

5th Euro-Global Summit and Expo on

Food & Beverages

June 16-18, 2015 Alicante, Spain

Qualification and traceability of Tuscany milk through NMR-based metabolomics

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Commercial value of dairy products is associated with origin and composition of milk, so information about quality and traceability are necessary. We used ¹H-NMR spectroscopy to profile different types of milk samples: Samples coming directly from 10 stables located in a small region and collected in two different periods; samples of organic and non-organic milk and samples from supermarket collected in three distinct periods. Results showed that through metabolic profile is possible to distinguish samples from their belonging stables, although differences among the seasons are present. Analyzing also feeding rations, we found three different nutritional patterns. Then we grouped the stables belonging to the same nutritional group and we analyzed milk metabolic profiles according to these feeding groups. Results show that milk metabolic profiles are strongly influenced by cow nutrition. The most important difference was between stables fed with silages and not and this fact is very important for the production of dairy products; further, from the analysis of metabolites content we are able to observe a 3-fold decreasing of lecithin in stables not fed with silages. We also correlated spectral data and nutritional data to understand relations between feeding and metabolites, in order to understand if the production of some metabolites can be influenced by cow nutrition. In this study we have demonstrated that ¹H-NMR spectroscopy can be an accurate tool to analyze milk allowing to obtain information about traceability and quality; furthermore it is possible to extract information about feeding of cow and it is important to assess the quality of dairy product.

Biography

Claudio Santucci obtained his Master's degree in Medical Biotechnology at University of Florence in 2017 (110/110 cum laude). He acquired skills about molecular biology during Academic internship and during a Postgraduate internship in a biotechnology company. He worked in the development of PCR-based methods to analyze nucleic acids. In 2012 he has joined CERM. He is a third-year PhD student and he is working on NMR-metabolomics. He has acquired skills about analysis of food products and the effects of diet in human metabolism. He is co-author of two scientific publications about molecular biology and two reviews and three scientific papers about metabolomics.

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