A paradigm in cheese production - using cellular automaton modeling to reduce cheese ripening time

Period:	January 2015 – December 2017
Budget:	5.266.065 DKK
Funding:	The Danish Milk Levy Fund (Mælkeafgiftsfonden)
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Aim:

The aim of this project is to establish a new paradigm in cheese processing combining a mathematical modelling approach based on the principles of "cellular automaton" and well defined laboratory experiments to determine the minimal ripening time without compromising quality (taste and texture).

Description:

Cheese ripening is an expensive process that costly in terms of capital tied up in the cheese that are stored during ripening and in energy used to keep the correct temperature during ripening. In order to achieve the most efficient ripening, in as short a time as possible, it is important for each cheese that is put into production, to determine under which physical and chemical conditions the interaction between the selected starter bacteria and non-starter bacteria work together at its optimum, so that the degradation of casein peptides into amino acids and subsequent conversion to essential flavors happens as quickly as possible and without compromising the quality in terms taste and texture. In this project we establish a new method/paradigm in cheese ripening, where a mathematical model based on the principles of so-called "cellular automaton" will be combined with the development of specific laboratory methods used to obtain the necessary input data for the model, including growth and autolysis of bacteria and diffusion rates of key metabolites. It is expected that by applying this method the ripening time of a number of Danish produced cheeses can be reduced significantly. In future the method may also be used for other purposes, including the prediction of optimal conditions for extended shelf life, as well as prediction of the microbial safety.