

A COMPARISON OF FEEDLOT BUNK MANAGEMENT STRATEGIES AND THEIR INFLUENCE ON CATTLE PERFORMANCE AND HEALTH

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SUMMARY

Four bunk (feed trough) management regimens were compared to evaluate their effect on feedlot cattle performance and health. These were: 1) *ad lib.* feeding with four feeds per day, two morning and two afternoon/evening; 2) *ad lib.* feeding with one morning feed; 3) one evening feed, clean bunk at 1200 hours; and 4) two feeds per day, divided into proportions of 30% morning and 70% afternoon, clean bunk at 1200 hours. Treatments 3 and 4 significantly reduced feed wastage ($P < 0.001$) and feed costs on a \$/head/day basis ($P < 0.05$) compared to *ad lib.* feeding during the summer period. Differences between actual feed intake, daily gain, feed conversion, morbidity and carcass assessment were non significant between the different feeding regimens. Cattle feeding activity closely followed natural feeding peaks at sunrise and sunset with minimal feeding activity during the middle part of the day. The feeding proportions and timing of deliveries of Treatments 3 and 4 contributed to the lower cost of feeding and comparable performance to *ad lib.* feeding during the summer period.

Keywords: beef cattle, bunk management, feedlot, feeding activity.

INTRODUCTION

The method by which feedlot cattle are fed (ie time animals assessed, quantity allocated within a day and feed delivery) has direct implications for production cost and the ability of animals to meet market specifications. Traditionally, *ad lib.* feeding has been a preferred method of feeding cattle (ie animals assessed and feed allocation made during the morning and feed delivery throughout the day). However, large fluctuations in feed intake occur, predisposing animals to digestive disorders (Slyter 1976). Problems associated with *ad lib.* feeding are increases in feed wastage and in equipment requirements (Hicks *et al.* 1990). Feeding strategies that reduce daily variation in dry matter intake have been shown to significantly lower production cost and improve feedlot cattle performance (Eng 1995).

Increasing feeding frequency has been a strategy used to stimulate feed intake (Gibson 1981) and stabilise rumen fermentation (Bragg *et al.* 1986), but this is associated with increased labour and machinery costs (Goetsch and Gaylean 1983). The response to feeding frequency is dependent on regularity of feed delivery and natural animal feeding activity. Natural feeding activity is closely related to photoperiod, with peaks in activity stimulated by sunrise and sunset (Gonyou and Stricklin 1984). In the middle part of the day most animals rest and ruminate (Vasilatos and Wangness 1980) with little feeding activity (Ray and Roubicek 1971). A 'clean bunk management strategy' is based on animals consuming all feed from bunks at least once per day, with feed remaining as an indicator of feed required for the following 24 hours. This strategy aims to minimise daily intake variation through providing appropriate quantities of fresh feed that is synchronised with the animals natural peaks in feeding activity (Doyle 1994). The provision of two feeds per day in proportions that meet natural feeding activity, (ie two hours peak feeding activity during 0500-0900 hours and six hours low feeding activity during 1400-2000 hours), with feed bunks devoid of feed through the middle part of the day. This strategy provides greater opportunity for animals to maintain feed intake during summer period when environmental stress (Hahn 1995) compromises animal performance and health.

This experiment compared various feeding strategies on performance, production cost, health status and evaluated consistency of feed intake during a spring and summer period (October to February).

MATERIALS AND METHODS

Cattle

Six thousand Hereford and Hereford cross steers were assigned to the trial. Animal weight at entry averaged 430kg, and they were to be fed for 150 days. Animals were sorted into lots of 250 head, receiving similar introductory treatment.

Treatment allocation

Cattle in trial pens were group weighed after 30 days on feed which was used as trial 'in weight' with animals averaging 465kg. The four treatments (summarised in Table 1) contained six replicated pens of cattle. Treatment pens were randomly allocated and located in the same area of the feedlot with health monitored by the same 'pen riders'.

Table 1. Bunk management treatments

	Treatment			
	1	2	3	4
Strategy	<i>ad lib.</i>	<i>ad lib.</i>	clean bunk	clean bunk
Number of feeds per day	4	1	1	2
Feed times (hours)	0800, 1000, 1200, 1630	0500	1400	0600, 1230
Feed proportion	25:25:25:25	100	100	30:70
Allocation time*	morning before first feed	morning before first feed	midday	midday

* The allocation refers to estimating the amount of feed required for the pen for the next 24 hours

Feeding and feeding costs

Animals were fed a barley based diet. A minimum of 10 cm of feed was maintained in bunks for cattle on *ad lib.* treatments. Prior to feed allocation of *ad lib.* Treatments, orts (uneaten feed) were removed. Only spoilt feed was removed from clean bunk treatments. Orts were removed from treatment bunks, weighed, and tested for dry matter. Feeding cost was determined by the quantity of feed delivered to bunks, removed from bunks, number of times bunks required cleaning, and number of feed deliveries.

Health

Cattle removed for health reasons or death were recorded by date and diagnosis. A necropsy was performed on animals that died.

Feeding behaviour

Feeding behaviour was recorded twice during 30 to 100 days on feed, and twice after 100 days on feed. Treatment pens were chosen randomly for each assessment. The number of cattle at the bunk and number actually consuming feed were recorded on an hourly basis from 0300 to 2200 hours.

Kill

Animals were weighed in groups on despatch from the feedlot to determine final live weight of each pen. Carcass information was recorded at the abattoir on an individual animal basis.

Statistical analysis

Pen data were analysed using one-way AOV.

RESULTS

The frequency with which feed bunks required cleaning was significantly greater ($P < 0.001$) for *ad lib.* treatments than for clean bunk treatments. Both *ad lib.* treatments resulted in significantly higher ($P < 0.001$) feed wastage on a dry matter basis than clean bunk Treatments 3 and 4. Greatest feed wastage occurred with Treatment 1. High feed wastage and cleaning frequency associated with *ad lib.* treatments resulted in significantly ($P < 0.05$) higher feeding costs for *ad lib.* Treatments 1 and 2. Feed wastage, frequency of cleaning, cost of feeding and other relevant results are summarised in Table 2.

The pattern of feeding activity described in Figure 1, shows that initiation of feeding corresponded with sunrise and sunset and in response to feed delivery. Little feeding activity occurred during the middle part of the day. Feeding duration and level of response to delivery outside sunrise and sunset peaks was limited for *ad lib.* treatments and duration of feeding was limited for the clean bunk treatments.

Table 2. Animal performance, feed wastage, cleaning frequency and feeding cost for four bunk management treatments

	Treatment				s.e.
	1	2	3	4	
Initial weight (kg)	460 ^a	472 ^a	469 ^a	459 ^a	7.72
Final weight (kg)	672 ^a	680 ^a	674 ^a	659 ^a	5.96
Trial days on feed	136 ^a	137 ^a	139 ^a	137 ^a	1.35
Feed intake (kg DM/head/day)	11.6 ^a	11.8 ^a	11.6 ^a	11.4 ^a	0.19
FCR (kg feed/kg gain)	7.5 ^a	7.9 ^a	7.9 ^a	7.9 ^a	0.23
Daily gain (kg/d)	1.56 ^a	1.51 ^a	1.48 ^a	1.46 ^a	0.05
Total feed wastage (DMkg/head)	32.1 ^a	31.8 ^a	0.77 ^b	0.87 ^b	3.52
% of cattle removed from pen	11.0 ^a	9.0 ^a	8.0 ^a	11.0 ^a	2.75
Feed wastage (tonnes DM/ trial period)	7.5 ^a	7.3 ^a	0.2 ^b	0.2 ^b	0.025
Cleaning frequency (number of times cleaned during 137 day trial period)	32.0 ^a	31.0 ^a	2.0 ^b	1.0 ^b	3.07
Feeding cost (\$/head/day)	2.12 ^a	2.17 ^a	2.06 ^b	2.03 ^b	0.03

Superscript letters signify significant difference only within a row ($P < 0.05$)

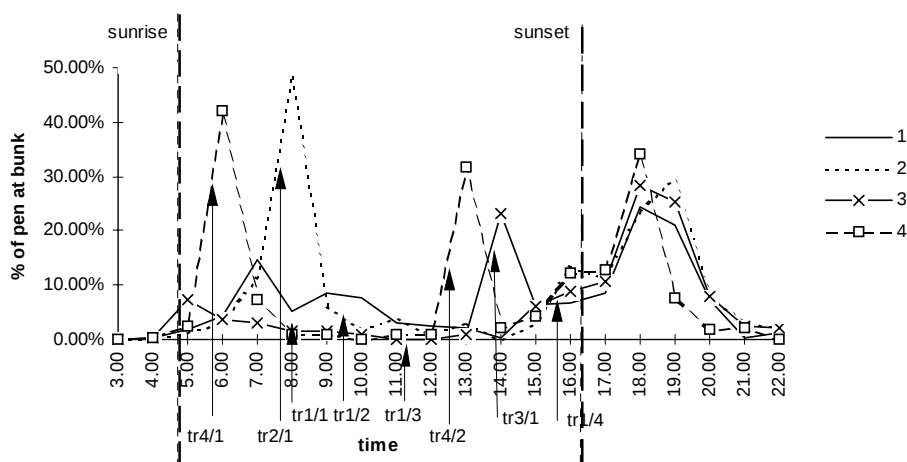


Figure 1. Feeding activity of four bunk management treatments during a twenty hour period. Dashed vertical lines represent sunrise and sunset times and arrows represent feed delivery times. The name of treatment and delivery number is provided below each arrow: eg tr4/1 is Treatment 4, first feeding

DISCUSSION

Feeding regimens incorporating a clean bunk at 1200 hours have the potential to reduce feeding costs and maintain performance comparable to *ad lib.* feeding. Providing fresh feed in proportions that closely correspond to natural feeding activity and synchronising feed delivery for animals to consume feed by midday assisted in the reduction in feeding costs in Treatments 3 and 4. Ensuring a clean bunk at midday minimised feed wastage and spoilage, as this period is characterised by limited feeding activity (Ray and Roubicek 1971). Fell and Clarke (1993) reported the consumption of feed by feedlot cattle is concentrated within 1.5 to 2 hours per day. Providing feed continuously throughout the day contributes to greater feed spoilage and waste. Figure 1 illustrates the benefit of timing feed delivery with sunrise and sunset, particularly during summer when environmental stress causes reduction in feed intake and performance (Hahn 1995). Sunrise and sunset times were characterised by initiation of feeding activity across treatments. The response of feeding activity to sunrise and sunset was characterised by a high intensity, limited duration for sunrise and

a lower intensity, extended duration for sunset. This feeding pattern corresponds with the observations made by Ray and Roubicek (1971). The importance of synchronising feed delivery with sunrise and sunset is highlighted by the two feeding activity peaks of Treatments 3 and 4 directly before sunset. The 'clean bunk' Treatment 4 enhances the conditioned response to initiate feed activity on delivery (Doyle 1994). In contrast low feeding response was shown by the multiple feedings of Treatment 1. Training animals through feed condition response can stimulate animals to consume feed outside their natural feeding pattern (Driver and Forbes 1981), as shown by Treatments 3 and 4. However, the stimulus to maintain feeding is limited and feeding activity naturally increases again by sunset.

Ad lib. feeding has been reported to cause large daily fluctuations in feed intake predisposing animals to digestive disorders (Slyter 1976). The health status of animals in this study was not significantly different between treatments as shown by percentage of cattle removed from pen. Fluctuating feed intake may be attributed to an inability of estimating the quantity of feed required to satisfy animals daily levels of satiety. Indicators used to manage clean bunk treatments included feed remaining in bunk at midday and responses of animals to morning feed delivery.

In conclusion, 'clean bunk management' incorporating two feeds per day and delivering feed in a manner that was synchronised with natural feeding activity minimised feed wastage and labour requirements and achieved growth and carcass performance comparable to *ad lib.* feeding.

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