The Relationship between Pasture Yield and Height for Phalaris Pasture

David Kemp and Geoffrey Millar

Agricultural Research & Veterinary Centre
ORANGE NSW 2800

Pasture management is a developing science that requires a level of skill in estimating pasture yield and productivity so that animal production can be optimised as well as the productivity and persistence of the pasture. These competing aims can be satisfied by managing pastures within defined boundaries such as the 'Pasture Management Envelope' proposed at the 1991 conference of the NSW Grassland Society (Kemp, 1991).

To manage pastures within biological limits, one of the key skills required is the ability to confidently estimate pasture yield. In this paper we will discuss one of the ways this can be done for a phalaris based pasture under grazing during winter and spring when relationships are more consistent.

Pasture height is one criterion that can be used to estimate pasture yield. However it is important to consider which parameter of yield is the most critical for production. Animal production is often very dependent on the green fraction in a pasture rather than the total dry weight (Willoughby, 1959), while pasture growth rates depend very much on the area of green leaves (Kemp, 1988). The 'Pasture Management Envelope' is based on yield of the green fraction.

METHODS

Data were obtained during winter and spring in 1989, from a pasture sown to phalaris (*Phalaris aquatica*), white (*Trifolium repens*) and subterranean clover (*T. subterraneum*) and lucerne (*Medicago sativa*) in 1988. The pasture was continuously grazed by sheep at 10-15 DSE/ha.

Pasture height was measured every few weeks using a rising plate meter (Earle and McGowan, 1979) and quadrats cut to estimate pasture yield and green dry weights. The rising plate meter gives an integrated measure of height across a 30 cm x 30 cm area using a standard, light, aluminium plate. The season was productive for pasture growth and as the pasture was only stocked at district average rates, this resulted in higher pasture yields than would occur in other years.

RESULTS

Different relationships apply between pasture height and total dry weight of a phalaris pasture, and height and green leaf dry weights as shown in Figure 1. This is unlike the

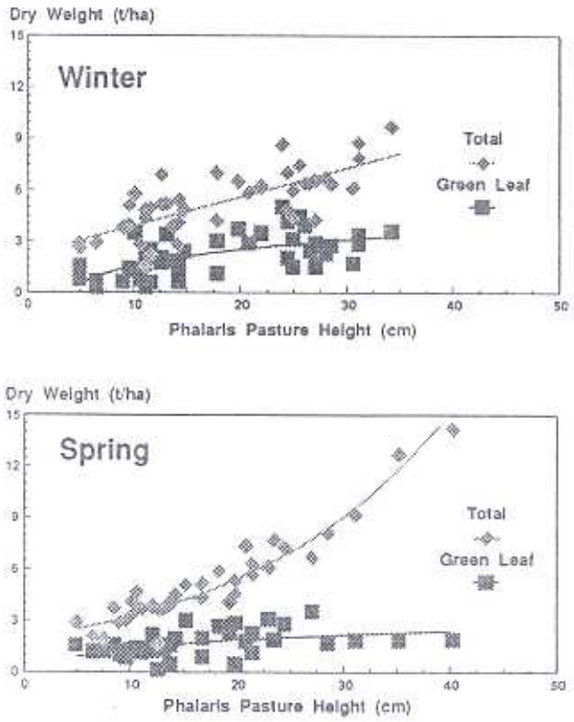

Figure 1: Relationship between sward height and total and green leaf dry weights measured in winter and spring on phalaris-based pasture.

circumstances for an annual legume pasture where there are limited plant crowns and mature material, and where similar relationships would be expected for green or total dry weights with height during winter and spring. These relationships changed with season. Total dry weight increased dramatically in spring, as frequently occurs in the region. During summer and autumn, relationships between height and green yield vary more between years, due to rainfall, than in winter and spring.

The important relationships are those between green leaf dry weight and height. These varied between seasons with, on average, greater amounts of green leaf at a given height in winter, than in spring. This occurs because in spring there is extra stem growth and considerable shading of plants that leads to lower amounts of green leaf. Green leaf yields of 0.5, 1.5 and 2.5 t/ha occurred at heights of 5, 10 and 20 cms in winter and 3, 12 and 48 cms in spring. The last figure (48 cms) is an estimate beyond the data.

DISCUSSION

Pasture height can be used to estimate pasture yield, but as can be seen in the figure the relationship is variable and will change with season and plant morphology. To estimate pasture yield effectively producers should only use height as one criteria. A visual appraisal of the type and state of the pasture is also important and it is possible to calibrate oneself to give reliable estimates. First estimate total yield and then the proportion of green material to estimate green forage yields.

The 'Pasture Management Envelope' recommended that pastures be managed within limits of 1.5 to 2.5 t DM/ha for perennial pastures, allowing 3-4 kg green DM/ewe/day for the best performance of individual animals, *ie.* 8-20 cms in winter and 8-48 cms in spring. However in spring the pasture never actually got to 2.5 t/ha of green leaf. This may explain why it is often difficult to finish stock on such pastures. Greater green leaf yields may be obtained in spring, by using higher stocking rates to keep the pasture short and allow more legume and less stem growth. This is the subject of other research at Orange.

The estimation of pasture yield needs to be kept in perspective. It is more important to determine the seasonal feed profile and manage stock to match that profile by feed budgeting, such that a high utilisation of the pasture is obtained (Clark, 1992), before detailing the procedures for grazing the pasture.

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REFERENCES

Clark, D. (1992). Grazing for pasture management in New Zealand. *Proceedings Pasture Management Farmers Forums, Orange, Goulburn, Albury, Seymour & Ballarat.* The Grassland Societies of NSW & Victoria, February 1992

Earle, D.F., and McGowan, A.A. (1979). Evaluation and calibration of an automated rising plate meter for estimating dry matter yield of pasture. *Australian Journal of Experimental Agriculture and Animal Husbandry*, 19:337-43.

Kemp, D.R. (1988). The effects of flowering and leaf area on sward growth in winter of temperate pasture grasses. *Australian Journal of Agricultural Research*, 39: 597-604.

Kemp, D.R. (1991). Defining the boundaries and manipulating the system. *Proceedings, Sixth Annual Conference Grassland Society NSW, Orange*, pp 24-30.

Willoughby, W.M. (1959). Limitations to animal production imposed by seasonal fluctuations in pasture and by management procedures. *Australian Journal of Agricultural Research*, 10: 248-68.