Disappearance of residual dry matter on annual grassland in the absence of grazing

W.E. Frost[1], J.W. Bartolome[2] and K.R. Churches[1]
[1]University of California Cooperative Extension, 311 Fair Lane, Placerville, California, USA, Email: wefrost@ucdavis.edu, [2]Environmental Sciences, Policy and Management, University of California, Berkeley, USA

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Introduction Residual dry matter (RDM) is a standard used by grassland managers for assessing the level of grazing use on annual grasslands and associated savannas and woodlands. Residual dry matter is the old plant material left standing or on the ground at the beginning of a new growing season. It indicates the combined effects of the previous season's forage production and its consumption by grazing animals of all types. The standard assumes that the amount of RDM remaining in the fall, subject to site conditions and variations in weather, will influence subsequent species composition and forage production, in addition to providing soil protection and protect against nutrient losses (Bartolome, *et al*., 2002). While RDM is measured at the beginning of a new growing season, grazing does not always occur continuously up to this time. Managers do not have information to predict the disappearance of residual dry matter due to physical and chemical breakdown during a period of non-grazing. In this study the rate of RDM disappearance during the summer (non-growing) period on annual grasslands was investigated.

Materials and methods Nine 9.29 square meter (100 square foot) exclosures, protected from grazing by fencing, were located across 4 counties in the central Sierra Nevada mountains of California. At each location, within these exclosures, six .093 square meter (1 square foot) plots were randomly assigned to measure either peak standing crop at the end of the growing period (3 plots) or residual dry matter just prior to the beginning of the following growing season (3 plots). Exclosure were relocated, on the same ecological site, after measurement of residual dry matter. Data were collected from 1998 through 2003. Data was converted to reflect the percentage weight disappearance per 30 day period during the dry summer period between the time of peak standing crop and the beginning of the next growing season.

Results Residual dry matter disappearance varied by location and year. However, these differences were not consistent among locations, i.e. no location consistently had amounts of RDM disappearance that were consistently greater than or less than other locations. The RDM disappearance at individual locations ranged from a high of 13.3% per 30 day period to a low of no disappearance over the dry summer period. Yearly averages (per 30 day period) ranged from a high of 9.4% in 1998 to a low of 4.4% in 2003.

Conclusions The results of the study demonstrate that the amount of residual dry matter, by weight, will average a decrease of 7% per 30 day period from the time of peak standing crop of annual herbaceous species to occurrence of the germinating rain in the fall. The time of peak standing crop is generally accepted to be the time at which the vast majority of annual species cease growth, demonstrated by a change of colour from green to yellow/brown. With the information from this study, grassland managers, for the first time, will be able to determine the amount of herbaceous material that must be left at peak standing crop to insure adequate amounts of residual dry matter at the time of the first fall rains to provide for site protection. In situations where conservative use and a higher residual dry matter standard is appropriate or desired, grassland managers should plan utilizing the higher observed rate of residual dry matter disappearance, 13% per 30 day period. Thus, management of grazing animals can be altered to optimise the utilisation of annual herbaceous production while maintaining the residual dry matter to provide site protection and insure long term productivity.

References

Bartolome, J.W., W.E. Frost, N.K. McDougald & J.M. Connor (2002). California guidelines for residual dry matter (RDM) management on coastal and foothill annual rangelands. University of California Division of Agriculture and Natural Resources Publication 8092, 8.