

| Questions | Answers |
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| <p>1. For the Voss strains/cultures, what do you see in the isolate options, rather than the mixed culture that you recommend?</p> | <p>Purportedly, either the Loki is an isolate (or cleaned sacch culture), or the Omega Voss is an isolate rather than the culture. In both cases, each produced orange notes and flavor at 85-95°F, but the "total" culture that Tivoli has used from Propagate has provided a much rounder, fuller orange aroma. An easy way to compare is to think of having the actual fruit in front of you as opposed to a light extract. There was little comparison in terms of which provided a larger and fuller bouquet in both aroma and flavor. That being said, both Imperial and Omega will not be as fresh to our brewery (Denver, CO) as Propagate Labs, as we are hyperlocal with respect to Propagate. If there is an issue with the viability of the yeast due to shipping, that is something to consider.</p> |
| <p>2. Do you know of anyone that has used it for seltzer fermentations or would it work well for seltzer fermentations? Thanks</p> | <p>Answered in the webinar</p> |
| <p>3. What recommendations do you have for in-house propagation of these yeasts?</p> | <p>This is best answered by Matthew! In our brewery, we have successfully used cone-to-cone transfers, but have little experience with cropping, storing, and then propagating.</p> |
| <p>4. The fermentations always go rapidly at first, dropping 4+ plato in the first 24 hours, then fermentation slows drastically, and it will take up to 2 weeks to finish.</p> | <p>Our experience has been quite the opposite, provided there is a healthy dosing of nutrient (towards the upper end of recommended amounts) and robust oxygen levels (close to saturation at room temp). In multiple trials, we are able to fully ferment 10-12°P in 18-24 hours at 95°F. Higher gravities (14-16) reached terminal gravity in 36-48 hrs.</p> |
| <p>5. The Vermont ale fermentation is always normal, so there is no issue with wort fermentability.</p> | <p>?</p> |
| <p>6. Why are these kveik fermentations slowing after a rapid start? They always end up finishing dry (i.e. 2.5P or less) but take forever.</p> | <p>This might be an issue with nutrient, oxygen, temperature, or starting osmotic pressure. In all of our trials that started above 18-20°P, we would observe this behavior. In instances where we had little available nutrient outside of the existing FAN from malt, we would also observe this "stalling." Our current protocol has generated close to 2 dozen ales ranging from 3.5-8.0% ABV with terminal gravity being reached in 36-48hrs.</p> |
| <p>7. Any recommendations on yeast nutrient additions and impact on growth rate?</p> | <p>We started using superfood (https://bsgcraftbrewing.com/superfood-1kg) from BSG to provide all of the nutrients needed for all of our fermentations. Kveik appears to respond well to the higher dosing range, and will ferment down to terminal gravity, at a 0.5x pitch rate to ales, in approximately 36 hrs.</p> |
| <p>8. There was a lot of discussion regarding low ph. My experience is most lager yeast end ferment at about 4.2 --</p> | <p>This was a clumsy comment on my part - I should have specified ale yeast. Our lagers do finish as low as kveik, and perceived bitterness should be compensated accordingly in both cases, particularly</p> |

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| was is the concern around perceived bitterness only ??? | when attempting to create high BU, high perceived bitterness styles. |
| 9. is there a special strain of kveik to prepare mead? | I have used Opshaug, Muri, Voss, and Hornindal to create meads, melomels, and braggots with incredible success. I would expect the other major strains to also be capable of fermenting honey incredibly rapidly as well. Nutrient is incredibly critical with the use of honey, however. |
| 10 What the best Plato to prop up Kveik (a starting volume of say 25mL with DME, Dextrose)? What is the best prop temp? | ET: Generally, we have amplified pitches to krausen using 10°P wort. Due to the incredible fermentation speed, these would be fabricated in the morning, and activity would be observed within a couple of hours. At this point, it would be utilized immediately. Prop temp was 80-90 using a commercially available hot water bath. MIP: We propagate these strains at 78F and start them at 1.040 SG |
| 11. And if so, can you elaborate on any findings on those batches? | If this is with regards to 12, our findings with batches krausened using the same kveik showed little to no negative impacts. In all cases, however, the beer was either a fairly neutral pale ale or cream ale. |
| 12. Have you done any fermentation starting an anormal ale yeast temp? Any advantages to this: extend ferm times, decrease esters? | We have fermented as low as 75-78°F, and this has served to suppress ester production, as well as extend fermentation times significantly. Fermentation was still shorter than typical ale strains, but not by a significant margin (2-3 days shorter to terminal). |
| 13. You touched on unknowns regarding biotransformation vs. VOC blowoff. Have you seen any negative sensory effects from dry hopping during fermentation at the high temperatures? | While mostly anecdotal, in the half-dozen or so trials where we began dry hopping the major aroma hops at 95°F, we did not see too deleterious an effect, as long as temperatures were lowered within 24-ish hours after the initial charge (to allow for working through the diacetyl bump). Extended times at 95°F (>2-3 days) began to yield some vegetal flavors or cheesiness according to sensory trials. |
| 14. Also, has anyone seen success re-pitching any Kveik strains, are their some that are better than others? | See above. |
| 15. Thank you both for your presentation. Do you folks know of anyone currently producing large production batches, say >50bbl batches in cylindroconical vessels? | We will be engaging in those trials relatively soon we hope! Currently we have been producing up to 8bbl batches in the standard pencil tanks. |
| 16. Any ideas of adjuncts to produce mouth feel? | The strains we tend to favor (Oslo, Voss, Hornindal) do not appear to manifest diastaticus behavior. These appear to behave just fine in the presence of lactose and dextrin malts. |
| 17. When brewing very high gravity beers >12%, could one expect the same 18-24-hour fermentation time? | We have had very little success in attempting to ferment wort greater than 25°P in one go. We have utilized staged dosing to get to higher ABVs (>12%), starting with 18-20°P and then dosing every 24 hours to reach the desired ABV. While this doesn't achieve the usual 24 hrs. turnaround, it does expedite the process when compared to the same protocol with non-kveik strains. |

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| 18. How do desired aeration levels for Kveik compare and contrast to other yeasts? | Aeration to similar levels to typical ale strains appears to be just fine - it is the combination of enough nutrient and oxygen, and temperature, that yields the impressive results seen. |
| 19. I had hornindal form yeast rafts that floated at the top and cause plugged transfer. | We have yet to experience this. My apologies! |
| 20. what are the potential effects of fermenting under pressure? | We haven't attempted pressurized fermentations but hope to do so as we develop other methods for testing in smaller batches. |
| 21. You mentioned ham and meaty off flavor potential. What are the conditions where these flavors appear? | These aromas/flavors all manifest at low nutrient levels, low aeration levels, and poor temperature control. Nutrient and aeration appear to have the most deleterious effects when not ideal. |
| 22. How many generations can kveik yeast be re-pitched until noticeable aroma/flavor difference? | We have only sistered one or two batches and have yet to go further. In those cases, we saw zero flavor differences. |
| 23. Has anyone used darker malts, is there any off flavors with these malts? | Use of much darker malts, such as Special B and Dark Munich, don't appear to have any ill effects. |
| 24. should you stick with the standard 10x when stepping up prop? | We treat these strains the same as all of our other cultures |
| 25. What is recommended timing for dry hopping a NEIPA? Normally it's done mid fermentation... any data on how the haze/flavor holds? | Haze and flavor appear to hold just fine - or at least as much as any typical NEIPA tends to behave. Dry hopping, however, tends to be a bit accelerated at the initial stages of dry hopping, due to the incredible speed of fermentation, as well as the ability to proceed through the diac bump so rapidly after the first aroma charge. |
| 26. Is there any info on low pH tolerance of the common strains? i.e. in mixed culture ferments | We have seen it works well in mixed cultures and in kettle sours |
| 27. What is recommended timing for dry hopping a NEIPA? Normally it's done mid fermentation... any data | see above |
| 28. Could you comment on any variation in ester production based on varied pitching rates per strain? | As with all yeast, the lower the pitch rate the increase ester production, however, even at a low rate the ester production of these strain is very low. |
| 29. How would you store Kveik after cropping? | These strains flocculate very well, so make sure that you break up the cake to prevent them from holding onto too much CO2. |
| 30. will Kveik ferment well in low pH conditions? Applications for bottle conditioning? | As far as bottle conditioning, we have had little issue with bottle conditioning at temperatures around 68-75, though it does tend to take longer than at 95. |
| 31. I am using Loki from Imperial which is a Voss strain and was instructed that it can be used in the 70s for a cleaner profile and as low as 62 for a suedo lager. Any thoughts on this information? | This may be successful for Imperial's Voss, but we have had always had a clean profile regardless of temperature. There is lower ester production at lower temperature, but temperatures below 75 appear to yield some light sulfur that held on a bit longer than expected (48-50 hrs.). The sulfur was gone by 4-5 days and forced carbonation. |

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| <p>32. If bottle ore putting in a pin or firkin will they be completely carbonated in 18-24 hrs.?</p> | <p>This is pretty dependent on temperature, but our experience with bottle conditioning showed full carbonation in one week at 68-72°F.</p> |
| <p>33. You discussed umami and soy sauce ester generation in the Hornindaal strain, are there conditions that will reduce these esters in favor of more tropical, fruity notes.</p> | <p>This is strain dependent. Use of a strain such as Ebbegarden would obtain the results you're looking for.</p> |