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**New insights into sustainable
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Key issue in nutrient recycling: Integration between crop and animal production - conclusion about BERAS-project

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EU-funded (Baltic Sea Region, Interreg IIIB) project, Baltic Ecological Recycling Agriculture and Society (BERAS), was run in 2003-2006 around the Baltic Sea region. The aim of the project was to learn about and promote sustainable food systems. Methodologically the project was based on studies of 35 selected ecological recycling farms representing different farming conditions and 10 examples of more or less local and/or regional food systems located in the eight partner countries.

Part of this project a more detailed analysis was made of nitrogen (N) utilization on 9 organic farms in eastern Finland (Juva region). All the main nutrient flows were identified for the years 2002-2004. The assumption of a steady-state with balanced systems and reserve nutrients in the soil was applied. Biological N fixation (BNF) was assumed to account for 70 – 90 % of total nitrogen content in the legume biomass (Kristensen et al. 1995, STANK 1998, Väisänen 2000, Seuri 2005).

Based on the data from the farms three models were built: specialized dairy farm (D), specialized crop farm (C) and integrated dairy and crop farm (I). Equal amounts of milk, beef and (bread) cereal were produced either on D + C models jointly or in integrated system.

Integrated system showed 24 % higher total production per area and 24 % (figures are not bounded, but just by random equal) higher nitrogen utilization compared to specialized system. The main factors were more efficient nutrient circulation, better utilization of legume crops and low intensity of nitrogen on non-legume crops.

Kristensen, ES., Högh-Jensen, H. & Halberg, N. (1995) A simple model for estimation of atmospherically-derived nitrogen in grass/clover systems. *Biol Agric Hort* 12: 263-276.

Seuri, P. (2005) Evaluation of nitrogen utilization by means of the concept of primary nutrient efficiency. In Granstedt, A., Thomsson, O. and Schneider, T. (eds.). *Environmental impacts of eco-local food systems – final report from BERAS Work Package 2. Baltic Ecological Recycling Agriculture and Society (BERAS) Nr. 5. Ecological Agriculture* nr 46. Centre for Sustainable Agriculture. Swedish University of Agricultural Sciences. P. 36 – 42.

STANK. 1998. Statens Jordbruksverks dataprogram för växtnäringsbalansberäkning. Stallgödsel och växtnäring i krettslopp (STANK) Jordbruksverket, Jönköping. (Plant nutrient balance calculation program)

Väisänen, J. (2000) Biological nitrogen fixation in organic and conventional grass-clover swards and a model for its estimation. Licentiate's thesis. University of Helsinki Department of Plant Production Section of Crop Husbandry. 42 p. + 2 app.