UV-C light as an effective technology for extending the shelf-life of meat products: from laboratory scale to industrial applications

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INTRODUCTION

The application of ultraviolet light (UV-C) in the food industry, as an emerging non-thermal technology for the decontamination of food products, has been widely investigated in the last years. Although there is a lot of information available concerning the lethality of UV-C light, the efficacy of the UV-C depends on a variety of factors such as the operational parameters of the UV-C equipment, the initial microbial load and the characteristics of the food product (composition, surface roughness, size, etc.) that should be considered not only at lab scale but also when industrializing the process.

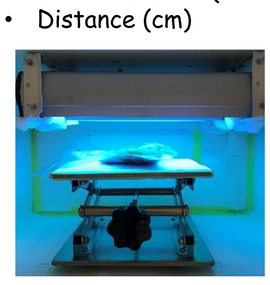
OBJETIVE

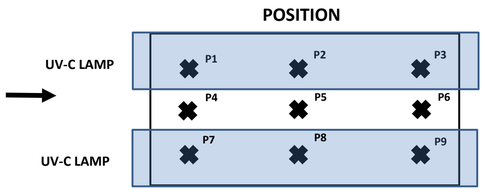
To evaluate the effect of UV-C light on the microbial load of fresh meat, both after the treatments and along its shelf-life at 4°C, from laboratory to pilot plant scale.

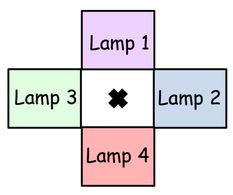
METHODOLOGY

1. CHARACTERIZATION UV-C EQUIPMENTS

- UV- lamps 32 W model VL-208G (Vilber)
- UV-C radiation (mW/cm²) UVX™ Radiometer (Analytik Jena)
- Distance (cm)







2. EFFECT OF THE UV-C TREATMENT ON THE MICROBIOTA

LIQUID S. *Typhimurium* SL1344 5 CFU/mL → 2,4,5,6 mW/cm² (UV-C) Exposure times (s): 5,10,15 → TSA+YE (37°C/ 24h)

SOLID Bacon samples

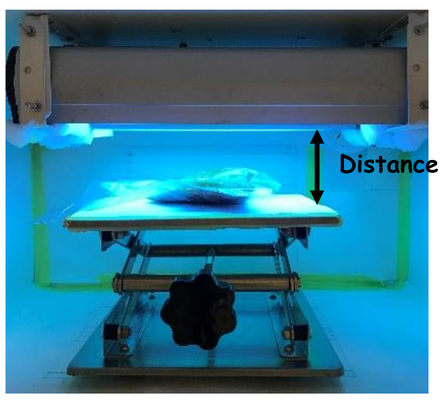
5x5 CM

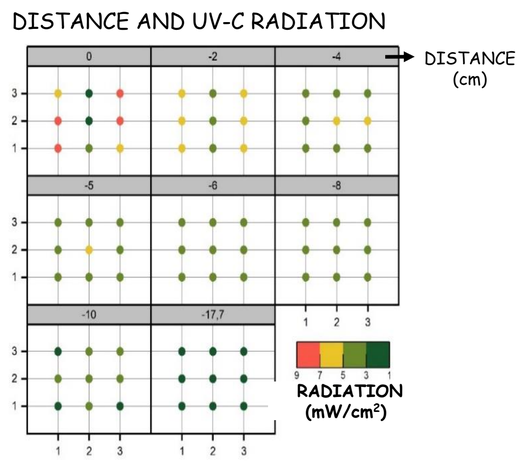
25X50 CM

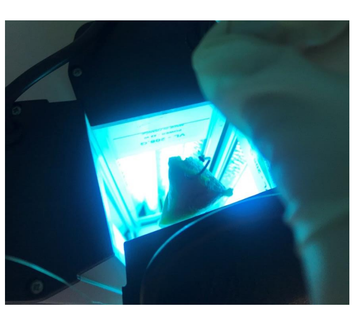
→ 5 mW/cm² (UV-C) Exposure times (s): 15, 30, 60, 120, 300 → Mesophilic bacteria (CFU/g) TSA+YE (30°C/ 48h)

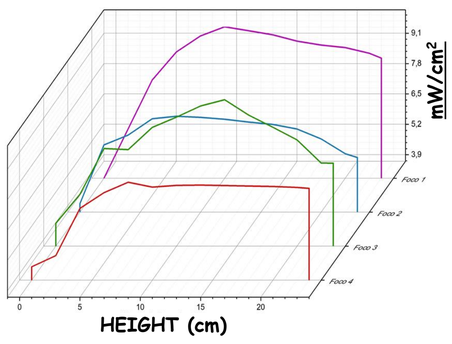
SHELF LIFE (aerobiosis/4°C/72h)

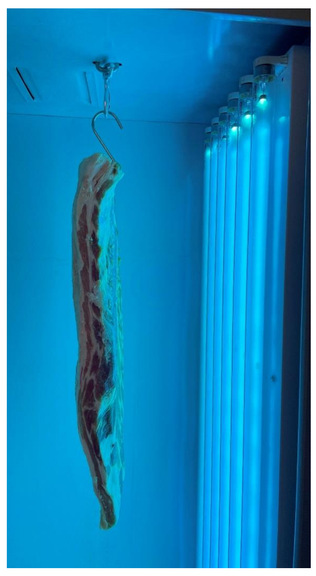
RESULTS





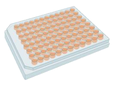


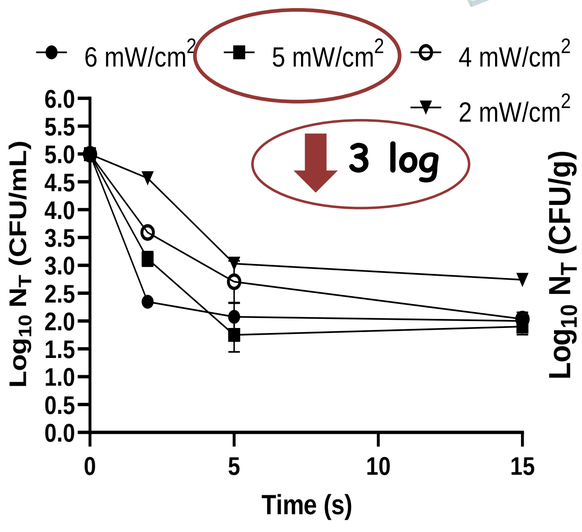




LIQUID

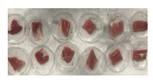
(S. *Typhimurium* SL1344)

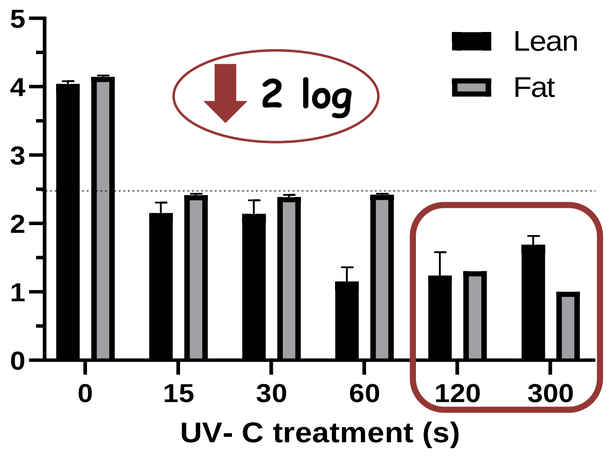




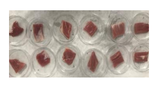
SOLID

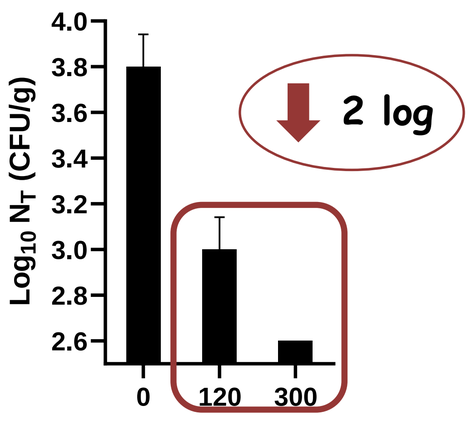
PIECES (5X5 CM) ONE SIDE (5 mW/cm²)



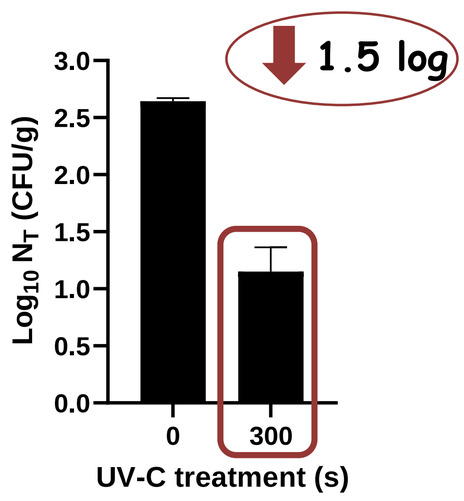


PIECES (5X5 CM) BOTH SIDES (5 mW/cm²)



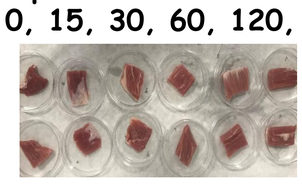


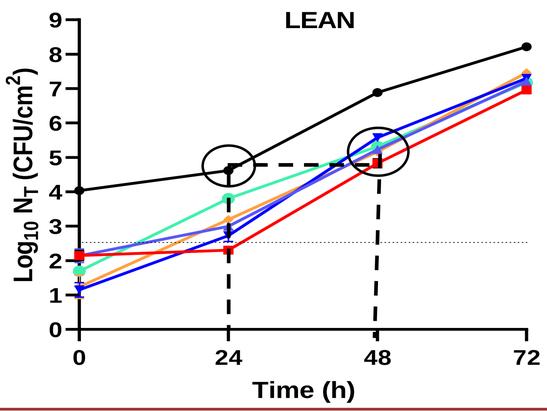
PIECES (25X50 CM) BOTH SIDES (5 mW/cm²)



SHELF-LIFE STUDY

Aerobiosis/4°C/72h
Exposure times UV-C (s): 0, 15, 30, 60, 120, 300





CONCLUSIONS

The results of this study highlight the UV-C light as a promising technology for reducing the microbial load of fresh meat and extending its shelf life, being suitable for industrial application.

Acknowledgements

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