Effects of perennial ryegrass cultivars on traits for improved animal performance

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Introduction The use of quality parameters in grass breeding is limited. There may be options to improve grass cultivars (cvs) for improved animal performance.

Material and methods Grass breeders' options to select perennial ryegrass cvs on traits associated with improved animal performance were examined in a 4-year project. To examine the effects on dry matter intake and milk production, 3 experiments with 6 commercial perennial ryegrass were conducted. In 2000 and 2001, 12 dairy cows were stall-fed 6 diploid perennial ryegrass as fresh herbage in two 3x3 Latin squares (Tas *et al*., 2005). In 2002 and 2003, 12 dairy cows grazed 4 of these in a 4x4 Latin square (Tas *et al*., 2005; Smit *et al*., 2005). In 2003 and 2004, 3 grazing experiments were conducted with 3 groups of dairy cows that could choose freely among 6 perennial ryegrass (Smit *et al*., 2005).

Results Cvs differed for earliness: 1, 2 and 6 were intermediate- and 3, 4 and 5 late-heading. 1 and 4 had higher water soluble carbohydrates and lower neutral detergent fibre concentrations than the other. Cvs 1 and 4 had a higher resistance to crown rust (*Puccinia coronata* f.sp. *lolii*). Table 1 shows the effects of cv on herbage intake (DMI; kg DM/cow/d) and milk production (MP; kg FPCM*/cow/d) during stall-feeding and grazing. When offered one cv for a period of 2 weeks, cows showed no significant differences in DMI and MP.

Table 1 Herbage DMI (kg/cow/d) and milk production (MP; kg FPCM*/cow/d) of dairy cows fed on perennial ryegrass cultivars in 2 experiments

Experiment	Trait	Cultivar						Sig.	Mean
		1	2	3	4	5	6		
Stall feeding	DMI	15.5	16.2	15.9	14.9	15.4	15.7	NS**	15.6
	MP	25.4	25.8	24.8	24.2	25.2	25.5	NS	25.1
Grazing	DMI	17.3	17.4	16.6	18.2			NS	17.4
	MP	25.9	24.5	25.1	25.8			NS	25.3

*FPCM: Fat and Protein Corrected Milk = ((0.337+ 0.116 Fat (%) + 0.06 Protein (%)) x MP (kg/cow/d)
**NS: Not Significant

Cows given a free choice to graze all 6 at high allowance showed clear selective grazing behaviour (Table 2). As a significantly higher proportion of the diet consisted of cv 1, it was concluded that dairy cows preferred cv 1. Cv 3 was least preferred. DMI in mixed swards was higher than in pure stands.

Table 2 Herbage intake (kg DM/cow/d) on 6 perennial ryegrass cultivars in 3 free choice experiments

Exp.	Trait	Cultivar						Sign.	Total
		1	2	3	4	5	6		
Free Choice	DMI	4.32^{c}	3.70^{bc}	2.99^{a}	3.55^{ab}	3.51^{ab}	3.22^{ab}	**	21.3

^{a,b,c,d} : means with the same subscript are not significantly different (P>0.05). **: P<0.01

Conclusions Options to improve cow performance through breeding perennial ryegrass for forage quality are limited. DMI and MP variation was limited among the perennial ryegrass; differences during grazing or stall feeding were not significant. However, dairy cows offered free choice preferred certain perennial ryegrass cvs and ingested more total herbage.

References

Smit, H. J. & A. Elgersma. Cattle grazing preference among six cultivars of perennial ryegrass (2005). (Submitted to *Journal of Animal Science*)

Smit, H. J., B. M Tas, H. Z. Taweel, S. Tamminga & A. Elgersma (2005). Cultivar effects of perennial ryegrass on grass production, nutritive quality and herbage intake under grazing. (Subm to *Grass and Forage Science*)

Tas, B. M., H. Z. Taweel, H. J. Smit, A. Elgersma, J. Dijkstra & S. Tamminga (2005). Nitrogen utilisation of perennial ryegrass cultivars of stall-fed lactating dairy cows. (Submitted to *Journal of Animal Science*)

Tas, B. M., H. Z. Taweel, H. J. Smit, A. Elgersma, J. Dijkstra & S. Tamminga (2005). Intake and milk production by dairy cows grazing four perennial ryegrass cultivars. (Submitted to *Journal of Dairy Science*).