

## Combined effect of steam and lactic acid treatment for inactivating *Salmonella enterica* Serovar Enteritidis on chicken skin

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### Introduction

Raw poultry carcasses are often contaminated with pathogens, including *Salmonella spp.*, *Campylobacter jejuni*, and *Listeria monocytogenes*. Further to best management practices in husbandry, slaughtering and processing, decontaminating treatments might be required.

A previous study<sup>1</sup> has shown that combining heat and lactic acid treatments for decontaminating chicken skin inoculated with *Listeria innocua* seems particularly promising as it cumulates the advantages of each treatment: an immediate bacterial reduction due to heat treatments while acid treatments lead to a bacteriostatic or bactericidal effect during storage. After 7 days of storage at 4°C, the combined treatment was even more effective than each single treatment.

In the present work, the effectiveness of combined heat and lactic acid treatment for inactivating *Salmonella enterica* Serovar Enteritidis was evaluated.

### Methodology

Chicken skins were inoculated with *Salmonella enterica* Serovar Enteritidis ( $7 \log_{10}$  cfu.cm<sup>-2</sup>) and treated with steam (temperature 100°C, duration 8s) and/or lactic acid (5% v/v for 1 min at 25°C). Surviving bacteria on the skin were enumerated immediately after treatment and after 7 days of storage at 4°C. Bacterial concentration was expressed in  $\log_{10}$  cfu.cm<sup>-2</sup>. Each treatment was repeated 10 times.

### Results and discussion

Single heat treatment reduced immediately the bacterial count by more than  $4.5 \log_{10}$  and no growth of the surviving bacteria was observed during storage.

The lactic acid treatment applied alone was less effective (reduction of  $1.5 \log_{10}$ ) but the reduction significantly increased during storage to reach  $3.1 \log_{10}$ .

Combining heat and acid treatments improved significantly the reduction in bacterial counts ( $6.2 \log_{10}$  immediately and  $6.6 \log_{10}$  after storage). Heat shock did not enhance acid resistance of *Salmonella* Enteritidis which is in accordance with others studies (Leyer 1993).

### Conclusion

Combining mild steam and lactic acid treatments improved the reduction of *Salmonella* Enteritidis on chicken skins (the main site of contamination) and might thus enhance the safety of poultry products.

1. Lecompte J.-Y., Kondjoyan A., Sarter S., Portanguen S., Collignan A., 2008. Effects of steam and lactic acid treatments on inactivation of *Listeria innocua* surface-inoculated on chicken skins. International journal of food microbiology, 127, 155-161.

2. Leyer G.J. and Johnson E.A., 1993. Acid adaptation induces cross-protection against environmental stresses in *Salmonella typhimurium*. Applied and environmental microbiology, 59, 1842-1847.