WORLD BREWING CONGRESS
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#ElevateBeer

Brew Water Experiment

Effects of changing the water profile on an American Porter

Previous Trial

Pilsen IPA

- Higher mash, KO pH
- Higher IBU
- Lingering, bitter aftertaste

Burton IPA

- Low mash, KO pH
- Crisp, dry finish
- Pleasant hop character

The Goal

- Assess how altering our water profile will affect aroma, flavor, mouthfeel and other characteristics of a Porter

Overview

Typical knockout pH of beers at Ballast Point Scripps Ranch

- 5.2 to 5.4 for Lagers, IPAs
  - Treat with lactic acid, $CaSO_4$, or CaCl
- 4.9 to 5.1 for Stouts, Porters
  - Only carbon filtered

Overview

Trial #1

- Carbon filtered city water

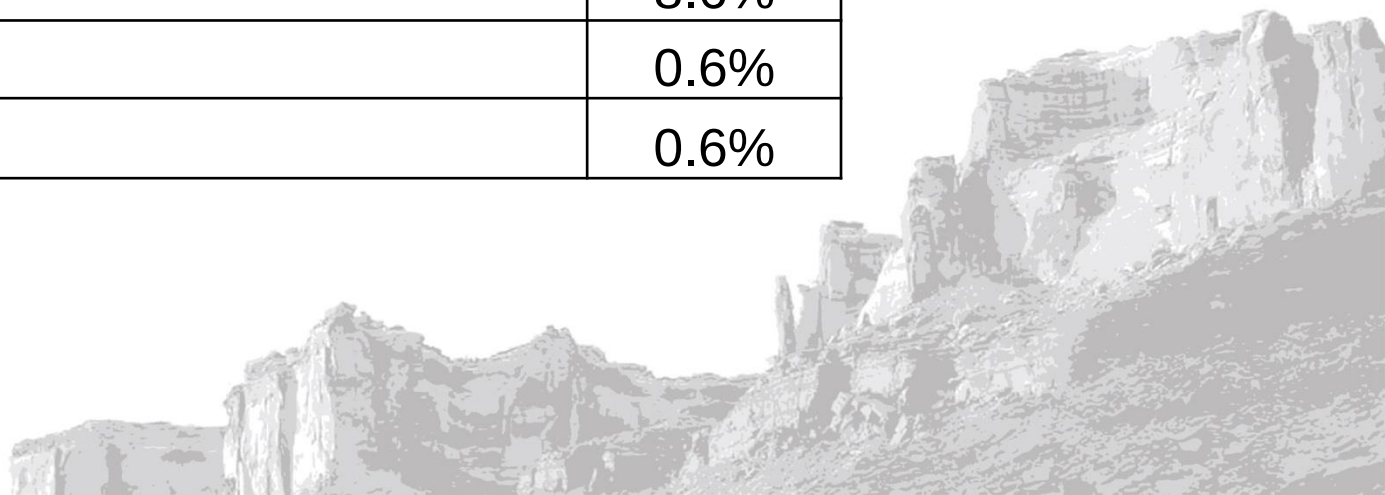
Trial #2

- Deionized water treated with brewing salts: CaCl, $MgSO_4$, $Ca(OH)_2$, NaCl

Overview

Grist

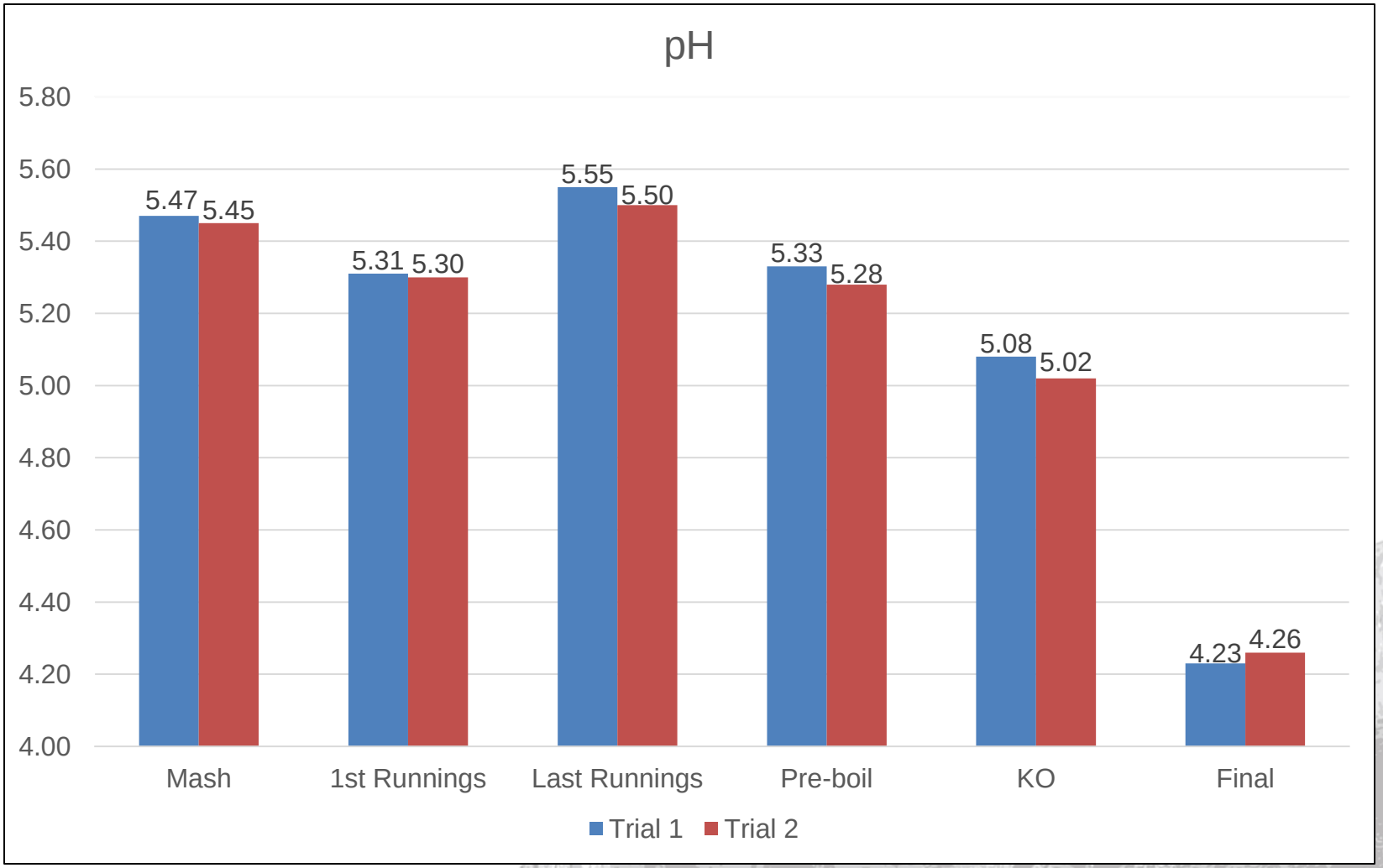
GRAIN	%
American 2 Row	64.2%
Flaked Barley	8.6%
Caramel 80L	8.6%
Victory	8.6%
Chocolate	8.6%
Black Malt	0.6%
Midnight Wheat	0.6%



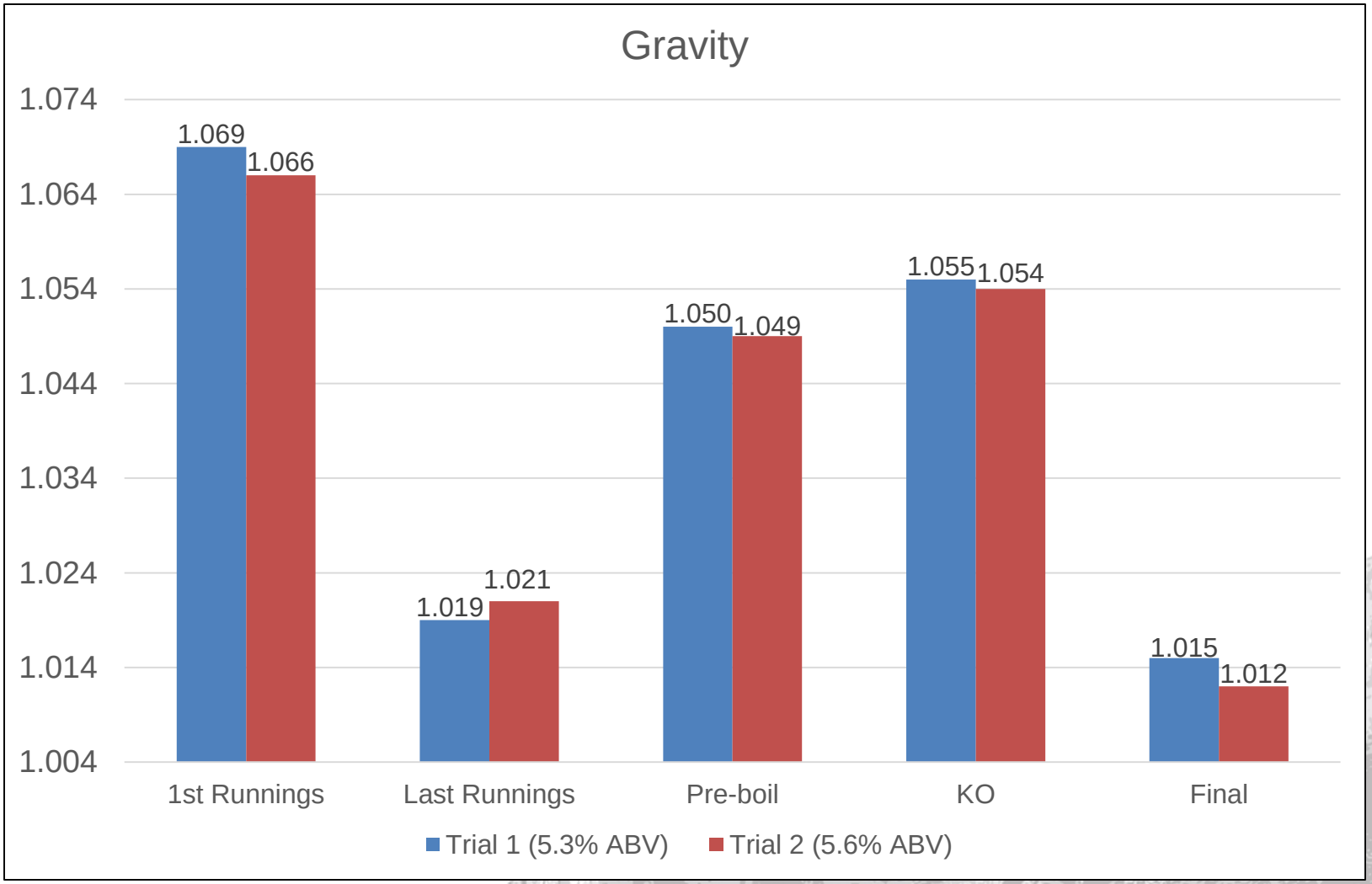
Water Analysis

	City Report	Trial #1	Trial #2
Calcium (ppm)	66.4	74.1	68.8
Magnesium (ppm)	23.9	28.5	9.91
Sulfate (ppm)	173	156	41.1
Chloride (ppm)	108	106	125
Sodium (ppm)	93.9	98.9	46.8
Alkalinity (ppm)	132	126	97

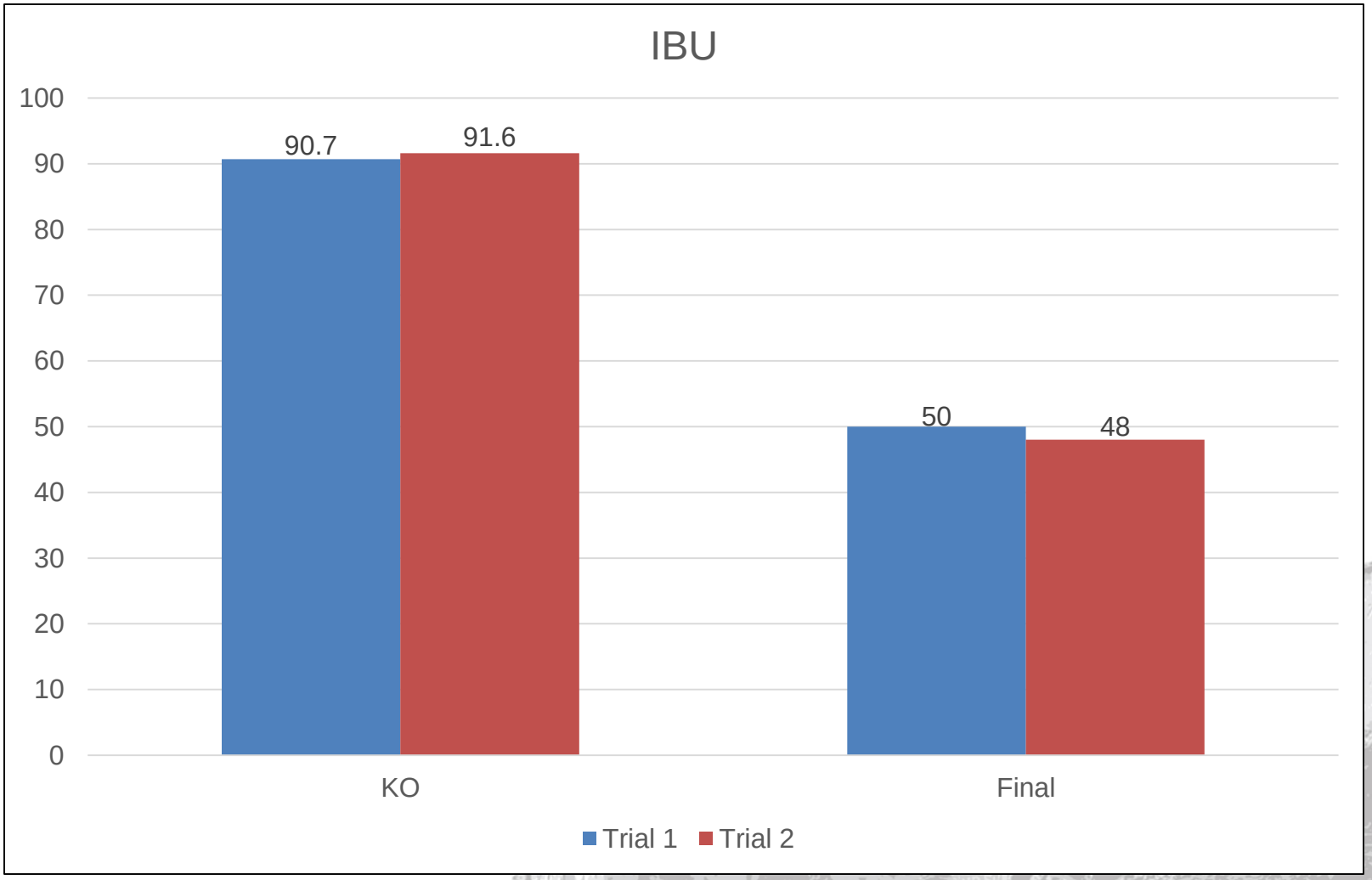
Brew Data


pH
5.80
5.60
5.40
5.20
5.00
4.80
4.60
4.40
4.20
4.00
5.47
5.45
5.31
5.30
5.55
5.50
5.33
5.28
5.08
5.02
4.23
4.26
Mash
1st Runnings
Last Runnings
Pre-boil
KO
Final
Trial 1
Trial 2

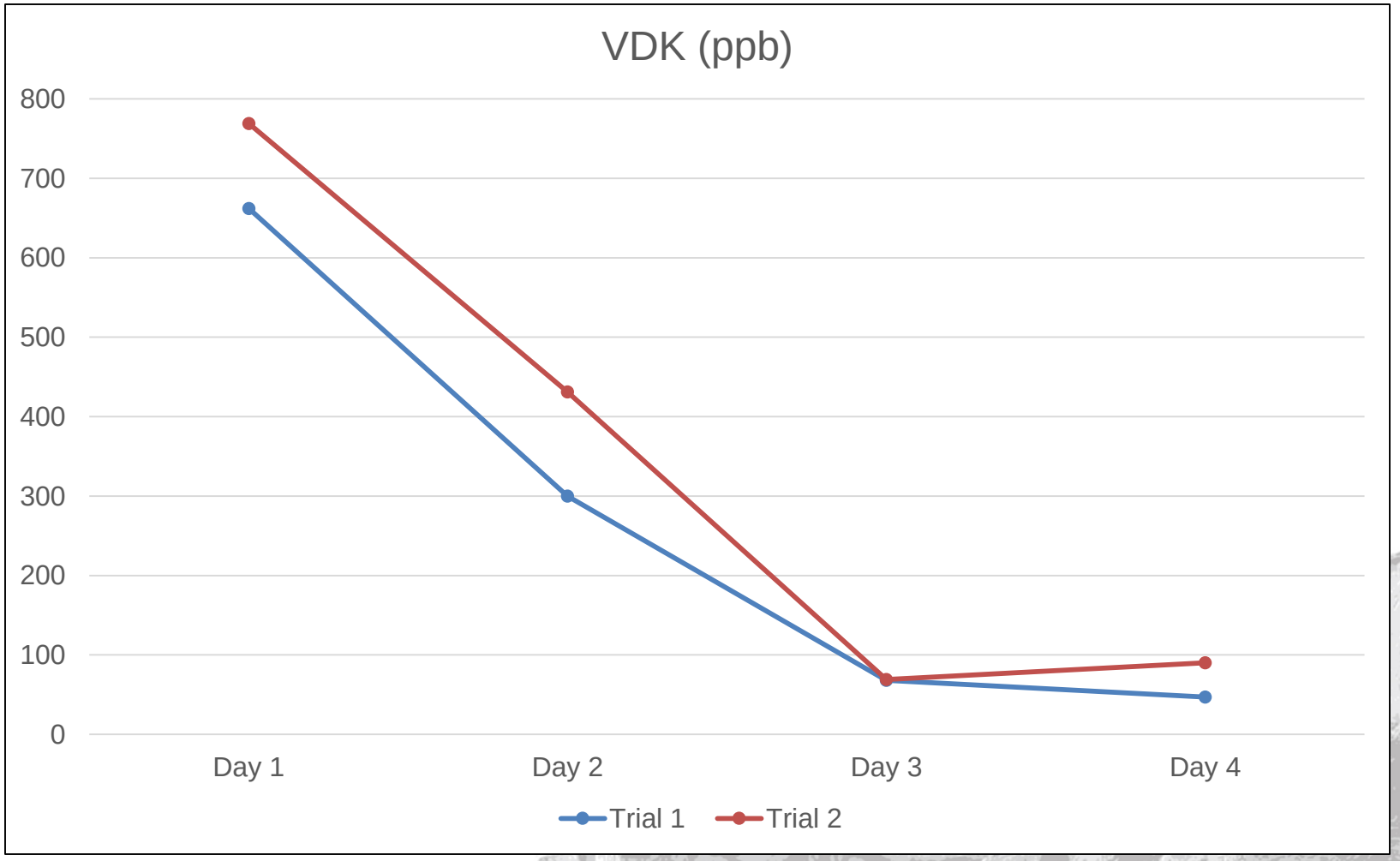
Brew Data


Gravity
1.074
1.064
1.054
1.044
1.034
1.024
1.014
1.004
1.069
1.066
1.019
1.021
1.050
1.049
1.055
1.054
1.015
1.012
1st Runnings
Last Runnings
Pre-boil
KO
Final
Trial 1 (5.3% ABV)
Trial 2 (5.6% ABV)

Brew Data


IBU
100
90
80
70
60
50
40
30
20
10
0
90.7
91.6
50
48
KO
Final
Trial 1
Trial 2

Brew Data


VDK (ppb)
800
700
600
500
400
300
200
100
0
Day 1
Day 2
Day 3
Day 4
Trial 1
Trial 2

Triangle Taste Test

- 11 of the 24 participants correctly identified the outlier
- 5 preferred Trial #1
- 6 preferred Trial #2

Triangle Taste Test

Trial #1 Notes

- Smooth, creamy mouthfeel
- Enhanced chocolate aroma/flavor
- Coffee aroma
- Sweet finish
- Stronger ester aroma

Triangle Taste Test

Trial #2 Notes

- Roasty
- Malty
- Acrid/astringent
- Better head retention
- Thinner mouthfeel
- Lingering aftertaste

Conclusions

- Although there was not a statistically significant difference between the two beers, the tasters that were correct generally said the same thing about Trial #2: roasty, thin mouthfeel, and lingering astringent aftertaste.

Conclusions

- Although the pHs were generally the same, the lower alkalinity (built from calcium hydroxide) in Trial #2 resulted in a roastier character.
- Higher sodium in Trial #1 contributed to a fuller mouthfeel, perceived sweetness and chocolate character.

Conclusions

- It was interesting that Trial #2 had a more pronounced, longer lasting head. It's definitely worth further investigation at our R&D system at Ballast Point.