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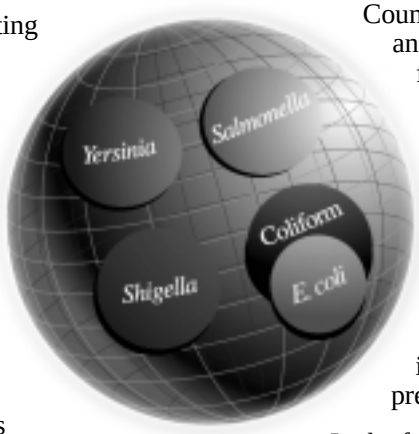
New 3M Petrifilm Plate Provides Reliable *Enterobacteriaceae* Testing

Enterobacteriaceae has long been accepted in Europe as a superior indicator organism for general sanitation by food processing plants. Whereas in the United States, coliforms have been used as the standard indicator of sanitation. Now *Enterobacteriaceae* testing is becoming the accepted global standard, and many multinational companies are converting post-processing coliform testing to this method.

The *Enterobacteriaceae* bacterial family presents a broader group of organisms, including all coliforms plus glucose-fermenting non-coliforms such as *Salmonella*, *Shigella* and *Yersinia*. As a result, *Enterobacteriaceae* testing may provide a more conclusive picture of potential post-processing contamination than detection of coliforms.



"Because *Enterobacteriaceae* testing includes more potentially harmful microorganisms, it can provide food processors with better answers about the safety of their food products," said Crispin Philpott, Market Development Supervisor, 3M Microbiology Products. "American food processing companies have traditionally looked at coliforms as an indicator of sanitation because of historical influences and regulatory requirements. However, if you want a broader view of sanitation and hygiene, you may want to look to *Enterobacteriaceae* tests."

Enterobacteriaceae testing is an excellent sanitation indicator particularly in dry food processing environments where coliform organisms may not survive, but where non-coliform pathogenic organisms such as *Salmonella*, *Shigella* and *Yersinia* could survive.

The new 3M™ Petrifilm™ Enterobacteriaceae Count plate combines the advantages of testing for *Enterobacteriaceae* with the convenience of Petrifilm plates. 3M developed the new Petrifilm plate in specific response to requests from its international food processing customers who needed to standardize their operations to *Enterobacteriaceae* testing.

Petrifilm Enterobacteriaceae Count plates offer a reliable and sample-ready system for enumerating this family of microorganisms after 24 hours of incubation. *Enterobacteriaceae* produce acid and/or gas from glucose during the metabolic fermentation that identifies their presence.

In the future, major multinational food processing companies that have accepted the global standard for *Enterobacteriaceae* will require their product suppliers to perform it as well. As a result, food processing companies are starting to feel this push to replace coliform with *Enterobacteriaceae* testing.

For more information on 3M's new Petrifilm Enterobacteriaceae Count plates, call 3M Microbiology Products at 1-800-228-3957. For technical support, call 1-800-328-6553.

Enterobacteriaceae and the Food Plant Environment

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Why Monitor the Food Plant Environment?

Public interest and concern for food safety are at an all time high. Recent food safety failures have received much media attention and have led to demands for increased product testing and government scrutiny. The food industry must cope with these demands in an effective, yet cost-efficient manner. The high cost and poor productivity of finished product testing is well known among food scientists. Low numbers of foodborne pathogens are difficult to detect with even the most stringent sampling schemes. Also, finished product testing is retrospective. If a pathogen is detected in a finished product, a manufacturer has little choice but to rework or destroy the product. Finally, finished products are often not distributed until test results are available. Holding product adds to manufacturing costs by reducing inventory turns and increasing product storage costs. The solution is to detect and control food pathogens before they have a chance to contaminate the finished product. This is done by establishing environmental microbiological performance criteria and monitoring the food plant environment with an effective sampling and testing program.

Continued on back

An Environmental Sampling Strategy

Most food manufacturing processes have one or more processing steps that effectively kill pathogenic bacteria. For these processes, the challenge is to prevent recontamination of the food before packaging. When recontamination does occur, it is often the result of contamination from food contact surfaces. How do food contact surfaces become contaminated? The answer is that bacteria travel through the food plant environment in a succession of steps that bring them ever closer to the food product before finally contaminating the product itself. For example, bacteria such as *Listeria* sp. can multiply to high numbers on wet areas of the floor and ultimately contaminate nearby surfaces such as a product conveyor belt. The movement of *Listeria* from the floor to a nearby product conveyor belt happens in a variety of ways. The use of high pressure water hoses and even the action of workers walking through heavily contaminated wet areas can produce an aerosol of bacteria that settles onto nearby processing equipment. Any food product that touches the contaminated equipment may also become contaminated. Besides the obvious need to eliminate contaminated wet areas and practices that spread bacteria, microbiological monitoring of the environment can help reveal sources of contamination. It is much easier to detect high numbers of bacteria in the plant environment than it is to detect relatively low levels of contaminating bacteria in the finished product.

The focus of an environmental monitoring program should be on post-processing food contact surfaces and those areas of the plant that immediately surround food contact surfaces. Post-processing food contact surfaces should be almost entirely free of bacteria prior to the start of production. After some period of production, it is not unusual for some bacteria to be present on post-processing food contact surfaces. However, we should not expect to find organisms that cannot survive the process step intended to pasteurize the product. If these bacteria are present, it indicates that contamination has occurred. Similarly, areas of the environment near food processing lines should be relatively free of contaminating bacteria. We cannot expect food contact surfaces to remain free from contamination if nearby floors, drains and equipment are heavily contaminated.

Environmental microbiological monitoring can be used to indicate unacceptable conditions or practices and thereby aid in controlling pathogenic bacteria such as *Listeria* and *Salmonella* species. The frequency of sampling and number of samples is dictated by past performance and product risk. The first goal of the environmental monitoring program is to establish acceptable microbiological criteria for each sample site. This is done by sampling test sites when the plant environment is in an acceptable condition. Once microbiological criteria are established, each sample site is regularly monitored for compliance with the criterion. When testing shows a site to be unacceptable, prompt action must be taken to find the source of contamination and to sanitize the area. It is important that each sampling site be sampled using the same sampling technique and test methods. This ensures that test results can be compared to previous test results.

Enterobacteriaceae as Indicator Organisms

The choice of which organism(s) to test for in the environment is important. Testing for pathogens (e.g., *Listeria monocytogenes* and *Salmonella* sp.) is both costly and time consuming. It is preferable to test for suitable indicator organisms. In my opinion, the species that comprise *Enterobacteriaceae* make excellent indicator organisms for assessing post-process sanitation. Although, coliform organisms have long served as indicator bacteria, there is no logical reason to limit testing only to coliform species. All species in the family *Enterobacteriaceae* are potentially of interest, particularly some of the lactose negative species. Organisms belonging to the family *Enterobacteriaceae* are heat-sensitive and chemical sanitizer-sensitive bacteria and therefore should be controlled in the plant environment. Members of the *Enterobacteriaceae* family commonly colonize both wet and dry factory environments and are excellent indicators of equipment contamination from environmental sources.

Detecting *Enterobacteriaceae* with Petrifilm Plates

The 3M Petrifilm plate is a very cost effective and rapid method for detecting *Enterobacteriaceae* in the environment. Sampling should be done with a swab or a sponge moistened with a suitable buffer. The swab or sponge is then rinsed in the buffer and the buffer is plated onto the Petrifilm Enterobacteriaceae plate. Results are available within 24 hours. Post-process food contact surfaces should be free of *Enterobacteriaceae* contamination. Non-food contact surfaces may have varying numbers of *Enterobacteriaceae* depending on the site sampled and the nature of food manufacturing processes in the plant. Generally, dry plant environments should have fewer than 10^3 *Enterobacteriaceae* per 100 cm^2. However, each plant should determine the microbiological criteria that best meet the needs of its processes. When environmental microbiological monitoring is combined with proper raw materials and process controls, there is no need or value in finished product testing.

To order Petrifilm Plates, call **1-800-328-1671.**

Latin America/Africa region, call **612-733-4758.**

Asia Pacific region, call **612-736-1888.**

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