

Insert PROJECT logo:

PhytoMilk

Annual Abstract template:

Project title and Acronym:	PhytoMilk – Potential improvement of the salutary effects of organic milk by forage species and by supplementation
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Period Covered:	31 July 2008 to 31 December 2009

Popular Description of project progress and summary of results (1-2 pages)

Short description of the project

The overall 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 and phytoestrogens in organic dairy milk, and to investigate the biological activity of the collected milk samples on normal and cancer cells. For that reason we have created the following six work packages. The effects of silage and pastures with different botanical composition on milk quality (WP 1), and on rumen fatty acid hydrogenation (WP 2). The effects of selenium supplementation on milk quality and storage stability of milk (WP 3). The effects of latitude, harvest time, preservation and storage time on fatty acids, vitamins and phytoestrogens on forage species grown on three sites (WP 4 and WP 5), and finally we will investigate the effects from naturally occurring bioactive components from milk samples collected from cows of different breeds and different lactation – and pregnancy stages, and from cows fed rations high in clover, grass, birdsfoot trefoil etc on human tissues (WP6).

Project progress

This period we have been busy working with feeding trials, farm studies and rumen hydrogenation studies. We have cooperated intensively. The PhD students Steffen Adler (Norway) and Annika Höjer (Sweden) have visited Foulum, Denmark for three and six weeks, respectively. During the visits they have worked in the laboratory with chemical analysis. Annika Höjer has visited the Norwegian University of Life Sciences at Ås in September 2008 to standardize the milk sampling procedures between the two sites together with Steffen Adler. Steffen Adler has visited Umeå in September 2009 for discussions about writing of joint articles. In October 2009 we had a project meeting in Tingvoll, Norway. The agenda was to sum up the results so far, and to plan the last part of the project. All project partners attended the meeting and we had very fruitful discussions. At the meeting we also discussed possibilities to search for funding to extend the cooperation after this project is ended.

We made a time plan for the rest of the project time. We decided to apply for extension of the project period, because some parts of the projects have been postponed. In WP 1 the employment of the PhD student was delayed. Annika Höjer was employed in April 2008, about 10 month after the start of the project. In WP 2 the rumen hydrogenation experiment was postponed about 6 month because of too low botanical diversity in the long term grassland that was planned to be harvested in 2008 (see previous report). The decision was to apply for extension of the project period until May 2011.

The progress in the work packages are:

WP 1: The feeding experiments were conducted in Umeå (December 2008 – March 2009) and in Ås (February 2009 – April 2009). Samples from the feeds and milk from the two experiments were collected and sent to Foulum, Denmark for chemical analysis. For the silage experiment from

Umeå, the milk and feed samples are analysed for vitamins and fatty acids. Analysis of phyto-estrogens will be conducted during spring 2010. Milk vitamin analysis is finished for the Ås silage experiment. Milk and feed samples of the grazing experiment at Ås, Norway, are analysed except for phyto-estrogens in feed stuffs that will be analysed during spring 2010. The compilation of the experimental data will be performed during spring 2010 when all chemical analyses are finished. WP 2: The experimental feed was harvested according to the revised plan for the summer 2009. The second cut was very poor, due to drought, and it was decided to use a mix of only first and third cut silage during the feeding experiment instead of the mix of all three cuts. The experiment started in early November 2009 and will be finished in March 2010. WP 3: The field work and laboratory analysis for this project part are conducted, and a manuscript for a scientific paper is conducted. WP 4: The samples are freeze dried, and the chemical analysis for fatty acids and phyto-estrogens will be conducted during spring 2010. WP5: The field study is conducted, and the samples will be analysed in Denmark during spring 2010. WP 6: Analyses of phyto-estrogens: Milk samples from experiments carried out in the Nordic countries has been collected and the concentration of phyto-estrogens have been analysed in a large part of the collected samples. A “new” compound was also observed in a concentration higher than other phyto-estrogens. A fraction of this compound was prepared and is currently under investigation. Analyses of phyto-estrogens are not finished yet. Milk samples from the Nordic countries are currently being studied in cell-based models with cancer cells representing human tissues of colon, prostate and breast origin. Until now 64 milk samples from the grazing experiment in Norway and 45 milk samples from farms in Finland have been tested. Furthermore, the effect of 8 individual phyto-estrogens and 3 hormones/growth factors found in milk, have been studied to compare the effects in different human tissues. Studies will continue with more milk samples from experiments in the Nordic countries.

Project communication and administration

We communicate frequently by e-mail. All e-mails are distributed to the whole group. It works very well. We use the intranet to have common access to project plans, meeting agendas and other interesting documents. At the meetings we have tried to decide the frames of our cooperation concerning publishing, authorship, analysis and supervision of PhD students. The PhD students have visited several sites in the network for longer or shorter periods.

References and links to papers/reports which have been published in the period:

Reports:

Okker L., Kuusela, E., Eurola M. 2009. Selenium concentration of Finnish organic milk. NJF-seminar, Fostering healthy food systems through organic agriculture – focus on Nordic-Baltic region, 25-27 August 2009, Tartu, Estonia (presentation)

Okker L., Kuusela, E., Eurola M. 2009. Effect of selenite and selenised yeast supplementation on selenium concentration of Finnish organic milk – a farm survey. NJF-seminar, Fostering healthy food systems through organic agriculture – focus on Nordic-Baltic region, 25-27 August 2009, Tartu, Estonia (poster)

Kuusela, E., Okker L., Jensen S.K., Purup, S., Hanssen-Møller, J. 2009. Fatty acid characterization of Finnish organic milk – a Farm survey, NJF-seminar, Fostering healthy food systems through organic agriculture – focus on Nordic-Baltic region”, 25-27 August 2009, Tartu, Estonia (poster)

Adler, 2009. Effect of pasture botanical composition on milk quality in organic production. NJF-seminar, Fostering healthy food systems through organic agriculture - Focus on Nordic-Baltic Region, 25-27 August, Tartu, Estonia

Höjer, A. 2009 Fatty acids and vitamins in forages. Internal report.