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# IFPTI Fellowship Cohort V: Research Presentation


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## 2015-2016

# *Food Safety Risk Attributed to Ionic Bond Between Quaternary Ammonium Sanitizers and Cloth Towels in Nevada*

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Funding for this program was made possible, in part, by the Food and Drug Administration through grant 5U54FD004324-05; views expressed in written materials or publications and by speakers and moderators do not necessarily reflect the official policies of the Department of Health and Human Services; nor does any mention of trade names, commercial practices, or organization imply endorsement by the United States Government.

# Minimizing Food Safety Risks

Properly sanitized food contact surfaces are critical to minimizing food safety risks associated with the growth of pathogens.

# Quaternary Ammonium – "Quat"

- Most prevalent sanitizer used in restaurants and processors
- Cost-effective and simple approach
- Noncorrosive and not a skin irritant
- Effective at inactivating pathogens such as:
  - *Staphylococcus aureus*
  - *Listeria monocytogenes*
  - *Escherichia coli*

## Quat Binding

- Ionic bond is formed when quat is used with cotton or viscose cloth to sanitize surfaces
- Cotton and viscose cloth are anionic
- Quaternary ammonium chlorides are cationic
- Bond prevents sanitizer from being applied on food contact surfaces at prescribed concentrations

## Four Factors that Affect Quat Binding

- Time that the cloth spends in sanitizer solution
- Volume of the solution
- Type of fabric
- Concentration of the solution

# Background (continued)

- Viscose and cotton cloths bind up to 40% of the quat chlorides, limiting disinfection performance (Condon, 2014).

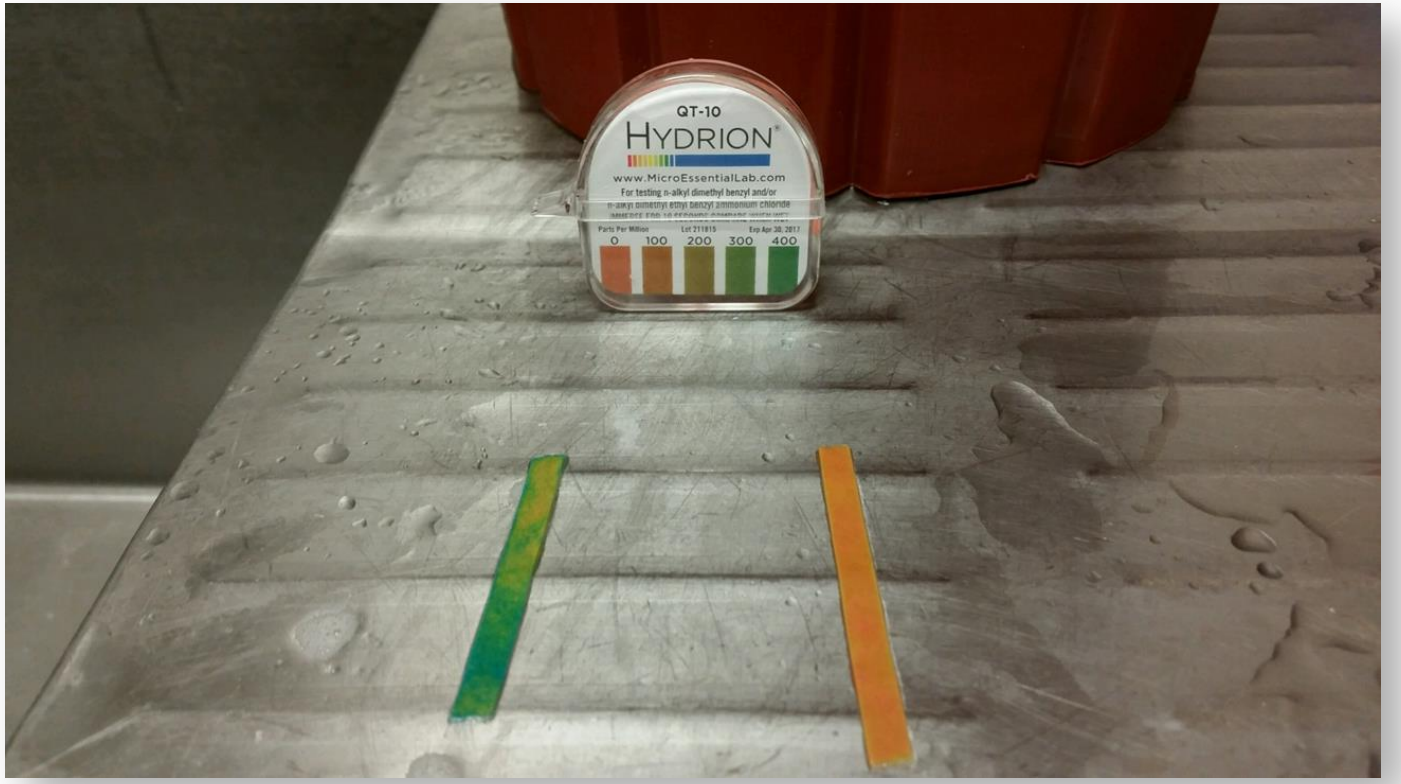


Image source: Taken by Brendon Gibb

# Problem Statement

The risk regarding the use of quaternary ammonium–based sanitizers when cleaning surfaces with a cotton cloth is unknown in restaurants and food processing facilities in Douglas County and Carson City, Nevada.

# Research Questions

1. What is the level of knowledge of food workers in Carson City and Douglas County regarding the reaction that occurs between cotton cloth and quaternary ammonium-based sanitizers?

2. What methods are currently used by restaurants and food facilities in Douglas and Carson Counties to reduce the risk caused by the reduction of effectiveness in using cotton cloth towels to apply quaternary ammonium sanitizers?

# Methodology

**Five Environmental Health Specialists Collected Data While Performing Routine Investigative Duties:**

- Number of facilities using quat
- Knowledge of sanitizer and ‘quat binding’
- Any mitigation strategies in place
- Chemical supply companies used

# Study Population

- Facilities that were processing or cooking food
- Facilities surveyed:
  - 162 out of 320 (50.6%) in Carson City
  - 133 out of 345 (38.6%) facilities in Douglas County

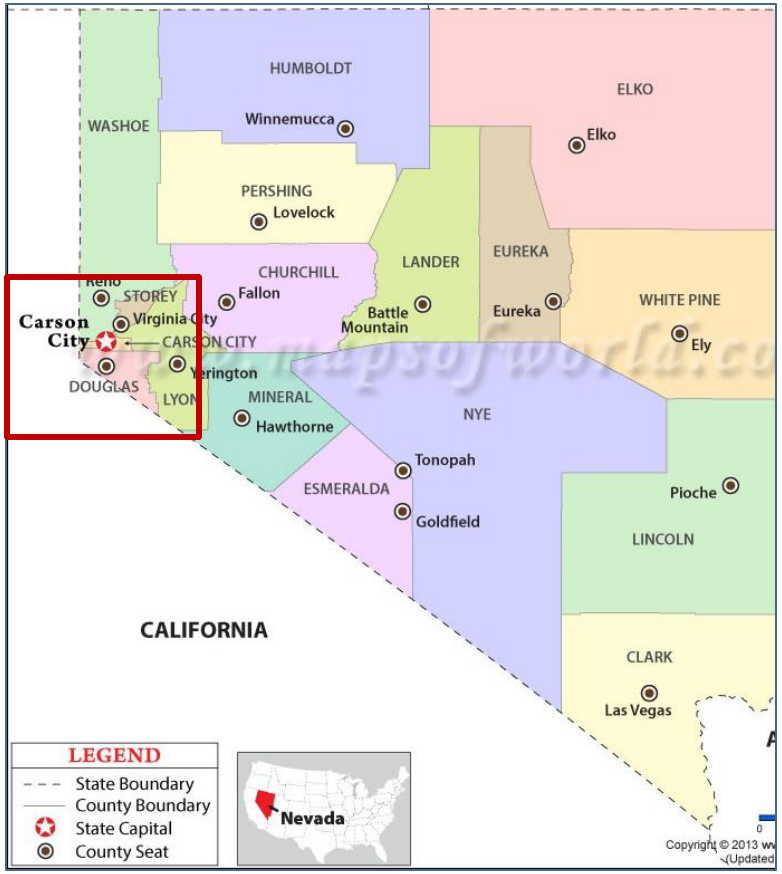


Image source: http://www.mapsofworld.com/

# Results

| Location | Total Using Quat (%) | Total Aware of Quat Binding (%) |
|---|---|---|
| Carson City | 99 out of 162 (61%) | 6 out of 162 (3.7%) |
| Douglas County | 100 out of 133 (75.2%) | 0 out of 133 (0%) |

5 of 6 reported testing sani-buckets more frequently to mitigate issue; other facility used bleach on food contact surfaces.

# Conclusions

- Quat used by majority of facilities surveyed.
- Knowledge of sanitization limitations is virtually unknown at operational level.
- Facilities reported using problematic mitigation strategies.
- ‘Quat binding’ research is available; not in right hands.
- Operators were eager to ask for more information.
- Anecdotal information suggests minimal awareness within both chemical supply industry and regulatory agencies.

# Recommendations

1. Food safety regulators need to understand ‘quat binding’ and mitigation strategies.
2. Chemical supply company representatives who set up sanitizer dispensers should add specific instructions on how to avoid product limitations.
3. Manufacturers provide container labels targeting ‘quat binding’ and proper use, and if prescribed concentration changes.
4. FDA Food Code should cover ‘quat binding.’
5. Practical mitigation strategies need to be implemented at the operational level today.

# Acknowledgements

**I would like to thank:**

- Dustin Boothe, REHS MPH
- Greg Parks, REHS CP-FS
- Robert Elliott, REHS
- Mark Sprout, REHS
- Becky Purkey, REHS CP-FS
- Steve Steinhoff, Mentor
- Paul Dezendorf, Research Subject Matter Expert
- IFPTI Fellows
- IFPTI staff

# Questions?


Image source: http://www.amazon.com/Hydrion-Papers-Quaternary-Ammonium-Sanitizer/

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# Additional Information
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# Mitigation Strategies

- Apply quaternary ammonium to food contact surfaces using spray bottle.
- Soak cloths in sanitizer solution, replace solution and soak again, repeat.

Image source: https://allmightygreen.com/wp-content/uploads/2015/01/446e42d7cfbc1b3181a68aaaaa03e09e.jpg

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# Mitigation Strategies (continued)

- Switch from cotton or paper towels to higher polyester blend fabric.
- Use ionized towels and presoaked quat wipes.
- Replace quat with bleach or iodine.
- Reformulation of quat compounds using salts.

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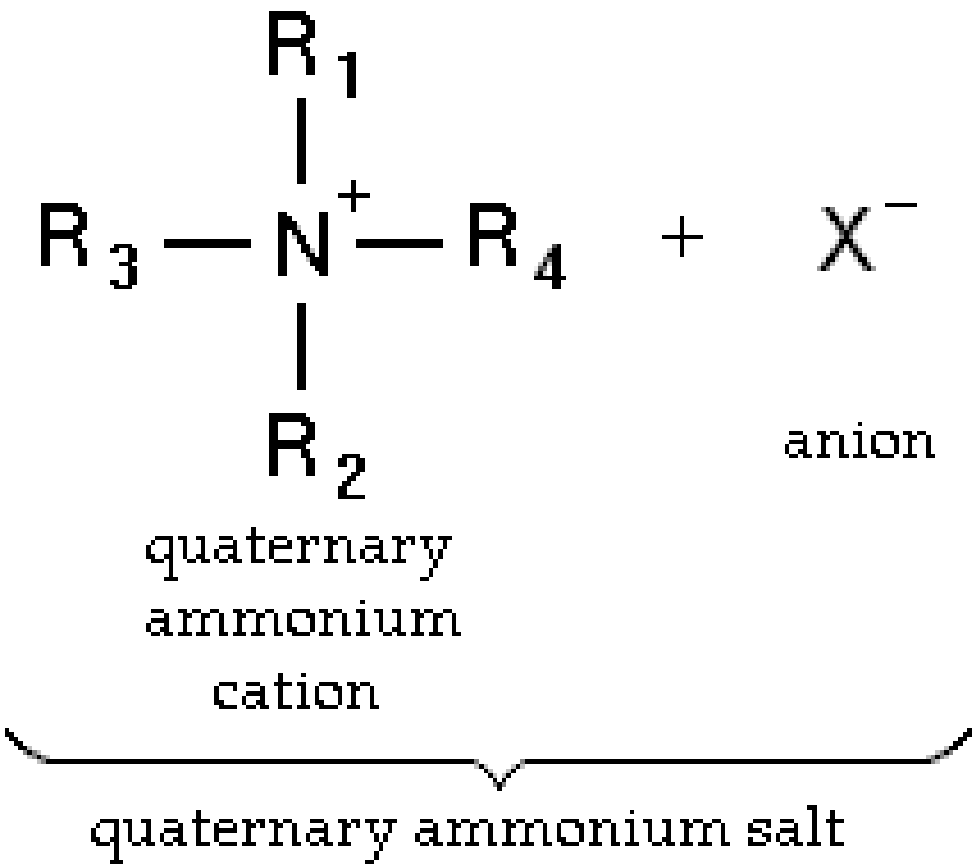
# Quaternary Ammonium

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# Fabric Types

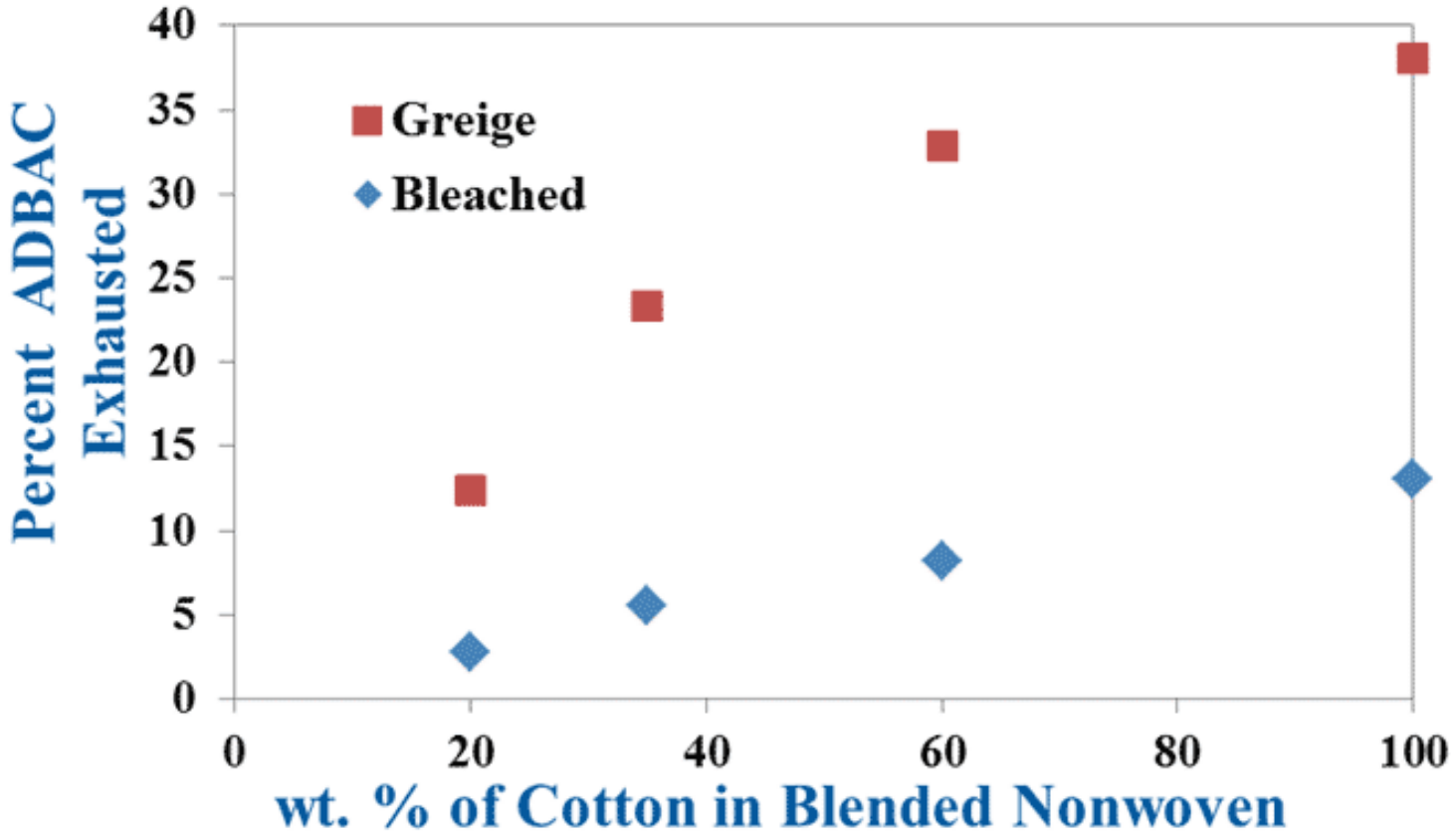


Image source: http://www.cottoninc.com/

Polyester fiber showed a bulk entrapment slope of ZERO

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