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The control of bacterial infections in sugar factories is complex and so it is difficult to achieve optimum results. There are many different types of bacteria, which can vary from one factory to another and resistant strains can develop during a campaign. Furthermore different conditions within the factory (pH, temperature, aerobic/anaerobic), enables particular strains to dominate in different areas of the factory. To combat infections, synthetic biocides and more recently a range of natural anti-bacterial agents (beta acids, rosin acids, fatty acids) are used, but it is not always easy to select which are the best agents to use in particular situations. In this study the effectiveness of natural and synthetic biocides have been compared against important strains of bacteria found in sugar factories. The results show that biocides have different relative activities against these bacterial strains, and this knowledge along with factory trial data helps to target the best biocide or combination of biocides to be most cost effective for the factory.