

AQUAGUARD[®]

Liquid

Concentrations For Inhibiting Pathogens In Water

Summary

AquaGuard, a liquid complex of food-approved antimicrobial agents, is well recognized for reducing pathogen contamination in nutritional products, thereby increasing food sanitation, supporting animal health and guarding human food safety. Increasing public and regulatory focus on Salmonella enteritidis, E. coli O157:H7 and other bacterial contaminants has customers asking how to use AquaGuard to purify livestock drinking water supplies. The research in this summary measured the amount of AquaGuard required to completely eliminate three highly-pathogenic bacterial isolates from an aqueous solution. AquaGuard was able to fully eliminate the bacterial contaminants when added to solutions at very practical concentrations, which were approximately 10 times less than an alternative mineral acid.

Purpose

To evaluate the antimicrobial effectiveness of AquaGuard used as an antibacterial drinking water treatment against three prevalent pathogens (Salmonella enteritidis, Clostridium perfringens, and E. coli O157:H7). Methods: Highly pathogenic bacterial strains were grown either in trypticase soy broth (Salmonella and E. coli) or fluid thioglycolate broth (Clostridium). The cultures were diluted in peptone water and inoculated on plates to count the number of living colonies remaining in increasing concentrations of AquaGuard. All dilutions and plate counts were performed in triplicate.

Results

AquaGuard's very potent antimicrobial activity is not based on reducing pH alone, and other studies confirm it is a much stronger antimicrobial sanitizer than ordinary food-approved inorganic acids that have lower pH. The amount of AquaGuard required to kill 50% of the pathogens (minimum inhibitory concentration, MIC₅₀) ranged 750-850 ml per 1000 liters of solution. Further purifying the solution by killing 100% of the pathogens (MIC₁₀₀) required no more than 2500 ml/1000 liters for all of the pathogens tested (see table).

Pathogen	AquaGuard concentration killing 50-100% of the colonies	
	50% inhibition (MIC ₅₀)	100% inhibition (MIC ₁₀₀)
<i>Salmonella enteritidis</i>	750 ml/1000 liters	2500 ml/1000 liters
<i>Clostridium perfringens</i>	850 ml/1000 liters	2500 ml/1000 liters
<i>E. coli O157:H7</i>	755 ml/1000 liters	2500 ml/1000 liters

Conclusions

Each of the bacterial contaminants was sensitive to AquaGuard, with 100% control of all highly pathogenic bacterial isolates used in this study requiring no more than 2500 ml of AquaGuard per 1000 liters of solution. AquaGuard's potent antimicrobial effect offers food-producing livestock growers a convenient, practical and cost-effective means to reduce bacterial drinking water contamination, support animal health and guard human food safety.

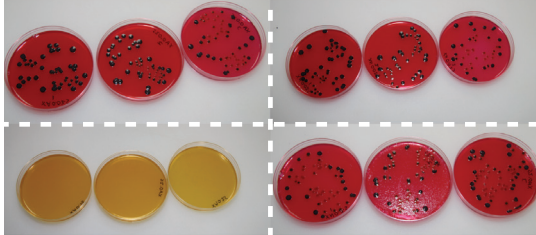
Salmonella Enteritidis

AquaGuard

Alternate Inorganic Acid

250 ppm pH 4.2

250 ppm pH 3.7



2500 ppm pH 4.3

2500 ppm pH 2.8

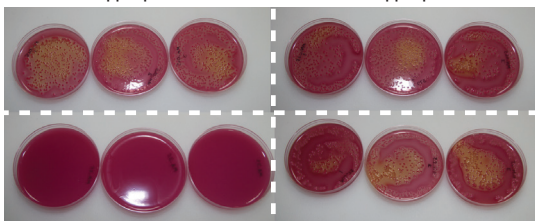
E. coli O157:H7

AquaGuard

Alternate Inorganic Acid

250 ppm pH 4.2

250 ppm pH 3.7



2500 ppm pH 4.3

2500 ppm pH 2.8

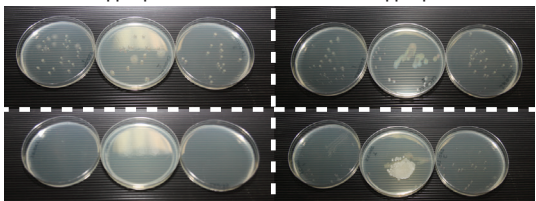
Clostridium Perfringens

AquaGuard

Alternate Inorganic Acid

250 ppm pH 4.2

250 ppm pH 3.7



2500 ppm pH 4.3

2500 ppm pH 2.8

Figure 1 Salmonella Enteritidis - Sensitivity to AquaGuard

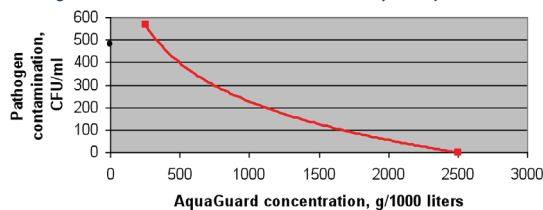


Figure 2 Clostridium Perfringens - Sensitivity to AquaGuard

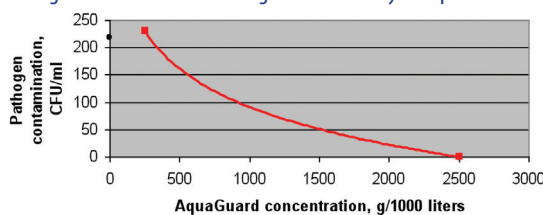


Figure 3 E. coli O157:H7 - Sensitivity to AquaGuard

