

Content and stability of vitamin E in organic milled wheat and spelt

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Background

Vitamin E is an antioxidant, which protects the cellular membranes against oxidation. There are 8 isomers of vitamin E, four tocopherols (α , β , γ , δ) and four tocotrienols (α , β , γ , δ) where α -tocopherol is the best known. Some studies show that tocotrienols have greater antioxidative effect than tocopherols, and therefore it is important to know the content and composition of vitamin E in flour and bread. I have already optimized a HPLC method so I can measure all eight isomers, which is not a standard method today. Danish people mainly get their vitamin E through vegetable oil and cereals and the intake is lower than recommended for many people. Therefore, it is important to make flour and breads that have the highest possible content of vitamin E. Vitamin E is located in germ and bran and it is therefore expected that whole meal flour has the highest content of vitamin E. Normally; commercial mills grind the grain at a stand of rolls where the germ is sorted. However, some bakers grind their grain on stone mills, and they are mostly used for organic grown cereals.

Vitamin E is a fat, soluble vitamin and it is an antioxidant for the unsaturated fatty acids to prevent rancidity. The shelf life of different flours will be measured by GC-MS and kept together with sensory tests to determinate when the flour and the corresponding bread is eatable or not. On behalf of these tests a recommended time of storage for flour will be documented.

Objective

The main objective for this PhD project is to determinate the content of vitamin E in different organic wheat and spelt products. Partial aim of this project:

- Content of vitamin E in organic flour depending on the type of grinding
- Stability of vitamin E in different flour types during storage
- Influence of baking methods on the content of vitamin E in bread
- Determination shelf life of different organic flour types and relation to bread quality

Progress – 2007

- Been on three months leave
- End storage experiment on spelt
- End off-flavour experiments
- Writing my thesis :-)
- Defend my thesis :-))

Publications

Nielsen, Merete Møller; Viereck, Nanna and Engelsen, Søren Balling (2007) [Phytic acid degradation by phytase – as viewed by 31P NMR and multivariate curve resolution](#), in Farhat, I.; Belton, P.S. and Webb, G.A., Eds. *Magnetic Resonance in Food Science: From molecules to Man*, page pp. 214-222. The Royal Society of Chemistry.

Nielsen, Merete Møller; Damstrup, Marianne Linde; Thomsen, Agnete Dal; Rasmussen, Søren Kjærgaard and Hansen, Åse (2006) [Phytase activity and degradation of phytic acid during rye bread making](#). *European Food Research and Technology* 225 (2), pp. 173-181

Nielsen, Merete Møller; Viereck, Nanna and Engelsen, Søren Balling (2006) [Fytinsyre nedbrydning ved fytase](#) [Degradation of phytic acid by phytase]. In *Dansk Kemi*, Volume 87, No 11, page pp. 26-29.

Viereck, Nanna; Helene Fast, Seefeldt; Merete Møller, Nielsen and Søren Balling, Engelsen (2005) [HR MAS NMR-spektroskopi: En hel ny verden for fødevareforskningen](#) [HR MAS NMR-spectroscopy: A new world for food science]. In *Dansk Kemi*, Volume 86, No 11, page pp. 30-37.

Presentations

Nielsen, Merete Møller (2007) [Content of vitamin E in fractions of milled wheat](#) [Indhold af vitamin E i fraktioner af formalet hvede]. [oral] Presentation at *6th European Young Cereal Scientists and Technologists Workshop*, Montpellier, 2 may 2007.

Nielsen, Merete Møller (2006) [Fytaseaktivitet og fytinsyre nedbrydning under fremstilling af fuldkornsrugbrød](#) [Activity of phytase and degradation of phytic acid during whole meal rye bread]. [oral] Presentation at *Cerealienetværkets årsmøde*, Slagelse, 2. november 2006.

Time schedule details

Total period(s) of leave (not working on PhD project): 3

Total period of extra employment on PhD project: 0

Planned date of submission of thesis: 1. November 2007