

# Fire as a management tool in the semi-arid tropics

## A case study from Charters Towers, Queensland

This case study is not meant to be the definitive version of how and when to burn.

However, it is the result of 83 years of experience at Trafalgar Station, and this experience enabled the property to come through the last drought in good shape. The decision to stock conservatively, to spell paddocks, and to burn when it is sensible to do so, have proved to be good pasture management for the property.

### **Roger Landsberg, Manager, Trafalgar Station**

Trafalgar Station is a 32,000 ha property in the Charters Towers district with a large proportion of phosphate deficient yellow-earth soils. Three large creeks run through the property and are flanked by richer alluvial soils. Approximately 25 per cent of the property is timbered with Blackwood (*Acacia argyrodendron*) and Gidgee scrub (*A. cambagei*) growing on brown cracking clays that are higher in phosphate than the yellow earths.

The remainder of the country is predominantly Box and Iron bark forest country, with a wide variety of eucalypts along the watercourses. Wattle, Quinine and other undesirable Acacias grow on the ridge country.

The most common natural perennial grasses include Desert Mitchell grass (*Bothriochloas ewartiana*), Queensland Bluegrass (*Dichanthium ericeum*), Black Spear grass (*Heteropogon contortus*), Kangaroo Grass (*Themeda triandra*), White Spear grass (*Aristida calycina*) and Golden Beard Grass (*Chrysopogon fallax*).

There are also improved pastures in an on-going pasture development program on Trafalgar. The species used are Buffel grass (*Cenchrus ciliaris*) and Sabi grass (*Urochloa mosambicensis*) sown into cleared Acacia scrub and Seca and Verano stylos (*Styloanthes* sp) oversown into native pastures. The property can

sustainably carry around 3200 head of cattle. Fire, after clearing the land, is used as part of the pasture management program on Trafalgar to control certain weeds and to encourage better species of grasses in their place.

### **Pasture management and role of fire**

The current pasture management policy is to 'lock up' or 'spell' 15-20 per cent of the property each year. This is helped by the large number of paddocks on Trafalgar as well as a large investment in fencing.

The primary purpose of spelling is to allow a good establishment of seed so that the more desirable species of grasses are able to compete better with the other opportunistic species. Good grass cover helps to control erosion. This build up of pasture also allows for three more options: fire, a 'fresh' paddock for weaners or maiden heifers, and drought mitigation.

A systematic woody weed control program relies on fire, as well as chemical, mechanical and biological control. The whole pasture management system aims to be in balance with nature conservation, yet still providing for the overall aim of beef production.

### **Paddock spelling**

Selection of paddocks for spelling is based on the following criteria:

- Paddocks where pasture composition needs improving; too much of the undesirable species;
- Paddocks with a high weed infestation;
- Paddocks needing erosion control;
- Paddocks in preparation for sowing of Stylos;
- Paddocks to the 'fresh' paddock for weaners or maiden heifers;
- Paddocks where there is pulled timber, cleared paddocks;
- Total area to be between 15 and 20 per cent of the property. The number of paddocks spelled thus depends on their size. For

### **Do's and don'ts when managing with fire**

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| <b>Do</b>    | plan to burn every year, even if there has not been a wet season                 |
| <b>Do</b>    | obtain a permit, notify the neighbours and get their assistance and prepare well |
| <b>Do</b>    | wait for the right conditions on the right day                                   |
| <b>Do</b>    | follow up burning exotic woody weeds with chemical control                       |
| <b>Don't</b> | skimp on the preparations  |
| <b>Don't</b> | waste the grass by burning on the wrong day under the wrong conditions           |
| <b>Don't</b> | stock the paddock until the pasture is well established                          |



example; 15–20 per cent of 32,000 ha is 5000–6000 ha. This could therefore be two or three small paddocks or one large one.

The other factor that plays a large part in paddock spelling is the duration and quality of the wet season. This will influence whether or not a paddock is spelled for the whole year (good wet season) or only part of the year (poor wet season). Also, it means that the paddock may not be burnt to help mitigate drought, or it may be burnt later on. The exceptions to these rules are paddocks that have been locked up after clearing of virgin scrub—they are always burnt and allowed a full growing season before being grazed.

### Fire management

Burns are usually conducted in October–November when it is hot, slightly humid and the winds are fairly light. A northerly wind is preferred, as these are usually moist. Hot, dry winds tend to move the fire along too quickly burning the grass, but not the weeds or fallen timber.

Firebreaks are placed around the paddock. Burning from the firebreak in towards the middle creates a vacuum in the centre which draws the fire, making its own winds and encouraging a ‘hot’ fire.

It is particularly important that the burn is conducted in the right conditions. Burning in the wrong conditions—when the sky is overcast, or the winds in the wrong quarter or with winds that are too light—wastes the fuel and ensures that the goals of the fire are unlikely to be met.

The final part of fire planning is post-fire management.

Stock should be excluded until ground cover is well established, preferably after good rain. The standard practice at Trafalgar Station is to sow *Stylos* (*Stylothantes* sp) and grasses into the ash bed three to four weeks after the fire and before the first rains. This means that burning may be closer to the beginning of October than the end of November.


### Fire for woody weed control

Fire is effective against some weeds burnt under the right conditions, but less so on other weeds. Following is an outline of particular species’ fire resistance:

- **Native weeds such as Currant Bush (*Carisa ovata*).** Burns very well once started even with low grass fuel. Fire may not kill the adult plant, however, it is an effective control agent, setting the plant back many years and allowing the grass to re-establish.
- **Flannel weed (*Sida cordifolia*) and *Sidas* spp.** Fire is effective in controlling both these plants and, depending on the fuel load, can kill a high percentage.
- **Rubber vine (*Cryptostegia grandiflora*).** The most effective way of controlling both dense and light infestations is with fire. This plant can support a fire without additional fuel load, although climatic and environmental conditions must be extremely hot and the sap very active in the plant. Thus, with a heavy grass fuel load, a light wind, slightly moist ground and/or atmosphere, a burn will kill up to 80 per cent of rubber vine, especially if they are smaller plants.

**Table 1: Estimates of lost production from spelled paddocks**

Foregone Situation	Calculation	Total Loss
Agistment	\$1.20/head for 52 weeks=\$62.40/head/year	\$6240 or \$6.24/ha
Breeder production (weaners)	Calculation is based on 70% weaning rate and weaners sold at weaning 100 head x 70% = 70 head 70 head sold at \$220/head	\$15,400 or \$15.40/ha
Steer production	Calculation is based on a liveweight gain of 0.4 kg per day over one year at \$1.10/ kg. 100 head x 0.4 kg x 365 days =14 600 kg 14 600 kg x \$1.10	\$16,060 or \$16.06/ha
Do-nothing scenarios	Reclearing cleared land 1 000 ha pulling suckers at 40 ha per hour = 25 hours work 25 hours x \$250 per hour	\$6250 or \$6.25/ha
Chemical weed/ timber control	Cost depends on the intensity of infestation, the chemical used and the application methods used	Between \$8.00/ha–000’s/ha

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- **Eucalypt seedlings or suckers.** Fire plays a significant part in control in the open forest environment where it is used regularly. However, in a cleared environment, after the initial burn, burning in later years is a waste of grass as the suckers tend to regrow within two weeks of the fire going through.

### Costs of burning

Fire is often quoted as a cheap option for pasture and land management. The direct costs of setting up fire breaks, getting the right equipment and personnel and the actual burning may be quite small on a per hectare basis, but locking up a paddock and burning it is definitely not a cheap option. The cost of locking up a paddock results from the lost potential production. Some examples are outlined in Table 1, on the preceding page, for 1000 ha paddocks, giving estimated production lost. Stocking rates are based on 1 beast per 10 ha/year. Therefore, 1000 ha stocked with 1 beast:10 ha produces 100 head. Other costs, such as reclearing regrowth and weed and timber control are the ‘do-nothing’ scenarios, which are also explored.

**Don't be afraid to light the match!**

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