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Grazing management targets for improved pasture intake and utilisation

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Pasture intake (kg DM/animal.day) and utilisation (kg DM/ha.season) are factors driving the productivity and profitability of grazing systems. These factors are determined by grazing management targets (GMT) such as leaf stage, pasture utilisation per grazing and pasture residue management. Recent studies found that beef (Benvenutti *et al.* 2015) and dairy (Ison *et al.* 2019) cattle achieve high levels of pasture intake only when grazing the top leafy stratum (TLS) of pastures. Pasture intake started to decline when a small proportion of the TLS was left ungrazed only around the faecal patches. These findings led to the development of a new grazing management strategy called PUP (proportion of un-grazed pasture) grazing. To achieve high pasture intake the grazing intensity of PUP grazing is less than traditionally recommended. The target pasture utilisation per grazing of the PUP strategy is 100 % of the TLS mass excluding faecal patches for all pasture species. Instead, the traditional target utilisation is 80 % and 66 % of the pasture mass for annual ryegrass (DPI 2022) and kikuyu (Fulkerson *et al.* 1997) respectively. Also, recent plot studies found that less intense and more frequent defoliations resulted in greater pasture utilisation per season of the TLS in comparison to the more intense and less frequent defoliations that are traditionally recommended. These findings resulted in additional GMT for the PUP strategy for maximum utilisation per season. The target leaf stage for PUP grazing is 2 and 3.5 fully expanded leaves for annual ryegrass and kikuyu respectively. In contrast, the traditional recommendations for annual ryegrass and kikuyu are 2.5 to 3 (DPI 2022) and 4.5 (Fulkerson *et al.* 1997) leaves respectively. In addition, the PUP strategy includes maintaining the pastures residues at 10 cm using mechanical means or non-lactating animals for both pasture species. In contrast, it is traditionally recommended to regularly reduce the pasture residues down to 5 cm for annual ryegrass (DPI 2022) and kikuyu (Fulkerson *et al.* 1997) respectively. These grazing strategies have not been compared before.

This demonstration study was conducted at Gatton Research Dairy on annual ryegrass and kikuyu pastures grazed by dairy heifers during two growing seasons for each pasture species from 2019 to 2021. Heifers were randomly allocated to two pasture strips that were managed according to either the PUP or the traditional GMT. The number of heifers used and the amount of pasture offered per day was calculated based on the target pasture utilisation. Pasture intake and utilisation were measured using the double sampling method described by Ison *et al.* 2019. All data were statistically analysed with Genstat using analysis of variance. Growing seasons were used as replicates in the ANOVA analyses.

Despite the high grazing pressure, the heifers in the traditional treatment decreased pasture intake instead of grazing the pastures down to the target pasture utilisation (Table 1). Therefore, pasture intake was 61% and 53% greater for the PUP strategy for ryegrass and kikuyu respectively. The pasture utilisation per grazing was similar between grazing strategies for both pasture species. However, since the rotation length was longer for the traditional treatment the number of grazings per season was greater for the PUP strategy in both species. Consequently, the utilisation per season was 36 and 63% greater for the PUP strategy for ryegrass and kikuyu respectively. These results showed the potential of the PUP strategy to improve productivity and profitability of grazing systems, which should be quantified in future studies

Table 1. Results for the traditional and PUP grazing treatments[A]

	Annual ryegrass		Kikuyu		SEM	*P*-value
	Traditional	PUP	Traditional	PUP		
Pasture mass (kg DM/ha)	1779	1767	1682	1867	36	0.138
Pre-grazing pasture height (cm)	26.7^{b}	24.6^{ab}	25.5^{b}	21.7^{a}	0.6	0.040
Post-grazing pasture height (cm)	11.7^{a}	11.2^{a}	15.1^{b}	12.1^{a}	0.4	0.048
Pasture utilisation per grazing (kg DM/ha)	1112^{b}	1046^{b}	579^{a}	601^{a}	37	0.608
Pasture utilisation per season (kg DM/ha)	6107^{ab}	8326^{b}	4002^{a}	6511^{ab}	425	0.031
Pasture utilisation per day (kg DM/ha)	40.7^{b}	56.2^{c}	28.9^{a}	49.7^{c}	1.2	0.005
Pasture intake (kg DM/heifer.day)	5.7^{ab}	9.2^{b}	4.4^{a}	6.7^{ab}	0.8	0.062

[A]*P* values for grazing treatments. Within rows, means with a common superscript are not significantly different ($P < 0.05$).

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