

Ability of acid-induced gels to drain - Understanding of mechanisms and influencing factors by NMR methods

RONDEAU-MOURO C. (1), MONARETTO T. (1), CAMBERT M. (1), QUELLEC S. (1)

¹ INRAE, UR OPAALE, RENNES, France

Acidified milk products like yoghurt are important food products but there are relatively few reports on the mechanisms involved in gel draining and the effects of processing variables such as heat treatment, gelation temperature and milk composition on the important physical properties of acid-induced gels and their draining (whey separation) capacities. There are few proven measurement methods to characterize draining behaviour and kinetics of acid-induced gels, or to prevent draining difficulties. Most studies characterize the spontaneous exudation of gels or its syneresis, but this does not allow to know the behaviour of the curd during a mechanical draining. From a production perspective, the management of acid gel draining is more a matter of field experience and empirical practice than of a systematic technological approach, and when delays in draining occur, curative actions are applied after the fact. Moreover, poor draining can lead to large variations in "quality" of finished products, with consequences for consumer satisfaction. Here, we present time-domain Nuclear Magnetic Resonance (NMR) at low field and Magnetic Resonance imaging as innovative methods in the field to monitor and quantify in real time the whey draining. Different gels with various milk composition, heat treatment, gelation temperature have been studied and compared. Such results aim at providing companies with levers to control acid-induced gel kinetics and exudation phenomena by understanding the molecular mechanisms of draining with the ultimate aim of developing and making available to companies operational tools for prediction and control.