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## BOOK of ABSTRACTS

*draft*



## 1125 - POTENTIAL USE OF THE STABLE ISOTOPE RATIOS OF BIOELEMENTS AND ELEMENTAL COMPOSITION TO TRACE THE ORIGIN OF DAIRY PRODUCTS

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### Introduction:

There is an increasing demand for reliable analytical methods to verify the authenticity of the food we eat. This is also important for PDO dairy products, which can command significantly higher prices than their non-PDO competitors. Stable isotope ratios and elemental composition have been used for discrimination and can be used to verify the authenticity of marketed products. An overview of the use of this approach to trace dairy products is presented here.

### Methods:

Isotope Ratio Mass Spectrometry and Inductively Coupled Plasma Mass Spectrometry methods were developed to characterise and determine the authenticity of different types of dairy products. In particular, the stable isotope ratios (SIRs) of five bioelements- hydrogen, carbon, nitrogen, oxygen and sulphur - were determined in defatted dairy products, whereas elemental composition was determined in the raw product after acid microwave digestion.

### Results:

Geo-climatic and pedo-geological factors affect SIRs in nature and the isotopic variations are ultimately incorporated into animal tissue through eating, drinking, breathing and exchanges with the environment, and are memorised in the resulting dairy products. Similarly, the elemental composition of dairy products is affected by different factors related to the place of origin (e.g. geology and soil characteristics) and animal diet, but also depends closely on the conditions in which such products are made and processed. The combination of these two approaches has led to the development of models able to trace the origin of high premium products. The developed method was applied to test the traceability of PDO cheeses: Italian alpine cheeses (e.g. Fontina, Montasio and Toma) [1, 2], as well as buffalo Mozzarella from the Campania region, Grana Padano and Parmigiano Reggiano [3, 4, 5].

### Conclusions:

This work considers a robust and effective method that can be used to guarantee the authenticity of dairy products to consumers, focusing particularly on cheese. The method is based on determination of stable isotope ratios and the elemental composition of products. Specifically, in the case of PDO Grana Padano and Parmigiano Reggiano cheese, the model has been officially adopted as a reference method for assessing the authenticity of grated and shredded products on the market. Furthermore, this method was recently officially validated and adopted by UNI (Italian Standardisation Body, UNI Regulation 11692:2017).

### Novel Aspect:

The method applied and described has been officially validated and can be used before the courts in legal cases.

### References

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