Improve Lab Efficiency and Workflow With Rapid Microbiological Methods

We've all heard the phrase – "Work Smarter, Not Harder". What does this mean for the microbiology testing lab? It means streamlining your workflow to be as efficient as possible, while maintaining full sample and results traceability. Historically, this has meant manually labelling samples, culture plates, and coding results in some type of spreadsheet format for future reference. It also meant significant amounts of labor hours were spent on these processes – running the gamut from menial labeling tasks to complex, manual processes requiring high levels of technical training. With advances in technology, these traditional, labor-intensive operations can be transitioned to more automated, streamlined workflows.

What are the benefits of lab automation?

Laboratory automation offers many benefits. Method variability is reduced when replacing the human element with instrumentation. Often a 2 -3 fold improvement in precision is obtained by automating a process. Labor costs can also be reduced twofold. First, automation can eliminate the need for additional laboratory personnel often required just to perform the repetitive, routine tasks in the lab. Second, an increase in employee satisfaction is often obtained, minimizing turnover and allowing lab technicians time to work on more analytical processes and results interpretations. Of course, the major gain is in lab throughput, which means a decrease in turnaround time for results, analysis, and report generation. This can mean significant efficiency gains for the laboratory and reduced overall test costs.

EnSURE™ Touch and UltraSnap™

What hurdles will a food facility face when automating lab testing like microbial contamination?

Of course, there are a number of hurdles to overcome when automating laboratory testing, especially when automating food testing for microbial contamination. With a wide variety of matrices, sample sizes, and organism variations, each food type can have its own unique methodology for sample preparation and testing. Another issue is the uneven distribution of the target organism, requiring large sample sizes or homogenization of multiple samples to achieve the testing precision needed to ensure food is safe to eat. Last, a lab must select an efficient laboratory information management system (LIMS). The LIMS must be capable of ensuring efficient processing of all samples through all laboratory steps; it must also be capable of storing not only the obtained results but also sufficient information of each process step, enabling traceability and chain of custody.

What tests should the laboratory consider and when should these tests be run?

The lab must also consider the tests they run most often when automating processes. High-volume tests or tests performed multiple times a day should take precedent over occasional tests when establishing a plan for automation. This ensures the lab selects the activities that have the greatest impact on workflow efficiencies due to automation. In addition, the lab must determine what steps are easy to automate. For example, sample pipetting can easily be automated if processing large numbers in a similar format. In fact, liquid handling is the most common type of process that is automated. Another step that can be easily automated is data collection and processing. Often, highly technical assays and equipment can individually capture the relevant data and make pass/fail decisions based on established test criteria – but integration of all data into a single LIMS can be challenging.

When considering automation options, look for those manual processes that can be replaced with instrumentation and software capable of improving overall lab efficiency while maximizing method performance. Also consider the physical space in the lab – and build flow diagrams to help identify the best placement of equipment for maximum workflow outcomes.

Are there any simple automated tools for microbial testing?

Some automated tools for microbial testing are as simple as instruments for specific testing. Examples include enzyme-linked immunosorbent (ELISA) assays and readers that feed results to an automated output system or link to a computer, polymerase chain reaction (PCR) assays and instruments that analyze results using sophisticated software and saving results to a computer, and rapid indicator testing for contamination such as adenosine triphosphate (ATP) monitoring devices that measure, store, analyze and share data via a cloud-based network or through integrated computer software.

Autosampler III

What solutions does Hygiena™ offer for automated microbial testing?

For microbial testing assays, automating the process further to simplify workflow and feed data to a LIMS is ideal. Hygiena™ can offer solutions for many of these assays. While not fully automated, Hygiena™ ELISAs can be paired with plate readers to feed results to computer-based analysis tools. Hygiena™ offers ELISA tests for allergens (including gluten) and mycotoxins. Kits include **AlerTox® ELISAs**, **GlutenTox® ELISAs**, and tests for mycotoxins, including aflatoxins, deoxynivalenol and fumonisin.

For PCR, Hygiena™ offers the **BAX® System** kits for a wide range of organisms from *E. coli* to *Listeria* to *Salmonella*. Kits are available as standard assays as well as real-time assays, with results in hours. To aid with workflow, the BAX® System stores all results in a computer-based software for analysis and interpretation. For even further automation, the **BAX® Prep Xpress** liquid handling platform can automate lysis preparation for subsequent PCR assays. It reduces the risk of technician error while increasing pipetting accuracy and reliability. Software also prompts the technician when any maintenance is needed.

For laboratories supporting the beverage and dairy manufacturers, ATP testing is often performed on finished product to confirm no microbial contamination is present. This requires sampling a large number of individual containers. The Hygiena™ **Innovate System** can analyze 96 samples at once, helping simplify workflow. However, the process can be further streamlined with the use of the Innovate **Autosampler III**. It streamlines product sampling from any style carton to testing plate, increasing efficiency and consistency. It also has the added flexibility of selecting the number of channels for sampling finished product (from 4 – 8) to ensure maximum sampling efficiency. The Innovate Autosampler III offers a continuous workflow to eliminate any sampling interruptions and can prepare 2,000 samples per hour with the ability to hold 96-well plates in a queue for subsequent testing on the Innovate System. Maintenance and downtime are also minimized with on-board controls and the integrated software allows communication between the production line and the Innovate System using existing LIMS functionality. For smaller sample sizes or generalized environmental monitoring, the **EnSURE™ Touch** system can aid in workflow. Testing sites can be pre-programmed into the device and all readings are stored in the cloud-based software, **SureTrend™ Cloud** for further analysis, reporting, and trending.

When it comes to microbiological laboratory testing, a multitude of complex, time-consuming workflow processes are needed. By smartly evaluating the labs' need for automation to streamline these workflows, consider automation solutions that can handle the most tedious tasks, including sample processing. Hygiena™ can assist you with this.

Learn more at hygiena.com