

Malt COAs: One Brewer's Perspective

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BREWING SUMMIT 2022

Providence, Rhode Island | August 14-16



pFriem Family Brewers

West Brewhouse

- 50bbl, 5-vessel (MTK, LT, PRT, WK, WHP)
- Wet mill
- Automated

East Brewhouse

- 15bbl, 4-vessel (MTK, LT, WK, WHP)
- 2-roller mill (it's well... "loved")
- Manual




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What do we care about in the brewery?

- Recovered Extract – BHY%
 - Extract CG (as is)
 - β -glucan
 - S/T
 - Moisture
- Attenuation – FG/OG
 - DP/ α -amylase
- Sensory
 - Color
 - S/T, protein: clarity
 - FAN: Non-DO related staling



RAHR MALTING CO.
RAHR MALTING CANADA ALIX, AB TOC OBO

Issued: 04 Mar, 2022

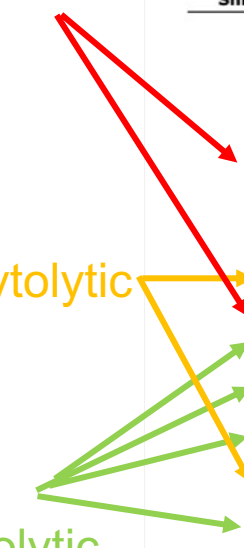
Certificate Of Analysis

Customer	Ship Date	Car Number	Grade	Destination															
BREWERS SUPPLY GROUP	3/3/2022	CAIX 636144	Craft 2 Row	PORTLAND, OR															
Shipment Wt. kg				Rahr Ref No															
96110				0006490															
Assay	Methodology	Shipment	Min Spec	Max Spec															
<table border="1"> <thead> <tr> <th>Crop Year</th> <th>Variety</th> <th>Percent</th> <td colspan="2"></td> </tr> </thead> <tbody> <tr> <td>2021</td> <td>Synergy</td> <td>75 (+/-10)</td> <td colspan="2"></td> </tr> <tr> <td>2021</td> <td>Copeland and/or Connect</td> <td>25 (+/-10)</td> <td colspan="2"></td> </tr> </tbody> </table>					Crop Year	Variety	Percent			2021	Synergy	75 (+/-10)			2021	Copeland and/or Connect	25 (+/-10)		
Crop Year	Variety	Percent																	
2021	Synergy	75 (+/-10)																	
2021	Copeland and/or Connect	25 (+/-10)																	
Moisture, %	ASBC-Malt-3	4.26		5.00															
Fine Grind, As Is, %		78.5																	
Fine Grind, Dry Basis, %	ASBC-Malt-4	82.0	78.0																
Fine/Coarse Difference, %	ASBC-Malt-4	0.9		1.5															
Coarse Grind, As Is, %		77.6																	
Coarse Grind, Dry Basis, %	ASBC-Malt-4	81.1																	
Color, SRM	ASBC-Wort-9	2.11	1.75	2.25															
Diastatic Power, °Lintner	ASBC-Malt-6C	133	115	150															
Alpha Amylase, DU	ASBC-Malt-7D	57.6	45.0																
Total Protein, %	ASBC-Malt-8B	11.93		13.0															
Soluble Protein, %	ASBC-Wort-17	5.12		5.50															
S/T Ratio		42.9	37.00	43.00															
Viscosity, cP	ASBC-Wort-13B	1.47		1.50															
Beta Glucan, mg/L	ASBC-Wort-18B	99		130															
DON, mg/L		0.10		0.20															
FAN, mg/L	ASBC-Wort-12B	185		215															
pH	ASBC-Wort-8	6.01																	
7/64	ASBC-Malt-2B	78.9	75.0																
6/64	ASBC-Malt-2B	17.6																	
5/64	ASBC-Malt-2B	2.7																	
Thru	ASBC-Malt-2B	0.8		1.5															
Turbidity, NTU		7.1																	
Friability	ASBC-Malt-12	89.8	80.0																
Friability %WK	ASBC-Malt-12	0.10																	
Test Weight, kg/hL	ASBC-Malt-2A	53.0																	

Kiln

Cytolytic

Proteolytic



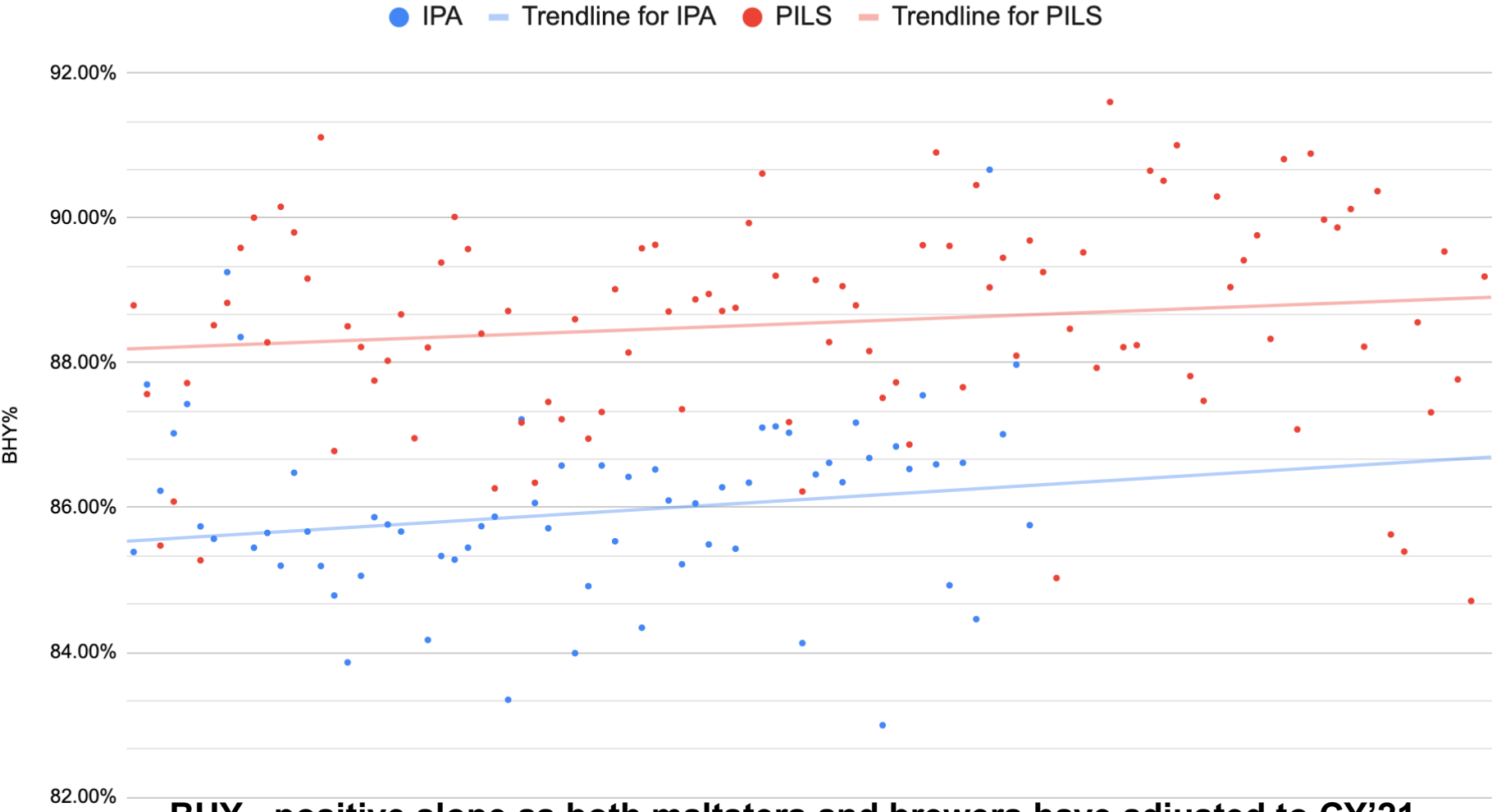
Crop Year '20 vs. '21

	Moisture (%)	CG As Is (%)	Color (SRM)	Protein (%)	S/T (%)	FAN	B-Glucan (ppm)	Friability (%)	DP	AA
Pale CY '20	4.28	77.96	2.09	10.85	43.29	167.62	95.38	90.82	125.69	58.61
Pale CY '21	4.37	77.24	2.09	11.95	41.78	182.54	98.38	87.78	135.08	58.24
CY '21 - 20	0.09	-0.72	0.00	1.10	-1.52	14.92	3.00	-3.04	9.38	-0.37
Significance	ns	**	ns	***	**	***	ns	**	***	ns
Pilsner CY '20	5.06	76.15	1.28	10.25	42.27	146.08	88.08	93.18	145.00	51.06
Pilsner CY '21	5.50	76.39	1.45	11.05	41.09	161.10	87.17	90.68	166.50	55.61
CY '21 - 20	0.44	0.24	0.17	0.80	-1.18	15.67	-0.92	-2.50	23.58	4.92
Significance	*	ns	***	**	ns	*	ns	ns	**	**

* <0.05, ** <0.01, *** <0.001, ns – not significant

Pale (n=26) – Synergy, Connect, Copeland
Pilsner (n=24) – Copeland

Brewhouse Yield (BHY)

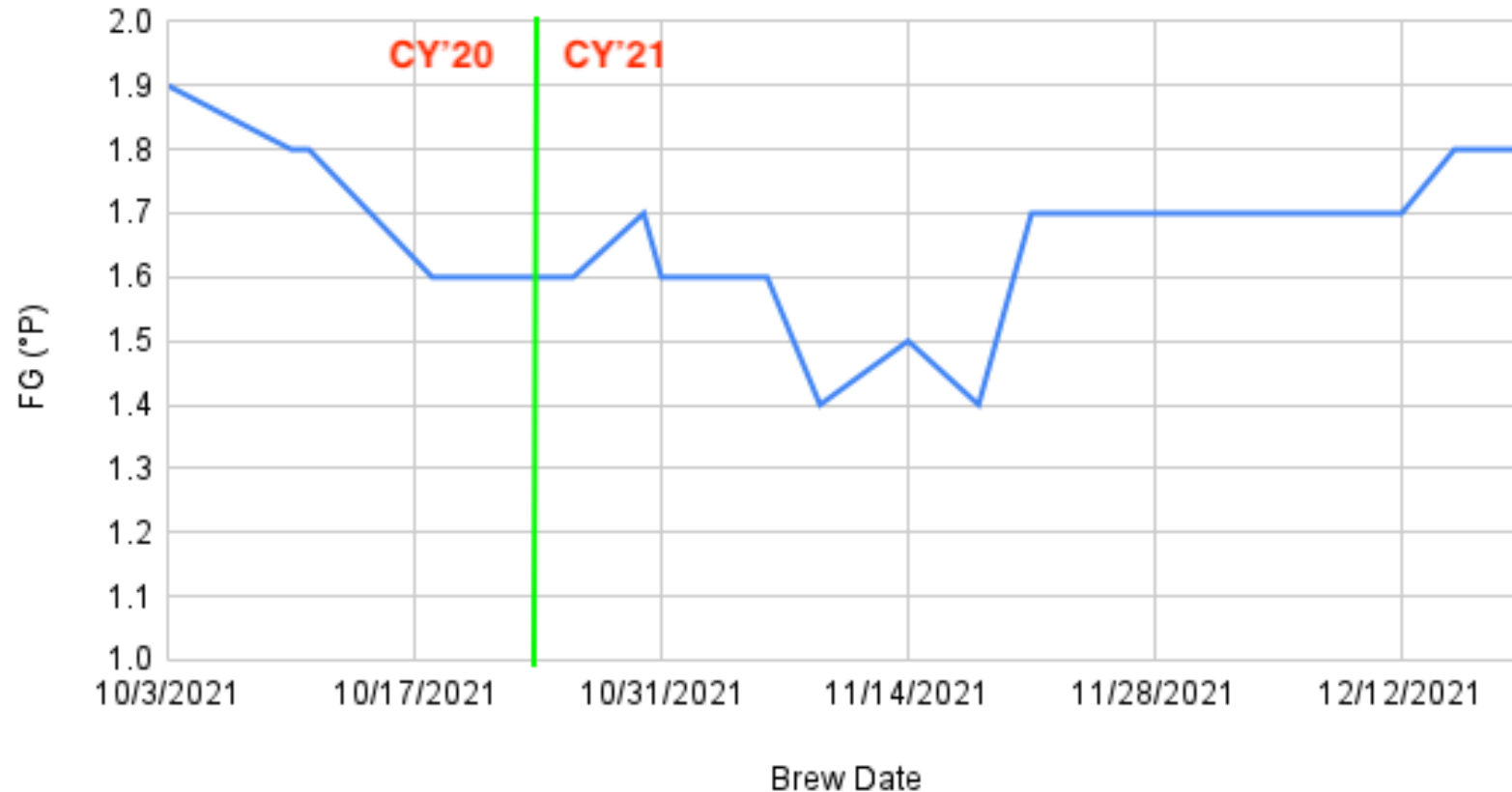


Pale-malt/IPA: strong correlation between BHY and BG, AA, DP, and FAN
Pilsner-malt/Pilsner: moderate correlation between BHY and Total Protein
No direct correlations with extract!



Crop Year '20 vs. '21

Pilsner FG (°P) vs. Brew Date



Significant increase in enzymes in CY'21 pilsner malt : DP +21.50; α -amylase +4.55

November '21 began incremental mash changes: increased mash temp and reduced overall rest times by 40%

So what levers do we pull?

- Recovered Extract – BHY%
 - Mill gap/grist composition
 - Mash pH
- Attenuation – FG/OG
 - Mash temp.
 - Mash time and steps
 - Liquor:grist
 - Mash pH
 - Mill gap/grist composition
- Sensory
 - Clarity
 - Finings adjustments – hot side and cold side
 - Protein rests – temps and times
 - Flavor
 - DMS – Sensory panel flags
 - FAN next step for stability control

Thank you to Elon Martin and Jeffrey Rittenhouse at pFriem for their hard work on data collection and aggregation.

Please reach out with any questions.

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