THE DESIGN AND OPERATION OF CATTLE ROAD TRANSPORTS IN VICTORIA

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SUMMARY

A survey of 100 trucks delivering cattle to various country sales, Newmarket and two metropolitan abattoirs was carried out during the latter part of 1980. The object of the survey was to assess the design, construction and operational management of cattle transports and the criteria for loading density currently being used by the industry for the transport of slaughter cattle in Victoria.

The results of the survey indicated that tray body trucks are generally restricted to country sales and that there is considerable variation in pen size and the number of pen divisions on trucks. Although class of animal and body shape are the main criteria for adjusting loading density there is a tendency to pack larger animals more tightly than smaller ones. Classes of animals are generally segregated during transport, but there appears to be no attempt to separate horned from hornless animals. The effect of these factors on animal welfare, safety and meat quality are discussed.

INTRODUCTION

It has been estimated that about $26 million is lost each year to the Australian cattle industry through bruising (Meischke 1975) and this loss would probably be greater if the cost of down grading carcasses due to trimming and or stress related problems was considered. The major causes of bruising and stress are at present ill-defined, nevertheless much may be attributable to the inadequate design of handling and transport facilities at both the public and private levels, careless handling and driving techniques.

Consequently there is a need to define more closely the general practices for handling and transport of cattle as a basis for improving handling efficiency, transport techniques and the general welfare of the animal during these processes. A survey was conducted by the Victorian Department of Agriculture during the latter part of 1980 to determine the design and construction of stock crates and the loading density normally carried when cattle are presented for sale or slaughter.

SURVEY METHOD

The survey was carried out at five country saleyards, the major metropolitan saleyard at Newmarket and at two metropolitan abattoirs. The proportion of trucks surveyed at the various cattle markets and abattoirs (Table 1) was based on the numbers of animals presented for sale at these markets during July 1980 and the number of cattle slaughtered at the abattoirs. Only registered livestock carriers were surveyed and were selected at random as they arrived at unloading bays at either the markets or abattoirs. The aim and method of the survey was explained to the driver before he commenced unloading and his permission was obtained to include his truck in the survey. Most drivers were receptive to the survey and only a few refusals were received.

The data collected during the survey included the number and description of the animals in each pen of the truck as well as detailed description and measurement of the stock crate and truck. For analysis of the data, the trucks were grouped into four basic types, rigid tray body (RT), RT with dog trailers (RD), articulated semi-trailers used for cattle only (AC) and articulated general

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livestock carriers (AG). These truck types were further subdivided on the number of pens in each stock crate. The cattle on each truck were classified into six classes of stock (young cattle, heifers, steers, cows, bullocks and bulls). Each class of stock was subjectively scored for body shape (Scored 1 to **5** for very light to very heavy respectively) and visually assessed for mean live weight.

Each truck was allocated a number and marked to avoid repeating the examination at a later date as no other form of identification was recorded. The survey form was designed to follow the flow of events at unloading and to allow direct coding for computer analysis of results. The actual time taken to survey each vehicle was between 10 and 15 minutes.

RESULTS

A total of 100 trucks were surveyed, 51 in the metropolitan area and 49 at country saleyards. The distribution of truck types (Table 1) indicates that RT trucks are used mostly for servicing country areas while AC and AG vehicles are used mainly for delivery to Newmarket and the abattoirs. RD vehicles were used for both metropolitan and country deliveries.

TABLE 1 The number and types of trucks surveyed at saleyards and at abattoirs

Location	Tray body (RT)	Tray body with dog trailer (RD)	Articulated semi-trailer Cattle only (AC)	Articulated semi-trailer General (AG)	Total
Newmarket	1	5	5	10	21
Abattoir A	-	-	8	7	15
Abattoir B	2	1	8	4	15
Bendigo	4	2	3	3	12
Dandenong	4	1	1	2	8
Hamilton	3	-	-	7	10
Warragul	4	1	2	-	7
Wodonga	7	-	2	3	12
Total	25	10	29	36	100

Truck details

The deck area available for cattle on the various types of trucks ranged from 11.9 to 18.7 m^2 for RT, 25.3 to 59.6 and 28.4 to 57.3 m^2 for AC and AG trucks respectively. The deck area of RD vehicles was similar to that of the larger single deck AC and AG trucks with 31.0 ± 3.4 m^2 (± SD). The pen size on trucks was extremely variable and ranged from a mean of 6.4 ± 2.34 m^2 on three-pen RT trucks to 14.6 ± 1.54 m^2 on two-pen AG vehicles. The number of pens per truck ranged from one pen on RT trucks to four on articulated single deckers and eight on double deck vehicles. Three-pen AC and AG trucks were the most common vehicle used to transport cattle. The three-pen AC trucks usually had pens of equal size while the three-pen AG trucks were composed of one large and two smaller pens dividing the deck area into the approximate proportion of 0.25:0.50:0.25. The larger pen was created by removing one of the pen divisions normally used when carting sheep. The distance travelled by the trucks tended to increase with increasing deck area and ranged from 48 ± 14 km for small RT trucks to 306 ± 106 km for the large eight-pen AC trucks.

Sixty-eight of the stock crates were constructed as separate units that were secured to the truck or trailer by means of bolts or clamps while the remaining 32 stock crates were constructed as an integral part of the truck or trailer. Seventy-four percent of stock crates were of all steel construction, 23 percent

used timber over a steel frame and three percent used aluminium as the main construction material. Of the 38 trucks used solely for cattle (AC = 29, RT = 6, RD = 3), 30 of these trucks were clad either in solid or punched panels while a more open type of cladding, such as rails or mesh, was used by the general livestock carriers. All except three trucks had some form of non-slip material on decks for animal safety. There was little variation in the width of the rear door for unloading (mean width 111 ± 7.3 cm). The mean height between decks was 154 ± 10.9 and 145 ± 5.3 cm respectively on two-deck AC and AG vehicles while the respective heights between the top deck and the bow frame was 141 ± 12.2 and 130 ± 12.3 cm. There was no close relationship between the deck area and the number of axles on the vehicles, however all two-deck cattle trucks used tri-axle trailers.

Cattle details

A total of 2732 head of cattle were carried by the trucks surveyed (Table 2).

TABLE 2 Number, class, mean score for body shape and mean live weight of animals carried by the vehicles surveyed

Class of stock	Number	Body shape score Mean ± SD		Live weight (kg) Mean ± SD	
Young Cattle	503	2.7	0.98	134	75.3
Heifers	307	3.2	0.64	299	71.4
Steers	591	3.3	0.74	354	86.8
Cows	734	3.0	0.82	388	75.1
Bullocks	518	3.8	0.82	634	88.3
Bulls	79	3.9	0.69	650	129.7

The factors possibly influencing the loading density of the vehicles were examined by step wise regression analysis. The best fit to this data was provided by the equation:-

$$D = 2.90 - 0.68C - 0.23B - 0.03C^2 - 0.04B^2 + 0.10CB \quad (n = 249)$$

where D = loading density (animals/m^2); C = class of stock (coded 1 to 6), B = body shape (coded 1 to 5); R^2 was 60.5%. Of the total variation accounted for, by this model, 43 percent was attributed to class ($C + C^2$) while only 8.7 percent was attributed to body shape ($B + B^2$). The remaining variation is due to the interaction term CB(8.8%). The live weight of the animal was rejected as non-significant however, class and live weight are highly correlated ($r = 0.83$). The mean loading density was 0.92 ± 0.33 animals/m^2.

The majority of animals were transported in pens containing a single class. Classes of similar size, such as heifers/steers and cows/steers (see Table 2) were mixed in 13.4 percent of pens while the remaining 13.2 percent of pens contained various mixes of cattle that were often different in size and weight such as young cattle/cows and cows/bullocks. Eighty-four of the trucks carried both horned and non-horned cattle, and in only three of these trucks were the animals separated. Almost all (79/84) of the trucks carrying mixed horned and non-horned cattle contained less than 50 percent of horned animals. Only 13 trucks carried all hornless cattle while three trucks carried all horned animals.

DISCUSSION

The proportion of rigid tray body trucks delivering cattle to country sales compared to the larger articulated vehicles (Table 1) probably reflects the smaller lot sizes of animals consigned to country selling centres. An exception

to this would appear to be Hamilton, where a majority of articulated general livestock vehicles were used for delivery.

Design and construction features that may affect the level of bruising and meat quality related to stress, animal welfare and safety include pen dimensions, door and gate widths, type of cladding and non-slip material on the floor or animal deck (Anon. 1977a). On the trucks surveyed one of the most noticeable features was the extreme variation in pen sizes on trucks. The largest pens (14.6 m^2) were approximately 6 m long or twice that recommended by the New Zealand Standards Association (Anon. 1977b). Pen divisions within the stock crate act as baffles against excess movements of stock during acceleration and braking and are particularly important in emergency situations. Most drivers surveyed agreed that a single division to create two 6 m long pens on a 12 metre trailer is insufficient for stock safety, however they pointed out that pen divisions reduce pay load.

The type of panelling used on stock crates ranged from solid panels to mesh. The solid panel permits a large contact area and could be expected to reduce bruising. The advantage of this panelling is often offset however by placing the panelling on the outside of the frame and also this type of panelling may restrict air circulation. Wide rail sections or punched panels permits good circulation of air with similar advantages of large contact areas. However, unless the rails or punched panels are well placed they can lead to hazards for legs. In most cases, the width of the unloading door was adequate, however on many occasions this width was not fully utilized because the vehicle was poorly aligned with the loading ramp and therefore increasing the chances of shoulder and hip bruising.

The main criteria used for adjusting loading density is class of animal and body shape, however the quadratic and interaction terms in the regression equation indicate that animals with a heavy body shape are packed more tightly than animals with a lighter body shape both within and between classes. The effect of loading density and overloading of vehicles on stress, meat quality and animal welfare are not known at this stage.

Meischke (1975) points out the importance of segregating classes of cattle and horned animals on the level of bruising. The results of our survey indicate that while most classes of animals are transported separately there appears to be no attempt to separate horned and hornless animals. Despite the publicity and evidence of the effect of horns on the level of bruising during transport (Yeh et al. 1978) there appears to be insufficient incentive on behalf of the industry to reduce the detrimental effect of horns.

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