

ASBC ANNUAL MEETING 2017



BREWED & BOTTLED BY SIERRA NEVADA BREWING CO., CHICO, CA & MILLS RIVER, NC



STEVE ANDERSON

JAMES CONERY



BALLAST POINT BARREL AGING PROGRAM

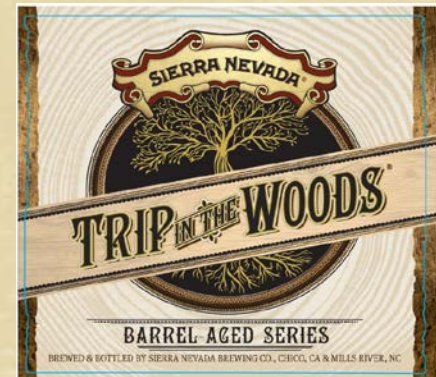
Program Growth

- Began barrel aging beer in 2000 for experimentation.
- Projected for 3,000 to 5,000 oak barrels by end 2018.
- 750 ML limited release bottles and Draft currently available.
- Dedicated ware house for additional barrel storage 6,000 oak barrel limit.
- Current dedicated facility for Barrels Production.
 - 2 x 100 bbl Brite Tank - 6 x 60 bbl Fermenters -3,600 oak barrel limit



Sierra Nevada Barrel Program

- 2006 started with a handful of barrels and only served in our onsite pub.
 - Floor space in cold storage warehouse
- 2013 built out off site warehouse
 - 10,000+sq feet
 - Can hold ~2500 barrels
 - Temperature controlled (55of)
- 2016 added on 'sour' room
 - ~2000 sq. feet
 - Small scale at this point
 - We are currently underway in creating a house mixed culture selected from wild inoculations.
 - Wild cultures captured from surrounding fruit orchards in bloom.
- 2017 added dedicated (and isolated) processing area at main brewery
 - ~1500 sq. feet
 - 1x 200bbl bright beer/receiver
 - 2x 10bbl conical receivers



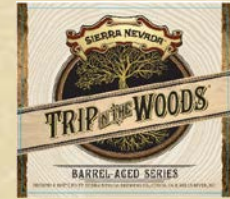


Barrels Used

- Single Malt Whiskey
- Bourbon Whiskey
- Rye Whiskey
- Rum
- Brandy
- Tequila
- Gin
- Virgin America/French
- Wine:
 - ✓ -Cabernet, Syrah, Merlot, Pinot Noir.
 - ✓ - Sauv Blanc, Chardonnay, Fume Blanc, Cab Franc, Zinfandel.



Sierra Nevada Barrel Program



- Barrels used
 - Bourbon
 - Rye
 - Wine
 - Red
 - White
 - Rum
 - Tequila
 - Scotch
 - Brandy
 - Madeira
 - Port





Trial Stave Information

Utilizing 3 types of staves with specific tannin levels supplied from Vicar Generation 7.

Origine/Low tannin (LTP)

- 1000-4000 μ /g of ellagitannin/ Light long toast

Symetrie/Medium Tannin (MTP)

- 4000-6000 μ /g of ellagitannin /Medium toast

Energie/High tannin (HTP)

- 6000-10,000 μ /g of ellagitannin/ Medium + toast





Stave Trial Process

Samples added to ½ bbl kegs at a rate of

- 1st keg: 4 staves (Each Tannin Level)
- 2nd keg: 6 staves (Each Tannin Level)
- 3rd keg: 7 staves (Each Tannin Level)

Samples taken at 2 weeks and 4 weeks

- All samples run for GC analysis on specified known barrel compounds:
 - 2-methoxy-4-methylphenol – spicy, vanilla, woody, smoky
 - 5-methyl-2-furfural – spice, caramel, maple, bready, coffee-like
 - Cis-whiskey lactone – coconut, woody, maple, nutty, toasted
 - Furfural – sweet, woody, almond, baked bread/burnt nuance
 - Furfuryl alcohol – musty, sweet, bready, caramel
 - Guaiacol – smoky, phenolic
 - Vanillin – vanilla, sweet, creamy
- Samples blended to make three final versions for sensorial testing (the best part!)
 - Low - tannin
 - Medium - tannin
 - High -tannin



Barmy / Trial Base Beer

ABV: **12%**

Bitterness Units: **25**

SG: **1.107**

Color: **Gold**

Hops: **Palisade**

Yeast: **Ale yeast**

Additives: **Apricots,**

Orange Blossom Honey.

Malts: **Two-row**



- On early European sailing vessels, barmy was the foam on top of old fruit fermenting in oak barrels. Brewed commercially since 2005

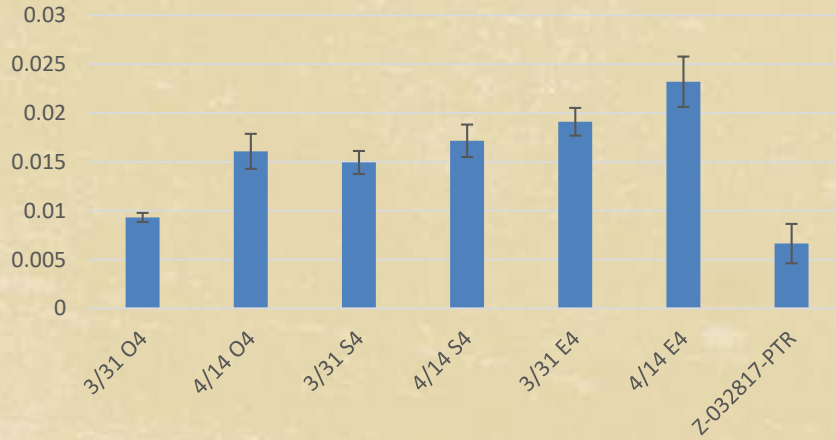
Oak Stave Analysis

- Chico Base Beer: Porter
- ABV: **5.6%**
Bitterness Units: **32**
Beginning Gravity: **13.8° Plato**
Ending Gravity: **3.5° Plato**
Color: **Russet brown**
Bittering Hops: **Palisade**
Finishing Hops: **Aurora**
Dry Hops: **N/A**
Torpedo Hops: **N/A**
Malts: **Two-row Pale, Munich, Chocolate, Caramel, Black & Carafa**
Yeast: **Ale yeast**
Other: **N/A**

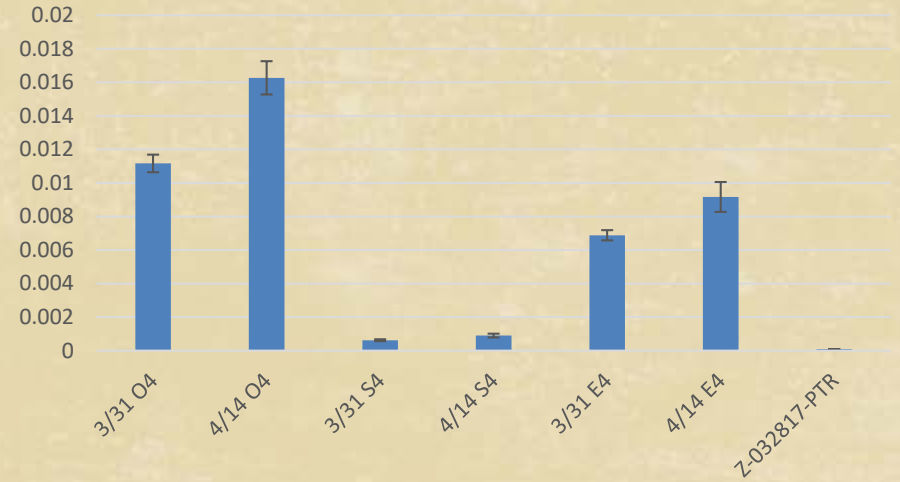


Oak Stave Analysis

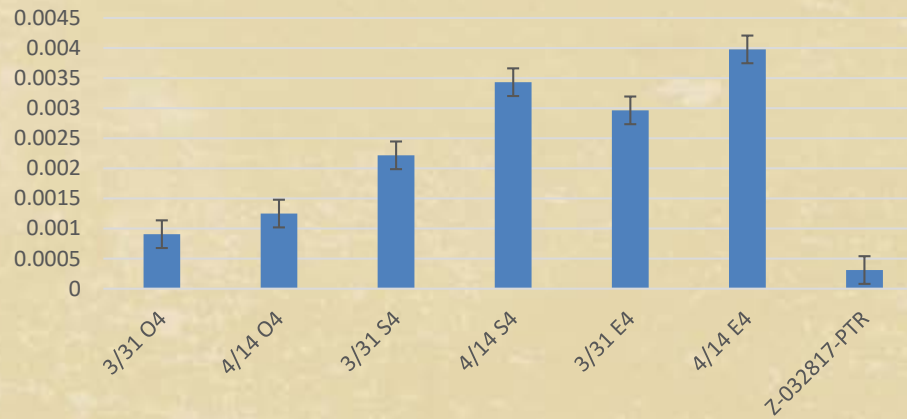
Vanillin



Cis-whiskey lactone

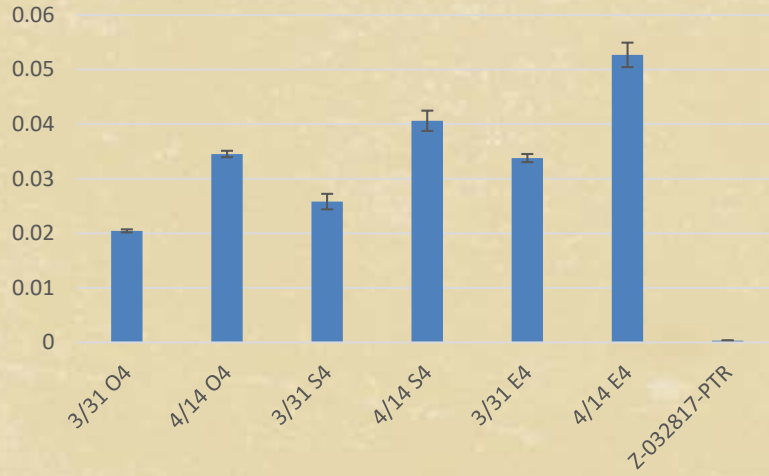


2-methoxy-4-methylphenol

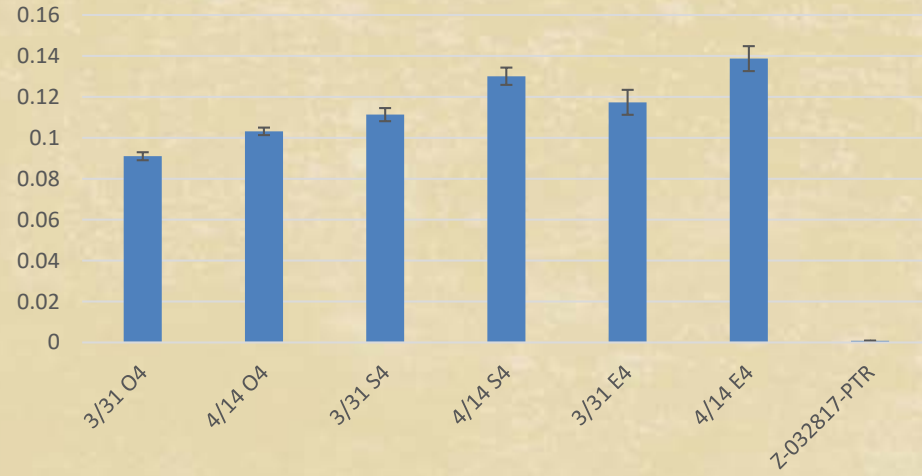


Oak Stave Analysis

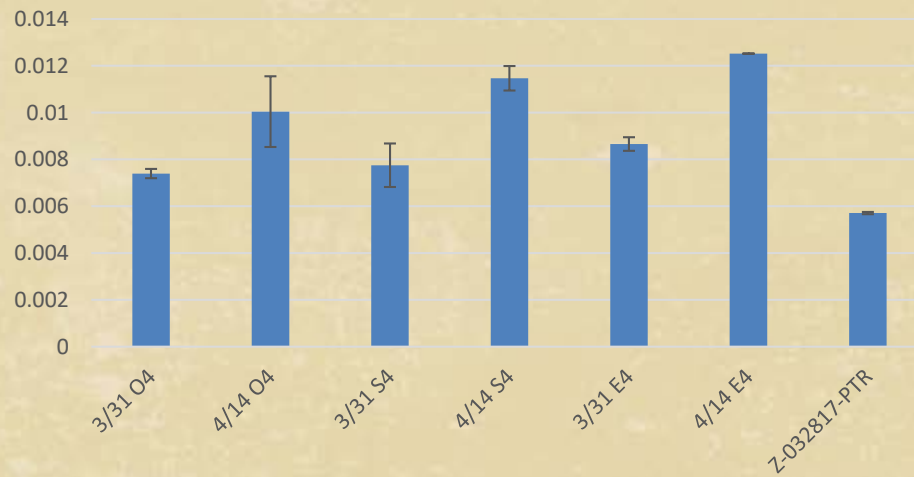
5-methyl-2-furfural Mean



Furfural

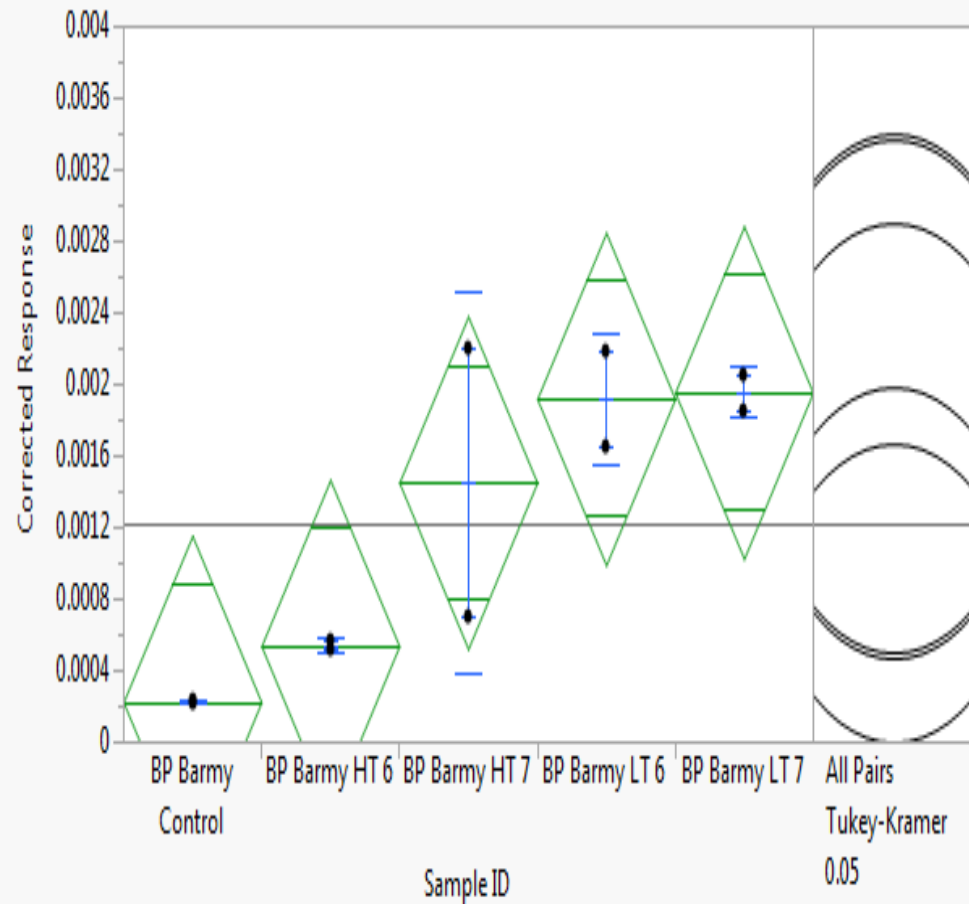


Furfuryl alcohol

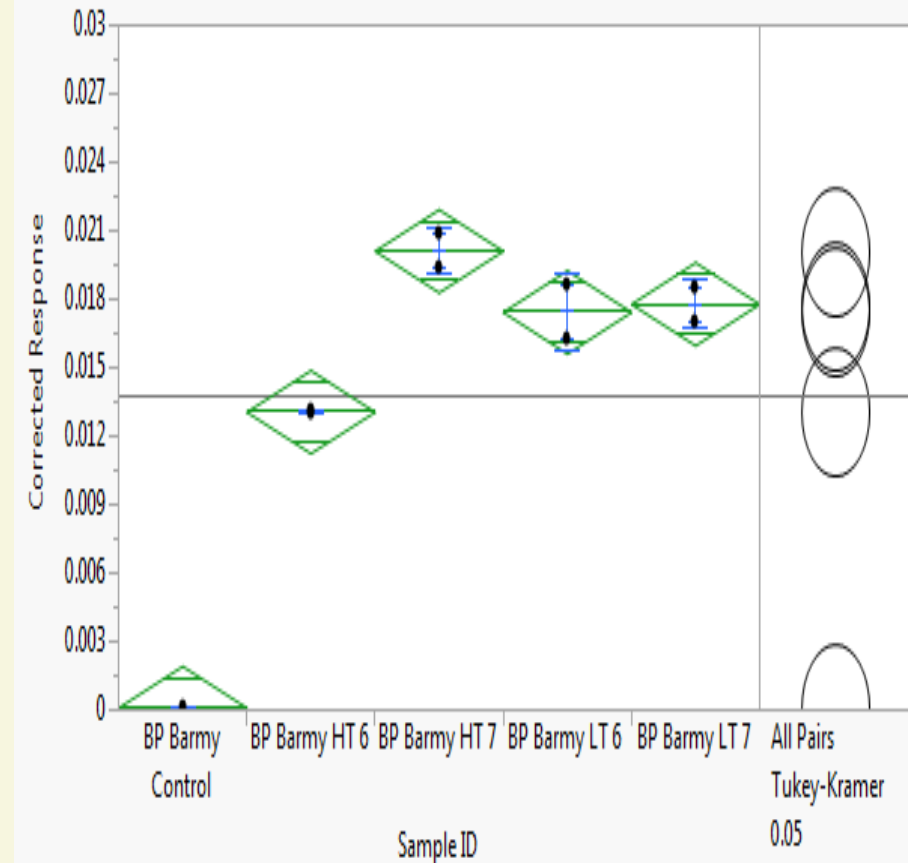


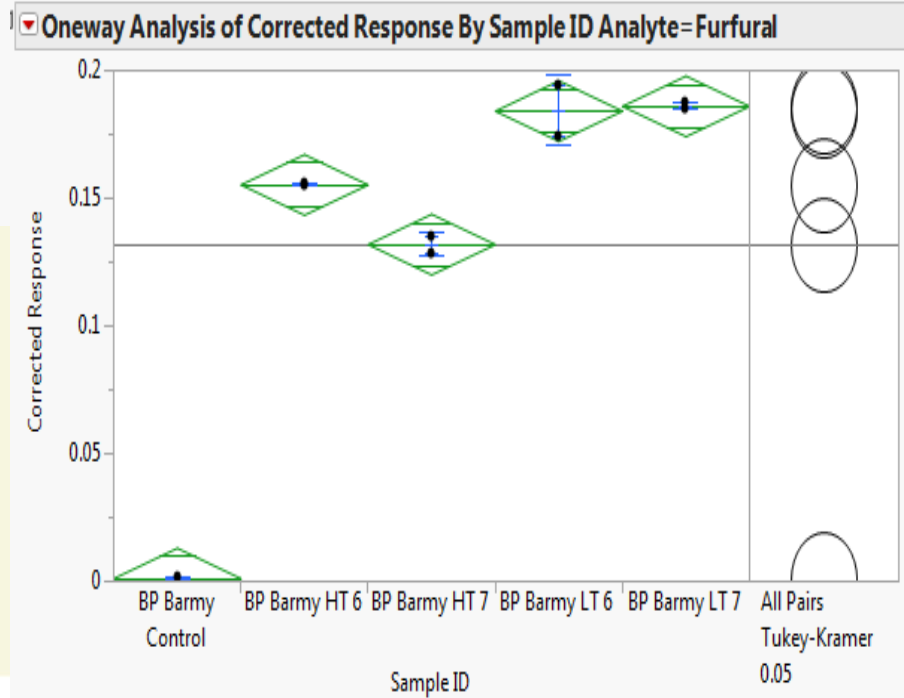
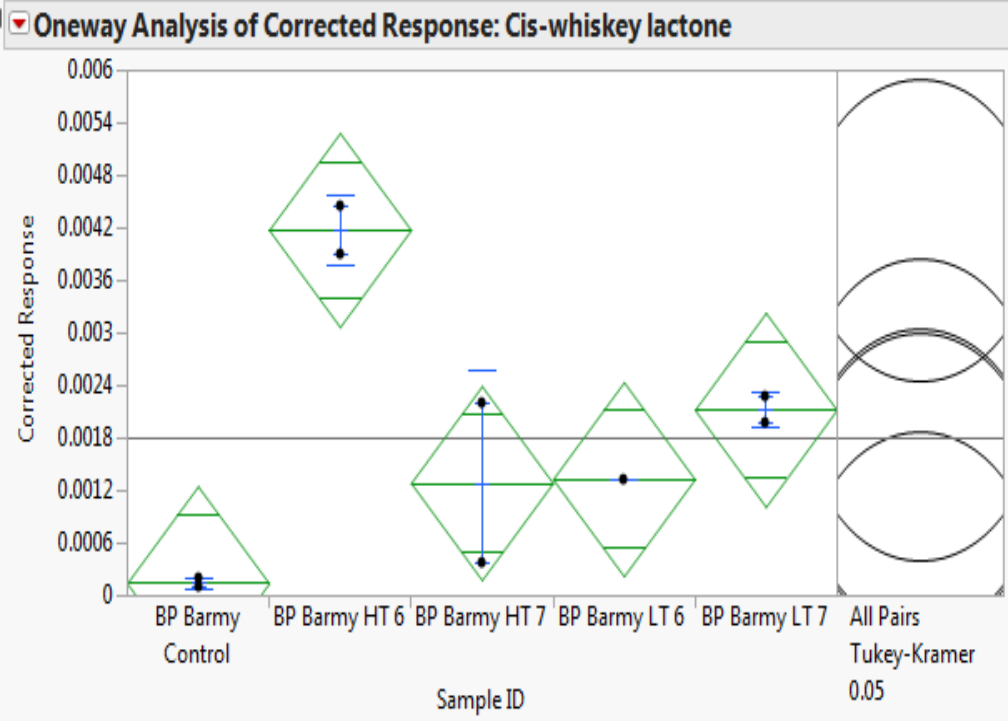


▼ Oneway Analysis of Corrected Response: 2-methoxy-4-methylphenol



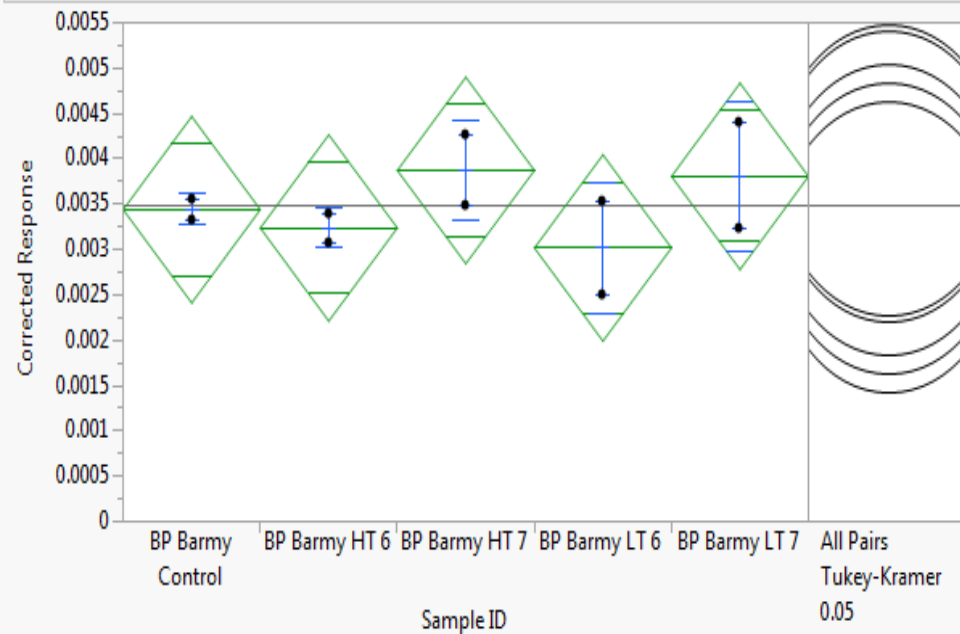
▼ Oneway Analysis of Corrected Response: 5-methyl-2-furfural



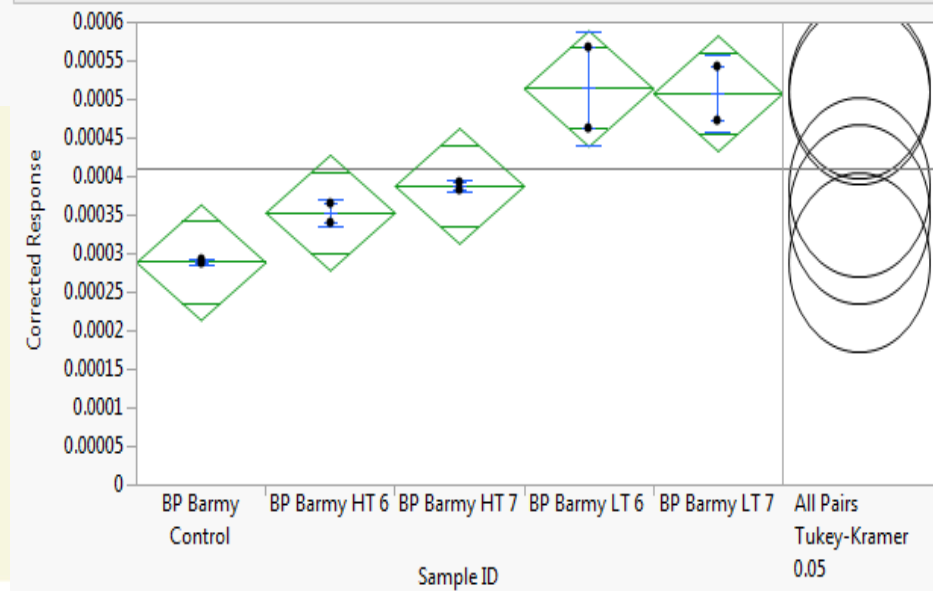




▼ Oneway Analysis of Corrected Response: Furfuryl alcohol



▼ Oneway Analysis of Corrected Response: Guaiacol



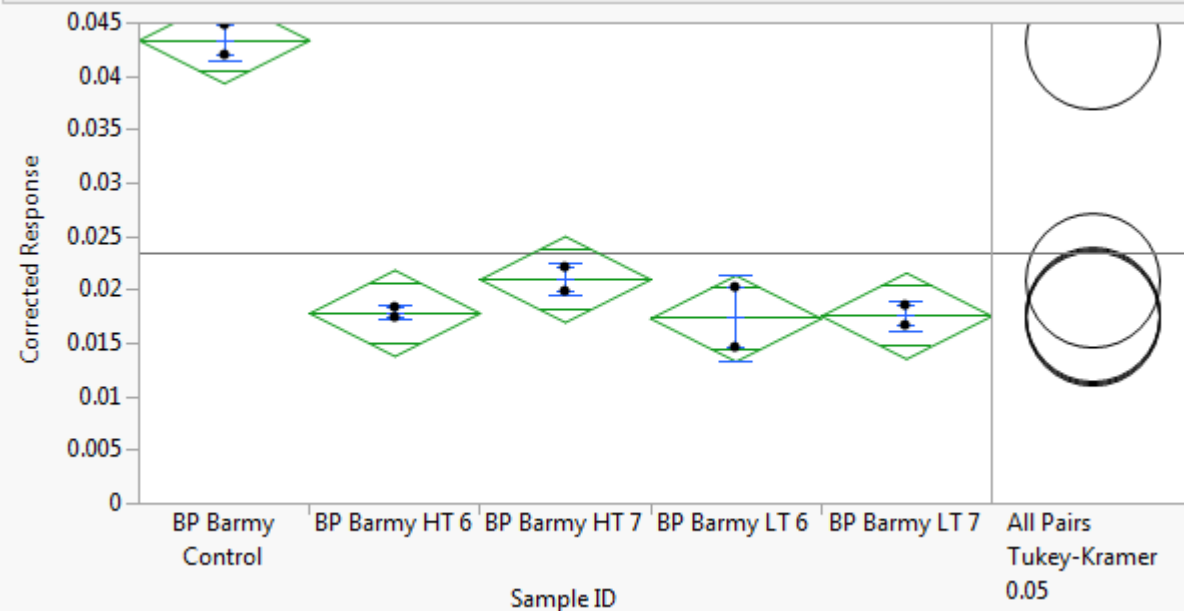


Results

Level	Number	Mean	Std Dev
BP Barmy Control	2384	0.043	0.001989
BP Barmy HT 6	2846	0.017	0.000643
BP Barmy HT 7	2007	0.021	0.001540
BP Barmy LT 6	2355	0.017	0.003984
BP Barmy LT 7	2588	0.017	0.001379

Vanillin

Oneway Analysis of Corrected Response: Vanillin



What Does it all Mean?

- In general the increase in tannin level/toast level lead to increased extraction of “barrel” compounds that we look for.
- Whiskey Lactone was an exception – Most apparent in light tannin (as shown by the data)
- 2 weeks was more than sufficient for extraction with toasted staves (at high levels).....
 - Less time is needed if you want the toasted wood character with new staves.
- Middle and Heavy tannin are close in aroma due to toasting but flavor profile is tannic.
- We need to do more trials over the long term on new oak staves!



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DEDICATED TO THE CRAFT

Q&A



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