Development of a Model of Growth of Grass/White Clover Swards for a Grassland Management Support System

A. Scott Laidlaw

Agri-Food and Biosciences Institute, UK

The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

Development of a model of growth of grass/white clover swards for a grassland management support system

A .S .Laidlaw
Agri-Food and Biosciences Institute ,50 Houston Road ,Crossnacreevy ,Belfast BT6 9SH ,United Kingdom .
E-mail :scott .laidlaw@ afbini .gov .uk

Key Words : model ,nitrogen ,clover ,organic farming

Introduction A decision support system for management of grass/white clover swards is being developed in Northern Ireland ,to help organic dairy farmers to budget their forage during the grazing season . A model developed to predict growth and clover content in monitor plots was tested against data from plots throughout the Province in 2006 (Laidlaw *et al* . ,2007) .While the output of the model reflected differences in herbage growth and clover content between sites ,soil mineral nitrogen availability as an input needed to be varied throughout the season and was site dependent . Also white clover content was considerably lower in grazed paddocks than in plots laid down on these paddocks and protected from grazing cows .These issues are addressed in this study .

Materials and methods The grass-clover model has been outlined in Laidlaw *et al* .(2007) .In addition to standard meteorological inputs the model requires estimated initial conditions in March for herbage mass and LAI ,and abundance of clover .Estimates of rate of soil nitrogen mineralisation (kg N m^{-2} d^{-1}) at three times in the year are required .Growth of herbage and clover content in six paddocks and in two sets of three plots in each paddock were monitored in 2007 on three organic dairy farms in Northern Ireland .Paddocks were grazed and plots cut approximately monthly .The model was run for these sites and estimates of N mineralisation were applied iteratively by varying these rates until the model produced the best fit to the grass and clover growth rates .These were compared to similarly derived estimates from running the model for plots mainly in the same fields on these farms for 2006 .

Results

Table 1 *Estimates of soil nitrogen mineralisation as inputs to model so that predicted grass and clover yield from plots corresponded to actual yields .*

		kg N kg^{-1} dry soil d^{-1} × 10^{-6} mineralised at 20℃		
	Year	April/May	June/July	Aug ./Sept .
Farm 1	2006	2 .80	0 .70	0 .70
	2007	4 .50	0 .75	0 .75
Farm 2	2006	2 .00	1 .00	3 .00
	2007	2 .00	0 .90	1 .4
Farm 3	2006	1 .40	1 .10	0 .70
	2007	2 .00	1 .40	0 .60

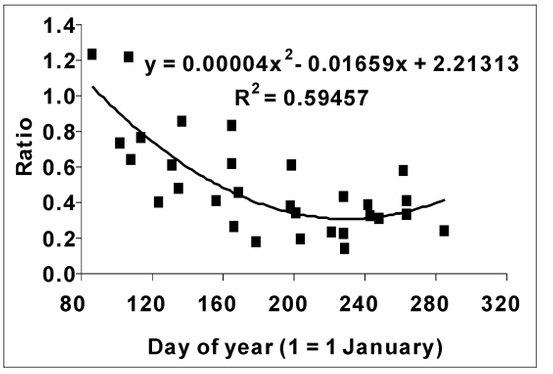

Figure 1 *Relationship between ratio of white clover content of paddock : plot and time of year .*

Clover content varied widely between sites ,from a maximum of 8% on one site on Farm 2 to 44% for a site on Farm 3 . Generally the highest estimated mineralisation rate was early in the season and rates for a given farm (mean of 2 sites) and season were similar between years (Table 1) although there were exceptions .Regarding clover content ,the greatest decline in paddocks relative to plots was in mid season (Figure 2) .The quadratic relationship in Fig .2 will be incorporated into the model so that it can be applied directly to grazed swards .Herbage growth rate was lower in paddocks than plots by a mean of 19% until late June and by 33% thereafter .

Conclusions For the model to be useful to farmers they will require help in interpreting the likely profile of mineralisation of N in their swards but at least the data provide a range within which estimates are expected .The decline in clover content in paddocks relative to plots is a guideline to farmers when applying model/plot data to paddocks .

Reference

Laidlaw ,A .S . ,Moore ,N ,Dale ,A .J .(2007) Monitoring and modelling growth in a proposed management support system for grass-white clover swards .In : Holden N M ,Hochstrasser T ,Schulte R P O ,Walsh S .Making Science Work on the Farm . *Dublin : Agmet* , 83-88 .