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September 2019

QUESTION

Our frozen meals manufacturing facility has been successfully certified to the BRC Global Standard for Food Safety for several years. During our last re-certification audit to issue 8, the new BRC auditor asked if we had considered the possibility of rotating sanitizers so that we did not end up creating populations of microorganisms which would develop a resistance to antimicrobials and create problems later. He explained that sanitizers fall into the broader category of "antimicrobials" and antimicrobial resistance is a big problem globally. I have heard of antimicrobial resistance and antibiotic resistance, but not sanitizer resistance. Is the possibility of microorganisms becoming resistant to sanitizers a real issue? Should I be rotating my sanitizers to minimize the potential for sanitizer resistance in my plant?

ANSWER

The auditor may be confusing the issue by referring to the broader category of antimicrobials rather than addressing sanitizers specifically. Even though sanitizers (a.k.a. biocides/disinfectants) and antibiotics fall under the classification of an "antimicrobial", they are very different chemicals, act very differently on microorganisms and provide very specific results when used.

Antibiotics typically target very specific portions of a microbial cell (i.e., specific target sites) in order to inactivate the cell. This is analogous to a key unlocking a lock, it is specific. If the key does not fit, it is unlikely the microorganism will be affected. This explains why some antibiotics are effective against some microorganisms but not others and certainly not all microorganisms. The science shows low level exposure to an antibiotic can cause mutations in cellular populations over time, therefore, antibiotic resistance can become an acquired trait. This is analogous to changing the shape or inner workings of the lock - the key

may still fit, but it will not successfully open the lock.

The action of chemicals sanitizers is much less specific. They work by affecting multiple cellular components of a microbial cell. Some microorganisms may not be as susceptible to a particular sanitizer (e.g., it may be a yeast or a spore-former and thus inherently have more physical protection against the sanitizer than a gram-negative bacterium). This explains why some sanitizers are more effective against different kinds of microorganisms and also explains why the ability of a microbial cell to develop resistance to a chemical sanitizer is less probable. This is analogous to using a hammer to smash a glass ball - even if the shape of the glass ball changes, the hammer will smash the glass ball. When used at the maximum permissible concentrations, sanitizers quickly damage the cell wall, proteins and other components the cell needs to survive.

The key to the effective use of sanitizers is to expose the microorganisms to the appropriate sanitizer. Some sanitizers may simply not be effective because the microorganism is not susceptible to it (e.g., yeast or a spore-former vs. a gram-negative bacterium) or because they have protected themselves so they are not exposed to the sanitizer by populating a hard to reach area (a niche) or embedding themselves into a protective matrix (a biofilm).

Your facility will have mixed microbial flora due to incoming materials, the variety of products manufactured and the general environment. Keep in mind that all sanitizers have advantages and disadvantages. Some may have better efficacy against bacteria than yeast and mold, or even differences in efficacy between gram-negative and gram-positive bacteria. As a result, if one single sanitizer were to be used over an extended period of time, the less susceptible group of microorganisms may begin to dominate the microflora of the facility. Therefore, rotating sanitizers is a worthwhile action when spectrum of microbial activity rather than development of microorganism resistance is the primary concern.

There is a large and ever growing body of scientific work addressing both antibiotic resistance and sanitizer resistance and both are of heavy interest by industry. There is a lack of a definitive scientific connection between antibiotic resistance and sanitizer resistance. The Journal of Food Protection recently published a peer-reviewed paper on the "Relationship of Sanitizers, Disinfectants and Cleaning Agents with Antimicrobial Resistance" (Donaghy et. Al, 2019. *J. Food Prot.* May 2019, Vol 82, No. 5, pp 889-902. https://doi.org/10.4315/0362-028X.JFP-18-373) which addresses this issue.

Contact your chemical services provider for advice on which sanitizers are appropriate for use in your facility, on your equipment and for assistance in designing an effective plan. Once you have the information you need, be sure to follow the EPA label instructions for the sanitizer - not only is it the law (United States Federal Insecticide, Fungicide and Rodenticide Act), but it will assure you are using effective concentrations.

Ecolab continues to monitor developments in this area very closely. If you'd like more information about this topic, please contact us for a copy of our whitepaper.

2020 GFSI Training Calendar Coming Soon!

DO YOU HAVE A QUESTION?

Contact us for more information on food safety management programs and consulting services, inquiries about on-site training at your location for large groups, educational webinars, e-learning modules and other specialized training.

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ABOUT THE EXPERT

Dr. Tatiana Lorca manages food safety training programs for Ecolab. She is a registered SQF Trainer, FSMA/PCQI lead instructor and IHA approved HACCP Trainer. Previously, she was the technical manager for the SQF (Safe Quality Food) Institute, a division of the Food Marketing Institute.

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