



TOPIC: QUALITY

WANT YOUR BREWERY TO DELIVER CONSISTENT QUALITY? HERE ARE FIVE ESSENTIALS FOR CRAFT BREWERS

It's packaging day. The canning line is powered up. The team is busy monitoring the flow and packing out cases of a beer that has been nearly three weeks in the making.

One problem: No one has yet tasted the new IPA that's due to be sold in the taproom later that day and released for small-scale distribution in the area. There is no guarantee the packaged beer is ready for customers to drink.

It's a scenario that plays out more often than many would think in today's beer industry. Increased competition, changing consumer demands and streamlined staffs push many breweries to bring beers to market without a system in place to help deliver consistent, high-quality products.

It doesn't have to be that way. With training, targeted investments and time-tested techniques, breweries can implement a quality control program that covers all of the basics. Five core QC components that are essential to producing good beer consistently are laid out below.

1. Good Manufacturing Practices (GMPs)

GMPs combine the best practices of risk management, training, traceability and facilities care. Though GMPs can vary from brewery to brewery, these practices serve as the foundation for producing good beer and creating a safe and clean workspace.

For example, typical brewery GMPs cover the steps needed to meet all government regulations, such as food handling and equipment safety practices. GMPs should also include proper health and sanitation requirements for the brewery team as well as cleaning and upkeep for equipment and tools, such as written CIP (clean in place) procedures for each piece of equipment in the brewery. Other GMPs should cover the use and storage of chemicals, product date coding and proper pest control.

"There are so many different aspects to running a brewery," said Corbett, a senior quality specialist with First Key Consulting, who previously served as a microbiologist with Labatt and set up a QC program at Mill St. Brewery in Ontario, Canada. "Even small locations can have multiple team members performing similar routines. It's important to have everyone following the same proper steps – as well as ongoing internal auditing of those steps – to ensure rigor around these processes. That drives consistency."

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GMPs come into play even before opening a brewery as everyone should follow appropriate design and construction protocols. One example is the avoidance of porous or fibrous material such as exposed drywall, wood, and fabric in wash-down areas where cleanliness and bacteria are a concern.

2. Yeast cell counts and viability testing

Yeast, typically the only living organism in beer, requires careful usage and monitoring.

When yeast is underpitched, fermentations can slow or not come to a complete finish. This can also lead to diacetyl in the finished product, leaving off-flavors akin to butterscotch or buttered popcorn. Overpitching simply wastes valuable yeast and can lead to other issues.

Stressed yeast, which results from low cell counts or inadequate yeast storage practices, can result in undesirable characteristics, such as beer with meaty, green apple or rotten egg flavors. To guard against stressed yeast, each brewery should perform yeast cell counts and viability testing.

Testing the yeast regularly requires widely available lab equipment, including a microscope and a hemocytometer. The full cell count procedure can be found on the websites of many yeast providers and through other industry sources. Many brewers consider themselves to be “yeast farmers”, working to maintain the health of the most important biological factor in fermentation and a key contributor to beer flavour and consistency.

3. Simple microbiological testing

Though brewer's yeast is a critical biological ingredient in the cellar, other microorganisms are generally not desirable. Bacteria, such as *Lactobacillus* and *Pediococcus*, and wild yeast, including *Brettanomyces*, can easily contaminate the brewing environment. These organisms, which can be found on people, in ingredients, in the air or on improperly cleaned equipment, can lead to spoiled batches, unsavory off flavors, unwanted haze and excessive carbonation. Often times, the impact is only discovered by unsatisfied customers after the product has been packaged, distributed and sold.

Those breweries that rigorously follow brewhouse sanitation GMPs can help prevent beer spoilage caused by unwanted microbes. Their presence, though, can only be determined through proper testing.

It is recommended to use HLP tubes (Hsu's *Lactobacillus-Pediococcus*) to test for those beer-spoilage bacteria in the finished product. Brewers can also use outside labs for testing or send samples to another brewery with the required capabilities.

These are not very expensive or time-consuming practices, particularly when factoring in potential revenue lost from a spoiled batch or the reputational risk created by a product recall. When possible, microbiological testing should also occur upstream to help prevent potential issues. For many breweries, this could be as low-tech as a “wort stability test”.

4. Oxidation prevention

People need oxygen; beer does not. Oxidized beer creates a papery or cardboard taste and masks the brewer's intended aromas and flavors. Just 150 parts per billion (ppb) of dissolved oxygen (DO) in a finished package can reduce the shelf life of a beer to only a few weeks with warm storage. It's important to measure DO immediately after filling a brite tank as the longer you wait before measuring, the lower the value will appear to be. Oxidation can occur several ways, but the most common are improperly purged brite tanks, aerated water, poor equipment operation and maintenance and improper packaging.

Breweries that consistently follow standard maintenance and packaging GMPs will generally avoid oxidized beer, but here are a few specific practices to keep in mind:

- **Cleaning and maintenance.** Improperly cleaned or maintained pumps, valves and gaskets can lead to air ingress in equipment containing beer that is being transferred, packaged, or about to be packaged. Hoses are another frequent source of oxygen as empty sections can be full of atmospheric air.
- **Package properly.** Ensure beer is being filled and capped properly to avoid capturing air in the packaged product. For example, cans should be filled until a mushroom cap of foam rises just above the rim before the lid is set in place and seamed. Low-filled cans and bottles will undoubtedly contain higher oxygen levels.
- **Measure DO and TPO.** Many brewers use tools such as the Anton Paar CBoxQC or the Haffman's Portable Optical CO₂/O₂/TPO Meter c-DGM to measure DO and total packaged oxygen (TPO) during each run. When the measured values run above target levels, steps such as adjusting fill levels or seamer settings can be taken to avoid oxidized beer.

A device to measure DO can be a huge benefit in troubleshooting your processes by taking measurements upstream and downstream of a potential oxygen ingress point. "These tools can go a long way in giving breweries resolution about areas that may require further investigation like seals, pumps, and even large pieces of equipment like a centrifuge or blending station," says Nick Posloski, a technical brewing advisor with First Key Consulting.

5. Bright beer sensory analysis

The scenario painted at the beginning of this story – where beer was packaged without being tasted – simply doesn't happen at breweries that have instituted a disciplined sensory analysis program.

This is your most important quality check. Does the beer taste the way you want it to taste? Is it ready for your customers to purchase?

Sensory analysis programs can be simple and fun. The key is to have select members of your staff (including non-brewers) identified and trained to pick up off-flavors and understand the proper characteristics of key beer styles.

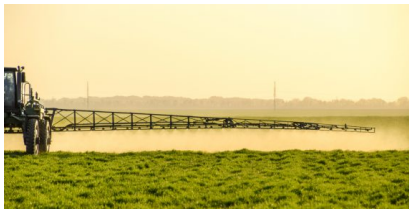
This group, known as a sensory panel, should taste beer from the brite tank one to two days before it is scheduled to be packaged. The packaging and quality teams should also make a practice of setting aside cans or bottles from select packaging runs to taste at a later date. This will provide the team with a good sense of each style's shelf life and offer insights on how flavor profiles change over time. You may even find that some of your most reliable tasters spend very little time on the production floor, but instead have a lower taste threshold for some off flavors than your most seasoned brewer.

Rigor and discipline

Using a targeted, data-driven approach to quality assurance, breweries can save a lot of time and money and ultimately avoid potential issues for future batches.

Leaders and team members must follow each of the five programs with rigor and with a continuous improvement mindset for the QC program to be as effective as possible.

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