DEATH AND DECAY RATES OF PERENNIAL PASTURE AS AFFECTED BY SEASON

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Most estimates of herbage growth of pastures are of net pasture growth (NP) i.e. the difference between successive determinations of herbage availability (HA) in areas protected from grazing. This underestimates true pasture production (TP) and no allowance is made for decay.

Our aim was to estimate mortality and decay in a perennial ryegrass/subterranean clover pasture in order to estimate TP (where TP = NP + decay). The method used was based on that used by Wiegert and Evans (1964) and Lomnicki et ***al.*** (1968). Measurements were made over 12 months in ten plots of a cattle grazing experiment using 26 periods each overlapping by 14 days. On day 0 of each period (t_0), three square quadrats each 400 cm^2 were matched for HA and the amount of dead herbage present. Quadrat A was harvested and green HA (G_0) and dead HA (W_0) determined; all dead herbage was carefully removed from quadrat B and discarded and quadrat C was left in place. A cage was placed over them. On day 42 (t_1), the herbage in quadrat B that had died since t_0 was removed and weighed (h), and the herbage in quadrat C harvested to obtain green and dead HA (G_1 and WI). The instantaneous rate of decay (Di) was calculated as $Di = 1000 \ln \{W_0/(g-h)\}/(t_1-t_0)$. The instantaneous rate of mortality (Mi) for most of the season when $G_0 \leq G_1$ was calculated as $Mi = 1000 \times 2h/\{(G_0 + G_1)(t_1-t_0)\}$. When senescence exceeded growth ($G_0 > G_1$), Mi was calculated as $1000\ h/\{G_0\ (t_1-t_0)\}$. It was assumed that removal of dead herbage did not affect mortality and that the decay of newly dead herbage was negligible.

TABLE 1 Yearly variation in instantaneous rates of decay and mortality (mg/g/day) of pasture with associated climatic data during 1977/78

Variable†	First and last dates of pairs of overlapping 42 day periods												
	10.3	7.4	5.5	2.6	30.6	28.7	25.8	22.9	20.10	17.11	15.12	12.1	9.2
	4.5	1.6	29.6	27.7	24.8	21.9	19.10	16.11	14.12	11.1	8.2	8.3	5.4
Di	13.5	11.0	14.3	14.2	15.2	12.6	6.4	4.1	5.4	9.9	4.9	2.5	-0.2
Mi	6.0	5.2	3.6	3.1	3.2	2.6	4.7	7.3	14.4	26.3	26.9	15.1	10.2
P/E	0.53	1.15	2.35	2.31	1.15	0.65	0.48	0.28	0.29	0.27	0.13	0.11	0.16
H (%)	76	82	90	93	87	81	76	71	71	70	70	73	71
T (°C)	13.5	10.6	9.1	7.5	7.8	8.6	9.2	11.0	13.3	15.7	16.6	16.6	16.4
P (mm)	92	112	184	175	126	85	77	64	81	90	49	40	51

† Di = mean instantaneous decay rate; Mi = mean instantaneous mortality rate; P/E = precipitation/evaporation; H = mean relative humidity at 9.00 a.m.; T = mean of maximum and minimum temperatures; P = total precipitation.

Di was influenced by the dampness of dead herbage and increased when relative humidity was high or following rain. During winter Mi was low and the increase in spring reflects maturation of pastures. Prediction of Di from climatic data will allow decay rates to be calculated and hence TP to be estimated for other seasons where NP data is available.

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