The Development of a Grazing Rating Index to Identify the Biomass Removed and the Plant Species and Parts Eaten by Grazing Sheep

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The 22nd International Grassland Congress (Revitalising Grasslands to Sustain Our Communities) took place in Sydney, Australia from September 15 through September 19, 2013.

Proceedings Editors: David L. Michalk, Geoffrey D. Millar, Warwick B. Badgery, and Kim M. Broadfoot

Publisher: New South Wales Department of Primary Industry, Kite St., Orange New South Wales, Australia

The development of a grazing rating index to identify the biomass removed and the plant species and parts eaten by grazing sheep

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Keywords: Diet selection, non-invasive, methodology.

Introduction

Determining the diet selection of grazing animals is inherently difficult and a trade-off exists between obtaining accurate information and interfering with the normal grazing behaviour of an animal. The botanical composition of a grazing animal's diet may be estimated using one or a number of techniques in combination. A six-point grazing rating index was developed to identify the plant species consumed by sheep grazing within a heterogeneous native grassland and the extent to which each species within a quadrat was grazed. The method was developed to remove error from visual estimates that prevents detection of significant reductions in biomass for minor species from grazing between two samplings and to determine animal preference.

Methods

Site location and experimental design

The experiment was conducted at the EverGraze Central Tablelands Proof Site, at Panuara (33°27'S, 148°33'E) in New South Wales. Four replicate plots (each 20 m x 40 m) were established within a native grassland in October 2009. The plots were paired, based upon available forage and similar botanical compositions and were grazed by two groups of 10 dry Merino ewes at a stocking rate of 125 DSE/ha over a period of seven days in February 2011. The pasture biomass pre- and post-grazing was assessed by direct visual estimation (Campbell and Arnold 1973) and the plant parts and biomass consumed by the animals was determined daily using a grazing rating index of marked plants and tillers.

Identification and location of marked plants and tillers

Prior to the commencement of grazing 36 plants within each plot were randomly selected by a single operator. The plant species, number of leaves, stage of growth and number of tillers (for grasses) were recorded. Each plant was marked using wire rings (Hodgson 1966). Plant species included native grasses (C3) *Austrodanthonia* spp., *Austrostipa* spp., *Elymus scaber*, *Microlaena stipoides*, and introduced species; *Acetosella vulgaris*, *Holcus lanatus*, *Hypochaeris radicata*. Plant height was recorded from ground level to the end of the upright plant; in grasses this included the final leaf length. To estimate the initial dry weight of each marked plant a paired (or 'matching') plant of the same height with similar numbers of leaves and the same number of tillers located within the surrounding area was cut at ground level using hand-operated pasture shears, placed in a paper bag, dried (60°C for 72 h) and weighed.

Assessment of marked plants

The height and number of leaves on each plant were measured and plant parts that had been eaten (leaf and/or stem) recorded. The six point scale used (Fig. 1) to estimate the plant parts consumed by grazing sheep was: 0 = no grazing evident; 1 = tips of leaves removed; 2 = tops of leaves removed; 3 = leaves, tillers and stem material removed; 4 = stem and minimal leaf material remain; 5 = only stem and base of plant material remain. At the end of grazing marked plants were assessed, harvested, dried and weighed. The relationship between the proportion of biomass, plant height removed and final grazing rating was

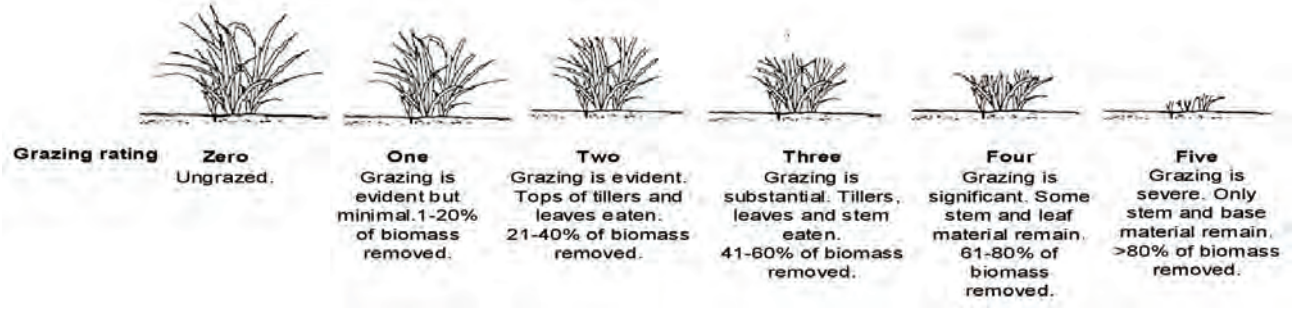

Figure 1. Grazing rating index to identify the biomass removed and the plant species and parts eaten by grazing animals.

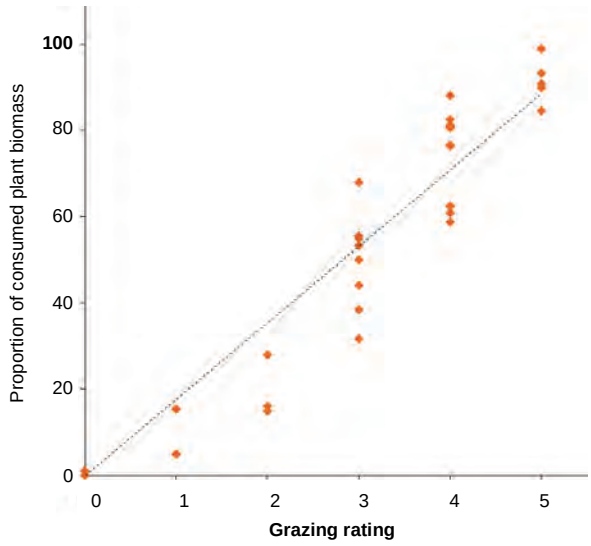

Figure 2. Relationship between the proportion of consumed plant biomass and the estimated grazing rating for several grass and forb species within a native grassland (y = 17.7x; *P*<0.001; R^2 = 0.93; SE = 0.09).

analysed using regression analysis in Genstat® (13th edition, Hemel Hempstead United Kingdom).

Results

A strong linear relationship was established between the estimated proportion of plant biomass consumed for the grass and forb species at this site and the grazing rating (Fig. 2).

Conclusion

The grazing rating index and proportion of plant biomass consumed proved to be highly correlated. The ratings enabled the identification of which plant species were selected by grazing sheep and the intensity they were grazed within this native pasture. The fitted equation enabled more precise estimates of proportion removed where averages for species were between the ratings made in the field (Fig. 1). The index when used with other visual estimates (Tothill *et al.* 1992) provided greater detail of plant selection by free-ranging grazing animals and was used to identify the daily plant species selection in short-term grazing studies (Cox 2013). It is recommended further investigation of the relationship between this grazing rating index and the proportion of plant biomass consumed be done, in other grasslands and by different operators to determine the broader applicability of this method.

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