Using cedar GRASP to simulate pasture utilisation in historical grazing trials in northern Australia

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Abstract: Nutrition affects the reproductive performance of beef breeding females, but the optimal level of pasture utilisation for cow herd production in northern Australia is unknown. Historical grazing trial and reproductive performance datasets are being used to quantify the effect of pasture utilisation rates on reproductive performance. This paper describes the methodology to simulate pasture utilisation using the Mt Sanford grazing trial in the Victoria River District, Northern Territory, as a test case.

The Mt Sanford grazing trial included eight paddocks ranging in size from 4 to 12 km^2 for between 5 and 13 years. Average annual rainfall during the trial was 761mm. More than 90% of rain falls between November and March. The vegetation is a mixed tropical grassland dominated by *Astrebla* spp. (19%), *Aristida latifolia* (18%), *Iseilema* spp. (12%), *Dichanthium* spp. (11%) and *Chrysopogon fallax* (11%). The soil is a basalt derived vertosol. Cedar GRASP was used to model annual pasture growth and utilisation. Parameter sets from six SWIFTSYND sites at the trial site provided the start point for paddock level calibration. Interpolated climate files from SILO data drill and station rainfall provided daily climate data. Satellite derived persistent green cover was used to estimate foliage projective cover. Cattle records were used to estimate intake. Field estimated total standing dry matter (TSDM) measured at the end of the growing season (April / May) and at the end of the dry season (October) was used to calibrate paddock pasture growth (Figure 1). An independent dataset of satellite derived fractional ground green cover clipped to paddock boundaries was used to calibrate site green cover (Figure 2). Modelled green cover is a critical component for modelling pasture growth. The good correspondence between simulated and satellite green cover (r^2=0.90) suggests satellite green cover can be used to calibrate pasture growth for datasets where there are no pasture yield observations. Satellite green cover can identify when growth starts and ends each year and when simulated growth is unreliable, such as in in 2005 when satellite green cover reached a higher peak than simulated green cover. This suggests GRASP underestimated growth that year, possibly due to differences between site and station rainfall.

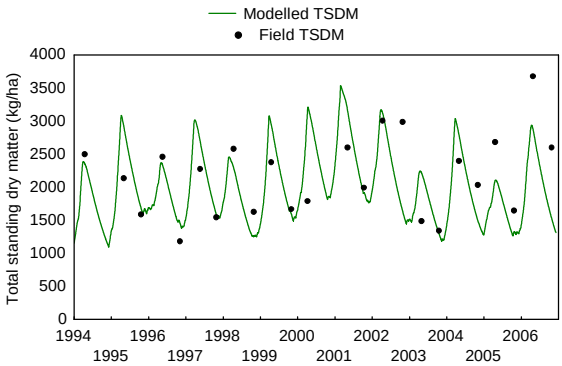

Figure 1. Observed vs. simulated TSDM using GRASP for a paddock at the Mt Sanford

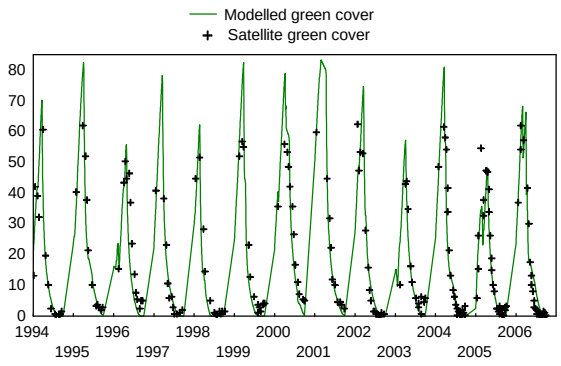

Figure 2. Satellite derived vs. simulated green cover using GRASP for a paddock at Mt Sanford

This approach will be used to retrospectively estimate pasture growth and utilisation for 28 historical grazing trials representing more than 500 herd years. The resulting modelled pasture utilisation will be used in a meta-analysis of the effects of pasture utilisation on beef cattle breeder performance across northern Australia.

Pasture utilisation, northern Australia, GRASP