

CHICKEN MINCE AS A SUBSTRATE FOR DANGEROUS VIABLE BUT NONCULTURABLE BACTERIAL CELLS

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Abstract

The problem of viable but non-culturable (VBNC) bacteria is important for food industry, because their presence in foods cannot be detected using conventional methods. These dormant microbes pose a health threat because they can return to active state and cause a disease outbreak.

Off-the-shelf chicken mince was used as a model substrate for detection of VBNC cells. 5 grams this mince were suspended in 5 mL sterile normal saline solution. The mixture was immediately plated on nutrient agar for determination of CFU/mL value. Total number of cells in the suspension was determined using a counting chamber, and portion of viable cells was determined using Live/Dead[®] kit of DNA-binding dyes. Another sample of chicken mince was artificially contaminated with *Staphylococcus aureus* 209P by combining 5 grams of meat with 5 mL of 18-hour broth culture. The mixture contained $1.136 \pm 0.13 \times 10^9$ cells/g. The same testing procedures were performed as for the first sample. Subsequent to determination of viability parameters, both contaminated and uncontaminated samples were incubated for 5 hours at room temperature, and measuring procedures were repeated. Initial value for non-contaminated chicken mince was $(4 \pm 0.44 \times 10^3)$ CFU/mL.

Direct counting in a microscope showed that total cell count was 6 orders of magnitude higher than CFU/mL, and cells were 99.99% VBNC. During 5 hours of incubation at 21 ± 1 °C total number of cells/mL and portion of VBNC cells didn't change significantly, but CFU/g increased to $9 \pm 9.9 \times 10^4$. In the sample contaminated with *S. aureus* were revealed $3 \pm 0.32 \times 10^5$ CFU/g. Though, 99% of cell population was viable, and 97.33% of cells were VBNC. After 5h incubation of samples CFU/g decreased to $8 \pm 0.87 \times 10^3$. However, viability and culturability remained relatively unchanged. Therefore, number of VBNC cells increased to 99.99% over incubation period.

Thus, we showed for the first time that VBNC cells are present in chicken mince and can multiply to dangerous level.

Key words: Bacteria, VBNC, Chicken mince, Contamination.