



**MITCHELL
GRASSLANDS**
Quality & Quantity
GUIDE

Chris Materne



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Front Cover: Four main factors affecting the quantity and quality of Mitchell Grasslands on the Barkly Tableland: rainfall, grazing, fire and hay production

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INTRODUCTION

The Mitchell grasslands of the Barkly region extend across approximately 57 000km² of virtually treeless plains on red, grey or black cracking clay soils. The perennial Mitchell grasses (*Astrebla spp.*) are the dominant grassland species forming dense, deep-rooted tussocks that stabilise this land system and provide cover and protection to the soil from wind and water erosion.

Extensive cattle grazing is the dominant land use of the Mitchell grasslands in the Barkly region. After rain this pasture becomes highly productive due to prolific growth of annual grasses such as Flinders grasses (*Iseilema spp.*), and palatable forbs like the Necklace Peas (*Desmodium spp.*). During dry times the Mitchell grasses provide valuable standing feed.

The resilience of the native Mitchell grasslands make them an important and valuable resource to the pastoral industry but require active management to maintain and maximise their sustainable production.



Fresh Mitchell Grass growth after controlled burning at the end of the Dry Season to remove rank grass

The purpose of this booklet is to provide land managers in the Barkly region with a visual aid for assessing pasture quality and quantity, and to guide decisions regarding fire management, stocking rates and hay production. If used regularly, the photographic standards in this booklet can be a useful tool to help achieve sustainable long-term production in the Mitchell grasslands by balancing production and pasture health.

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SECTION I

LAND CONDITION

Land Condition is the capacity of the land to respond to rain and produce useful forage over an extended period of time. It is also an indicator of how well the grazing ecosystem is functioning. The better the Land Condition, the more efficient it will be at utilising rainfall and nutrients, maximising growth per millimetre of rain and the quality of growth.

It is important not to confuse Land Condition with Seasonal Response. Seasonal Response is the effect of timing, distribution and amount of rainfall on the pasture growth over an individual growing season. For example land in poor condition may produce considerable growth of annual species after a single good growing season, but this will provide only short-term benefits for land protection and production. For land to be in good condition a good coverage of palatable perennial species is required.

Land Condition is based on the status of three components:

COMPONENT	FUNCTION / ABILITY	ASSESSMENT CRITERIA
Soil	<ul style="list-style-type: none"> • Absorb and store water • Store and cycle nutrients • Provide habitat for seed germination and plant growth • Soil stability 	<ul style="list-style-type: none"> • Cover / bare ground • Erosion • Compaction
Pasture	<ul style="list-style-type: none"> • Capture solar energy • Efficiently use rainfall • Conserve soil condition • Cycle nutrients 	<ul style="list-style-type: none"> • Distribution and abundance of palatable indicator species • Plant species diversity • Abundance of unpalatable increaser species
Woodland	<ul style="list-style-type: none"> • Grow pasture • Cycle nutrients • Regulate ground water 	Abundance of: <ul style="list-style-type: none"> • Native woody species • Introduced weeds

Why monitor Land Condition?

Monitoring Land Condition will identify opportunities to improve pasture health and detect any declining or recovering trends. Monitoring allows grazing practises to be implemented that will maximise the Land Condition, and ultimately achieve sustainable production.

Assessment Timing

Assessments can occur at any time of the year but should be undertaken annually or as regularly as possible. End of Wet Season Assessments (April) will enable all the Land Condition criteria to be assessed. End of Dry Season Assessments (October–November) may assist in determining the perennial grass component of the pasture without the misleading obstruction of annual grasses and forbs, especially after above average growing seasons.

Assessment Location

When monitoring Land Condition it is important to take into account uneven grazing trends and distance from watering points. An understanding is also needed of the area's pasture diversity and any naturally occurring events such as fires or flooding.

Ideally, Land Condition assessments should be undertaken across an entire paddock. In large paddocks, assessments may be limited to representative areas but should include sites at least 1–2 kilometres from the watering points and areas favoured by grazing cattle.

NOTES: Grazing management options will be the same regardless of whether Land Condition status is due to grazing practices or natural events. Species diversity in Mitchell grasslands is dependent on seasonal response rather than Land Condition. Therefore no matter what the Land Condition is, species diversity may be extremely variable.

GOOD “A” CONDITION

ASSESSMENT CRITERIA	INDICATOR SPECIES	NOTES
Palatable Perennial Grasses	Barley Mitchell Grass	Even and continuous distribution of Mitchell Grass tussocks. Hoop, Bull or Curly Mitchell grasses may also be present
	Bull Mitchell Grass	Bull Mitchell Grass often dominates in wetter areas
	Golden Beard Grass, Native Millet, Curly Bluegrass and Silky Brown-top	Other perennial grasses may also be present
Palatable Annual Grasses	Flinders grasses	The quantity of Flinders Grass present is strongly related to seasons and not necessarily due to land condition Good seasonal rainfall may see an abundance of growth, but be absent in dry periods
	Pepper Grass, Native Couch, Queensland Bluegrass and Button Grass	Other annual grasses may also be present
Palatable Forbs	Native Pea, Necklace Peas, Fringed Glycine, Onion Vine and Sensitive Plant	One or several of these desirable forbs are usually present
Increaser Species <i>(Species that increase in abundance with increased grazing pressure)</i>	Feather-top Wiregrass, Indigoferas, Pigweeds, Sidas, Rattlepods, and Goathead Burr	Increaser species form only a small component of the pasture
Soil Condition	<ul style="list-style-type: none"> • No Erosion • No Compaction 	
Bare Ground	<ul style="list-style-type: none"> • Less than 30% 	
Woody Vegetation	<ul style="list-style-type: none"> • Nil 	
Weed Status	<ul style="list-style-type: none"> • Nil 	
Management Options	<ul style="list-style-type: none"> • Controlled burning may be used as a pasture management tool to control woody vegetation and uneven patch grazing or to “freshen-up” pasture that is becoming rank (refer to Section 4) • Hay baling may be undertaken 	

GOOD “A” CONDITION



Open Mitchell grassland in good condition during the Dry Season.



Open Mitchell grassland in good condition during the Wet Season.

FAIR “B” CONDITION

ASSESSMENT CRITERIA	INDICATOR SPECIES	NOTES
Palatable Perennial Grasses	Barley or Hoop Mitchell Grass	Mitchell Grass distribution is noticeable, is more open and patchy and may be dominated by Hoop Mitchell Grass
Palatable Annual Grasses	Flinders grasses	Flinders Grass species may produce a prolific seasonal response after good seasons
Palatable Forbs	Native Pea, the Necklace Peas, Fringed Glycine, Onion Vine and Sensitive Plant	One or more of these desirable forbs or a combination may still be present
Increaser Species	Feather-top Wiregrass	Feather-top Wiregrass may dominate the perennial grass component of the pasture
	Indigofera, Pigweeds, Sidas, Rattlepods, and Galvanised Burr	Together increaser species such as these contribute significantly to the pasture
Soil Condition	Generally minimal erosion or compaction, however it may begin to be noticeable between the tussocks	
Bare Ground	Greater than 30% but less than 60%	
Woody Vegetation	If present only scattered (for example Gundabluie, Corkwood Wattle, Whitewood, Beefwood, Cassias, and/or Supplejack)	
Weed Status	Nil	
Management Options	<ul style="list-style-type: none"> • Reduce stock numbers and ensure less than 25% of the pasture growth is utilised • Spell over summer growing season • Burning may still be an option in association with Wet Season spelling • Hay baling may be undertaken if it is followed by Wet Season spelling 	

FAIR “B” CONDITION



Obvious thinning of Mitchell Grass tussocks, which are being replaced by Flinders Grass and unpalatable perennial forbs.



Obvious thinning of Mitchell Grass tussocks. Downs Sorghum is also present but this is due to seasonal response, not declining land condition

POOR “C” CONDITION

ASSESSMENT CRITERIA	INDICATOR SPECIES	NOTES
Palatable Perennial Grasses	Mitchell grasses	Mitchell Grass tussocks are sparse or absent.
Palatable Annual Grasses	Flinders grasses	Flinders Grass may grow prolifically due to seasonal response and can dominate the pasture after good seasons.
Palatable Forbs	Native Pea, the Necklace Peas, Fringed Glycine, Onion Vine and Sensitive Plant.	Desirable forb species are absent or low in abundance.
Increaser Species	Feather-top Wiregrass	If present Feather-top Wiregrass will dominate the perennial grass component of the pasture.
	Indigoferas, Pigweeds, Sidas, Rattlepods, and Galvanised Burr.	One or more of these increaser species will contribute significantly to the pasture, and may dominate the seasonal response.
Soil Condition	Minimal erosion or compaction – pedestalling of remaining perennial grass tussocks may be present.	
Bare Ground	Greater than 60%	
Woody Vegetation	If present only scattered (for example Gundabluie, Corkwood Wattle, Whitewood, Beefwood, Cassias, and/or Supplejack).	
Weed Status	If present only sparse (for example Rubber Bush, Mesquite, Parkinsonia, and/or Prickly Acacia).	
Management Options	<ul style="list-style-type: none"> • De-stock or stock only lightly even during above average growing seasons • Spell over summer growing season • Do not burn • Hay baling may continue if pasture is dominated by Flinders grasses, but must be followed by Wet Season spelling to ensure seed stocks are replenished 	

POOR “C” CONDITION



Mitchell Grass tussocks absent and replaced with annual grasses and unpalatable forbs.



Perennial Mitchell Grass tussocks are absent and have been replaced with Flinders Grass. Flinders Grass and Pea Bush have dominated the above average seasonal response.

DEGRADED “D” CONDITION

ASSESSMENT CRITERIA	INDICATOR SPECIES	NOTES
Palatable Perennial Grasses	Mitchell grasses	Mitchell Grass tussocks are absent.
Palatable Annual Grasses	Button Grass and or Native Couch	Button Grass or Native Couch may dominate the pasture. Flinders Grass may be present.
Palatable Forbs	Native Pea, the Necklace Peas, Fringed Glycine, Onion Vine and Sensitive Plant.	All desirable species are usually absent.
Increaser Species	Awnless Barnyard Grass	This undesirable introduced species may dominate the pasture.
	Feather-top Wiregrass	Feather-top Wiregrass may dominate the perennial grass component of the pasture.
	Indigoferas, Pigweeds, Sidas, Rattlepods and Galvanised Burr.	One or more of these increaser species will contribute to the majority of the pasture, and will usually dominate the seasonal response.
Soil Condition	Erosion and compaction may be minimal on the plains but more severe along watercourses. Soil structure may be degraded through compaction or disturbance.	
Bare Ground	Greater than 60%	
Woody Vegetation	Absent or scattered to dense woodlands (for example Gundabluie, Corkwood Wattle, Whitewood, Beefwood, Cassias, and/or Supplejack).	
Weed Status	May form dense thickets if present (for example Rubber Bush, Mesquite, Parkinsonia, and/or Prickly Acacia).	
Management Options	<ul style="list-style-type: none"> • De-stock • Spell especially over the Wet Season • Do not burn • Erosion control measures may be required along watercourses • Re-seeding Mitchell Grass may be required • Chemical or mechanical weed control will be required 	

NOTE: It is usually not cost effective to improve the condition of land in degraded “D” condition. The resources required for rehabilitation usually outweigh the land’s potential returns. Managers should always endeavour to keep their land in good condition to maximise their returns.

DEGRADED “D” CONDITION



Parkinsonia thickets have established, requiring chemical or mechanical control and long-term follow-up measures.



This pasture has been spelled over the Wet Season but is still dominated by unpalatable forbs. The presence of a Barley Mitchell Grass tussock in the foreground suggests seeds still exist in the area, but a full recovery will be slow and require spelling over a succession of above average growing seasons.

SECTION 2

PASTURE QUANTITY

Mitchell grasslands are highly productive and are considered to be relatively resilient to both drought and grazing compared to other native pasture types. The dominant perennial Mitchell grasses provide a significant grazing benefit by supplying feed through the dry times and are considered “standing hay-stacks”.

Setting stocking rates and foraging budgets (matching available pasture to livestock demand at the end of each growing season) is the basis to sustainable grazing management. Stock numbers may either be set at relatively stable long-term levels or vary according to seasonal or market trends. The option chosen will depend on the individual management preference and the ease with which stock numbers can be varied from year to year. This section can be used as a guide to estimating pasture biomass for the purpose of managing stock numbers.

The table below is a stocking rate guide for Mitchell grasslands based on stock numbers per watering point rather than by area. Calculating stocking rates based on watering points may help reduce the risk of overutilising areas close to watering points, by eliminating areas rarely grazed by stock. Debate continues regarding the appropriate grazing distance from a watering point to base stocking rate calculations. The following table provides examples based on both a 3km and 5km grazing radius.

In an average growing season (350-450mm over a 3-4month period), Mitchell grasslands may sustain the following stocking rates:

PASTURE STATUS	AVERAGE GROWTH PER YEAR (KG/HA)	STOCKING RATE PER WATERING POINT (AE)*			
		3km Grazing Radius		5km Grazing Radius	
		Paddock Water Location: Middle	Paddock Water Location: Corner	Paddock Water Location: Middle	Paddock Water Location: Corner
Good to Fair (“A or B” Condition)	1200 -1500	295-370	75-90	820-1025	205-255
Poor ** (“C or D” Condition)	500 -900	60-180	15-45	170-490	45-125

* Based on 25% utilisation (see Section 3) of a 450kg steer (AE=One Animal Equivalent) consuming 1.75% (including Dry Season supplementation) of body weight per day (2875kg/year).

** Stocking rates will vary significantly with poorer Land Condition due to their unstable nature. The Seasonal Response will greatly affect pasture composition and the associated ratio of palatable to unpalatable forbs and grasses of poorer pastures. This makes it difficult to maintain set stocking rates year to year on pastures in poor condition.

0-1000KG/HA



Small Mitchell Grass tussocks interspaced with stunted sparse Flinders Grass following heavy grazing. Subsequent spelling has had little effect due to a below average growing season – 450kg/ha.



Monoculture of Flinders Grass – 900kg/ha.

1000-1500KG/HA



Scattered Mitchell Grass tussocks interspersed with Flinders Grass and annual forbs – 1100kg/ha.



Moderately dense Mitchell Grass tussocks interspersed with Flinders Grass after burning and followed by a below average growing season – 1200kg/ha.

1500-3000KG/HA



Moderately dense Mitchell Grass tussocks interspersed with sparse Flinders Grass and annual forbs – 1500kg/ha.



Evenly spaced, moderately dense Mitchell Grass tussocks – 2400kg/ha.

3000 – 4000KG/HA



Mitchell Grass tussocks interspersed with Flinders Grass – 3100kg/ha.



Dense Mitchell Grass tussocks – 3500kg/ha.

4000-5000KG/HA



Dense Mitchell Grass in a water “run-on” area – 4100kg/ha.



Dense Mitchell Grass – 4500kg/ha.

SECTION 3

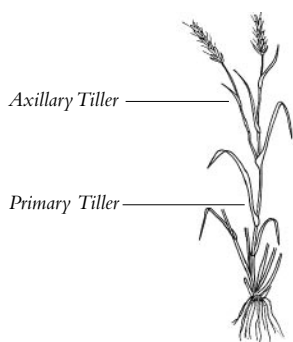
PASTURE UTILISATION/ CONSUMPTION

Mitchell grasslands are a valuable pastoral resource that requires active management and constant monitoring. Appropriate grazing management is crucial in maintaining Mitchell grasslands in good condition and ensuring long-term sustainable production.

Mitchell Grass tussocks are considered resilient to grazing and drought, however they are vulnerable to grazing during the early growth stage following rain. During this growth phase the plant draws heavily on energy supplies stored in the root system, and constant heavy grazing can deplete these energy reserves, ultimately resulting in the plant's death.

Utilisation Rate refers to the percentage of annual pasture growth that is consumed in one year.

Consumption Rate compares the total pasture standing biomass at the beginning of the Dry Season (April) with the total standing biomass left at the end of the Dry Season (November).



Mitchell Grass tussocks produce two types of leaf shoots, primary and axillary tillers. Primary-tillers grow from the base of the tussock, while axillary-tillers originate from amongst the leaves of one-year-old or greater primary-tillers. Axillary-tillers have a greater leaf-stem ratio and ultimately produce more nutritious feed per volume.

Grazing land managers should aim to maintain Mitchell Grass primary-tiller length above 20cm. This will ensure any vulnerable new primary-tiller shoots will be protected from grazing during the early growth stage while maximising axillary-tiller production.

The recommended long term utilisation of Mitchell grasslands

GRAZING SYSTEM	UTILISATION RATE
Continuous Grazing	25%

Research indicates that utilisation rates may be increased, perhaps to as high as 50%, through the adoption of alternative grazing strategies such as rotational grazing that incorporates Wet Season spelling.

Assessment Location

Ideally assessments should be undertaken across the entire paddock. However, paddock size, uneven grazing and the influence of watering points need to be considered. It is recommended that assessments in large paddocks with numerous watering points be undertaken approximately 1-2 kilometres from each watering point, on an area that is evenly utilised.

0-10% CONSUMPTION



Consumption rate is less than 5%. This pasture is under-utilised and will eventually require a disturbance such as fire or grazing to maintain it in good condition.



Consumption rate is approximately 10%.

10-20% CONSUMPTION



Consumption rate is approximately 15%. Rank grass is still accumulating and may eventually require burning to maintain this pasture in good condition.



Consumption rate is approximately 20%.

20-50% CONSUMPTION



Consumption rate is approximately 35%. This is considered a sustainable short-term consumption rate but may be too high in the long-term.



Consumption rate is approximately 45%. Under the traditional continuous grazing system this rate is unsustainable. Constant grazing pressure needs to be reduced if the health of the pasture is to be maintained. This consumption rate may only be sustained if management includes Wet Season spelling.

50-100% CONSUMPTION



Consumption rate is approximately 60%. If continued the Mitchell Grass tussocks will become smaller and sparser.



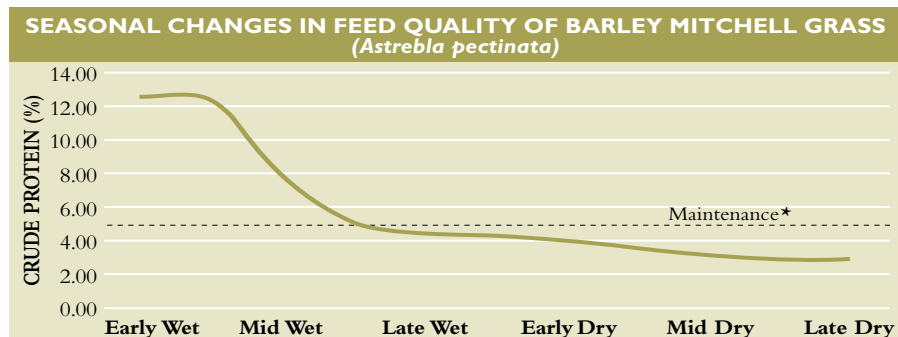
Consumption rate is approximately 80%. This rate of consumption is unsustainable.

SECTION 4

PASTURE QUALITY

Although Mitchell Grass itself is considered relatively low in feed quality especially during the Dry Season, the associated annual grasses and forbs that grow following summer rain produce highly palatable and productive feed.

The feed quality of Mitchell Grass varies considerably depending on the growth phase and section of the plant consumed. Leaves are more nutritious than the stems, and their nutritional value will decline with age.



* Dietary Crude Protein required for maintenance of one animal equivalent using

- Barley Mitchell Grass (“Grab Sampling”) as an indicator = 5%

- Dung samples and Near Infra-red Reflectance Spectroscopy technology (NIRS) technology = 8%.

FEED QUALITY INDICATOR	SEASON						RANK MATERIAL
	Early Wet	Mid Wet	Late Wet	Early Dry	Mid Dry	Late Dry	
Crude Protein (%)	12.5	8	4.5	4	3.5	3	1.5%
Phosphorous (%)	0.22	0.14	0.09	0.07	0.05	0.04	0.01%
Digestibility (%)**	65	61	60	57	55	54	25%

** Digestibility figures were obtained from NIRS dung sample analysis

With the onset of the Dry Season, Mitchell Grass pastures begin to cure and turn a golden colour. Any rain received after the pasture has cured will begin the decay process on dead leaves and stems, turning them a grey. This material is said to have become rank and is regarded as “standing litter”. It is unpalatable to stock and is of very little nutritional value. Rank material will continue to accumulate in a pasture after each Wet Season.

Although rank grass provides valuable soil cover, too much rank grass in a pasture can prevent new tiller growth in perennial tussocks, eventually causing the tussock to die.

Cattle will not eat rank material but their movement through the pasture and associated trampling activity will help prevent the build-up of rank material. Alternatively, it is recommended that rank material is removed by cool burning after rain at the beginning of the Wet Season. Fire will remove the rank material, release any nutrients to be used in new pasture growth, and freshen up the pasture. Once the rank grass component of a Mitchell grassland rises to above 50% a disturbance through burning may be required to maintain it in good condition.

BEFORE



AFTER



Rank pasture (approximately 60% rank) pre burning in December and again in late January after burning and rain.

0-25% RANK



Hoop Mitchell Grass - 11% rank.



Barley Mitchell Grass - 18% rank.

25-50% RANK



Barley Mitchell Grass - 26% rank.



Hoop Mitchell Grass - 42% rank.

50-75% RANK



Hoop Mitchell Grass - 53% rank.



Barley Mitchell Grass - 65% rank.

75-100% RANK



Hoop Mitchell Grass - 80% rank.



Bull Mitchell Grass - 95% rank.

PLANT SPECIES REFERED TO IN THIS BOOKLET

Perennial Grasses

Awnless Barnyard Grass (*Echinochloa colona*)
Barley Mitchell Grass (*Astrebala pectinata*)
Bull Mitchell Grass (*Astrebala squarrosa*)
Curly Bluegrass (*Dichanthium fecundum*)
Curly Mitchell Grass (*Astrebala lappacea*)
Feather-top Wiregrass (*Aristida latifolia*)
Golden Beard Grass (*Chrysopogon fallax*)
Hoop Mitchell Grass (*Astrebala elymoides*)
Native Millet (*Panicum decompositum*)
Queensland Bluegrass (*Dichanthium sericeum*)
Silky Brown-top (*Eulalia aurea*)

Annual Grasses

Button Grass (*Dactyloctenium radulans*)
Downs Sorghum (*Sorghum timorense*)
Flinders Grass (*Iseilema* spp.)
Native Couch (*Brachyachne convergens*)
Pepper Grass (*Panicum laevinooides*)

Forbs

Fringed Glycine (*Glycine falcata*)
Goathead Burr (*Sclerolaena bicornis*)

Forbs cont.

Indigofera (*Indigofera* spp.)
Native Pea (*Rhynchosia minima*)
Necklace Pea (*Desmodium muelleri* and *D. campylocaulon*)
Onion Vine (*Operculina aequisejala*)
Pea Bush (*Sesbania* spp.)
Pigweed (*Portulaca* spp.)
Rattlepod (*Crotalaria* spp.)
Sensitive Plant (*Neptunia* spp.)
Sida (*Sida* spp.)

Shrubs

Cassias (*Senna* spp.)
Corkwood Wattle (*Acacia sutherlandii*)
Beefwood (*Grevillea striata*)
Gundabluie (*Acacia victoriae*)
Mesquite (*Prosopis pallida*)
Parkinsonia (*Parkinsonia aculeata*)
Prickly Acacia (*Acacia nilotica*)
Rubberbush (*Calotropis procera*)
Supplejack (*Ventilago viminalis*)
Whitewood (*Atalaya hemiglauca*)

FURTHER READING

General Grazing Land Management

The Ecograz Project: Developing Guidelines to Better Manage Grazing Country – Ash, A., Corfield, J. and Ksiksi (2002), CSIRO, Townsville, Qld.

EDGEnetwork – Grazing Land Management Manual – Mitchell Grass Downs – Chilcott, C.R., Milson, J.A. and Phelps, D.G. (2004).

Managing Mitchell Grass: a Grazier's Guide – Partridge, I. (1996), Dept. of Primary Industries, Brisbane.

Land Condition Assessment

A Guide for Rangeland Condition Assessment on the Barkly Tablelands – Jessop, P. (2002), Dept. of Infrastructure, Planning & Environment, Palmerston, NT.

A Guide for Rangeland Condition Assessment in Central Australia – Reu, S. (2000).

Nutritional Management

EDGEnetwork – *The Nutrition EDGE* – Meat & Livestock Australia (2003), North Sydney, NSW.

Nutritional Influences on Reproductive Performance of Beef Cattle in the Barkly Tableland – Savage, D.B. (2004), Ph.D. thesis, University of Queensland.

Plant Identification

Pasture Plants of North-West Queensland – Milson, J. (2000), Dept. of Primary Industries, Dept. of Primary Industries.

Pasture Quality & Quantity Estimates

North Australian Grassland Fuel Guide: Sturt Plateau & Victoria River District, N.T. – Johnson, A. (2002), Tropical Grasslands CRC, Darwin.

GLOSSARY

Annual Grass – A grass that usually completes its lifecycle in one year, and therefore regenerates from seed each year.

Curing – The drying out of a pasture at the end of a growing season. The stage of growth where a grass has reached maturity, its leaves and stems have dried out and turned a golden colour (“hayed off”).

Forb – Any pasture plant that is not a tree, shrub or grass. Includes both annual and perennial plants.

Growing Season – The time period when a plant’s physical and chemical requirements are met to allow it to grow and set seed.

Increaser species – A plant species that increases in abundance when land condition and pasture health decline.

Indicator species – Any plant or animal species present within a vegetation community that enables the overall land condition or pasture health to be gauged by its abundance.

Palatable – Vegetation which is pleasant to taste and sought after by grazing animals.

Pedestalling – Individual perennial grass tussocks appear to be sitting on raised soil platforms. It occurs when soil condition between the perennial grass tussocks decline through erosion and/or compaction.

Perennial Grass – A grass that usually survives for more than one year.

Rank – Any attached plant material that has died and turned grey in colour due to the on set of the decaying process once being re-wet. It is unpalatable and tends to accumulate in pastures following rain.

Seasonal Response – The effect of timing, distribution and amount of rain on pasture over a season.

Standing Biomass – Includes all attached plant material both alive and dead. Expressed in terms of weight per given area for example kilograms per hectare (kg/ha).

Tiller – A shoot that arises from the base of the grass plant in a generally upright manner.

Tussock – A dense clump formed by an individual grass plant.



Typical watering point on the Barkly Tablelands. Photo by Kerryl O'Rourke



Natural Heritage Trust

Helping Communities Helping Australia

An Australian Government Initiative



Australian Government
**Department of Agriculture,
Fisheries and Forestry**



**Future
Drought
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