Feeding Mixed Grass-Clover Silages with Elevated Sugar Contents to Dairy Cows

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Introduction Grasses with high sugar content (WSC) have been claimed to increase feed intake and milk production and at the same time give more efficient N utilisation and thus reduce pollution (e.g. Miller *et al*., 2001). In an ongoing EU-supported project ("Sweetgrass"), we have grown the new varieties of perennial ryegrasses and fed them to dairy cows. Results from the first year's experiment when pure ryegrass silages made from standard or high-sugar varieties were fed, showed small differences in feed intake, milk production and N partitioning. In order to test the principle, it was therefore decided to increase the difference in sugar content in the following experiment by mixing sucrose into the silage before feeding.

Material and methods High-sugar perennial ryegrass (*Lolium perenne)* (cv.Aberdart), standard perennial ryegrass (cv. Fennema) and red clover (*Trifolium pratense*) (cv. Vivi) were grown in pure swards. The crops were cut with a mower conditioner and wilted for up to 24 h and then ensiled in bales. The bales were covered with six layers of plastic and Kofasil Ultra™ was used as an additive. The differences in WSC content between varieties of perennial ryegrass within cuts were small. Grass silages from the second and third cuts were mixed with red clover (75/25 or 50/50 on a dry matter (DM) basis). At each mixing occasion samples were drilled out of the bales and DM content was rapidly determined using a microwave-oven. Grass silages were combined in order to give an even WSC content in the combined silage. Finally an addition of 10% sucrose (DM basis) was mixed into two of the silage mixes, giving in total four treatments. The silages were fed *ad libitum,* while concentrate was fed at a fixed amount of 6.5 kg DM/cow/d.

Results The analyses of silages fed are presented in Table 1 and the animal performance in Table 2. The intended difference in WSC content was achieved. When comparing sugar levels in silage, only the N efficiency differed.

Table 1 Composition of the silage mixes as fed (g/kg DM)

Clover (% DM)	25	50	25	50
Sugar	no addition	no addition	addition	addition
DM	320	325	332	334
CP	175	169	162	158
WSC	121	107	207	197
NDF	405	403	376	364

Table 2 Feed intake, milk production and N partitioning for cows fed silage mixtures with and without addition of sugar (LS-means)

Clover (% DM)	25	50	25	50	Se	(significance *P*<)		
Sugar	no addition	no addition	addition	addition		sugar	clover	Sugar* clover
Feed intake (kg DM)								
Silage	13.9	14.4	14.5	14.3	0.7	0.44	0.63	0.27
Silage plus conc.	19.9	20.9	20.5	21.4	0.8	0.29	0.07	0.17
Milk production								
Milk (kg)	24.1	25.4	24.7	25.9	1.1	0.39	0.08	0.17
Protein (g/kg)	33.8	33.6	34.0	34.7	0.6	0.16	0.61	0.70
Fat (g/kg)	48.0	43.6	46.7	45.0	1.4	0.99	0.005	0.004
N in milk/N in feeds	0.232	0.230	0.247	0.260	0.01	0.02	0.52	0.89

Conclusions When fed to dairy cows in combination with moderate to high levels of grain-based concentrate, the effects on milk production of added sugar to silage were minor, while the effect on N efficiency (N in milk/N in feeds), although numerically small, was statistically significant.

Reference

Miller, L.A., J.M. Moorby, D.R. Davies, M.O. Humphreys, N.D. Scollan & J.C. Macrae (2001). Increased concentration of water-soluble carbohydrate in perennial ryegrass (*Lolium perenne* L.). Milk production from late-lactation dairy cows. *Grass and Forage Science*, 56, 383-394.