A world-leading manufacturer of smoked salmon maximizes pathogen test throughput and efficiency using the Thermo Scientific SureTect Real-Time PCR System



A world-leading processor of salmon and market leader in smoked salmon has been able to significantly improve their pathogen test workflow while reducing test complexity at the same time.

The Situation

This fish processing company carries out around 65,000 *Listeria monocytogenes* and 5,000 *Salmonella* species analyses each year on a range of raw and smoked fish products, as well as testing environmental swabs from the processing plant. On a typical day this translates to between 200 and 300 pathogen test samples arriving at different times depending on the business's production schedule. Pressure is on to get samples tested as soon as possible to enable the processing facility to take actions such as releasing highly perishable product to market, re-directing product if a positive result is obtained or releasing quarantined equipment for use in production.

The laboratory had already reduced the time to result compared to culture methods by using an alternative PCR system to carry out the bulk of their pathogen testing. However, they were struggling to get all of the samples through their 96-well instrument each day. The laboratory often had to wait until the afternoon before they had sufficient samples to initiate their first cycle of the day, and then found they did not have enough capacity for the 200-300 samples that might arrive before the end of the day.

This situation was compounded by the fact that their current Listeria method required samples to be enriched for 48 hours, meaning that their first PCR run often didn't happen until the afternoon of the second day (Refer to Figure 1, Customer's Current Workflow). Even with a 24 hour enrichment protocol (proposed as an alternative to their current method on their 96-well instrument), samples that may have come in during the early hours of the day wouldn't have been reported to production until the afternoon of the next day. This long time-to-result meant that a lot of product had to be stored waiting for release, taking up valuable cold room space and also reducing the shelf-life and value of their products.



The Solution

To determine a solution to the customer's daily challenges, several meetings were held between the customer and a Thermo Fisher Scientific representative to establish:

- Frequency and number of samples received throughout the day
- The opening hours of the laboratory and work patterns of the staff
- Priority needs of the laboratory
- Priority needs of the production managers acting on lab results
- Testing bottle necks and restrictions
- Predicted future test numbers

With a clear understanding of the customer's current workflow, we were able to propose an alternative way of working. The Thermo Scientific[™] SureTect[™] Real-Time PCR System, with the relatively small capacity of the Thermo Scientific[™] SureTect[™] PikoReal[™] instrument (24-well), may not have seemed like an obvious alternative choice. However, we were able to demonstrate that by linking multiple smaller capacity instruments in the place of a single 96-well instrument, the customer could revolutionize their workflow.

By installing four SureTect PikoReal instruments there would be no need to wait for as many samples to be ready for processing before they started their first PCR run. By running a first set of tests earlier in the day they could report results to production sooner. Or, if a large number of samples was ready for processing at the same time they could still process them together by running more than one system in parallel. (Refer to Figure 1, SureTect HTP Workflow). Multiple smaller systems would allow for continuous test processing and enable the laboratory to better handle fluctuating sample numbers and unpredictable sample receipt times.

Having seen the flexibility that SureTect High Throughput (HTP) Linking could bring, the customer still needed assurance that this wouldn't lead to increased complexity and hands-on time for set up. However, when they saw that up to five instruments could be run from a single laptop or PC and that setting up multiple systems was really simple, they decided to move into the evaluation phase.

Once connected, the Thermo Scientific[™] SureTect[™] Software automatically detects up to five systems and displays them as available for use on the home screen. It's then just a case of selecting the instrument to set up. To make things even simpler and quicker, commonly used plate layouts of particular sample type and target combinations can be set up and saved as templates to be retrieved as needed. The sample code is then assigned to the appropriate well in a matter of seconds using the automated increment function. As soon as a run is started for one system, the next one can be set up.



Figure 1. Summary of the customer's *Listeria monocytogenes* workflow showing the time that can be saved by using the SureTect HTP Linked system compared to their 96-well instrument.

Once the customer could see the benefits that the SureTect HTP Linking would bring, the next stage was to try it out. The laboratory manager was concerned that some of their sample types could be quite challenging; smoked fish can create issues when using PCR technologies due to the presence of polyphenols introduced during the smoking process. The customer had previously experienced difficulties when trying different molecular tests. To reassure the customer, we tested their samples using the SureTect system in one of our own labs. Results compared well with those they were getting with their current 96-well system.

Next, our Food Applications Specialist (FAS) helped set up the SureTect HTP Linked system in the customer's lab and trained the customer to analyze their samples. Initial tests were carried out under our FAS's supervision, and then by the customer on their own, comparing the results from both batches.

The customer quickly became familiar with running the system and was very happy with the convenience and accuracy of the system, and of the support they received from Thermo Fisher Scientific.

The Outcome

In order to meet their growing test throughput, and to give them the flexibility to process smaller batches in a staggered fashion, the laboratory installed seven SureTect PikoReal instruments, using just two laptops to control and run the systems.

The 24-well nature of the SureTect PikoReal instrument gives them the ability to connect, programme and run up to five SureTect PikoReal instruments from the same PC or laptop. This gives them the flexibility they need; they can run the SureTect PikoReal units together or in a sequential manner as needed, adapting to the number of samples and the time they are received. This means they can get results faster so the production manager can release product to market sooner, maximizing shelf-life and reducing inventory holding. Having multiple systems also gives the customer the peace of mind of knowing that in the event of an instrument breaking down they have another six functioning systems and can continue testing without the potential interruption to their service that a breakdown of a single 96-well system might cause.



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