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Variations in liveweight between steers following fasting periods of six to eighteen hours and access to water

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Abstract

Liveweight changes were measured using 105 yearling Brahman crossbred steers (mean liveweight 336 kg) which were held in yards and fasted (no feed or water) for 6, 12 or 18 hours (6F, 12F, 18F, respectively). Each fasting period was followed by a 24 hour recovery period on water and then the steers were returned to pasture for 14 days.

After 6, 12 and 18 hours of fasting the steers had lost 12, 17 and 24 kg, respectively, of their initial liveweight ($P<0.01$).

All steers recovered liveweight rapidly during the first 6 hours on water but thereafter continued to lose weight. Mean water intakes per head during the first 6 hours of the recovery period were 12.5, 11 and 7 L for the 6F, 12F and 18F groups respectively. During the total recovery period, the 6F and 12F groups lost more ($P<0.01$) weight than the 18F group. The ranges in mean liveweight between groups were 11, 19, 13 and 10 kg after 0, 6, 12 and 18 hours of access to water. At the completion of this period there was no significant difference in liveweight between groups.

On day 9, after 7 days on pasture, all groups had returned to within 2 kg of their initial liveweight.

This study indicates that cattle, which have fasted for short periods, should have access to water for at least 12 hours before weighing at saleyards. Such a procedure should reduce the variation in liveweight between groups of cattle with the same on-farm liveweights.

INTRODUCTION

After fasting periods of up to 84 hours, a period of at least 12 hours with access to water alone before sale (wet curfew) at saleyards significantly reduces the large variation in liveweight and dressing percentage between sale lots of cattle with the same on-farm liveweights (Wythes *et al.* 1980*a*, 1981, 1983; Bailey *et al.* 1985). A wet curfew also stabilises these factors and all animals have a similar hydration status (Wythes *et al.* 1980*b*, 1983).

It is postulated that a wet curfew is just as applicable at saleyards handling only local cattle as at saleyards drawing cattle from both distant and local areas. A survey at a large saleyard with a dry curfew (no water) in southern Queensland revealed large variations in the total times that cattle from local areas were without water before sale weighing (Lapworth *et al.* 1982). Local cattle were generally without water for up to 33 hours and some for as long as 55 hours. Only 28% had an opportunity to drink between arrival and weighing. These findings imply that large differences in gut fill, and so dressing percentage, exist between cattle with similar on-farm liveweights from local areas. The benefits of a wet curfew may be less at saleyards drawing cattle from local areas, but they should still improve pricing efficiency (Lyons 1965; Hall 1981) and animal welfare (Wythes 1982).

Information on the rate of liveweight recovery by grazing cattle after a short fasting period is of particular interest to producers buying store cattle for fattening. Short fasts may affect the time to regain initial liveweight and so the duration of the fattening period. Periods of up to 35 days have been recorded for cattle to regain their initial liveweight after fasts of 12 to 72 hours (Self and Gay 1972; Wythes *et al.* 1980*a*, 1981).

In this experiment, the effects of fasting (no feed or water) and subsequent access to water on the liveweight change of cattle held in yards, without the stresses of transport and the saleyard environment, were examined. The time to regain initial liveweight on pasture also was measured. The experiment was conducted at 'Swan's Lagoon' Beef Cattle Research Station, Millaroo near Townsville, north Queensland in July 1980.

MATERIALS AND METHODS

Animals

The 105 yearling Brahman×Shorthorn (approximately 50% Brahman content) steers had a mean initial unfasted liveweight of 336 kg±0.3 (±SE). They were bred on the same property in north Queensland and had grazed native pastures (described by Winks *et al.* 1974) for the previous three months at Swan's Lagoon.

Treatments

The steers were allocated by stratified randomisation on the basis of their full liveweight (0 hour) to three treatment groups of 35 animals (Table 1).

Table 1. The duration and time of the fasting period and 24 hour recovery period on water for each treatment group from zero hour

Treatment	Duration of fast (h)	Period on water after 0h	Period on pasture
6F	6	6 to 30 h	30 h to day 16
12F	12	12 to 36 h	36 h to day 16
18F	18	18 to 42 h	42 h to day 16

Procedure

The steers were mustered and yarded by 0710 hours on day 1. They were weighed between 0715 hours (hour 0) and 0815 hours and drafted into treatment groups between 1000 hours and 1115 hours. All groups were weighed every 6 hours (from hour 0) until the end of the 24 hours period on water. They were always weighed in the same sequence so as to standardise the time between successive weighings. The groups were held in separate unshaded yards.

At the completion of their fasting period, each group was given *ad libitum* access to water for 24 hours. The mean water comsumption of each group was recorded prior to each weighing using a meter on the trough.

After 24 hours on water each group was returned to the original paddock, grazed together and subsequently weighed, unfasted, on days 9 and 16 of the experiment.

Mean daytime maximum temperatures varied from 26.5 to 27.5°C, and overnight minima from 9.0 to 9.5°C during the yard phase of the experiment (days 1 to 4). No rain fell.

Statistical analysis

Data were analysed by analysis of variance for a randomised block design with 35 blocks and varying number of treatments, depending on which treatment groups were weighed

each time. Differences between treatments were tested by the least significance difference method.

RESULTS

Table 2 summarises the liveweight changes during the fast and 24 hour recovery period on water.

Table 2. Effect of fasting and recovery on water alone on liveweight change

Treatment	Lightweight Change during recovery			Net change from 0h to end of 24h recovery period on water	
	During fast	Change during recovery			
		First 6 h	24 h period	(kg)	(%)
6F	−12.8*a**	+11.1*a*	−11.1*a*	23.9	7.1*a*
12F	−17.2*b*	+4.2*b*	−9.7*a*	26.9	8.0*a*
18F	−24.4*c*	+3.0*b*	−1.9*b*	26.3	7.8*a*
SE	0.50	0.89	1.06	1.14	0.34

* Means in the same column not followed by a common letter differ significantly at $P<0.01$.

Steers lost weight most rapidly during the first 6 hours of the fasting period and then at a slower rate to 18 hours. The progressive liveweight loss as a percentage of initial weight is shown in Table 3.

Table 3. Progressive liveweight loss during fasting for all steers

	Hours fasted		
	6	12	18
No. of animals	105	70	35
Loss (%)	3.9	5.2	7.3
SE	0.55	0.75	1.19

The steers in all treatments regained liveweight during the first 6 hours on water, with the 6F group gaining more ($P<0.01$) weight than the 12F and 18F groups (Figure 1). Thereafter all groups lost weight. During the 24 hour recovery period, the net liveweight loss for the 6F and 12F groups was more ($P<0.01$) than that for the 18F group. The ranges in mean liveweight between groups were 11, 19, 13, 10 and 3 kg after 0, 6, 12, 18 and 24 hours of access to water. There was no significant difference in liveweight between groups at the completion of the 24 hour period on water.

At day 9 all groups were within 2 kg of their initial liveweight. From day 9 to 16 they all lost weight. There was no significant difference in liveweight between groups on days 9 and 16, with mean liveweights being 335.7 (±1.07) and 332.7 (±1.11) kg, respectively.

Table 4. Effect of fasting treatment on water intake per head during the 24 h recovery on water alone

Treatment	Mean water intake (L) per steer	Consumption during first 6 h (L)	Time group offered water (hours)
6F	13.7	12	1400
12F	19.0	11	2000
18F	17.1	7	0200

Table 4 summarises the water consumption for the 24 hours recovery period on water. Water intakes were greatest during the first 6 hours after the fasting period.

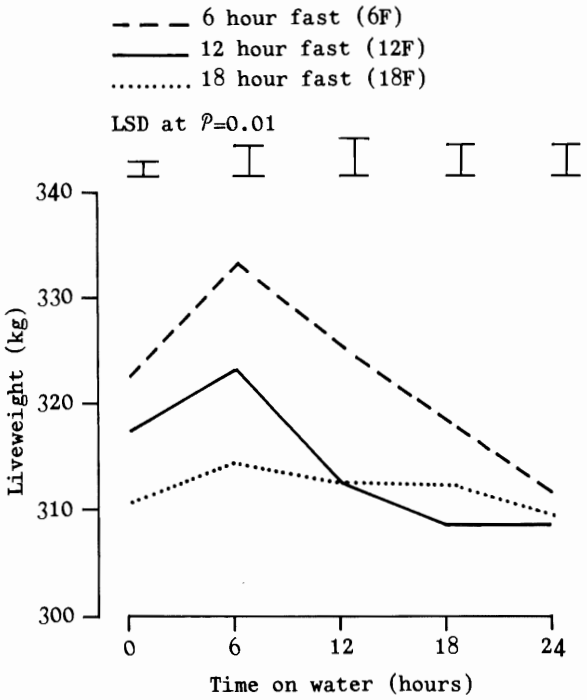

Figure 1. Trends in liveweight during the 24 hour period on water, when fasting treatments were compared after the same time with access to water.

DISCUSSION

This study indicates that substantial variations in gut fill can be expected when cattle fast for periods of 6 to 18 hours. Wythes *et al.* (1980*a*, 1983) showed that giving animals access to water was a better way to equalise gut fill than withholding water. The reduction in liveweight range between our groups after access to water was of the same order as that recorded in other experiments after both short and long fasting periods (Wythes *et al.* 1980*a*, 1981, 1983; Bailey *et al.* 1985). Under experimental conditions the ranges in liveweight between groups have varied from 3 to 20 kg after periods of 4 to 15 hours on water (Wythes *et al.* 1980*a*, 1981, 1983; Bailey *et al.* 1985).

Ambient temperatures and the time of day that animals were first offered water may have been more important in terms of liveweight recovery than the length of their fast in our experiment. Particularly, as the cattle were fasted in familiar yards and accustomed to the water. The warm maximum temperatures coupled with the intensive handling between mustering and being offered water may explain the higher water consumption by the 6F group for the first 6 hours. Hence the large variation in mean water intakes between the groups. This situation contrasts with that at saleyards, where cattle are in strange surroundings and drink water of a different quality. Other evidence for cattle at saleyards shows that most cattle do drink and consumption tends to increase with the length of the pre-curfew fasting period, provided animals are not disturbed (Wythes *et al.* 1981, 1983; Bailey *et al.* 1985).

As this experiment was carried out during the period when most movements of cattle occur in northern Australia, the magnitude of the liveweight losses provides general indications for industry. The most rapid loss during the first 6 hours of fasting and the magnitude of that loss, were similar to those recorded by others (Barlow and Aitken 1974; Wythes *et al.* 1980*a*). Liveweight losses probably reflected a loss of gut fill, since gut fill in adult cattle accounts for 12 to 22% of liveweight (Taylor 1954) and fasting for up to 48 hours does not significantly reduce carcass weight (Carr *et al.* 1971; Kirton *et al.* 1972). Greater liveweight losses may occur during summer, particularly if losses occur due to the dehydration of body tissues (Wythes *et al.* 1980*b*).

The length of the fast had no significant effect on the rate of liveweight recovery by steers on pasture, thus agreeing with the findings of Wythes *et al.* (1981). All groups had regained their initial liveweight after 7 days on pasture. This is well within the range of from 3 to 30 days (average 10 days) for feeder cattle transported 240 to 1824 km to a feedlot (Self and Gay 1972), and 10 and 14 days for store steers sold via paddock selling and saleyard auction systems (Robbins *et al.* 1982).

CONCLUSIONS

This study indicates that cattle, which have fasted for short periods, should have access to water for at least 12 hours before weighing at saleyards, in order to reduce the variation in liveweight between groups with the same mean on-farm liveweight. This result supports earlier research demonstrating that a wet curfew reduced the variations in both liveweight and dressing percentage. As a consequence, a wet curfew should improve pricing efficiency (Hall 1981) and safeguard animal welfare (Wythes 1982).

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