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| **Title:** *(Use Normal style (Times New Roman 12). Only capitalise the first letter of the first word. No full stop at the end of the title)* |
| Effects of dietary plantain inclusion on milk production and nitrogen utilisation efficiency of dairy cows |
| **Summary:** *(Your summary (Times New Roman 10) must use Body text style and must not be longer than this box)* |
| **Application** Sward plantsin inclusion rates have no effects on milk yield or nitrogen (N) utilisation in dairy cows. **Introduction** Plantain (*Plantago lanceolata* L.) has emerged as a potential means of improving the sustainability of dairy production and several studies demonstrated that inclusion of plantain in perennial ryegrass pastures reduced N losses in dairy cows (Navarrete et al., 2022). However, this reduction might be affected by sward plantain proportions and there is little research on the impact of plantain inclusion rates on N utilisation efficiency of dairy cows, Therefore the objective of this zero-grazing study was to determine the effect of sward plantain inclusion rates on N utilisation efficiency of dairy cows.**Materials and Methods** The data used were obtained from 2 zero grazing digestibility trials which were conducted respectively at the Agri-Food and Biosciences Institute in August and September 2023. Eighteen lactating Holstein-Friesian cows (9 cows/trial x 2 trials) were selected from a main grazing experiment which comprised three sward treatments: 100% perennial ryegrass (Control), 50% perennial ryegrass + 50% plantain (LP), 25% perennial ryegrass + 75% plantain (HP). In addition, each cow received concentrate pellets at 7.1 kg DM/day. These cows had been in the main grazing study for over 2 months before selected for these 2 zero grazing trials. In each trial, cow groups were balanced by parity, bodyweight, days in milk and milk yield. Forages were harvested daily using a zero grazer and offered to cows twice daily for ad libitum consumption allowing a 5% refusal rate. Before commencing the digestibility trials, all animals were housed as a single group in cubicle accommodation and offered experimental diets for 10 d. Afterwards, they were transferred to metabolism units and housed there for 7 d with total feed intake recorded daily and faeces and urine outputs collected during the final 6 d. Milk yields were recorded daily with milk samples taken during both morning (starting at 0530 h) and afternoon (starting at 15:30 h) milking during the 7 d in metabolism units. Animals had free access to water throughout the whole experimental periods. The data were analysed using GenStat (21st ed., VSNI Ltd).**Results** Plantaininclusion rates didn’t affect feed intake or milk yield (Table 1). The plantain inclusion significantly reduced N intake but had no significant effect on N excretion in faeces, urine or milk or N retention. Nitrogen losses from urine and manure, when expressed as a proportion of N intake, were not affected by plantain inclusions, whereas plantain inclusions tended to increase faeces N/N intake (*P* = 0.086) and milk N/N intake (*P* = 0.073).**Table 1** The effect of dietary inclusion of plantain on feed intake, milk yield and nitrogen utilization of dairy cows

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| --- | --- | --- | --- | --- | --- |
|   | Control | Low Plantain | High Plantain | SED | *P*-value |
| Animal and feed intake data |  |  |  |  |  |
| Milk yield, kg | 25.4 | 25.9 | 26.2 | 1.02 | 0.722 |
| Forage DM intake, kg/d | 15.7 | 14.8 | 15.5 | 0.58 | 0.280 |
| Total DM intake, kg/d | 22.8 | 21.9 | 22.6 | 0.58 | 0.280 |
| N intake and output, g/d |  |  |  |  |  |
|  | N intake | 584b | 540a | 541a | 12.8 | 0.005 |
|  | Faecal N output | 171 | 168 | 175 | 8.2 | 0.697 |
|  | Urinary N output | 168 | 132 | 146 | 20.9 | 0.262 |
|  | Manure N output | 339 | 300 | 322 | 17.8 | 0.130 |
|  | Milk N output | 151 | 154 | 156 | 6.08 | 0.722 |
|  | Retained N | 94.6 | 85.6 | 63.5 | 16.88 | 0.202 |
| N utilization efficiency, g/g |  |  |  |  |  |
|  | Faecal N : N intake | 0.293 | 0.311 | 0.323 | 0.0089 | 0.086 |
|  | Urinary N : N intake | 0.286 | 0.245 | 0.273 | 0.0368 | 0.537 |
|  | Manure N : N intake | 0.579 | 0.556 | 0.596 | 0.0299 | 0.423 |
|  | Milk N : N intake | 0.259 | 0.285 | 0.288 | 0.0130 | 0.073 |
|  | Urinary N : Manure N | 0.486 | 0.440 | 0.453 | 0.0413 | 0.542 |

**Conclusions** Inclusion of plantain in ryegrass swards significantly reduced N intake, but had no effects on feed intake, milk yield or N partitioning rates in faeces, urine or milk in dairy cows. **Acknowledgments** This project was funded by Department of Agriculture, Environment and Rural Affairs.**References**Navarrete, S., Rodriguez, M., Horne, D., Hanly, J., Hedley, M. and Kemp, P. (2022). Animals, 12(4): 469. |