

Effect of defoliation frequency and severity during winter on herbage regrowth and water-soluble carbohydrate content of perennial ryegrass (*Lolium perenne* L.) dominant swards

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Introduction Perennial ryegrass is one of the world's primary grazed grasses in temperate regions. To retain the low costs of production vital to the prosperity of industries that rely on ryegrass, it is necessary to maximise herbage growth. Grazing management decisions can have a positive or negative impact on regrowth. Although results have been inconsistent, two such decisions include the frequency and severity with which swards are defoliated.

Methods The interaction between defoliation frequency and severity was investigated in a 2 (frequency) x 3 (severity) factorial arrangement. Swards were defoliated either three times at the 1-leaf (frequently; F) or once at the 3-leaf (infrequently; IF) stage of regrowth to 40 mm residual stubble height (RSH). At the third harvest for the frequently defoliated swards and the first for the infrequently defoliated swards, swards were defoliated to 20, 40 or 60 mm RSH (H₁; late winter). All swards were allowed to regrow to the 3-leaf stage before a final defoliation to their treatment RSH (H₂; mid spring). The water-soluble carbohydrate (WSC) content of ryegrass tillers below the treatment RSH was determined post-defoliation and at each leaf stage between H₁ and H₂ using a modification of the method described by Smith (1969).

Results Frequently defoliated swards yielded less herbage up to and including H₁ (966 vs. 1361 kg DM/ha for F and IF defoliated swards, respectively; $P < 0.001$) and again at H₂ (2007 vs. 2279 kg DM/ha; $P < 0.001$). Defoliating swards to 60 mm reduced herbage production at H₂ (2266, 2249 and 1914 kg DM/ha for swards previously defoliated to 20, 40 and 60 mm, respectively; $P < 0.001$). The post-defoliation WSC content in ryegrass stubble was reduced by both frequent and severe defoliation (Figure 1; $P < 0.001$). By the 2-leaf stage, the effect of defoliation frequency had dissipated ($P > 0.1$), although the effect of defoliation height remained ($P < 0.001$). Contrary to previous glasshouse research, there was no correlation between post-defoliation WSC content and subsequent herbage yield. Frequently defoliated swards had both lower WSC content and herbage yield than those less frequently defoliated, whereas swards defoliated to 60 mm had higher WSC content, but lower yields than those defoliated to 20 or 40 mm. Further investigation is required to determine the importance of WSC on the yield of field-grown ryegrass.

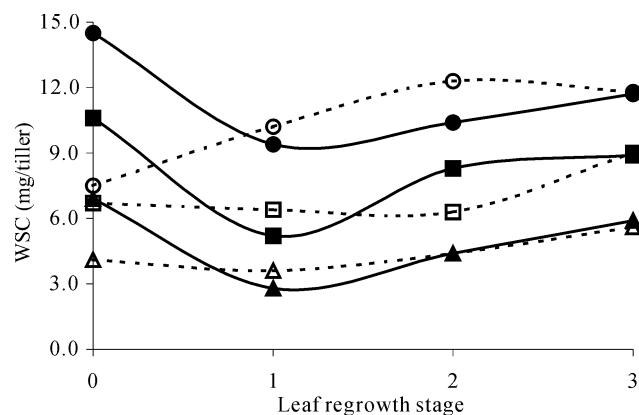


Figure 1 Water-soluble carbohydrate (WSC) content below the treatment residual stubble height (RSH) of perennial ryegrass tillers defoliated three times at the 1-leaf stage (dashed lines) or once at the 3-leaf stage (solid lines) to 20 (▲△), 40 (■□) or 60 (●○) mm RSH and allowed to regrow to the 3-leaf stage.

Conclusions Frequent defoliation of swards at the 1-leaf stage reduced herbage production, even if management then allowed regrowth to the recommended defoliation stage (3-leaf). During winter, it was possible to defoliate swards more severely than has been recommended during spring-autumn (40-80 mm; Lee *et al.* 2008) or from glasshouse studies (50 mm; Fulkerson *et al.* 1994), without adversely affecting herbage production.

References

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