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Cultivar influences milk production of grazing dairy cows

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Introduction

Perennial ryegrass is considered one of the most important forage grass species used in temperate ruminant animal production. In such regions, milk production can be achieved in an economic and cost effective manner by maximizing the proportion of fresh grass in the diet of the animal. Grass based ruminant production systems tend to target calving or lambing to coincide with the onset of grass growth and thus, maximize animal production from grazed grass. Plant breeding has largely focused on increasing annual DM yield. While this is an important trait, it fails to define the ultimate value of a grass cultivar, which is its potential to improve animal performance (Reed, 1994). The objective of this study was to quantify the difference in milk performance of lactating dairy cows offered 4 different perennial ryegrass cultivars.

Material and Methods

Four cultivars of perennial ryegrass were sown as monocultures in a split plot design. The cultivars included 2 tetraploids: Bealey (heading date 24th May) and Astonenergy (31st May) and 2 diploids: Spelga (22nd May) and Abermagic 28th May). Cultivars were sown in 2009. In March 2011, 24 cows were blocked and assigned randomly to one of four groups. Each group was then assigned to one of the four cultivars in a 4×4 latin square design. Two latin squares were completed during March to end of July. The first latin square (spring period) began in mid-March and ran for 56 d, divided into 14 day periods. Animals were offered 16 kg DM herbage and 1 kg DM concentrate cow⁻¹ d⁻¹. In May, a further 4 cows were blocked and assigned randomly to one of the four groups and the second 4×4 latin square was completed over 84 days, divided into 21 day periods (summer period). Concentrate was removed and animals were offered 17 kg herbage DM cow⁻¹ d⁻¹. Area was adjusted daily to ensure correct allocation of herbage. The final 5 days of each period was used for measurement, with the preceding days used to adapt cows to the cultivars. Milk yield was recorded daily, milk composition was determined from a morning and evening sample for 3 consecutive days. Data were analysed using Proc Mixed in SAS. The model included latin square, period and cultivar. Cow was included as a random effect.

Results and Discussion

Pre-grazing sward height was similar across cultivars (9.0 cm). Table 1 presents the milk performance results of the study. There was no interaction between cultivar and season for any parameter, however there was a tendency towards an interaction for protein composition (P=0.07). Cultivar had a significant effect (P<0.001) on milk yield, Bealey and Astonenergy had higher milk yields (28.7 kg cow⁻¹ d⁻¹), than Spelga and Abermagic (-1.4 kg cow⁻¹ d⁻¹). Cultivar did effect milk fat (P<0.05) and protein (P<0.001) content. Milk fat was higher for Bealey and Abermagic (43.4 g/kg) than for Astonenergy and Spelga (41.7 g/kg). Daily milk solids yield was higher for Bealey and Astonenergy (2.17 kg cow⁻¹ d⁻¹), than for Spelga and Abermagic. There was a significant effect of season on milk yield and composition (P<0.001). Milk yield, fat, lactose content and milk solids was higher in spring than summer, as a result of stage of lactation of the animal, and milk protein was higher in the summer than spring due to the quality of the herbage on offer.

Conclusions

Results from this study show that choice of ryegrass cultivar can influence the milk performance of spring calving dairy cows. The differences observed would go unnoticed if these cultivars were only evaluated in cutting plots. Therefore, these results support the need for testing grass cultivars under animal production trials. Such trials would be beneficial to farmers as it would present them with information on potential improvements in production which could be achieved when selecting cultivars for reseeding.

Acknowledgements

The authors wish to acknowledge Moorepark farm staff.

References


Table 1. Differences in milk performance of grazing dairy cows offered perennial ryegrass monocultures in the spring and summer period

<table>
<thead>
<tr>
<th></th>
<th>Bealey</th>
<th>Astonenergy</th>
<th>Spelga</th>
<th>Abermagic</th>
<th>SE</th>
<th>Cultivar P-value</th>
<th>Season P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk yield (kg/d)</td>
<td>28.5±</td>
<td>28.8±</td>
<td>27.2±</td>
<td>27.3±</td>
<td>0.47</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Milk fat (g/kg)</td>
<td>43.3±</td>
<td>41.7±</td>
<td>41.6±</td>
<td>43.4±</td>
<td>0.82</td>
<td>0.05</td>
<td>0.001</td>
</tr>
<tr>
<td>Milk protein (g/kg)</td>
<td>33.4±</td>
<td>33.4±</td>
<td>32.8±</td>
<td>33.6±</td>
<td>0.33</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Milk lactose (g/kg)</td>
<td>46.7</td>
<td>46.6</td>
<td>46.9</td>
<td>46.7</td>
<td>0.21</td>
<td>NS</td>
<td>0.001</td>
</tr>
<tr>
<td>Milk solids (kg/d)</td>
<td>2.18±</td>
<td>2.15±</td>
<td>2.02±</td>
<td>2.08±</td>
<td>0.04</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>

SE=standard error