

Lactone formation ability of a chosen *Lactococcus lactis* subsp. *lactis* var. *diacetyllactis* strain from the Agroscope Strain Collection during fermentation in cream

Matteo A. Lucchetti^{a,b}, Silvia Mallia^b, Alexandra Baumeyer^b, Barbara Guggenbühl^b, Katharina Breme^b

^a*Università degli Studi dell'Insubria, Faculty of Sciences, via Dunant, 3, 21100 Varese, Italy*

^b*Agroscope, Schwarzenburgstrasse 161, 3003 Bern, Switzerland*
katharina.breme@agroscope.admin.ch

Lactones are potent flavour compounds that contribute to creamy, fruity and coconut-like notes in milk products. Although their chemical formation in milk products from hydroxy-fatty acid triglycerides is accepted, their production by lactic acid bacteria (LAB) and the metabolic pathways are to date still uncertain.

Here we report on the investigation of a potential microbial formation of lactones in cream with and without addition of hydroxy-fatty acids (HFA), supposed precursors of lactones. The strain of *Lc. lactis* subsp. *lactis* var. *diacetyllactis* FAM18027 was selected out of 65 strains of different LAB species from the Agroscope Strain Collection for its ability to develop buttery and fruity aroma notes in cream during fermentation. Full-fat cream was fermented by FAM18027 at 30 °C for 24 h, with and without HFA supplementation. In addition, the same conditions were used to incubate cream without addition of bacteria. in presence or absence of HFA.

The formation of lactones was evaluated by head-space solid phase microextraction-gas chromatography-mass spectrometry (HS-SPME-GC-MS).

δ-Octalactone and δ-decalactone were the main volatile lactones found in the samples. GC-MS analyses revealed an increase of the signals of these two lactones after 4 h of fermentation already. Addition of HFA in presence of FAM18027 seemed to slow down the fermentation, which led to a slower acidification and less pronounced lactone formation. Especially the formation of δ-octalactone was affected by HFA addition, resulting in a reduced formation and in an approximately three times lower signal after 24 h of fermentation.

The results clearly show that GC-MS signals of δ-octalactone and δ-decalactone in cream fermented with LAB were higher than in samples incubated without LAB. It can hence be concluded that FAM18027 formed lactones during fermentation at 30°C.

Thus, LAB strains such as FAM18027 may be used to increase the flavour of fermented cream and sour cream butter.

References:

- Parliament T.H. *et al. J. Dairy Sci.* **49**, 1109–1112. 1966.
McSweeney P.L.H., Sousa, M.J. *Lait*, **80**, 293–324. 2000.
Wanikawa, A. *et al. J. Am. Soc. Brew. Chem.* **58(2)**, 51–56. 2000.
Alewijn, M. *et al. Int. Dairy J.* **17**, 59–66. 2007.

Acknowledgement: The authors thank the Bioflavour COST Action FA0907 for financial support for an STSM for M.A. Lucchetti.