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Sustaining land for beef production in the Ubobo area

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Sustaining land
for beef production in the
Ubobo area

Based on producer experience

Sponsored by



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Introduction

This report contains management guidelines for a beef property typical of the Ubobo area. The guidelines are for sustainable beef production. Sustainable production is defined as production which optimises profit with minimal degradation of the natural resources.

The Ubobo area is located in the Boyne Valley south of Gladstone which is in the Calliope Shire, Central Queensland (see map page 3).

This document contains a description of land-types in the Ubobo area, their vegetation, topography, soils, pastures, production capacity and condition. The report also describes suitable enterprises, cattle management and grazing-land management. Stocking rates and property sizes are suggested as guidelines for sustainable beef production. A list of common and scientific plant names is included as Addendum 1 to ensure accurate plant identification.

This information was provided in 1992 by a group of nine producers each of whom had at least 10 years experience of beef property management in the Ubobo area.

These guidelines were developed by using a process called the Local Consensus Data (LCD) technique. This process involved discussing the best management practices for a hypothetical property typical of the Ubobo area.

Participating producers agree that this report contains a range of practical, first hand information that contributes to identifying current best practices for local property management.

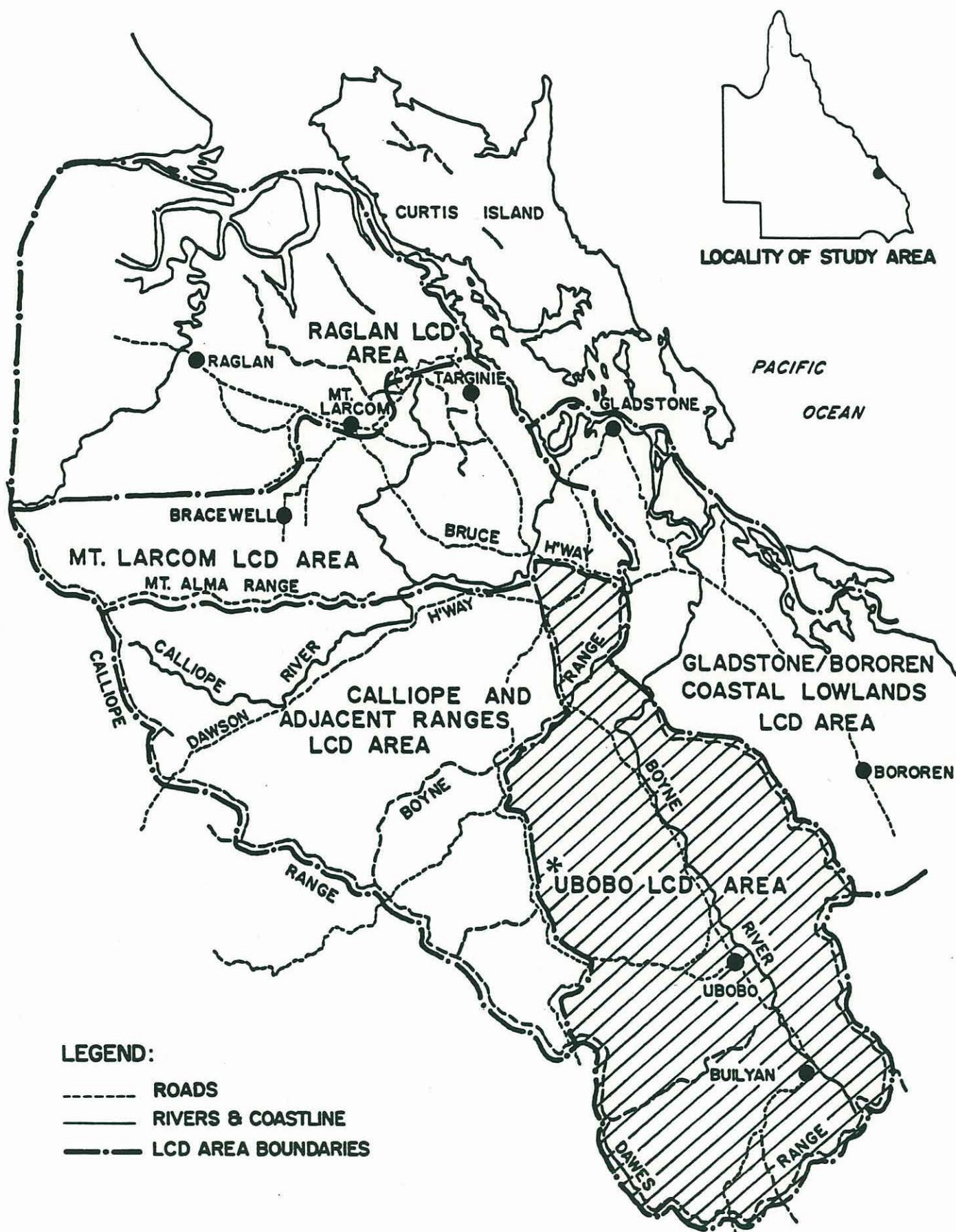
Similar reports are available for other areas in the different pasture communities of Queensland (see Native Pasture Communities map, Addendum 2).

Together, LCD reports offer a pool of practical ideas for sustainable beef production. The reports also identify industry constraints within and across pasture communities together with problems and gaps in information for further research.

These guidelines are based upon experience up to July 1992. Changes in knowledge, technology and market forces may alter the suitability of this information in the future. Producers and organisations involved in the preparation of this report accept no responsibility for adverse effects resulting from the use of this information. Some conclusions may not be endorsed by the Department of Primary Industries (DPI) or the Meat Research Corporation (MRC).

The production of LCD reports is the first step in a process which will include workshops to give all beef producers (in local areas in Central Queensland) an opportunity to participate in developing improved production systems. The process is sponsored by the MRC and the DPI. In the Calliope Shire the process was initiated and managed by the Calliope Soil Conservation Society (CSCA).

Readers should consult appropriate representatives of the CSCA or the DPI for further information or clarification.



* Location of the Ubobo area.

Land-types

There are three different land-types in the Ubobo area. This section of the report provides a description of each land-type. Problems with each land-type and opportunities for improved management are also discussed.

Flats

This country consists of mixed eucalypts and native pastures and covers 10% of the area (Table 1). Sub-types of flats recognised by participants are:

- River flats.
- Creek flats
- Secondary flats.

River flats

These flats are found on the banks of the Boyne River. Blue gum is the main tree species but some ironbark, applewood, Moreton Bay ash and mahogany also can be present.

Most trees have been dozed, ring-barked or harvested leaving most of the country cleared. Little regrowth occurs.

Soils are very fertile, deep loams (up to 3 m or 10 ft deep) interspersed with sand and gravel.

River flats are generally suitable for improved pastures with some areas suitable for grain, forage and lucerne crops. Improved pastures such as green panic, setaria, siratro and Callide Rhodes grass are suitable. About 50% of the area is sown to improved pastures.

River flats are generally fenced off from hill country and continuously grazed.

Noogoora burr (which mainly grows on river flats), lantana, mother-of-millions, rubber vine, parthenium and giant rat's tail grass are the main weeds in pastures. Parthenium and giant rat's tail grass have infested some areas recently and have potential to cause serious problems.

Creek flats

Vegetation on creek flats consists of blue gum, narrow-leaved ironbark, mahogany, Moreton Bay ash and bloodwood.

The soils range from heavy clays to sandy loams.

Creek flats are mainly used for grazing of native pastures and are fenced in with hill country. Small areas have been cleared of trees and very small areas established to green panic, siratro and Callide Rhodes grass.

Lantana is the main weed on creek flats.

Secondary flats

These are usually found above river flats and can be further divided into four categories.

1. Mahogany, blue gum, Moreton Bay ash flats

Soils are sandy to heavy loam surface over heavy clay.

2. 'Soft box' flats

These flats consist of gum-topped box on melon hole country. Soils are usually a loam over yellow clay.

3. 'Hard box' flats

Gum-topped box occurs on white powdery topsoil overlying yellow clays. Disturbance of this soil can cause 'bull dust'. This category of secondary flats usually has poorer soils on sloping land that is prone to erosion.

4. Ironbark and bloodwood flats

Soils on this type of country are heavy clays.

The secondary flats are not as productive as river flats. The better sub-types can be used for grain, fodder or crop production. However, secondary flats are generally used for grazing. Mahogany, blue gum and Moreton Bay ash flats are suitable for irrigation where water is available. Most trees have been ring-barked or chemically treated. Tree regrowth on secondary flats is slight. Weed problems are small because this country is not usually flooded.

These flats are fenced off from hill country and can include other types of flats.

Granite country

This country covers 3% (Table 1) of the area. Narrow-leaved ironbark, Moreton Bay ash, blue gum, mahogany and bloodwood are the main tree types. Most of these trees have been cleared by ring-barking. Very little regrowth has occurred.

The soils are either red or yellow coarse sands.

Granite country is used for grazing of native pastures. Fine stem stylo is suitable for growing with native pastures.

Hill country

Hill country covers 87% of the area (Table 1) and varies in quality. Sub-types recognised by the producers (participants) are:

1. Land unavailable to cattle, very 'hard' and steep hills. Country that is in a virgin state (Table 1).
2. Undulating country that is of better quality where most of the trees have been treated with Tordon® or ring-barked (Table 1).

This country consists of mixed eucalypts and native pastures on steep hills to undulating slopes. The dominant vegetation is spotted gum, narrow-leaved ironbark, blue gum, bloodwood, broad-leaved ironbark, supplejack (brush box), or mixtures of these.

Soils vary from heavy to light loams with spotted gum growing on shallow soils. Yellow and red gravelly soils occur on weathered granite with mainly broad-leaved ironbark.

Hill country usually provides good quality pasture during the summer growing period, but cattle generally lose weight between May and September.

Native pastures include black speargrass and are usually in good condition. They are grazed all year. Native pastures can be improved by adding legumes such as seca stylo and fine stem stylo.

This country is also suited to timber production from spotted gum, narrow-leaved ironbark and blue gum. All good straight trees of these species are

usually left when regrowth is 'thinned'. 'Thinning' is an operation whereby some trees in an area are killed by applying herbicides.

The main problems are infestation of pastures by lantana and tree regrowth. Regrowth mainly occurs from seedlings. Every 10-20 years the large trees are 'thinned'.

Hill country is generally low in phosphorus and supplementation is recommended for breeders (Table 2).

Enterprises

Cattle breeding and fattening on native and improved pastures are suitable enterprises for most properties with a mixture of the land-types described, and in Table 1.

Some properties allow for fattening cattle on forage crops on river country. Some properties have large areas of river flats that are suitable for cropping. There are approximately 1620 ha (4000 acres) of potential cropland in the Boyne valley with about 400 ha (1000 acres) cropped at present.

Cattle management

This section describes the type of cattle and their management which best suit local conditions.

Breeding

Cattle should contain $\frac{1}{2}$ - $\frac{3}{4}$ *Bos indicus* (Brahman type) blood to control ticks and increase survival during dry spring periods (Table 2). European breeds are not as well suited to local conditions.

Bulls

Bull to cow ratios are 3% for British breed bulls, or 4 - 5% for Brahman bulls (Table 2). The ratio of bulls to cows varies with the size of paddocks, the steepness of paddocks, and the number of watering points. Producers should aim to cull bulls at about eight years of age.

Cows

Pregnancy testing is used by some producers to cull non-pregnant cows during droughts and when reproduction rates are low. However, pregnancy testing is not generally used because:

- labour requirements are high
- veterinary fees are expensive.

Cull cows are usually sold at about 11 years of age for Brahman types and nine years of age for British types (Table 2). Some producers cull cows and heifers that fail to produce a calf every year. Most producers cull Brahman type cows to improve temperament.

Participants considered that phosphorus supplementation of cows can increase reproduction rates by 10-14% where cows graze on hill country.

Mating

Producers in this area use year round or seasonal mating systems (Table 2).

Year round mating

Most graziers leave bulls in all year round because:

- some paddocks have poor fencing
- seasonal mating can result in poor calving percentages
- bulls can be missed at mustering, especially on large properties of 2000 head or more
- most females normally fall pregnant at the same time after good spring rains.

Seasonal mating

Some graziers use seasonal mating where the bulls are placed with the breeders for 4-5 months. Bulls are placed with the breeders when good summer rains occur. Mating begins during the October-December period and finishes in April or May.

Reproduction rates

The average reproduction rate is about 75% (Table 2). Management, stocking rates and phosphorus supplementation on some properties can lift weaning rates above 75%.

Weaning

Calves are usually weaned at 6-7 months of age, but are weaned earlier if the season is dry (Table 2). The time of weaning is usually flexible and is varied to suit requirements such as the availability of labour.

Weaners are fed molasses and hay, and are trained in the yards before being put out to graze.

Marketing

Producers adapt to markets prevailing under different seasonal conditions. Generally producers aim to sell:

- 'Jap ox', cattle less than 3 1/2 years old and 620 kg liveweight (320 kg carcass)
- cull cows, at 500 kg liveweight or at a lower weight if the season is dry.

'Jap ox' and fat cull cows are usually sold to the meatworks and store cattle are usually sold through agents. Selling calves off cows can give good returns in some circumstances.

Herd health

Vaccinations

Participants usually vaccinate cows and maiden heifers for 'lepto' (Table 2). Cows are vaccinated two months before calving and maiden heifers two months before mating. Injection sites should be high on the neck to reduce spoiling of beef around the shoulders.

Participants also consider it important to vaccinate against blackleg. Some producers

vaccinate bulls for three day sickness (Table 2).

External parasites

Back-rubbers are used for the control of buffalo fly.

British breeds are dipped for tick control.

Deaths

Cattle deaths average less than 1% (Table 2). Some deaths occur due to poison peach and zamia poisoning in hill country if these plants are not controlled. High stocking rates can cause deaths from malnutrition in dry seasons. Very few deaths are recorded under good management.

Grazing-land management

This section describes management to sustain the natural resources for long term beef production.

Stocking rate and pasture management

Stocking rates for sustaining different land-types for beef production are shown in Table 1. Stocking rates should be adjusted according to the type of cattle and the paddock conditions. Producers consider an adult equivalent (AE) is a bullock of 450-500 kg or a breeder of about 550 kg.

The most difficult period for cattle is usually from September to when the wet season occurs. Cattle numbers may need to be reduced during this difficult period. High stocking rates on properties can cause:

- difficulty in finishing and selling cattle
- early sale of cattle when markets are unfavourable
- early start to supplementary feeding
- increase in deaths
- land degradation.

The original pastures in the Ubobo area were predominantly kangaroo grass with forest bluegrass on the river flats. Good stands of kangaroo grass are still seen in pastures that are lightly stocked. Where moderate stocking rates and regular burning are applied, pastures mainly consist of black speargrass.

Improved pastures should be spelled or lightly stocked for two months in spring to rejuvenate pastures.

Pasture "topping"

The technique of 'topping' has been used successfully on flatter country and especially secondary flats. Carrying capacity has risen through the use of this technique in some paddocks on secondary flats.

To carry out the 'topping' technique a haybine (mower conditioner) is used to regularly cut the pasture to a height of no less than 25-30 cm (10' - 1 ft). The haybine is better than a slasher as it leaves no windrows, and can travel at about 8 kph (5 mph) cutting 2.7 m wide. This technique has led to excellent establishment of siratro and green panic while controlling pitted bluegrass. 'Topped' paddocks give much higher productivity than non-'topped' paddocks.

Burn, slash or mow pastures

Mowing or slashing of improved pastures is recommended where graziers have the necessary machinery. Mower height is important in maintaining pasture vigour. It is preferable not to mow less than 15 cm (6 inches) in height.

Improved pastures should only be burnt when the soil is moist because intense fires during dry conditions do long term damage. Heavy grazing of improved pastures after a burn will also do long term damage to the pasture.

Rotational or continuous grazing methods

Rotational grazing increases the cost of fencing and water supply because more paddocks are required than with continuous grazing. Native pastures are usually continuously grazed. However improved pastures are sometimes grazed in rotation.

Establishment of improved pastures

On flats, the most common method of establishing improved pastures involves two disc ploughings followed by the sowing of suitable species. Producers who have suitable country often grow two or three grain crops before sowing improved pastures.

Pangola grass has been successfully established by distributing runners onto ploughed moist soil. The runners are then pressed into the soil by an offset disc plough with a small amount of 'set' (just off square).

On gentle slopes, contour banks are often used to protect ploughed land when establishing improved pastures. On steep country, participants chisel plough once and hand sow seca stylo and wynn cassia.

Effect of drought on land and pastures

Landowners have seen that in coastal country such as the Boyne Valley, where moderate stocking rates are used, there is often an abundance of long rank grass during droughts. During droughts high stocking rates will cause bare areas.

High stocking rates

High stocking rates can cause land degradation. The first signs are often the appearance of bare patches between areas of grass and/or a change in grass species. For example, (under heavy stocking rates) on some country, forest bluegrass is replaced by blue couch.

Degraded pastures may be treated by removing cattle and planting stylos.

Dry season management

Managing drought involves several measures including the following more important practices.

Supplementary feeding

Producers begin supplementary feeding with weaners and heavily pregnant cows. It is important to start feeding cattle before their condition gets too low.

The most commonly used form of supplementary feeding during a drought is urea and molasses (Table 2). It is fed from a

licker drum or as fortified molasses from an open trough. Urea, molasses and rumen modifiers are fed to weaners.

Urea based commercial blocks are also fed as a supplement in the early part of the drought to breeders (Table 2). Blocks are fed to maiden heifers and steers throughout the drought.

Cattle selling practices

At the start of a drought (when cattle are losing condition rapidly) all fat bullocks, non-pregnant cows and heifers are usually sold.

Fodder storage

Most cattle producers store hay to feed to weaners in dry seasons.

Tree and woody weed management

Areas of dense tree cover are usually 'thinned' because trees compete with pasture growth. The most common method of 'thinning' involves applying Tordon® into cuts to the trunks of trees. In hill country, trees generally require 'thinning' every 10-20 years. Most producers retain good tall straight trees of narrow-leaved ironbark, spotted gum and blue gum for on farm use or for sale. These trees can provide timber for posts, rails logs or sleepers.

Pattern of tree retention

In general, the preference is to have an open woodland-type clearing pattern (where trees have been 'thinned') with clumps of trees (not 'thinned') as cattle camps. Seeds from scattered trees in an open woodland can worsen regrowth problems. There is no standard spacing (or density) between trees to which timber is 'thinned'. All good straight trees of timber value are usually retained.

In hill country of the Boyne Valley, the drying effect of wind is not considered a problem because of the protection afforded by the hills. Belts of trees were therefore not considered necessary to protect pastures against wind. Such belts may cause seedling regeneration for a considerable distance from the belt edge.

Thick stands of gum-topped box left along drainage lines can often cause more erosion than scattered trees. Roots become exposed and water eddies around them, removing soil.

Participants considered that if landowners were to start clearing again they would leave more timber strips on some hilltops.

On flatter country that has been completely cleared of trees (e.g. towards Calliope), some trees are being allowed to regrow.

Timber clearing on slopes

In the past, steep slopes were cleared, but now the type of country and the type of trees is taken into consideration before clearing. In general, producers leave steep gullies uncleared.

Concern was raised that clearing guidelines (e.g. rules that include restricting clearing on land over 20% slope) would not be suitable in the Calliope shire and would make some properties unviable. Clearing or 'thinning' of slopes is considered acceptable if the slopes are well grassed, and the area has no apparent salt accumulation, erosion or pasture degradation.

Carrying capacity depends on the quantity of grass growth and this depends to a large extent on the number of trees that are 'thinned'. Grass cover is maintained on sloping country by reducing the number of trees and by using recommended stocking rates.

'Thinning' of specific type of country

Narrow-leaved ironbark

Most narrow-leaved ironbark country was 'thinned' by ring-barking in the past but now injection with Tordon® is used. Some trees are dozed (cleared) on flat country. Participants leave good straight narrow-leaved ironbark trees but thin other trees such as wattles and bloodwoods. When regrowth is 'thinned' the remaining trees increase in size, providing valuable timber. Producers do not usually recommend stick raking because it can cause erosion.

Silver-leaved ironbark (broad-leaved ironbark)

Nearly all of these trees have been 'thinned' or cleared but some are left for cattle camps. Timber is of no value for fencing.

Bloodwoods

Usually all bloodwood trees are cleared but some are left in cattle camps and along gullies.

Spotted gum

Producers prefer to leave straight trees as an open woodland on better types of spotted gum country. Poorer types of spotted gum country are left uncleared.

Moreton Bay ash

Most Moreton Bay ash trees are cleared because they produce regrowth problems.

Gum-topped box and mahogany

Nearly all of these trees have been cleared.

Fire

Fire is an essential management tool for the grazing industry and is used to remove dead grass (generally black speargrass) and improve the quality of feed available to cattle. Fire is required for the control of lantana and woody regrowth. Some landowners use fire every year but care is required to ensure that these fires are used in moist conditions wherever possible.

A problem can occur where producers do not use regular fires. The quantity of fuel accumulates and a fire can occur at the wrong time. If this occurs after 4-5 years of fuel accumulation, a hot fire will cause damage to trees, pastures and fences. However, very hot fires have been successful in controlling some types of timber regrowth such as mahogany.

Burning usually commences after the beginning of August and during spring in most years. Producers should only burn after rain when there is enough soil moisture to produce new growth. Falls of 50-75 mm of rain in September or October usually are required before paddocks are burnt.

Winter fires should be avoided even after good winter rain. They can cause problems by leaving country bare and vulnerable to erosion until after the first spring rains.

Fires from early January through to late summer are not recommended. Cattle tend to over-graze fresh growth on burnt areas, causing loss of grass cover.

Participants do not burn when feed is in short supply. 'Runaway' fires from neighbouring properties can be a problem during these periods. Relatively large areas in each paddock should be burnt to prevent stock from over-grazing small areas of emerging grasses.

Over-stocking reduces the amount of fuel for fires. It can reduce the frequency of fires and lead to a regrowth problem.

Fences and water

Most fences are inherited and it is considered costly to change current fences. Properties in the district usually have 10-11 paddocks, of 40-810 ha (100-2000 acres) in size.

Paddocks in hill country range from 120-570 ha (300-1400 acres) but 'holding' paddocks around the homestead or yards are much smaller. Producers prevent cattle on hill country accessing river country because they will over-graze the better country. River flats and secondary flats are fenced together. Creek flats and hill country are fenced together to provide access to water.

Stock water is mainly from dams, wells and water holes in creeks and rivers.

Soil quality

A landholder who uses the 'topping' technique and rotational grazing on a legume and grass pasture on secondary flat country has noted considerable improvement in his soil quality over recent years. This improvement has been indicated by increases in productivity, earthworm activity, humus levels, improved soil texture and soil analysis results. Legumes were important for improving soil quality in this situation.

Participants did not know how to assess soil quality without carrying out expensive laboratory tests.

Erosion

Gully erosion is the only erosion type of concern in the Boyne Valley. Gum-topped box and granite country are the most susceptible types of country. The best strategy is to prevent erosion by maintaining

an adequate grass cover. Timing of fires, timber clearing practices and stocking rates are also important management factors.

Landholders have occasionally stabilised gully erosion using contour or diversion banks, filling, grassing and controlling stock access to the eroding gully. Some producers have implemented these practices to save valuable pastures. However, landholders are aware that more work needs to be done on eroding gullies.

Water quality

Landholders are not concerned about the level of chemicals used in the Boyne Valley. They considered that chemicals and pollutants are not affecting river water. However, nitrates have been found in Norton Creek which is surprising. Landholders speculated that this may be the result of natural processes.

The Gladstone Area Water Board regularly tests water from the Boyne River which flows into the Awoonga Dam. It is consistently of high quality. This high quality ensures low filtration costs for the Board.

Usually, all water in the Boyne valley in creeks and bores is of good quality.

Salinity

This is not a major problem in the Boyne River catchment. However, participants were aware of a salinity problem in a small area. This problem occurred during wet seasons over several years but is more noticeable in dry times.

Pests

Lantana

This is a major problem in the Boyne Valley, and there is no satisfactory method of control. Fire and Roundup® are the main methods of control. Control options are:

- hot fires
- 0.75% Roundup® spray, spraying all green leaves when plants are growing well; follow up with spot spraying.
- 2,4-D sprayed on the base of plants
- 2,4-D plus atrazine - wet bush and base of plant.

Creeping lantana

This is a problem on hills or where areas are over-stocked. Roundup® spray can be used as a control method.

Rubber vine

This is becoming a major problem in the Calliope Shire in areas outside of the Ubobo area. This weed is increasing rapidly at Bracewell and in the Calliope River Valley. It has become much worse in the last 20 years. It is not considered as troublesome in the Ubobo area as lantana, but has the potential to be a serious problem.

Control options are the use of Tordon® or 2,4-D sprays.

Cat's claw

This is becoming a large problem in parts of the Boyne Valley and is causing loss of flora in rivers and creeks.

Participants considered a coordinated catchment management approach to the control of some types of weeds (e.g. rubber vine and cat's claw), however they had reservations about its effectiveness.

Giant rat's tail

It can still be controlled in this area, but control methods require more testing.

Mother-of-millions

Not a major problem in the Boyne Valley. A control method is the use of 2,4-D spray

Noogoora burr

Control options are:

- 2,4-D spray
- pull it out
- if left, rust may control it.

Parthenium

Control options are the use of Atrazine or Roundup® sprays.

Poison peach

Control options are to pull it out or apply Tordon®.

Zamia

This plant is a problem if left unchecked. There are two types, one grows into a tree and produces nuts (tree zamia), the other is low growing and produces fruit similar to a pineapple (pineapple zamia). Control options are:

- pour 1 eggcup full of power kerosene into the heart of the plant.
- application of Tordon®.

Black wattle

Control options are:

- annual fire in moist conditions to stunt growth
- application of Tordon®.

Trends

Beef production has risen with the introduction of Brahman-type cattle, the use of herbicides to kill trees and the establishment of improved pastures.

The subdivision of properties into small holdings has increased the incidence of over-grazing and land degradation.

Fauna and flora conservation

Landowners perform an important role in conservation and their help should be gained through cooperation. Some of the less productive areas should be left as flora and fauna reserves.

Flora

Red cedar, burdekin plum and lilly pilly need protecting.

Fauna

Participants consider that red bellied black snakes, grey kangaroos, green frogs and echidnas are increasing in numbers. Generally there has been an increase in wildlife.

A couple of native cats with white spots have been sighted lately.

Concern over flora and fauna populations was minimal.

Current and recommended property sizes

Current property sizes depend mainly on the proportion of land-types on the property. Properties range from 400-1210 ha (1000-3000 acres) on river flats, through to 2800-8100 ha (7000-20 000 acres) on hill country (Table 2).

The herd size and area required to raise a family with school age children and to sustain land for beef production is 800 head of mixed cattle on 2800 ha (7000 acres) (Table 2). A property of this size would have to be debt free and have the improvements described for a typical property. A property located entirely on secondary flats requires a living area of 2000-2400 ha (5000-6000 acres) and a property on hill country requires 4000-4800 ha (10 000-12 000 acres).

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Further information

Further information may be obtained from:

The Calliope Soil Conservation Association
PO Box 80
Calliope Q 4680.

The Department of Primary Industries in Gladstone, Biloela and Rockhampton.

Table 1. Land-types and their management in the Ubobo area.

Land-type % of area	Enterprises	Recommended stocking rate	Improvements	Constraints
Flats 10%				
River flats	Breeding/fattening	1 AE/2 ha (4 acres)	Cleared	Weeds
Secondary flats	Breeding/fattening	1 AE/2-2.5 ha (5-6 acres)	Cleared/chemical treatment or 'rung'	Few weeds or woody weed regrowth. Erosion on 'hard box'
Granite 3%	-	-	Cleared	-
Hill country 87%	Breeding/steers (15 mths - 2 ½ yrs)	1 AE/4 ha (10 acres)	Chemical treatment or 'rung'	Lantana, woody weed regrowth
	Breeding/steers (15 mths - 2 ½ yrs)	1 AE/4-20 ha (10-50 acres)	Uncleared	Lantana, woody weed regrowth

* AE = Adult equivalent

Table 2. Property and animal management data for the Ubobo area.

Category	Data
Breeds	$\frac{1}{2}$ - $\frac{3}{4}$ <i>Bos indicus</i> (Brahman type)
Bull % (Brahman type)	4-5%
Bull % (British type)	3%
Cull bull age	8 years
Cull cow age	11 years (Brahman types) 9 years (British types)
Mating system	Year round or seasonal
Reproduction rates	75%
Weaning age	6-7 months
Turn-off weight/age	Bullocks 620 kg liveweight 'Jap ox' at under 3 $\frac{1}{2}$ years
Herd health procedures	
Leptospirosis ('lepto') vaccination	Breeders
Three day sickness vaccination	Bulls
Blackleg vaccination	-
Death rates	Less than 1%
Supplements	
All cattle	Urea based supplement in dry season
Cows	Phosphorus supplement on hill and box country
Actual property sizes	
Range	400-8100 ha (1000-20 000 acres)
Recommended living area/herd size	
Area	2800 ha (7 000 acres)
Animals	800 mixed cattle

Addendum 1. Plant names.

Common names	Botanical names
Applewood.....	<i>Angophora floribunda</i>
Black speargrass	<i>Heteropogon contortus</i>
Black wattle	<i>Acacia</i> spp.
Bloodwood	<i>Eucalyptus</i> spp.
Blue couch	<i>Digitaria didactyla</i>
Blue gum.....	<i>Eucalyptus tereticornis</i>
broad-leaved ironbark.....	<i>Eucalyptus melanophloia</i>
Brush box.....	<i>Lophostemon confertus</i>
Burdekin plum.....	<i>Pleiogynium timorense</i>
Callide Rhodes grass.....	<i>Chloris gayana</i> cv. <i>Callide</i>
Cat's claw.....	<i>Macfadyena unguis-cati</i>
Corkwood wattle.....	<i>Acacia bidwillii</i>
Creeping lantana	<i>Lantana montevidensis</i>
Fine stem stylo	<i>Stylosanthes guianensis</i> var. <i>intermedia</i>
Forest bluegrass.....	<i>Bothriochloa bladhii</i>
Giant rat's tail grass	<i>Sporobolus pyramidalis</i>
Green panic	<i>Panicum maximum</i> var. <i>trichoglume</i>
Gum-topped box	<i>Eucalyptus moluccana</i>
Ironbark	<i>Eucalyptus</i> spp
Kangaroo grass	<i>Themeda triandra</i>
Lantana	<i>Lantana camara</i>
Lemon scented gum	<i>Eucalyptus citriodora</i>
Lilly pilly.....	<i>Syzygium</i> spp.
Lucerne	<i>Medicago sativa</i>
Mahogany.....	<i>Lophostemon suaveolens</i>
Moreton Bay ash.....	<i>Eucalyptus tessellaris</i>
Mother-of-millions	<i>Bryophyllum tubiflorum</i>
Narrow-leaved ironbark.....	<i>Eucalyptus crebra</i>
Noogoora burr	<i>Xanthium pungens</i>
Pangola grass	<i>Digitaria decumbens</i>
Parthenium.....	<i>Parthenium hysterophorus</i>
Pineapple zamia	<i>Macrozamia miquelii</i>
Pitted bluegrass	<i>Bothriochloa decipiens</i>
Poison peach	<i>Trema tomentosa</i>
Red cedar	<i>Toona australis</i>
Rubber vine	<i>Cryptostegia grandiflora</i>
Seca stylo	<i>Stylosanthes scabra</i> cv. <i>Seca</i>
Setaria.....	<i>Setaria sphacelata</i>
Silver-leaved ironbark	<i>Eucalyptus melanophloia</i>
Siratro.....	<i>Macroptilium atropurpureum</i>
Spotted gum	<i>Eucalyptus citriodora</i>
Supplejack	<i>Lophostemon confertus</i>
Wattles	<i>Acacia</i> spp.
Wynn cassia.....	<i>Cassia rotundifolia</i> cv. <i>Wynn</i>
Zamia, tree.....	<i>Cycas media</i>

Addendum 2. Native Pasture Communities map.

QUEENSLAND
DEPARTMENT OF PRIMARY INDUSTRIES

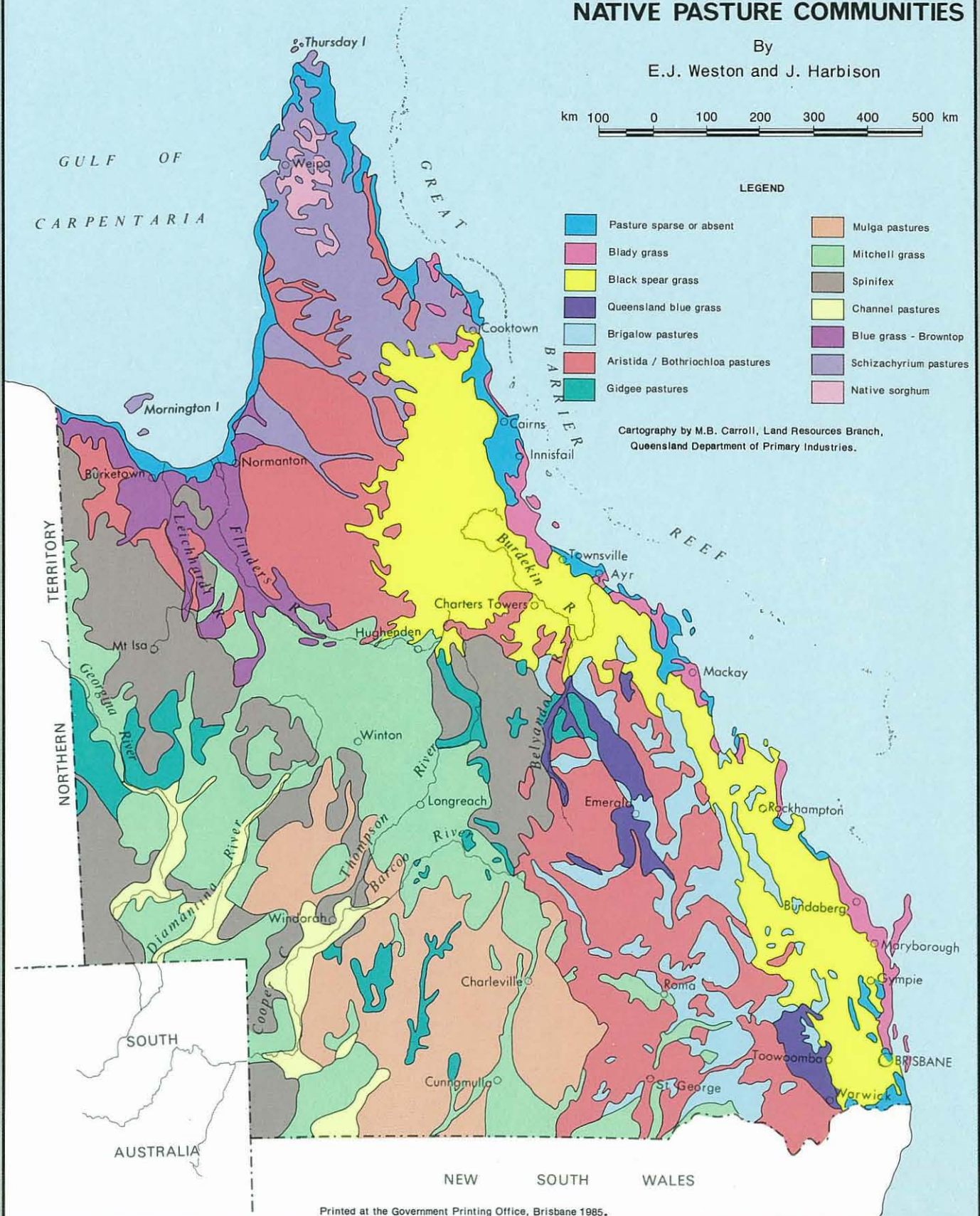
NATIVE PASTURE COMMUNITIES

By
E.J. Weston and J. Harbison

km 100 0 100 200 300 400 500 km

LEGEND

- | | |
|--|--|
|  Pasture sparse or absent |  Mulga pastures |
|  Blady grass |  Mitchell grass |
|  Black spear grass |  Spinifex |
|  Queensland blue grass |  Channel pastures |
|  Brigalow pastures |  Blue grass - Browntop |
|  Aristida / Bothriochloa pastures |  Schizachyrium pastures |
|  Gidgee pastures |  Native sorghum |

Cartography by M.B. Carroll, Land Resources Branch,
Queensland Department of Primary Industries.

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