Comparative response of tall fescue (*Lolium arundinacea* Schreb.) and perennial ryegrass (*Lolium perenne* L.) swards to variation in defoliation interval and height.

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Abstract

New Zealand agricultural pastures are predominantly comprised of perennial ryegrass (*Lolium perenne* L.) with a minor component of white clover (*Trifolium repens* L.). However perennial ryegrass and white clover pasture is often limited by poor growth and low feed quality during warm dry conditions. Tall fescue (*Festuca arundinacea* Schreb.) can be used as an alternative permanent pasture to perennial ryegrass. However, the optimal grazing management of tall fescue is not yet clear.

The main objectives of this research were to compare the dry matter (DM) yields, herbage nutritive value, tiller density and botanical composition of tall fescue and perennial ryegrass to develop grazing management guidelines for tall fescue. Tall fescue and perennial ryegrass were sown with white clover and arranged in 36 plots, laid out in a randomised complete block design with three replications. The experiment was established in November 2012. There were three defoliation treatments for both tall fescue and perennial ryegrass. Tall fescue was defoliated at either the 1-leaf, 2-leaf or 4-leaf stage of regrowth and perennial ryegrass was defoliated at either the 1-leaf, 2-leaf or 3-leaf stage of regrowth. The present study provides evidence that tall fescue requires a longer defoliation interval than perennial ryegrass in order to achieve high DM yields and maintain adequate botanical composition (a high density of sown species). Tall fescue out-yielded perennial ryegrass over the 13 month treatment period, due to higher growth rates from spring, summer and autumn; however this was only achieved under the longest defoliation interval (4-leaf stage of regrowth). Dry matter yields, growth rates, botanical compositions and tiller densities of both species were all greater at the longest defoliation intervals (4-leaf stage of regrowth for tall fescue, 3-leaf stage of regrowth for perennial ryegrass), and while perennial ryegrass tolerated the moderately fast defoliation treatment (2-leaf stage of regrowth), tall fescue DM yields and botanical composition were both significantly reduced. The fastest defoliation interval (1-leaf stage of regrowth) was detrimental to yield, tillering and botanical composition both species. While the highest DM yields were recorded for tall fescue under a 4-leaf defoliation interval, this consistently resulted in the poorest quality herbage. Overall, results from the current study indicated that only under a longer regrowth interval (at the 4-leaf stage of regrowth) was tall fescue able to maintain adequate DM yields, pasture growth rates and tiller survival. In fact, under this defoliation regime, tall fescue was able to out-yield perennial ryegrass, especially in the drier and warmer parts of the year. However, the decline in herbage quality under this longer rotation would have compromised animal production for some parts of the

year. While repeated defoliation at the 2-leaf stage of regrowth resulted in generally adequate herbage quality of tall fescue, it also resulted in inadequate pasture composition and tiller density. The current study highlights that under field conditions, the 2-leaf stage of regrowth may be too short, and the 4-leaf stage of regrowth too long, for an adequate compromise between pasture growth and survival on the one hand, and herbage quality on the other. Therefore, additional research is required to explore defoliation options between the 2-leaf stage of regrowth and 4-leaf stage of regrowth of tall fescue.

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