MILK PRODUCTION FROM DAIRY COWS GRAZING PASTURES OF MONOCULTURES OF ABERDART OR FENNEMA RYEGRASS

J.M. MOORBY\textsuperscript{1}, W.J. FISHER\textsuperscript{1}, D.W.R. DAVIES\textsuperscript{1}, M.K. THEODOROU\textsuperscript{1}, N.D. SCOLLAN\textsuperscript{1} and J.C. MACRAE\textsuperscript{2}

\textsuperscript{1}Institute of Grassland and Environmental Research, Plas Gogerddan, Aberystwyth SY23 3EB, UK
\textsuperscript{2}Rowett Research Institute, Greenburn Road, Bucksburn, Aberdeen AB21 9SB, UK

INTRODUCTION

Previous work has shown that feeding dairy cows with perennial ryegrass (\textit{Lolium perenne} L.) that has been bred to express high concentrations of water soluble carbohydrates (WSC) can increase milk yields and improve the efficiency of utilisation of dietary nitrogen, leading to lower rates of N excretion (see Moorby \textit{et al.}, 2006). That work, however, was done with housed cows offered an experimental high WSC ryegrass zero-grazed. The current study was done to extend the previous ‘proof-of-principle’ work by investigating the use of high WSC grass at grazing. Thus, this study used dairy cows on pastures comprising swards of commercially available varieties of ryegrass to examine the effects of increased grass WSC concentrations on milk production responses.

MATERIALS AND METHODS

Twenty-four plots of perennial ryegrass, each approximately 0.6 ha, were prepared in 2001: 12 replicates each of monocultures of varieties Aberdart (High Sugar; HS) and Fennema (Control). At the start of the grazing season in each of two consecutive years 32 Holstein-Friesian dairy cows were assigned to treatments, with 16 cows per treatment in two duplicate groups of 8. The cows rotationally grazed their assigned treatment plots in sets of 4 plots (2 duplicates for each treatment) for the duration of the season. All cows received a standard concentrate feed allowance of 3 kg per day throughout the experiment. In Year 1 of the experiment (starting 8 May 2002) each set of plots was grazed for 3.5 days on a 21 day rotation, allowing 17 days for grass regrowth. In Year 2 of the experiment (starting 29 April 2003), 5 sets of the same plots (20 plots in total) were each grazed for 7 days on a 35 day rotation (28 days regrowth). Milk yields were recorded at each milking and milk composition was analysed every 2 weeks. Grass intakes and diet digestibility were estimated once in July (during Rotation 3) of each year using the \textit{n}-alkane technique on a subset of 4 cows from each experimental group (i.e. half the cows).

RESULTS AND DISCUSSION

Concentrations of WSC in AberDart were low in both the current studies, being only 2-3\% higher (\textit{P} < 0.05) than in the control grass at any stage (Figure 1). Indeed, grass composition of both forages was similar in both years, with across-treatment means (Years 1 and 2 respectively) of 892 and 903 g organic matter/kg dry matter (DM), 276 and 195 g crude protein (CP)/kg DM, and 460 and 508 g neutral detergent fibre (NDF)/kg DM. The higher CP and lower NDF concentrations of grass in Year 1 compared to Year 2 is the result of shorter rotations and hence less mature grass. Perhaps not surprisingly, therefore, milk yields off both pastures were similar, even when the WSC content of AberDart was significantly, but not substantially higher. Nevertheless, milk yields were relatively high for cows on both treatments considering that they received only 3kg/d concentrate supplementation. There were no treatment effects on milk constituent concentrations or yields in either years.
Figure 1. Mean grass WSC concentrations and milk yields in each rotation in each of the two years of the experiment. *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$.

Estimated feed intakes were not significantly different between treatments, with grand means of 16.6 and 14.4 kg grass DM/d in Years 1 and 2 respectively, which probably indicates, particularly in Year 2, that efficiency of milk production was improved because more milk was produced without an apparent increase in feed intake.

CONCLUSIONS

These results indicate that when a ‘high WSC grass’ does not achieve high WSC concentrations at pasture, it is still comparable to a conventional grass. Considering these data with the increase in milk production obtained where the much higher WSC experimental ryegrass was used in a previous study (Miller \textit{et al.}, 2001) it is tempting to argue that increased performance is mainly driven through increased forages intakes.

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