

Application of Commercial Allergen Test Kits for Sanitation Validation Studies



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Introduction

Food allergens represent a major threat for allergic consumers. Although a law is in place to protect individuals that suffer from allergies (FALCPA), the presence of undeclared allergens is still a huge concern for the food industry since it is known to have caused severe reactions in sensitive people (FDA/CFSAN 2006).

It has been proven that one of the critical control points for successful food allergen management is thorough cleaning of shared equipment and processing lines, as well as adherence to Good Manufacturing Practices (GMPs). However, present techniques are not 100% effective in preventing allergen cross-contact, and there is a lack of consensus on the validation of cleaning protocols within the food processing industry (Jackson 2008).

Objectives

- To determine the effectiveness of commercial allergen test kits.
- To determine the effectiveness of three cleaning protocols for the removal of egg, peanut and milk residues from abraded and unabraded stainless steel surfaces.

Materials and Methods

Sample preparation

Potentially allergenic food products (peanut butter, pasteurized liquid eggs, and pasteurized milk) were applied in a controlled manner to 96 cm² of abraded and unabraded stainless steel coupons (type 304, 2B finish). All cleaning products were purchased from ZEP (Atlanta, GA).

Juice Products Association (JPA) type 4 wash

Plates were submerged in a 2.3% solution of hot (63°C) distilled water and food grade degreaser solution (Dawn Liquid Detergent, P&G, Cincinnati, OH) for 15 minutes. Plates were rinsed with room temperature DI water. USDA-A1 rated cleaner solution (3fl oz/1 gallon water) was applied at 63°C for 15 minutes. Plates were rinsed with room temperature DI water.

Chlorinated Alkali Detergent (CAD) wash

Plates were submerged in hot (63°C) distilled water and chlorinated alkali detergent (3fl oz/1 gallon water) for 15 minutes. Plates were rinsed with room temperature DI water. Food grade degreaser solution (3fl oz/1 gallon water) was applied at 63°C for 15 minutes. Plates were rinsed with room temperature DI water.

Acid Detergent (AD) wash

Plates were submerged in hot (63°C) distilled water and acid detergent (1:5) solution for 15 minutes. Plates were rinsed with room temperature DI water. Food grade degreaser solution (3fl oz/1 gallon water) was applied at 63°C for 15 minutes. Plates were rinsed with room temperature DI water.

Quantification

Allergen residues were tested with commercial test kits (Veratox Allergen Test Kits, Neogen Corporation, Lansing, MI.) in conjunction with the development of a standard curve. SAS 9.2 software was used to compare treatments and surfaces ($\alpha = 0.05$).

Results

A standard curve was constructed for the quantification of each food allergen. Figure 1 shows the standard curve for peanut allergen. Figures 2, 3, and 4 show allergen % reductions for peanut, milk, and egg, respectively. For all three allergens, JPA and CAD resulted in the highest % reductions (close to 99% for all surfaces), while AD resulted in the least allergen % reduction. This was the case for both abraded and unabraded stainless steel surfaces.

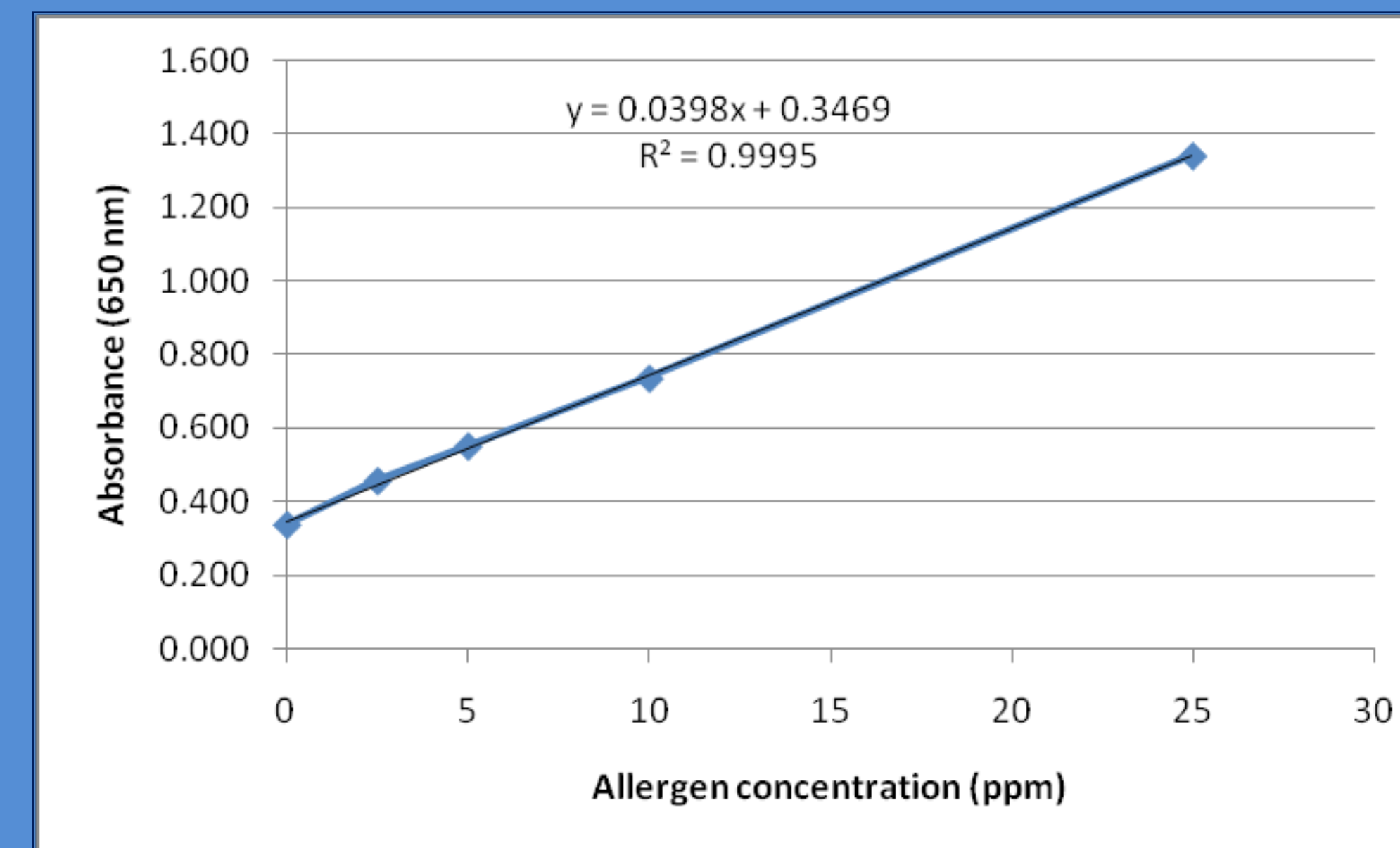


Figure 1- Standard curve for peanut allergen quantification

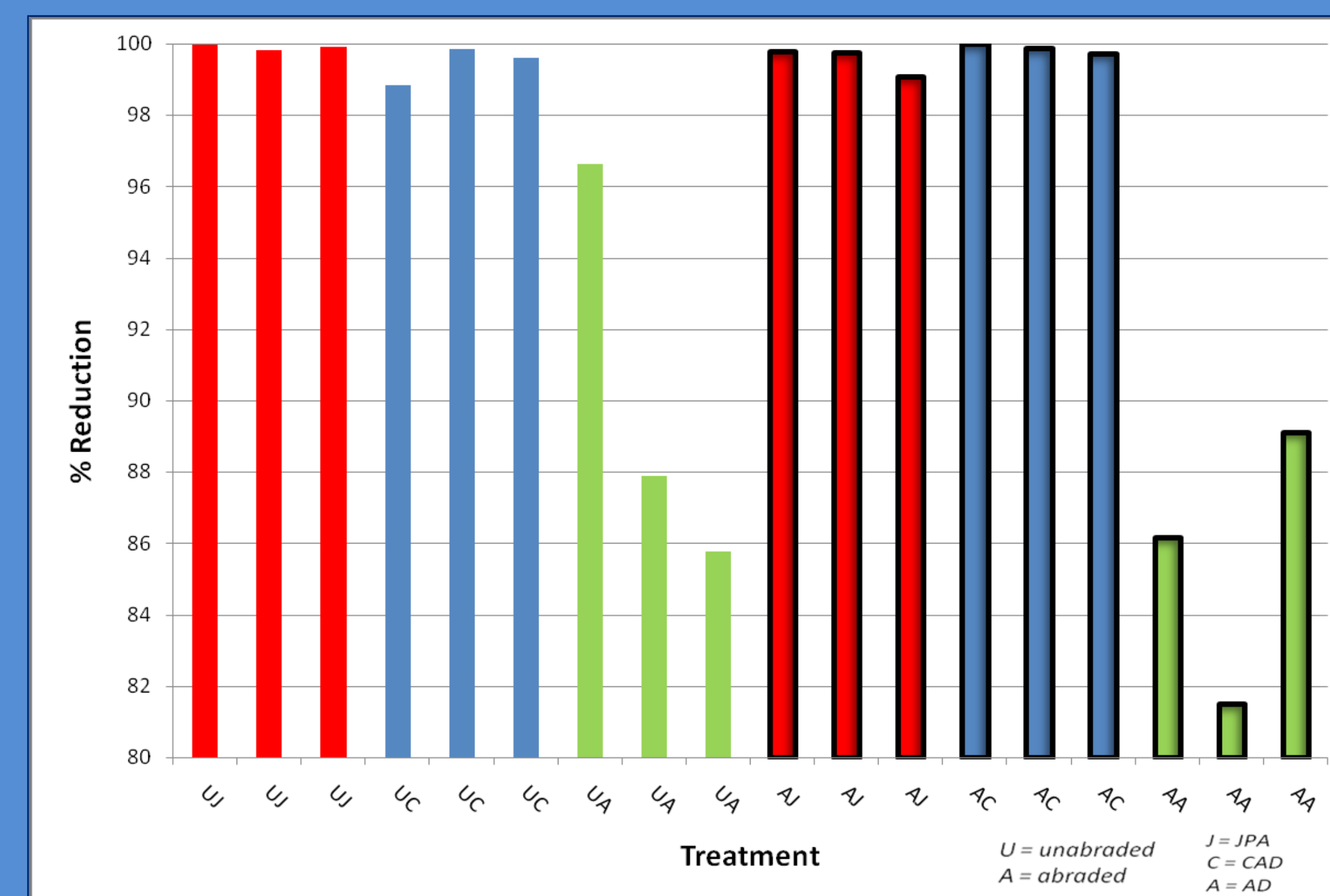


Figure 2- Peanut allergen reduction across methods

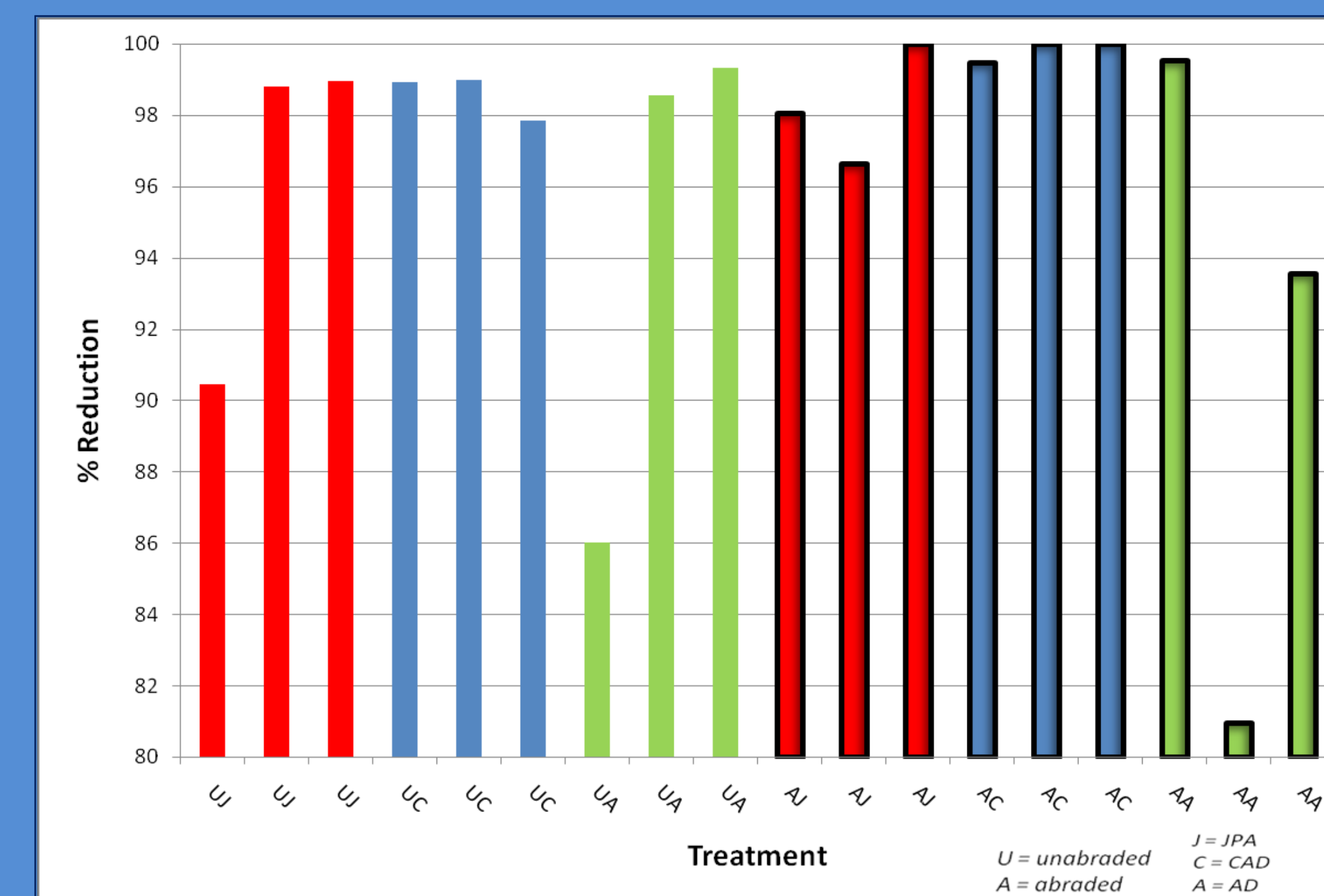


Figure 3- Milk allergen reduction across methods

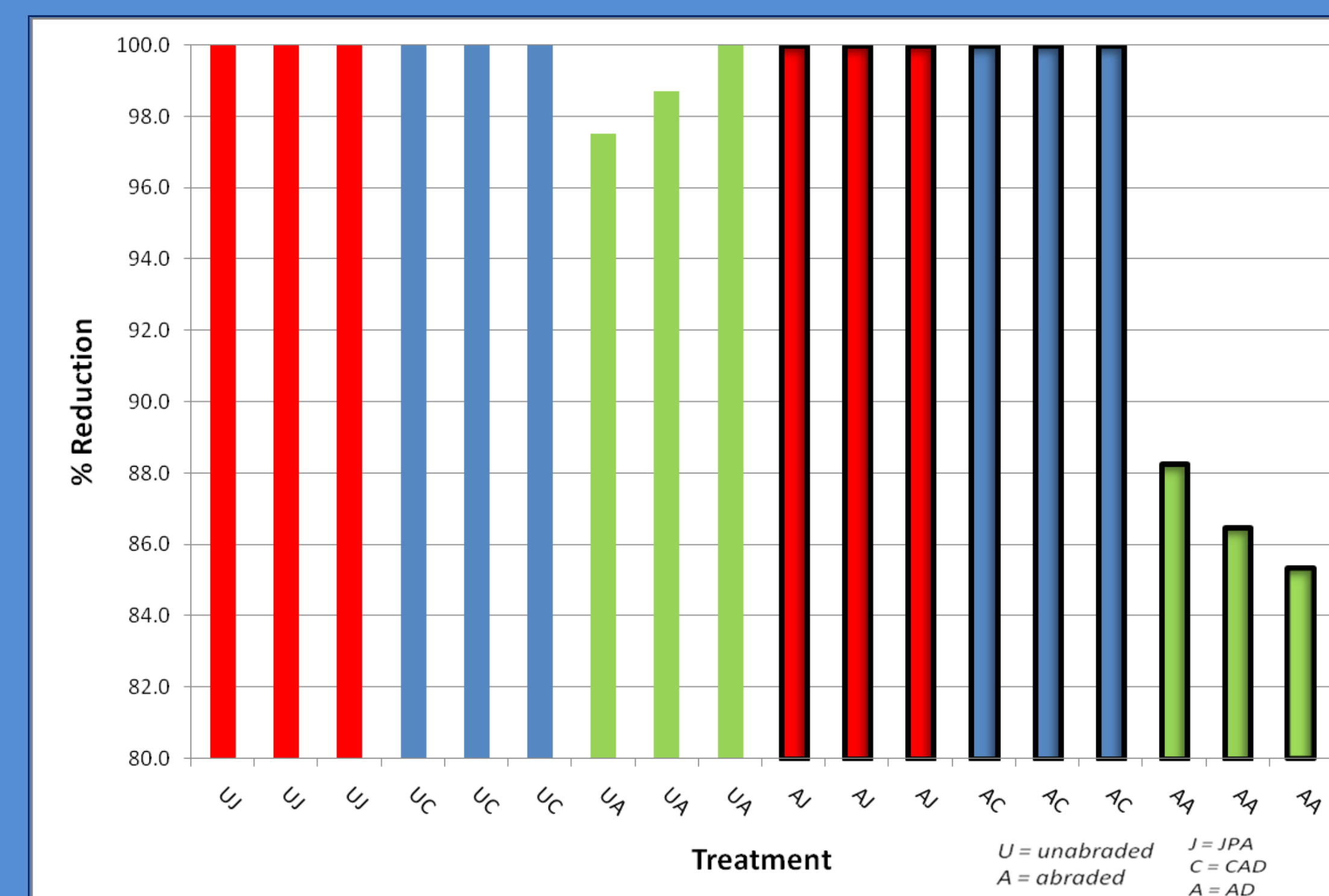


Figure 4- Egg allergen reduction across methods

Conclusions

According to the statistical analysis, there were no significant differences between CAD and JPA type 4 wash protocols for any of the three allergens, but these were significantly different from AD wash in all three cases. There were significant differences between abraded and unabraded stainless steel surfaces for peanut and egg allergens, but not for milk allergens.

For peanut allergens, AD was the least successful cleaning protocol with an average reduction of 86% and 90% for abraded and unabraded stainless steel, respectively. These results contradict a previous study where AD was found to effectively remove peanut butter residues at 62.8°C (Jackson 2004). Although not significantly different, CAD was found to be more effective than JPA type 4 wash.

For milk allergens, AD was only able to reduce an average of 91% and 96% for abraded and unabraded stainless steel, respectively. CAD was the most successful method with over 99% reduction for both types of surfaces. Studies by Jackson et. al. (2005) had reported similar findings.

For egg allergens, JPA and CAD achieved 100% reductions in abraded and unabraded coupons. AD wash achieved an average of 87% and 98% reductions for abraded and unabraded surfaces, respectively.

Significance

The benefits of an effective allergen removal protocol are countless, including prevention of cross-contamination, which leads to safer products on the shelves, and ultimately the well-being of the end user by avoiding dangerous allergic reactions. The food industry will benefit from these techniques by ensuring allergic consumers that their products do not accidentally contain allergens.

Interestingly, this study shows that three common cleaning protocols regularly used in the food industry did not yield the same results.

References

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- Jackson L S and others. 2004. Effect of cleaning on removal of peanut allergens from food-contact surfaces. Book of abstracts. Institute of Food Technologists Annual Meeting Session 54I-1.

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