

CGX™

CRYOGENIC
LUPULIN PELLETS

CASE STUDIES

CROSBY HOPS™



CGX™ CRYOGENIC LUPULIN PELLETS

CROSBY HOPS™

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Note: These case studies are ongoing and will continue to be updated. As more data is received over the coming months, we will amend conclusions as necessary regarding long-term QC evaluations.

CASE STUDY

Breakside Brewery RAINBOWS & UNICORNS

Session IPA

To better understand the effects of **CGX™ Cryogenic Lupulin Pellets** on beer, **Crosby Hops** collaborated with national and international award-winning **Breakside Brewery** of Portland, Oregon on a case study to measure the impact of CGX on finished beer.

Ben Edmunds, Brewmaster and this year's recipient of the Russell Schehrer Award for Innovation in Craft Brewing, organized this study using Breakside's method of new ingredient introduction for production beer recipes. Capturing data from three 120-barrel batches of Breakside's **Rainbows & Unicorns** Session IPA, we sought to discover:





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How does incorporating **CGX Cryogenic Lupulin Pellets** in a production beer recipe influence the below measurables compared to a 100% T-90 version of the same recipe?

- Finished beer yield
- Beer stability
- Overall sensory impact

Hop Varieties Measured



- El Dorado® **CGX**
- El Dorado® T-90

- Strata® **CGX**
- Strata® T-90 (an Indie Hops variety)

Background

- **Batch Size:** 120 barrels (x3)
- **Strata® CGX** and **El Dorado® CGX Cryogenic Lupulin Pellets** were treated as having a **2:1** impact of T-90 pellets in the whirlpool and dry hop
- **Rainbows & Unicorns** uses slightly less than 3 pounds of hops per barrel
- **Rainbows & Unicorns** is already a high-yielding beer for Breakside Brewery



CGX & T-90 Additions

- **By Weight**

Whirlpool → 80% T-90, 20% CGX

Dry Hop → 78% T-90, 22% CGX

- **By Impact**

Whirlpool → 67% T-90, 33% CGX

Dry Hop → 64% T-90, 36% CGX

- **Dry hop per 120-barrel batch**

El Dorado T-90 44 pounds

El Dorado CGX 33 pounds

Strata T-90 44 pounds

Strata CGX 22 pounds

Key Discoveries

- 3% increase in finished beer yield
- Lower FAN levels in finished beer
- High initial flavor and aroma intensity scores

Conclusion

By replacing T-90 pellets with CGX in the whirlpool and dry-hop at 33% and 36% by impact respectively, **Breakside Brewery was able to increase finished beer yield by 3% and potentially achieve better beer stability due to lower FAN levels while retaining the flavor and aroma qualities that make Rainbows & Unicorns an award-winning beer.** Aroma intensity scores were also above average for the first 20–30 days compared to 100% T-90 versions of the same recipe.

Due to Breakside's refined process to achieve high efficiency with Rainbows & Unicorns already, **CGX has the potential to increase yields across a variety of hop-forward beers**, especially at higher hopping rates above 3 lbs per barrel. Theoretically, the higher hopped the beer, the greater the yield increase when replacing T-90 pellets with CGX in whirlpool and dry hop applications at the observed dosage rate.



“ Using CGX pellets in place of some T-90 in these batches of Rainbows & Unicorns led to beers with a **clean mouthfeel and an elevated, lasting hop aroma intensity.** Even when used at modest levels, it seems that **CGX can be a powerful tool in helping us refine aroma and improve stability in all of our hoppy beers.** ”

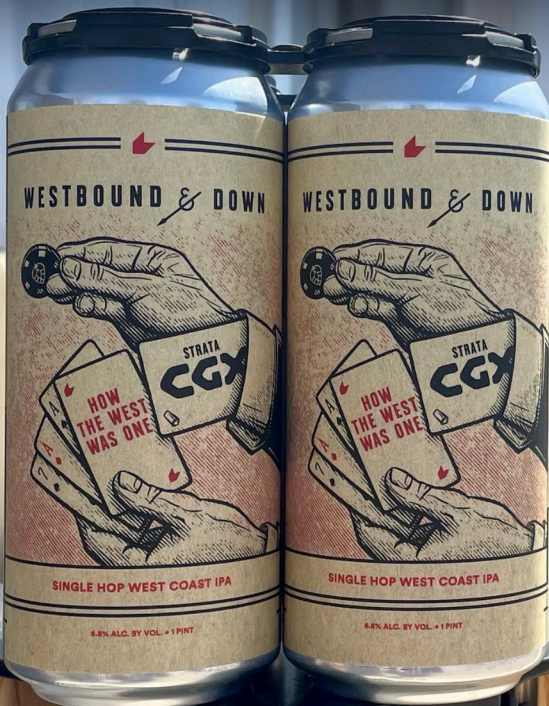
Ben Edmunds

Brewmaster, Breakside Brewery

CASE STUDY

Westbound & Down Brewing Company HOW THE WEST WAS ONE: STRATA® CGX™ Single Hop West Coast IPA

To better understand the effects of **CGX™ Cryogenic Lupulin Pellets** on beer, **Crosby Hops** collaborated with 2019 GABF Mid-Size Brewpub of the Year **Westbound & Down Brewing Company** of Idaho Springs, Colorado on a case study to measure the impact of CGX on finished beer. By capturing data from **How The West Was One**, a rotating single-hop West Coast IPA, Jake Gardner, Brewmaster, organized this study to measure the following:





How does incorporating **CGX Cryogenic Lupulin Pellets** in a production beer recipe affect post dry-hop pH?

Hypothesis

Using **CGX** in whirlpool and dry hop applications will result in a lower pH in finished beer compared to a 100% **T-90** batch due to **reduced vegetal load**. Lower pH results in a higher intensity hop sensory experience and better hop aroma shelf stability.

Hop Varieties Measured



- **Strata® CGX**
- **Strata® T-90** (an Indie Hops variety)

Background

The data measured is a comparison of two batches:

1. **How The West Was One: Strata® T-90**
2. **How The West Was One: Strata® CGX™**

Both batches were brewed as “oversized singles” meaning one 15-barrel turn at high gravity then liquored back at the end of boil to the desired whirlpool volume of 25 barrels. Each batch was fermented in identical 30-barrel fermentation vessels and transferred to identical 30-barrel brite tanks for equal measurement and comparison.



Given their experience in substituting T-90 pellets with other concentrated hop products, **Westbound & Down** chose to use a multiplier of 1.5x for impact pounds both in the whirlpool and dry hop calculations.

- **Batch Size:** 25 barrels each (CGX™ and T-90 respectively)
- **Strata® CGX™** was treated as having 1.5x the impact of **T-90 pellets** both in the whirlpool calculations (bitterness was adjusted with first wort additions to achieve identical IBUs) and in the dry-hop additions
- **Westbound & Down** typically sees a rise of 0.2 pH to 0.3 pH in post dry-hop pH in non-CGX beers

Key Discoveries

- The Strata CGX beer caused a 0.17 pH rise from pre-dry hop to post-dry hop compared to a 0.27 pH rise in the 100% Strata T-90 version
- 4.8% increase in finished beer yield

Conclusion

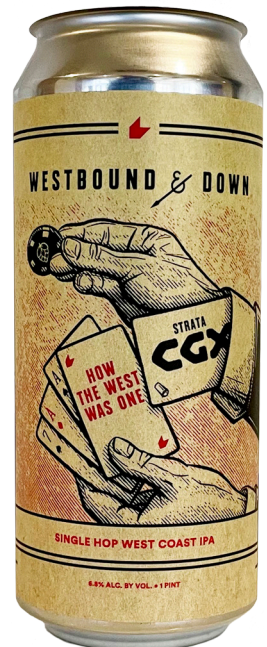
The hypothesis that less vegetal matter decreases post-dry hop pH was accurate. **By substituting CGX as a percentage of the whirlpool and dry hop applications, Westbound & Down measured a 0.17pH rise compared to a 0.27pH rise in the 100% T-90 version of this beer.** Yields were also higher due to more efficient wort recovery between whirlpool and fermentation vessels, as well as the lower overall dry-hop load.

Sensory

Westbound & Down's quality control team of four panelists will hedonically rate How The West Was One: Strata® CGX™ at 2 weeks, 4 weeks, and 8 weeks respectively to compare QC results from the 100% T-90 batch.

Additional Information

Without a similar beer being produced year-round, it will be impossible to conduct QC blind for this study. Both the Strata® T-90 and Strata® CGX™ hedonic scores will be provided as tested. QC testing will be complete by the week of 5/29/2023.





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