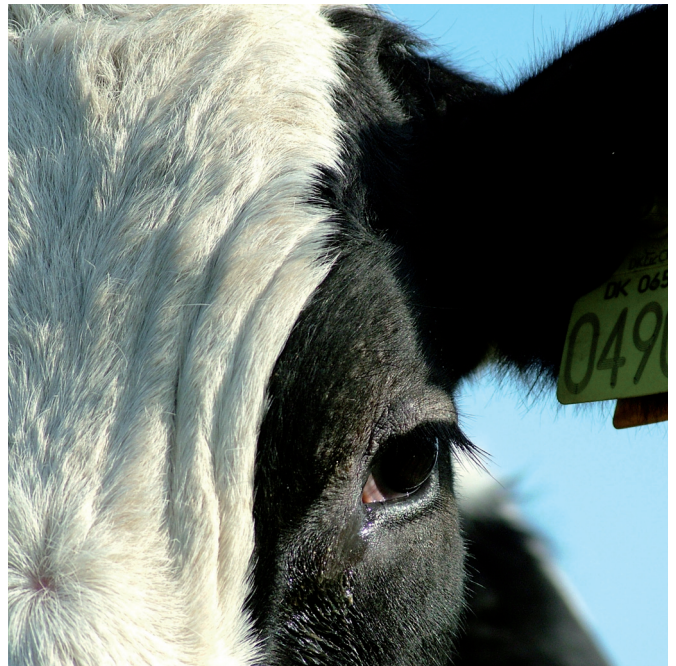


Potential improvement of the salutary effect of organic milk by forage species and by supplementation (PhytoMilk)

PhytoMilk

What makes organic milk healthy?

Dairy and milk products contain relatively high concentrations of saturated fatty acids and have therefore been associated with cardiovascular diseases. However, recent research has revealed a number of ingredients in milk that may be salutary. This project will give increased knowledge about the nutritional and salutary quality of organic milk. It will also increase the knowledge of the relationship between production systems, environmental conditions and milk properties.



Due to a higher proportion of forage in the organic ration, with more legumes and other herbs, organic milk quality is more and differently affected by the forage than conventionally produced milk. However, the knowledge of the chemical and sensory characteristics of organic milk is limited, and not much research has been carried out on organic grassland management and milk salutary properties. The objectives of this project are to:

- ▶ Investigate how different forage species affect the fatty acid composition and the content of bioactive components such as tocopherols, carotenoids, selenium (Se) and phytoestrogens of organic dairy milk.
- ▶ Investigate the biological activity of the collected milk samples on normal and cancer cells.

Nordic collaboration

Dairy production is important in all Nordic countries, but the milk is produced under very different environmental conditions and production systems. This project is carried out in collaboration with Nordic scientists from different disciplines such as crop science, animal science and chemistry. The collaboration improves our knowledge of the relationships between production system and environmental conditions and milk properties, which might serve as a basis for both farming management and human dietary recommendations.

Feeding experiments

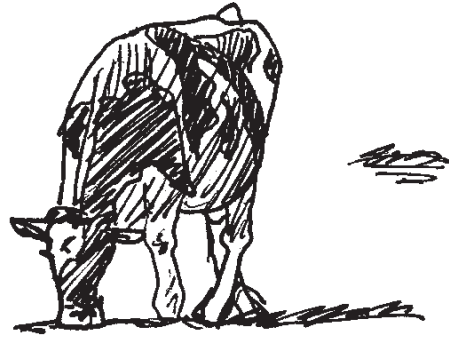
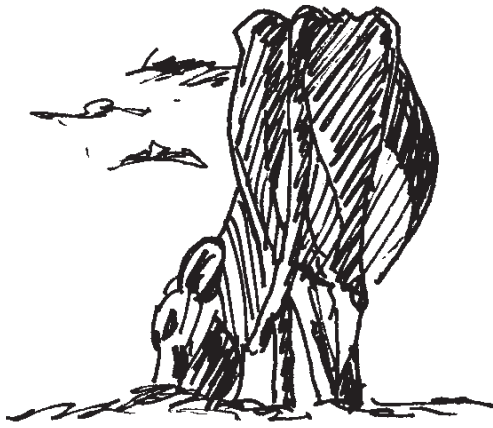
Three feeding experiments to investigate milk quality will be carried out within the project consisting of one grazing trial in Norway and two silage feeding experiments – one in Norway and one in Sweden. In the grazing trial the milk quality from grazing on botanically diverse long-term pasture will be compared with milk from red clover-rich short-term pasture. Both pastures are organically managed. The silage experiment in Norway will test milk quality from round-bale silage from two contrasting organically managed grasslands: one with a high proportion of non red clover herbs and the other from a short-term rotational ley with a high proportion of sown species and rich in red clover. The Swedish experiment will use silage from short-term rotational leys with a high proportion of red clover and a grass mixture, as well as birdsfoot trefoil and a grass mixture.

In yet another experiment, cows will be fed four types of silage containing different species. Samples of rumen and duodenal fluid and milk will be taken and analysed for fatty acids to examine the plant species effect on rumen biohydrogenation of forage fatty acids.

Effects of selenium supplementation

Milk samples will be collected from 50 farms in Eastern Finland. Half of the farms practise certified organic animal production and the other half practises only organic field farming. Samples of silage and concentrate mixture will also be taken from each farm. The farmers will





be interviewed about their feeding practices and their selenium (Se) and vitamin supplementation. The potential of selenium yeast and mineral selenium supplementation to improve milk Se will be compared in a farm study (15 voluntary farms).

Effects of latitude, harvest time, storage and preservation

Freeze dried plant material already collected from an ongoing experiment (in Denmark and at two sites in Sweden) will be used to investigate site and harvest time effects on the fatty acid (FA) composition and the phytoestrogen concentration.

Finally, samples of the silage from the same ongoing project will be tested to see how wilting and storage affect the chemical content (FA, α -tocopherol and carotenoids).

Possible effects on human health

The milk samples that will be collected from the Nordic countries in the project will represent a repository of milk samples from cows of different breeds and at different lactation- and pregnancy stages, and from cows fed rations high in clover, grass, birdsfoot trefoil etc. This repository of complex mixtures containing naturally occurring bioactive components is suitable for studies of cellular effects of bioactive components with suspected health benefits. In vitro cell-based models will be used for assessing the biological activity in specific human tissues. Relevant cell-based models include normal and cancer cell lines of gastro-intestinal, mammary or prostate origin exposed to different concentrations of milk samples or specific bioactive components for different time intervals. Cellular end points such as proliferation, viability and apoptosis (a process of "suicide" by a cell in a multicellular organism) as well as estrogenic or anti-estrogenic activity will be evaluated.



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4 PhD-students are attached to the project.

Work packages

In the project the following work packages will be conducted:

- WP1 Pasture and silage botanical composition – effect on milk quality
- WP2 Silage botanical composition – effect on rumen FA hydrogenation and milk FA composition
- WP3 Effect of Se supplementation on milk quality

- WP4 Effect of latitude and harvest time on FA composition and phytoestrogen concentrations on four organically managed forage species
- WP5 Effect on storage time and silage preservation methods on FA composition and concentrations of tocopherols and carotenoids on four organically managed forage species
- WP6 Bioactive components in organic milk with suggested health beneficial effects

Further information

You will find further information at the project website <http://www.phytomilk.coreportal.org>

The project is initiated as a result of the cooperation in CORE Organic. In this EU supported ERA Network, 11 European research funding organisations have launched a joint call, which intends to step up cooperation between national research activities in organic food and farming. Further information on CORE Organic can be obtained at www.coreorganic.org.

By subscribing to the CORE Organic news you can follow the progress in the project. Subscription is possible via www.coreorganic.org.

