Deferred grazing to enhance white clover content in pastures

R.N. WATSON[1], S.L. HARRIS[2], N.L. BELL[1] and F.J. NEVILLE[1]
[1]*AgResearch Ruakura, Private Bag 3123, Hamilton*
[2]*Dairying Research Corporation, Private Bag 3123, Hamilton*

Abstract

During the early 1990s declining milk yields on coastal Bay of Plenty farms, against wider district trends, was attributed to pasture clover deficiency. To investigate possible causes pasture herbage yield, species composition, white clover growing point density and N-fixation activity were measured on two coastal Bay of Plenty dairy pastures over two years following nematicide treatment (Watson et al. 1994). Soil temperature was also monitored over most of this period.

There was a marked decline in white clover growing point density of up to 90% from mid-December to mid-February in each year. This coincided with periods when surface (1 cm depth) daily maximum soil temperatures exceeded 30°C and soil moisture levels were below 30% M_w. Loss of clover was enhanced by clover cyst (*Heterodera trifolii*) and root knot (*Meloidogyne* spp.) nematodes which also delayed autumn recovery. Poor clover levels taken into the winter extended clover deficiency into a second season.

Observations of deferred grazing on coastal Bay of Plenty farms, where pasture was left to grow rank between October and February, showed that it was possible to retain good clover levels over a dry summer. To determine reasons for this two pairs of adjacent deferred and non-deferred (normally grazed) paddocks were monitored during November–June 1993/4 on the Coastal Producer Group focus farm for Bay Milk Products Ltd at Pongakawa.

The paddocks were on northerly aspects on rolling Kaharoa ash soil. Soil temperature (1 cm depth) was monitored using data loggers. Clover growing point density, N-fixation activity and soil moisture levels were determined 3–4 weekly during the summer. The grazed paddocks received 7–8 grazings between September and February while deferred paddocks were left ungrazed from late September/early October until mid-late February.

As a result of localised thunder storms pasture growth continued through summer and clover death was minimised. Some wilting of clover and shrivelling of nodules on the grazed paddocks occurred during February. Deferred pasture became very rank by February and a dense network of clover stolons developed beneath the canopy and retained vigorous rooting and nodulation. Clover leaves penetrated the canopy as the ryegrass flattened during seeding. Clover growing point density was comparable between grazing treatments in January but was 49% and 27% greater on the deferred plots in February (773/m^2) and March (357/m^2) respectively. N-fixation activity was increased by 27% in February and March. After the second round of resumed grazing the deferred pastures regained a normal appearance.

In deferred pasture daily maximum soil temperature was reduced by up to 11°C and did not exceed 30°C (the critical level for stolon death with low soil moisture). Temperature differences were greatest in January and declined to those of the grazed pasture by March/April. Daily minimum soil temperatures were not affected by grazing treatment. Deferred pasture retained higher soil moisture than grazed pasture during the summer (4.3–15.7 ml extra water per 250 ml soil, 0–10 cm depth). Greatest differences were measured during January and February.

Numbers of plant-parasitic nematodes in the soil were not significantly affected. Grass grub (*Costelytra zealandica*) populations were higher on deferred paddocks in September 1994 (88 v 43/m^2). Cooler, moister soils and more vigorous clover rooting through summer may have encouraged continued feeding at shallow depths by the grubs. Tasmanian grass grub (*Aphodius tasmaniae*), which oviposite during summer, were only found beneath grazed pasture (40/m^2). Direct comparison of grazing effects on pest numbers are indicative only since initial pest numbers in each paddock are unknown.

In conclusion, deferred grazing through summer encouraged a dense network of white clover stolons beneath a canopy dominated by ryegrass and weeds. The main factors influencing clover survival were the reduced daily maximum surface temperature and slightly higher soil moisture. However, major benefits from deferred grazing might only accrue in seasons in which severe summer drought could cause extensive loss of clover.

Keywords: drought, grazing management, stolon density

Reference

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