

INTRODUCTION

Listeria monocytogenes is a pathogenic bacteria for humans. It is ubiquitous and can contaminate food through contact with contaminated surfaces^[1]. This bacterium is found in food processing plants^[2] in which several strategies are used to eliminate its presence as UV-C radiation (200 to 280 nm)^[3] y^[4].

AIM

The purpose of this study was to determine the bactericidal effect of UV-C light (wavelength 254 nm, 163 mWs/cm²) on conveyor belt surfaces in the deboning room of a high throughput meat producing plant during the regular operation.

METHODS

Different doses of UV-C (between 38 and 405 mWs/cm²) were studied on the survival of LM ATCC19111 in cultures on Tryptone Soy Agar plates and in polyethylene coupons of 150 cm² (clean and with meat remains). Agar plates were inoculated with 10² and 10³ CFU and coupons with 10⁵ CFU. In the abattoir, the continuous application of a dose of 163 mWs/cm² on the conveyor belt during the production day was evaluated on three different days. Samples were swab-surface samples collected from UV-C exposed and non-exposed areas of the conveyor belt surface.

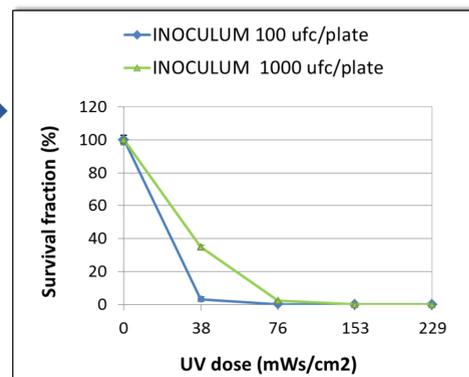
Listeria spp, total mesophilic aerobic (APC), *Escherichia coli* (EC) and total coliforms (CB) of areas exposed and not exposed to UV-C were enumerated on 3M® Petrifilm plates. Results were log transformed for analysis and the mean logs for the treatments were compared using SPSS IBM software.



Fig 1. A) Position of the UV-C germicidal emitting lamps. B) Picture shows the areas directly exposed and non-exposed to the UV-C light. C, D) Frame and sampling place along the production line.

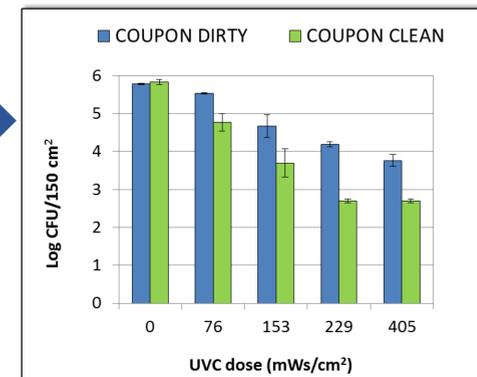
RESULTS

Fig. 2. Effect of UV-C application on TSA_{YE} plate on LM expressed as a survival fraction.



Reductions of *L. monocytogenes* of 3 log CFU/plate (equivalent to an area of 65 cm²) were obtained with a dose of 153 mWs/cm² of UV-C radiation.

Fig 3. Efecto de la aplicación de UV-C en cintas sobre LM expresados como Log (ufc/150 cm²).



The reduction achieved with a dose of 153 mWs/cm² in the coupon model was 1.1 and 2.1 for clean and dirty.

Table 1. *Listeria* (log CFU / 100 cm²)

Day	UV-C			Control		Mean log reduction
	Nº of samples	Nº (%) of samples above LOD ^c	Mean log CFU/100 cm ²	Nº (%) of samples above LOD ^c	Mean log CFU/100 cm ²	
2	7	4 (57)	1,2a	7 (100)	1,9b	0,7
3	10	3 (30)	1,3a	10 (100)	3,0b	1,7

a,b: mean values within a row followed by a different letter are significantly different (P 0,05). Control, non UV-C exposed samples; UV-C, UV-C exposed samples. c: Number of samples for which plate counts were above the limit of detection (LOD) of the 10 CFU/ 100 cm².

Table 2. Mean AC for each day (log CFU / cm²)

Day	AC			
	Control	UV-C	Log reduction	Nº of samples
2	4,1a	2,5b	1,6	23
3	4,3a	2,5b	1,8	21

a,b valores en una misma fila seguidos de una letra diferente son significativamente diferentes (P 0.05). a,b mean values followed by a different letter are significantly different (P 0.05).

Table 3. Mean CB and EC for each day (log CFU / 100 cm²)

Day	CB				EC			
	Control	UV-C	Log reduction	Nº of samples	Control	UV-C	Log reduction	Nº of samples
2	4,6a	2,5b	2,1	23	3,8a	2,1b	1,7	23
3	4,7a	2,7b	2,0	29	4,4a	2,5b	1,9	21

a,b mean values within a row for the same microorganism followed by a different letter are significantly different (P 0.05). Control, non UV-C exposed samples; UV-C, UV-C exposed samples.

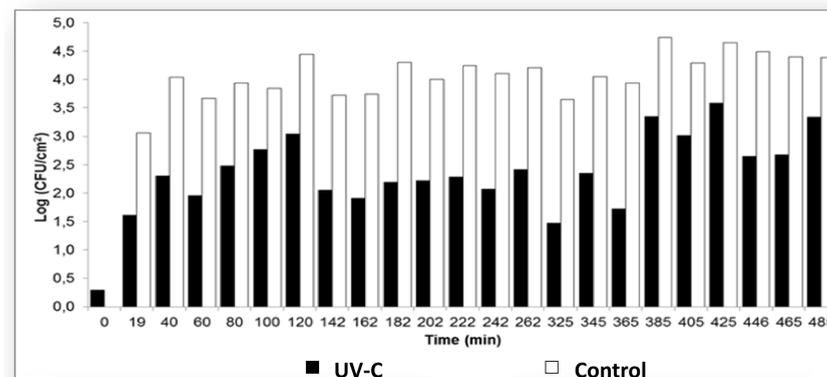


Fig 4. Effect of UV-C irradiation on the (AC) expressed as log (CFU/cm²) over time.

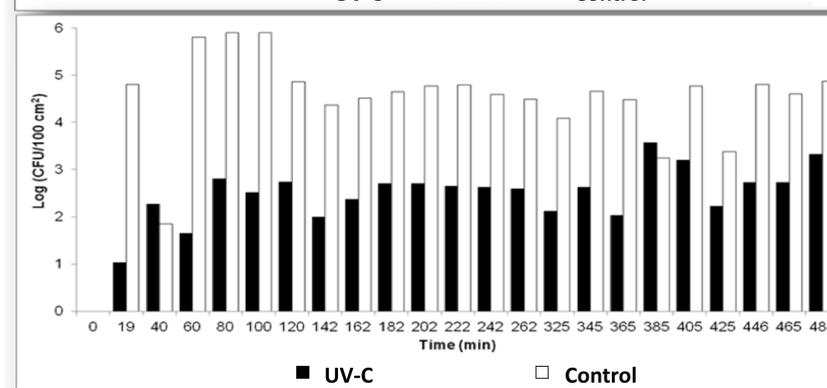


Fig 5. Effect of UV-C irradiation on coliform bacteria (CB) expressed as log (CFU/100 cm²) over time.

Dose of 163 mWs / cm² applied on the conveyor belt produced a significant decrease (p <0.05) in all microbial counts in the areas exposed to UV-C, maintaining this trend throughout the 8 hours of production.

CONCLUSION

The application of UV-C (163 mWs/cm²) on the conveyor belts of the abattoir reduces *Listeria* and the overall microbiological contamination of the surfaces that come in contact with meat contributing to the reduction of the microbiological contamination in the final product. The UV-C bactericidal effect will be observed independently of the operating conditions of the meat plant, and will add an extra hurdle for bacterial growth to the ones already used in the meat plant.

REFERENCES

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CONTACT INFORMATION

Dra. Caterina Rufo:
E-mail. crufu@fq.edu.uy