

## **Quantification of the effects of the advanced monitoring on the ripening process, and description of selected monitoring strategy**

The aim of this step of the work (WP2A task 3) on cheese ripening was to develop new instrumentation and monitoring strategies favouring the control of ripening rooms and leading to an increase of process productivity and efficiency. Two types of cheeses were chosen as models, «Saint Nectaire» type cheese (a pressed non-cooked cheese) and Graviere (a cooked hard cheese).

In a first step, a prototype able to control the cheese ripening rooms was designed and then validated during «Saint Nectaire» and Graviere ripening trials. Consequently, key ripening characteristics such as cheese mass loss rate and cheese respiratory activity were calculated in real time. In parallel, air flow pattern measurements and numerical calculations (Computational Fluid Dynamics techniques) allowed an improvement of the ventilation level and the homogeneity of the experimental ripening rooms. New monitoring strategies involving changes in air circulation timing and CO<sub>2</sub> concentration control were defined. This deliverable describes their effects on the ripening process efficiency and on cheese quality.

Sequential air ventilation (circulation cut off for 10 min every 15 min, or for 6 min every 10 min) was tested and compared to continuous air ventilation. This monitoring strategy allows a reduction of energy consumption evaluated at 14%, in average, in our configuration process, and no significant changes were observed on cheese ripening characteristics (kinetic and quality). A reduction of cheese mass loss can also be expected. These results are proposed for a demonstration at the industrial scale (WP6) with the aim to get more accurate and significant data.

For «Saint Nectaire» ripening, a control of the CO<sub>2</sub> concentration at 3% accelerated the ripening process with a quicker increase of the mycelium density and the pH rind, and a lower cheese final firmness.

These changes were linked with higher lactate consumption and proteolysis.