Microbiological tracing in chocolate production

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Chocolate production begins with harvest and opening of cocoa pods (Theobroma cacao), fermentation, drying and industrial processing. Microbiological contamination can occur at any point and Salmonella intoxication in chocolate has been reported (High fat content and low water activity favor heat resistance). Precarious hygienic and sanitary conditions result in contamination with coliforms, including Escherichia coli. Microorganism incidence was evaluated in a chocolate processing plant to determine its hygienic and sanitary conditions. Sampling was defined as a descriptive epidemiologic study to determine pathogen occurrence. Triplicate samples were collected: cocoa beans and chocolate at several processing stages, equipment surfaces, utensils, ambient (floors, walls, drains, curtains) and handler hands. E. coli (EC) and total coliforms (TC) were determined by Petrifilm™ EC (3M) plates and Staphylococcus aureus (SA), by Petrifilm™ STX (3M). Total mesophilic aerobic bacteria (MB) were counted with plate count agar. 81 samples were analysed (beans: 21, chocolate: 3, food contact surfaces: 30 and non food contact surfaces: 27). Total positive samples were: 30.9% TC, 9.9% EC and 17.3% SA; beans: 12.3% TC, 4.9% EC, 3.7% SA; chocolate: 1.2% TC; food contact surfaces: 6.2% TC, 1.2% EC, 3.7% SA and non food contact surfaces: 11.1% TC, 3.7% EC, 9.9 % SA. MB counts were high, above 7.8 log UFC/mL (>6.5x10⁷ UFC/mL), in 55.6 % samples (beans: 3.7%, food contact surfaces: 27.2% and non food contact surfaces: 24.7%.

Results demonstrate that despite low product water activity cross contamination is a risk, possibly for pathogens.