## Potential productivity of irrigated perennial pasture

F.M. Martin

Department of Agriculture, Animal and Irrigated Pastures Research Institute, Kyabram, Vic 3620

After an extensive review of the literature, a mathematical model was prepared to simulate irrigated pasture growth (1). The model was tuned to simulate the maximum growth rates found in the literature under field conditions. It was then used to simulate maximum growth rates for the climatic conditions of the Shepparton Region for the three most common species in irrigated perennial pastures, white clover (WC), ryegrass (RG) and paspalum (Pas) (Table 1). The average growth rates of pastures in the region (2) are well below those indicated by this simulation; this could be partly due to the poor physical structure of the common red-brown earth soils on which most pastures are grown (2) and partly due to the damage by grazing animals. The aim of this experiment was to study the productivity of pure and mixed swards of ungrazed pasture sown into an ameliorated soil.

### Methods

The soil was ameliorated in December 1979, by shattering to 1 m and mixing calcium into the massive red-brown clay B horizon. Slotted PVC pipe was installed to provide underground drainage. Plots of 3 m x 3 m were sown on 4/1/1980 to WC, cv. Haifa; RG, cv. Nui; Pas; WC + RG; and WC + RC + Pas. The swards were spray irrigated when the cumulative pan evaporation was 30 -50 mm. Defoliation within each plot was at three constant heights at intervals of three to four weeks from September to April, and six to ten weeks in winter.

### Results and Discussion

Usually, there was no response to height of defoliation of WC. The 50 mm defoliation with RG had a mean growth rate (GR) 13% higher than 25 or 100 mm. With Pas, 100 mm gave the highest GR. Seasonal GR are shown in Table 1. The summer GR of WC and Pas are of a similar order to the maximum simulated GR, but RG is much below this potential.

The production of dry matter, as shown in Table 1, is much higher than the best production recorded in this district of 18 t/ha/annum (3). WC is higher in digestibility (79-84%) than RG (66-74%) and does not drop in digestibility in late spring and summer as much as RG (4). Bloat can be overcome by drenching with a bloat prophylactic. There is a good potential to increase animal productivity by increasing the content and GR of WC in pastures.

**Table 1. Maximum simulated growth rates (SGR) of WC, RG and Pas. Mean growth rates of WC, RG and WC + RG defoliated at 50 mm and Pas and WC + RG + Pas at 100 mm for summer, April, winter and October. Annual production of dry matter. Average growth rate (AGR) from (2)**

| | SGR | Summer | April | Winter | October | Production |
|---|---|---|---|---|---|---|
| | (kg DM/ha/day) | | | | | (t/ha/annum) |
| WC | 110 | 101 | 72 | 26 | 78 | 27 |
| RG | 180 | 74 | 83 | 41 | 83 | 27 |
| WC + RG | - | 92 | 87 | 35 | 84 | 29 |
| Pas | 260 | 219 | 59 | 0 | 75 | 38 |
| WC + RG + Pas | - | 134 | 90 | 45 | 90 | 36 |
| AGR | - | 54 | 24 | 9 | 50 | 12 |

1. Martin, F.M. 1978. M. Agr. Sc. Thesis, La Trobe University.

2. Cockroft, B. and Martin, F.M. 1981. Red-brown earths. CSIRO 133-147.

3. Stockdale, C.R. 1982. Aust. Soc. Agron. Conf. Wagga Wagga.

4. Harkness, R.D. 1963. J. Brit. Grassl. Soc. 18:62.