methods available
- It is best to use a ***variety*** of methods.
- Some methods lower acidity directly (quantitatively), while some lower the *perception* of acidity, (or *qualitatively)*…

# De-Acidification with “Carbonates”, so easy, but…

(Calcium Carbonate, Potassium Carbonate, Potassium Bicarbonate)

Can ***negatively*** *affect aromas, flavors and texture/body*

- If decided to add, use <u>early</u> (before fermentation)
  - BEST TO ADJUST YOUR MUST BEFORE ADDING YEAST…..THINK AHEAD!!!
  - 1 gram/liter will lower TTA by about 1.5 grams per liter
  - Always good to do bench trials first!

# *DOUBLE SALT* METHOD

• Double-salt deacidification involves the formation of insoluble double calcium salts between malic and tartaric acids

(*Acidex* no longer available, but calcium carbonate can work)

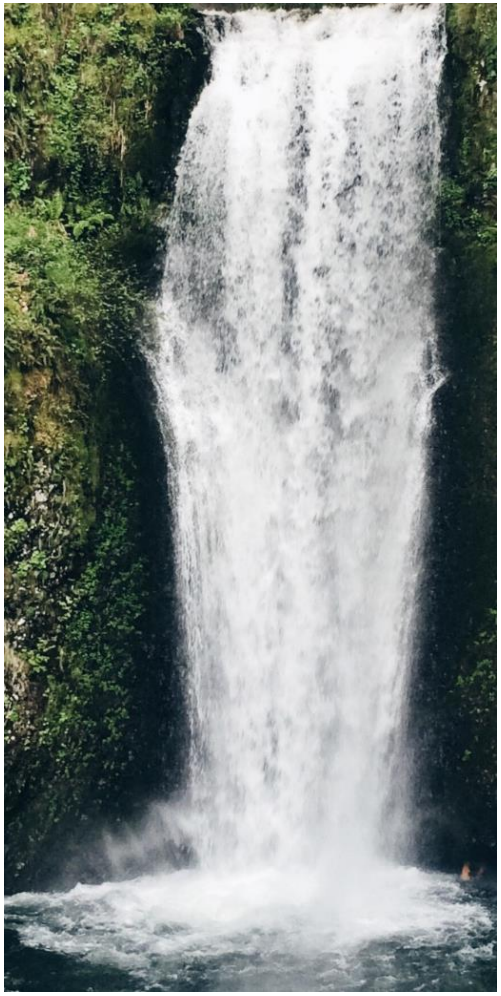
• Reduces tartaric acid **and** malic acid. Recommended for must and wine that have high malic acid concentration. (Can NOT be used in MLF+ wine)

• During the application of $CaCO_3$, a partial volume of the must or wine needs to be deacidified until it reaches a pH of 4.5. It's then blended with the rest of the volume.

Note: This blending should be done as quickly as possible to avoid oxidation

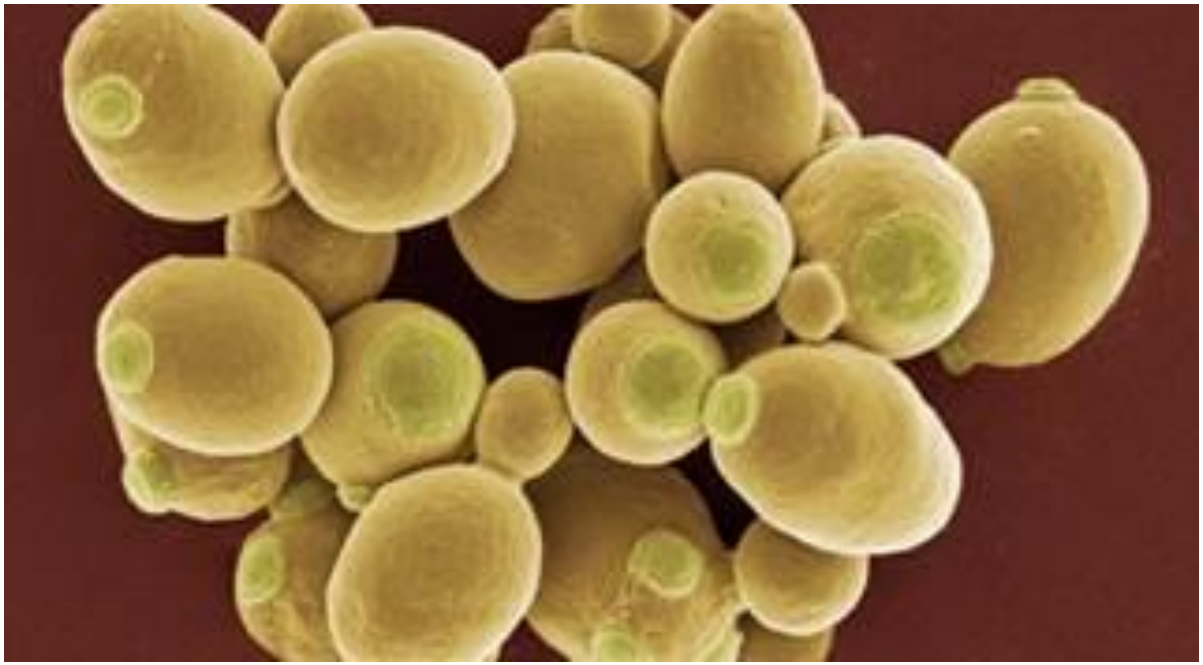
# Water addition, aka “Amelioration”

- Adding water will lower Total Acidity, and may raise pH
- Quality of water is important, no chlorine!
- SMALL additions work without dilution of flavor/aroma, do bench trials
- 2 gallons per 100 gallons will reduce TTA by 0.1 grams per liter
- You can add some sugar to raise/restore Brix.
- **27 CFR 24.178** amelioration: “…In producing natural wine from juice having a fixed acid level exceeding 5.0 grams per liter, the winemaker may adjust the fixed acid level by adding ameliorating material…”



# YEAST selection

- Some yeast strains will partially metabolize Malic acid and convert it to Ethanol (alcohol).



# Lalvin “C”

- Can lower TA by 40%
- Has high alcohol tolerance (16%)
- Good also for sparkling wine production

# Lallemand 71B

- Can lower TA by 40%,
- Good for reds and fruit wines
- Alcohol tolerance to 14%

# Lallemand SVG

- Can lower TA by 25%
- Good for aromatic whites
- Alcohol tolerance to 15%

# Other strains:

"Maurivin B" (they claim converts up to 56% malic)

..and alcohol tolerance up to 18% !

(Avail. At GWKent)

"Exotics Mosaic"

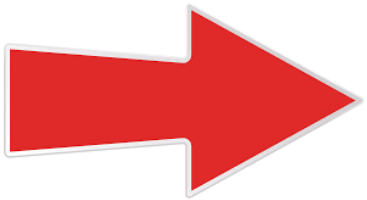
"ICV OPALE 2.0"

"ICV-GRE"

# “MLF” – Malolactic Fermentation

(think: green apples to milk…)

- MLF converts stronger **Malic** acid to weaker **Lactic** acid
- Raises pH, Lowers TTA
- MLF increases complexity/mouthfeel, creates a “creamy” texture.
- MLF can alter/mute aromatics.



# “MLF” – Malolactic Fermentation

- All red wines are put through MLF
  - exceptions are “*Beaujolais NOUVEAU*” wines, or Port wines

- Certain strains of ML bacteria can produce lots of **Diacetyl**, which gives the “buttery” aromas and flavors of many popular Chardonnays.

# Techniques in Malolactic Fermentation

**a brief review…**

- MLF CAN occur spontaneously when cellar temperatures rise in spring, or when using ML-positive barrels
- Or, you can add a pure strain of ML bacteria during yeast fermentation, co-fermentation
- Adding MLF bacteria early will produce **LESS** diacetyl
- Adding at the end will produce **MORE** diacetyl

# Malolactic Fermentation:

**practical methods**

**To encourage**

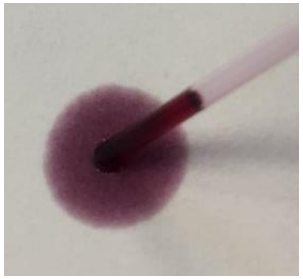
- Temp. above 65F (70F IS BEST)
- pH range 3.2 to 3.7
- Low free SO2, below 30ppm
- Low total SO2, below 60ppm
- Do not over-clarify or filter
- Alcohol below 13.5%
- Stir or re-suspend the lees
- (ML bacteria VP41 recommended)

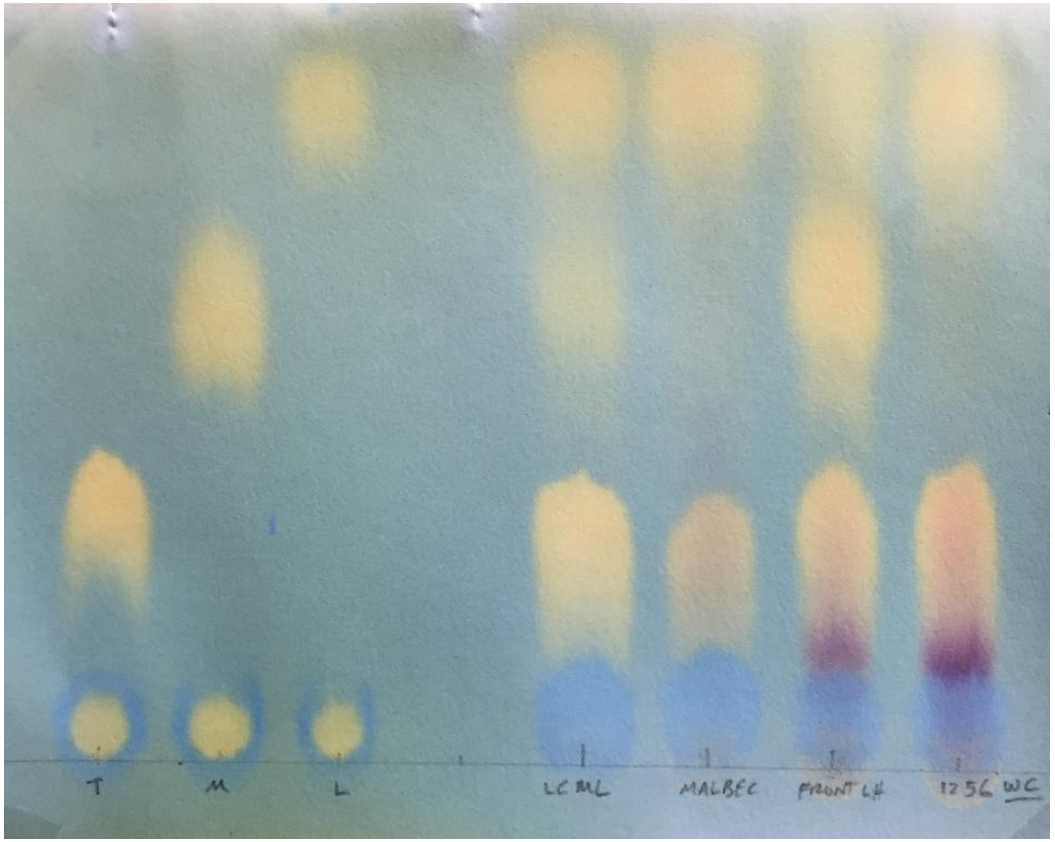
**To discourage**

- Temp. lower than 60F
- pH lower than 3.2
- Free SO2 above 30ppm
- Alcohol above 13.5%
- Sterile filtration
- Do NOT stir or re-suspend lees

# Paper Chromatography, easy to do…

- Presque'isle Wine Cellars sells a kit for $80 at **www.piwine.com**

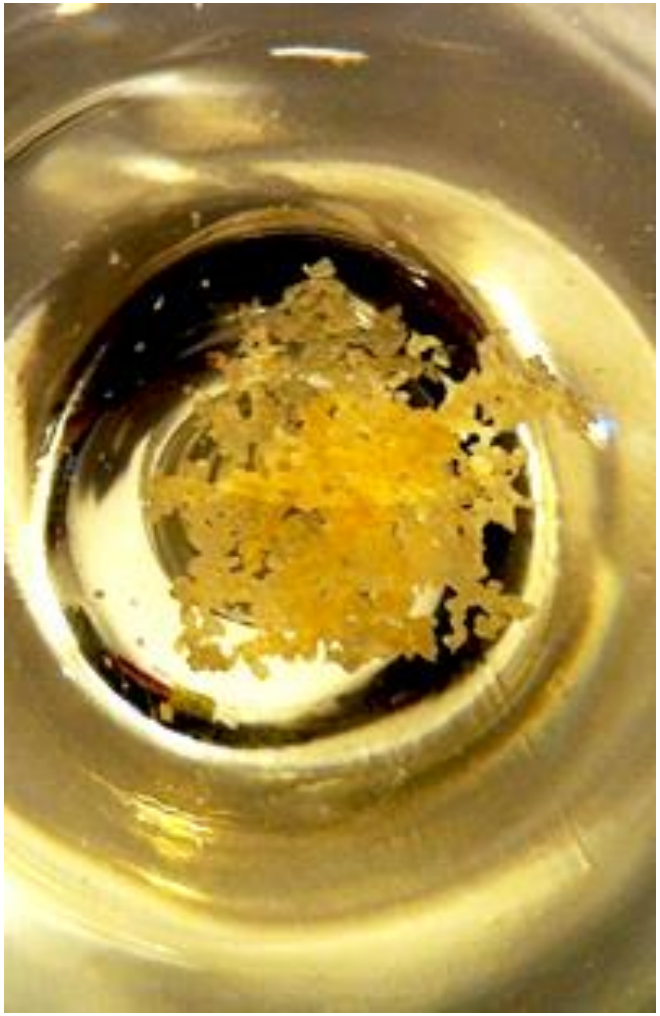





# BLENDING to lower acidity

- SIMPLE FACT: Blending low-acid wines with high-acid wines can lower Total Acidity,… do bench-trials…
- The 75% varietal label rule exists for a reason and has established historical precedent worldwide
- Blends SELL!!! Blended wines with “fanciful” names are popular now
- By acknowledging blending in your wine, you are making part of your winemaking part of your wine *marketing*!...

# Cold Stabilization, aka “Tartrate Stability”



- Traditional “cold-contact” chilling procedure will cause excess Tartaric acid to precipitate as Sodium Bi-tartrate “crystals”
- This effect will lower Total Acidity
  - Wine above pH 3.65, pH will rise
  - Wine below pH 3.65, pH will lower
- Wines should be conductivity-tested to ensure stabilization is complete and/or sufficient to insure tartrate stability
- This method requires substantial chilling over a long period but is often provided “free of charge” during a Midwest winter!

# “FREE” cold stabilization !

# Cold Stability via Colloidal Stabilizers, etc.

- Carboxy methylcellulose, Mannoproteins, Metatartaric acid, gum arabic
- Electrodialysis - $$$
- Cation Exchange Resins
- “ZENITH” from Enartis – Potassium Polyaspartic Acid – “KPA”
  - TTB approved Feb. 2020

- All might work, but there is no decrease in pH level or any reduction in TA
- Our high acid grapes/wines can benefit by traditional cold-contact stabilization, even on reds!

# Technical reduction of Total Acidity vs. "*Perceptional*" reduction of ACIDITY

So, de-acidification with carbonates, water-amelioration, yeast selection, Malolactic fermentation, blending and cold-stabilization all *absolutely reduce* the amount of total acidity in measurable **grams per liter** in a given juice, must, or wine.

But there are techniques which can reduce the ***perception*** of high acidity in a given wine…

# SWEETENING…

- Sweetening, though it does not lower TA, it certainly can help "balance" or mollify high-acidity,…
- There are **4 ways to sweeten:**
  - Stopping fermentation early
    - With $SO_2$, cold-temperature, sterile filtration
  - Adding dry sugar
    - Beet, cane, or corn, the yeast doesn't care
  - Adding sweet/unfermented juice
    - aka "Sweet Reserve" aka "Sussreserve" (Germany)
  - Adding grape concentrate
    - Which has a brix of about 70 degrees and can complement and accentuate flavors and aromas.
    - (I use *Muscat* concentrate in La Cresent/aromatic whites)

# Barrel Maturation, and “sur lie” aging

- Barrel fermentation/maturation, can work to reduce the *perception* of high-acidity

- Yeast ***autolysis*** during barrel maturation, aka ***sur-lie*** aging, works to add a “creamier texture”, complexity and richness

- Barrel maturation generally encourages MLF

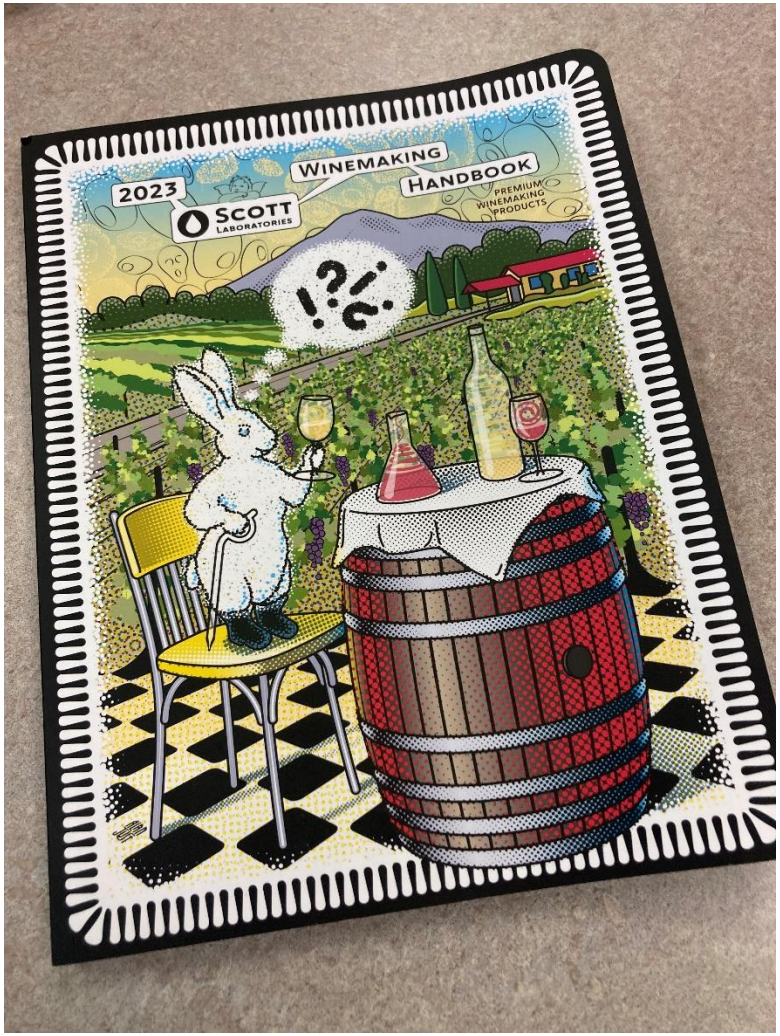
- Though not actually responsible for lowering acidity, the *textural effects* certainly can help “soften” or mollify the *perception* of high acidity.

# Re-suspending lees, *sur lie* maturation
## "batonnage"

# Other perceptual-change additions & products

- Yeast hulls
  - aka, yeast ghosts, yeast exoskeletons
  - Laffort *Oenolees* and *Powerlees*
- Mannoproteins/Gum Arabic
  - Scott Labs *Ultima Soft*
- Finishing tannins
  - Scott Labs *Uva'Tan*
- Oak infusion products

# **Free Knowledge!!!** www.scottlabs.com



# Bench trials, blending and additions take the time to test them on a small scale…

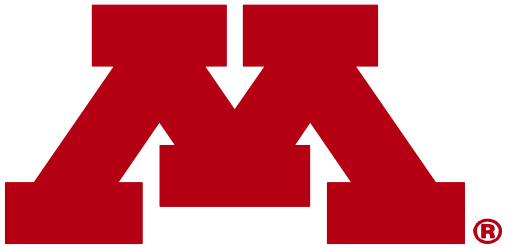
# Small percentage additions can make BIG changes, *work the variables!*

- Take the time to do your bench trials.
- Do multiple percentage, or scaled additions, i.e., 1%, 1.5%, 2%, etc.
- When doing *any* bench trials for any adjustment, taste them in a "blind" context and include the original control wine (or juice.)
  - Helps to maintain sensory objectivity and avoid sensory prejudice

# You have choices, use them! In small steps…

- Don’t just use the “biggest hammer” in your high-acidity winemaking toolkit, use ALL of your tools, or a well-chosen selection of them.
- Bench trials and small-scale experiments can be measured, manipulated, and adjusted easily.
- Once you decide to add sugar, water, another wine, etc., make the addition in multiple smaller “steps” to test and verify the results
- Once you add something, you can’t take it out!

Acknowledgement:



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# Thanks !

**Any questions ?**


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