

## Forage quality of white clover (*Trifolium repens* L.) X Caucasian clover (*T.ambiguum* Bieb.) hybrids over three harvest years

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**Introduction** Interspecific hybrids have been produced from crosses of white clover, a stoloniferous species with Caucasian clover, a rhizomatous species. Using white clover as the recurrent parent first and second generation backcross (BC<sub>1</sub> and BC<sub>2</sub>) plants have been produced that have both rhizomes and stolons and are more drought tolerant than white clover (Marshall *et al.*, 2001). Forage quality of these interspecific hybrids was investigated to determine whether introgression of the rhizomatous trait has any impact on forage quality.

**Material and methods** In September 1998 16 plots of 2.7m x 1.5m were established, with 32 plants of *T.repens*, *T. ambiguum*, BC<sub>1</sub> or BC<sub>2</sub> in each plot. After transplanting each plot was oversown with the intermediate perennial ryegrass, Fennema, at a seed rate of 25 kg ha<sup>-1</sup>. Once established, plots were cut five times in 1999 and 2000 and six times in 2001, from May with the final cut in October. Clover and grass fractions were milled separately through a 1 mm sieve. In vitro dry matter digestibility (DMD), nitrogen (N) and water soluble carbohydrates (WSC) concentrations were predicted by near infrared reflectance spectrophotometer. Crude protein (CP) concentration was then calculated as N concentration x 6.25.

**Results** After the establishment year parental material of *T.ambiguum* was absent, and forage quality of the clover fraction was analysed without the *T.ambiguum* plots (Table 1). Legume fractions from the BC<sub>1</sub> and BC<sub>2</sub> hybrid plots had a higher WSC, a lower CP concentration but an *in vitro* DMD value comparable with white clover, (supporting the results of a previous glasshouse study by Abberton *et al.*, 2002). These differences were observed in all harvest years, and, generally, the backcross hybrids and *T.repens* followed a similar trend throughout the growing season.

**Table 1** In vitro DMD, WSC and CP (g kg<sup>-1</sup>DM), of the clover fraction of plots of *Trifolium repens*, and the backcross hybrids (BC<sub>1</sub> and BC<sub>2</sub>). Data is a mean of three harvest years

	DMD	WSC	CP
<i>T. repens</i>	0.809	58.8	236.5
BC <sub>1</sub>	0.810	66.7	210.3
BC <sub>2</sub>	0.810	64.8	222.3
s.e.d.	0.0019 NS	1.50***	3.02***

s.e.d., standard error of difference of means; NS, not significant; \*P< 0.05; \*\*P< 0.01; \*\*\*P< 0.001

**Conclusions** Compared to white clover the backcrosses had a lower CP concentration and this may contribute to a more efficient utilization of protein in the rumen, thus reducing the release of nitrogenous waste. The significant differences between the backcross hybrids and *T.repens* were largely attributed to differences in forage quality at the beginning of the growing season and further work will determine whether these differences are beneficial in livestock feeding experiments. The fertility of these hybrids is poor and more cytological studies need to be made using fluorescence *in situ* hybridisation at meiosis to select plants with stable integration of introgressed genes.

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### References

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