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## Volatile compounds of Piedmont Ossolano cheese from highland and lowland farms

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In Piedmont (North West Italy) the cheese-making sector is highly developed in its quantity and quality and cheese manufacturing has always been an important economic and cultural resource.

The "Ossolano" is a typical round semi-hard cheese weighing 8-9 Kg and made using raw whole milk in summer or raw partially skimmed milk in winter exclusively from Bruna Alpina cows. This cheese is produced in the north of Piedmont, in the alpine zone bordering Switzerland.

The aim of this work was to study for the first time the flavour volatile compounds of this cheese and their evolution during summer productions by gas chromatography-mass spectrometry. The survey was carried out on 66 cheese samples, of which 24 were from the summer production of mountain farms located between 1500 m and 2200 m and 42 from winter production of lowland farms. The volatile compounds were extracted with a simultaneous distillation-extraction (SDE) then analysed by gas chromatography coupled with quadrupolar mass spectrometry. A semi-quantification in TIC was performed. Among the more than one hundred and fifty detected compounds, the most important are terpenes, sesquiterpenes and aromatic polycyclic hydrocarbons. Terpenes and sesquiterpenes are present in many plants and in particular dicotyledons and may be considered as biochemical indicators or markers to characterize the geographical origin of cheese. The aromatic polycyclic hydrocarbons derived from the wood combustion and consequently their presence in the Ossolano cheese is due to the use of wood for heating the milk.

The terpenes and sesquiterpenes are present in the summer cheeses because animal feed is based on fresh grass from natural highland pastures. A pasture rich in dicotyledons, mostly located in the highland, gives cheese with more flavour compounds than a pasture rich in gramineae, located in the lowland. Then the concentration of  $\alpha$ -pinene,  $\beta$ -pinene,  $\beta$ -caryophyllene, and other terpenes and sesquiterpenes showed a wide variability during the mountain grazing due to the stages of plant development (some terpenoids are formed only at advanced stages of plant development) and the pastured area.

The concentration of aromatic polycyclic hydrocarbons is higher in highland cheeses than lowland cheeses because, in many farms, wood is used for heating the milk during the cheesemaking. Concentration of linear and branched hydrocarbons is instead higher in lowland cheeses. These compounds are produced by rumen metabolism of gramineae that are particularly abundant in winter hay feed.

The obtained results have underlined that the aroma of Ossolano vary from highland and lowland cheese production, but this variability may be considered the most important and the most appreciated characteristic of this cheese which makes it one of the more important Piedmont cheeses.