

## **Risk assessments of *Listeria monocytogenes* in Dutch-type semi-hard cheese: incorporating variance in both product parameters and microbial growth parameters**

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### **Objective**

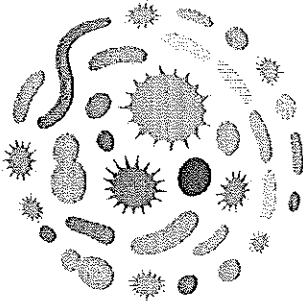
Since *Listeria monocytogenes* was recognized as a causative foodborne agent of listeriosis, Dutch-type Gouda cheeses made from pasteurized milk have not been associated with growth of this organism. To further support the microbiological safety of these cheeses, compounds with potential bacteriostatic or bactericidal action against *L. monocytogenes* were identified and the natural variation in concentrations was evaluated (experimentally and through literature review). In addition, the sensitivity of *L. monocytogenes* for these compounds was determined using a variety of strains and literature review. The variability of compounds present in Gouda cheese and sensitivity amongst *L. monocytogenes* strains were subsequently incorporated in a risk assessment model to predict the fate of *L. monocytogenes* in Gouda cheese.

### **Results**

Compounds that potentially inhibit *L. monocytogenes* in Gouda were identified as organic acids, calcium, sodium, diacetyl, lactoferrin, lactoperoxidase, lysozyme, nitrate, nitrite and nisin. Of the potential inhibiting compounds in cheese, undissociated lactic acid has the largest inhibiting effects on *L. monocytogenes*. Additional experiments were performed to assess the efficacy of undissociated lactic acid to inhibit 6 different strains of *L. monocytogenes* at pHs relevant to cheese (pH 4.2-6.0). By taking the variation of both product parameters and microbiological growth parameters into account, critical factors for growth inhibition of *L. monocytogenes* in Gouda cheese can be identified. This approach is applicable to all bacteria in all kinds of liquid, soft or (semi)hard foods.

### **Conclusions**

Together with pH, temperature and water activity, undissociated lactic acid has a prominent role in inhibition of *L. monocytogenes* in Gouda cheese. Undissociated lactic acid has now been incorporated into a predictive model on the fate of *L. monocytogenes* in Gouda cheese in time.



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**ABSTRACTS**

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