

# Cows chomping on fresh grass and red clover silage produce omega milk

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Fat is an important ingredient that has a material impact on the nutritional value, texture, taste, shelf-life and producer price of milk. However, milk products are a significant source of saturated fatty acids in the Western diet. How should dairy cattle be fed for their milk to contain more unsaturated fatty acids?

Only scant research data are available on the effects on the [lipid metabolism](#) of ruminants of the forage conventionally used to feed dairy cows. Anni Halmemies-Beauchet-Filleau, who has worked as a researcher at MTT and at the University of Helsinki, studied in her doctoral thesis the role of forage species and conservation method in ruminal lipid metabolism and milk fatty acid composition.

The practical aim was to develop a feeding strategy that decreases the share of saturated [fatty acids](#) and increases the share of unsaturated fatty acids, particularly oleic acid (Omega-9) and alpha-linolenic acid (Omega-3), in [milk fat](#) composition.

Approximately one half of milk fat is generated in the [mammary glands](#) of cows, the other half coming from the fats in forage. Most of the unsaturated fatty acids in forage go through biohydrogenation, i.e. become saturated in the rumen. In addition, as a result of feed fermentation, fat precursors are formed in the rumen which develop into [saturated fatty acids](#) in the mammary glands.

"Feeding can be used to affect the lipid metabolism of the rumen and the

mammary glands, and thereby the fat composition of milk," Halmemies-Beauchet-Filleau explains.

The effect of the forage conservation method was examined in two tests, using fresh grass, hay or silage prepared with or without acid-based additive. The most advantageous effect on lipid metabolism is produced by forage from pasture or fresh cut grass. Cows fed on fresh grass use more fatty acids originating in adipose tissue to form milk fat than do other cows.

"Fresh grass decreases the share of saturated palmitic acid and increases the share of unsaturated oleic acid in milk fat, compared to hay feed," says Halmemies-Beauchet-Filleau.

As for hay feeding, this accentuates the share of saturated fatty acids originating in the mammary glands. The differences in milk fat composition between hay and silage feedings were minor.

Milk fatty-acid composition was also investigated by replacing grass silage with red clover silage, and using a compatible vegetable oil supplement (rape, sunflower and camelina). The changes in ruminal lipid metabolism are based on the differences between plant species in terms of digestion kinetics and microbial flora in the rumen.

"Replacing grass silage with red clover accomplished a distinct decrease in the saturation of fatty acids in the rumen, and increased the concentration of alpha-linolenic acid in milk fat," Halmemies-Beauchet-Filleau notes.

A moderate vegetable oil supplement also further changed the composition of milk fat to become more favourable as human nutrition. The vegetable oil supplement did not decrease forage intake and made little change to the share of [trans fatty acids](#) in milk fat, except when

given as camelina press cake.

**More information:** Read the full report:  
[urn.fi/URN:ISBN:978-952-10-8877-3](https://urn.fi/URN:ISBN:978-952-10-8877-3)

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