Report prepared for the **Meat Research Corporation**

The pasture lands of northern Australia

J.C. Tothill and C. Gillies

Their condition,

productivity,

and sustainability.

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Contents

Terms of reference iv
Definitions of sustainability and degradation iv
Executive summary v
Introduction 1

Chapters

1 Sustainability and degradation 1
2 The pastoral resources 3
3 Assessment of condition and capability 9
4 Strategies for sustainability 22
5 Conclusions 29

Appendices

1 Botanical composition of pasture communities and local pasture units 31
2 Livestock statistics and pasture condition 75
3 Basic pasture condition data 79
4 Problem weeds of pasture lands in northern Australia 89
5 Statistical areas (regions and shires) 93

Bibliography 95

Acknowledgements 103

List of Tables

1 The pasture lands of northern Australia 5
2 Condition assessment matrix 10
3 Pasture productivity and condition
  3a Queensland 12
  3b Northern Territory 14
  3c Western Australia (Kimberley/Pilbara) 16
4 Overall ranking of problems and rating for each region 25
5 Basic pasture condition data
  5a Queensland 78
  5b Western Australia 84

List of Figures

1 Beef cattle populations 1960–1990
  1a Actual populations 74
  1b Relative changes 74
2 Potential and actual stocking rates in Dalrymple and Gayndah shires 1945–1986 75
3 Condition and production capability
  3a Queensland 76
  3b Northern Territory 76
  3c Western Australia 77
4 Infestations of serious exotic weeds 90
5 Statistical areas used in report 93

A map entitled *The pasture lands of northern Australia* (Scale 1: 4 000 000) accompanies this report

Terms of Reference

The Terms of Reference for this report were to:

- collate and interpret all relevant published information, data sets and knowledge in relation to the soil and vegetation condition of lands covered by the North Australia Program–2 (NAP–2)
- define sustainability and degradation for each of the vegetation zones
- identify and quantify the status of the pastoral resources
- detail strategies for sustainability of condition states of pasture communities
- list priorities in the target areas for future research
- indicate to potential researchers and end-users the boundaries of Meat Research Corporation funding.

Definitions

Sustainability is defined in this report as the long-term maintenance of the livestock production resources and environment to enable viable livestock production. This is judged on:

- maintenance or improvement of ecologically desirable pasture composition and ground cover
- maintenance of desirable soil physical and chemical fertility, and water-use efficiency
- management's ability to utilise these resources efficiently and responsibly within the total production environment
- reasonable economic output.

Degradation represents a departure from a sustained condition, resulting from an undesirable change in one or more of the elements that govern sustainability. Degradation embraces the whole production environment, not only land.
Degradation is considered at two levels:
deteriorating—a state reversible with appropriate management and normal rainfall
degraded—probably irreversible within bounds of economic management.

Executive summary

Co-ordinated description of resources of northern Australia

Twenty-four pasture communities over Queensland, the northern part of the Northern Territory, and the northern region of Western Australia have been mapped using a scale of 1: 4,000,000. This information was derived from a wide range of reports and from local knowledge, using the Atlas of Australian Soils as a unifying basis for its interpretation. These pasture communities have been interpreted into 151 local pasture units. The map accompanies this report.

Assessment of condition and capability of the pasture resources

The current condition of the pasture resources of this northern Australian region was assessed. Land degradation was classed as either *deteriorating*—a state able to be reversed—or *degraded*—a state probably not reversible by property management. A *condition assessment matrix* based on vegetation condition, soil condition and land management capability was used to rank the resource into three condition levels (A, B, C) which equated to 'desirably sustainable', 'deteriorating' or 'degraded' states respectively.

This procedure was considered unusable for the Central Australia region of the Northern Territory because of great spatial and temporal variation in its vegetation and climate. There is no adequate methodology for monitoring and assessing condition of these pastoral resources or for interpreting the large body of information that exists for this region.

The condition assessments and production capabilities are presented in Table 3; they are linked with the mapped communities and local pasture units through the unit code numbers.

Information from the more productive pasture communities or local pasture units has been aggregated and presented in Figures 3 of Appendix 2, where condition classes and productivity (in terms of beef equivalents of output) are compared across the three states.

Conclusions

Degradation and deterioration

We conclude that there is widespread deterioration in most pasture communities in Queensland; this is indicated by undesirable changes in pasture composition and soil surface characteristics such as cover and organic matter content.

Deterioration is related to increased grazing pressures resulting from rainfall deficiencies in the past decade and the substantial build-up of livestock numbers in the beef crisis of the 1970s. It may also be associated with recent husbandry practices that allow stock to survive periods of stress, but appropriate property management should be able to reverse this level of degradation.

In north Queensland, several exotic weeds provide a more serious risk of degradation which is near to or beyond the capability of managers alone to address.

In the northern part of the Northern Territory and in northern Western Australia, degradation in areas such as the Victoria River District and the Ord River catchment relates to a previous period of mismanagement and lack of understanding of resource maintenance. Now, as a result of the Brucellosis and Tuberculosis Eradication Campaign, with its associated control of livestock numbers, reduction of feral animals, and better management of stock watering (particularly on frontage country), a new awareness of resource management is emerging.

For Central Australia, the management of diverse vegetation and of high climatic risk is a key issue in resource maintenance; management of stock water is being used increasingly to control livestock movements and grazing times. Rabbits remain as destructive feral animal pests in the southern part of this region.

Resource capabilities

Information on resource capability has been assembled. The high capability areas are more heavily used, and therefore stressed, particularly where they are fragmented topographically within larger areas of lower capability, or associated with water access. How-

ever this localised information can be easily lost when condition data is generalised at the broad community level.

Resource improvement through species introduction and fertiliser inputs is generally most successful in areas of moderate natural capability, but these improved areas are modest in size and are used strategically rather than on a broad scale.

Strategies for maintaining sustainable condition

While problems relating to resource sustainability for Queensland, the northern part of the Northern Territory, Central Australia and northern Western Australia are similar, they are sometimes perceived as differing in priority for each region. General high priority is recognised for the following:

1. *Stocking strategies for*:
   - maintenance or improvement of the most productive pasture communities
   - managing resource diversity
   - managing drought and post-drought.
2. *Resource monitoring*:
   - to help understand the processes leading to sustainability or degradation
   - to aid in management
   - part of on-going leasehold monitoring.
3. *Research into fire as a tool*:
   - in pasture management
   - in weed control.
4. *Linking research and farm verification*:
   - to develop a closer relationship between researcher and property manager for improved feed-back
   - to access farm data to aid development of appropriate research.
5. *Weeds:*
   - for containment and control of exotic and native weeds.
6. *Education:*
   - to develop more participatory learning
   - to help develop appropriate decision support systems for managers.
7. *Management of trees*
   - as weeds and competitors with pastures
   - for control or prevention of salinisation
   - as an essential part of the ecosystem management.
8. *Management or control of feral animals and wildlife*
9. *Review of leasehold sizes and covenants*
10. *Market research.*

Pasture systems at risk

The following pasture systems are at risk:

At risk of overgrazing:
- black speargrass
- ribbongrass
- annual shortgrass on calcareous soils
- frontage country

At risk of weeds:

exotic woody weeds:
- mitchell grass (*Parkinsonia*, prickly acacia, mesquite)
- frontage country – Gulf and Peninsula (rubber vine, chinee apple)

native woody regrowth:
- southern black speargrass (eucalypts)
- *Aristida-Bothriochloa* (eucalypt, various shrub regrowth)
- mulga (seedling regeneration,turkey bush, hop bush)
- brigalow (sucker regrowth)
- gidgee (seedling regeneration and spread)

exotic herbaceous weeds:
- central Queensland bluegrass
- northern brigalow (parthenium)
- mitchell grass (threat of parthenium)
- southern Queensland alluvials (pimelea)

exotic grass weeds
- east coast of Queensland (giant rats tail)

At risk of soil salinisation resulting from tree clearing:
- duplex soils with high pH subsoils in the speargrass and *Aristida-Bothriochloa* regions
- brigalow clays with high subsoil salinity.

Role of the Meat Research Corporation

The Corporation's role in addressing the sustainability of the pastoral resources is to tailor the nature and degree of its sponsorship for research and development.

The Corporation should evaluate projects on an overall strategic basis, and should seek to integrate human, institutional, technical and regional resources. It must be aware of all potentially relevant research being done for a wider range of users and objectives, and know how its own sponsored research complements this. Linkages between research carried out on-farm and at local, regional and national levels should be strengthened.