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Science et technologie du lait et de l'œuf

MicroBio team

Microbiology of milk and egg sectors

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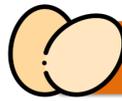
Keywords

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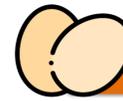


Ovotransferrin: a multifunctional protein involved in the passive immunity of egg white



Socio-economic context

- Hen's eggs are consumed all over the world, with an annual production of about 70 million tonnes (Zaheer *et al.*, 2015)
- *Salmonella* spp. is the second most important pathogen involved in food-borne diseases
- Six hundred and ninety-four outbreaks involving salmonellosis were due to egg consumption in 2020 in the EU, of which 67% were due to *Salmonella enterica* serovar Enteritidis



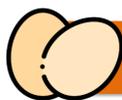
Scientific context

- Egg white is composed of several antimicrobial proteins of which ovotransferrin is the first representative (13 g/L)
- Ovotransferrin is involved in the antimicrobial activity of egg white due to its iron-chelating activity (Baron *et al.*, 1997)
- Ovotransferrin is also able to induce membrane damage in *E. coli* (Aguilera *et al.*, 2003)
- Egg white induces bacterial membrane damage in *S. Enteritidis* (Huang *et al.*, 2019)



Research question

What is the mechanism of action of ovotransferrin against *S. Enteritidis* under egg white conditions (alkalinity, high viscosity, specific ionic composition, and presence of other egg white antimicrobial proteins)?



Expected results

- Development of a synthetic medium mimicking egg white condition (same ionic composition and pH)
- Better understanding of the iron-chelating activity of ovotransferrin in egg white
- Better understanding of the impact of ovotransferrin on *S. Enteritidis* membranes under egg white conditions
 - Permeabilisation of the outer and inner membranes?
 - Depolarisation of the inner membrane?
 - Membrane damage
 - Release of the lipopolysaccharides (LPS) from the outer membrane?
 - Change in phage shock protein (*psp*) gene expression?



Perspectives

- There remains a need to clarify the role of ovotransferrin in egg white defense against bacteria and the impact of storage and technological practices on ovotransferrin degradation and activity
- A more complete understanding of ovotransferrin activity in egg white may suggest modifications of hen diet and egg-storage practices that could improve the antimicrobial activity of ovotransferrin in egg white and thus reduce the risk of microbial contamination and food poisoning