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TERPENE FINGERPRINT OF DAIRY PRODUCTS FROM ALPINE PASTURES

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Over the past 20 years a great attention was focused to food traceability since the consumer's demand for the knowledge of the exact food origin has been increased. Many tools have been introduced in order to protect food products coming from a specific area, as Protected Designation of Origin and Protected Geographical Indication, but also analytical techniques are called to become very important means to identify the food origin and, as consequence, to limit food adulteration. The identification of suitable molecular markers able to distinguish samples on the basis of different parameters such as geographical origin, transformation process or agronomic treatment is important to define traceability. Many authors have proposed terpenes as biomarkers of the chain plant-animal-milk-cheese;[1] in fact, they are secondary plant metabolites particularly abundant in dicotyledons and, if ingested by herbivores, could be subsequently found in associated milk, cheese and meat.[2] Thus, they could represent suitable markers to trace mountain dairy products with important consequences for the economy of highland pasture areas.

In this research milk and cheese samples were produced from cows grazing different vegetation types of two Italian alpine pastures. Samples were distilled under vacuum and cooled in liquid nitrogen. Distilled aqueous solutions were analyzed by headspace solid-phase micro extraction–gas chromatography/mass spectrometry (HS-SPME–GC/MS) technique, using a divinylbenzene/carboxen/polydimethylsiloxane fiber and 30' of extraction at 53°C.

Results showed that milk and cheese of the two alpine areas were characterized by a different terpene fingerprint, due to pasture-fed. Monoterpenes were more abundant than sesquiterpenes both in milk and cheeses. 19 monoterpenes and 2 sesquiterpenes in milk samples and 27 monoterpenes and 4 sesquiterpenes in cheese samples were found. Also C13-norisoprenoids as α-ionone and β-ionone were detected. Data analysis, in particular the application of Artificial Neural Network (ANN), showed that the terpene profiles allowed to discriminate among dairy products from different alpine pastures. Therefore the HS-SPME–GC/MS technique coupled with the ANN could be used as a tool to define traceability of dairy mountain products.

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2. Mariaca R.G.; Berger T.F.H.; Gauch R.; Imhof M.I.; Jeangros B.; Bosset J.O., Occurrence of volatile mono- and sesquiterpenoids in highland and lowland plant species as possible precursors for flavor compounds in milk and dairy products, J Agric Food Chem, 1997, 45:4423-4434.