

APPENDIX. NATIVE PASTURES

A broad division has been made on the map 'Native Pastures' between those native pastures that are naturally treeless or have only a sparse tree or tall shrub cover and those with a denser top cover. In the latter, pasture area is limited by tree shading but has been increased over large areas by the clearance of top cover.

In these descriptions grasses which commonly grow to more than one metre in height are termed *tall*; between a half and one metre, *mid*; and less than half a metre, *short*.

PASTURES WITH LITTLE OR NO NATURAL TOP COVER

BLUEGRASS

Grasslands with perennial bluegrasses (*Dichanthium* spp.) dominant or co-dominant occur on the wetter edges (average annual rainfall generally more than 500 mm) of treeless, cracking clay plains in northern Australia and in the Central Highlands of Queensland. Other co-dominant perennials are silky browntop grass (*Eulalia fulva*) in the Queensland Gulf Country and ribbon grasses (*Chrysopogon* spp.) in the Kimberley region of Western Australia. They form medium or occasionally tall tussocks between which there is ample space for the summer wet season growth of a complex mixture of annual, and generally more palatable, grasses (such as Flinders grasses, *Iseilema* spp.) and other herbs (forbs).

During the winter dry season, when the annuals have dried off, grazing is restricted to the small central portions of the perennial grass tussocks that remain green. Controlled burning in the late wet season and at times during the dry improves the accessibility of this small amount of green feed and stimulates limited regrowth; nevertheless, cattle lose condition in the dry season. However, these grasslands are better than those adjacent to them, with the exception of the Mitchell grasslands. Stocking rates vary between one beef beast to 10 ha on the best river frontage land to one beast to about 25 ha elsewhere.

Sown pastures are virtually absent but buffel grass (*Cenchrus pennisetiformis*) and Birdwood grass (*C. setiger*), both introduced in the Cloncurry area in 1926, are now naturalised over some areas of Gulf Country river frontage.

MITCHELL GRASS

Mitchell grasses are the characteristic plant cover of extensive cracking clay plains and valley floors in the northern semi-arid region with a summer wet season and an average annual rainfall of 250–500 mm. These areas are generally treeless or, as in their southern extension into New South Wales, with a very open tree cover. The predominant species varies regionally but is always one of the drought-resistant perennial Mitchell grasses (*Astrelba* spp.), which grow in discrete mid-height tussocks up to 250 mm in diameter and about 500 mm apart (see Figure 12).

In the summer wet season the normally abundant growth of annuals, mostly forbs but notably including Flinders grasses (*Iseilema* spp.), provide more palatable and nutritious feed than the Mitchell grasses which, however, provide valuable fodder in the long dry season when the annuals have disappeared. These pastures respond rapidly to rain, even when light, and the self-mulching property of the clay soil conserves moisture well.

Mitchell grasslands provide most of the best grazing for beef cattle in the northern semi-arid region, with stocking rates of one beast to 12–16 ha. Further south, on the extensive plains of central Queensland and northern New South Wales, sheep are grazed at one to 2–3 ha.

XEROPHYTIC TUSSOCK GRASS

This type contains a mixture of tussock grass species and is mostly developed on clay soils on plains or rolling downs where the annual rainfall is generally less than 250 mm, most of which falls in summer. Of the perennials, Mitchell grasses (*Astrelba* spp.) are the most widespread but many other xerophytic tussock grasses such as species of *Eragrostis* and *Enneapogon* are locally as common. However, the real value of these pastures, which are more productive than adjacent pastures on shallow or more sandy soils with a similar climate, lies in the annuals that grow during the summer wet season.

Much of the broad, inland-draining flood-plains of the Channel Country of south-west Queensland has these pastures. Their composition varies with the timing, extent and persistence of flooding; floods in mid to late summer are most common and can persist well into winter. Winter growth (dominated by forbs, notably Cooper clover, *Trigonella suavissima*) is generally highly nutritious so that beef fattening is possible. Summer growth (dominated by annual grasses, notably pepper grass, *Panicum whitei*; small Flinders grass, *Iseilema membranaceum*; and channel millet, *Echinochloa turnerana*) is



Figure 5. Xerophytic tussock grass fresh and green after summer rains and local flooding, Channel Country of south-western Queensland.

more abundant and, even though less nutritious than the winter growth, maintains cattle condition well. However, when the flood-grown pastures dry off, the remaining vegetation (such as canegrass, *Eragrostis australasica*; lignum shrubs, *Muehlenbeckia cunninghamii*; and various low *Sclerolaena* shrubs) is mostly unpalatable and has a low carrying capacity.

In the small areas near Port Hedland in Western Australia, naturalised buffel and Birdwood grasses (*Cenchrus* spp.) are dominant in some places.

The xerophytic tussock grass pastures are predominantly grazed by beef cattle at rates varying from one beast to 50 ha in the poorer parts to one beast to 15 ha on the Channel Country flood-plains after a good flood.

SALTBUSH-XEROPHYTIC MID GRASS

This type mostly occurs on saline or calcareous soils in areas of low relief, predominantly in southern arid and semi-arid areas where the annual rainfall is less than about 300 mm.

The characteristic plants are perennials belonging to the Chenopodiaceae family, predominantly species of *Atriplex* (saltbushes) and *Maireana* (bluebushes—previously named *Kochia*). Trees are either absent or sparse and grass cover between the saltbushes is variable and generally ephemeral. Perennial grasses (*Eragrostis*, *Danthonia* and *Stipa* spp. in the south and Mitchell grass in the north) occur on heavier soils, while on lighter soils on higher ground seasonal fluctuations are great but the pastures commonly include *Stipa* and *Enneapogon* grasses, various native burrs (*Sclerolaena* spp.—previously named *Bassia*—of the Chenopodiaceae family) and a great variety of daisy-like herbs.

The grass-forb component is the most important and is grazed preferentially when available but the saltbushes provide most of the feed in dry periods. Because saltbush is susceptible to overgrazing and trampling, much of this pasture is in poor condition.

In the south, sheep grazing predominates at rates ranging from one sheep to 1–2 ha on cracking clay plains in the Riverina of New South Wales to one sheep to 12–16 ha in drier areas.



Figure 6. Saltbush-xerophytic mid grass, Channel Country of south-western Queensland.

NATIVE PASTURES GENERALLY WITH TOP COVER

MONSOON TALL GRASS

This type occurs in northern areas where the annual rainfall is greater than about 700 mm, with a typical monsoon regime of very wet summers and almost completely dry winters. It is characterised by a number of tall annual and perennial grasses, such as *Sorghum*, *Themeda* and *Heteropogon* species, which grow rapidly and prolifically in the wet season in open eucalypt and melaleuca woodlands. However, most are palatable only in the early growth stages, becoming progressively less palatable and of sharply declining nutritional value later in the wet season. Also present are shorter grasses more characteristic of the semi-arid areas to the south (for example *Aristida* spp.); although mostly unpalatable, they provide some feed in the dry season.

Controlled burning in the late wet season and at times during the dry season, as with the bluegrass pastures, improves the accessibility of younger and more palatable growth and encourages regrowth. Beef cattle, the only livestock grazed on these pastures, lose weight and condition in the dry season so they are not marketed until 5–7 years old. Stocking rates are governed by the long dry season and are low, at around one beast to 50 ha.

Exotic legumes such as *Stylosanthes*, *Neonotonia* and *Desmodium* and grasses such as *Brachiaria*, *Panicum* and *Setaria* are sown over small areas.



Figure 7. Monsoon tall grass drying off at the end of the wet season, Kimberley region, Western Australia.

MONSOON MID GRASS

This type occurs in the same climatic zone as monsoon tall grass but is characterised by an assemblage of mainly perennial mid grasses of the *Eriachne*, *Aristida* and *Schizachyrium* genera which are mostly wiry, unpalatable, and of low nutritional value even in the summer wet season. Controlled burning at the end of the wet season encourages regrowth.

Stocking rates are low, generally less than one beef beast to 50 ha and commonly one to at least 100 ha. The combination of poor nutrition in the wet season and weight loss in the dry results in high annual mortality and low turn-off rates (usually less than 10% of total herd numbers). Cattle are mostly turned off for fattening elsewhere although some are turned off for slaughter after 6–8 years.

TROPICAL TALL GRASS

Most of the area occupied by this type—the coastal hinterland of eastern Queensland—has a tropical climate with a summer wet season and winters which are not so consistently dry as in the monsoon region.

The characteristic perennial species is bunch speargrass (*Heteropogon contortus*). Kangaroo grass (*Themeda australis*) and species of *Bothriochloa* and *Aristida* are also common. Kangaroo grass was probably more abundant in the past but has been replaced by speargrass as a result of grazing.

Speargrass provides good grazing in early summer but later becomes rank and unpalatable with a low nutritional value. As in all other tropical pastures, controlled burning in the late wet season and at times during the dry produces a limited regrowth of young shoots. The initially more nutritious pasture and a shorter and less severe dry season allow higher stocking rates than on monsoon tall grass. Clearing of the original timber (eucalypt woodland and brigalow, *Acacia harpophylla*, forest) has increased and improved the pasture. Speargrass in cleared areas can carry one beef beast to about 6 ha and fat cattle can be turned off in 4–6 years. This pasture is generally unsuitable for sheep: it is too tall, its poor nutrient value in the dry season affects wool yield, and the speargrass seeds affect fleece quality.



Figure 8. Tropical tall grass (speargrass) in brigalow country, Central Highlands of Queensland.

In central Queensland, particularly in cleared brigalow country, large areas have been sown with Rhodes grass (*Chloris gayana*) and green panic grass (*Panicum maximum* var. *trichoglume*).

NORTHERN XEROPHYTIC MID GRASS

This occurs in the northern semi-arid region on country intermediate between the Mitchell grass cracking clay plains and the semi-arid hummock grass growing on higher land with shallow soils. It extends into adjacent more humid regions where the soil is shallow.

Various perennial species of wiregrass (*Aristida*) characterise these pastures, mixed with other drought-resistant, mid-height grasses, notably *Bothriochloa*, *Eriachne* and *Sehima* in the north and *Chloris*, *Paspalidium*, *Enneapogon* and *Eragrostis* in the south. In places shrubs such as supplejack (*Ventilago viminalis*) provide useful browse feed. The *Aristida* grasses are generally unpalatable and stocking rates are accordingly low. Beef cattle predominate except in southern Queensland, where sheep are locally more important. Cattle are grazed at about one to 15–30 ha at best and sheep, in the south, at one to 2–3 ha on cleared land but one to 5–10 ha in timbered country.

In southern and central Queensland this pasture type generally occurs on the drier edge of brigalow areas and where these are cleared it is commonly replaced by buffel grass (*Cenchrus ciliaris*), allowing stocking rates of one beef beast to 3–5 ha.

SEMI-ARID HUMMOCK GRASS

This type is an extension of the arid hummock grass pastures of the interior to northern semi-arid areas where shallow or sandy soils diminish the effectiveness of the higher rainfall. It is characterised by evergreen perennial grasses of the *Triodia* and *Plectrachne* genera, commonly called spinifex, which have a distinctive circular hummock growth form and tightly rolled hard leaves formed into unpalatable spines. The softer young shoots are more palatable but cattle will eat older plants during severe droughts when there is nothing else available.

The grazing value of these pastures is low and is largely determined by the mixture of mainly annual grasses that grow between the spinifex hummocks in the summer wet season. These include species of *Aristida*, *Chrysopogon*, *Bothriochloa*, *Eriachne*, and *Cymbopogon*. Controlled burning at four or five year intervals, during or shortly after the wet season, promotes edible spinifex regrowth although other, more palatable, plants may be destroyed.

Tree and shrub cover is generally sparse and unpalatable. Heartleaf poison bush (*Gastrolobium grandiflorum*) makes livestock management difficult in parts of Queensland.

Cattle predominate, at stocking rates ranging from one beast to 25 ha in the wetter parts of central Queensland to much lower rates in drier areas further west.

ARID HUMMOCK GRASS

Most of the arid sand-dune country of the interior has a sparse hummock grass cover, composed of various species of spinifex (*Triodia* and *Plectrachne* spp.) already described above. Any grazing value lies in the growth of other plants, mostly annuals, in response to the sporadic rain. These are most commonly *Eragrostis*, *Chrysopogon* and *Aristida* grasses and a wide variety of forbs, which grow far more sparsely than in the semi-arid hummock grass pastures. Controlled burning induces regrowth of young and more palatable spinifex shoots.



Figure 9. Arid hummock grass (*spinifex*) with mulga trees. Past fires have burnt out the centres of the spinifex hummocks.

Most of this spinifex desert country is unused. Where it is grazed, predominantly by beef cattle, stocking rates are about one beast to 100 ha.

ACACIA SHRUB-SHORT GRASS

This type occurs over most of the southern arid and semi-arid regions except on sand-dune country (hummock grass) and on saline or calcareous soils (saltbush).

It is characterised by an open upper stratum of low trees or tall shrubs which are predominantly acacias (notably mulga,



Figure 10. Acacia shrub-short grass pasture in south-western Queensland, typical of large areas of the semi-arid inland.

Acacia aneura; and in the east, gidgee, *A. cambagei*). The ground cover is a scattered mixture of forbs and mainly short grasses, including woollybutt grass (*Eragrostis eriopoda*), mulga oats (*Monachather paradoxa*) and *Eriachne* and *Aristida* species, which grow in response to the brief and erratic rains and make up the bulk of the feed.

Mulga foliage is palatable and provides valuable reserve fodder in times of drought, when the mulga can be pushed over or branches lopped to make it available to livestock. While clearing mulga is necessary to increase pasture area, particularly in the wetter areas where the cover is denser, sufficient are usually left standing for drought feed.

These pastures are grazed predominantly by sheep in the wetter south and by cattle in the drier centre and north. Stocking rates range from one sheep to 2 ha at best to one to 8–12 ha over large areas. Cattle are grazed at rates ranging from one to 40 ha to much lower rates on the desert margins.

SOUTHERN XEROPHYTIC MID GRASS

This type is confined to the south-eastern semi-arid and sub-humid regions where rain falls mainly in winter or is fairly evenly distributed. As in its northern counterpart, the relatively unpalatable *Aristida* grasses form a fairly constant component, but in declining proportions southward. Other, generally more palatable, perennial grasses, notably species of *Stipa*, *Chloris* and *Danthonia*, are usually more common locally than *Aristida*. Overgrazing has led to increases in *Aristida* in the north and some less palatable wiry leafed *Stipa* species in the south.



Figure 11. Southern xerophytic mid grass in central New South Wales. Once tree covered, as at the top of the picture, most is now cleared. Ring-barked dead trees still stand in this paddock and many unvegetated 'scalds' can be seen.

On the edge of the wheat belt, this pasture is much altered by naturalised species. Annual medics (small Mediterranean leguminous species of *Medicago*) greatly improve the carrying capacity as does the winter-growing annual barley grass (*Hordeum leporinum*), although the mature seeds of this grass can injure sheep and affect fleece quality. Overgrazing in these wetter areas leads to an increase in unpalatable naturalised weeds such as saffron thistle (*Carthamus lanatus*).

This pasture is predominantly grazed by sheep at better than one to 2 ha on the wetter margins to one sheep to 6–8 ha in drier areas.

TEMPERATE SHORT GRASS

This pasture type originally extended in an arc broadly coincident with the eastern wheat belt, extending from the Darling Downs in southern Queensland to eastern South

Australia. Over much of this area the native pasture has been replaced by crops and sown pastures and the original open eucalypt tree cover has been extensively cleared. The structure and composition of the remainder have been much altered by a long history of grazing.

Originally, warm-season perennial grasses, notably *Themeda australis* (kangaroo grass), *Poa poiformis* (blue tussock grass) and *Stipa aristiglumis* (plains grass) were abundant but they have been severely reduced by grazing, except locally in northern New South Wales.

The perennial grasses *Danthonia carphoides* (short wallaby grass), *D. auriculata* (lobed wallaby grass), *Enneapogon nigricans* (niggerhead grass), *Stipa falcata* (slender spear grass) and *Chloris truncata* (windmill grass) are now characteristic over much of the area. Of these only the niggerhead and windmill grasses make warm-season growth.

The present pastures largely reflect past overgrazing and strong contrasts exist even between adjacent paddocks. The first effect of overgrazing is the disappearance of native perennial grasses starting with *Danthonia*. These are replaced by annuals, mostly introduced species such as summer-growing stinkgrass (*Eragrostis cilianensis*), winter-growing barley grass (*Hordeum leporinum*) and legumes (medics and trefoils). Further overgrazing reduces the annual grasses and increases the legumes. Paradoxically this change actually increases the carrying capacity as long as rainfall is average or better but the lack of perennials causes problems in dry periods. Continued overgrazing reduces the legumes and encourages the growth of herbaceous weeds, mostly accidentally introduced and of little or no fodder value, such as Paterson's curse (*Echium plantagineum*), capeweed (*Arctotheca calendula*) and saffron thistle.

These pastures are predominantly grazed by sheep although cattle are locally important, particularly in northern New South Wales. Stocking rates, which are high though variable depending largely on the proportion of naturalised legumes in the pastures, range from about 2–3 sheep per hectare to about one sheep to 2 hectares.

TEMPERATE TALL GRASS

Occupying the more humid coastal plains and uplands of the south-east, this type was the understorey of eucalypt forest and woodlands now largely cleared on all but the most rugged land. It also occurred or still remains on ridges and hilltops in moister parts of the adjacent temperate short grass areas.

In wetter areas the perennials kangaroo grass (*Themeda australis*) and blue tussock grass (*Poa poiformis*) are common. In drier inland areas silvertop wallaby grass (*Danthonia pallida*)—a coarse tussock grass of low grazing value—is more common. As these common perennial grasses are warm-season plants they provide poor winter feed.

On the better land native pasture has been largely replaced by sown pastures of ryegrass and white clover in the wetter and cooler areas or phalaris grass and subterranean clover in the drier parts. In coastal New South Wales its composition has been much altered by invasive naturalised species such as paspalum (*Paspalum dilatatum*), kikuyu (*Pennisetum clandestinum*) and carpet (*Axonopus* spp.) grasses.

In their unaltered state these pastures have a low carrying capacity considering the high rainfall of the areas in which they occur. Stocking rates are about one sheep to 1–2 ha or one cattle beast to 10–15 ha. They are grazed mostly by beef cattle in the wetter areas and beef cattle and sheep in the drier inland extensions.

MAPS FOLLOWING

Native Pastures

Sown Pastures and Fodder Crops