

Effect of perennial ryegrass cultivars on the fatty acid composition in milk of stall-fed cows

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Introduction Herbage provides bulk feed for ruminants and plant lipids, especially C18:3, are a major source of beneficial fatty acids (FA) in milk. There are very few direct comparisons allowing a precise evaluation of the effects of the basal forage diet on milk FA composition. Grass quality differences can affect rumen metabolism and there could be opportunities to change the composition of ruminant products through choice of grass cultivar. To test this hypothesis, six cultivars were fed to dairy cows in a stall-feeding trial with fresh grass to evaluate the effect of grass cultivar on rumen VFA and milk FA composition during the growing season.

Materials and methods Twelve Holstein Friesian dairy cows were used in a stall-feeding trial with fresh grass to evaluate the effect of grass cultivar on milk fatty acid (FA) composition during the growing season. Six diploid perennial ryegrass (*Lolium perenne* L.) cultivars were used: Abergold, Respect and Agri (intermediate heading) and Herbie, Barezane and Barnhem (late heading). They were cut daily during three 14-d periods between July and August at the same target yield. The experiments consisted of two 3x3 Latin square trials, in each of which three cultivars were fed to two groups of three cows. Half of the cows had a rumen fistula. Dry matter intake (DMI), milk production (MP) and milk composition (MC) were recorded daily in individual cows. Rumen liquid samples were taken from the fistulated cows and analysed for volatile fatty acid (VFA) composition. Levels of individual FA in grass and milk were determined by gas chromatography.

Results The dry matter (DM) yield during the three harvest periods was on average 2433 kg/ha in early July and 2090 kg/ha thereafter. The leaf blade proportion of DM increased from 0.67 to 0.87 to 0.91 during the season. The biggest range among cultivars was found in early June (Table 1); in later harvests leaf blade proportions varied from 0.84 to 0.90 and from 0.90 to 0.93, respectively. The six cultivars were rather variable in their chemical characteristics. Barnhem and Abergold had the highest ($P < 0.001$) WSC and the lowest ($P < 0.01$) NDF concentrations. Barezane and Respect had a lower WSC concentration ($P < 0.001$) than the other cultivars. Barnhem had the lowest and Barezane the highest CP concentration ($P < 0.001$). However, there were no significant differences among cultivars in FA concentration (22.1 g/kg DM) or proportions of FA. Average proportions of the major FA C18:3, C16:0 and C18:2 were 0.74, 0.13 and 0.10, respectively.

Despite the variation in quality parameters among the cultivars, their DMI (16.6 kg DM/d) did not differ, and MP (27.4 kg/d) and MC (34 g/kg protein, 40 g/kg fat and 45 g/kg lactose) were similar (Smit *et al.*, 2005). Rumen VFA concentrations did not differ among cultivars. No variation in milk FA composition was found. The mean proportions of individual FA C16:0, C14:0, C18:0, C18:1 *cis*-9, vaccenic acid and rumenic acid were 263, 121, 108, 178, 33 and 14 g/kg FA, respectively.

Conclusions Despite variation in morphological and chemical characteristics of the herbage, no variation in DMI, VFA concentrations, milk production or milk FA composition was found. The latter may be due to the lack of variation in grass FA concentration and composition in the cultivars studied.

References

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Table 1 Chemical characteristics (g/kg DM) of six perennial ryegrass cultivars, averaged over 3 cuts taken early and late July and late August, and leaf blade proportion of DM in early July

Cv	CP	NDF	WSC	Leaf
Abergold	160	399	192	0.66
Respect	159	429	152	0.59
Agri	157	423	170	0.57
Herbie	156	412	172	0.64
Barezane	166	414	158	0.73
Barnhem	150	400	195	0.79
Mean	158	413	173	0.67
s.e.d.	2	6	5	0.03
Sign.	***	**	***	***

Sign.: ** : $P < 0.01$; *** : $P < 0.001$