

Bio-economic modelled outcomes of stocking rate and drought recovery strategies in the Mitchell grass region

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Extreme year-to-year rainfall variability, long periods of drought, and temporal variability in forage supply pose significant challenges for the sustainable and profitable management of extensive grazing enterprises in Northern Australia. The impact of climate variability on a range of stocking rate and herd management strategies applicable to the Mitchell grass region of central Queensland were simulated by integrating output from the GRASP pasture growth model with the Breedcow and Dynama herd models.

With a safe stocking rate as a base, 'retain core breeders,' 'drought responsive,' and 'fully flexible' stocking rate strategies were simulated (1982-2017) using the GRASP model for a 16,200 ha, predominantly open Mitchell grass downs, cattle breeding property. The strategies varied by the amount stock numbers increased or decreased each year in response to available forage at the end of April. There were no limitations to annual stock changes for the fully flexible strategy. Over the entire simulation period, total annual stock changes could be reduced to a maximum 25% (retain core breeders) or a maximum 75% (drought responsive). Simulated outputs from GRASP were used in the beef cattle herd models to predict herd productivity and enterprise profitability.

Over the 36-year simulation, high annual pasture growth variability (<100 to 4600 kg DM/ha) necessitated the implementation of drought response and recovery strategies for four separate periods. Land condition was maintained or improved when livestock numbers were changed, with some restrictions, in response to pasture availability (drought responsive). A 30-year (1988-2017) economic analysis indicated the drought responsive strategy, when combined with drought recovery options (e.g. the purchase of Pregnancy Tested In Calf (PTIC) cows, trading stock or taking cattle on agistment), was as risky but more profitable (20%, two orders of magnitude, respectively) than the fully flexible and retain core breeders strategies.

Additional keywords: stocking rate strategies, drought recovery options, economic outcomes