Safety of shell eggs as affected by rate of heating during pasteurization to inactivate *Salmonella* Enteritidis

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INTRODUCTION

- *Salmonella enterica* serovar Enteritidis (*Salmonella* Enteritidis) in shell-eggs have caused numerous outbreaks in US (1–4).
- Egg pasteurization: 5-log reduction of *Salmonella* in the yolk of shell eggs.
- Due to quality concern, slow heating rate during temperature come-up stage is practiced in commercial pasteurization.

HYPOTHESIS

Slow heating rate during temperature come-up constitutes a thermal stress that triggers hazardous responses in the *Salmonella*. Such response could increase *Salmonella* resistance to further processing and could be associated with increased virulence of the pathogen.

AIM

To understand how different heating rates during come-up stage could affect:

1. The expression of *Salmonella* heat-resistance genes
2. The heat resistance of *Salmonella* during the holding stage and cooling stage
3. the expression of *Salmonella* virulence genes.

METHODS

Objective 1 and 3:

- Remove eggs from incubators for transcriptomic analysis using RT-qPCR

Objective 2:

- Monitor changes of bacterial population during cooling stage

RESULT

Figure 5. Expression of virulence when egg internal temperature reached 42°C and 47°C, and after eggs were cooled at 30°C for 15min.

Figure 3. Expression of stress response genes when egg internal temperature reached 42°C and 47°C, and after eggs were cooled at 30°C for 15min.

- Slow heating rate during come-up stage increased heat resistance of *Salmonella* at holding stage and at cooling stage.
- Slow heating rate during come-up stage caused more profound heat stress response

SIGNIFICANCE

- New egg pasteurization design is required.

BIBLIOGRAPHY


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