



# Oklahoma Wine Quality Project – 2015

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# What is this project?

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- Funded mainly by the Oklahoma Viticulture and Enology Fund with additional support from OGIC and OSU.
- One-year project originally, will have five years of data soon.



# What are our goals?

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- Identify common areas for quality improvements.
- Structure enology assistance to assist with areas of improvement and highlight positive winery practices.
- Improve wines made from Oklahoma grapes to increase market sales share of Oklahoma wines.



# What is our vision?

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- Consistent, high-quality Oklahoma wines.
- An ongoing, self-sustaining quality testing program for Oklahoma wines.
- A sustained quality assurance resource for Oklahoma winemakers and grape growers.





# What did we test?

- Tested wines submitted to Watonga Cheese and Wine Festival Event and Purchased Oklahoma wines.
  - Tested 40 red wines.
  - Tested 30 white wines.
  - Tested 12 rose wines.
  - Tested 20 other wines (fruit, blend, mead).
  - Received or purchased wines from 20 wineries.
  - Mostly vinifera wines.



# What tests did we run?

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- Sensory evaluation:
  - Simple 0-22 scale:
    - <9 seriously flawed.
    - 10-14 low quality.
    - 15-19 acceptable wine.
    - 20-24 high quality wine.
    - 25-27 outstanding wine.
  - Comments about notable strengths and weaknesses were recorded.



# What tests did we run?

- Chemical tests:
  - pH
  - Total titratable acidity (TA)
  - Tartaric acid content
  - Color density
  - Color Hue
  - Total phenols
  - Reducing sugars
  - Dissolved Oxygen
  - Free SO<sub>2</sub>
  - Total SO<sub>2</sub>



# Tests related to acid

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- pH
  - Affects wine color, flavor, chemical and microbial stability.
- TA
  - Affects wine flavor, balance, mouthfeel, and chemical stability.
- Tartaric acid content
  - Affects tartrate stability and influences TA calculations.





# Tests related to color

- Color Density
  - Calculated as  $A_{420\text{nm}} + A_{520\text{nm}}$ 
    - $A_{420}$  equals yellow color.
    - $A_{520}$  equals red color.
    - General rule: <6 light colored; 6-10 medium; >10 dark.
- Color Hue
  - Calculated as  $A_{420\text{nm}} / A_{520\text{nm}}$ 
    - Smaller number = more red.
    - Higher number = more brown.



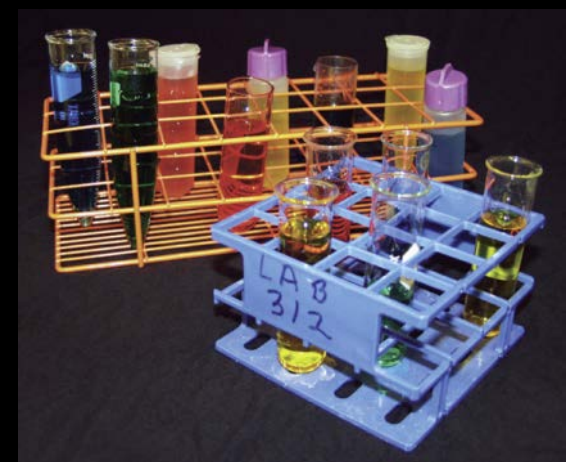
# Other tests

- Total phenolics
  - Relates to mouthfeel, tannin structure, storage stability, astringency, bitterness.
  - Higher numbers are *generally* desirable in red wines – but... it's complex.
- Reducing sugars
  - Measure of residual sugar (unless wine has been sweetened with sucrose).
- SO<sub>2</sub> content
  - Directly affects microbial and color stability.



# Testing done in FAPC

- Sensory testing done as blind taste test
  - 5 judges.
- Chemical tests done in the FAPC Analytical Chemistry Lab
  - Lab now set up to accept wine/must samples for testing on an ad hoc basis.





# Wines prepped for analysis





# Wines being analyzed

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# General thoughts

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- Chemical analysis alone is not the best assessment of wine quality; this must be done by sensory methods.
- Wines of very different quality may show nearly identical chemical analysis.
- Sensory analysis is not exact, and results may depend on the goals for the wine inside the judge's mind.





# Chemical testing results

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# Uses for chemical analyses

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- Can sometimes help to identify quality issues.
- Useful over time for a winemaker to correlate test values to desirable wine characteristics.
  - Desired values will vary according to wine type, style, and intended market.
- Helps winemaker to quantify changes in a wine e.g. during storage, in blending, etc.





# Observed pH Values *vinifera* whites



- Typical values: red wines – 3.3 to 3.8      white wines – 3.0 to 3.5

## Dry White Wines

Average

3.40

3.38

Standard Deviation

0.19

0.17

High Value Observed

3.60

3.68

Low Value Observed

3.05 (n=9)

3.14 (n=6)

## Semi-Sweet White Wines

Average

3.49

3.44

Standard Deviation

0.35

0.14

High Value Observed

4.09

3.65

Low Value Observed

3.24 (n=4)

3.29 (n=5)

## Sweet White Wines

Average

3.67

N/A

Standard Deviation

0.22

N/A

High Value Observed

3.94

N/A

Low Value Observed

3.41 (n=3)

N/A



# Observed pH Values reds



- Typical values: red wines – 3.3 to 3.8 white wines – 3.0 to 3.5

## vinifera Red Wines

Average

3.73

3.55

Standard Deviation

0.19

0.18

High Value Observed

4.03

3.94

Low Value Observed

3.31 (n=13)

3.26 (n=13)

## Non-vinifera Red Wines

Average

3.75

3.65

Standard Deviation

0.87

0.33

High Value Observed

3.86

4.19

Low Value Observed

3.64 (n=5)

3.30 (n=4)

# Observed TA values (g/L)

## *vinifera*

Typical values: red wines – 6 to 8  
white wines – 5 to 8.5

	OK Grapes	Non-OK Grapes
• <b>Whites:</b>		
– High:	6.90 <sup>1</sup>	6.20 <sup>2</sup>
– Low:	3.90	2.90
– Average:	5.16	4.91
• <b>Reds:</b>		
– High:	6.30 <sup>3</sup>	7.50 <sup>4</sup>
– Low:	3.70	3.30
– Average:	4.92	4.82

- Sweet wines usually require higher TA for proper balance.

1. n=14

2. n=10

3. n=13

4. n=13



# Observed TA values (g/L) *non-vinifera*

Non-*vinifera* wines may be up to ~ 14 g/L.

	OK Grapes <sup>1</sup>	Non-OK Grapes <sup>2</sup>
• <b>Reds:</b>		
– High:	6.80	6.30
– Low:	4.00	5.10
– Average:	5.10	5.65

1. n=5

2. n=4





# Observed total phenolics values *vinifera* (g gallic acid equivalents/L)

OK Grapes

Non-OK Grapes

- **Whites:**

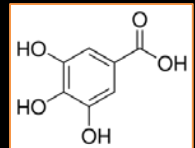
(0.1-0.5 g/L typical for whites)

– High:	0.41	0.30
– Low:	0.15	0.20
– Average:	0.29	0.24

- **Reds:**

(1-2.5 g/L typical for reds)

– High:	2.89	2.97
– Low:	1.63	0.76
– Average:	2.37	2.14

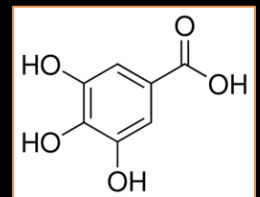


# Observed total phenolics values *non-vinifera* (g gallic acid equivalents/L)

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- **Reds:**

	OK Grapes	Non-OK Grapes
— High:	2.98	3.20
— Low:	0.54	0.37
— Average:	2.03	1.69



# Observed color density

*vinifera* ( $A_{420\text{nm}} + A_{520\text{nm}}$ )



- General rule: <6 light colored; 6-10 medium; >10 dark.

	OK Grapes	Non-OK Grapes
<b>Whites:</b>		
– High:	0.32	0.28
– Low:	0.04	0.06
– Average:	0.12	0.15
<b>Reds:</b>		
– High:	6.19	15.00
– Low:	3.41	2.16
– Average:	5.45	8.10



# Observed color density *non-vinifera* ( $A_{420\text{nm}} + A_{520\text{nm}}$ )



- General rule: <6 light colored; 6-10 medium; >10 dark.

## Reds:

	OK Grapes	Non-OK Grapes
– High:	8.02	14.15
– Low:	0.20	0.25
– Average:	5.51	8.16



# Observed molecular SO<sub>2</sub> values (ppm)

- Note: typical desired levels at bottling:  
reds – 0.5 whites – 0.8

	OK Grapes	Non-OK Grapes
• <b>Whites:</b>		
– High:	1.23	0.68
– Low:	0.03	0.09
– Average:	0.39	0.34
• <b>Reds:</b>		
– High:	1.48	0.45
– Low:	0.03	0.03
– Average:	0.23	0.18





# Sensory testing results

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# Sensory Ratings *vinifera* wines

<9 seriously flawed.  
10-14 low quality.  
15-19 acceptable wine.  
20-24 high quality wine.  
25-27 outstanding wine.

## OK Grapes

## Non-OK Grapes

- **Whites:**

– High:	20.8	15.4
– Low:	8.2	7.6
– Average	14.6	11.5

- **Reds:**

– High:	18.0	20.8
– Low:	4.0	10.8
– Average:	11.9	14.9



# Sensory Ratings *non-vinifera* wines

<9 seriously flawed.  
10-14 low quality.  
15-19 acceptable wine.  
20-24 high quality wine.  
25-27 outstanding wine.

- **Reds:**

## OK Grapes

## Non-OK Grapes

— High:	20.6	23.4
— Low:	15.0	12.8
— Average:	17.6	18.1



# Sensory Ratings fruit wines / blends

<9 seriously flawed.  
10-14 low quality.  
15-19 acceptable wine.  
20-24 high quality wine.  
25-27 outstanding wine.

## OK Fruit/Grapes

## Non-OK Fruit/Grapes

— High:	20.4	26.2
— Low:	8.0	8.4
— Average:	13.6	18.0



# Sensory issues that were noted

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- Issues perhaps related to fruit ripeness were noted a number of times.
  - Muted character.
  - “Pleasant, but...”
- Many “fruity” varieties lacked a lot of typical variety fruit and/or floral notes.
  - Could be related to ripeness, fermentation temperature, or other factors.
- Storage stability may be an issue for some red wines.





# Where do we go from here?

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# For 2016 and beyond

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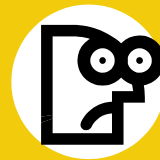
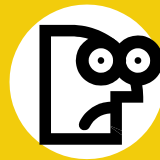
- Wine testing of 2016 samples is being finalized.
- Where do we go from here?





# Thank You!

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**It's QUESTION TIME !!**