THE DYNAMICS OF LIVEWEIGHT IN CATTLE GRAZING SOUTHWESTERN UNITED STATES SEMI-ARID RANGELAND

D.M. Anderson[a], and D.L. Weeks[b]
[a] U.S. Department of Agriculture, Agricultural Research Service, New Mexico State University, Jornada Experimental Range, Las Cruces, New Mexico 88003, United States of America
[b] Department of Statistics, Oklahoma State University, Stillwater, Oklahoma 74078, United States of America

HIGHLIGHT
This paper alleges that information necessary to make management decisions, such as calving date, and improved precision in estimating characteristics of an individual cow's liveweight profile, can be obtained when liveweights taken frequently and automatically are compared to liveweights taken at greater than 27-day intervals using conventional methods.

INTRODUCTION
The measurement, liveweight, is used to evaluate biological and economic components of production animal agriculture. Changes in liveweight are dynamic, both diurnally and seasonally, mainly in response to body fluids and fill (Anderson and Tietjen 1982). To reduce variability in the mean liveweight between animals, past research has been directed to evaluate number of animals to be weighed, time of weighing, type and length of fasting, and the use of consecutive weighings (Hughes 1976).

Until the advent of single animal electronic scales and individual electronic animal identification, frequent weighing of free ranging cattle was not practical (Anderson, Landt and Salazar 1981). Automatic liveweight data acquisition reduces the incidence of transcriptional and phonetic errors and variability in data taken during manual weighing arising from nervous animals, that move excessively on the scale platform.

Analyses in this paper compare liveweight data of free ranging cattle obtained when both infrequent manual and automatic weighings were recorded. Prior to drinking, automatically obtained individual liveweights were taken whenever animals entered the corral to drink water.

MATERIALS AND METHODS
The study was conducted between July 1980 and March 1983 on the Jornada Experimental Range (32°37'N, 106°45'W) in Dona Ana County, New Mexico, U.S.A. Two cows, one born in 1976 and one born in 1978, representing Hereford and Santa Gertrudis-Hereford genotypes were managed together in a herd of about 40 cows under yearlong continuous stocking with natural seasonal breeding on approximately 3,500 ha characterized as mesquite dune rangeland. esa dropseed (*Sporobolus flexuosus*) is the predominant perennial grass, and dunes have developed where honey mesquite (*Prosopis juliflora* var. *glandulosa*) has invaded the sandy soils. The animal diet quality improves when perennial and annual forbs are available. Most perennial plant growth occurs in July, August, and September when more than half the average annual precipitation is received. Precipitation within the study area during 1980, 1981, and 1982 was 25% below, 12% above, and 3% below, respectively, the 64-year mean precipitation of 230 mm. A variable precipitation pattern within and between years is typical of semi-desert grasslands, which greatly influences the quality and quantity of standing crop available to grazing livestock. During the 960-day study, lowest mean ambient air temperatures (3.8°C) were recorded in January, while highest mean ambient air temperatures (26.8°C) were recorded in July. Past records indicate average yearly wind velocity of 3 km/hour with highest wind velocities usually in April and May and the lowest wind velocities in December.

Overnight drylot shrunk liveweight was obtained about every 28 days throughout the study, beginning July 23, 1980. Between the infrequent weigh dates, continuous liveweight data was obtained where the frequency of the cattle entering a yard to take water dictated the amount of liveweight data collected per unit of time. Means, classified by season and cow, are reported along with their 95% confidence limits.

RESULTS AND CONCLUSIONS
Preliminary analyses of the liveweight data obtained from the two weighing procedures indicate each cow's liveweight profile is unique within and between years. Although the pooled average liveweight does not differ ($P > 0.10$) between the two weighing procedures, the standard deviation obtained from the frequently obtained data (21.8 kg, df=445) was slightly lower than the standard deviation obtained from the infrequently obtained data (23.7 kg, df=52). The 95% confidence interval widths set on seasonal means pooled over years are about three times smaller for the frequently obtained data, compared to the infrequently obtained data. Better precision resulting from frequent weighing is obtained as the time interval, within the time period when data is pooled, decreases. In addition, intra-infrequent period information is available with the automatic weighing system.

Highest mean liveweights for the barren cow were recorded for the period November through February in which mean liveweights of 466 ± 3 kg and 435 ± 10 kg were obtained from the frequently and infrequently obtained liveweights, respectively. Lowest mean liveweights for this same cow were recorded for the period March through June.

For the reproductively sound cow, a May 1 calving date was estimated in 1981 before examining the data. However, from the frequently obtained liveweight data, a liveweight decrease was recorded between April 7 and 9. Because this liveweight decline was maintained after April 9, and no significant liveweight decline was recorded between April 26 and May 3, the earlier 81 kg decline in liveweight indicated calving information not available when weighing infrequently.

The perennial growing season (July through October) was driest in 1980. The yearly mean liveweight profile of the barren cow in 1980 was about 20% less when compared to this same cow's liveweight profile in 1981 and 1982 when total yearly precipitation exceeded 220 mm. Regardless of the cow's physiological status, method of weighing or year, mean liveweight was lowest between March and June, a period characterized as receiving the least amount of precipitation compared to the remaining 8 months within each of the 3 years.

Frequent weighing of grazing cattle provides an almost continuous liveweight change profile the manager can use to develop optimum production strategies. Frequent weighing also provides a more precise estimate of the liveweight profile characteristics, which are of interest regardless of weighing method used.

LITERATURE CITED

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BROWSE AS A FORAGE SOURCE IN SEMI-ARID SOUTH SAVANNAH

A.J. Aucamp and J.E. Danckwerts

Stutterheim, 4930, Republic of South Africa

HIGHLIGHT

Grass production does not decrease linearly with increasing tree density, so that maximum production of forage is maximised at some intermediate density. Maximum red meat production and maximum profitability occur when the density of *Acacia karoo* approaches 1600 tree equivalent/ha and goats are run in conjunction with cattle.

INTRODUCTION

A major factor limiting primary production in semi-arid South African savanna is a low and erratic moisture supply. Management must therefore ensure the most efficient use of the incoming precipitation. Since herbaceous vegetation ensures maximum infiltration and protection against soil erosion, it must form the production base. Woody plants can, however, increase community primary productivity because they have more deeply penetrating root systems than herbaceous species and are able to make effective use of water at depth in the soil profile. Therefore, to achieve highest biological efficiency at the primary producer level, the amount of edible browse must be increased to the point where total available primary productivity is maximised and not, as in the past, eliminated from the system in an effort to convert savanna communities into grasslands.

The experiment consisted of five treatments replicated twice. The treatments were: (1) Complete removal of woody plants; (2) partial clearing to a density of 500 *Acacia karoo* plants/ha; (3) partial clearing to 1,000 *A. karoo* plants/ha; (4) partial clearing to 1,500 *A. karoo* plants/ha and (5) no removal of woody plants. Seasonal herbage production was estimated by cutting 30 x 1 m^2 quadrats per treatment. The seasonal production of *A. karoo* was estimated for each by harvesting ten *A. karoo* plants per treatment. The quality of the browse component was determined by oesophageal fistulated Boer goats.

RESULTS AND DISCUSSION

Woody plants have a negative effect on potential herbaceous production, but this effect, in the case of *A. karoo* is not linear with increasing tree densities. Herbaceous production is adversely affected only at densities greater than 297 tree equivalents/ha (tree equivalent is a tree of 1.5 m high). This effect was relatively minor up to densities of 850 tree equivalents/ha. However, browse production increases linearly with increasing tree density, at least in the tree density range used in practice. Total feed production (herbaceous plus browse) increased with increasing tree densities up to 850 tree equivalents/ha. Thereafter, the sharp reduction in grass production reduced overall feed production/ha. This means that grazing capacity declines with changing tree density and it does so according to the following relationship:

$$\frac{100 - (99.78 + 0.014X - 0.000024X^2) \times G\,Co}{100}$$

where X is tree equivalents/ha and GCo is the grazing capacity where there are no trees present. Stocking rates of grazers must be adjusted accordingly.

Results show that maximum livemass of production of both grazers and browsers and the maximum profitability/ha