



Cas d'èxit – Higiene d'aliments

Let's Co (Sant Dalmai, SAU + UAB + Itram Higiene)

“What is essential is invisible to the eye” (A. de Saint-Exupéry) and so is cleaning in the food industry today. It is a key process carried out, usually at night, by highly specialized human teams. Cleaning and disinfection, when carried out correctly, are invisible, but this does not happen by chance. It is the result of planning and hard work: defining and applying a cleaning and disinfection plan, training the personnel involved, carrying out the appropriate controls and implementing corrective measures (of which there will be, if we are doing it right). It is also essential to collaborate with cleaning experts such as ITRAM HIGIENE or the Universitat Autònoma de Barcelona (UAB) as they help us to continuously improve.

So, why do we clean and disinfect? It is essential in order to avoid microbial contamination of food when contacting work surfaces or elements that have previously been in contact with other surfaces (cross contamination). In the food industry, highly hydrated environments together with the presence of nutrients, favour the proliferation of bacteria. The contamination of food with pathogenic microorganisms is a serious danger that can become a public health problem and must be avoided at all costs. Furthermore, food can be contaminated with spoilage microorganisms, and although this has no repercussion on people's health, it could potentially cause considerable economic losses (product destruction, removal of lots, etc.) and negatively impact the image of a company. Cleaning well is not an easy task, it requires of planning and time. When thinking about the optimal cleaning procedures in the food industry, the pathological anatomy classes of Mariano Domingo at the UAB come to my mind. He used to say again and again that a necropsy should be systematic, ordained and complete. The ideal cleaning and disinfection systems share these same features.

Innovation in industrial cleaning methods has been relentless in the last 20 years. Until recently, the food industry still considered that anyone could clean, and that cleaning was a task of 'little value' that was not worth paying close attention to. Until the 80s, in Sant Dalmai, cleaning was carried out following very simple instructions based on “it's always been done like this”: At the end of the working day each worker cleaned his part, and periodically, they all spent a few hours washing thoroughly. In the 90s, two people were hired to perform full-time cleansing tasks. The methods were physical (rubbing) and chemical (using different detergents and disinfectants) and some surface contamination controls were carried out to verify that everything had been cleaned properly. A bit later the first central cleaning unit was installed seeking to improve efficiency. After equipping the factory with a cleanroom in 2000, the cleaning team was extended to 6 people full-time, and it became essential to change the cleaning unit for another one of greater power (with pressure and detergent mixture) coupled to a circuit capable of supplying detergent to all production areas. We were preparing to get certified by IFS and cleaning had to be considered another

stage in the production process. In recent years we have learned to alternate disinfectants, calibrate dispensers and circuits, schedule tasks better, etc. but the most important milestone was made with ITRAM about 4 years ago with the discovery of biofilms.

Biofilms

Biofilms are complex communities of microorganisms that grow immersed in an extracellular polymeric organic matrix (EPS), which allows them to adhere to any surface. Development in biofilms is a common form of growth of bacteria in nature. At present it is considered that most bacteria are capable of forming biofilms. We can find biofilms in all media where bacteria exist: natural, clinical or industrial environments are appropriate as they can develop on all types of surfaces (including plastic, glass, wood and metal) and they only require some hydration and a minimum amount of nutrients. In the food industry, the presence of biofilms in drains, equipment and materials is very common. Some bacterial pathogens with special importance in food safety that have the capacity to form biofilms are: *Listeria monocytogenes*, *Salmonella* spp, *Escherichia coli*, *Pseudomonas* spp, *Campylobacter jejuni*, and *Bacillus cereus* among others.

When conditions are right, bacteria adhere to surfaces forming biofilms, which are difficult to remove, as bacteria protected by biofilms are much more resistant to external environmental changes and can survive even the best hygienic practices. Formation of biofilms is an adaptive strategy of microorganisms as it offers four important advantages:

Protects microorganisms from the action of adverse agents.

Increases the availability of nutrients for their growth.

Facilitates the use of water, avoiding dehydration.

Allows the transfer of genetic material (DNA).

We must keep in mind that the usual cleaning and disinfection methods are ineffective against bacteria protected by a biofilm.

In addition to the risk of contamination, the development of biofilms can cause biocorrosion and even interfere with different processes. For example, in potable water systems the formation of biofilms can clog pipes and decrease the flow capacity. In heat exchangers, the formation of biofilms can reduce heat transfer and consequently, their efficiency.

At the end of December 2014, we detected sensorial alterations in some batches of high quality cooked hams. The incidence manifested itself 60 days after production, and, although all our records (manufacturing times and temperatures, pasteurization process...) were correct, microbiology showed the proliferation of a lactic bacterium. We contacted ITRAM and the UAB, and in a few hours we had in our plant the solution to the problem in the form of an enzymatic detergent and a rapid biofilm detection system. In that moment of crisis, we valued the response, attitude and involvement of our suppliers who exceeded our expectations.

Detection

In order to eliminate a biofilm first of all we have to know where it is, a complicated task if we do not have the appropriate means. The solution proposed by Itram is BioFinder *, a product that reacts immediately when contacting biofilms after applying it with a sprayer; a simple visual inspection allows us to confirm or discard their presence.

Elimination

Biofilms can be eliminated by combining enzymatic technology and surfactant chemistry. The enzymes used in the product range offered exclusively by ITRAM specifically act on the extracellular polymeric substances that form the structure of the biofilm, degrading it and leaving the bacteria exposed so that they can be easily eliminated in the disinfection phase. These enzymes are completely biodegradable and, as they work at neutral pH, are not corrosive to surface materials, pose a low risk of exposure for the operator, efficiently eliminate the structure of biofilms (they also prevent their reappearance and dispersion), improve the effectiveness of cleaning and activate the processes of water purification. However, the difficulty to eradicate these formations once they are established makes prevention the strategy of choice to handle this problem.

The incident at the end of 2014 helped us rethink the established cleaning and disinfection programme. We can correctly avoid contamination of food in a production plant if we know what we are facing. To know this we should not only do analysis but it is also fundamental to evaluate data taking into account that:

The presence of a pathogen or spoilage microorganism in the final product is a sign that there was a contamination in the past, and that may continue to occur if corrective measures have not been applied.

The analysis of surfaces shows what risks of product contamination we have in the present or the immediate future and it is essential to gather data as fast as possible.

Genomics indicate what could contaminate the product and cause problems in the not so immediate future.

Modern industries must anticipate problems, and it is not possible to anticipate the unknown if it has not been foreseen. It is essential to collaborate with specialists that help us to see from different angles the challenges to solve.

* More information at <https://itramhigiene.com>