

## The dynamics of daily milk production and sward height under paddock grazing conditions

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The objective of the present work was to establish a relationship between daily herbage intake (DHI), daily milk production (DMP) and the height of marked individual tillers in paddocks grazed by dairy cows. The trial was carried out at the Station de Recherche sur la Vache Laitière (INRA), St Gilles during the spring of 1988 and 1989. Six paddocks of vegetative *Lolium perenne* were grazed for five days by six lactating dairy cows. DHI was measured by means of chromic oxide to estimate faecal output and milk production was measured routinely twice daily. The extended height of the topmost leaf (ETH) and leaf sheath (ESH) of 100 (1988) or 250 (1989) marked tillers were measured from ground level before, each day during and after grazing. The daily herbage allowance (DHA) was on average 26 kg OM/cow/d (between 23 and 34 kg OM/cow/d) calculated on the basis of the herbage mass measured to ground level (HM) and the area allotted per cow. Mean pregrazing HM was 4693 kg OM/ha (range 3700 and 6000 kg OM/ha), ETH was 296 mm (range 225 and 380 mm) and ESH was 104 mm (range 83 and 135 mm). Mean postgrazing HM was 3167 kg OM/ha, ETH was 117 mm and ESH was 85 mm. Maximum DMP in a period varied between 21.7 and 24.8 kg/cow/d and estimates of maximum DHI between 16.4 and 19.7 kg OM/cow/d. During the five days mean DMP fell gradually by an average of 15 % (9 to 25 % according to period). Daily milk production expressed relative to the maximum value

within in each period (DMP %) started to fall from between the first and fourth day of grazing when the ETH of the sward was between 140 and 170 mm twenty four hours previously. No such relation between estimates of DHI and ETH could be identified. The best relationship appeared to be between DMP % and the depth of the leaf layer (LL) on the previous day calculated by subtracting ESH from ETH ; the relationship is a segmented model with a plateau of 99 % DMP :  $DMP \% = 59.9 (\pm 7.2) + 1.10 LL (\pm 0.311) - 0.0078 LL^2 (\pm 0.00306)$  ;  $r^2 = 0.99$  ; RSD = 3.28 ; n = 30

This relatively precise relationship indicates that, in spite of considerable variation in initial HM, ETH and DHA, the DMP follows closely the evolution of the depth of the leaf layer (LL). While LL was greater than about 71 mm, DMP remained near to its maximum for the period, but fell sharply below 71 mm. Since it is known that DHI in grazing ruminants is sensitive to changes in ETH, and more particularly to the depth of the leaf lamina layer of vegetative swards, the data suggest that DMP is responding in a very sensitive way to alterations in the level of DHI, provoked in turn by progressive grazing down the sward. In the absence of more direct techniques to measure in a precise and dynamic way changes in DHI, these findings indicate the possibilities of using daily milk production as an index of restriction in daily herbage intake. This could possibly be used as a simple and rapid way to evaluate other pasture characteristics.