

WE BREW WITH YOU.™

THE OFFICIAL NEWSLETTER
OF ALL THINGS LALLEMAND BREWING



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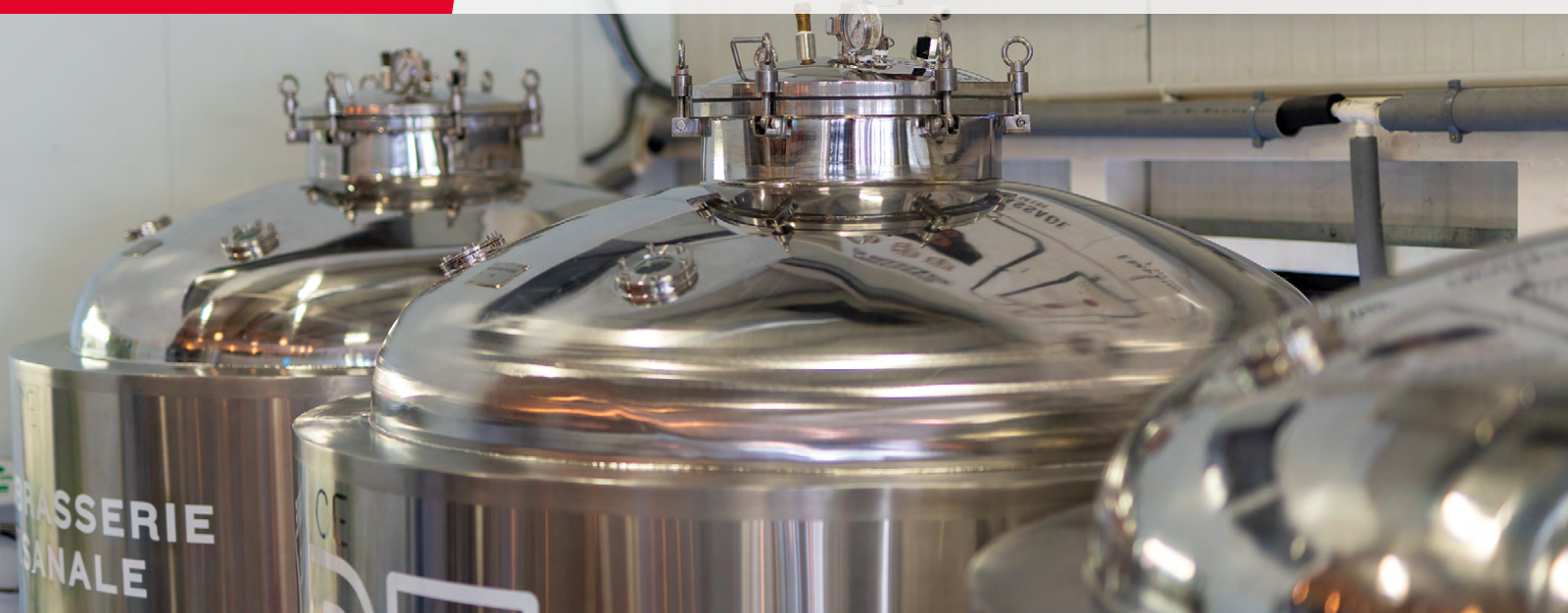
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Join the
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EDITION #15



BE PASSIONATE BE LALLEMAND



Sylvie Van Zandycke, our Sales and Marketing Director and Director of Ethics at Siebel Institute of Technology, has recently been inducted President of the [American Society of Brewing Chemists](https://www.asbcnet.org/Pages/default.aspx)¹ for a 1-year tenure. Founded in 1934, the ASBC is an association that promotes scientific excellence in brewing.

Sylvie has been an active member of the brewing industry and ASBC since 2001. She is also a chapter leader of [Pink Boots](https://www.pinkbootssociety.org/)² Las Vegas, encouraging and supporting women and non-binary individuals through education. We are very proud to have her leading the Sales and Marketing team and are inspired by her commitment to the industry.

#bepassionatebelallemand

As a low-alcohol product champion at Lallemand Brewing, I have followed developments in the non-alcohol beers and low-alcohol beers (NABLAB) sector closely for several years. When viewed on a day-to-day basis, it is hard to appreciate the pace of change in this area. Writing this editorial has allowed me to step back and welcome the many positive changes we have seen.

In the past, NABLAB has been the preserve of the larger breweries, which are able to invest in alcohol removal technologies and equipped with the process control to properly manage arrested fermentation. New technologies in the form of smaller dealcoholization units, and innovative yeast strains, such as the new LalBrew® LoNa™, have simplified the production process. This allows smaller and craft breweries to enter and disrupt the NABLAB market. One of the exciting consequences of this is much greater diversity in the beer styles being produced, with craft producers mirroring the multitude of different beers seen in their higher-alcohol brands.

Breweries are right to invest in this area. The NABLAB segment is growing even in the mature markets of Spain and Germany, and is expanding rapidly in the USA, where market share has historically been tiny. Breweries devoted entirely to the production of non-alcohol beers and low-alcohol beers, such as Athletic Brewing Company (USA), have quickly gained international market share. In contrast, uber-craft outfits like Mash Gang (United Kingdom) have gained a cult following of craft beer aficionados for their many special releases.

In this edition, we explore the critical areas of focus in producing NABLAB and showcase Lallemand's expertise in this style. We ask the questions, what exactly are aldehydes? Should you create an alcohol-free beer at home? And, what exactly is low-alcohol beer anyway? We hope that you find it a thoroughly engaging read!

EDITORIAL

Andrew Paterson

NABLAB Toolkit Champion and
Technical Sales Manager UK/Scandinavia

¹: <https://www.asbcnet.org/Pages/default.aspx>

²: <https://www.pinkbootssociety.org/>



A *SACCHAROMYCES CEREVISIAE* FOR NABLAB PRODUCTION? CHALLENGE ACCEPTED!

By Avi Shayevitz,
R&D Research Scientist

Let's explore the process of producing NABLAB

The production of non-alcohol beers and low-alcohol beers (NABLAB) requires one of two production paths: either producing a full-strength beer (~5.0% ABV) and mechanically removing the ethanol; or through limiting ethanol production by controlling fermentation through biological methods. Both approaches involve complex processes and have pros and cons. Technological implementation often includes techniques such as thin-membrane evaporation, vacuum distillation, or nanopore filtration. Whereas biological control can be achieved through solid-state continuous fermentation, arrested fermentation, or using non-traditional yeast strains that are limited in carbohydrate assimilation. These methods are routinely employed and, as technology advances and our understanding of biological processes improves, producing very low-alcohol beer becomes more efficient.

However, for independent brewers, the challenges remain significant. Capital investment poses a major barrier to entry into the low-alcohol beer sector. Small-to-medium-sized breweries, account for a substantial portion of the US (24-27%) and global (11-12%) beer market and often opt for alternative methods that leverage existing infrastructure or contract facilities. One economically viable approach is the use of non-traditional yeast strains like *Pichia kluyveri*, *Saccharomyces ludwigii*, or *Zygosaccharomyces rouxii*, which can employ pre-existing infrastructure and typically don't require significant changes to existing processes. However, a key challenge arises from cultivating non-domesticated and non-traditional yeast strains. Brewing wort is a complex medium that favors the growth of more domesticated microorganisms, potentially adding to the difficulty of using non-*Saccharomyces* yeasts. Under optimal conditions, wort is best suited for those organisms adapted to its unique nutrient composition and environment.

The story behind LoNa™ development: from the brewery to the lab

The story behind LalBrew® LoNa™ is in the name: a portmanteau of "low/no-alcohol beer", derived from 100% domesticated *Saccharomyces cerevisiae* stock. LoNa™ is a multi-lineage hybrid, bred from both wine and beer yeast lineages and designed to provide many of the benefits of domesticated *S. cerevisiae* metabolism, but with minimal ethanol output. This is mediated by a lack of functional genes necessary for

fermenting polysaccharides – those encoding for external hydrolases and transport proteins normally required for the uptake and metabolism of polysaccharides such as maltose and maltotriose.

LoNa™ was designed to minimize many of the issues associated with common biological controls used in low-alcohol beer production. During the normal production process of brewer's wort, thermal degradation of barley material results in the development of carbonyl compounds through lipid oxidation, Maillard reaction, Strecker degradation, and aldol condensation, which can be associated with off-flavors if not utilized properly. Many of these compounds are significantly diminished or covered during a standard ethanol fermentation, with *S. cerevisiae* having the metabolic pathways capable of processing these substrates. This is a distinct advantage over the previously mentioned non-traditional yeasts, which may end up exacerbating "worty" flavors with the development of unintended secondary metabolites.

The unique functional characteristics of domesticated *S. cerevisiae* remain preserved in LoNa™, providing a more consistent and reliable method of control over a fermentation. This results in predictable behavior that does not require special infrastructure or equipment.

Testing LoNa™ in real conditions: from the lab to the field

As with previous product launches, prior to the release of LoNa™, Lallemand worked with breweries around the world to see how the product might behave in a true production environment. This is a necessary step as development work done in the laboratory does not always translate well into the real world. Breweries selected for trials fulfilled specific criteria agreed by Lallemand in advance of the trial taking place. Key was the intention to produce, or already be producing a non-alcohol beers and low-alcohol beers, but also to have the ability to pasteurize. NABLAB beers are uniquely vulnerable to spoilage, and brewers already possessing the experience and knowledge of producing them were sought out to receive trial product from the first batch.

To learn more about LalBrew® LoNa™: www.lallemandbrewing.com/lonna

WHAT'S UP WITH THE WORTY FLAVOR IN NABLAB?

By Molly Browning,
Technical Support Manager

One of the most noticeable issues with non-alcohol beers and low-alcohol beers (NABLAB) is that flavor often does not match or compare with traditional beer flavors. The primary reason for these substantive flavor differences is the production process of these beverages. NABLAB can be made through physical or biological methods, with the latter relying upon maltose or maltotriose negative yeasts.

There are advantages and disadvantages to each method of production (discussed in our extensive [NABLAB Best Practice](#)¹), but as our expertise is in yeast, we are going to focus on the biological methods and why NABLAB beverages often taste sweet or warty.

Fermentation considerations when producing NABLAB

As the goal of NABLAB production is to produce a beverage with a lower alcohol concentration than a traditional beer, it comes as no surprise that the brewing and fermentation processes are approached from a different perspective. To begin with, the starting gravity for NABLAB beverages is usually quite low (around 6 degrees Plato) and the mashing temperature is quite high (to ensure there is little glucose formation). Carrying onto to fermentation, using a yeast that does not ferment maltose or maltotriose (a maltose-negative and maltotriose-negative yeast) and the low concentration of fermentable sugars translates into a shorter fermentation time (3-4 days) than usually seen in traditional beer fermentation.

A shorter fermentation time (or limited fermentation) has consequences for flavor active compounds, often resulting in these compounds not being fully metabolized, thus

creating impactful flavor differences compared to a traditional strength beer.

Let's talk about aldehydes

One of the most common sensory descriptions of NABLAB products is that they taste "sweet" or "warty". These flavors are typically attributed to the presence of flavor-active aldehydes that are formed during the malting process and the mashing and boiling stages of wort production. Aldehydes are formed by different pathways including enzymatic oxidation of fatty acids, Maillard reactions, Strecker degradation, and degradation of bitter acids.² The most prevalent aldehydes are:

- **3-methyl butanal** – tastes of malty, chocolaty, cherry, almond
- **2-methylbutanal** – tastes of almond, apple-like, malty
- **methional** – tastes of cooked potatoes, warty

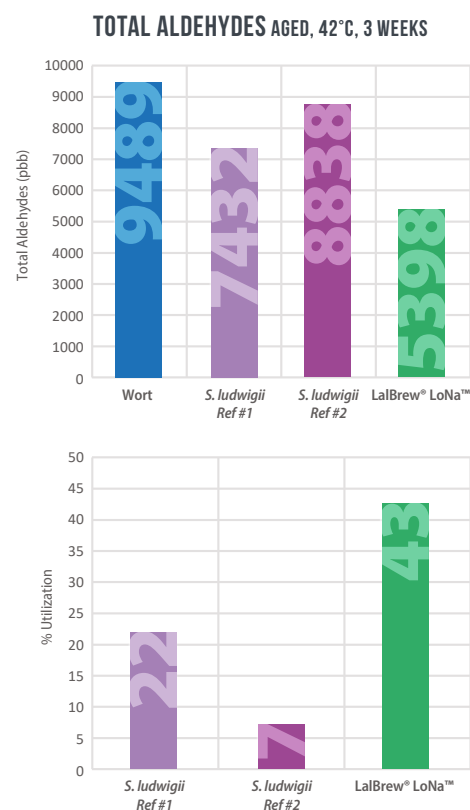
Ordinarily, these aldehydes are reduced to their primary alcohols through yeast metabolism that occurs during a standard fermentation. However, in a limited or arrested fermentation, aldehydes are not reduced as efficiently, thus creating more of these wort or sweet flavors.

How to choose your brewing strain for NABLAB

Because of these production constraints, yeast strain selection becomes an important tool for brewers to consider. This is especially true as different maltose-negative yeast strains have varying degrees of aldehyde utilization, as seen in Figures 1 and 2. In general, *Saccharomyces cerevisiae* strains are able to metabolize these aldehydes to a larger extent than other maltose negative yeast strains (*S. ludwigii* for example).

The result of this metabolism is a reduction of aldehydes, which translates to a fresher and cleaner tasting NABLAB beverage that is closer to a traditional beer with significantly improved sensory characteristics.

Fig. 1 & 2



Aldehyde utilization in NABLAB fermentation illustrates one of the many ways in which these beverages differ from full strength beer fermentations. For brewers embarking upon their non-alcohol beers and low-alcohol beers production journey, understanding these flavor and production differences will help them make better tasting NABLAB for all to enjoy.

¹: See additional resources on page 6

²: Gernat, D.C., Brouwer, E., Ottens, M.; Aldehydes as Wort Off-Flavours in Alcohol-Free Beers – Origin and Control. Food and Bioprocess Technology (2020) 13:195–216.

SHOULD NABLAB BE SENSORY TESTED DIFFERENTLY?

By Keith Lemcke,
Marketing Director of Siebel Institute of Technology

There was a time just a few decades ago when the range of characteristics found in beer was quite narrow, regardless of the brand you drank. Then came the craft beer revolution, which broadened the scope of flavors and aromas found in an ever-widening selection of ales, lagers, and specialty beers. Over the last decade, consumers have been spoiled by the vast range of choices in beer and alcoholic beverages, and now we are seeing a new wave of beers brewed and processed to present no, or low, alcohol. This new generation of non-alcohol beers and low-alcohol beers (NABLAB) can be challenging to brew and, as with alcohol-containing beer, they need skilled sensory analysis throughout their production to assure consistently high-quality results.

Why is NABLAB sensory different from alcoholic beer sensory?

Many consumers expect that NABLAB will have similar or identical characteristics to their alcohol-bearing counterparts, yet achieving such a feat is quite a challenge for even the most talented brewer. If the brewer seeks to limit the production of alcohol in the first place through brewing ingredients, techniques, and/or fermentation-related practices, the resulting beer can have “worty” aromas characterized as aldehydes with “grainy” being a commonly perceived aroma as well.

Typically, fermentation of conventional beer results in the robust reduction of compounds like diacetyl and H_2S , something that can be of concern to a brewer that chooses to limit fermentation as these off-flavors may not be eliminated during the process. A big issue during the production of NABLAB is getting an ester profile that consumers associate with high-quality beer. Esters may be suppressed or modified due to controlled fermentation of NABLAB beers. In the practice of removing alcohol from beer with some ethanol content, a wide range of esters may also be removed resulting in a less flavorful and aromatic beer.

Key factors for operating a NABLAB sensory panel

A lot of experimentation with different recipes and processes is needed to find a method of NABLAB production that will yield the best result. While those involved in taste panels used in developing NABLAB beers need to have sensory training in the same wide range of compounds as with alcoholic beers, some special emphasis should be placed on

learning characteristics common to NABLAB products. Firstly, smell and taste wort! Raw, full-strength wort can be used but diluting it in water can yield a result closer to what remains in an incomplete NABLAB fermentation.

Overt sweetness can be common in NABLABs, usually coupled with worty compounds, so tasters should be especially observant of the sweet/dry/bitter balance of beers that exhibit overt worty characteristics. It is common for breweries to acidify these beers to drop the pH in an effort to make them more microbiologically stable. This can make achieving balance more of a challenge as sweetness/dryness, bitterness from hops, and acidity are now factors in taste and in mouthfeel.

Sensory training in a full range of esters is important as the lack of esters can be notable in NABLAB beers. Practically any brewing method that results in a non- or low-alcohol beer will result in ester profiles that are different than what consumers expect from traditional beer, so tasters need to know the characteristics of major brewing-related esters to assess their contributions to these beverages.

Lastly, it is important to not only spot all these characteristics as individual contributors to beer character but also to know how they work together to form the finished products. Consumers don't generally take apart their beverage characteristics but rather consider them within the matrix of the finished products. Taste panelists should take the time to go through an entire can or bottle of each brand to see how the beer characteristics change as the product warms up. After all, it's what the customer perceives that is most important. Understanding the house flavor of what is expected for the product is key for establishing a sensory baseline. This is true for all products within a sensory program. The rest of the sensory analysis can be to ensure you are hitting the set targets.

Visit our Sensory Corner
on Siebel Institute website



<https://shop.siebelinstitute.com/Sensory-Corner>



THROWBACK TO OUR FIRST EUROPEAN DISTRIBUTOR OPEN DAYS IN LISBON

By Natalie Anderson, Event Manager

Lallemand Brewing recently organized its inaugural Distributor's Open Days in Lisbon, Portugal. More than 30 European distributors were invited to join the event, which took place from June 26-28, 2023.

“Our team has been supporting breweries, alongside our distributors, through the We Brew With You™ approach with great success. This time, we decided to go one step further by inviting regional distributors to this innovative event. Our goal was to show them what we do within Lallemand in depth: from production and quality aspects to the latest R&D projects and our marketing resources. Creating a closer human relationship with our partners is fundamental to achieving our goals together, as their success is also our success.”

Joan Montasell, Regional Sales Manager, Europe

The attendees had the opportunity to participate in technical meetings to gain a deeper understanding of Lallemand and its brewing products. Additionally, they enjoyed visiting the Setubal yeast production plant and engaged in various enjoyable activities throughout their stay in Lisbon.

The Lallemand team gathered several beers for tasting from different European breweries, trying different LalBrew® yeast strains. Thanks to

Acme Craft Brewery (Italy), Gloucester Brewery (UK), Cobolis (Czechia), iFBM (France), Purtse (Estonia) and La Virgen (Spain).

This tasting was also an opportunity to taste beers made with our newest yeast LalBrew® LoNa™ for non-alcohol beers and low-alcohol beers (NABLAB) production.

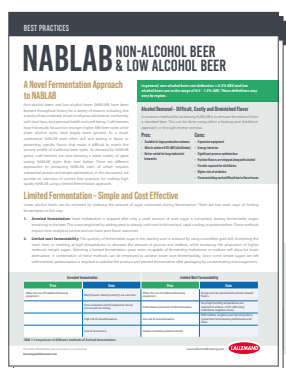
The participants tried La Virgen Sin Tostada (Madrid, Spain). This copper-colored brew boasts rich bread and caramel flavors, using only the finest ingredients and incorporating the innovative LalBrew® LoNa™ yeast. With its unfiltered character, La Virgen Sin Tostada offers a distinct and satisfying drinking experience for beer enthusiasts.

Our goal is to replicate this event in various locations worldwide to continue building strong relationships with our distributors and gain a better understanding of their needs.



Focus: additional resources

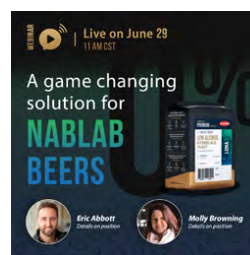
LOOKING FOR MORE NABLAB RESOURCES?



Check out our new Best Practice guide: NABLAB Solutions

This comprehensive document compares NABLAB production methods, explores pros and cons, and discusses the science behind the reduction of aldehydes, compares yeast strains, discusses fermentability and flavor control and provides food safety resources for anyone looking to commercially produce a no-alcohol beer and low-alcohol beer (NABLAB).

<https://www.lallemandbrewing.com/wp-content/uploads/2023/06/NABLAB-BP-ENG-Digital-LalBrew.pdf>



Lallemand Brewing presents "A game-changing solution for NABLAB" in our latest webinar

In the webinar "Introducing LalBrew® LoNa™: A game-changing solution for NABLAB", Eric Abbott and Molly Browning, Technical Support Managers for Lallemand Brewing, dove into the world of maltose-negative yeast strains and their transformative impact on the brewing industry. With 175 attendees present, the webinar addressed the growing demand for alternative methods of producing NABLAB.

On October 3rd, we will also host a webinar where experienced brewers share their insights and feedback on using LalBrew® LoNa™ yeast in various beer styles.

Follow the link to signup:

<https://www.crowdcast.io/c/brewing-nablab-with-lalbrewlona>

A HEARTFELT LETTER TO HOMEBREWERS FROM NABLAB

By Eric Abbott,
Technical Support Manager

It's not you, it's me

Dear Homebrewers,

It's me, NABLAB. We need to talk. First of all, let me say that you are great. For years you have been making excellent beer and pushing style boundaries. Your creativity and innovation were driving forces in the High Gravity and Extreme Beer revolution of the earlier 2000's. And your pioneering spirit helped grow the popularity of sour and wild fermented beers.

Now that High Gravity beers are declining in popularity in favor of more sessionable, low ABV styles, I have noticed you taking a greater interest in me (NABLAB). While I am flattered by your interest, I think that we should take things slow. Let's take the time to get to know each other well before you brew your first low ABV beers.

It's not you, it's me. Like I said, you are very skilled at making a huge range of beer styles. But NABLAB is not like anything you have brewed before. Without the proper precautions, the low ABV levels can increase the risk of growth of spoilage microbes, some of which could be pathogenic. For food safety reasons, it's essential that you take the proper precautions.

So what can you do? First of all, stick to using maltotriose-negative yeast to achieve lower attenuation. Maltotriose-negative yeast achieves around 65-72% attenuation in a typical beer wort. Mashing at higher temperatures will reduce the attenuation even further. By also reducing your original gravity, a maltotriose-negative strain will be able to get you in the range of 1-3% ABV. Avoid maltose-negative strains for homebrew, since these strains require pasteurization in order to stabilize the beer and prevent fermentation of the remaining maltose. Nobody likes gushers or exploding bottles.

Second, control your pH through the process. The shorter fermentations of low gravity NABLAB won't drop the pH enough to prevent the growth of spoilage and pathogenic microbes like they do with regular beers. Make sure the pH is lower than 4.6 at the start of fermentation and around 4.0 in the finished beer. You don't want to make anyone sick.

Third, and most simple, keep the beer cold after packaging. Not only will this reduce the risk of spoilage, you will also have fresh beer available at all times without having to throw a few bottles in the freezer at the last moment. If using kegs, keep the dispensing lines cold, too. It should be noted, that most of the world's largest producers of NABLAB beers are taking a cautious approach to not serve in draft at this time, until more is known about the potential of supporting pathogens in draft systems.

I am challenging to brew for commercial and homebrewers alike. With a proper understanding and management of the challenges and risks, homebrewers can love and enjoy brewing styles like me. If you need support, Lallemand Brewing is there to help you out.

For homebrewers able to manage the risks of brewing low alcohol styles, cheers to you! For everyone else, keep up the good work brewing more traditional styles. I'm glad we had this chat.

Sessionably yours,

NABLAB

UNRAVELING MASH GANG'S JOURNEY INTO LOW-ALCOHOL BEER

Meet Jordan Childs, the co-founder of Mash Gang, a pioneering low-alcohol brewery making waves in the beer industry. In this interview, Lallemand UK's Andrew Paterson explores Jordan's path into the world of low-alcohol beer, the challenges faced during a pandemic launch, and the ethos that makes Mash Gang stand out.

How did you get into low-alcohol beer?

I used to run a tattoo business, but Covid forced its closure. During that time, I started experimenting with homebrewing and making non-alcoholic beers. Eventually, I teamed up with James and others to create our own low-alcohol brewery. We chose to focus on New England IPA and worked with various breweries to produce our beers.

How has the journey been since you started Mash Gang in 2020?

It has been challenging, especially launching during a global pandemic with supply chain issues and financial difficulties. However, we have grown more confident in running the business and have chosen to prioritize the quality of our beers over traditional marketing.

Is the low-alcohol beer market growing?

Yes, the market is growing, but it's not necessarily eating away at the regular beer market. It seems to be appealing to people who want to drink more beer but can't due to work or lifestyle reasons.

What is your company ethos?

We focus on creating experiential beers rather than just utilitarian ones. We aim to balance flavors and offer unique experiences to our customers.

What is key to making a good low-alcohol beer?

For us, it's all about finding a balance and creating an enjoyable experience, even with extreme styles. Each beer should have a certain level of drinkability, depending on its style.

Do you read Untappd reviews?

I used to, but I realized it can be toxic and affect the mental health of brewers. Now, I see it more as a diary of others' drinking experiences and try to enjoy it without taking it too seriously.

Where do you see growth in the low-alcohol beer industry?

The USA, the UK, and France are experiencing significant growth. I'm optimistic about the future of the beer industry in the UK, especially as we unlock the potential of native hops and grains.

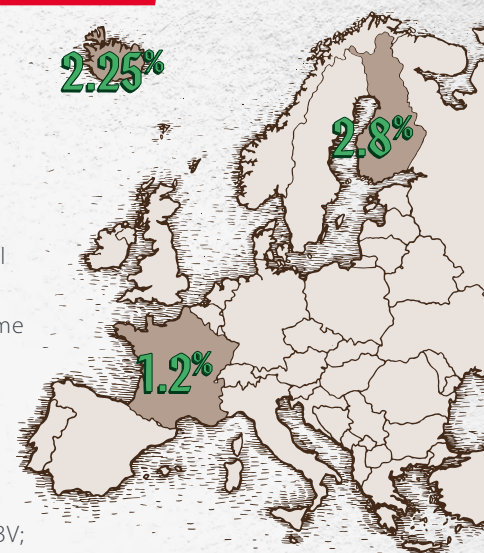
Jordan Childs is the founder and CPO of Mash Gang and oversees production for Impossibrew. He is a multiple award-winning beverage specialist and brewed more than 100 beers at 0.5% or below.

DID YOU KNOW...

The definition of non-alcohol beer and low-alcohol beer varies across the globe.

For instance, in Finland and Iceland, non-alcohol beer is considered beer with an alcohol by volume (ABV) level below 2.8% and 2.25% respectively.

Most of the world typically defines non-alcohol beer as having less than 0.5% ABV; however, France joins Finland as one of the EU countries with a higher ABV percentage granted for these beverages, defining beer as non-alcohol from 1.2% ABV and below.¹ These variances highlight the importance of reading labels as one explores the non and low-alcohol beverage landscape.



¹: Okaru, A.O.; Lachenmeier, D.W. Defining No and Low (NoLo) Alcohol Products. *Nutrients* 2022, 14, 3873. <https://doi.org/10.3390/nu14183873>