SOMETHING FOR EVERYONE

Brewing alcohol-free beers for the taste

A steady increase in sales volume of alcohol-free beer has remained unbroken for years. Why? In many cases, there seems to be a reaction to lower alcohol limit tolerances on the road. In addition, today's consumer is more conscious about diet in general, and alcohol consumption is certainly a factor when calorie reduction is a goal. Could it be that alcohol-free beer simply tastes good?

Though it might sound somewhat "heretical," even brewers who have an aversion to alcohol-free beer are beginning to see the light, especially now that it has become easier to produce this type of brew. The fact that it is selling so well is, of course, a big factor. Brewers may need to focus less on producing an alcohol-free beer that tastes just like its traditional „cousin" and turn their attention to making a brew for consumers who generally shun beer.

The brewer's perspective vs. the consumer's

Flavor attainment in alcohol-free beer production traditionally relies on masking the wort, whether in stopped fermentation or other procedures. For the brewer, this is an undesirable flavor that demonstrates insufficient fermentation. For many consumers, however, this is a thoroughly enjoyable and even preferred taste sensation! In beer deprived of alcohol after fermentation, traditional brewing circles often use attributes such as "watery," "lack of fullness" or "empty." This may well be the right description when compared with fully fermented beers. However, consumers often view alcohol-free beers as being "light and refreshing," "not so sweet" or "thirst-quenching."

When considering the idea of producing an alcohol-free beer in the brewery on a regular basis, the brewer should first consider the demands of the target audience. It's no coincidence that large breweries don't target their traditional customers when presenting alcohol-free beer brands, but focus on new audiences, such as athletes. Even at major sporting events, athletes can be observed quenching their considerable thirst with half a liter of alcohol-free beer. Even though the word "beer" is on the label and other promotional material, it has now become more of a "drink."

Alternative methods for removing alcohol

Based on these preliminary considerations, it will be noted that even smaller and medium-sized breweries can produce alcohol-free beer without major problems, and can easily develop and master a modified brewing process for this purpose. For smaller and medium-sized breweries, dealcoholization units are often too expensive, simply because the necessary investment outpaces expected sales. For this reason processes which aim at interrupting the fermentation ("stopped fermenter"), cold contact processes or the use of special yeasts is preferred. These will be explained below. Procedures for removing alcohol after full fermentation is not addressed here because it's simply not a practical alternative for the smaller brewery.

The following processes are generally applicable in small and medium-sized operations:

Stopping fermentation

Here, yeast is added to the wort of about 7 to 8° P, and before reaching the 0.5 %vol. mark, the yeast is inactivated (for example using a flash pasteurizer) or removed (for example by filtration). This means there's a limited time window for bottling. There are many different variants with regard to fermentation parameters. For example, some plants cool the wort to near 0° C before releasing the yeast, which gains them some time before having to repeat the process. Other brewers will start at their normal pitch temperatures, but will then have to repeat the yeast separation procedure much sooner.

Cold contact

Yeast is introduced into the wort at about 7 to 8° P and within a range between 0 and 2° C. The green beer is then permanently circulated to create constant contact between the two. Due to the low temperature, the yeast shows very limited activity, yet wort carbonyls are significantly reduced due to

intensified contact with the surface of the yeast cells. Subsequently, separation or inactivation of the yeast is necessary.

Using specialty yeasts

Some yeast strains can either not or just barely utilize the main wort sugars, such as maltose and maltotriose. When using these yeasts, a wort in the range of about 8° P is prepared and then fermented. Since the special yeasts can only ingest the classic sugar precursors, an alcohol content of less than 0.5 %vol. results. It is important to influence sugar composition at the mashing process, and, at the same time, adjust fermentation temperatures significantly. It should also be noted that if specialty yeasts are used, the brewery should have its own yeast propagation to reclaim these yeasts for each brew. Due to reduced fermentation activity, yeast growth is minimized, which means that almost no yeast can be harvested. This method has a further disadvantage: Sudden pH reduction no longer occurs, which may favor the growth of wort bacteria, meaning that biological acidification may become necessary. In terms of taste, this process differs a little from the other processes mentioned, since the typical wort flavor is much less apparent.

Utilizing immobilized yeast

Strictly speaking, the use of immobilized yeast is a special form of the cold contact method. The disadvantage is that additional technical support will become necessary. Yeasts are immobilized on a suitable carrier material (usually glass) and strongly cooled wort is then passed over this immobilized yeast. As a result of the low temperatures, there is hardly any fermentation activity, and immobilization means that there is considerably more cell mass than with the cold contact procedure. However, the reactive surfaces on which the immobilized cells have been fixed must first be inserted and then made continuously available over longer periods of time. However, this requires that the wort be continuously available. Since this is usually only possible in larger breweries, this procedure becomes impractical for small and medium-sized operations. It is only mentioned here for the sake of completeness.

Caution is advised!

In all processes mentioned here, alcohol-free beer retains significant amounts of fermentable sugars when bottled. Accordingly, the beers are susceptible to yeasts, especially those flying around inside the brewery. Therefore, pasteurization after bottling is indispensable. Flash pasteurization alone is insufficient, since the risk of recontamination with yeasts during filling is high. Usually, chamber pasteurizers are used in small and medium-sized operations.

CO_2 content of the beer is also a factor. By stopping the fermentation, the commonly accepted CO_2 content of about 5 g/l in the finished brew is no longer assured. Accordingly, it is usually necessary to carbonize at this stage. When using specialty yeasts, you could still achieve a value closer to the desired CO_2 content, but higher fermentation temperatures used in this process make it essential to use a tank rated to at least 3 bar.

Nevertheless, an additional carbonation unit is recommended for all breweries that choose one of the above methods. If German or Bavarian purity requirements apply to the batch, care must be taken that the carbon dioxide used is fermented carbon dioxide.

With regard to microbiological quality control, any brewery producing alcohol-free beer according to the procedures described above must be aware of the inherent challenges. Due to the lack of alcohol, one of the protective factors against beer-spoiling bacteria is missing; and the presence of fermentable sugars remaining in the beer means they remain extremely susceptible to yeast contamination.

Despite these difficulties, in-house production of alcohol-free beers offers a wealth of opportunities to secure or increase output, while meeting the demands of new consumers. □

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