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THE EFFECTS OF TWO DIFFERENT SOIL MANAGEMENT TREATMENTS ON FORAGE DRY MATTER, FERMENTATION CHARACTERISTICS AND SILAGE QUALITY DURING THE FIRST HARVEST YEAR.

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Introduction

- Soil analysis is fundamental to the sustainability of farming, to optimise nutrient management and fertiliser use. Typically in the UK, soil nutrient requirements are determined using an index system of available nutrients and assumes that once nutrients are supplied at a sufficient level in soils, plant growth will be optimal.
- An alternative approach for interpreting soil requirements is the base cation saturation ratio (BCSR) method, which aims to balance the ratio of cation bases in soil to optimise the uptake of nutrients by plants.
- Here we present some preliminary findings on the effects of these two different soil management regimes when ensiling ryegrass / white clover swards during their first harvest year.

Materials and Methods

- There were two soil management treatments:
  - BCSR theory method - Alternative treatment (AT)
  - Standard N, P, K index system - Control (Con)
- Triplicate 3 ha plots of a standard ryegrass / white clover mix for each treatment were established on 28 August 2009.
- Soil amendments according to BCSR requirements were made to AT plots and lime was applied at 3 t ha^{-1} to all plots during cultivation.
- In the 1st harvest year, silage cuts were taken on 13 May, 21 June and 5 August. Prior to each cut, slurry containing 14, 27, and 41 kg of available N ha^{-1}, respectively, was applied to all plots. Control plots received ammonium nitrate at 101, 41 and 54 kgN ha^{-1} prior to each cut, respectively. Forages were left to wilt for 24 - 48 h.
- Forage loads were weighed and sub-sampled for yield, chemical analyses and ensiling. Triplicate 1.5 L mini-silos from each replicate plot of both treatments were prepared at each silage cut. All data were compared by ANOVA using Genstat® 11.1.

Results

- Forage DM yield from AT plots was lower in Cut 1 & 2 compared to Con but there was no difference between treatments by Cut 3. DM content of wilted forage from AT plots was higher than Con plots. Wilted forage from AT plots had a higher WSC concentration than forage from Con plots for Cut 1 only.

Table 1. Effect of soil management on three silage cuts taken during the first harvest year.

	Cut 1				Cut 2				Cut 3			
	Con	AT	sed	P	Con	AT	sed	P	Con	AT	sed	P
DM (g/kg)	234	318	9.8	*	630	730	10.5	*	286	349	21.9	NS
pH	3.90	3.89	0.004	NS	5.78	5.57	0.023	*	3.91	3.80	0.076	NS
CP	158	128	0.5	***	130	106	7.8	NS	182	181	5.6	NS
WSC	45	131	7.2	**	157	192	7.7	*	22	56	10.4	NS
NDF	453	457	13.1	NS	536	530	9.0	NS	483	465	14.5	NS
Ash	93	80	1.3	*	87	76	1.8	*	105	99	2.1	NS
Lactate	128	108	3.0	*	0	0			125	99	8.3	NS
Acetate	31	15	3.7	*	1	0	0.4	NS	29	14	1.7	*

NS, *not significant; *, P< 0.05; **, P<0.01; and ***, P<0.001.*

Conclusions

- During the first harvest year, changing from a soil index system to an alternative approach of soil management based on BCSRs (AT), resulted in differences in forage DM yields, silage CP and WSC concentrations for Cut 1 and DM yields of Cut 2, mostly due to differences in N input between the two different treatments at this time. However, these differences were not found by third cut due to increases in the clover content of AT plots.

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