

Technote

No. 97

December 1996

Agdex No: 420/70

ISSN No: 0158-2755

Transport Weight Loss in Export Feeder Steers

PROGRESS REPORT AUGUST 1996

Peter Ridley, Chief Animal Production Officer

Summary

1. After an eight hour 500 km truck trip over sealed roads, feeder steers weighed 16 kg (5.2%) less if they had been held over night (3 pm to 8 am) in yards with water and hay before loading, compared to loading straight off pasture (8 am).
2. The weight loss from the two treatments using steers averaging 325 kg was 10.6% and 5.7% respectively.
3. A fast of 24 hrs no feed 16 hrs no water resulted in a 7.1% weight loss in these steers.
4. Forthcoming research on this topic will focus on the impact of 0 vs 1 hr vs 3 hrs vs 6 hrs access to water after unloading, on the transport cycle weight loss after truck trips varying in time, distance and road surface types.

1. FARM TO WHARF

INTRODUCTION

Data on transport weight losses is being collected as part of the background information necessary for producers if they are to meet post weaning market specifications for the SE Asian feeder steer market. The weight of imported feeder steers is an important market specification when they are weighed off the boat on arrival in SE Asia. Importing countries seek to maximise the value adding potential of imports. For example, at the time when this project was carried out, individual animals exceeding 320 kg and batches exceeding a 300 kg average, were subjected to an import tariff increase from 3% to 30% in the Philippines (Paradice and Linnegar, 1994). There was therefore a major economic incentive for exporters to avoid such penalties by not purchasing cattle which would exceed these limits.

At the same time exporters wished to maximise the weight of transported cattle within the pen space available on the boat. Present animal welfare motivated regulations (Anon, 1991) result in a reduced gross weight/100m² of pen space for smaller animals. For example 300 kg cattle have to be provided with a minimum of 1.175m²/hd while 275 kg cattle require 1.106 m² / hd. This results in 2.7% more weight (672 kg/100m²) being permissible for the larger cattle.

The feeder steer project at DDRF (project 8.4.1) is aimed at the Philippines market (300 kg average) with tail end steers (those failing to reach 280 kg) fitting in to the Malaysian market. This strategy provides flexibility in the output target to cope with variations in wet season feed production and variations in purchased weaner weights. It assumes that the full weight at time of turnoff equals the weight of the steers when they arrive in SE Asia.

This report provides an analysis of data on the weight loss experienced by several groups of steers under three different pre loading curfew regimes. These steers travelled approximately 500 km over bitumenised roads between 8 am and 5 pm. In this report the term 'cycle' covers the period from muster until unloading. The term 'trip' covers the period from loading until unloading from the truck approximately 500 km later in the late wet season in the NT in 1995.

MATERIALS AND METHODS

1. Animals

(i) Set 1

On 24 January, 18 yearling Brahman steers in project 8.4.1 (DDRf feeder steer project) reached their target turnoff live weight (group average \geq 300 kg 8.00 am straight off feed) and were 'sold' out of the project. As a consequence of weight restrictions due to flooding on the road to the Stuart Highway they could not immediately be involved in transport weight loss measurements. They were placed on a plentiful supply of improved pasture until 27 February when they commenced the first period of a Latin Square design to measure weight loss.

(ii) Set 2

On 16 March 54 yearling Brahman steers in project 8.4.1 reached their target turnoff weight and four days later were involved in transport weight loss measurements. Table 5 shows the four different properties of origin of these steers.

2. Design and Treatments

(i) Set 1

On day 0 (27 February) the 18 steers were mustered and weighed full at 8.00 am prior to being allocated at random to three groups. This weighing provided evidence of the similarity in initial weight of the three groups.

The three treatments which were imposed on the group of 18 steers were:

Group 1 - mustered on day 2 (1 March) at 8.00 am, weighed and immediately loaded on to the truck,

Group 2 - mustered on day 1 (28 February) at 3.00 pm and after weighing, held over night (O/N) with free access to water before being weighed again at 8.00 am (to give a full and empty weight) and loaded on to the truck,

Group 3 - as in the second treatment above but with ad lib access to pangola hay (90 kg for 6 steers).

The measurements were repeated approximately one month later (March 20 - 23), with the animals in the first and third treatments being changed over to create a Latin Square design between these two treatments. During this month all 18 steers grazed together on a plentiful supply of growing improved pasture.

The Latin Square design was as follows:

Treatment	Period 1	Period 2
1	Group 1	Group 3
3	Group 3	Group 1

(ii) Set 2

The 54 steers were mustered on 20 March at 8.00 am and weighed full before loading. This procedure was used because it appeared to give the least weight loss for the cycle in Period 1.

3. Transport

After loading, all 72 cattle were carted on single deck trailers over bitumenised roads for 500 km. The three trips each took approximately 8 hours. All cattle were weighed immediately after they were unloaded, prior to access to feed or water.

RESULTS

(i) Set 1. 18 Steers initially averaging 324 kg

Table 1. Initial Weights (27/2/95)

Group	Day 0 8.00 am	Day 1 3.00 pm	Day 2 8.00 am
1	321 kg	322 kg	318 kg
2	328 kg	330 kg	310 kg
3	323 kg	327 kg	308 kg
Av	324 kg	326 kg	NR

Table 1 shows that the difference between the 8 am weight and the 3 pm weight (both straight off pasture) was negligibly small (2 kg/hd). The differences in weight between Day 1 and Day 2 represent the weight losses in the yards for groups 2 and 3 (20 kg and 19 kg respectively, see Table 2 also)

Table 2. Period 1 Weight Losses

Treatment Over Night	Group	O/N	+	Trip	=	Cycle
Grazing	1	0		-18		-18
Yard + Water	2	-20		-13		-34
Yard + Water + Hay	3	-19		-13		-31

Table 2 shows the period 1, O/N and trip weight losses for all three treatments. Analysis of variance indicates a significant difference in the cycle weight loss between group 1 (loading straight off feed) and the two groups that were yarded over-night (-18 kg vs -34 kg and -31 kg $P < .01$). This statistical significance was not expected with such small numbers and the low variability of weight loss within treatments may reflect absence of handling stress in frequently handled cattle.

Table 3. Period 2 Weight Losses

Treatment Over Night	Group	O/N	+	Trip	=	Cycle
Grazing	3	0		-19		-19
Yard + Water	2	-13		-17		-35
Yard + Water + Hay	1	-21		-16		-38

Table 3 shows the period 2, O/N and trip weight losses for all three treatments. These results were very similar to those obtained a month earlier in period 1.

Table 4. Latin Square Results (Cycle Weight Losses)

Treatment Over Night	Period 1	Period 2	Average
Grazing	-18	-19	-18.5
Yard + Water + Hay	-31	-38	-34.5
Average	-25	-28	-26.5

difference between treatments = 16 kg

Table 4 provides the Latin Square layout of results for treatments 1 and 3. The treatment effect was both statistically ($p < .001$) and materially (16 kg difference) highly significant. The difference in weight loss between both periods and animal sets (group 1 and group 3) were small and not significant.

(ii) Set 2. 54 Steers averaging 285 kg full 8.00 am 20/3/95

Table 5. Full and Empty Weights at Time of 'Sale' and at the Beginning and End of the Transport Cycle (March 20)

Property of Origin	16/3 Full (kg)	17/3 Empty (kg)	% Loss	diff (kg)	20/3 8 am (kg)	20/3 5 pm (kg)	% Loss	diff (kg)
F	289	268	7.3%	21	280	263	6.1%	17
G	305	282	7.5%	23	294	278	5.4%	16
H	292	271	7.2%	21	282	265	6.0%	17
I	294	273	7.2%	21	284	269	5.3%	15
Av *	295	274	7.1%	21.5	285	269	5.6%	16.3

* arithmetic mean

Table 5 provides the weight losses of the larger set of 54 steers which were subjected to treatment 1 (mustered weighed 8 am, loaded 8 am) at period 2 (third week in March). There were no significant differences in weight loss due to property of origin and the cycle weight loss of this group was similar to that in the corresponding group of 6 in the Latin Square analysis (16.3 kg or 5.6% vs 19.0 kg or 5.6% respectively)

In summary the data collected in this project indicates:

- the live weight difference between weighing at 8.00 am and 3.00 pm in the 18 steers (Table 1) was negligibly small and not statistically significant (2 kg/hd),
- mustering and immediate loading provided a consistent and materially significant benefit of 16 kg at unloading ($P < 0.001$), over yarding with hay and water overnight before loading (Table 4),
- the effect of providing ad lib pangola hay to cattle yarded with ad lib access to water over night was inconsistent and unexpected but not significant (average 3 kg more weight loss than the cattle with water only). The cattle with hay appeared on average to eat 3 kg/head or more (Tables 2 and 3).
- differences in weight loss due to original property of origin were not significant.

The transport weight loss of the 54 steers in Table 5 (16.3 kg or 5.6%) was very similar to that of the 6 steers in the corresponding treatment in the second period of the Latin Square design (19.0 kg or 5.6%). Both measurements were taken in the same week (third week in March).

In Table 5 the time period of the transport cycle (approximately 8 hours on March 20) was much less than the full/empty cycle in the yards on March 16/17 (24 hours no feed, 16 hours no water). This partly explains the difference in weight losses (21.5 kg or 7.1% in the yards vs 16.3 kg or 5.6% in the transport cycle). The lower weights on March 20 may reflect a small change in gut fill due to a change in the paddock after 'sale'. The new paddock provided a plentiful supply of green feed not visibly different in quantity or growth stage to the project pastures.

DISCUSSION

The current results involve too few cattle to form the basis for confident recommendations to Daly Basin producers. However they clearly indicate the need for more measurements because at 1995 prices (\$1.50/kg live weight at the wharf) there may be major price distortions ($\$1.50/\text{kg} \times 16 \text{ kg} = \$24/\text{hd}$) when payment is based on live weight (at the Darwin weighbridge) after a trip of several hundred kilometres.

For these reasons it is considered important that the transport weight loss measurement should continue in order to:

- verify the effect of over night yarding,
- provide results from a much larger number of cattle (say 1000) over a range of circumstances (eg month of year in relation to herbage supply),
- obtain weight loss information from curfew regimes which include those imposed by livestock exporters prior to weighing for purchase price calculation and from native pasture based production systems where mustering stresses are greater than for improved pasture based production systems,
- confirm the assumption that the full weight obtained at the farm gate is a good approximation (say $\pm 5 \text{ kg}$) to the weight at unloading in South East Asia when changed of ownership prices are again calculated.

It is important to recognise that this work will not increase prices to producers in general. As soon as exporters' cattle exhibit reduced weight gains (mainly restoration of gut fill) during their voyage to SE Asia, as a consequence of their higher weight at point of ownership transfer between producer and agent, exporters will reduce the price offered ($\$/\text{k LW}$) to producers. However price distortions experienced by some individual producers should be greatly reduced if they arrange mustering and cartage times to optimise live weight at time of ownership transfer. This may be limited by curfew requirements imposed by exporters, prior to the change of ownership.

Finally in many respects the between property equity problems which occur due to differential gut fill at the time of ownership-transfer weighing in the live cattle export trade, are identical to those which faced producers and buyers in the saleyard liveweight auction system elsewhere in Australia in the 1980's. Wythes et al (1980) provided some of the data which set the pre sale weighing protocols which are now in place in southern Australia.

It is appropriate to consider the relevance of this data to the northern live cattle export trade.

Wythes et al used 210 Brahman x steers at Swans Lagoon at the start of the dry season. The steers had been on the same native pasture for 15 months. They were drafted in to several similar groups and fasted for either 12, 24, 48 or 72 hours (no feed or water). No shade was provided.

The group weight losses were proportional to length of fast and varied from 23.4 kg/hd for 12 hours to 55.6 kg/hd for 72 hours (range 32.2 kg/hd between groups).

By providing ad libitum access to water for the first six hours after their fast, the between group range in weight loss was reduced to 17.0 kg/hd (a reduction of 47%).

By providing ad libitum access to low quality hay (3.5% crude protein) as well as water for the first six hours after their fast, this between group difference was further reduced by 5.9 kg/hd to 11.1 kg/hd. Only one third of the original divergence of live weight due to different fasting periods remained after this simple and inexpensive procedure was applied. While the original weight losses did not incorporate the stress of transport it is reasonable to expect that this simple procedure would also

eliminate most of the differential weight loss in similar cattle transported without feed or water for up to 72 hours.

The attached diagram (Figure 1) provides a composite perspective of various fasting regimes and two alternative post fasting regimes (water ad lib vs no feed or water), and their effects of the percentage of initial weight lost. This diagram was derived from a number of research projects and was prepared by the Ad Hoc Working Party on Standardised Liveweight Selling Procedures for Cattle in 1981 (Anon, 1981). The range of fasting weight loss ranges from 10.5% for 60 hours to 2.25% for 6 hours (a range of 8.25% or 29 kg for cattle originally weighing 350 kg).

The dry curfew (no feed or water) resulted in further post fasting losses, to give a total loss of 12.5% for the 60 hour fasted set and 5.5% loss for the 6 hour fasted set (a range of 7% or 24.5 kg for cattle originally weighing 350 kg).

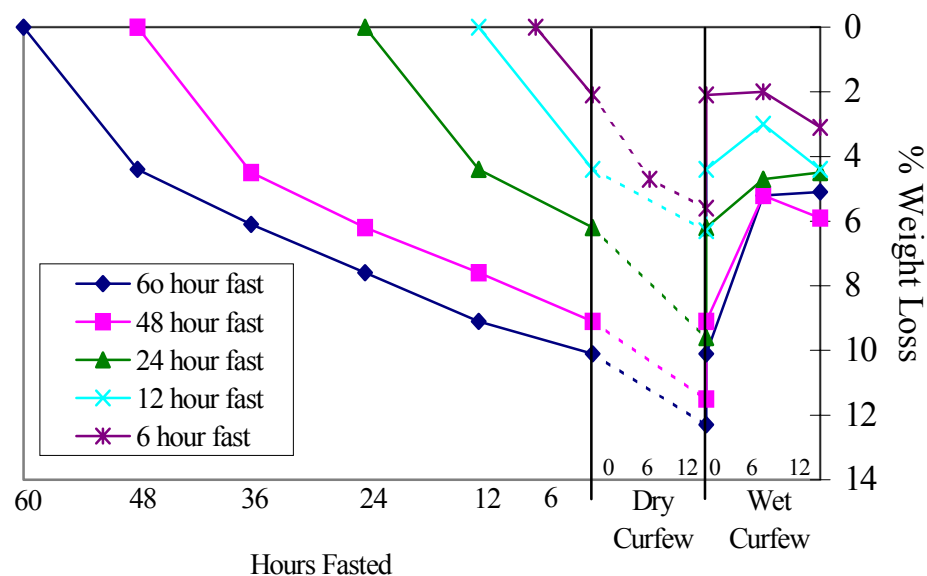
The diagram shows the effect of the alternative wet curfew with weights taken 6 hours and 12 hours after the fast. After 6 hours on ad lib water, the range between fasting periods was 5 - 2 = 3%. After 12 hours the range was 6 - 3 = 3% (or 10.5 kg for 350 kg cattle.)

Clearly the six hour wet curfew process here eliminated nearly two thirds of the difference in post fasting weight between groups which had undergone widely different periods of fasting (6 hours to 60 hours).

Future work in this project should concentrate on documenting the potential of this procedure to:

- minimise differential gut fill (and its consequential effect on pricing efficiency),
- reduce the total stress of the property to feedlot transition in the live export cattle trade.

Figure 1. The effects of fasting period and post fast curfew on weight - loss variation in Brahman feeder steers



BIBLIOGRAPHY

Anon. (1981) Special Ad Hoc Working Party on Standardised Liveweight Selling Procedures p 13.

Anon. (1991) Australian Maritime Authority, Marine Orders part 43. 27: Cattle - Number that may be carried.

Paradice. J., Linnegar. M. (1994) AMLC Meat and Livestock Review Aug p 22.

Wythes. J., McLennan. S., Toleman. M. (1980) Australian Journal of Experimental Agriculture. Anim. Husb. 20 517-521.

While all care has been taken to ensure that information contained in this Technote is true and correct at the time of publication, the Northern Territory of Australia gives no warranty or assurance, and makes no representation as to the accuracy of any information or advice contained in this publication, or that it is suitable for your intended use. No serious, business or investment decisions should be made in reliance on this information without obtaining independent/or professional advice in relation to your particular situation.