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Trevor J. Hall
Department of Primary Industries and Fisheries, Australia

John G. McIvor
CSIRO, Australia

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Rangeland responses to cattle grazing systems in northern Australia

T.J. Hall¹ and J.G. McIvor²

¹Dept of Primary Industries and Fisheries, PO Box 102, Toowoomba, Qld 4350, Australia. ²CSIRO Sustainable Ecosystems, 306 Carmody Road, St Lucia, Qld 4068, Australia. E-mail: trevor.hall@dpi.qld.gov.au

Key words : grazing systems , rangeland , set-stocked , rotational grazing , cells

Introduction Beef cattle producers are searching for management systems that will improve their pasture resource and increase production and profitability in the rangelands of northern Australia where increasing costs and a highly variable climate impact on their business . Producers are using a range of grazing systems to achieve these goals : including set-stocked or continuous grazing , rotational grazing , and intensive cell systems . However , these systems have varying inputs , benefits and costs which are not readily identifiable (McIvor & Hall 2006) . This paper reports preliminary results from a producer co-funded (via Meat and Livestock Australia) research project investigating the rangeland responses of commercial grazing systems in northern Australia .

Materials and methods Beef producers , industry consultants and researchers developed a 4-year project (2006 and 2009) to monitor 74 paddocks on 9 commercial properties with 2 or 3 grazing systems each (a total of 21 systems) located in different environments of north and south Queensland . The sites include fertile heavy clay soils with cleared *Acacia* forest and lighter textured , less fertile soils supporting *Eucalypt* woodlands . The grazing systems have been operating from 1 to more than 10 years . Three to 11 paddocks are being monitored at each site , not whole properties . Cattle breeding , steer growing and finishing properties are included . The aim is to record grazing system inputs , and environmental and production outcomes . The data sets (Table 1) measure the impacts of the producers' management on pastures , soils , cattle performance and costs . Environmental factors are also recorded to assist with interpretation of the results .

Table 1 Attributes and data sets measured in 21 grazing systems on 9 commercial beef properties .

Attributes	Data sets
Pastures	Yield , botanical composition , grass basal area , cover (litter , organic , total) , utilisation , patchiness , tree regrowth
Soils	Surface condition , indices of infiltration , stability and nutrient cycling (by LFA , Tongway & Hindley 2004) ; land condition score (range 1 good stable condition to 4 bare and degraded)
Cattle	Classes , density , grazing pressure , stocking rate , diet quality (by near infrared reflectance spectroscopy [NIRS])
Costs	Infrastructure , capital , labour , operating costs , break-even analysis
Environment	Rainfall , soils , landtypes , vegetation communities

Results and discussion The three types of grazing system operate effectively by maintaining desirable pasture composition and good soil surface conditions , on both light and heavy soils in *Acacia* and *Eucalypt* communities . However , the more intensive cell grazing systems tend to be located on introduced pastures with a high proportion (94%) of sown perennial grass , predominantly buffel (*Cenchrus ciliaris*) and on the more fertile soils . Measurements over the drought period 2006-07 (rainfall 24% below long-term average) , show grazing system mean ranges were : pasture yield 1590-2580 kg/ha , ground cover 51-62% , land condition score 2.1-2.4 , and soil surface condition (LFA indices) stability 58-61 , infiltration 37-40 and nutrient cycling 28-31 . These parameters varied more between properties and seasons than between the grazing systems . Cows with calves and growing cattle can all be managed effectively in all systems . NIRS analysis of faecal samples suggests diet quality (crude protein and digestibility) is higher in set-stocked (8.73% CP ; 58% DMD) and rotation systems than in cell systems (7.34% CP ; 56% DMD) during the summer pasture growing season .

Conclusion The first 12 months of data recording indicate that there are no large differences in pastures or soil surface conditions between the two or three grazing systems on any of the nine properties . However , serious drought conditions prevailed at most sites and may have prevented differences occurring .

Reference

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