Clostridium sporogenes: investigation of the spores' heat resistance

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There is much concern about industrialized foods in relation to the presence of the pathogen Clostridium botulinum. Due to the risks it can bring to the manipulator’s health, it is not possible to work with it at a university laboratory. Clostridium sporogenes, a nonpathogenic spore-forming anaerobe, is an excellent surrogate microorganism for modeling thermal inactivation processes because it is 3 to 5 times more resistant to heat than C. botulinum. However, there are few studies including this microorganism and focusing on its spore resistance. This study investigated the sporulation of C. sporogenes at different times of heat treatment. The lyophilized microorganism was activated and inoculated in TPGY medium, and incubated at 36°C/48h in anaerobic conditions. After obtaining the vegetative cells, the suspension was washed and re-suspended in a sporulation medium for 10 days/36°C in anaerobic conditions. Then, each part of the suspension underwent a heat treatment consisting of heating in a water bath at 90°C, followed by cooling with crushed ice (4°C), at different time spans (10, 15, 20, 30, 40 and 50 minutes in each step). The number of vegetative cells and spores in each treatment was counted. The treatment with higher percentage of spores was that consisting of 90°C/15 minutes and 4°C/15 minutes of heating and cooling, respectively. Thereafter, the number of spores decreased until 90°C/30 minutes and 30 minutes/4°C treatment when there were no spores, only a few vegetative cells.