White clover effect on yield and quality of a *Lolium perenne* sward under cutting conditions

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Introduction

Farmers in Flanders see great potential in introducing white clover (WC) into their grassland, because N-fertilisation is expensive and restricted by the Flemish Government in accordance with the EU Nitrate Directive. Is there any effect of WC in the perennial ryegrass sward when 200 -330 N/ha is applied? Are there consequences for the leachable N residue in the soil?

Materials and methods

- Experiment: 2007-2011
- Sandy loam soil in Merelbeke (Belgium)
- Split plot design - harvest area per plot: 8.4 m^2 - 5 cuts a year.
- Sward types:
  - perennial ryegrass (PRG)
  - perennial ryegrass + white clover (PRG/WC)
- Fertilisation treatments
  - (1) 170 N_{slurry} + 100 $N_{mineral}$ (2) 170 N_{slurry} + 180 $N_{mineral}$
  - (3) 250 N_{slurry} + 100 $N_{mineral}$ (4) 250 N_{slurry} + 180 $N_{mineral}$

Measurements:

- Dry matter yield, clover content, forage quality
- Calculation of energy value and protein quality
- Nitrate nitrogen content of the 0-90 cm top soil in autumn

Results

	2007		2008	
	PRG	PRG/WC	PRG	PRG/WC
Yield (ha^{-1} y^{-1})				
Dry matter (kg)	13516[a]	13099[a]	13284[a]	14305[b]
Crude protein (kg)	2090[a]	2130[a]	2297[a]	2684[b]
Clover content in DM (g kg^{-1})	-	130	-	210
Forage quality				
Energy VEM in DM (kg^{-1})	848[a]	837[a]	862[a]	859[a]
Crude protein in DM (g kg^{-1})	155[a]	163[b]	183[a]	200[b]
DVE in DM (g kg^{-1})	77[a]	78[a]	84[a]	89[b]
OEB in DM (g kg^{-1})	3[a]	12[a]	26[a]	40[a]
Residual nitrate in soil				
NO_3-N (kg ha^{-1})	15[a]	24[b]	6[a]	11[b]

VEM: fodder unit milk; DVE: true protein digested in the small intestine; OEB: rumen degraded protein balance
Treatments with the same letter in the same row and in the same year are not significantly different (P<0.05)

Conclusions

In a cutting regime with N-fertilisation between 200 and 330 $N_{available}$ ha^{-1} white clover is still an interesting component in a perennial ryegrass sward because:

- it can persist in the sward
- it can stimulate DM and CP yield and increase CP content of the forage
- it increases the nitrate residue in the soil significantly without any risk for nitrate leaching (values far below the treshold of 90 kg NO_3-N ha^{-1} in 0-90 cm top soil)

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