

**PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY
BIENNIAL CONFERENCE**

Official publication of The Australian Rangeland Society

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Form of Reference

The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite (*Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

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COMPARATIVE IMPACT OF LIVESTOCK AND KANGAROOS ON RANGELANDS

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This project investigated the impact of livestock and kangaroos on rangeland condition and soil properties. This paper reports on some of the results of the project.

Study Sites

Two existing enclosure sites were studied. Each of the sites consisted of three enclosure treatments, viz. (i) total animal exclusion (control), (ii) exclusion of livestock but not kangaroos and (iii) open to both livestock and kangaroos. Individual enclosure plots were 400 m².

The first site was established approximately 20 km west of Injune in Central Qld. in 1993. The site consisted of open (previously cleared) undulating brigalow country with vertosols (dark grey-brown clay loams) supporting a buffel grass (*Cenchrus ciliaris*) pasture. Domestic stock were cattle.

The second site was established approximately 10 km north of Charleville in south-western Qld. in 1982. The site consisted of level "hard red" mulga woodland country on ferrosols (red loams) supporting native pastures. Domestic stock were mainly sheep.

Measurements

The following measurements were made in April, 1999:

- Soil surface strength (kg/cm²)
- Bulk density (g/cm³ at 0-25 mm)
- Soil moisture (% at 0-25 mm)
- Landscape Function Analysis

Results/Discussion

Brigalow Country

A summary of the results for the brigalow country site is in Table 1.

Soil properties: Soil surface strength and bulk density increased under kangaroo grazing and increased further when livestock were present. Soil moisture holding capacity declined under livestock grazing. This negative impact was attributed to the finer texture of the soils predisposing them to compaction, particularly when wet.

Ecosystem Function: The number of obstructions and obstruction width increased and the average fetch length was unchanged under grazing. This was attributed to the disturbance of material by both kangaroos and livestock. The vegetative cover decreased under kangaroos and further decreased when cattle were present. The indices for ecosystem function declined under grazing but were not greatly different between the kangaroo and cattle grazing.

Table 1: Summary of results for brigalow site

Parameter	Control	+Kangaroos	+Livestock
Soil surface strength (kg/cm ²)	1.0	1.3	2.3
Bulk density (g/cm ³ at 0-25 mm)	1.2	1.4	1.5
Soil moisture (% at 0-25 mm)	27.0	23.0	17.0
Landscape Function Analysis:			
* No. of obstructions/10 m	13.3	21.0	18.7
* Total obstruction width (m)	3.2	3.9	4.0
* Average fetch length (m)	0.4	0.3	0.4
* Total vegetative cover (%)	44.3	34.9	33.5
* Indices (%):			
# Stability	82.0	77.0	66.0
# Infiltration	64.0	36.0	36.0
# Nutrients	52.0	31.0	30.0

Mulga Country

A summary of the results for the mulga country site is in Table 2.

Table 2: Summary of results for mulga site

Parameter	Control	+Kangaroos	+Livestock
Soil strength	3.5	3.4	3.9
Bulk density	1.7	1.7	1.7
Soil moisture	3.0	3.0	4.0
Landscape Function Analysis:			
* No. of obstructions/10 m	12.3	11.0	11.3
* Total obstruction width (m/10 m)	14.1	7.9	10.6
* Average fetch length (m/10 m)	0.5	0.6	0.5
* Total vegetative cover (%)	30.5	18.3	32.0
* Indices (%):			
# Stability	73.0	70.0	74.0
# Infiltration	55.0	57.0	55.0
# Nutrients	46.0	37.0	38.0

Soil properties: The soil properties were virtually unchanged under any of the treatments. This indicated that the presence of grazing did not affect the soil physical properties in the long term.

Ecosystem function: The number of obstructions decreased slightly under grazing but there was little difference between livestock and kangaroos. Total obstruction width decreased under kangaroos but under livestock it was higher than for kangaroos. The vegetative cover decreased significantly under the kangaroos but was higher under cattle than for either kangaroos or the control. Stability was slightly lower for kangaroos but the control and cattle were the same. Infiltration was unchanged. Grazing reduced the nutrient index but there was no difference between the kangaroo and livestock plots. These results suggest that in the mulga country grazing may provide some benefits to the ecosystem. They also suggest that the negative impacts of grazing are no worse for livestock than for kangaroos and may even be less impacting.