Effectiveness of Infrastructure Developments in Achieving Uniform Grazing Distribution on Extensive Cattle Properties in Northern Australia

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Introduction Uneven distribution of cattle grazing at patch to landscape scales contributes to poor overall forage utilisation and land degradation in extensive grazing systems in northern Australia. The large paddocks and sparse water points typical of these enterprises are key factors causing uneven grazing. This paper reports the initial results of a project that tested the effectiveness of installing additional waters or reducing paddock size to improve grazing distribution in the Victoria River District of the Northern Territory, Australia.

Materials and methods Three paddock configurations were tested: a small paddock (9km^2 with one water point), a medium paddock (34 km^2 with two waters) and a large paddock (57 km^2 with five waters). These configurations were established at the start of the project and contrast with paddocks of 130 km^2 with 2-3 waters that are typical of the region. Grazing distribution was quantified over 6-month periods for four years using global positioning collars fitted to cattle, and by vegetation surveys along transects across the paddocks. Generalised linear models were used to test for an effect of soil type, palatable pasture availability and distance to water in determining grazing distribution, with the number of GPS fixes as the dependent variable. It should be noted that occupation of a site according to the GPS data does not necessarily indicate grazing at that site.

Results and discussion The GPS data indicated that individual cattle used almost all the small paddock (mean 90%), but only 75% and 59% of the medium and large paddocks respectively. By comparison, individual cows used ~43% of an undeveloped 149 km^2 paddock with three waters. Installing additional water points does improve the distribution of use in large paddocks, partly because different patterns of use by individual cattle can result in more even use overall. However, the manager has less control over grazing distribution, and large areas are still avoided by the cattle. Subdividing the land into smaller paddocks would therefore appear the better option for obtaining more effective use of pasture resources across the landscape. Despite smaller paddocks improving use over the landscape as a whole, uneven grazing within these smaller paddocks remains a problem. Distance to water, soil type and pasture availability were all influential ($P < 0.001$) in determining grazing distribution. Preference for minor soil types (e.g. red and intermediate black-red) and riparian areas was reflected in higher pasture defoliation in these areas than on the dominant black soil (Figure 1). However, this trend was somewhat variable and appears to have weakened markedly later in the study. Cattle spent more time in areas with low to moderate pasture biomass dominated by annual grasses and forbs than areas where perennial grasses remained and biomass was higher. This is attributed to the higher forage quality of annual species.

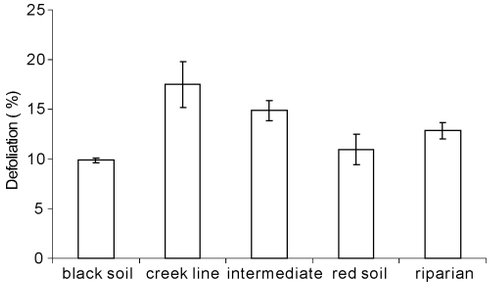

Figure 1 *Pasture defoliation (mean ± SE) on different soil/land types during the 2004 dry season.*

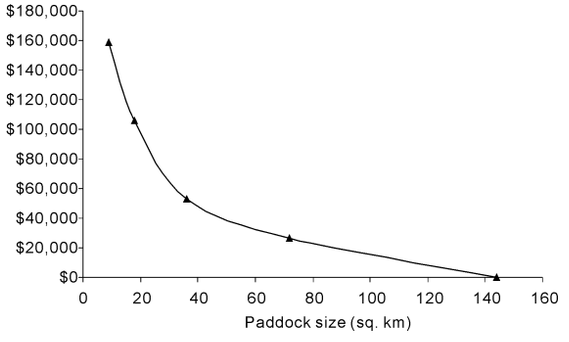

Figure 2 *Cost for fencing for different paddock sizes when subdividing a large paddock.*

Conclusions In view of these results and the disproportionate cost of fencing for paddocks below about 40 km^2 (Figure 2), a paddock size of 30-40 km^2 with two well-spaced water points is recommended for the study region as a compromise between achieving more uniform grazing use and the cost. To further improve grazing distribution, the strategic use of fire and mineral supplements should be adopted. Potential effects of even use on biodiversity must also be considered.