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The behaviour and welfare of calves during unloading after transportation

K.J. BREMNER, L.R. MATTHEWS, D.J. BREARS AND A.M. PAINTING

AgResearch, Ruakura Agriculture Centre, Private Bag 3123, Hamilton, New Zealand.

ABSTRACT

The behaviour of 7476 calves transported on double- or triple-decker trucks was studied during unloading. Recorded behaviour was classified into 2 categories (upright or not upright) and the frequencies of these at three ramp slopes (4.2, 12 and 18.8°) are presented. The proportions of animals upright on the 3 slopes (low, medium and high) were 93, 74 and 20%. On average, 100 calves were unloaded in 5.3, 7.7 and 7.1 min down the low, medium and high slopes, respectively. Improvements in welfare of bobby calves and probably reduced bruising would result if ramp slopes were kept at less than about 12° so that most animals could remain upright.

Keywords Calf behaviour, welfare, transportation - unloading, ramp slope.

INTRODUCTION

At least once during their lifetime the vast majority of farm animals in New Zealand are transported and thus exposed to a range of potentially stressful handling experiences. For cattle, loading and unloading, confinement in an unfamiliar environment and travel motion all contribute to transport stress (Eldridge, *et al.*, 1986; Hails, 1978; Tarrant, 1990) and transportation or components of it may be stressful to calves, also (Ewbank, 1986; Kent and Ewbank, 1983, 1986a, 1986b; Trunkfield and Broom, 1990). The age of cattle is considered to affect their ability to cope with transportation stress, as most developed countries specify a minimum age at which calves may be transported. In NZ calves are transported at the relatively young age of 4 days, while minimum ages for calves in Canada and the United Kingdom are 14 and 7 days respectively. The aim of the present study was to quantify some responses of young calves to transportation. Specifically, responses to different ramp gradients were examined during unloading. In a previous study, cattle aged 1 or more years slipped less often on a ramp with a gradient of 11.3° compared with a gradient of 18.3° (Eldridge *et al.*, 1989).

METHOD

Animals

7,476 calves which had travelled on 96 decks and arrived at a commercial facility in the afternoons over 10 days were observed. Calves met the minimum age and weight standards for transportation/processing (minimum 4 days old, 25 kg bodyweight).

Unloading procedure

At the unloading bays a steel ramp (6m long and 2m wide, with a checker plated surface) was raised to the level of the truck deck for unloading. Steel cleats extended part way up the left hand side to aid handler footing. In general, unloading was from the top deck down.

Measurements

For each deck observed records made were: position of the deck on the truck/trailer (upper or lower for a double-decker; top,

middle or bottom for a triple-decker), height of the ramp, time at which unloading began (1st calf off deck), total calves recorded per deck, behaviour of each calf, and time at which unloading was completed (all calves cleared from deck plus ramp). Calf behaviour was recorded as: walked or ran, with or without minor slipping or sliding (no part of the calf's body contacted the ramp or ground); slid (with the chest, haunches, side or belly in contact with the ground); fell; turned and climbed the ramp after sliding or falling; and calves not able to sit or stand at any stage of unloading which were classified as "down". If, during unloading, a calf showed behaviour appropriate to more than 1 category it was recorded in the category considered more likely to result in some degree of bruising. Thus, a calf which walked off a deck and down most of the ramp, then was knocked over by another, was recorded as a fall. Statistical significance was tested using a t-test following arc sin transformation of the data because many of the values were close to the extremes of the percentage range.

RESULTS

For analysis, behaviours recorded during unloading were classified as upright (no body contact with ramp) or not upright.

During unloading the height of the ramp varied from 0.29 to 2.2 m, with 35 decks (all bottom or lower decks) unloaded from between 0.29 and 0.55 m (the "low" category), 31 decks unloaded from 1.05 to 1.41 m ("medium" category which included all the middle plus some upper decks), and 30 decks from 1.48 to 2.2 m ("high" category, which included the top decks from all of the triple- and some of the double-deckers). For the 3 height categories the average number of calves recorded per deck was 82, 78 and 73, respectively (Table 1).

TABLE 1 Category, height and number of decks and average number of calves recorded per deck.

Deck category	Height range (m)	Av. height (m)	Decks recorded (no.)	Calves/deck (average)
low	0.3 - 0.6	0.44	35	82
medium	1.0 - 1.4	1.25	31	78
high	1.5 - 2.2	1.94	30	73

The percentage of calves which remained upright varied with ramp slope ($p < 0.05$) (Table 2). The variability was much greater on high slopes than on low slopes. For low decks (average ramp slope 4.2°) 92.8% of calves remained upright during unloading. Corresponding figures for medium decks (average slope 12°) and high decks (average slope 18.8°) were 74 and 20%, respectively.

TABLE 2 The percentage of calves remaining upright during unloading for each deck category.

Deck height category	Ramp incline average (deg)	% upright (average)	SD	Range (%)
low	4.2°	92.8	± 5.55	80 - 100
medium	12°	74	± 25.52	3 - 97
high	18.8°	20	± 25.18	0 - 79

The time taken to unload was recorded for 75 of the 96 decks ($n = 6,076$ calves). On average 100 calves were unloaded from the low, medium and high decks in 5.3, 7.7 and 7.1 minutes, respectively, at a rate of 19, 13 and 14 calves per minute, respectively (Table 3). These data included only those decks where an accurate time for unloading was recorded.

TABLE 3 Average rate of unloading in relation to deck height categories.

Deck height category	No. of decks	Time (min) to unload 100 calves (mean ± SD)
low	25	5.3 ± 6.3
medium	25	7.7 ± 4.3
high	25	7.1 ± 5.5

DISCUSSION

Unloading procedures may contribute to stress and bruising in calves since at higher ramp slopes many calves appeared reluctant to exit from the truck and fewer remained upright during unloading. On steep slopes many calves found downward movement difficult and, if they could get a grip, turned and moved upwards. This, plus the casual observation at other commercial facilities that calves unload readily where upward movement is required, suggests that calves of the age studied may prefer to move on a slightly upward rather than steep downward slope.

Calves sliding or falling during unloading often impacted with solid objects or other animals, which could have resulted in bruising and is likely to have been stressful. Also, handlers had difficulty moving safely on the steeper slopes which may have influenced stock moving techniques. The greater variability in the percentage of calves remaining upright on medium and high slopes may have resulted from a combination of other factors such as wet weather, faeces on the ramp and handling techniques with slope.

It would appear that very young calves slip or fall more readily than adult cattle at an equivalent ramp slope. In this study a significant proportion of calves was unable to remain upright at 12°, whereas adult cattle showed little slipping at a slope of 11.3° (Eldridge *et al.*, 1989). Grandin (1979) recommended that injuries to adult cattle could be kept to a minimum so long as slopes were not greater than 20° (adjustable ramp) or 25° (fixed).

If an unloading facility layout necessitates unloading downwards, a longer ramp could be used to reduce the incline. In this study, where the average proportion of calves observed upright was 92.8, 74 and 20% at average slopes of 4.2, 12 and 18.8°, respectively, extending the ramp length by 50% would have reduced the slopes by 33% and increased the % remaining upright to 90-100%, 80-100, and approximately 70%, respectively.

This study supports the recommendation of the UK Farm Animal Welfare Council (1984) that "where new facilities are constructed (or old facilities renovated) unloading bays should permit off-loading at either truck deck level or at a very slight gradient".

With adult cattle the use of steps is reported to reduce the incidence of slipping. In this study there was a 10cm step off the bottom of the ramp (at low slopes only) which appeared to cause some of the slipping and falling. It is possible that slightly older calves would be less likely to lose their footing during unloading down the steeper slopes.

While no attempt was made to measure bruising, the behaviour of some animals during unloading would suggest that carcass damage is likely to occur.

Research is required to elucidate the relationship between calf behaviour during unloading and the incidence of bruising. Many other aspects of the transportation process may adversely affect the welfare of calves, including size and maturity of calf, driver and handler behaviour, loading methods, stocking rate, transport and environmental conditions, provision of water or electrolytes after transportation, holding time, and repeated transportation/handling. These factors need to be evaluated for calves at a range of ages.

CONCLUSIONS

Calves transported then unloaded down steep ramps are more likely to fall or slide than calves unloaded down gentle slopes. Because calves moved more freely on ramps that were level or slightly downward than on steep downward slopes, psychological stress and physical trauma could be reduced by unloading onto an approximately level or a slightly upwardly sloping ramp. If slopes cannot be kept to a minimum careful handling is required at 12° or steeper.

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