

## **Cows' feeding and milk and dairy product nutritional and sensory properties: a review.**

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### **Abstract**

This review summarises the recent knowledge established on the relationships between the diet of animals and the sensory and nutritional quality of cattle milk and dairy products. It starts by a rapid overview of the digestive and metabolic pathways involved in the secretion of milk components that play a major role in milk and dairy product nutritional and/or sensory properties. A specific attention is given to fatty acid (FA) composition, carotenoid, retinol and tocopherol contents as well as plant secondary metabolites like terpenoids and phenolic compounds and milk endogenous enzymes. The literature data confirms the wide plasticity of these milk components related to cows' nutritional factors. Feeding dairy cattle with pastured grass in comparison with diets based on concentrate or maize silage leads to butter and cheese, more yellow dairy products because of an increase in  $\beta$ -carotene and with a softer texture because of the increase in unsaturated FA like oleic, vaccenic and to a lesser extent linolenic and rumenic acids, to the detriment of the saturated FA with 10 to 18 carbons. The raw milk cheeses issuing from pasture are also generally characterised by their stronger flavour but this effect seems to be cancelled when the milk is previously pasteurised. Within the grass based diets, major differences in sensory and nutritional characteristics of milk and derived products are also observed according to the preservation of the grass (pastured vs conserved). Conversely, the influence of the grass preservation mode concerns mainly the dairy product yellow colour and carotene content (higher when grass is preserved as silage, by comparison to hay) and also the cheese flavour in the case of large size cheese models. Several recent experiments showed a significant effect of grass botanical composition mainly on milk FA composition and on cheese texture and flavour. In addition, dietary supplements of plant oil or oilseeds, proposed to increase the nutritional value of dairy fat, have almost similar effects to pastured grass on FA composition and dairy products texture, even sometimes more marked, but they simultaneously increase other trans isomers of 18:1 and 18:2 and sometimes are responsible for off-flavours in milk or cheese because of unsaturated FA oxidation. The off-flavour formation seems to vary according to the lipid nature and presentation (oil or oilseeds) and dietary antioxidants.