

Pre-Filtration for Detection of Spoilage Microorganisms in Yeast Slurry and Unfiltered Beer with Non-flocculant Yeast

Wachusett Brewing Company produces dozens of different beers over the course of a month. These range in a multitude of styles, aromas and mouthfeels with their signature beer being the Blueberry Ale, a refreshing wheat ale. With such a wide selection, detection of spoilage microorganism contamination is essential.

Checking for spoilage microorganism contamination in yeast slurry and unfiltered beer with non-flocculant yeast, are two steps along the brewing workflow where detection becomes critical. As such, these samples are extremely thick due to high yeast concentrations, detection of bacteria by sterile membrane filtration was impossible. Only 0.1 μL of Yeast Slurry diluted in 0.1 mL was directly plated on WLD agar media, and the unfiltered beer with non-flocculant yeast was not tested.

Therefore, Wachusett was looking to increase detection and sensitivity is critical to assure there are no spoilage microorganisms lurking around.



Before

- Only 0.1 mL of diluted Yeast Slurry was tested and plated directly on WLD agar
- Detection and sensitivity was low due to volume tested
- Operations at risk from undetected microbiological contamination at key points in brewing process



After

- Possibility to do filtration for all critical steps in the brewing process
- Able to test 2 mL of Yeast Slurry diluted in 100 mL sterile water and unfiltered beer with non-flocculant yeast
- 2,000% increase in sensitivity (and detection potential) over current method

Case Profile

Since 1994, Wachusett has grown to be one of New England's largest craft breweries: expanding capacity to approximately 90K barrels annually to include contract volume. A robust quality program and early detection of potential spoilage microorganisms has been essential to protecting the reputation of the brand, and winning the confidence of contract clients.

Company Type:

Food & Beverage/Brewery

Related Application:

- Pre-filter device
- Microsart[®] Manifold
- Biosart[®] 250mL funnel, Stainless Steel funnel 250mL,
- 0.45 μm White with black gridded CN membrane (sterile)
- 8 μm with CN membrane (sterile)
- Forceps
- Microsart[®] e.jet pump
- Pipettes & Pipette tips

Related Application:

- Spoilage Microorganism Testing

Challenges of Case Study

- Both the yeast slurry and the unfiltered beer are very thick due to high concentrations of yeast, therefore filtration is not possible. A “cake” forms on the top of the filter fairly quickly, preventing further filtration and obscuring the growth of any bacterial colonies.
- Current method for the yeast slurry is to only sample 0.1 µl diluted in 0.1 mL of sterile water onto WLD media for spoilage detection. Greater sample sizes overload the culture media with yeast, and interfere with the detection of spoilage bacteria. The current sample size is not sensitive enough and could lead to a false negative test. The unfiltered beer with non-flocculant yeast is not normally tested due to extremely high levels of yeast in sample.

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Provided Solution

- Using the Pre-Filter Device by Sartorius Corporation and a range of different pore sizes of Cellulose Nitrate membranes (0.65 µm, 0.8 µm, 1.2 µm, 3 µm and 8 µm) for pre-filtration, approximately 100 mL of undiluted, unfiltered beer from fermentation was successfully filtered. Also, up to 2 mL of diluted yeast slurry was successfully filtered. The best success was the 8 µm pre-filter to separate yeast cells from the sample with a combination of the 0.45 µm filter to retain bacterial cells of interest, which can then be plated onto WLD agar media. The 8 µm pre-filter is discarded.
- This is a 2,000% increase in sensitivity over current method which will allow for more confidence in the low risk of spoilage microorganisms present.



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