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## Manure – an agronomic and environmental challenge

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Maria Stenberg, Hans Nilsson, Rikharð Brynjólfsson, Petri Kapuinen, John Morken, Torkild Søndergaard Birkmose (eds.)

## **Cattle slurry as a fertilizer of whole crop cereal silage (WCCS) when renewing ley**

*Petri Kapuinen and Sanna Tyynelä*

*MTT Agrifood Research Finland, Agricultural Engineering, Vakolantie 55, FIN-03400 Vihti, Finland, tel +358 / 9 2242 5227, fax + 358 / 9 2242 610, e-mail petri.kapuinen@mtt.fi*

Cattle farms with long-term leys have had difficulties spread slurry without problems with fodder hygiene. A new approach is to shorten the ley rotation and found the new ley in barley intended for WCCS. This would provide a more frequent opportunity to use slurry without need to apply in ley during the productive years. The other opportunity would be the use of annual meadow grasses like Italian rye-grass to improve the feed value and yield of WCCS. In both cases the potential leaching of nutrients following a large rate of slurry used in the spring are mitigated by the uptake of meadow grass. However, a large rate of slurry at least applied in the growing crops might harm the establishment of perennial leys. The maximum application rate of slurry is on nitrate vulnerable zones usually limited by the limit for total nitrogen from animal manures stated in the Nitrate directive, 170 kg per ha and its national implementation. The whole Finland is declared to belong to the zone. In this study we applied cattle slurry the same maximum amount when seeding barley WCCS (cv. Inari in 2002 and Saana in 2003) field, at 1 to 2 or 3 to 4-leaf phase with or without timothy or Italian rye-grass. When seeding the WCCS the slurry was injected with the method developed by Kapuinen (2001). In the growing crops the slurry was applied with the same machinery imitating trailing hoses. 40 kg ha<sup>-1</sup> of mineral nitrogen was drilled in all the treatments in combination with seeding to meet the requirement of soluble nitrogen.

In 2002 the WCCS yield was the best when the slurry was applied in combination with seeding of barley and Italian rye-grass. Application at seeding time yielded 18.7% better than in growing crops on an average. In 2003 barley-timothy combination yielded about the same as barley-Italian rye-grass combination. Application of slurry at 1 to 2-leaf phase did not yield significantly differently than at seeding time or at 3 to 4-leaf phase. However, application at seeding time yielded 16.0% better than at 3 to 4-leaf phase. The regrowth of Italian rye-grass was minimal in both the years.

The establishment of timothy ley following the use of slurry at different times was measured as 1st yields in the first productive year. In 2003, the first and third yield of timothy were 150.4% and 81.7%, respectively, better when slurry was injected in 2002 at seeding time than in growing crops on an average. There was no significant difference in the second cut. In 2004, the first yield of timothy was significantly better 25.4% when slurry was applied in 2003 at 3 to 4-leaf phase instead of 1 to 2-leaf phase. Application at seeding time did not differ significantly from the application at either phase in growing crops. Application of slurry at seeding time produces the best WCCS yield without significant drawback in the first cut of timothy next year.

Kapuinen, P. 2001. A new concept for use of pig slurry for cereals. In *Proceedings of NFJ-Seminar no. 320, Denmark 16-19 January 2001.* (Eds H.B.Rom & C.G.Sorensen). Ministry of Food, Agriculture and Fisheries. Danish Institute of Agricultural Sciences. DIAS report No. 21, pp. 89-97.