Whole Crop Silage From Barley Fed in Combination with Red Clover Silage to Dairy Cows

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Introduction Grass silage is the basic feed in Swedish dairy cow rations. The nitrogen utilisation in this type of diet is, however, low. A combination of forage legume protein and whole crop silage carbohydrates might be a solution to this problem. From other countries in Northern Europe the experience from feeding barley whole crop silage in combination with legumes is that it is possible to maintain a reasonably high milk production and at the same time have a good protein utilisation (Kristensen, 1992).

Material and methods Whole crop silage (WCS) of barley was made at two stages of maturity; either at milk stage or at early dough stage. Red clover silage was from a second cut. These three silages were made in the form of round big bales covered with 6 layers of plastic. Kofasil Ultra™ was used as an additive. Barley silage from both cuts was mixed with clover silage either at 40/60 or 70/30 (DM basis), giving four experimental treatments. Precision chopped clover/grass silage of high quality (10.8 MJ ME; 18% CP) from a first cut stored in a tower silo was used as a control. All silages were fed *ad libitum* to dairy cows in mid to late lactation in combination with a fixed amount of 7.2 kg DM concentrate. The feeding was according to a balanced, incomplete changeover design with 15 cows, 3 blocks, 3 periods and 5 treatments. Total collection of faeces (5 days) and urine (3 days) was performed for five of the cows in each period. The cows were of the Swedish Red and White Breed and had an average live weight of 670 kg.

Results The later cut of barley led to an increase in DM content from 32.0 to 37.5%, an increase for starch from 13.3 to 16.6% (in DM) and a decrease in sugar from 15.8 to 10.2% (in DM). Contents of ash, protein and fibre showed relatively small changes between cutting dates. The inclusion of 40% WCS gave very similar production results as feeding a pure clover/grass silage, while 70% WCS in the mix gave lower milk production. Protein content in milk increased at the highest inclusion of WCS. N in milk and faeces increased, while N in urine decreased drastically as WCS increased as a proportion of the silage.

Table 1 Production results and nitrogen efficiency. LS-means per cow and day

	n[1]	Grass silage	WCS1-40[2]	WCS2-40	WCS1-70	WCS2-70	s.e.	*P*<	LSD[3]
Silage intake (kg DM)	9	13.2	13.0	14.9	12.7	14.6	0.5	0.0007	1.1
Milk (kg)	9	23.4	22.4	23.3	20.6	21.9	1.1	0.04	1.9
Protein content (%)	9	3.47	3.49	3.55	3.69	3.58	0.11	0.02	0.13
% of N in feeds									
N in milk	3	21.3	22.8	24.5	26.1	26.1	1.6	0.08	4.0
N in faeces	3	28.8	43.5	43.4	46.6	51.2	2.5	0.004	6.7
N in urine	3	46.8	40.4	39.6	34.3	29.2	2.9	0.05	10.6

[1]n = no of observations behind a LS-mean; [2]WCS1-40 = whole crop silage, cut 1, 40% of DM in mix; [3]LSD = least square difference

Conclusions Combinations of whole crop silage from barley and red clover were consumed at the same level as clover/grass silage. Milk production tended to be lower at high proportions of WCS while protein content in milk and protein efficiency increased. N in urine decreased at the same time. This gives prerequisites for a lower nitrogen loss to the environment.

References

Kristensen, V.F. (1992). The production and feeding of whole-crop cereals and legumes in Denmark. Chapter 12 in Whole-crop cereals (eds. Stark and Wilkinson), Chalcombe publications, 21-37.