

Timing of forage cut affects feed yield, quality and seed set in subterranean clover

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Abstract. The effect of timing of forage conservation on forage yield, forage quality, clover seed set and seedling regeneration by subterranean clover was measured over two successive years. The study was conducted on pure swards of Clare, Seaton Park, Junee and Goulburn subterranean clover at Wagga Wagga NSW. Swards were cut at 3 times to simulate an early silage (23 Sept.), late silage (9 Oct.) or hay cut (25 Oct.). Forage yield increased up to the second cutting time but thereafter either was similar or declined with a late hay cut. Feed quality declined consistently over the 3 forage harvests with IVV DM digestibility declining from 76% to 70% and protein falling from 23.5% to 16%. Seedling regeneration in the following year was good (>1000 plants/m²) in all cultivars, except Clare, with the early silage cut, but decreased markedly with later cutting times.

Introduction

Subterranean clover (*Trifolium subterraneum* L.) pastures often produce more feed in spring than be readily utilised by stock, resulting in poor pasture utilisation. One option is to cut the surplus feed early in spring for silage or later for hay. The impact of the time of cutting on the yield of conserved forage and its quality is not well documented. It is generally assumed that the later the cut, the more feed, but the trade-off in quality may offset this advantage. Another question is the effect of different cutting times on subsequent seed set by the subterranean clover and its ability to regenerate the following year. The following study examined the effect of an early silage cut, late silage cut or a later hay cut on the yield and quality of herbage from 4 subterranean clover cultivars and seedling regeneration the following year.

Materials and methods

Pure swards of Seaton Park, Junee, Goulburn and Clare subterranean clover at the Agricultural Institute, Wagga Wagga, New South Wales, were cut on 23 Sept (early silage), 9 Oct (late silage) or 25 October (hay cut) in two successive years, 2003 and 2004 after being locked up on 1 August. Plots were 2 m x 8 m and arranged in a randomised plot design with 4 replications. Total yield and quality of the cut forage was measured as were subsequent seed yields and clover regeneration. In both years the forage was cut at a height of 3 cm, but in 2004

an additional cutting height of 6 cm was included as a treatment to determine the effect of a more lenient cutting. Total annual rainfall was 438 mm in 2003 and 402 mm 2004, compared to a long term average rainfall of 580 mm.

Results and Discussion

Forage yields increased with the later cutting only up until the middle cut in both years. Delaying the conservation cut further until late October usually resulted in lower yields in 2003 (Table 1) or similar yields in 2004 (Table 2). The lack of additional yield was most likely due to the higher respiration and leaf decay due to shading as a result of the dense canopies.

The results show that where a later hay cut is intended, delaying the lock up time and grazing for longer may be more efficient, rather than losing herbage due to decay.

The trend in herbage quality with time as measured by digestibility and protein quality was very consistent. The later the feed was conserved the greater the decline in digestibility (Table 3) and protein content (Table 4) with an average decline of 6% in digestibility units and 7% units in protein. Conserving feed as hay in preference to silage greatly reduced the potential quality of the conserved fodder. The actual quality of the forage will depend on the ability to convert the cut material into high quality conserved forage, but it could be argued with modern silage making

Table 1. Forage yield (t/ha) from 4 cultivars of subterranean clover cut early (23 Sept.), mid (9 Oct.), or late (25 Oct) in 2003

Cutting time	Cultivar			
	Seaton Park	Junee	Goulburn	Clare
Early (early silage)	3.25	3.79	3.68	3.93
Mid (late silage)	10.39	10.4	8.56	10.98
Late (hay)	8.42	7.36	6.53	7.62

Table 2. Effect of cutting time (early silage, late silage and hay cut) and cutting height (low 3 cm or high 6 cm) on forage yield (t/ha) of 4 subterranean clover cultivars in 2004

Cutting height/ Cutting time	Cultivar							
	Seaton Park		Junee		Goulburn		Clare	
	low	high	low	high	low	high	low	high
Early (early silage)	3.0	2.0	3.9	2.7	3.3	2.2	4.7	3.7
Mid (late silage)	5.9	3.1	5.0	3.8	5.2	3.6	5.3	3.4
Late (hay)	4.3	3.3	5.3	3.0	5.1	2.6	5.0	3.9

techniques, losses from silage may be lower than from hay which is more susceptible to the vagaries of weather due to the longer drying time required compared to silage.

Clover seed set and subsequent seedling regeneration declined with later cutting, suggesting that the early cut provided more time for the clover to recover (Figure 1). This was supported by the good correlation between the amount of herbage remaining at the end of the season and subsequent clover seed yield. For all cultivars except Clare, clover seedling regeneration following a late Sept cut was good with more than 1,000 seedlings/m² but was less satisfactory with the early or late Oct cutting times.

Despite Clare appearing taller and more productive than the other cultivars, this apparent advantage was deceptive with clover cultivar having only a minor impact on subterranean clover herbage yield and quality. Cultivars did however differ in their response to cutting in terms of seed yield and seedling regeneration. The 3 cultivars belonging to the subterraneum subspecies recovered well from cutting, but Clare, which belongs to the brachycalicinum sub species, was less able to recover from the early cut and produced less seed and had poorer regeneration in the subsequent year than the other 3 cultivars (Figure 1). Clare is a more upright cultivar with thicker petioles and stems and it was apparent after cutting that more of the runners were removed compared to the more prostrate cultivars.

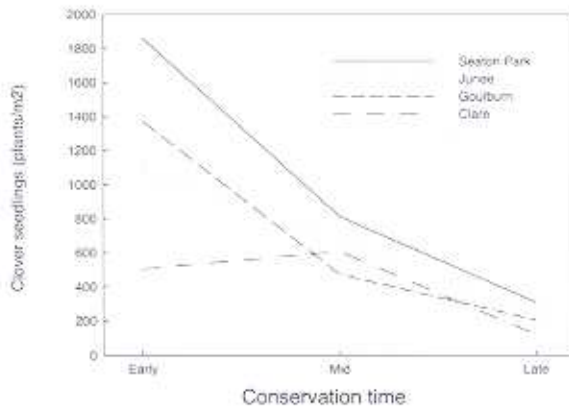
Table 3: Effect of cutting time on digestibility (DMD%) of 4 cultivars of subterranean clover cut for silage or hay in 2003.

Cutting time	Cultivar				
	Seaton Park	Junee	Goulburn	Clare	mean
Early (early silage)	77	77	78	76	76
Mid (late silage)	73	74	75	73	74
Late (hay)	70	71	71	68	70

Table 4: Effect of cutting time on crude protein (%DM) of 4 cultivars of subterranean clover cut for silage or hay in 2003.

Cutting time	Cultivar				
	Seaton Park	Junee	Goulburn	Clare	mean
Early (early silage)	22	25	25	22	23.5
Mid (late silage)	17	21	20	19	19.3
Late (hay)	14	17	17	16	16.0

Figure 1. Effect of forage cutting time on clover seedling regeneration by 4 cultivars in autumn of the following year (2004)



Conclusions

The results show that subterranean clover pastures can be cut early for silage and still recover to set sufficient seed for good seedling regeneration in the subsequent year. Cutting later for hay reduces the digestibility and protein of the forage compared to earlier cutting for silage. Given that a 1% unit change in digestibility will result in a 3-5% change in liveweight gain, a decrease in digestibility from 76% to 70% will decrease the potential animal liveweight gain achieved from the forage by 18-30%.

Locking up a pasture for too long decreased total forage yield with losses due to decay and shading countering any benefits flowing from the additional lock up period.

Herbage yields and seed set following cutting are likely to vary with seasonal conditions however both years received below average rainfall and therefore the results should be achievable in most average or better seasons. In regions with an earlier finish to the growing season, seed yield recovery could be expected to be poorer than reported here.