**A comparison of dairy cow grazing behaviour in ryegrass and ryegrass-plantain pastures**

**Application:**

Monitoring ingestive-related behaviours (i.e., feeding and ruminating) can yield important information about the health, productivity, and welfare of dairy cows. This study highlights how dairy cow grazing behaviour differs when plantain is included in ryegrass pastures.

**Introduction:**

Evidence suggests that including plants from contrasting functional groups (e.g., grasses, legumes, and forbs) in grazing pastures may be beneficial for herbage production and quality and the delivery of ecosystem services (Grace et al., 2016; Cummins et al 2021). In recent years, plantain (*Plantago lanceolata* L.) has emerged as a potential means of improving the sustainability of dairy farms, with studies demonstrating reductions in nitrogen (N) losses when compared to perennial ryegrass pastures (Navarrete et al., 2022). It is important however to understand the effect that altering pasture species composition has on the animal. Trends in grazing and rumination behaviours and their variation can provide farmers with information about the health status, physiological state, productivity, and welfare of the animal (Iqbal et al., 2022). Ingestive-related behaviours such as chewing during ruminating and eating, play a vital role in maintaining high levels of feed intake and efficient digestive function in dairy cows (Beauchemin, 2018). This study therefore aimed to determine the effect of sward plantain inclusion on grazing behaviour in high-producing dairy cows.

**Materials and Methods:**

Twenty-one mid-lactation Holstein-Friesian cows were selected from a larger grazing experiment which comprised three pasture treatments: perennial ryegrass-only (GO); low plantain (LP, 20% sward plantain); and high plantain (HP, 49% sward plantain). Seven cows from each treatment group were fitted with a RumiWatch noseband sensor (Itin and Hoch GmbH, Liestal, Switzerland) which recorded grazing behaviours during a 7-day period, commencing 22 August 2023. The noseband sensors measured several behavioural activities including rumination, grazing and drinking. Average pre-grazing herbage mass (above ground level) was 3701 kg DM/ha for GO, 3761 kg DM/Ha for LP, and 3915 kg DM/Ha for HP. Post-grazing sward height was 6cm across all three treatments. Statistical analyses were conducted using R (version 4.2.2) and the package “rstatix” with the individual variables analysed according to their distribution and homogeneity of variances using a one-way ANOVA. Multiple comparisons of means were performed using the TukeyHSD function.

**Results:**

Results are outlined in Table 1. Daily grazing time was similar between treatments, however GO had more grazing bites and eating chews than both LP and HP (P < 0.05). Time spent ruminating was higher in HP than LP and GO (P < 0.05), and the overall daily number of rumination chews was also highest in HP (P < 0.05). Chews-per-minute was similar across treatments. The HP cows spent more time drinking than GO cows (P < 0.05), while number of gulps was similar between treatments. The daily number of regurgitated boli was higher in HP than LP (P < 0.05), and similarly chews-per-bolus was higher in HP than LP (P < 0.05). Activity index was lowest in HP (P < 0.05) and similar in GO and LP.

**Table 1.** Effects of pasture composition on dairy cow behavioural parameters measured (mean ± SEM)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Grass-only (GO)1 | | Low plantain (LP)2 | | High plantain (HP)3 | |  |
|  | **Mean** | **SEM** | **Mean** | **SEM** | **Mean** | **SEM** | **p-value** |
| Grazing time (min/day) | 556 | 12.8 | 565 | 8.3 | 558 | 10.0 | NS |
| Rumination time (min/day) | 407b | 8.6 | 382b | 16.3 | 448a | 8.4 | 0.0003 |
| Eating time (Min/day) | 476a | 18.2 | 415b | 15.6 | 414b | 20.2 | 0.032 |
| Drinking time (min/day) | 4b | 0.4 | 5ab | 0.5 | 6a | 0.5 | 0.015 |
| Activity index (n/day) | 128a | 2.2 | 127a | 2.4 | 117b | 3.0 | 0.008 |
| Rumination chews (n/day) | 24525b | 643.6 | 23300b | 1170.1 | 27443a | 661.8 | 0.002 |
| Eating chews (n/Day) | 34927a | 1533.7 | 30036b | 1130.5 | 30145b | 1468.7 | 0.026 |
| Grazing bites (n/day) | 31460a | 1437.7 | 26249b | 1056.7 | 25342b | 1365.5 | 0.003 |
| Chews per minute | 68 | 0.6 | 69 | 0.5 | 68 | 0.8 | NS |
| Regurgitated boli (n/day) | 458ab | 9.5 | 436b | 16.2 | 492a | 9.7 | 0.004 |
| Chews per bolus | 53ab | 1.0 | 52b | 1.0 | 56a | 1.0 | 0.016 |
| Gulps (n/day) | 61 | 5.9 | 75 | 6.7 | 81 | 6.9 | NS |

Within rows, means with differing superscripts (a–c) differ significantly.

1Grass-only: 100% perennial ryegrass sward

2Low plantain: 20% sward plantain content

3High plantain: 49% sward plantain content

**Conclusions:**

Results from this study indicate that the inclusion of plantain in ryegrass swards, particularly at the higher level, alters a number of ingestive-related behaviours in dairy cows. This may be caused by differences in the physical structure and nutritive properties of the swards. Further nutritional analysis of the forages will help clarify this.

**Acknowledgments:**

The authors wish to acknowledge the funding of the DAERA E&I research stimulus.

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