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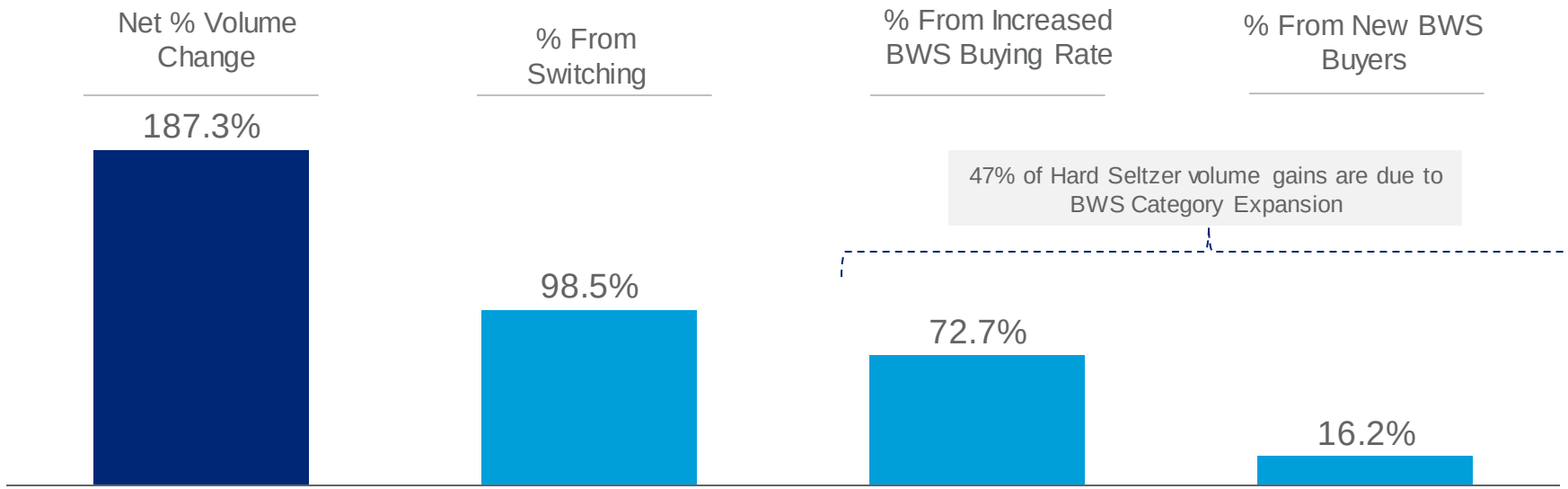
Hard Seltzer 101: Development, Production, and Troubleshooting From a Brewers Perspective

Hard Seltzers are a Driver at Retail of Incremental Beer Wine and Spirits (BWS) Purchasing, as well as a Replacement For Other BWS Products

Hard Seltzers: Source of Volume Summary



Contribution to Growth		**52.6%**	**38.8%**	**8.6%**
Vol MM	**+505.9 MM**	**+265.9 MM**	**+196.4 MM**	**+43.6 MM**

Source: IRI Consumer Network Households (NCP)
52 w/e November 3, 2019 vs YS - Total U.S. All Outlets, NBD Adjusted (Vol)

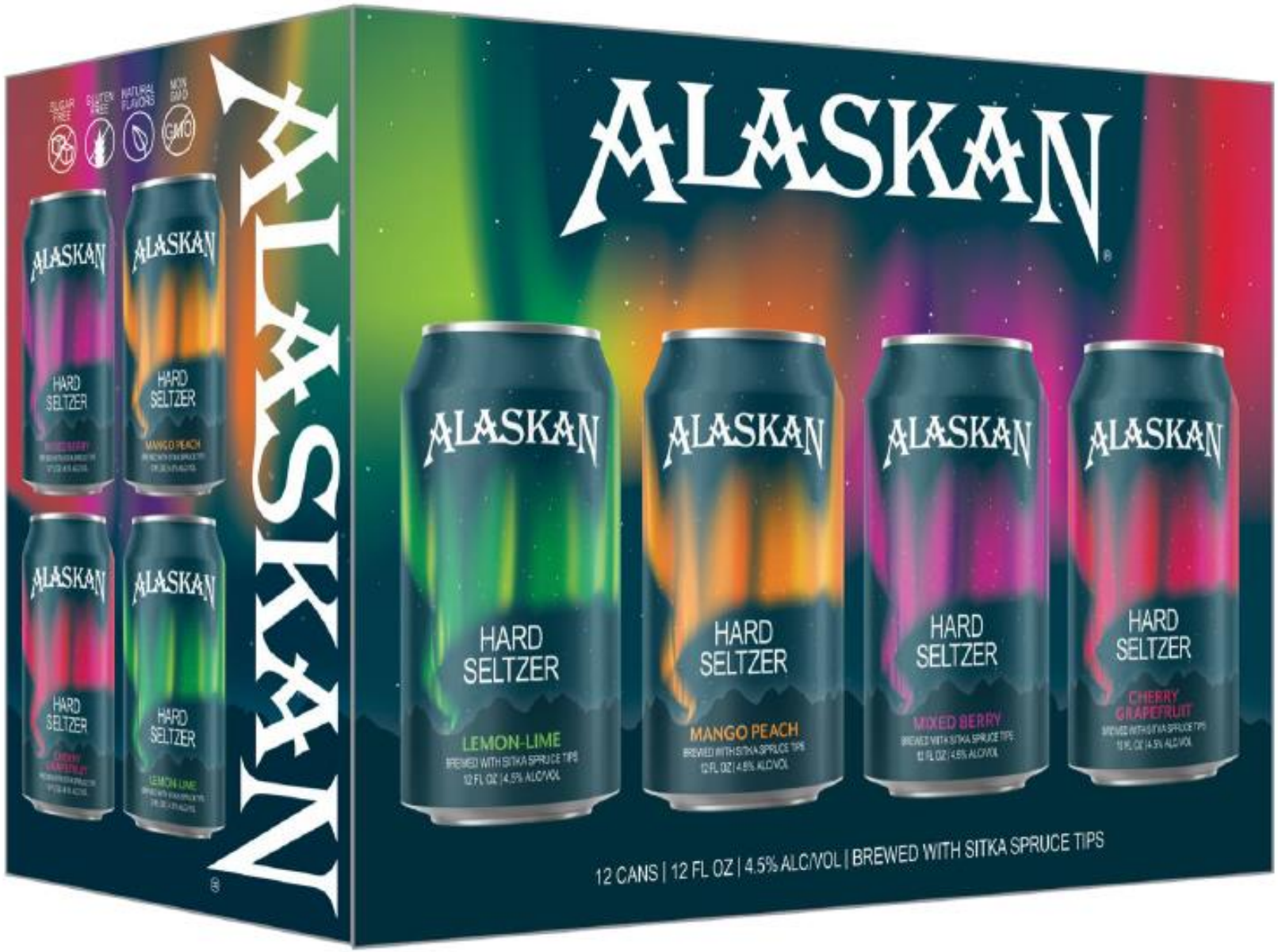
Seltzers More Concentrated than Craft Which Produces 3x sales via 27x Brand Families…Seltzers More Efficient in Sales per Brand than Imports, Craft, Cider

	DOLLAR SALES	# OF BRAND FAMILIES	SALES PER BRAND	RANK	# OF BRAND FAMILIES TO REACH 80% OF SALES
TOTAL BEER	**$37,266,568,638**	**3054**	**$12,202,544**	**-**	29
DOMESTIC PREMIUM	$12,160,658,370	24	$506,694,099	1	3
DOMESTIC SUPER-PREMIUM	$3,333,675,391	24	$138,903,141	2	2
DOMESTIC SUB-PREMIUM	$5,358,941,332	61	$87,851,497	3	6
FMB	$3,977,394,558	188	$21,156,354	4	10
HARD SELTZER	$1,458,897,116	73	$19,984,892	5	2
IMPORT	$7,491,635,814	411	$18,227,824	6	5
NON-ALCOHOLIC	$131,912,306	30	$4,397,077	7	5
CRAFT	$4,344,109,934	1986	$2,187,367	8	97
CIDER	$428,258,703	328	$1,305,667	9	11

Source: IRI, BWS Multi Outlet + Conv; 52 Weeks ending Dec 29 2019

Attitudes and Considerations

- Are seltzers right for your brewery?
- Would the addition of seltzer fill a gap in your current brand portfolio?
- Is the cost of additional investment equipment and knowledge worth the benefit hard seltzer would provide?
- Would the addition of hard seltzer conform with your current brand identity?
- Is broadening your customer base important, or would you prefer to focus time and resources catering to customers you already have
- How will marketing decisions affect production?



Attitude and Considerations:

Brand Identity & Off-premise Focus

Attitude and Considerations:

Alaskan Ingredients - Spruce Tips

Ingredients

Seltzers are fundamentally very simple

Sugar	Water	Yeast	Flavoring

Seems pretty easy, Right??

Supplemental Yeast Nutrition is Critical

- Sugar solution is a nutrient wasteland
- Unlike a malt based fermentation, nutrient contribution from fermentables is virtually nothing
- Supplementing with a nutrient blend consisting of organic and inorganic nitrogen, amino acids and trace minerals is not only recommended but necessary
- We supplement to 250 ppm nitrogen incrementally over the first half of fermentation

Process- Building a Fermentable Solution

- 11 pounds of sugar/gallon of fluid/brix point
- *This is a good starting point but will vary with type of sugar and coarseness*
- Adding sugar incrementally and measuring brix as you go is advisable until you get your process dialed for your system
- Desired Brix/11= lbs sugar per gallon
- 1.2 lbs (desired volume)= total sugar
- Every 13.5 lbs sugar displaces a gallon of fluid
  - *Again, this is dependent on sugar source, but is a solid baseline*

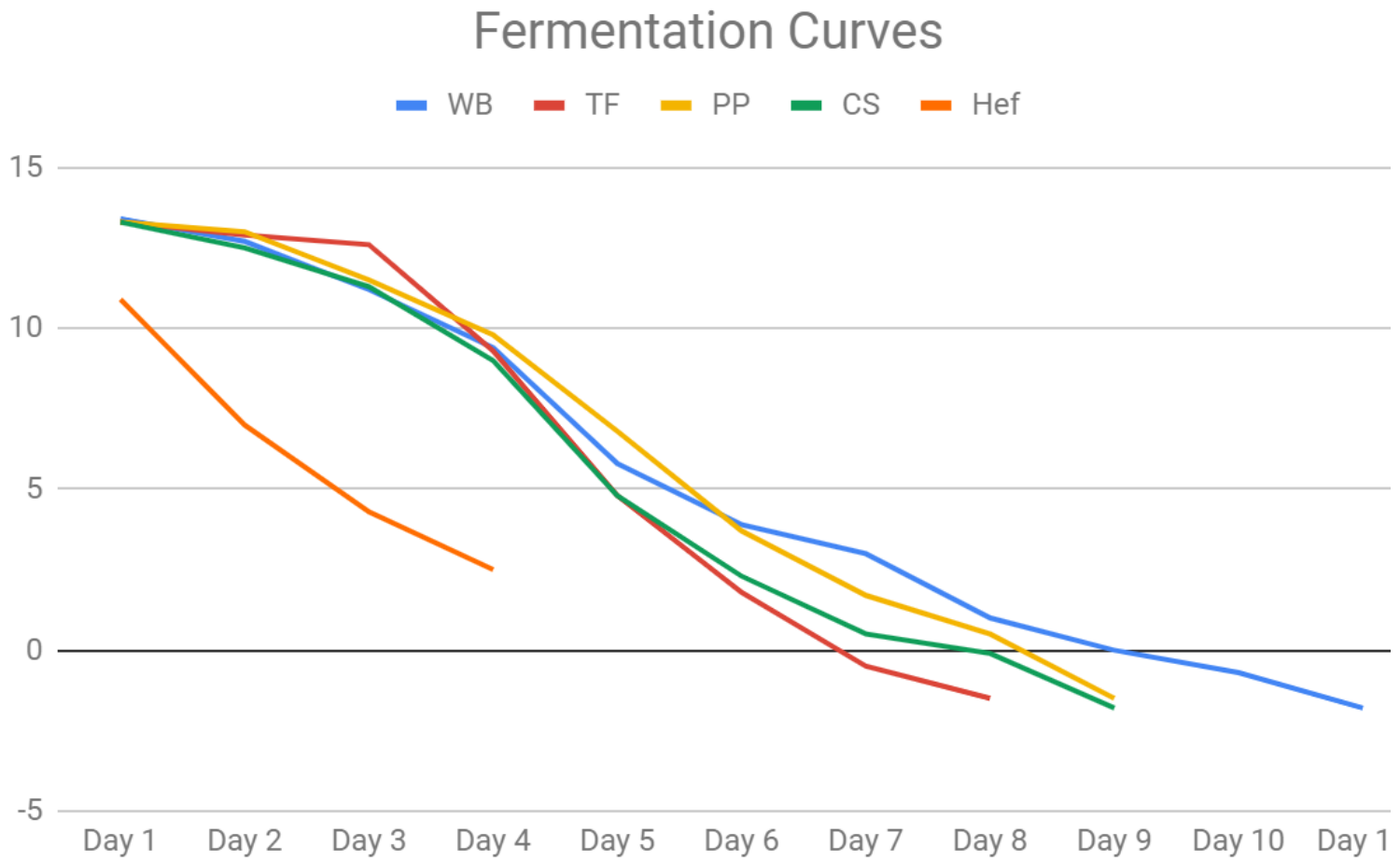
- Example For 775 gallon (25 bbl) solution at 13.2 bx
- 13.2 bx/11=1.2 lbs of sugar/gallon
- 775 gallon x 1.2= 930 total pounds of sugar
- 930/13.5=68.8 gallons displaced by sugar
- 775 gallons-68.8 gallons=706.2 gallons of water needed after displacement compensation
- ***<u>*spreadsheets are your friend, but I strongly encourage becoming familiar with the long hand calculation*</u>

Process- Building a Fermentable Solution

- Add predetermined volume of water to mixing kettle
  - Kettle/Whirlpool combination vessel is perfect for this
- Begin adding sugar while mixing thoroughly
  - Recirculating through whirlpool works well
  - If equipped with a direct fire kettle, be careful to avoid scorching
    - I have not experienced this, but it is something I worry about
- Measure brix as the last 10% is added
  - This will become unnecessary as you fine tune your formula to your system
- Boil 15 minutes and add initial nutrient shot

Process Continued

- Knockout as usual, oxygenate and pitch yeast
  - Oxygenate to 6-8 ppm*
  - 3.5 g/gallon yeast (will vary depending on strain)
  - 76* F
  - Second Nutrient shot added @ 24-48 hours
  - *Dependent on the needs of your yeast*
  - *At this time we have not re-pitched from a seltzer fermentation, but will be exploring as a cost saving measure in the very near future*


Fermentation Curves
WB
TF
PP
CS
Hef
15
10
5
0
-5
Day 1
Day 2
Day 3
Day 4
Day 5
Day 6
Day 7
Day 8
Day 9
Day 10
Day 1

Process-ABV Calculation

- Once solution is fermented to dryness, we now have a strong base that can be diluted to desired strength
  - To find ABV
    - Original Brix + Terminal Brix = Xbrix ***if using negative brix, simply convert to positive*
    - Xbrix (.525) = ABV
  - Example:
    - 13.2 + 1.8 = 15
    - 15(.525) = **7.88 ABV**

Process-Dilution/ABV Adjustment

- (Current Vol.)(Current ABV) = (Desired ABV)X
  X= Total Volume in gallons
- Ex.: (775)(7.88) = 5x
- 6107 = 5x
- 6107/5 = x
- 1221 = Gallons Total volume
- 1221-775=446 gallons needed

Process- Backsweetening

- (Current Volume)(Current Brix) + (Total Volume – Current Volume)X = (Total Vol.)(Brix Target)
- Ex: (775)(-1.3) + (1221-775)X = (1221)(.5)
- (-1007.5) + 446X = 610.5
- 446X = 1618
- X = 3.62 brix points from sugar
- Assuming 11 lbs of sugar per gallon of fluid per brix
- X=(Brix)/ 11
- Ex: 3.62/ 11 = .329 lbs of sugar/ gallon
- (lbs of sugar)(total volume – current volume) = total amount of sugar needed
- .329 lbs of sugar x 446 = **146 lbs of sugar**
- ***if backsweetening and diluting in the same step remember to account for displacement*

Process-Filtration

- If a colorless and neutral tasting base is desired filtration will be necessary
- 2 stage filtration recommended
  - Primary filtration to remove yeast
    - Centrifuge, DE, plate and frame will all work
  - Secondary filtration through activated carbon media to remove color and some fermentation derived flavors
    - Lenticular or plate and frame seem to be most effective

Package Stability and Preservatives

- Best Practice is to store package product cold (>38*)
- Pasteurization is probably most effective but impractical for most small brewers
- Any back sweetened and un-pasteurized product should ABSOLUTELY include preservative to prevent re-fermentation in the package
  - Preservation concerns were one of several reasons we decided against back sweetening
- Common Preservatives include
  - Citric Acid-1.0 g/L addition of Citric acid will increase the TA by about 1.17 g/L and will decrease the pH by 0.08 pH units
    - Some seltzer appropriate yeast strains can ferment <3.0 pH
    - No maximum limit
    - Falls under “natural flavor” in the FDA CFR
  - Potassium Metabisulfite- 200 PPM is legal limit
  - Potassium Sorbate-Classified as a chemical preservative and must be included in ingredient statement
  - Consult manufacturer for dosing guidance

Flavoring

Very much dependent on individual product goals

Possibilities are nearly unlimited

Process can dictate timing and type

Bench trialing during development is critical

- Flavor houses are typically very generous with samples
- Start with 100ml of diluted base and a micro pipettor and go wild

Blind tasting panels are also helpful

Alaskan Brewing Company Innovation Process

Benchtop Samples

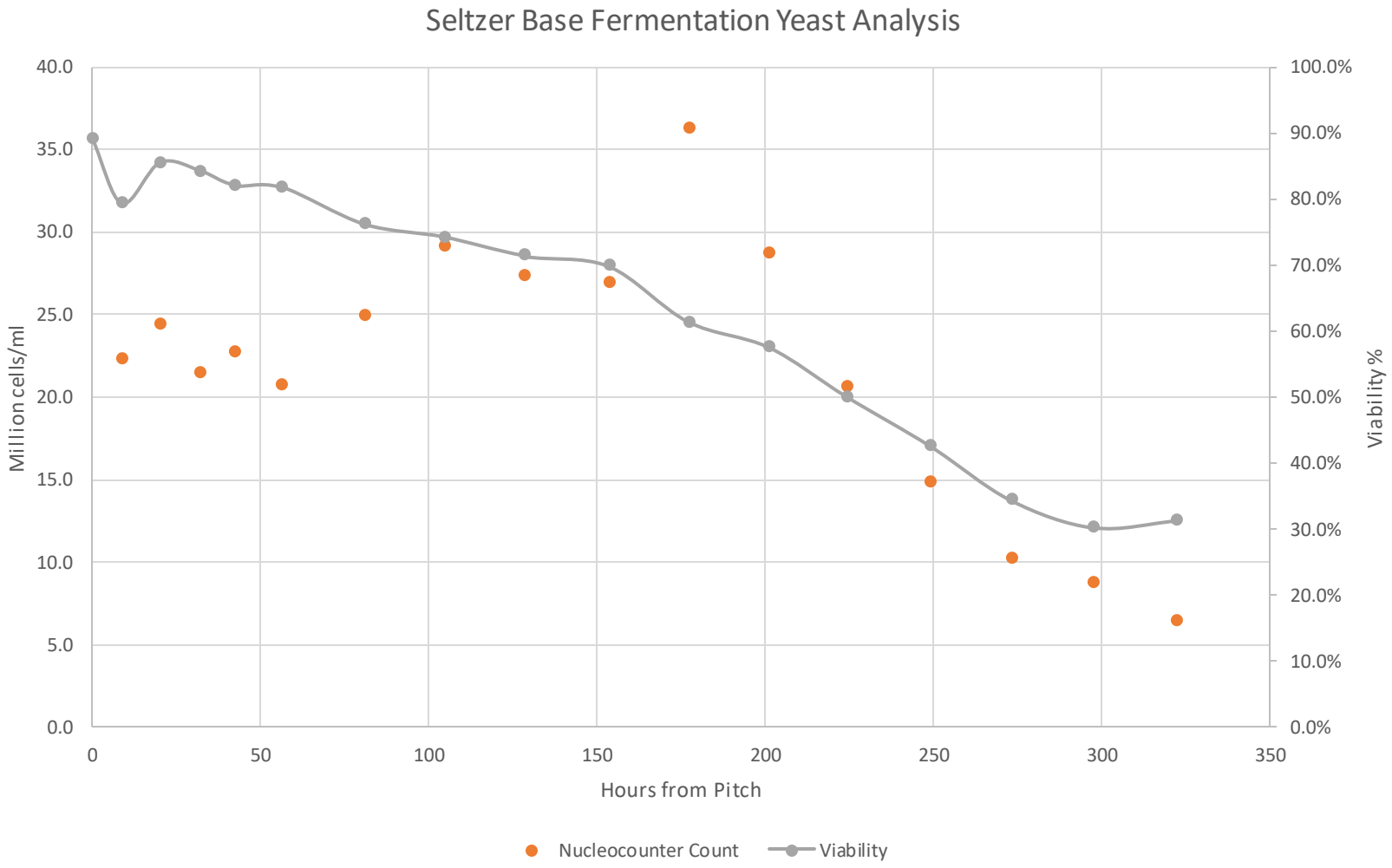
5 Gallon Fermentations

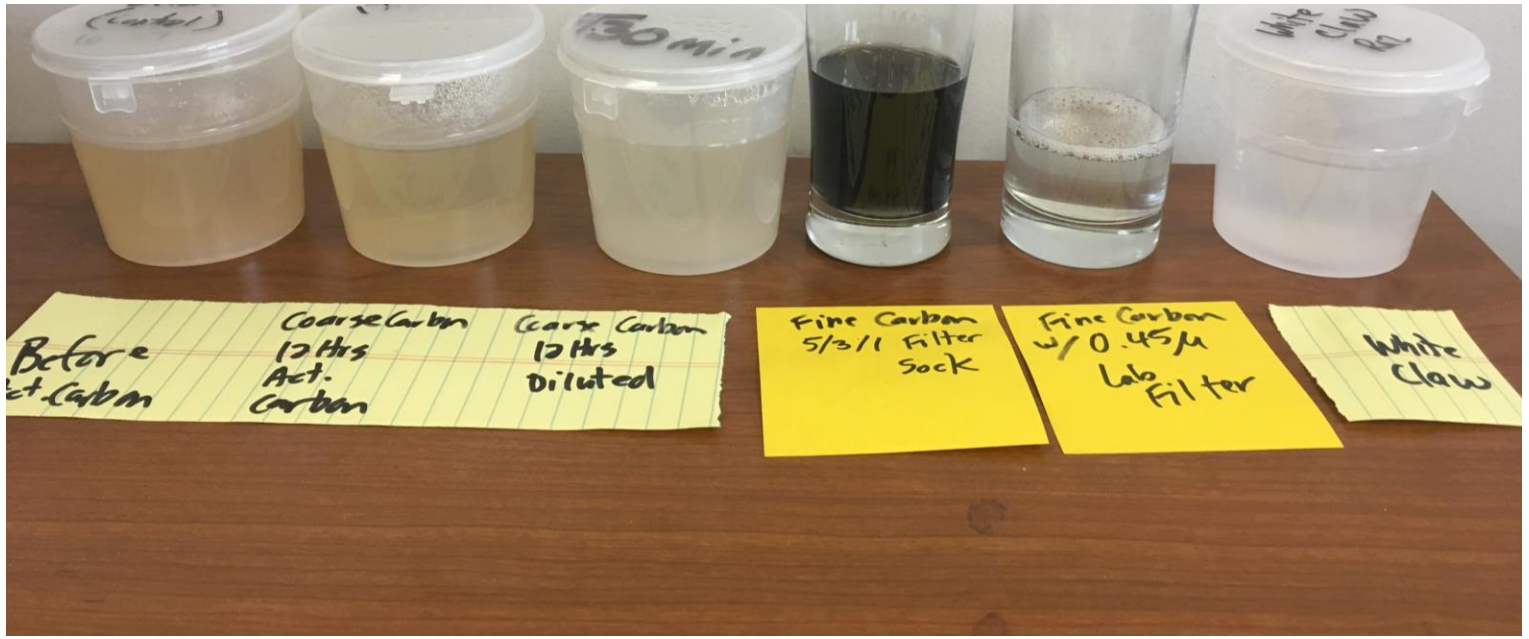
1 BBL Test Brews

10 BBL Test Brews

100 BBL Production Brews

Alaskan Brewing Company Fermentation Trials





Filtration Trials

Process & Scaling

Equipment Needs and Considerations

- If you are already producing beer you have most of what you need to get started-
  - Kettle/Whirlpool combination vessel is perfect for mixing solution
  - Moving thousands of pounds of sugar around effectively can be challenging
    - Specialized handling equipment may become necessary
  - A self priming flex pump for fruit juice is at the very top of my wish list
  - Activated Carbon media for existing filtration equipment
  - A reliable flow meter is essential
  - Micro pipette is handy for bench trialing when tiny and precise measurements are called for


630


GPI
Industrial Grade
Electronic Digital Meter
CALIBRATE
DISPLAY
CAL B
1.20
TOTAL 2
Great Plains Industries, Inc. Wichita, KS.
Model Number under battery.


LAMBDA
PLUS
autoclavable

Hard Seltzer Regulations Reference—TTB/FDA

ALASKAN BREWING CO.

TTB Regs

- Surgeon General Warning is still required on Hard Seltzer/IRC Beer
- Definitions
  - Malt Beverage—requires both malt/hops
    - Malt >25% of Total
    - Hops>7.5 lb/100 BBL
  - Flavored Malt Beverage
    - Doesn't require any malt
    - Hops are optional
  - Beer—doesn't require any malt or hops
- Most Hard Seltzers are <6% FMB's
  - Malt Based Gluten Reduced
  - Cane Sugar/Dextrose Gluten Free
- IRC defers to State Laws—Does your state allow/define FMB ?
  - Example--Oregon--Hard Seltzer is classified as a Wine so you need a wine license to make it.
- No hops/malt and <6%→"IRC" beer—TTB formula is required if you process/remove color or flavor [i.e. Activated Carbon use]. You need lots of info on the Flavor and Flavor Company:
  - ALC/VOL from Flavor
  - Max. ALC/VOL from Flavor
  - Flavors need to be registered # and have a FIDS#
  - Flavors qualify for a Tax credit called a Drawback since Taxes are paid when you buy from the supplier and again when you sell the Hard Seltzer

- TTB Summary—Common Sense Language:
  - http://www.graceregconsult.com/blog/kombucha-hard-seltzer-and-sodas-oh-my-orwhen-beer-isnt-a-malt-beverage
  - https://bevlaw.com/bevlog/hard-seltzer-regulatory-considerations/
  - https://www.oregonlaws.org/ors/471.001
- TTB Summary from '15 CBC:
  - http://www.craftbrewersconference.com/wp-content/uploads/2015_presentations/W1320_Battle_Martin.pdf
- Circa 2002 Historical Context on FMB:
  - https://www.atf.gov/resource-center/docs/report/atf-quarterly-bulletin-2002-volume-2-%E2%80%93-bureau-rulings/download
- Current FMB Regs:
  - **<6% then Max ABV from flavor is 49% of Total**
  - >6% then Max 1.5% of Total Volume from Flavor
  - https://www.ttb.gov/faqs/flavored-malt-beverages
- The TTB 2008-3 Ruling--Acronyms from Hell:
  - IRC vs. FAA/TTB--MB, FMB, Beer
  - https://www.ttb.gov/images/pdfs/rulings/2008-3.pdf

FDA Packaging Regs

- No formal submittals for Label Approval by FDA, but
  - Don't be Misleading
  - Avoid Nutritional Claim language on alcoholic beverages
  - Be accurate
  - Required if selling in only home state
  - Recall Plan is Required
- Nutrition Facts Panel
  - Calories
  - Carbs—"Added" Sugar, Citric
  - Protein
  - Not a significant source of….see Nutrition Facts changes link
- Principle Display Panel
  - FDA has oversight if <7% and Cocktail names are OK** as long as they're not misleading [imply DS are present, or contain a DS company in the name]
  - TTB has oversight >7% and has limitations on Cocktail names/usage.
- Ingredient List
  - Descending order by weight
  - Must use Standard of Identity definitions
  - Water SOI's—purified [hard to meet/bottled] vs. filtered
  - Gluten Free [verification/testing/documentation is required] vs. Gluten Reduced
  - Allergens must be declared if used, including wheat
  - Non-GMO—includes sugar & dextrose [refined]
  - Natural/Imitation Flavors
  - No Vanilla limitation like Beer has
  - All Ingredients must be GRAS

- General Food Labeling Guide—PDP/NFP/IL:
  - https://www.fda.gov/files/food/published/Food-Labeling-Guide-%28PDF%29.pdf
  - https://www.fda.gov/food/food-labeling-nutrition/changes-nutrition-facts-label
- Generally Recognized as Safe:
  - https://www.ttb.gov/formulation/determining-if-and-how-ingredients-may-be-used-in-your-beverage
- Filtered vs. Purified/Bottled Water:
  - https://www.epa.gov/sites/production/files/2015-11/documents/2005_09_14_faq_fs_healthseries_bottledwater.pdf
- TTB Cocktails:
  - https://www.ttb.gov/images/pdfs/spirits_bam/chapter4.pdf
- 2020 Revisions to the NFP:
  - https://www.fda.gov/food/nutrition-education-resources-materials/new-nutrition-facts-label
- 2020 Voluntary/2022 Mandatory Bioengineered Declarations and Exemptions https://www.ams.usda.gov/rules-regulations/be
  - The 5% Exemption
  - The Refined Exemption--HFCS, Cane Sugar and Dextrose are all Non-GMO (i.e. no DNA present)
    - https://www.harvestpublicmedia.org/post/usdas-new-rule-gmo-labeling-boon-sugar-beet-farmers

Conclusions

- Hard Seltzer volumes are expected to continue to grow off-premise
- Yeast nutrition is paramount
- In addition to TTB and state regulatory bodies, hard seltzers are regulated by the FDA
- Flavor possibilities are nearly endless, apply the same creativity you've been using in your beers
- Investment in equipment to get started is very minimal
- It is advisable to have lab verification before making labeling claims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