

The nutritional value of cocksfoot (*Dactylis glomerata* L.) and perennial ryegrass (*Lolium perenne* L.) under leaf-stage based defoliation management

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Introduction The perception that cocksfoot is of lower nutritional value and less productive than perennial ryegrass is largely the result of studies in which management was based on perennial ryegrass (to the detriment of cocksfoot) or involved defoliation of both species at the same time (Greenhalgh & Reid, 1969; Johnson & Thomson, 1996). Maintaining plants in a vegetative state through species-specific management is essential to retain the high quality and productivity of cocksfoot. Defoliation at or before 4-5 fully expanded live leaves per tiller is recommended as the ideal physiological regrowth stage for defoliation of cocksfoot, resulting in metabolisable energy (ME) levels in excess of 11 MJ/kg dry matter (DM) (Rawnsley et al., 2002). The aim of the current study was to provide an objective comparison of the nutritional value of cocksfoot and perennial ryegrass grown in dryland conditions under a management regime based on the physiological status of each grass species.

Methods Newly established cocksfoot (cv. Kara) and perennial ryegrass (cv. Impact) swards were defoliated repeatedly over an 8-month period at species-specific intervals (between 2 and 4 leaves/tiller). At each defoliation event DM yield tonnes/hectare (t/ha) was calculated and herbage samples were collected for analysis of neutral detergent fibre (NDF) and acid detergent fibre (ADF) using an Ankom^{200/220}® fibre analyser, while total nitrogen (N) was determined by the Kjeldahl method. Crude protein (CP), digestibility and ME were subsequently calculated. Means for herbage quality measurements from defoliations during spring, summer and autumn were compared by ANOVA using the statistical package SPSS and least significant difference (LSD), as defined by Steele and Torrie (1960).

Results There was no significant difference ($P > 0.05$) in total DM yield between cocksfoot and perennial ryegrass at the conclusion of defoliation treatments; both yielded a mean of 4.2t DM/ha. The slower growth rate of ryegrass resulted in less frequent defoliation than for cocksfoot (i.e. 7 defoliations at 2L for cocksfoot vs. 6 defoliations for ryegrass). The ME levels of both species increased significantly ($P < 0.001$) between summer and autumn, by at least 0.4 MJ/kg DM (which equates to approximately 2.4% digestibility). There was no difference in ME between species throughout the experimental period (see Figure 1). Cocksfoot had significantly higher levels of ADF (22.9 vs. 20.4%; $P < 0.05$) and CP (17.9 vs. 12.6%; $P < 0.001$) than perennial ryegrass.

Conclusions Under the imposed defoliation management regime, the nutritional value and productivity of cocksfoot is comparable to perennial ryegrass. The ME range of cocksfoot throughout the experimental period was between 10.8 and 11.2 MJ/kg DM, indicating the energy content of this species is acceptable in terms of meeting the high energy requirements of a lactating dairy cow. Although cocksfoot is relatively slow to establish, this study showed its productivity can be equivalent to that of perennial ryegrass within one year from sowing. Maintaining cocksfoot plants in a vegetative state through defoliation at or before 4-5 leaves/tiller was successful in maintaining the nutritional value and productivity of this species.

References

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Figure 1 Metabolisable energy content of cocksfoot (▲) and perennial ryegrass (■) (MJ/kg DM). Vertical bars represent LSD at $P = 0.05$

