Do not graze your kikuyu pasture too frequently

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Introduction

Recent research on the effect of cutting frequency on the production and quality of kikuyu pastures indicated that re-growth periods of less than 21 days may decrease total value of kikuyu pastures. Very short re-growth periods may even increase the risk of acidosis in grazing cows. The optimal re-growth period appears to be 28 days.

Materials and methods

A trial was executed at the Outeniqua Experimental Farm to investigate the effect of re-growth stage and cutting frequency of kikuyu pasture on its chemical composition and fermentation characteristics. Four plots of 60m^2 each were randomly selected in an existing kikuyu camp. Each plot was subdivided into six plots of 2 × 5m, thus enabling a trial with six treatments and four replicates. Plots were first cut to ground level and soil samples were taken to determine the mineral status which was used as a guideline for fertilization. All fertilizer and irrigation applications were according to current recommendations.

During a 42 days cycle, plots were cut after the following re-growth periods: 7 days (allowing 6 cuttings), 14 days (allowing 3 cuttings), 21 days (allowing 2 cuttings), 28 days (allowing a single cutting), 35 days (allowing a single cutting) or 42 days (allowing a single cutting). Cycles were repeated 35 days after the end of the previous cycle. Three cycles were completed in one growing season. Thirty five days before the start of each cycle, the pasture was cut to a height of 50 mm. One week before cutting the first treatment, all the plots were again cut to a height of 50 mm and fertilized; this was then regarded as the starting date of the relevant cycle.

Pasture samples were analysed for dry matter (DM), crude protein (CP), crude fibre (CF), nitrogen free extract (NFE), neutral detergent fibre (NDF) and acid detergent fibre (ADF). The samples were also subjected to *in vitro* analyses, including 24h NDF disappearance, 48h organic matter digestibility (IVOMD), and gas production (ml gas/g OM) after incubation times of 0, 1, 2, 4, 8, 12, 24, 48, 72, and 96h. Dry matter yield was determined on each plot at the specified cutting times.

The data are presented in two ways: i) Average values of the multiple cutting treatments (i.e. for each of the 7 days, 14 days and 21 days treatments) and values from the single cutting treatments (i.e. the 21 days, 28 days and 42 days treatments) are compared. ii) Data from each multiple cutting treatment were analyzed to determine the effect of multiple cuttings within a specific cutting frequency (for example, the six cuttings in the 7 days frequency treatment were compared with each other, the three cuttings in the 14 days frequency treatment with each other, etc.).

Results and discussion

The effect of cutting frequency on DM content and DM yield is presented in Figure 1.

It appeared that up to 35 days, the dry matter content of kikuyu pasture decreased when re-growth period increased. The DM content of the pasture increased again in the 42 days treatment. Although the differences between treatment means were statistically significant, they were small. However, it could have an impact on total DM yield per hectare in the long term.

Although the DM yields per cutting provide interesting information, there is no purpose in comparing the data between treatments because of the difference in re-growth time. However, when values are expressed as total DM yield over the 42 days cycle, it is of importance to note that the efficiency of DM production increased significantly as

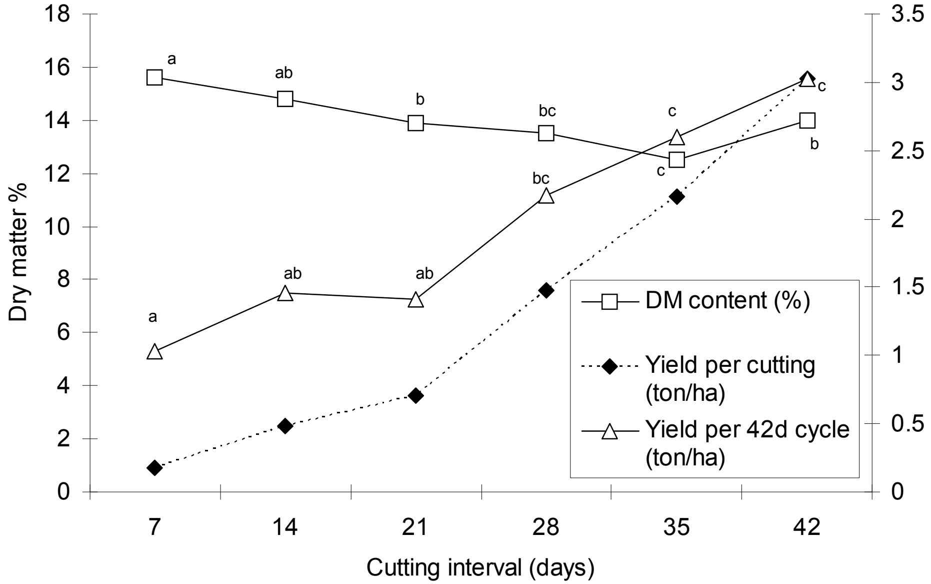

Figure 1. The effect of cutting frequency on the DM content and DM yield of kikuyu pasture. Points with letters in common were not different (P<0.01). The yield per

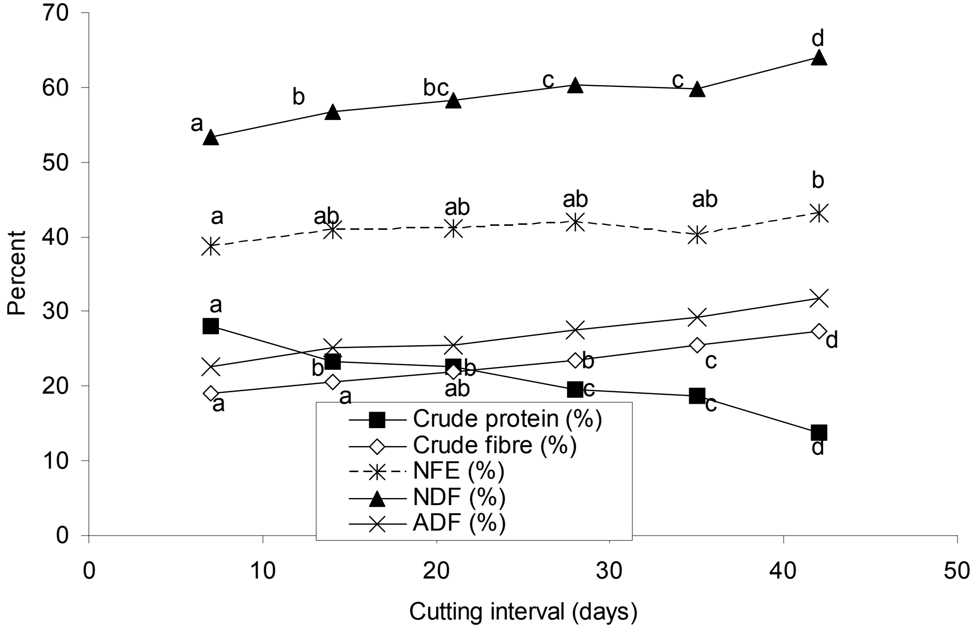

Figure 2. The effect of cutting frequency on the chemical composition of kikuyu. Values are on a dry matter basis. Points with letters in common are not significantly different (P<0.01).

cutting frequency decreased. These results suggest that too frequent grazing of kikuyu pasture could have a significant negative impact on pasture production. It must be added, though, that pasture yield estimations were based on small sample sizes taken at the respective cutting frequencies and that extrapolations might not be very accurate.

Results on the chemical composition of the pasture are presented in Figure 2 and Table 1. The average values of each multiple cutting treatment were calculated and compared with values from the single cutting treatments; these are presented in Figure 2. The within-treatment results, where results between the different cuttings in a multiple cutting treatment were compared, are presented in Table 1.

The CP content decreased as the re-growth period increased from 7 to 42 days, while the crude fibre and NDF contents increased. The NFE content (mostly sugars) also increased, but the effect is not as apparent as with CP and fibre; only the 7 days and 42 days treatments differed in NFE content.

The effect that frequent cutting had on the quality of the next cutting is indicated in Table 1.

In all cutting frequency treatments, the protein content decreased from one cutting to the next, while the fibre fractions and NFE increased. The shorter the re-growth period, the greater the effect was. It is interesting to note that the chemical composition of kikuyu obtained from the last cut in each of the multiple cutting treatments was quite similar. The last cut of the three multiple cutting treatments (7, 14 and 21 days) coincided with the 42 days cutting treatment. In the multiple cutting treatments the CP content of the last cutting was higher and crude fibre and NDF lower than those in the 42 days re-growth treatment. The last cutting of the three multiple cutting treatments were, however, not that much different from the 28 days cutting. In terms of DM yield and average quality, 28 days thus appears to be the cutting frequency of choice.

The effects of cutting frequency on *in vitro* fermentation parameters are presented in Table 2.

Mean 24 h NDF disappearance decreased with increased re-growth periods, but only when re-growth periods were longer than 28 days. This would suggest that the fibre became less digestible as plant ma-

Table 1. The effect of cutting number per treatment on the chemical composition of kikuyu. Values are on a dry matter basis

Nutrient	Re-growth period and cutting number							
	7 d, 1	7 d, 2	7 d, 3	7 d, 4	7 d, 5	7 d, 6	SEm	P
Crude protein (%)	33.2^{a}	31.3^{ab}	30.8^{ab}	26.6^{bc}	24.5^{c}	22.1^{c}	1.18	<0.01
Crude fibre (%)	17.2^{a}	17.5^{a}	17.2^{a}	19.6^{b}	20.3^{b}	22.2^{c}	0.37	<0.01
NFE (%)	33.9^{a}	35.9^{ab}	38.0^{ab}	40.4^{bc}	42.5^{c}	41.4^{c}	1.25	<0.01
NDF (%)	48.6^{a}	50.3^{a}	51.1^{a}	55.3^{b}	56.7^{bc}	58.6^{c}	0.60	<0.01
ADF (%)	21.2	22.3	20.0	23.0	23.4	25.7	0.38	<0.01
	14 d, 1		14 d, 2		14 d, 3		SEm	P
Crude protein (%)	27.0^{a}		23.1^{ab}		19.4^{b}		0.90	0.17
Crude fibre (%)	18.6^{a}		20.3^{ab}		22.6^{b}		0.51	<0.01
NFE (%)	39.8		42.5		43.5		1.05	0.08
NDF (%)	53.4^{a}		57.1^{b}		59.8^{c}		0.56	<0.01
ADF (%)	25.2		24.0		26.5		1.52	0.55
	21 d, 1			21 d, 2			SEm	P
Crude protein (%)	23.7			20.9			2.32	0.43
Crude fibre (%)	20.7			23.1			0.55	0.02
NFE (%)	40.8			41.3			2.08	0.87
NDF (%)	55.0			61.4			1.05	<0.01
ADF (%)	23.9			27.0			0.79	<0.03

Table 2. The effect of cutting frequency on *in vitro* fermentation parameters of kikuyu

Parameter	Cutting frequency (re-growth period)							
	7 d	14 d	21 d	28 d	35 d	42 d	SEm	P
24 h NDF disapp. (%)	70.0[a]	67.8[a]	65.6[a]	63.7[a]	53.7[b]	53.7[b]	1.86	<.01
12 h gas prod. (ml/g OM)	77.3[a]	79.4[a]	65.3[b]	64.5[b]	39.3[c]	59.0[b]	3.13	<.01
96 h gas prod. (ml/g OM)	292.5[a]	303.9[a]	291.1[a]	295.8[a]	261.9[b]	279.3[ab]	5.73	<.01

terial was removed less frequently than once a month. According to Figure 2, the NDF content increased with increasing re-growth periods; this increase would probably be related to an increased ADF content. The differences between the 7, 14, 21 and 28 days treatments were not significant.

The 12h gas production values give a fairly good idea of how fermentation rates compared between treatments. It can be seen that rates decreased as the re-growth period increased. The fact that the fermentation rate was so low in the 35 days treatment cannot be readily explained, but it is possible that environmental conditions played a role. The 96h values are an indication of the extent of fermentation, which was not significantly different between treatments, except for the 35 days treatment where the value was

Table 3. The effect of treatment (within cutting frequencies) on *in vitro* gas production of kikuyu

Parameter	Re-growth period and cutting number							
	7 d, 1	7 d, 2	7 d, 3	7 d, 4	7 d, 5	7 d, 6	SEm	P
24 h NDF disapp. (%)	69.0	68.2	71.6	68.9	72.8	69.5	1.41	0.20
12 h gas prod. (ml/g OM)	28.8[a]	63.2[b]	76.0[bc]	92.8[cd]	106.6[d]	96.6[d]	4.32	<.01
96 h gas prod. (ml/g OM)	201.8[a]	268.4[b]	297.3[c]	312.7[cd]	342.1[e]	332.6[de]	5.87	<.01
	14 d, 1		14 d, 2		14 d, 3		SEm	P
24 h NDF disapp. (%)	65.6		71.3		66.6		3.72	0.53
12 h gas prod. (ml/g OM)	70.9[a]		84.8[ab]		90.3[b]		5.15	<.064
96 h gas prod. (ml/g OM)	271.2[a]		319.2[b]		321.4[b]		7.4	<.01
	21 d, 1			21 d, 2			SEm	P
24 h NDF disapp. (%)	64.6			66.6			3.72	0.53
12 h gas prod. (ml/g OM)	40.4[a]			90.2[b]			3.3	<.01
96 h gas prod. (ml/g OM)	261.3[a]			320.9[b]			8.22	<.01

much lower.

Within-treatment effects on *in vitro* parameters are indicated in Table 3.

Mean 24h NDF disappearance did not change much from cutting to cutting in any of the multiple cutting treatments and differences were not significant. However, 12h and 96h gas production increased significantly from the first to the last cutting in all three multiple cutting treatments. With the increase in NDF content observed from cutting to cutting (Figure 2), and the fact that the NDF digestibility appears to remain constant between cuttings, it would appear that more fermentable material (g/g) become available from cutting to cutting. With the rapidly increasing rate of fermentation in the multiple cutting treatments, and especially the 7 days re-growth treatment, it can be concluded that very frequent grazing would result in increased forage fermentation rate, which could potentially increase the risk of acidosis in cows. The lower NDF content of frequently cut kikuyu would further increase the risk.

Results from the current trial would suggest that multiple cutting of kikuyu pasture results in higher nutritive value, when looking at the average values of each of the multiple cutting treatments. However, the chemical composition (especially CP% and NDF%) of the last cutting of each multiple cutting treatment did not differ that much from the 28 days and 35 days treatments. The high CP content of younger material is not necessarily an advantage because a significant portion of the CP may be in the form nitrates and the high CP content of pastures usually contributes to abundant N-intake by pasture-based cows. Frequent cutting appeared to have lowered total DM yield per hectare significantly. Increased fermentation rates of frequently grazed kikuyu may even increase the risk of acidosis. It should therefore be kept in mind that pasture dry matter yields and effective fibre intake must be taken into account before deciding on an optimal grazing system.

Cattle strip-grazing kikuyu at Broadacres, Cedara