



Redefining *Pediococcus* and *Lactobacillus* Detection

**Sample to Result in Under 3 Hours –
Empowering a Preventive Approach To Quality at Your Brewery**



ACTUAL SIZE SHOWN

THE CHALLENGE

Lack of a Detection Tool Combining Specificity and Speed

You take every precaution to maintain the quality of your brews – and test as you go to ensure your standards are met. One major challenge is the lack of immediate, accurate and actionable test information throughout the brewing process.

Traditional testing methods are dated, and limited by wait times and the inconclusive results of plating, or the expense and complexity of conventional molecular technologies. These limitations make it impossible to address spoilage organisms in real-time – and can result in facility contamination, production inefficiencies and holds, or shipping beer at risk.

THE TECHNOLOGY

Proven Platform Delivers Speed, Accuracy, and Sensitivity

brewPAL is powered by Veriflow – a game-changing platform technology that combines proven diagnostic principles for microbial detection and innovative, first-in-class scientific approaches.

Veriflow technology offers unparalleled performance combined with ease-of-use and is utilized for rapid detection of microbes in various sample types. The technology is AOAC International Certified for foodborne pathogen detection and has been widely adopted by food manufacturers, global 3rd party testing labs, and more recently, by premium wineries.

brewPAL was developed specifically for the brewing industry and has been validated and implemented by a variety of award winning, quality-centric breweries across the United States.

Veriflow DNA Signature Capturing Technology	
DNA Amplification	Proprietary reagents eliminate need for sample purification
DNA Identification	Proprietary DNA signature detection specifically targeting beer spoilers
Visualization of Results	Proprietary vertical flow mediated visualization of results for easy interpretation
Sample Preparation	No enrichment or purification steps required

brewPAL Performance Specifications	
Sensitivity (LOD)	10 cells/ml
Time to Results	< 3 hours
Matrix Compatibility	Beer, yeast slurry, colony PCR, environmental
Assay Configuration	Qualitative and quantitative
Target Selection	<i>Pediococcus</i> and <i>Lactobacillus</i> -specific hops resistance genes <i>horA</i> and <i>horC</i>
Specificity	<i>Pediococcus</i> Species: <i>P. damnosus</i> , <i>P. inopinatus</i> , <i>P. parvulus</i> , <i>P. pentosaceus</i> , <i>P. acidilactici</i> , <i>P. clausenii</i> <i>Lactobacillus</i> Species: <i>L. buchneri</i> , <i>L. brevis</i> , <i>L. rhamnosus</i> , <i>L. jensenii</i> , <i>L. backii</i> , <i>L. paracollinoides</i> , <i>L. lindneri</i> , <i>L. delbrueckii</i> , <i>L. fructivorans</i>

Product and Your Brand



THE SYSTEM

Simple and Cost Efficient Deployment at the Brewery

The system is comprised of a small, customized thermocycler, pre-aliquoted PCR reagent tubes, and proprietary buffers. Semi-quantitative results are obtained in less than 3 hours via hand-held disposable cassettes, and quantitative results can be tracked, stored, and exported via the Veriflow Reader.



brewPAL is ideally suited for both high volume and craft brewers – with a modest capital investment and affordable per-test cost. Sample collection and prep is simple, and can be completed by brewery staff with minimal training.

THE BENEFITS

Improve Quality Processes to Ensure the Integrity of Your Brand

brewPAL is the only *Pediococcus* and *Lactobacillus* detection tool with proven accuracy, unmatched ease of use, and quantitative test data available in less than 3 hours from sample collection – providing actionable results that enable you to optimize your quality processes.

- Prevents processing, bottling, and shipping at risk
- Allows traceability to the point of contamination
- Reduces the risk of further contamination
- Protects against recall of tainted beer
- Protects your brewery's brand image

brewPAL Integrates Easily Into Your Brewing Quality Processes

Ingredients



"brewPAL is robust enough to detect *Pediococcus* and *Lactobacillus*, even in high bio-mass samples like yeast slurries that may be re-used for multiple generations and brews."

– Mike Guilford, Brewer/QA&QC
Russian River Brewing Co.

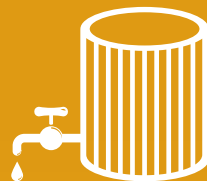
Fermentation



"Earlier detection in the brewing process allows for effective remediation steps. brewPAL can pinpoint problematic bacteria even before high krausen of fermentation is reached."

– Zachary Miller, Quality Lab Tech.
Victory Brewing Co.

Bright Tanks



"We love using brewPAL to test bright tanks before firing up the canning line so we can avoid wasting valuable time and packaging materials on a product that will never be sold. Turnaround time for results is so quick, we have answers before the beer is carbonated."

– Todd Crowell, Head Brewer
KettleHouse Brewing Co.

Packaged Product



"As a definitive quality assurance assay with the high sensitivity you need to ensure your beer is free of spoilage bacteria, brewPAL is peace of mind against a potential recall situation."

– Chris Reilly, QA/QC Lab Manager
Weyerbacher Brewing Co.

Facility



"brewPAL is great at identifying problem areas at the brewery. It provides clear and rapid evidence of bacterial contamination so we can implement cleaning specifically where we need it most – saving everyone time in the process."

– Franklin Winslow, QA Director
Yards Brewing Co.

Game-changing Detection of *Pediococcus* and *Lactobacillus*

- Sample to result in under 3 hours
- Accurate, sensitive, and specific to beer spoilers
- Simple and cost efficient deployment
- Quantitative and actionable results
- Reliable detection at any stage of brewing
- Robust assay compatible with all styles of beer

Additional Detection Tools For Your Brewery



For *Brettanomyces Bruxellensis*



For Wild Yeast *Dekkera* Species



For *Megasphaera* & *Pectinatus* (Coming Soon)



TEST PROTOCOL

COLLECT

Collect sample and centrifuge. Resuspend sample using provided proprietary Buffer A.

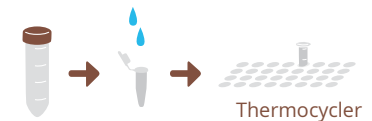
START - MINIMAL SAMPLE PREP



AMPLIFY

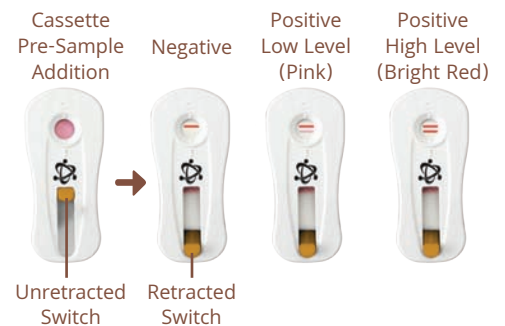
Transfer 5 ul of resuspended sample into provided PCR reagent tube. Place tube into Thermocycler and run program.

2.5 HOUR AMPLIFICATION



ANALYZE

Remove PCR Tube from Thermocycler and add proprietary Buffer B. Dispense PCR Tube contents onto test cassette window. Wait 3 minutes and retract test cassette switch to reveal test results. One line indicates negative result, two lines indicates semi-quantitative positive results.



ITEM #	DESCRIPTION	SIZE
IS1020	 brewPAL Complete Test System Includes: Mastermix Reagents, Cassettes, Buffers	1 Kit 24 Tests
ISTC002	 Veriflow Thermocycler	1 Unit
IS0904	 Veriflow Loading Tray	1 Unit
ISRD001	 Veriflow Reader	1 Unit

For more information or to place an order, please contact Invisible Sentinel at 215.966.6118 or www.invisiblesentinel.com

Invisible Sentinel, a global molecular solutions company, is dedicated to providing first-in-class microbial detection tools. The company's core technology, Veriflow, is a patented, game-changing platform that integrates molecular diagnostics, antibody design, and immunoassays. Veriflow has been applied across multiple industries including food safety and beverage quality.

