

Progres report

The biological activity of phytoestrogens in organic and conventional milk

Name: Tina Skau Nielsen
University: Royal Veterinary- and Agricultural University (RVAU)
Department: Veterinary Pathobiology
Supervisor: Nils Brünner (RVAU); Stig Purup (DIAS)
Timescale: April 2006-March 2009
E-mail/phone: TinaS.Nielsen@jagrsci.dk / 89991305
Master's degree: Animal Science, December 2004

Background

Epidemiological studies and studies with animals and *in vitro* cell based model systems have shown that phytoestrogens (plant derived substances that mimic or modulate the actions of endogenous estrogens) possess potent and wide-ranging biological activities, and may improve human health by protecting against certain types of cancer, cardiovascular disease and osteoporosis, as well as hormone dependent conditions like menopausal symptoms.

Phytoestrogens are present in high concentrations in leguminous plants such as clover, lupine, horse beans and peas but also in soy products, which are widely used as feedstuffs for cows. Therefore these plants are potential sources of phytoestrogens in milk and in humans as consumers of milk and milk products. Results from a pilot study confirmed that both organic and conventional milk contained different phytoestrogens, and some in concentrations which are shown to be biological active when tested in different model systems. However, the concentrations of phytoestrogens in milk varied considerably between farms, and the variation is mainly believed to be associated with differences in composition and content of leguminous plants in the feed ration. However, the biological effects (e.g. the estrogenic potential) of phytoestrogens in cow's milk in relation to for example breast cancer are not known.

Objective

The objective is to gain knowledge on how composition of the feed ration and especially content of different legumes affect the content of specific phytoestrogens in milk, and to elucidate the biological activity of these compounds in milk mainly by the use of *in vitro* cell based model systems.

Progress – 2006

- Milk samples obtained from the FØJO III project ORMILKQUAL will be analysed for the content of selected phytoestrogens.
- Optimal conditions for *in vitro* testing of the biological activity of phytoestrogens in general and in milk will be investigated using estrogen receptor positive mammary cancer cells (MCF-7) and

estrogen receptor negative mammary epithelial cells (HBL-100). Cell proliferation, aromatase activity, estrogen mediated expression of the progesterone receptor, expression of the estrogen receptor and estrogen mediated expression of the pS2 gene are some of the responses which will be studied.

- Ph.d. course in “Potential of organic farming to contribute to rural development in Europe”, SOAR summer school, June 2006. Passed. 4 ECTS.
- Ph.d. course in “In vitro growing of cells”, MSC Aps, September 2006. Passed. Applied for 2 ECTS.
- Ph.d. course in “Laboratory Animal Science” Department of Veterinary Pathobiology The Royal Veterinary and Agricultural University, October 2006. 9 ECTS
- Participation in the conference “Molecular and physiological effects of bioactive food compounds” Vienna, October 11.-14. 2006. Presentation of a poster.

Plans – 2007

- Additional milk samples from cows fed different diets will be collected. A short term feeding trial will be conducted to produce milk with a high or low content of phytoestrogens (high or low legume diet), and a high or low content of endogenously estrogen (cows on two different stages of the reproduction cycle and lactation) for use in the *in vitro* studies.
- Short term feeding trial with multi-catheterized cows to explore the metabolism of dietary phytoestrogens in ruminants
- Preparing manuscript on the effect of different types of legumes in the feed ration on milk content of various phytoestrogens
- To arrange a stay abroad during the second half of 2007 or beginning of 2008, since it is of high priority to generate contacts to a foreign laboratory and learn new techniques to investigate the biological activity of phytoestrogens.
- Additional ph.d. courses

Publications

The publications should be copied from Organic Eprints. *A list of SOAR publications is available on the web-site <http://www.okoforsk.dk/funktion/udd/phd/index.html> under "Publikationer" under the individual PhD projects. From this list you select and copy your own publications. (NB: Your publications will only be on the list if you have uploaded them on Organic Eprints).*