

Interactive effects of pelletised lime and fertiliser N on sward productivity

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Introduction Maintaining an optimum soil pH through liming is critical for soil health and grass growth. Pelletised lime is finely ground limestone, pelletised into fertiliser-sized granules that can be conveniently spread using a conventional fertiliser spreader, making it easier to apply than regular liming materials and eliminating the dust problem associated with them. Pelletised lime has been shown to produce yield responses in crops such as alfalfa, soybean and wheat but the effects on grass yield have yet to be evaluated. The fine particle size of pelletised lime may result in a quicker reaction in the soil and a smaller quantity may be required compared to bulk spread aglime, which often has some larger nonreactive particles as part of its composition. Some studies however, have reported a slower rate of reaction, possibly due to the lignosulfonate binding agent and/or the distribution pattern (Murdock, 1997). This study is aimed at evaluating some of the potential benefits of using pelletised lime on grassland, in a three-year fully replicated plot experiment and through a concurrently running on-farm trial at four farms across Northern Ireland. The first year results of the experiment are presented here.

Materials and methods A grassland plot experiment investigated the following rates of pelletised lime (0, 175, 350 and 525 kg lime/ha/yr) and dolomitic ground limestone (0, 175, 350 and 525 kg lime/ha/yr) applied annually in spring. Nitrogen fertiliser (as CAN) was applied equally over three applications, at the following rates, 0, 75, 150, 225 and 300 kg N/ha/yr. There were three replicates of each treatment, laid out in a randomised block design, along with controls, giving a total of 117 plots. Each plot (2m x 8m) was cut using a Haldrup harvester, under a three cut silage system (cuts at ~ 6 week intervals) with 2 slurry applications per year after harvest. In the on-farm trial, silage fields were marked on into 24 m wide strips. Pelletised lime was applied to alternate strips. Two cuts of silage took place per farm, with strip-cuts made using an Agria mower. Grass dry matter (DM) yield was measured at each cut, along with N Offtake, and the nutrient composition of the grass was analysed. Grass Quality was measured by the digestibility of the grass, the crude protein content and dry matter content at each cut. Soil pH and soil chemical composition were analysed at the start of the experiment and will be evaluated after three years of the study to assess the effects of pelletised lime on soil pH and other chemical properties, along with grass yield and grass quality. The pH at the start of the study was 5.78, which is below the UK guidelines for the optimum soil pH for continuous grass swards on mineral soils.

Results Within the plot trial there was no significant effect of lime at Cut 1 or Cut 3 or on the total DM yield for the year. There was a slightly significant (*) difference in DM yield at Cut 2 for plots that had received lime compared to those that had not. Plots which had received pelletised lime had a small significantly lower DM yield at zero N and at the highest N application rate (300 kgN/ha/yr). However, the effect was only slightly significant and applied to Cut 2 only. There were no overall statistically significant effects of pelletised lime on grass DM yield, grass quality, N offtake or nutrient composition of the herbage in year 1. In the on-farm trial there were significant differences in grass yield and nutrient composition of the herbage between different farms, but there was no significant lime effect on DM yield of chemical composition of the herbage at any cut.

Conclusions Pelletised lime had no overall significant effect on herbage DM response curves to nitrogen in both plot and on-farm trials in the first year of use. There were no overall statistically significant effects of pelletised lime on grass quality, nitrogen offtake or in the nutrient composition of the herbage. No overall positive benefits or conclusive interactive effects of pelletised lime and fertiliser N on sward productivity were apparent in year 1. Two further years of experimental data will enable more conclusive benefits of using pelletised lime on grassland to be scientifically evaluated.

Reference

Murdock, L.W. 2007. Pelletized Lime How quickly does it react? Vol. 18 Number 9. University of Kentucky, USA.