

## **PhageWarn: Development of a phage problem warning system for dairies using undefined DL-starter cultures**

**Period:** January 2016 - December 2018  
**Budget:** 9,694,565 DKK  
**Funding:** The Danish Milk Levy Fund  
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### **Aim**

PhageWarn will develop an early phage problem warning system for dairies using undefined DL-starter cultures with the aim of ensuring optimal fermentation control, efficient use of resources and consistent production of high quality cheeses.

### **Description**

Despite many years of technological improvements and development of alternative starter culture propagation and inoculation systems, phage attacks continue to constitute a significant challenge at dairies using undefined DL-cultures. Using traditional acidification assays it is possible to monitor the current situation of acidification problems due to bacteriophage attacks, but it does not provide any means to predict the acidifications problems before it is too late to implement corrective measures. In PhageWarn we will develop a warning system based on modern molecular detection methods in combination with mathematical modelling. With such a system in place corrective measures can be carried out in due time before significant problems arise in the production.

In the recent MetaPhageLAB project we have learned that it is not only the number of bacteriophages, but particularly the diversity of bacteriophage strains that determines if acidification problems will arise. We will develop a high throughput quantitative PCR method to monitor the quantitative changes in phage diversity over time. Furthermore, studies will be carried out both in laboratory-systems and later also in selected dairies to determine the critical levels of phage diversity before acidifications problems occur. Taken together these studies will be used to develop a mathematical model that based on phage diversity analysis can predict phage problems before they arise and in due time to implement corrective measures in the production.