Forage quantity and quality of dual-purpose wheat: changes during grazing and implications for livestock production

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Summary

Sheep can graze dual-purpose wheat at feed on offer levels below recommendations for pasture due to the different presentation of feed. The quality of wheat forage can decline during the grazing period, which has implications for the management of livestock.

Introduction

Dual-purpose wheat (Triticum aestivum) is recognised as a high quality forage for livestock during late-autumn and winter, and is important in filling the winter feed gap in mixed-farming systems. New research suggests that the quality of forage can vary with grazing pressure and during the grazing period, and this may have implications for sheep grazing wheat crops.

Forage availability

Industry benchmarks for ewes grazing pasture recommend a minimum of 1200 kg green DM/ha for late-pregnant twin-bearing ewes grazing pastures (Hatcher 2006). The above-ground biomass, or feed on offer (FOO), of wheat crops was 552 and 1092 kg DM/ha at the commencement of grazing by ewes in two experiments in southern NSW (McGrath et al. 2015), and we have now observed ewes safely graze pastures with a mean starting FOO of 330 kg DM/ha (McGrath et al, this issue). The availability of pasture for prehension is a function of both herbage weight and height (Smith et al. 1972), and pasture availability below requirements can have important implications including reduced colostrum production, loss of ewe weight and low lamb birth and growth rates (Penning et al. 1991; Morris and Kenyon 2004; Kenyon et al. 2005), and under-nutrition in late pregnancy can increase the risk of perinatal lamb losses (Kenyon and Webby 2007). Poor nutrition in late-pregnant ewes can also precipitate pregnancy toxaemia (Mavrogianni and Brozos 2008). Ewes did not lose condition and no cases of pregnancy toxaemia were observed in the experiments of McGrath et al. (2015), suggesting ewes were able to meet intake requirements at the low FOO levels used in these experiments.

The height of grazed wheat and annual ryegrass swards were characterised in an experiment in 2012, with height and FOO measurements as described by McGrath et al. (2013). The relationship between FOO and height was analysed for wheat swards sown at row spacing 17.5 cm or 35 cm, and an annual ryegrass sward. The presentation of forage to grazing livestock was different for the three treatments, and an example of predicted height across a quadrat is displayed in Figure 1. The height of wheat within the row compared to annual ryegrass would likely assist prehension, and explains why sheep can graze wheat and gain weight at a lower FOO compared to annual pastures, presuming that the quality of the forage remains as high at the lower FOO.

Figure 1. Changes in height across quadrats in grazed swards of annual ryegrass (solid line) and wheat at row spacing of 17.5 cm (dashed line) and 35 cm (dotted line) at feed on offer 500 kg DM/ha (McGrath 2014).

Forage quality

Many of the studies with dual-purpose wheat have represented this forage as being of high quality, with the potential to allow high livestock production levels. Our research has measured changes in quality during the grazing period and noted that the quality of wheat forage can be influenced by grazing conditions prior to stem elongation (GS31). Toe-cut samples of wheat being grazed by lambing ewes demonstrated a significant decline in digestible organic matter digestibility (DOMD) from 85.3% to 72.2% in 2011 (McGrath et al. 2015), and a similar result was observed from pluck samples in a replicated experiment in 2014 (McGrath and Friend 2015).

High stocking rates resulted in a decline in FOO when lambs grazed wheat or annual ryegrass plots in 2012 (McGrath 2014). DOMD of wheat forage was measured for quadrat samples cut to ground level. The experiment was characterised by a ‘high’ digestibility period for wheat in the first part of the grazing period (DOMD range 73-78%; 26 July to 15 August), which aligns with the ‘normal’ grazing period in the region, and a ‘low’ digestibility period (DOMD 61-67%; 22 August to 4 September). Regression of lamb growth rates against FOO, and accounting for the two digestibility periods showed that lamb growth rates were affected by both FOO and digestibility (Figure 2). It is also notable that crude protein levels of wheat forage were ≤ 15% from 8 August, a level that could also have restricted lamb growth rates.
A decline in forage quality has previously been noted when wheat plants transition to the reproductive stage (Jacobs et al. 2009); however it is clear that grazing management may also have an impact. Virgona et al. (2006) observed that sheep selectively grazed leaf laminae, leaving the sheaths and pseudostem. In an experiment with lambs grazing wheat in 2013, quadrat samples cut at ground level were separated for laminae and other plant components (De Mattia 2013). DOMD was analysed using a linear mixed model with random term Plot/Date. Treatment was not significant as a term in the model (P=0.05), however both date (P<0.001) and proportion of leaf (P=0.039) were significant terms. As in previous experiments, DOMD declined during the experiment (Table 1). Regression of the proportion of leaf dry matter (as part of the whole plant) against DOMD of the sample was significant (P<0.001; R² = 62.4%). In this experiment GS31 was first detected on 22 August.

Table 1. Digestible organic matter digestibility (% DM) of wheat forage grazed by lambs in 2013

<table>
<thead>
<tr>
<th>Date</th>
<th>DOMD (%)</th>
<th>s.e.d.</th>
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<tbody>
<tr>
<td>23 July</td>
<td>88</td>
<td>1.4</td>
</tr>
<tr>
<td>7 August</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>21 August</td>
<td>71</td>
<td></td>
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</tbody>
</table>

Concluding comments

The above studies suggest that wheat can be grazed at lower levels of feed on offer compared to pasture, however under high stocking rates that affect a rapid decline in FOO there may be a decline in forage quality associated with preferential removal of leaf. Given high stocking intensities may also be detrimental to survival of new-born lambs (Robertson et al. 2012), moderate stocking rates may be more appropriate for ewes grazing wheat, although utilisation levels of the forage will be lower.

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References


