

Focus on the Bactericidal Efficacies of Alkaline Agents in Solid and the Required Time for Bacterial Inactivation

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Abstract : Disinfectants and their application are essential part of infection control strategies and enhancement of biosecurity at farms, worldwide. Alkaline agents are well known for their strong and long term antimicrobial capacities and most frequently are applied at farms for control and prevention of biological hazards. However, inadequate information regarding such materials' capacities to inactivate pathogens and their improper applications fail farmers to achieve the mentioned goal. Thus, this requires attention to further evaluate their efficacies, under different conditions and in different ways. Here in this study we evaluated bactericidal efficacies of food additive grade of calcium hydroxide (FdCa(OH)₂) powder derived from natural calcium carbonates obtained from limestone (Fine Co., Ltd., Tokyo, Japan), and bioceramic powder (BCX) derived from chicken feces at pH 13 (NMG environmental development Co., Ltd., Tokyo, Japan), for their efficacies to inactivate bacteria in feces. [Materials & Methods] Chicken feces were inoculated by 100 µl *Escherichia coli* and *Salmonella Infantis* in falcon tubes, individually, then FdCa(OH)₂ or BCX powders were individually added to make final concentration of 0, 5, 10, 20 and 30% (w/w) in total weight of 0.5g, followed by properly mixing and incubating at room temperature for certain periods of time, in a dark place. Afterwards, 10 ml 1M Tris-HCl (pH 7.2) was added onto them to reduce their pH, in order to stop powders' activities and to harvest the remained viable bacteria, whereas using normal medium or dW2 to recover bacteria increases the mixture pH, and as a result bacteria would be inactivated soon; therefore, the latter practice brings about incorrect and misleading results. Samples were then inoculated on DHL agar plates in order to calculate colony forming units (CFU)/ml of viable bacteria. [Results and Discussion] FdCa(OH)₂ powder at 10% and 5% required 3 hr and 6 hr exposure times, respectively, while BCX powder at 20% concentrations required 6 hr exposure time to kill the mentioned bacteria in feces down to lower than detectable level ($\leq 3.6 \log_{10}$ CFU/ml). This study confirmed capacities of FdCa(OH)₂ and BCX powders to inactivate bacteria in feces, and both materials are environment friendly materials, with no risk to human or animal's health. This finding helps farmers to properly apply alkaline agents in appropriate concentrations and exposure times in their farms, in order to prevent and control infectious diseases outbreaks and to enhance biosecurity. Finally, this finding may help farmers to implement better strategies for infections control in their livestock farms.

Keywords : bacterial inactivation, bioceramic, biosecurity at livestock farms, chicken feces

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