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QUANTIFYING THE BENEFITS OF SUSTAINABLE MANAGEMENT IN A VARIABLE CLIMATE: RESULTS FROM THE WAMBIANA GRAZING TRIAL

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INTRODUCTION

Current recommended strategies to cope with climate variability are not widely adopted, due partly to the perception that sustainable strategies are uneconomic. In this paper we provide preliminary data from a long-term study suggesting that sustainable strategies, such as light stocking, deliver significant benefits to both resource condition and the economic performance of grazing enterprises.

METHODOLOGY

The trial was established in 1997 on Wambiana station, near Charters Towers (MAR= 650 mm, C.V.=40%) to test the ability of different grazing strategies to cope with rainfall variability (O'Reagain and Bushell 2003). Ten *c.*100 ha paddocks were established in an open Eucalypt/Acacia savanna on soils of relatively low fertility. Paddocks contain similar areas of yellow earth, texture contrast and black cracking clay soils. Strategies being tested are (i) constant *light stocking*, run at 8ha per large stock unit (LSU), (ii) constant *heavy stocking* (4 ha/LSU), (iii) *variable stocking* - stock numbers adjusted annually in May according to available forage (range: 3-10 ha/LSU), (iv) a *variable-SOI* (Southern Oscillation Index) strategy – stock numbers adjusted annually in November according to available forage and SOI-based climate forecasts (range: 3-10 ha/LSU) and (v) *rotational spelling* (6 ha/LSU) – 1/3 of the pasture spelled annually during the wet season. Treatments are replicated twice. Paddocks are stocked with Brahman-X steers of *c.* 2.5 years of age. Dry season urea supplementation is provided to all treatments. Animals are weighed six weekly and pasture composition monitored annually using BOTANAL (Tothill *et al.* 1992).

RESULTS AND DISCUSSION

Rainfall was above average over the first four years of the trial but declined sharply thereafter with the last three seasons being in the lowest 20% of rainfall years. In all years, individual animal production was consistently higher (30-50kg/head) under light than in the heavier stocked treatments. This difference may be attributed to the lower diet quality and reduced pasture availability confronted by animals under heavy stocking (O'Reagain and Bushell 2003). In contrast to individual animal production, total animal production/ha was markedly higher under heavy than under the lighter stocking regimes. However, the magnitude of this difference declined sharply with time due to reduced rainfall and the cumulative effects of heavy stocking on pasture production and composition. For example, while animal production/ha was 71% greater under heavy than under light stocking in 1998/1999, this difference was only 16% in 2002/2003.

Importantly, in this last season animals in the heavy stocking rate treatment required feeding with molasses and urea (M8U) to prevent mortality, incurring a significant cost to production. Preliminary economic analysis thus indicates that in 2003/2004 gross profit/ha was only marginally lower under light than under heavy stocking, despite running half the number of cattle as the latter treatment (Table 1). The economic advantages of lighter stocking are likely to be amplified at the enterprise level due to the effects of reduced time to turnoff on overall herd efficiency and the improved marketing opportunities for better condition cattle.

After six years, marked differences are also obvious between treatments in terms of both pasture yield and composition (Fig. 1). Overall, the contribution of 3-P (palatable, productive and perennial) grasses to yield is far greater, while the *proportion* of wire grasses is lower, under light stocking, than in any of the other strategies.

Table 1. Urea consumption, beef production and gross profit per hectare from five different grazing strategies over the 2003-2004 grazing season.

Stocking Strategy	Urea consumption (kg/ha)	Supplement cost ($/ha) [1]	Production per ha (kg/ha)	Production value ($/ha) [3]	Profit per ha ($/ha)
Variable	1.51	0.69	12.77	19.15	18.46
R/Spell	2.00	0.91	9.40	14.09	13.18
SOI	1.40	0.64	11.60	17.40	16.76
Heavy	2.93	8.97 [2]	24.31	36.46	27.49
Light	2.04	0.93	17.34	26.01	25.08

[1] Urea costed at 0.45c/kg [2] Includes cost of molasses and urea [3] Beef valued at $1.50/kg

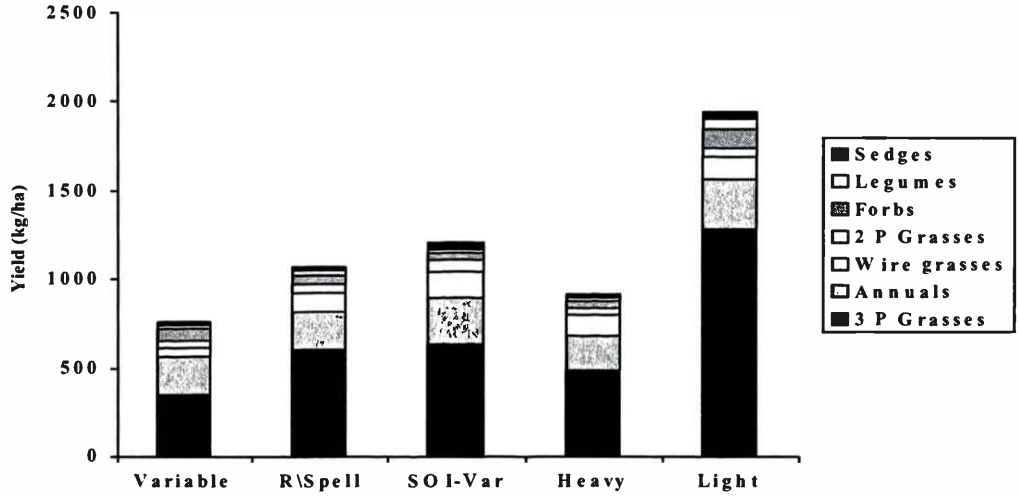

Figure 1. Contribution to yield in May 2003 of different species groups under five stocking strategies at the Wambiana grazing trial.

The present results suggest that sustainable strategies like light stocking not only maintain resource condition in a variable climate but also deliver strong economic benefits likely to enhance enterprise viability. However, the present work needs to be continued before a definitive analysis of the relative performance of all strategies will be possible.

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