

Do not blame rinsing hands during cooking!

Octavian Augustin Mihalache, Daniela Borda, Corina Neagu, Paula Teixeira, Solveig Langsrud, Anca Ioana Nicolau

Introduction

Consumers' hand hygiene practices during meal preparation plays a critical role in reducing the risk of cross-contamination and accidental ingestion of foodborne pathogens. The aim of the study was to assess the efficacy of several hand cleaning procedures in the removal of bacteria and dirt from hands.

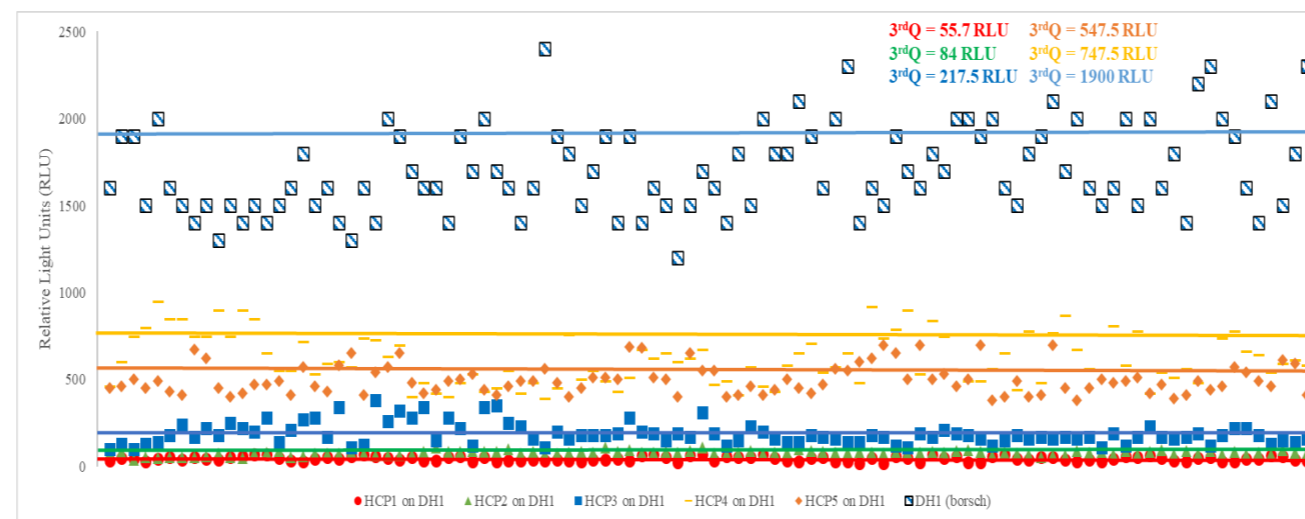
Methodology

The experiment was carried out at the Faculty of Food Science and Engineering from the Dunarea de Jos University of Galati, Romania. A convenience sample of 100 people, representing either students or technical staff, voluntarily participated. In order to assess the effectiveness of HCPs on dirt removal, participants were asked to wash to contaminate their hands artificially with borsch or borsch + oil. For measurements, the participants were asked to dip their right hand into a jar with sterile water and clench and open their fist for 20s. The dirt released into the water was considered as total dirt when a hand cleaning procedure was not applied and as remnant dirt when a hand cleaning procedure was applied. The dirt that was released into the sterile water was measured using a bioluminescence test: HyLite pens were used to collect the water samples immediately after the participants removed their hands from the water to avoid dirt sedimentation. The bioluminescence reaction was initiated by mixing the water with the pens' reactants (luciferin/luciferase). A HyLite 2 luminometer was used for the readings, reported as Relative Light Units (RLU).

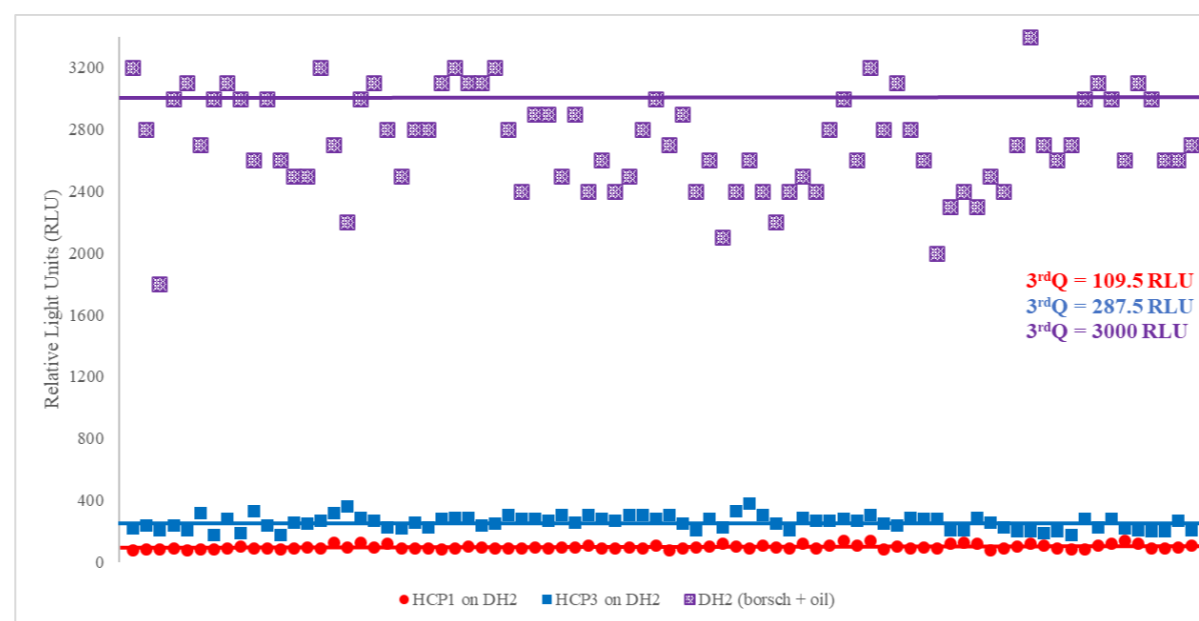


Methodology of assessing hand hygiene

Results



Quantification of remnant dirtiness for all HCPs on DH1 (borsch); HCP1 (red) - Washing hands for 20 s with running warm water (40 ± 2 °C) and soap, then wiping hands with paper towel; HCP2 (green) - Washing hands for 20 s with running cold water and soap, then wiping hands with paper towel; HCP3 (dark blue) - Rinsing hands for 5 s with running cold water, then wiping them with paper towel; HCP4 (yellow) - Wiping hands for 20 s with wet wipes; HCP5 (orange) - Wiping hands for 20 s with antibacterial wet wipes



Quantification of remnant dirtiness after applying HCP1 and HCP3 on DH2 (borsch + oil); HCP1 (red) - Washing hands for 20 s with running warm water (40 ± 2 °C) and soap, then wiping hands with paper towel; HCP3 (dark blue) - Rinsing hands for 5 s with running cold water, then wiping them with paper towel

Efficacy of the tested hand cleaning procedures on DH1 and DH2 scenarios

RLU on hands	Mean value, RLU	Efficacy, %	Grouping letter*
DH1 contamination	1708		
Warm water + soap	45.1	97.3	A
Cold water + soap	77.2	95.4	B
Rinse	188	88.9	C
Wipe with wet tissue	618	63.8	D
Wipe with antibacterial tissue	498.6	70.8	E
DH2 contamination	2725		
Warm water + soap	100.1	96.3	F
Rinse	258.5	90.5	G

DH1 – first scenario of contamination (borsch); DH2 – second scenario of contamination (borsch + oil); *Means that do not share the same letter are significantly different at $p < 0.01$.

Conclusions

Washing hands with warm water and soap for 20 s is the most effective method when the hands are either **dirty or greasy**.

Rinsing under running water for 5 s, a routine during meal preparation, **removes 90% of the hands' dirtiness**.

Visualisation of dirt removed from hands after applying different cleaning procedures may help consumers understand better **the importance of hygiene** both in kitchens and other life situations.

Acknowledgments

This research was supported by the Horizon 2020 project Safe Consume (Grant Agreement No. 727580).

Further information

Mihalache, O. A., Borda, D., Neagu, C., Teixeira, P., Langsrud, S., & Nicolau, A. I. (2021). Efficacy of removing bacteria and organic dirt from hands—a study based on bioluminescence measurements for evaluation of hand hygiene when cooking. *International Journal of Environmental Research and Public Health*, 18(16), 8828.