Red clover for silage: management impacts on ensilability indices in the second season after sowing

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Introduction

The ensilability of swards containing red clover (*Trifolium pratense)* is influenced by a range of management factors. This experiment quantified the impacts of cultivar, companion grass, harvest schedule and N fertiliser on herbage ensilability at each of four harvests in the second year after sowing.

Materials and Methods

Within a randomised complete block (n=4) design, field plots (16 per block, each 10m x 2m) were used to evaluate a 2 (cultivars) x 2 (alone or with companion grass) x 2 (harvest schedule) x 2 (application of N fertiliser in spring) combination of factors. Two cultivars of red clover (Merviot and Ruttinova) were each sown in autumn as a monoculture or with perennial ryegrass (*Lolium perenne*, cv. Greengold). They received 0 or 50 kg inorganic N fertiliser/ha in mid-March and had a first-cut harvest date of 31 May or 13 June. Sequential harvests following 31 May were taken after 46, 48 and 57 days, with the corresponding durations after 13 June being 47, 42 and 49 days. All plots were harvested to a 5 cm stubble height and received P and K after each harvest. Clover data were analysed using a General Linear Model that accounted for each of the four factors and all two-, three- and four-way interactions.

Results and Discussion

The mean annual proportion of red clover in the monocultures was 0.79 compared with 0.70 for the binary mixtures (s.e.m. 0.026; P<0.05). The corresponding values for no N or N being spread in March were 0.79 and 0.70 (s.e.m. 0.026; P<0.05) and for the early and late harvest regimes were 0.80 and 0.69 (s.e.m. 0.026; P<0.01). Whereas red clover cultivar had little effect on ensilability indices (Table 1), inclusion of ryegrass with red clover reduced sward buffering capacity (BC) at Harvests 1 (P<0.001), 2 (P<0.01) and 4 (P<0.05), and increased (P<0.05) water-soluble carbohydrates (WSC) at Harvest 4. Spring application of N increased (P<0.05) WSC at Harvests 1 and 3, and reduced BC at Harvest 1 (P<0.001) but increased (P<0.05) it at Harvest 3. It increased (P<0.01) dry matter (DM) content at Harvest 1 but reduced (P<0.05) it at Harvest 3. The late harvest schedule increased (P<0.001) DM content at Harvests 1 and 3, reduced WSC at Harvests 1 (P<0.001), 2 (P<0.05) and 3 (P<0.001), and reduced (P<0.001) BC at Harvests 2 and 3. A small number of 2- and 3-way interactions occurred.

Conclusions

Both red clover cultivars had similar ensilabilities. Binary mixtures of red clover and ryegrass should be easier to preserve as silage than red clover monocultures due to higher WSC and/or lower BC. Spring applied N generally improved ensilability by increasing WSC and/or reducing BC. Much of the effects of binary mixtures versus monocultures, or of spring applied N, were due to increasing the proportion of ryegrass in the sward. The impact of the late harvest regime was more difficult to assess as it generally increased DM but reduced WSC and BC.

Table 1. Herbage ensilability indices for each harvest in the second season after sowing

Red clover	Grass[1]	N[2]	Harv.	Harvest 1			Harvest 2			Harvest 3			Harvest 4		
cultivar			sched.[3]	DM[4]	WSC[5]	BC[6]	DM	WSC	BC	DM	WSC	BC	DM	WSC	BC
Merviot	No	No	Early	148	73	433	130	85	499	126	76	538	159	50	511
	No	No	Late	153	33	411	138	82	447	148	27	348	167	46	527
	No	Yes	Early	148	75	411	134	83	499	127	72	537	141	47	555
	No	Yes	Late	172	44	412	137	70	464	137	34	445	148	49	557
	Yes	No	Early	145	67	393	136	96	495	128	67	560	139	44	546
	Yes	No	Late	154	32	388	134	54	414	144	27	348	147	52	505
	Yes	Yes	Early	146	100	383	131	77	486	134	81	546	141	41	540
	Yes	Yes	Late	160	49	325	133	84	453	126	40	454	157	74	471
Ruttinova	No	No	Early	139	65	442	129	75	514	125	66	565	152	42	562
	No	No	Late	152	67	425	130	65	478	144	30	388	149	42	595
	No	Yes	Early	144	82	406	129	75	517	116	72	561	146	46	539
	No	Yes	Late	164	34	417	132	66	455	135	38	444	152	40	537
	Yes	No	Early	137	77	415	130	78	503	125	69	549	151	49	538
	Yes	No	Late	138	33	408	133	65	459	144	32	396	162	51	503
	Yes	Yes	Early	146	97	375	133	65	493	119	70	546	155	64	535
	Yes	Yes	Late	151	34	355	133	60	419	144	30	395	151	79	512
s.e.m.[7]				5.4	8.1	16.0	4.0	8.7	11.8	4.5	4.4	27.0	8.2	9.3	21.8

[1]With companion perennial ryegrass; [2]Application of inorganic N in spring; [3]Early or late first-cut harvest schedule; [4]Dry matter (g/kg); [5] Water-soluble carbohydrates (g/kgDM); [6] Buffering capacity (mEq/kgDM); [7]For 4-way interaction.