

Maintaining Stock Cultures In-House: Are You *Really* Saving In The End?

By: Kelly Ehnes



Economical solutions have become a growing interest to many people both personally and professionally. Individuals are looking to save money, both at home and at the office. Industries and companies worldwide are seeking innovative and convenient methods for cutting costs, driving productivity, and increasing revenue. In microbiology laboratories around the world, individuals are maintaining their own stock cultures as a method they feel is more cost-effective. However, in reality it may actually cost the same or less to purchase ready-to-use quality control microorganisms from a Reference Material Producer. Reference Material Producers have demonstrated competency with international criteria through the accreditation of a third party. This provides confidence that the products are of the highest quality. Purchasing laboratory materials such as prepared quality control microorganisms may offer more consistent and accurate results, which increases compliance with regulations and ensures a laboratory is following best practices.

Stock cultures are microorganisms maintained for the purpose of keeping the microorganisms viable. Maintaining cultures internally may seem like the most cost-effective solution. However, a deeper financial analysis of the cost of obtaining stock cultures, additional supplies and equipment, and the lab technologist's time, may prove the cost of maintaining cultures in-house to be equal or higher than purchasing ready-to-use quality control microorganisms.

Cost Analysis

Obtaining Stock Cultures

There are a number of resources for purchasing original stock cultures all ranging in price and strain availability. To ensure you are getting the best product for your needs, research all of the available options. Investigate each provider's prices and product offering. Consider the types of tests to be performed and any requirements you may need in a microorganism strain. For example, do you need a specific concentration? Will you be investing a great deal of time and

supplies into reaching that value? Chances are it may be more economical to purchase a ready-to-use microorganism product that will deliver your desired concentration with little to no preparation time rather than spending copious amounts of time and money to alter a standard reference culture to meet your needs.

Preserving Stock Cultures

A popular method for preserving microorganisms is through lyophilization, or freeze drying. This method is best for long term storage. The lyophilization process requires costly equipment including a lyophilizer, vacuum pump, generator, etc. This process also requires purchasing specific media to create the bacterial suspensions which will be lyophilized. Lastly, and most importantly, hiring or training an employee to conduct the lyophilization process and paying their wage puts a major dent in a laboratory's already tight budget. In regards to cost-effectiveness, it is probably best to leave the lyophilization process to the experts, such as Microbiologics.

An alternative method for long-term storage of microorganisms is cryopreservation. This process involves storing samples at sub-zero temperatures. This process also requires purchasing a cryoprotectant medium to create the organism suspensions. The most critical part of cryopreservation is the use of a low temperature freezer, preferably -70°C or colder. This type of equipment is expensive to purchase and maintain. If purchasing and maintaining costly equipment is not in a laboratory's budget, perhaps purchasing cultures from an accredited source is a better option. Purchased ready-to-use microorganism products are available in many easy-to-use formats that are typically stable at refrigerated temperatures making them user-friendly, convenient and ultimately, more cost-effective.

Additional Equipment and Supplies

Maintaining stock cultures in-house often requires additional equipment. Purchasing and maintaining equipment is expensive and usually results in the need to purchase additional supplies. For example, preservation of bacteria necessitates purchasing specific media for creating microorganism suspensions. Plus, samples must be stored in small vials which are specifically made for low temperatures. Depending upon the number of samples being stored, a large number of vials may need to be purchased. Additionally, a considerable amount of agar plates will also be required for subculturing.

Labor

Time and labor must also be considered in the debate of maintaining stock cultures in-house versus purchasing prepared quality control microorganism products. When maintaining stock cultures internally, the samples need to be prepared, subcultured, labeled, and preserved. There is also considerable setup and cleanup time, as well as equipment maintenance. All of these steps are done manually, by an employee. This employee is earning a wage, and regardless of the employee's hourly salary, it is costing the company money. It is also costing time, which could be spent on more productive tasks. An employee's wage and time is often forgotten when factoring the cost of a process. However, employee wages often consume the largest portion of a laboratory's budget and must be considered during cost evaluations.

Reliability

Passages

Any microbiologist will tell you that the average bacterial species has a relatively fast generation time when compared to other species. Each subculture carries a risk of genetic and phenotypic changes. The greater the number of subcultures correlates with a greater risk of mutations. Why bother with the risk of additional passages and using mutated strains, when you can purchase ready-to-use microorganism products which are limited to 4 passages or less from a reference culture.

Storage conditions

Storage conditions can also lead to mutations. When stored improperly, an organism may adapt to the new environment, resulting in genetic changes, also referred to as genetic drift. Genetic drift and/or mutations may result in inaccurate phenotypic test results, loss of virulence or sensitivity to antimicrobials, and misidentification. Improper storage conditions can also lead to a decrease or complete loss of recovery. Ready-to-use quality control microorganism products are guaranteed to give a minimum recovery which provides confidence to the customer. Purchased microorganisms are also formatted to withstand long-term storage and expectantly prevent genetic alterations.

Verification

When maintaining laboratory cultures internally, the preservation method must be formally verified and culture viability should be tested periodically. This verifies the cultures are stable in the storage conditions. Since stability varies from one organism to the next, it is recommended to test the stability of each species. This is another labor intensive step of maintaining stock cultures internally. Prepared organisms from a Reference Material Producer are conveniently packaged in easy to use formats, with given expiration dates. There is no need to question the stability of purchased cultures, as they should remain viable until the expiration date. Another benefit of purchased cultures from a Reference Material Producer is the identity is certified and guaranteed. Samples are accompanied by a certificate of analysis which certifies the quantity, viability, and identity. This removes any guess work, and there is no need for a validation. The products are guaranteed and ready to use.

Traceability

Audits

Anyone who has been through an audit knows the importance of traceability. When an auditor requests specific documents or data, it becomes very stressful if that information cannot be presented. Organization and proper documentation is critical to running a smooth laboratory and company. When maintaining stock cultures, it is critical that proper documentation be maintained. This is important for lab organization, as well as audits. In regards to in-house stock cultures, maintaining the paperwork can be a tedious process, especially if a large number of strains are being maintained. Many ready-to-use microorganism products provide convenient certificates which include documentation regarding testing and traceability.

Labeling

All samples need to be labeled as well. This can be time consuming and poses a high risk of mislabeling. Lab personnel spend a great deal of time labeling all the samples, and organizing the samples in storage; this time could be spent doing something more productive. Plus, a minor distraction in the labeling process could cause drastic repercussions. If one microorganism is labeled incorrectly, it could provide false-positive or false-negative results. Releasing products with inaccurate test results in the food industry, clinical setting, pharmaceutical industry, or any industry for that matter, could be catastrophic, even fatal. Ready-to-use microorganism products come in clearly labeled packaging, which greatly decreases the risk of mislabeling, and also saves time.

Certificates of Analysis

Equally important as the laboratory's documentation and labeling, is the strain's traceability to its original source. Laboratory reagents often include a certificate that verifies the chain of custody, item name, expiration date, test results, etc. These certificates are important because they allow for traceability to the source. Quality control microorganism strains should be treated the same as any other laboratory reagents. A microorganism from a reputable source verifies the correct identity and a limited number of passages. For example, all of Microbiologics ready-to-use microorganism products are traceable to their original source and are only 4 passages or less. When an auditor asks for the origin of a culture, the lab can easily present a certificate from the quality control microorganism's producer.

Reputation

Whether you are a consumer or a producer, the word "recall" can make you shudder. The severity of a recall can vary, but the end result always costs the company money. A great example is food recalls. There have been many foodborne outbreaks that caused hundreds or even thousands of illnesses or deaths. A recall can end up costing a company millions, or even billions of dollars. In addition to the cost of the recall, there is also the loss of sales and the cost to implement changes to prevent future recalls. And of course the damage a recall can cause to a brand or company's reputation is immeasurable. When all is said and done, the company could be looking at bankruptcy or closure due to loss of business from a tarnished reputation. It's not only the company's reputation on the line, but the lab manager's as well. A recall may reflect poorly on the laboratory employees, especially the laboratory manager, who should be implementing processes to prevent recalls. The repercussions for the laboratory manager can be devastating both personally and professionally.

A laboratory can help prevent a recall and audit findings by, using high quality laboratory supplies, conducting proper testing, documenting test results, and maintaining organized data and documentation. In today's age, word spreads fast and a recall can be detrimental to a company and the industry as a whole.

When considering maintaining cultures internally versus purchasing ready-to-use microorganism products, it is best to do a complete cost evaluation. You may be surprised to learn that maintaining cultures internally costs the same or more than simply purchasing already prepared cultures. Microbiologics provides cost-effective quality control microorganism products in a wide variety of formats that are easy-to-use and convenient, which saves time and money. Purchasing Microbiologics ready-to-use quality control microorganisms also provide reassurance that strains are free of contaminants, correctly identified, and guaranteed. At the end of the day, your patients, customers, and reputation are on the line.

Biography



Kelly Ehnes holds a Bachelor of Science Degree in Microbiology. Her experience at Microbiologics includes working as a microbiologist and directing one of the quality control laboratories. Currently, she assists sales and marketing with her technical expertise. Kelly has industrial experience with biological and chemical testing of wastewater samples, as well as experience in food quality with bacterial and chemical testing of ingredients and food samples. Through her education and career, Kelly has developed a strong background in microbial testing and identification. She has experience with validations of laboratory equipment and processes, and is also a certified internal auditor for ISO 9001:2008.