

Effectiveness of quaternary ammonium in reducing microbial load on eggs

ABSTRACT

Table eggs are an affordable yet nutritious protein source for humans. Unfortunately, eggs are a vector for bacteria that could cause foodborne illness. This study aimed to investigate the effectiveness of a quaternary ammonium compound (quat) sanitizer against aerobic mesophilic bacteria, yeast, and mold load on the eggshell surface of free-range and commercial farms and the post-treatment effect on microbial load during storage. Total aerobic mesophilic bacteria, yeast, and molds were enumerated using plate count techniques. The efficacy of the quaternary ammonium sanitizer (quat) was tested using two levels: full factorial with two replicates for corner points, factor A (maximum: 200 ppm, minimum: 100 ppm) and factor B (maximum: 15 min, minimum: 5 min). Quat sanitizer significantly ($p < 0.05$) reduced approximately 4 log₁₀ CFU/cm² of the aerobic mesophilic bacteria, 1.5 to 2.5 log₁₀ CFU/cm² of the mold population, and 1.5 to 2 log₁₀ CFU/cm² of the yeast population. However, there was no significant ($p \geq 0.05$) response observed between individual factor levels (maximum and minimum), and two-way interaction terms were also not statistically significant ($p \geq 0.05$). A low (<1 log₁₀ CFU/cm²) aerobic mesophilic bacteria trend was observed when shell eggs were stored in a cold environment up to the production expiry date. No internal microbial load was observed; thus, it was postulated that washing with quat sanitizer discreetly (without physically damaging the eggshell) does not facilitate microbial penetration during storage at either room temperature or cold storage. Current study findings demonstrated that the quat sanitizer effectively reduced the microbial population on eggshells without promoting internal microbial growth.

Keyword: Quaternary ammonium compound; Microbial control; Egg shell