https://dspace.org/

Microbiological survey of ready-to-eat foods prepared and displayed in retail delicatessens

Christison, Claire Ashleigh

2008-03-07T07:38:40Z
http://hdl.handle.net/10539/4576

Downloaded from a DSpace repository. https://dspace.org/

LIST OF FIGURES

FIGURE 2.1 Schematic diagram representing the layout of a typical retail delicatessen. Indicates the location of food handlers, depicts the preparation surfaces and display areas sampled…… 40

FIGURE 2.2 Map of Johannesburg indicating the location of four branches of a South African retail chain at which RTE foods are prepared on site and which have delicatessens where samples were taken. Boksburg Bedfordview Kensington and Northgate. (Adapted from Map studios)…… 41

FIGURE 2.3 Flow diagrams illustrating the preparation process for selected retail delicatessen assorted salads, filled baguettes, sliced processed meats and hot meals. Stars represent points within the preparation process where samples were taken…….. 42

FIGURE 2.4 Examples of RTE food products such as filled baguettes (A), assorted salads (B), vacuum packaged sliced processed meats (C), hand wrapped sliced processed meats (D) and hot meals (E). In addition, examples of cleaning tools such as floor mops (F), cleaning cloths (G) and disposable plastic gloves (H) sampled from four retail delicatessens…… 43

FIGURE 2.5 Microbiological tests conducted on RTE foods and associated preparation surfaces, cleaning tools and disposable plastic gloves sampled from four retail delicatessens. Plate Count Agar used to evaluate the aerobic bacterial population (A); Rapid' *E. coli* 2 agar used to determine *E. coli* (purple colonies) and coliform bacteria (green colonies) (B); Baird Parker agar medium plus 0.05% Egg's Yolk Tellurite Sterile Emulsion for *S. aureus* (C); *Bacillus cereus* Agar plus 10% Egg's Yolk Sterile Emulsion plus 1 vial of Polimixin B Sulfate Selective Supplement for *B. cereus* (D); Xylose-Lysine Deoxycholate Agar for *Salmonella* spp. (E) and Rapid' *L mono* agar used for *L. monocytogenes* (F)……..…..…… 44

FIGURE 2.6 Mean aerobic bacterial, coliform and *E. coli* counts obtained for preparation knives (n=34), preparation spoons (n=23), preparation surfaces (n=35) and handlers' hands (n=35) sampled from four retail delicatessens (Lower detection limit: 1 Log CFU/cm^2)…….....…….. 45

FIGURE 2.7 Counts of bacterial cells attached to floor mops and cleaning cloths used as cleaning tools and disposable plastic gloves from food handlers' hands associated with the preparation of RTE foods in retail delicatessens (Lower detection limit: 1 Log CFU/g). Means with different superscripts represent statistically significant differences (P<0.05) between cleaning tools …… 46

FIGURE 2.8 Mean aerobic bacterial (A), coliform (B), *E. coli* (C), *S. aureus* (D) and *B. cereus* (E) counts of RTE foods sampled from four retail delicatessens before and after preliminary incubation (PI). Means with different superscripts represent statistically significant differences (P<0.05) between non-PI and PI (Lower detection limit: 1 Log CFU/g)…….... 47

FIGURE 3.1 Examples of ready-to-eat filled baguettes (A) and assorted salads (B) sampled from four retail delicatessens in Johannesburg…….. 76

FIGURE 3.2 Plate Count Agar was used to determine total aerobic plate counts (A), Rapid' *E. coli* 2 agar for coliform (green colonies) and *E. coli* (purple colonies) counts (B) and BD BBL^{TM}CHROMagar^{TM}O157 (BD Biosciences, Becton, Dickinson and Company, USA) used to screen coliform and *E. coli* isolates for *E. coli* O157:H7 (C) in ready-to-eat foods, associated preparation utensils, plastic chopping boards, handlers' hands, display ice and storage refrigerators sampled from four retail delicatessens……...…… 77

FIGURE 3.3 Modified characterisation key (after Faller and Schleifer, 1981; Fischer *et al*., 1981) used to characterise bacteria isolated from aerobic plate counts (APC) of filled baguettes, assorted salads, associated preparation utensils, plastic chopping boards, storage refrigerators, handlers' hands and ice used to cool salads during display, sampled from four retail delicatessens……..... 78

FIGURE 3.4 Light micrographs (x 1000 oil immersion) depicting morphologies of typical Gram-positive (purple) rod-shaped *Bacillus* (A) and *Lactobacillus* (B), Gram-positive (purple) cocci-shaped *Micrococcus* (C) and *Staphylococcus* (D) and Gram-negative (red) rods (E and F)…….. 79

FIGURE 3.5 Aerobic bacterial (A), coliform (B), *E. coli* (C), *B. cereus* (D) and *S. aureus* (E) counts from filled baguettes, assorted salads and display ice sampled from four retail delicatessens. Means with different superscripts indicate statistically significant differences ($P<0.05$). (Lower detection limit: 1 Log CFU/g)……. 80

FIGURE 3.6 Aerobic plate (A), coliform (B) and *E. coli* counts (C) from filled baguettes and assorted salad preparation utensils, plastic chopping boards, handlers' hands and storage refrigerators. In addition *S. aureus* counts (D) for handlers' hands sampled from four retail delicatessens. Means with different superscripts indicate statistically significant differences ($P<0.05$). (Lower detection limit: 1 Log CFU/cm^2)……. 81

FIGURE 3.7 Percentage distribution of 648 predominant bacteria isolated from aerobic plate counts of filled baguettes (140 isolates) (A), assorted salads (140 isolates) (B), associated preparation knives (92 isolates) (1), preparation spoons (92 isolates) (2), plastic chopping boards (92 isolates) (3) and handlers' hands (92 isolates) (4) sampled from four retail delicatessens in Johannesburg…… 82

FIGURE 3.8 Percentage distribution of 64 predominant bacteria isolated from salad display ice (32 isolates) (A) and storage refrigerators (32 isolates) (B) sampled from four retail delicatessens in Johannesburg……... 83

FIGURE 4.1 Aseptic collection of cleaning tools such as a floor mop (A) used to clean the delicatessen floor in both the filled baguette and assorted salad preparation areas, dedicated cleaning cloths (B) used to clean food contact surfaces in either the filled baguette or assorted salad preparation area and disposable plastic gloves (C) used as a barrier between the handlers' hands and food during the preparation of filled baguettes and assorted salads from four retail delicatessens…… 99

FIGURE 4.2 Mean aerobic bacterial (APC), coliforms (CC), *E. coli* (ECC), *S. aureus* (SAC) and *B. cereus* (BCC) counts on cleaning tools such as floor mops, cleaning cloths and disposable plastic gloves sampled from four retail delicatessens during the preparation of filled baguettes and assorted salads (Lower detection limit: 1 Log CFU/g). 100

FIGURE 4.3 Percentage distribution of predominant microbial isolates from aerobic plate counts of floor mops (A) (100 isolates), cleaning cloths used during filled baguette preparation (B) (80 isolates), cleaning cloths used during assorted salad preparation (C) (76 isolates) and disposable plastic gloves (D) (80 isolates) sampled from four retail delicatessens during the preparation of filled baguettes and assorted salads ……..…….. 101

FIGURE 4.4 Scanning electron micrographs of an uncolonised, (control) floor mop (A), cleaning cloth (E) and disposable glove (I), and used floor mops (B-D), cleaning cloths (F-H) and disposable plastic gloves (J-L) sampled from four retail delicatessens during filled baguette and assorted salad preparation…… 102