

## Both Grass Development Stage and Grazing Management Influence Milk Terpene Content

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**Presenter Information**

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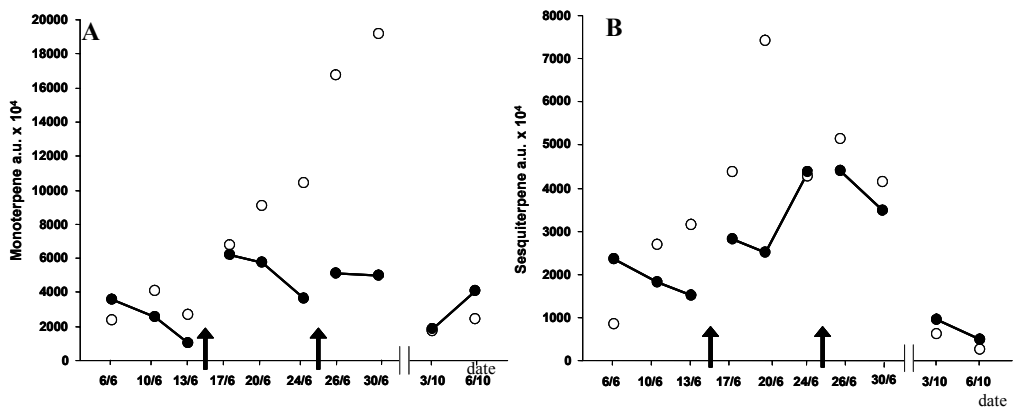
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**Introduction** Terpenes are a wide group of molecules originating from plants' secondary metabolism. Forage terpenes vary according to the botanical composition and in particular to the proportion of plants such as Apiaceae, Lamiaceae or Asteraceae. These molecules are considered effective milk markers for the presence of diversified forages in dairy cow diets. The variation in terpene content in the milk of grazing cows would depend on the period of development of terpene-rich plants and on the grazing management, whereby cows do or do not have the opportunity to choose and to modify the botanical composition of the ingested grass. The aim of this trial was to quantify the respective effects of grass development stage and grazing management on milk terpene content.

**Material and methods** A diversified mountain grassland (1100 m elevation) located in the Cantal (France), was exploited from 31 May to 1 July (first growth) and again from 1 to 6 October 2003 (re-growth). The portion was divided into two parts each grazed by 6 cows, either by strip grazing (SG), the strip limits moving ahead every 2 days or by paddock grazing (PG), the paddock being changed on the 13 and 24 of June 2003. Bulk milk was sampled twice a week for analysis. Volatile compounds were extracted from the milk fat by Purge and Trap Dynamic Head Space, separated by gas chromatography and terpenes were selectively detected by mass spectrometry using their characteristic fragments at 93, 136, 161 and 204 ions. Monoterpenes and sesquiterpenes were semi-quantified by integrating the 93 and 161 ion chromatograms respectively.

**Results** In SG milk obtained in June, monoterpenes increased linearly with time ( $R^2=0.91$ ) up to 8 times the initial value. Sesquiterpenes also increased linearly until 20 June and then decreased. This strong increase was linked with the DM proportion of dicotyledons in the pasture ( $R^2 = 0.51$  and  $0.35$  for mono and sesquiterpene respectively) and strip-grazing cows had limited selectivity of ingested grass.



**Figure 1** Milk mono-(A) and sesquiterpene (B) content evolution  
●: paddock grazing (PG); ○: strip grazing (SG); ↑: paddock changing for PG cows

Milk terpene content in PG at the entrance of cows in to each paddock increased less than in SG milk. PG milk monoterpene content was much lower at the entrance of the third paddock. Milk from re-grown grass was very low in terpenes probably because this grass was almost entirely vegetative, including regrowths of dicotyledons that still account for 20% of the biomass.

**Conclusions** Milk from the SG cows who had limited selectivity of the plants they ate was much higher in terpenes. Our results show that the milk terpenes are fingerprints of both the botanical composition and the grazing strategy.