Excess N: Reducing the output and concentration of N in the urine of cattle consuming grass (RMIS 6429)

A major problem that will accompany intensification of ruminant production in Ireland will be increased herbage N content - improvements in grazing management, increased N fertiliser use and the inclusion of legumes all lead to increased herbage N content. This, in turn, will likely result in increased urinary N output, with consequent environmental challenges, unless a strategy is identified that will avoid this outcome.

The objective of the first task was to determine how the management of a grassland sward influences the nutritional composition of the grass and, in turn, how the nutritional composition of the grass can influence the urinary N excretion from dry dairy cows. Following the collation and analysis of a number of completed experiments undertaken at participating institutions, it was concluded that under the prevailing conditions, cutting regime (e.g. simulated grazing or silage regime), harvest season (inflorescence (April-June), hybrid (July and August) and vegetative (September-March)), length of regrowth of the sward (days) and fertiliser N application rate (kg N/ha/growth) were the important grassland management factors that greatly influence herbage DMD and CP. Of these factors, the combination of cutting regime × harvest season × N fertiliser rate appears to have the greater influence on the digestibility and protein content of herbage.

Regression equations were derived to relate grass nutritional composition and intake with various urinary traits. The mass of urinary N excreted daily was the most important of these traits, as it accounts for both urine volume and urinary N concentration. As expected, N intake was found to be the principal factor in predicting the overall mass of urinary N excreted daily. When N intake was combined with grass nutritional composition (DM, NDF, WSC, EE and CP) it accounted for 52% of the variation in the mass of urinary N excreted daily. This demonstrates that the nutritional composition of a sward can indirectly and directly influence daily urinary N excreted.

A second task involves collating and analysing ruminant N partitioning data obtained from a number of participating institutions to identify new approaches to improving nitrogen-use efficiency and reducing urine N from pasture-based feeding. The available data comprise a wide range of treatments including differences in forage quality, level and type of supplementary feed, cow breed, and cow production potential (e.g. stage of lactation).

A final task will quantify the N balance of beef cattle consuming different qualities of grass and supplemented with different concentrate types.

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