

TRIAL TO DETERMINE THE EFFECTIVENESS OF A KANGAROO DRAFTING RACE AT TOTAL GRAZING MANAGEMENT TRAPYARDS

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Abstract

A race designed to draft kangaroos off from entering Total Grazing Management (TGM) trapyards was trialed at Callagiddy and Winderie Stations in the Gascoyne region. Time-lapse video recording equipment was used to monitor animal movement through the race from dusk through till dawn for ten nights. Results were inconclusive: No kangaroos passed through the race, though a large number of goats and sheep successfully used the race without triggering the kangaroo drafting switch. It was concluded that more trials were needed during hot and dry weather, and that animals should be trained with the race for a period of weeks before further monitoring was undertaken. Additionally, the trial provided some useful information on the behaviour of sheep and goats around TGM trapgates and also demonstrated the high value of video recording equipment for animal monitoring.

1. Introduction

Background

The Total Grazing Management project at Agriculture Western Australia began in 1995 and continues at present. The primary aim of the project is to develop and implement strategies to improve animal management on pastoral properties in the Southern Rangelands in Western Australia. Central to the Total Grazing Management (TGM) project is a permanent trapyard system, targeted at all waters on station properties. These permanent trapyards consist of the following:

- Drafting, loading and holding facilities, to enable animal management activities like marking, mulesing and weaning to occur on site.
- Circular construction using durable materials, to aid with animal handling and yard durability.
- Permanently set trapgates, with entry and exit spears.

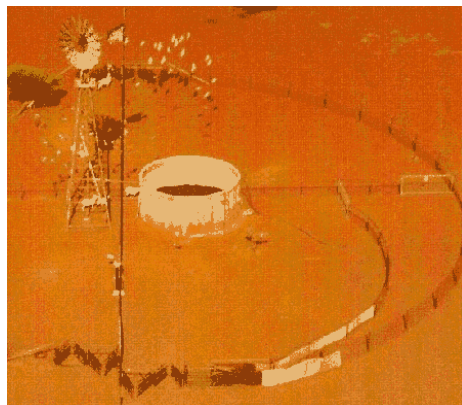


Figure 1: Total Grazing Management permanent trapyard.

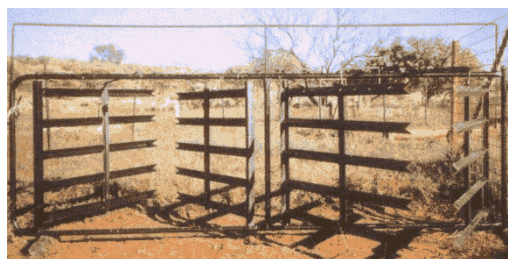


Figure 2: Total Grazing Management trapgates, with entry and exit spears.

Approximately 90% of permanent water sources in the Southern Rangelands are man-made (Cribb 1990). By controlling animal access to water, TGM trapyards provide managers with much greater control over grazing animals, primarily through the capacity for self-mustering. Self-mustering occurs

by training stock to permanently access water through trapgates. Capturing animals is then simply a matter of closing the exit spear on the trapgate. Effective self-mustering, when compared to conventional mustering by air and motorcycle, results in higher mustering percentages, lower long term mustering costs and improved returns.

TGM trapyards have been put in place 61 stations in the Southern Rangelands, and have been successful in improving the management of cattle, sheep and goats. TGM yards have been particularly effective in harvesting feral goats.

Total grazing pressure

Cattle, sheep and goats however, are not the only animals grazing in the Southern Rangelands. Kangaroos in particular comprise a large component of total grazing pressure (Hacker & Freudenberger 1997, Wilson 1991). Their numbers have increased with the development of man made waterpoints. Kangaroos have a significant capacity to degrade certain land systems when in large numbers, particularly the mulga shrublands, chenopod shrublands and tussock grasslands (Norbury *et al* 1993, Short *et al* 1996). The effect of kangaroo grazing can be particularly harmful in sensitive areas or paddocks that have been destocked. In these paddocks, kangaroo grazing impedes accumulation of annual and perennial grass biomass, and pasture species diversity. In addition, there is an animal welfare issue with kangaroos becoming trapped in TGM yards and harming themselves.

A number of methods have been developed to control kangaroo numbers in the Rangelands, including electric fencing and the Finlayson trough designs (Brooke 1995, Norbury 1992). These methods have had varying degrees of success. For example, the Finlayson trough has been effective in controlling kangaroos, but significant numbers of sheep have also been electrocuted, and the system is not robust enough for cattle. More effective systems for managing kangaroos are the focus of the current trial.

The TGM drafting race attempts to prevent kangaroos from entering trapyards. Placed at the mouth of the entry spear, the race was designed for kangaroos to trigger a switch that drafts them out of the trapyard, while cattle, sheep or goats avoid the switch and are drafted to the water. A technical description of the race is provided in section 2 below.

Trial Objectives and hypothesis

The primary objective of this trial was to:

- Determine the effectiveness of the TGM drafting race in selecting kangaroos from other stock at TGM trapgates.

Consequently, the trial sought to test the following hypothesis: *The drafting switch will be triggered by kangaroos only.*

There were also a number of important secondary objectives. These were to:

- Observe the behaviour of other station animals with regard to their use of TGM trapgates and drafting race. These animals included sheep, goats and emus.
- Evaluate the usefulness of time-lapse video recording in pastoral monitoring programs.

2. Methods

Site selection

The criteria for choosing a trial site were as follows:

- The site had to have a TGM trapyard with TGM trapgates in place.
- There had to be evidence (tracks and droppings) of Kangaroos watering at the trapyard, and;
- The site had to be relatively easy accessibility from the Carnarvon AgWest office.

For these reasons, Callagiddy Station approximately 50 kilometres south east of Carnarvon, was chosen for the trial site. Additionally, Winderie Station, 110 kilometres to the south east of Callagiddy, was selected as an alternative trial site.

Materials

In addition to the TGM trapgates, there were two essential pieces of equipment used in the trial. Firstly, the drafting race itself. This was constructed from steel tubing, with a two-way drafting gate at one end. The entry of the race contained a switch, located in a piece of square steel tubing attached to the floor of the race, which would be avoided by sheep, goats and cattle, but which could not be

avoided by the long feet and tail of kangaroos. At this stage of the trial, the objective was primarily to monitor the success with which this switch mechanism worked to select kangaroos only; ultimately the switch could be connected to the drafting gates, enabling kangaroos to be drafted off as they entered the race. The race was placed directly at the opening of the entry spear of the TGM trapgate.



Figure 3: TGM kangaroo drafting race, end view.



Figure 4: TGM kangaroo drafting race and video monitoring equipment.

Secondly, time-lapse video recording equipment was used to record activity through the race. A Sony SVT-124P Time-Lapse Video Recorder and an IVEC Video Lens were used to do this (see Figure 4). Because kangaroos favour the late afternoon and early morning timeslots for drinking, recording had to be possible without light. An infra red light source was used to overcome this problem, which was attached to the video lens. The added benefit of the infra red light source was that it was invisible to kangaroos and stock.

Timeframe

Initially, the video recording equipment was set up to record all night (from 17.00 hours till 08.00 hours the following morning) for the 30/31 May and the 31/1 June. This was done to check if any activity was observed through the race during the night. As no activity was observed during the middle of the night, recording was set for the dusk and dawn periods only (17.00-21.00 and 04.00-08.00) from the night of the 1st of June through to the night of the 8th of June.

Monitoring procedure

There were three stages to the monitoring procedure. These were:

1. Collect and change videotapes daily from the trial sites.
2. Observe videotapes and record kangaroo and other animal behaviour.
3. Record the number of times the switch was triggered by kangaroos.

3. Results

All video data was observed and edited. The edited version is available on one videotape. These results are summarised in Table 1 below.

Table 1: Results from Kangaroo drafting race trial.

Date	Recorded time	Location	Observations
30-31 May	17:00 – 08:00	Callagiddy	17:44 Sheep milling around t/gates Reluctant to go through race Sheep/goats exiting through exit spear well 18:22 Goats go through race Goats enter through exit spear 07:08 Sheep approach t/gates – reluctant to go through race Drafting switch not triggered
31-1 June	17:00 – 08:00	Callagiddy	17:55 Sheep use out spears Will not use race 18:02 Goats use race Drafting switch not triggered
1-2 June	17:00 – 21:00. 04:00 – 08.00	Callagiddy	18:26 Goats use race 18:30 Goats use race 06:32 Goats use race Drafting switch not triggered
2-3 June	17:00 – 21:00. 04:00 – 08.00	Callagiddy	06:44 Sheep will not use race. After long period some sheep use race Drafting switch not triggered
3-4 June	17:00 – 21:00. 04:00 – 08.00	Callagiddy	Drafting switch not triggered
4-5 June	17:00 – 21:00. 04:00 – 08.00	Callagiddy	18:37 Goats moving in and out of t/gates Drafting switch not triggered
5-6 June	17:00 – 21:00. 04:00 – 08.00	Callagiddy	17:50 Sheep reluctant to use race 18:01 Goats block sheep from using race Drafting switch not triggered
6-7 June	17:00 – 08.00	Callagiddy	11:55 2 Kangaroos approach t/gates, hang around and then leave Drafting switch not triggered
7-8 June	17:00 – 21:00. 04:00 – 08.00	Winderie	13:05 Kangaroos check out t/gates, then leave Drafting switch not triggered
8-9 June	17:00 – 21:00. 04:00 – 08.00	Winderie	Drafting switch not triggered

Significant results

- Perhaps the most significant result of the trial was that no kangaroos used the drafting race, either at Callagiddy or at Winderie stations. And, the drafting switch was not triggered at any time during the trial.
 - At the Callagiddy site, no kangaroos were observed at all.
 - At Winderie, a number of kangaroos were observed 'sniffing out' the trapgates. They did not appear to be particularly thirsty or eager to access water. They did not pass through the race, rather they investigated the area then left.
- A considerable amount of video evidence of the movement of sheep and goats through the trapgates and race was collected.
 - Sheep used the exit spear very well: They did not attempt to enter through it and they exited through it regularly. Sheep often approached the entry spear, but appeared hesitant or even unwilling to pass through the race. Indeed, most sheep that approached the entry spear did not pass through the race.
 - Goats used the trapgates well in general. They were less hesitant to walk through the entry spear and the race, though a small number appeared unfamiliar with it at first. All goats

leaving the trapyard did so through the exit spear. A number of goats however, particularly small nannies and kids, entered through the exit spear.

- Those sheep and goats that did pass through the race did not activate the drafting switch.
- The time-lapse video recording equipment appeared to work well in monitoring animal movement overnight. Animals did not appear to be stressed with the presence of the equipment.

4. Discussion

Testing the hypothesis

Because of the lack of data of kangaroos passing through the drafting race, the hypothesis that *the drafting switch will be triggered by kangaroos only* could not be fully tested. However, a large number of goats, and a smaller number of sheep, did pass through the race without activating the drafting switch. This suggests that the hypothesis was proven correct in part; it demonstrated that animals other than kangaroos did not activate the drafting switch. Further trials may be required to determine the ability of the drafting switch to be triggered by kangaroos.

Lack of kangaroo data

There are a number of possible explanations for the lack of kangaroos observed passing through the drafting race. Firstly, the weather at the time of the trial was mild. This may have reduced the need for kangaroos to access permanent water sources. Ideally, hot and dry weather conditions would be optimal for the trial, as kangaroos would be more dependant on water sources in trapyards and thus would need to use the race more frequently.

Secondly, the drafting race may have been unfamiliar to kangaroos and thus put them off from using it. Previous research has shown that kangaroos are shy animals, particularly when compared to goats, cattle and sheep (Hacker & Freudenberg 1997). This being the case, a period of training before videotaping occurs may be required to increase familiarity with the equipment.

Thirdly, the TGM trapgates at the Callagiddy site had to be set to the operational position at the beginning of the trial. This means that the trapgates were not set permanently before the trial. Therefore, animals during the trial would have had to become familiar with two new pieces of equipment: The TGM trapgates and the drafting race. Again, this may have led to a degree of unfamiliarity for the animals, and could have put them off from using the equipment. For the trial to achieve optimal results, all animals need to be trained with the use of the entry and exit spears and with the drafting race before trial recordings begin.

Goat and sheep data

A great deal of useful information regarding the behaviour of goats and sheep was obtained from the current trial. It became clear from video recordings that sheep are generally more timid than goats when it comes to using new equipment such as the drafting race. A small proportion of the total number of sheep that came up to the entry spear actually went through it and passed through the race. Conversely, most goats that approached the entry spear ended up passing through the race. This would suggest that sheep require a longer training period than goats.

It was also observed that the TGM trapgates, at the width settings used during the trial, were more effective for sheep than for goats. Approximately 75 sheep left the trapyard through the exit spear, and they appeared to be very familiar with the trapgates. Furthermore, not a single sheep entered the trapyard through the exit spear, though a number of goats did. Similarly, no sheep left the trapyard through the entry spear though a number of goats did so. A possible remedy for improving the efficiency of goat trapping would be to narrow the width setting on the trapgates.

Video monitoring equipment

The combination of time-lapse video recording and infra red lighting appeared to work well in successfully monitoring animal activity through TGM trapgates. Video monitoring has a number of advantages over physical observation including:

- High degree of accuracy. Observer error is avoided (eight hour all night shifts can lead to fatigue and error).

- Low degree of interference. The presence of humans can often upset stock and other animals, thus changing their normal behavioural patterns. The video monitoring gear is relatively compact and unobtrusive.
- Lower long term running costs. Using video equipment frees up staff to complete other tasks.

However, the current trial found that the infra red light beam was a little too narrow. It would be useful to have a wider beam so that the activity of animals a short distance from the trapgates could also be monitored.

5. Conclusions

The following conclusions emerged from the current trial to determine the effectiveness of the TGM drafting race:

1. The animals to be observed, whether they be kangaroos, goats or sheep, must be well trained in using TGM infrastructure before accurate monitoring can take place. This requires trapgates at the trial site to be set at the operational position all year round, and for the drafting race to be positioned at the trial site for a period of weeks before monitoring is undertaken. If animals are not trained, then the accuracy and efficiency of video recordings is reduced.
2. More research is required to obtain meaningful data on how kangaroos use the drafting race. Though it was found that sheep and goats do not trigger the drafting switch, data from kangaroos is required to completely test the hypothesis. The best conditions to do this would be during hot and dry weather, when the animals are most dependant on water.
3. This type of trial presents a great deal of useful information regarding the behaviour of sheep and goats with regard to TGM trapgates. Data demonstrates ways that TGM infrastructure may be improved.
3. The video monitoring equipment is, in general, successful in monitoring the trapgates. It is recommended though, that a wider infra red beam be used in any future trials.
4. In order to maximise the efficiency of goat trapping, it may be useful to set the TGM trapgates at a narrower setting, then monitor the results. This may reduce or eliminate the ability of goats to move through trapgates the wrong way (for example, to enter through the exit spear or vice versa). The effect the narrower settings have on sheep and kangaroos would also need to be monitored.

On the basis of this trial, it is evident that more research in the area would be useful. This is particularly true if the recommended changes are adopted.

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