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**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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# Table of Contents

<b>Abstract</b> .....	2
<b>Acknowledgements</b> .....	4
<b>List of Tables</b> .....	8
<b>List of Figures</b> .....	9
<b>1 Introduction</b> .....	11
1.1 Aim and thesis structure.....	13
<b>2 Literature review</b> .....	14
2.1 Perennial ryegrass .....	14
2.1.1 <i>Origin and adaptation</i> .....	14
2.1.2 <i>Morphology</i> .....	14
2.1.3 <i>Soil requirements</i> .....	15
2.1.4 <i>Establishment</i> .....	15
2.1.4.1 <i>Effect of temperature</i> .....	16
2.1.4.2 <i>Weed competition</i> .....	16
2.1.5 <i>Root system and drought tolerance</i> .....	16
2.1.6 <i>Pest tolerance</i> .....	17
2.1.7 <i>Dry matter yields from perennial ryegrass pastures</i> .....	17
2.1.7.1 <i>Annual dry matter yields</i> .....	17
2.1.7.2 <i>Seasonal dry matter yields</i> .....	17
2.1.7.3 <i>Effect of irrigation on dry matter yields</i> .....	18
2.1.8 <i>Herbage quality</i> .....	18
2.1.9 <i>Milk production from perennial ryegrass pastures</i> .....	19
2.1.10 <i>Grazing management</i> .....	19
2.1.10.1 <i>Defoliation interval</i> .....	20
2.1.10.2 <i>Defoliation height</i> .....	20
2.1.10.3 <i>Leaf regrowth stage</i> .....	22
2.1.11 <i>Conclusions and limitations of perennial ryegrass</i> .....	23
2.2 Tall fescue .....	24
2.2.1 <i>Origin and adaptation</i> .....	24
2.2.2 <i>Morphology</i> .....	24
2.2.3 <i>Soil requirements</i> .....	25



2.2.4	<i>Establishment</i> .....	25
2.2.4.1	Effect of temperature .....	26
2.2.4.2	Weed competition .....	27
2.2.5	<i>Root system and drought tolerance</i> .....	27
2.2.6	<i>Pest tolerance</i> .....	29
2.2.7	<i>Dry matter yields from tall fescue pastures</i> .....	29
2.2.7.1	Annual dry matter yields.....	29
2.2.7.2	Seasonal dry matter yields .....	29
2.2.7.3	Effect of irrigation on dry matter yields .....	32
2.2.8	<i>Herbage quality</i> .....	32
2.2.9	<i>Milk production from tall fescue pastures</i> .....	33
2.2.10	<i>Grazing management</i> .....	33
2.2.10.1	Defoliation interval.....	33
2.2.10.2	Defoliation height .....	34
2.2.10.3	Leaf regrowth stage .....	36
2.3	Summary and conclusion .....	37
<b>3</b>	<b>Methods</b> .....	38
3.1	Site .....	38
3.2	Treatments and experimental design.....	41
3.3	Defoliation treatments .....	41
3.4	Sampling and measurements.....	43
3.4.1	<i>Dry matter yield</i> .....	43
3.4.2	<i>Herbage quality</i> .....	43
3.4.3	<i>Botanical composition</i> .....	44
3.4.4	<i>Tiller density</i> .....	45
3.5	Statistical analysis .....	45
<b>4</b>	<b>Results</b> .....	47
4.1	Herbage dry matter yields .....	47
4.2	Pasture growth rates .....	49
4.3	Botanical composition.....	52
4.4	Tiller density of sown species .....	55
4.5	Herbage nutritive value .....	56
<b>5</b>	<b>Discussion</b> .....	59

<b>References</b> .....	66
<b>Appendix A: Cumulative dry matter yields</b> .....	84
<b>Appendix B: Pasture growth rate</b> .....	86

## List of Tables

Table 2-1. Summary of dry matter yields (t dry matter (DM)/ha/year) of tall fescue and perennial ryegrass pastures studies in New Zealand. Source: Minneé (2011), page 42.....	31
Table 2-2. Daily pasture growth rate (kg dry matter (DM)/ha/day) response to cutting frequency. Source: Kerrisk & Thomson (1990), page 137.....	34
Table 3-1. Soil chemical and physical properties at the trial site prior to fertiliser application, from soil sampled to a depth of 100 mm. ....	38
Table 3-2. Monthly rainfall (mm) and average maximum and minimum air temperatures (°C) for the duration of the current study, along with the 10 year average. Source: AgResearch Weather Station, Palmerston North. ....	40
Table 3-3. Sowing rates (kg of seed/ha) of swards established in the current study. ....	41
Table 3-4. Pasture species treatment cuts for tall fescue (TF) and perennial ryegrass (PR) subjected to defoliation at different regrowth intervals (1-leaf stage (TF-1, PR-1), 2-leaf stage (TF-2, PR-2), 3-leaf stage (PR-3), and 4-leaf stage (TF-4)) for the experimental period 4 October 2013 - 7 November 2014. ....	42
Table 4-1. Cumulative dry matter (DM) yield (kg/ha) of tall fescue (TF) and perennial ryegrass (PR) under two defoliation heights (optimum (5cm, O) and high (8cm, H)) and subjected to defoliation at different regrowth intervals (1-leaf stage (TF-1, PR-1), 2-leaf stage (TF-2, PR-2), 3-leaf stage (PR-3) and 4-leaf stage (TF-4)) for the periods 4 October - 31 December 2013, 1 January - 30 April 2014, 1 May - 30 September 2014 and 1 October - 7 November 2014. The total yield (kg DM/ha) throughout the trial period (4 October 2013 - 7 November 2014) is also shown.....	48
Table 4-2. Herbage nutritive value (metabolisable energy (ME, megajoules/kg dry matter (DM)), crude protein (CP, % of DM), acid detergent fibre (ADF, % of DM), neutral detergent fibre (NDF, % of DM), digestibility of organic DM (DOMD, %) and water soluble carbohydrate (WSC, % of DM)) of tall fescue (TF) and perennial ryegrass (PR) subjected to defoliation at different regrowth intervals (1-leaf stage (TF, PR-1), 2-leaf stage (TF, PR-2), 3-leaf stage (PR-3), and 4-leaf stage (TF-4)) during November 2013, May 2014, and November 2014.....	57

## List of Figures

Figure 2-1. Perennial ryegrass plant. Source: Soper & Mitchell (1956), page 2.....	15
Figure 2-2. Regrowth of a perennial ryegrass tiller indicating the correlation between leaf number and levels of water soluble carbohydrate (WSC) stored in the tiller bases. Source: Donaghy & Fulkerson (1999), page 14.....	22
Figure 2-3. Regrowth of a ryegrass tiller following defoliation. Source: Donaghy (1998), page 25.....	23
Figure 2-4. Tall fescue plant. Source: Hannaway <i>et al.</i> (1999a), page 1.....	25
Figure 2-5. Days required for 75 % to reach germination of tall fescue and perennial ryegrass seeds at different soil temperatures. Source: DairyNZ (2010), page 2.....	26
Figure 2-6. Pasture growth curves (kg dry matter (DM)/ha/season) for tall fescue and perennial ryegrass (growing in a summer dry environment). Source: DairyNZ (2010), page 1. ....	28
Figure 3-1. Mowing of experimental plots using a rotary mower, for determination of pasture dry matter yields. ....	44
Figure 3-2. Left - Tall fescue and perennial ryegrass plant and tiller density determined during the establishment phase (January 2013, 9 weeks after emergence). Right - Tiller density counts at the end of the trial (late October - early November 2014).....	45
Figure 4-1. Average pasture growth rate (kg dry matter (DM)/ha/day) of tall fescue (TF) and perennial ryegrass (PR) subjected to defoliation at different regrowth intervals (1-leaf stage (TF-1, PR-1), 2-leaf stage (TF-2, PR-2), 3-leaf stage (PR-3), and 4-leaf stage (TF-4)) for the periods 4 October - 31 December 2013, 1 January - 30 April 2014, 1 May - 30 September 2014 and 1 October - 7 November 2014.....	50
Figure 4-2. Average time taken for the full growth of 1 new leaf /tiller (days) in tall fescue and perennial ryegrass for the periods 4 October - 31 December 2013, 1 January - 30 April 2014, 1 May - 30 September 2014 and 1 October - 7 November 2014.....	51
Figure 4-3. Botanical composition (on a percentage dry matter (DM) basis) of sown grass species (tall fescue (TF) and perennial ryegrass (PR) - blue columns), legumes (red columns)	

and other species (green columns), subjected to defoliation at different regrowth intervals (1-leaf stage (TF-1, PR-1), 2-leaf stage (TF-2, PR-2), 3-leaf stage (PR-3) and 4-leaf stage (TF-4)), in May 2014. Vertical bars represent standard errors at  $P < 0.05$ .....52

Figure 4-4. Botanical composition (on a percentage dry matter (DM) basis) of sown grass species (tall fescue (TF) and perennial ryegrass (PR) - blue columns), legumes (red columns) and other species (green columns), under two defoliation heights (optimum (5cm, O) and high (8cm, H)) and subjected to defoliation at different regrowth intervals (1-leaf stage (TF-1, PR-1), 2-leaf stage (TF-2, PR-2), 3-leaf stage (PR-3) and 4-leaf stage (TF-4)), in October/November 2014. Vertical bars represent standard errors at  $P < 0.05$ .....54

Figure 4-5. Tiller density (tillers/m<sup>2</sup>) of tall fescue (TF) and perennial ryegrass (PR) 9 weeks after sowing (January 2013 - dotted horizontal lines) and subjected to defoliation at two heights (optimum (5cm, O) and high (8cm, H)) and different regrowth intervals (1-leaf stage (TF-1, PR-1), 2-leaf stage (TF-2, PR-2), 3-leaf stage (PR-3) and 4-leaf stage (TF-4)) on October/November 2014 (blue vertical columns). Vertical lines at tops of columns represent standard errors at  $P < 0.05$ .....55